

ALASKA LEGISLATURE COMMITTEE FILES 1987-1988 8672
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that will be directly affected by the proposed action, and to make an adequate number of copies of the assessment report available in a timely manner.

Unfortunately, a series of citizens' lawsuits proved necessary during the assessment process to assure that the law was followed. Furthermore, citizen monitoring of government activities was required as well to learn of industry activities taking place on the Arctic Refuge. And, despite the magnitude of resources at stake and the seriousness of the consequences of the decision on people both in Alaska and throughout the nation, the Department of the Interior chose not to make this report available to the public. Then, after being placed under court order to do so, the Department abbreviated the comment period to 60 days over the Christmas holiday period. This is not the way a democracy like ours works best.

In addition to Audubon's long history of involvement in wildlife conservation, another major priority goal of the Society is to "promote national strategies for energy development and use, stressing conservation and renewable energy resources." In an effort to achieve this goal, we have developed an "Audubon Energy Plan" with input from energy experts in industry, government and the academic community. This was done in the realization that energy is a major factor in determining the quality of human life. It furthers the production of goods and services, but its production and use can seriously impact the quality of the environment.

The Audubon Energy Plan is a practical, step-by-step alternative to the Administration's energy policy of exploiting the last remaining wilderness lands in the United States. It shows that proper planning and policy development at the federal level will enable the United States to produce more goods and services while actually improving the environment. The

environmental pay-off will be cleaner air, purer water, and less pressure to exploit wilderness lands and wildlife habitat such as that in the Arctic Refuge.

True, Audubon's Energy Plan requires the introduction of regulatory measures that correct imperfections in the marketplace, such as efficiency standards for home appliances and fuel economy standards for automobiles. Such reliance in our Plan on modest measures to promote cost-effective conservation stands in contrast to the approach taken by the Administration, which holds that conservation should be left solely to the marketplace, no matter how far economists tell us individual markets are operating from the cost minimum, no matter how much energy is being wasted as a result. When this blindspot toward energy conservation is combined with the Administration's skepticism towards environmental protection, it is perhaps not surprising that the Administration makes drilling in wilderness areas one of the pillars of its energy policy.

Fortunately, the recent bipartisan show of support in Congress for appliance efficiency standards indicates that the Administration is out of touch with the country when it comes to tolerance of modest conservation regulations. We are confident that a Presidential veto of the appliance bill in the upcoming session will be overridden by Congress. We are also confident that, when the choice is clearly put, Congress will decide to enact additional conservation legislation in order to preserve our national treasures such as the Arctic Refuge (as well as to save consumers money.)

In the meantime, and as long as this Administration refuses to take reasonable administrative and legislative action to promote cost-effective energy conservation, we will have no choice but to oppose attempts to open the Arctic Refuge to oil and gas development. Audubon has worked hard, particularly at

the state level, to get appliance efficiency standards enacted. In New York, we initiated the process that led Governor Cuomo to introduce a tough efficiency standards bill last year. Massachusetts Audubon played a similar role in getting a bill introduced (and passed) in Massachusetts. Audubon members are well aware that preservation of wildlife and protection of the human environment requires wise husbanding of our energy resources.

Audubon continues to be actively involved in efforts to develop a long-range "Comprehensive Conservation Plan" for the Arctic Refuge. However, we have not been party to any actions that would preempt a thorough review of the mandated resource assessment report for the refuge's coastal plain, waiting to judge the report on its merits, waiting to see if there were a few key areas in which exploration could be allowed without risking serious interference with wildlife and wilderness resources. Instead of a complete and objective report with viable management options, we find the assessment report biased, contradictory, and lacking essential information. The only possible excuse for this is that Interior must not really be serious, but is floating a totally unreasonable position in the hopes of maximizing its bargaining power in Congress. If so, the tactic is likely to backfire by completely alienating those organizations willing to keep an open mind regarding multiple resource values on the coastal plain. Certainly, this has been the effect on the National Audubon Society.

The major undiscovered deposits of oil and gas on federal land holdings are thought to lie off the coast of the lower 48 states and Alaska. Thus, in the next two decades, as known onshore reserves are depleted, offshore development will become more important. Relatively little offshore land is currently off-limits to energy development. Most of these deposits will eventually be tapped.

The fact that all federal lands have not yet been leased does not mean that development is proceeding too slowly. These leases will be much more valuable ten to twenty years from now. If the government were to lease all these lands at once, it would derive an unfair economic return for the taxpayers.

Judged in this context, the Reagan Administration is making a serious mistake in rushing to lease virtually the entire U.S. Outer Continental Shelf (OCS)--almost a billion acres--and onshore prospects as well. The practice of offering tens of millions of acres of public lands each year at a time when oil prices are depressed raises very serious questions about whether the entire federal leasing program is amounting to a giveaway to the oil industry.

By flooding the market with lease offerings, it is clear that the Administration is helping to drive the price of leases down, thereby providing the oil industry with an opportunity to lease large acreages at bargain-basement prices. Evidence of this downward pressure on lease prices is overwhelming:

- * The average bid per acre under the Reagan Administration's 5-year program has been less than half that under the Carter program (\$1,092 per acre versus \$2,381 per acre), (Washington Post, November 8, 1983.) Before Interior went to area-wide leasing in 1982, the average price per acre for OCS lease bids in Alaska was \$2,794. After area-wide leasing was initiated, OCS lease sales in Alaska netted an average of only \$1,229/acre, (OCS Report, MMS 86-0067, September 1986.)
- * The General Accounting Office (GAO) found that the number of bids per tract declined from of 2.44 to 1.65 under the area-wide program.

- * GAO estimated that "the federal government received about \$7 billion (or a discounted value of \$5.4 billion in 1984 dollars) less than it would have received if the same acreage were under the tract selection program," (GAO Report, RCED-85-66, 1985, p.i.v.)

- * Even the industry recognizes the lease price depression caused by area-wide leasing--the Oil and Gas Journal reports that "offshore producers agree that acreage costs on area-wide lease sales are lower than under the previous nominated tract concept because more acreage is offered at one time." (Washington Post, November 8, 1983.)

Aside from the economic arguments against leasing so much so fast when oil prices are depressed, there is a compelling conservation argument. Huge lease offerings involving tens of millions of acres make it impossible to do meaningful environmental impact analyses. Additionally, they make it extremely difficult for states like Alaska to conduct rational development planning.

In Alaska, less than 6 percent of oil resources are estimated to lie beneath designated or potential wilderness lands, including those in the Arctic National Wildlife Refuge. Clearly, Congress and the federal government have made sure that lands with the vast majority of highest potential for oil and gas have been excluded from consideration as potential wilderness.

Nationwide, relatively little oil and gas is estimated to lie under wilderness lands. When this country was first settled by Europeans, 100 percent of the land area corresponding to the contiguous 48 states was wilderness and teeming with wildlife. The unrestrained pressure of civilization has steadily eroded wilderness areas to a small percentage of the total--4 percent

in the lower 48 states. To those who assign value to wilderness, it is incomprehensible that anyone would object to protecting the nation's last remaining fragments. Unless the nation maintains the sanctity of designated and potential wilderness areas, even that small percentage will disappear.

There will always be proposals to use wilderness and critical habitats for other purposes, particularly energy and mineral development. But little wilderness will be left if the engineers are allowed to scour the land for the next thirty years and beyond--building new roads and drill sites, returning for a closer look each time the price of energy or minerals jumps, and returning whenever a new technology allowing recovery of formerly inaccessible resources is developed.

The National Audubon Society believes that a nation like ours with a 200-year history should look at the wilderness preservation issue in a time frame that spans hundreds of years rather than decades. Only with such perspective can the nation pass on to succeeding generations the wilderness resources that are still intact.

The fact is that wilderness such as that on the Arctic Refuge coastal plain serves a variety of valuable, noncommercial uses: fish and wildlife habitat, watershed protection, scientific study, fishing, hunting, camping, hiking, and most other forms of dispersed, low density outdoor recreation. Such wilderness lands offer also the spiritual lift of peaceful, truly natural settings.

Although not every oil industry organization takes the limited view on wilderness protection espoused by such organizations as the American Petroleum Institute, there is obviously a clash in values between advocates of exploitation and those whose favor preservation--a dispute that must

continuously be settled through the political process. The Audubon Energy Plan has been developed with this dispute in mind. The Plan demonstrates that there are practical alternatives to exploiting the last of our wilderness areas. The United States can leave wilderness alone and still solve its oil import problem. The total amount of oil and gas under wilderness lands is too small to justify the abandonment of the nation's remaining wilderness heritage.

Under the Audubon Energy Plan, the mean risked estimate of 1.6 billion barrels of oil and the 1.6 billion barrel equivalent of natural gas estimated to lie under land already legally designated as wilderness would remain underground forever. The same would be true for the 2.3 billion barrels of oil and the 2.5 billion barrel equivalent of natural gas estimated to lie under wilderness land that has yet to be formally designated as wilderness, (A. Stege and J. Beyea, "Oil and Gas Resources on Special Federal Lands: Wilderness and Wildlife Refuges," Annual Review of Energy, Vol. 11, 1986, pp. 143-161.) Because wilderness land would never be exploited under the Audubon Plan, there would be no need for exploration.

The estimates for oil in wilderness lands given above assume a mean risked estimate of 600 million recoverable barrels of oil for the Arctic Refuge. In contrast, the Draft Coastal Plain Resource Assessment mentions a figure of 3.2 billion barrels, without clearly specifying whether or not the estimate is "risked." (We suspect it is not.) Clarification on this point is needed from Interior. If the 3.2 billion figure is risked, that is, already incorporates the risk of finding no oil (81%), Interior would be claiming that there are 2.6 billion more barrels of oil likely to be found in wilderness lands than in the estimates we have been using. Nevertheless, even an additional 2.6 billion barrels would not change the fact that a very small percentage of U.S. oil is in potential and designated

wilderness lands. The percentage of U.S. oil resources on these lands would rise from 3.5% to 5.8%.

Certainly, any exploration that may eventually be permitted on these areas should be made by nonintrusive methods, such as satellite survey. Nonintrusive methods are currently inadequate for confirming existing Interior estimates, but the situation will no doubt change in the future. Fifty years from now, technologies for identifying natural resources will have surpassed the crude methods available to energy companies today. With such a small percentage of U.S. land remaining as wilderness, it would seem wise for the nation to be patient in confirming Interior's estimates.

As has been indicated, the National Audubon Society is not blindly opposed to resource extraction on public lands. We expect that more than 95 percent of oil and gas resources on federal lands will eventually be tapped. The Society stands ready to work with oil and gas companies to help them develop environmentally sound methods of exploration and extraction that are suitable for the great percentage of land, both public and private, on which such activities need not be prohibited completely. Audubon will continue to insist, however, that exploitation of resources on public lands be carried out carefully in a manner that protects the environment and wildlife. Audubon will continue to oppose oil and gas exploration in any situation where government agencies or energy companies move hastily, without fully assessing the environmental and economic effects of activities or providing adequate safeguards for their implementation. This appears to be one of those cases.

It is argued by industry that the coastal plain of the Arctic Refuge must be leased now because it will take at least fifteen years to develop any oil fields discovered there. It

must be remembered that following discovery of oil at Prudhoe Bay in 1968, oil was flowing through the 800-mile-long Trans Alaska Pipeline (TAPS) by June of 1977, a period of only 9 years. All that would be needed should oil production be permitted on the Arctic Refuge would be a 100 to 150-mile-long pipeline spur (at maximum) to tie into TAPS. Our guess is that industry could bring an oilfield on line in the refuge within 5 years should it someday prove in the national interest to do so.

It is an illusion to believe that leasing on the coastal plain of the Arctic Refuge will solve the economic problems of the North. After all, its whole purpose is to deliver northern oil to homes and industries in the South--or perhaps the Orient. Indeed, rather than solving the North's economic problems, it may accentuate them. For evidence of this, we need look no further than the situation in Alaska today. With the Trans Alaska Pipeline carrying oil at near full capacity, the state is going through one of the most serious economic recessions in its history.

The situation on the Arctic Refuge obviously calls for bold and courageous political leadership at both the state and national levels. For politicians to be holding out the promise that yet another great oil bonanza lies beneath the Arctic tundra just waiting to be exploited only postpones the day when all Americans must begin to live within their means by implementing cost-effective conservation measures.

On page 6 of its assessment report, Interior states:

"Oil and gas development will result in widespread, long-term changes in wildlife habitats, wilderness environment, and Native community activities. Changes could include displacement and reduction in the Porcupine caribou herd."

We agree, and therefore do not believe the long-term conservation, economic, or national security interests of the United States will be served by recommending that such sacrifices be made on the finest Arctic wildlife and wilderness sanctuary in the world at a time of a world oversupply of oil, and with hundreds of millions of acres of other federal and state lands available for exploration.

It has been said by many that we are now at our Last Frontier in Alaska. This has different meaning to different people. To some it offers opportunity for resource development and the jobs and material benefits delivered. To others, it is wildlife and wildland spectacles which constitute a heritage to be preserved for generations of Americans. The decisions we make on the Arctic Refuge therefore are not simply about oil fields and caribou herds. They are decisions that strike to our very deepest concerns as a nation.

The National Audubon Society feels the Department of the Interior is making a serious mistake in recommending that the coastal plain of the Arctic Refuge be opened to full leasing. The facts convince us that America can achieve energy security without exploiting the last great arctic coastal wilderness in the United States.

We believe that U.S. Senators Howard Metzenbaum and Paul Tsongas were right when in the 1979 debate on the Alaska Lands Act they stated:

"It appears as if the "forbidden fruit" syndrome is operating with regard to the Arctic National Wildlife Range. Regardless of how bitter that fruit may be, there are some oil and gas companies which will want to invade this last stretch of north slope arctic land unimpacted by man. What the Congress does with regard to this fragile

area will be an indication of how wisely we are going to conserve the nation's natural resources in the future. We can afford to make this Range the "last place to go" in the search for energy and we should. We urge the Senate to study the arguments on both sides of this issue, for we believe strongly that aside from high emotions which have surrounded the debate on this issue, the facts support protection for the Range at this time..." (Report of the Committee on Energy and Natural Resources, United States Senate, No. 96-413, November 14, 1979, page 421.)

The National Audubon Society therefore strongly opposes leasing of the coastal plain for oil and gas development at this time, and recommends that the U.S. Fish and Wildlife Service be directed to manage the entire Arctic Refuge consistent with the conservation purposes for which it was established.

Your consideration of our comments and recommendations is greatly appreciated.

OUTLINE OF TESTIMONY

BY

MARK A. FRAKER
STANDARD ALASKA PRODUCTION COMPANY
ANCHORAGE, ALASKA

BEFORE

HOUSE RESOURCES COMMITTEE

FEBRUARY 19, 1987

BASIS OF IMPACT ASSESSMENT

- 2-MILE EXCLUSION AROUND ALL ROADS, FACILITIES, ETC.
- USED TO CALCULATE 'HABITAT LOSS'
- 'HABITAT LOSS' USED TO PREDICT 20-40% POPULATION DECREASE.

WHAT IS BASIS OF 2-MILE EXCLUSION?

- STUDY BY DAU AND CAMERON (ADF&G) IN MILNE POINT AREA
- 4 YEARS BEFORE ROAD (1978-1981)
- 4 YEARS AFTER ROAD (1982-1985)
- FWS MISINTERPRETED POINT AT WHICH LINES CROSSED ($\approx 3\text{KM} \approx 2 \text{ MILE}$) AS EXCLUSION DISTANCE (FIG. 1)

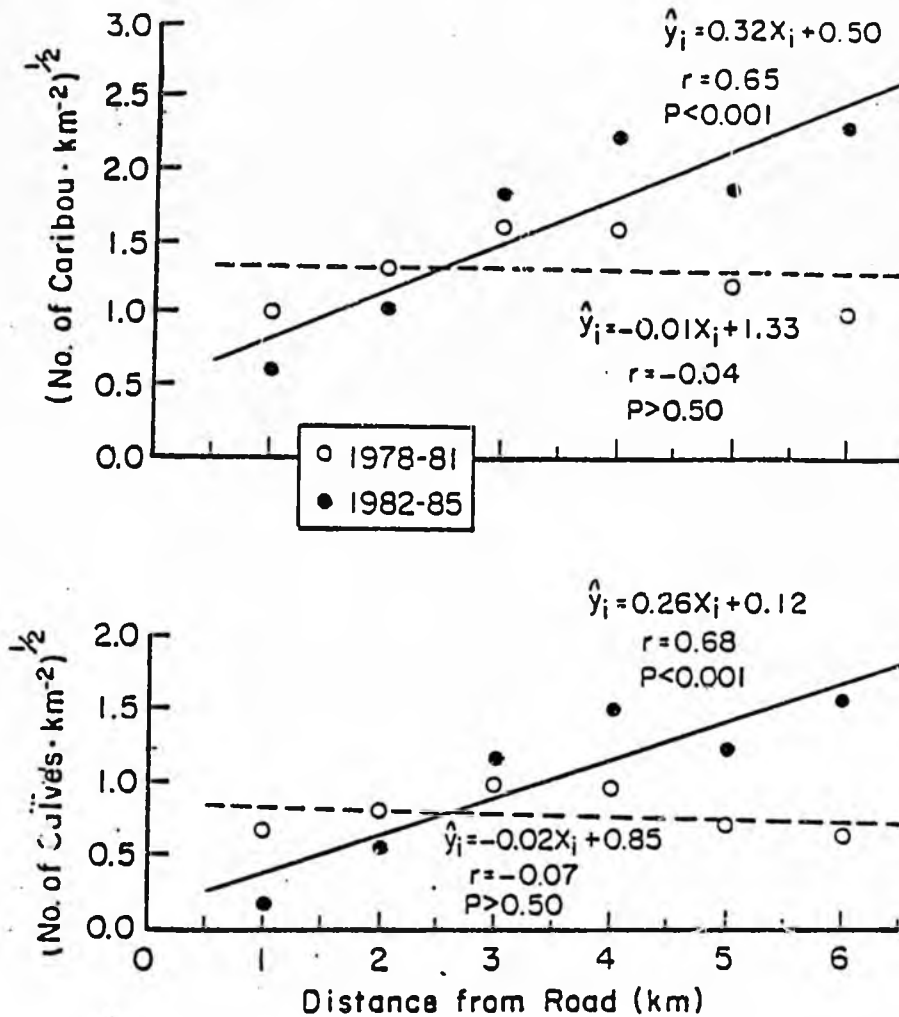


Figure 1. Graphs from Dau and Cameron (1985) showing relationship between the square root of the density of caribou to distance from the road leading to the Milne Point oilfield. Data from 1978-1981 were collected prior to construction of the road; data from 1982-1985 were collected after the road had been built. Note that the data points shown are square roots of the four-year means. Values for individual years have not been made available by the authors and consequently, the annual variability is unknown.

THE MILNE POINT ROAD/CARIBOU STUDY

- PLOTTED DENSITY OF CALVING CARIBOU BEFORE AND AFTER ROAD (FIG. 1)
- USED SQUARE ROOT TRANSFORMED DATA
- APPEARS THAT DENSITY WAS SAME THROUGHOUT AREA EVEN BEFORE ROAD (1978-1981)
- APPEARS THAT AFTER ROAD CONSTRUCTION (1982-1985) DENSITY WAS LOW NEAR ROAD, HIGH AWAY FROM ROAD
- ANNUAL DIFFERENCES IN TOTAL CARIBOU NUMBERS NOT SHOWN
- ANNUAL DIFFERENCES IN SNOW AND WEATHER CONDITIONS NOT REPORTED
- AUTHORS DID NOT CLAIM EXCLUSION NEAR ROAD
- FWS MISAPPLIED STUDY

RE-EXAMINATION OF MILNE POINT STUDY

- PLOTTED DENSITY OF CALVING CARIBOU BEFORE AND AFTER ROAD (FIG. 2)
- DATA NOT TRANSFORMED
- RESULTS:
 1. INCREASING DENSITY OF CARIBOU AWAY FROM ROADWAY BEFORE AND AFTER ROAD CONSTRUCTION TO DISTANCE OF 3KM (2 MI)
 2. HIGHER DENSITY 3-6 KM (2-4 MI) AFTER ROAD THAN BEFORE
 3. ABOUT 2X AS MANY CARIBOU IN STUDY AREA AFTER ROAD THAN BEFORE
- STATISTICALLY EXAMINED (WITH THE AUTHORS) DATA AT EACH DISTANCE INTERVAL BEFORE AND AFTER ROAD CONSTRUCTION
- RESULTS:
 1. STATISTICALLY SIGNIFICANT DIFFERENCES ($P < 0.05$) IDENTIFIED IN THE 0-1 KM AND 5-6 KM INTERVALS
 2. NO STATISTICALLY SIGNIFICANT DIFFERENCES IN THE 1-2 KM, 2-3 KM, 3-4 KM AND 4-5 KM INTERVALS

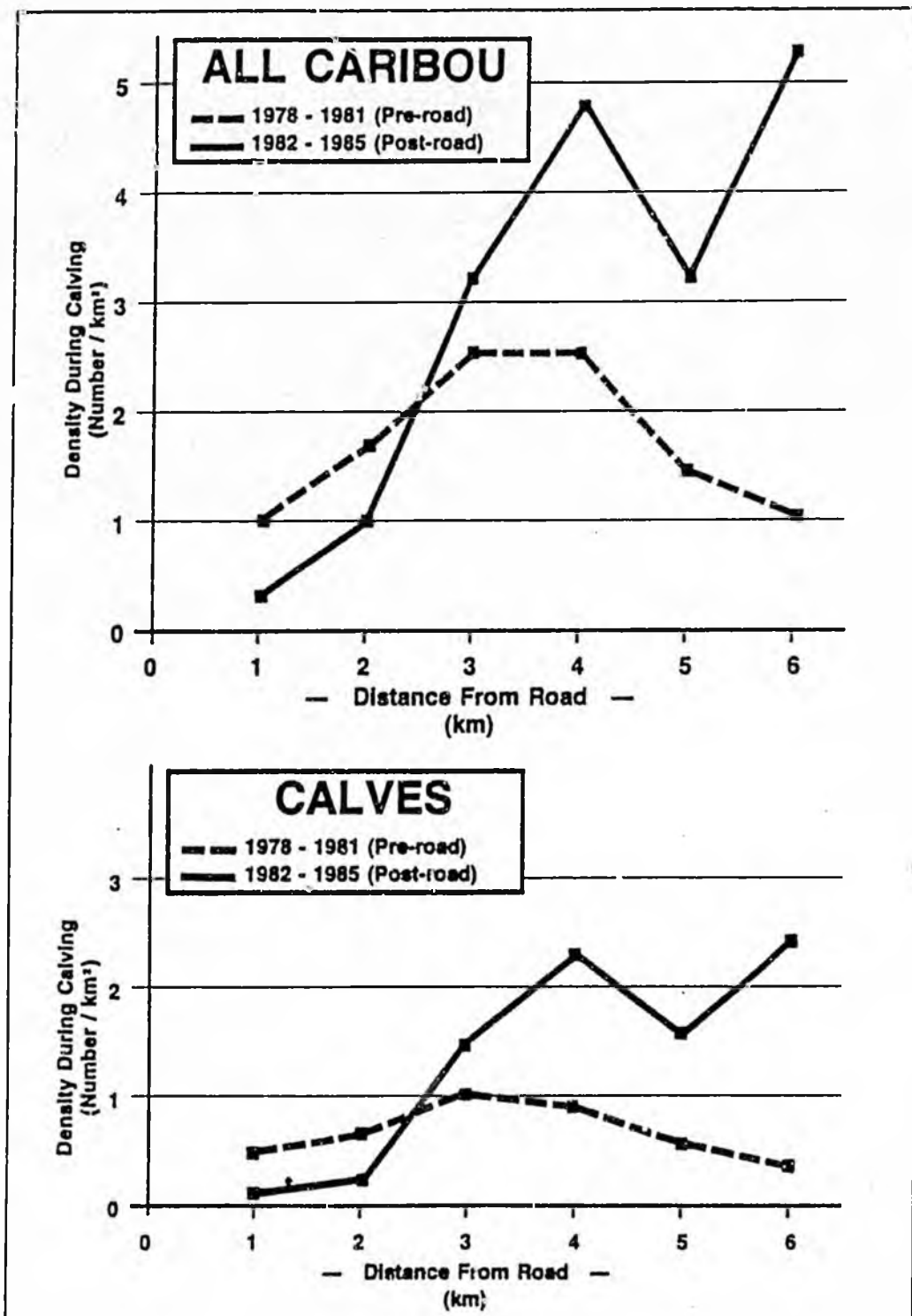


Figure 2. A replotting of the data in Figure 1 to show approximate actual values. Because the authors have not made the original data available, values were obtained by reading the square roots in Figure 1 and squaring them. Shown are the four-year means; variances are not known. [Note added in proof: R. Cameron, Alaska Department of Fish and Game, has provided the actual four-year means. They are not significantly different from those shown in Figure 2.]

CONCLUSIONS

- NO 2-MILE EXCLUSION ZONE
- PARTIAL AVOIDANCE WITHIN 0-1 KM OF ROAD; NOT COMPLETE DISPLACEMENT
- NO EVIDENCE THAT SMALL AMOUNT OF DISPLACEMENT IS HARMFUL TO CARIBOU
- DISTURBANCE CAN BE MINIMIZED BY REGULATING OPERATIONS WHEN CARIBOU ARE PRESENT

The following information is excerpted from "Comments of the Standard Oil Company on the Draft Legislative Environmental Impact Statement for the Arctic National Wildlife Refuge, Alaska, Coastal Plain Resource Assessment" dated 6 February 1987.

G. Response of caribou to oilfield development

The draft report's analysis of potential effects of development on calving caribou are based primarily on conclusions attributed to a study comparing densities of caribou cows and calves before and after construction of an oilfield road on the Arctic Coastal Plain: "Dau and Cameron (1985), in what may be the most systematic study of caribou displacement by oil development, reported that maternal groups showed measurable declines in habitat use within approximately 2 miles on either side of the Milne Point road in the central Alaskan arctic" (p. 107, col. 2, par. 2). However, examination of the cited paper shows that Dau and Cameron (1985) did not refer to decreased habitat use within 2 miles of the Milne Point road, and that their study is so confounded by uncontrolled variables that it is quite impossible to make any conclusive interpretation of their results.

Figure 5 presents graphs from the Dau and Cameron paper showing the relationship between the square root of the density of all caribou and also of calves only, and distance from the road. The data points shown are the means of four years; no information about year-to-year variability is given. The data were collected by helicopter surveys conducted during the four years prior to road construction (1978-1981) and the four years following road construction (1982-1985). The intent, of course, was that the first four years' data would serve as a control against which to compare caribou distribution after the road was in place and development had begun.

Use of the square root transformation and of calculated regression lines (Fig. 5) gives the impression that caribou density was evenly distributed within 6 km of the alignment prior to construction of the road, but afterwards was low near the road and high away from it. If we take the graphs in Fig. 5 at face value, an effect relating to the presence of the road appears to continue out to at least 6 km. However, removing the square root transformation gives quite a different picture (Fig. 6). Examination of the non-transformed data leads to four observations:

1. In both four-year periods, the data from 1-3 km show the same trend, i.e. increasing density away from the road alignment. The fact that this trend existed both before and after the road was constructed suggests that some other factor (e.g., topography) may have influenced the distribution of caribou.
2. The densities shown for the 1-3 km interval are the four-year means; no information on year-to-year variability is given. Assuming that there was a normal amount of variability, it is almost certain that the data from both four-year periods overlap and are not statistically different.
3. The real differences in the data sets appear to be in the 4-6 km interval.

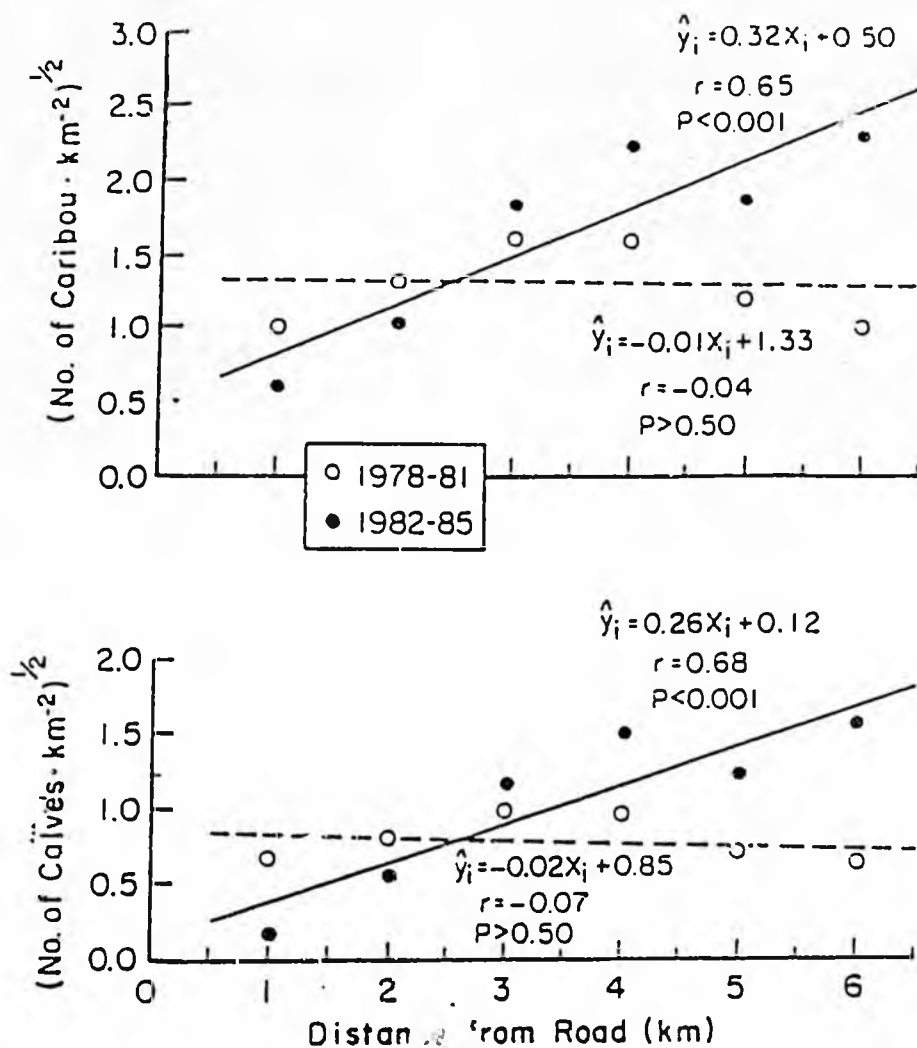


Figure 5. Graphs from Dau and Cameron (1985) showing relationship between the square root of the density of caribou to distance from the road leading to the Milne Point oilfield. Data from 1978-1981 were collected prior to construction of the road; data from 1982-1985 were collected after the road had been built. Note that the data points shown are square roots of the four-year means. Values for individual years have not been made available by the authors and consequently, the annual variability is unknown.

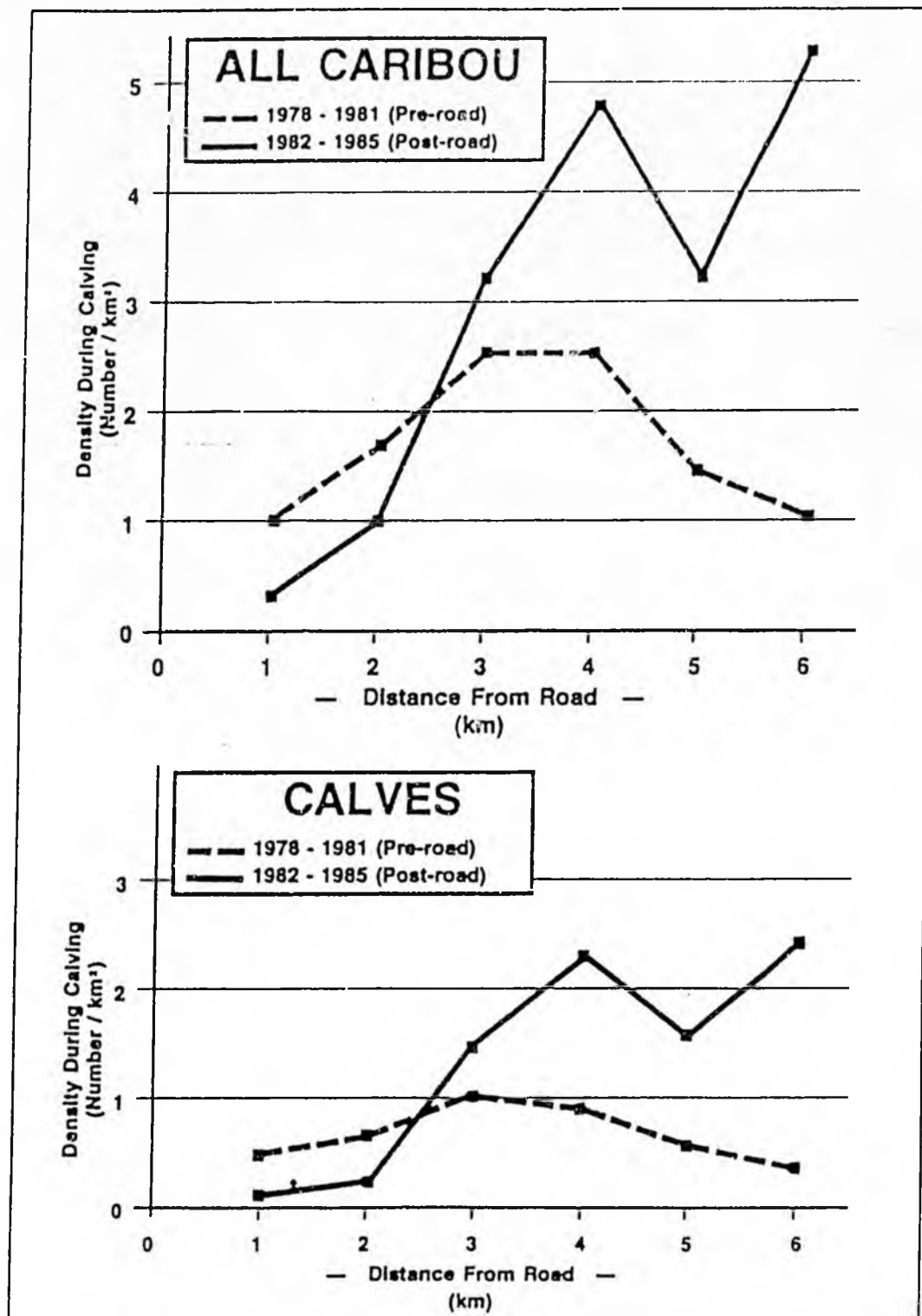


Figure 6. A replotting of the data in Figure 5 to show approximate actual values. Because the authors have not made the original data available, values were obtained by reading the square roots in Figure 5 and squaring them. Shown are the four-year means; variances are not known. [Note added in proof: R. Cameron, Alaska Department of Fish and Game, has provided the actual four-year means. They are not significantly different from those shown in Figure 6.]

4. From inspection of the curves, it is apparent that there were roughly twice as many caribou in the study area (i.e., the 1-6 km zone) following road construction than before.

Finally there are two other factors that confound interpretation of the Dau and Cameron (1985) data. The authors apparently assumed that the density of calving caribou would be the same in both four-year periods. This implies an assumption on their part that 1) the population was constant in size, 2) that the distribution was essentially the same, and 3) that snowmelt and weather conditions were practically identical. In fact, the Central Arctic herd roughly trebled (i.e., from 5,000 to 15,000) in size during the period over which the study took place, and snowmelt and weather conditions differed between years, as did the distribution of calving caribou.

What explains the pattern seen in Figure 6? It is impossible to know. Dau and Cameron's (1985) study is too unclear to permit a conclusion to be drawn, and there is no scientific basis to conclude from their study that any displacement of caribou resulted from the road and associated activity. If the numbers out to 6 km are compared, it is clear that there were about twice as many caribou in the area after the road was constructed than there were before. Clearly, it is inappropriate for the draft report to base predictions of potential caribou displacement from the "core calving area" on the Dau and Cameron study.

During the period 1981-1986 surveys of the calving distribution of the Central Arctic Herd have been conducted (RRCS, 1985; R.M. Jakimchuk 1986, pers. comm.). Figure 7 shows areas of major usage by calving caribou. It is clear that although calving densities may be lower immediately adjacent to areas of active oilfield operations, caribou continue to calve in the region where they have traditionally done so.

The most important point is that whatever the exact response of the Central Arctic Herd to oilfield activities, the herd has grown rapidly. Clearly, and contrary to many earlier predictions, whatever the effect of oilfield activities on individual caribou, there have been no detectable population-level effects. The herd has more than quadrupled in size since development began in the early 1970s. Nor is this situation unique: several other herds are thriving in the presence of considerable human activity (Bergerud et al. 1984). The only effect of human activity that has clearly been capable of seriously lowering caribou numbers is direct mortality from excessive hunting.

[It should be recognized that traffic in the 1002 area will be appropriately controlled during periods when calving animals are present near oilfield developments, and that construction will be timed to avoid periods when calving and post-calving caribou are present.]

[NOTE: On 13 February 1987, a meeting of Petroleum Industry and Alaska Department of Fish and Game biologists was held to analyse further the data collected by Dau and Cameron (1985). A t-test applied to the data at various distance intervals away from the road showed statistically significant ($p < 0.05$) differences in the 0-1 km and 5-6 km intervals; differences in the other intervals were not statistically significant. (Note added February 18, 1987)]

CENTRAL ARCTIC HERD CALVING AREAS MAJOR ACTIVITY AREAS 1981-1986

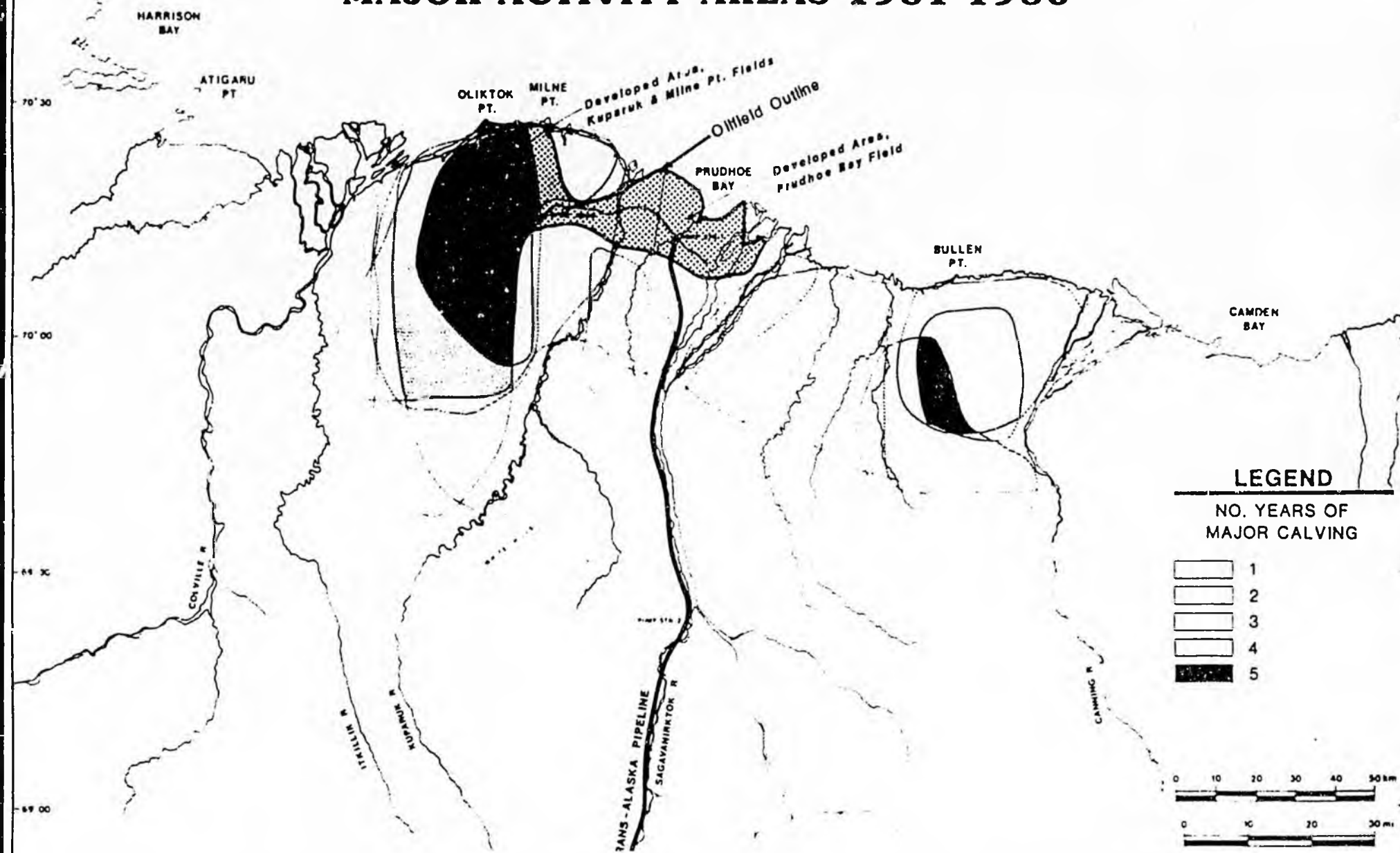


Figure 7. Locations of areas of major calving activity of the Central Arctic Herd, 1981-1986. Note the presence of calving caribou within the general area of the Prudhoe Bay, Kuparuk, and Milne Point oilfields. The Prudhoe Bay Oilfield has never been known to be used often by calving caribou, even prior to development. [Based on data provided by RRCS (1985) and Jakimchuk 1986, pers. comm.].



National Audubon Society

ALASKA REGIONAL OFFICE

308 G STREET, SUITE 217, ANCHORAGE, ALASKA 99501 (907) 276-7034

January 23, 1987

Ned Farquhar
c/o Representative Sam Cotten
Pouch V
Juneau, AK 99811

Dear Ned:

It was nice to talk with you on the phone yesterday. As promised, I have enclosed the following information on the Arctic National Wildlife Refuge for you:

- 1) A copy of Dave Cline's testimony for National Audubon Society on the "1002" Report for the Arctic NWR;
- 2) A copy of the The Audubon Energy Plan; and
- 3) A review of legal issues arising from the Audubon Energy Plan in the Columbia Journal of Environmental Law.

I hope these documents are helpful. Should you have any questions regarding the enclosed information, don't hesitate to contact me.

Sincerely,

Barbara A. Johnson
Regional Representative

ANWR Issue continued Page 2



Standard Alaskans Receive Awards Page 3



SAPC Aviation Department Page 4-5



INTERCOM

Volume Nine, Number One

January 1984

ANWR: MORE THAN AN ALASKA ISSUE:

SAPC launches information program

SAPC employees testify at ANWR public hearings

Ed. Note: This year Congress is expected to decide on whether the Arctic Coastal Plain of the Arctic National Wildlife Refuge (ANWR) will be opened to oil and gas exploration. The draft 1002h report released last November recommended that the area be opened for exploration, based upon the fact it contains large structures which geologists say could contain the most significant hydrocarbon reserves in the U.S. At public hearings in Anchorage January 5th, SAPC employees were among the many individuals who testified in favor of opening the coastal plain to exploration and development. Following the public hearing and comment period, which will end January 23, the Secretary of Interior is expected to recommend to Congress that the Refuge be opened to full oil and gas leasing. However, the question of whether to permit exploration in this small portion of northeastern Alaska is perceived by some in a narrow sense—that ANWR is an issue of concern to Alaska's residents and the petroleum industry. Late last year Standard Alaska Production Co. (SAPC) launched an information campaign to inform over 48 businessmen and lawmakers how important the domestic petroleum industry is to the national economy, and ultimately, U.S. security. The following text contains excerpts from that information program, as well as comments by SAPC President George N. Nalaca and others involved in the program.

Energy security — a national concern

Development of Alaska's arctic over the past 10 years has brought more than \$30 billion in business to all 50 states, providing major benefits to thousands of U.S. firms. Standard Alaska Production Company (SAPC) itself has spent \$15 billion since Prudhoe development began in 1974.

These and other expenditures related to Alaska petroleum development have served to develop 20 percent of America's domestic petroleum production—oil which presently comes from the North Slope of Alaska. The nearly five billion barrels produced from Alaska's Prudhoe Bay field over the past 10



SAPC Environmental Scientist Mark Fisher was among many Standard Alaska employees who testified at the ANWR public hearing in Anchorage January 5. The majority of testimony from the public favored opening the coastal plain of ANWR for oil and gas leasing.

years has reduced the cost of foreign imports by more than \$130 billion.

The United State's dependence on foreign oil is quickly increasing. Today we import more than one-third of our supply, and by the year 2000, could be importing as much as two-thirds. Our economy and national security mandate that we not allow ourselves to become more dependent on unreliable foreign suppliers. The Middle East, one of our princi-

pal suppliers, is no more stable today than it was in 1973 or 1979 when we suffered devastating shortages.

"Development of Alaska's arctic over the past 10 years has brought more than \$30 billion in business to all 50 states..."

pal suppliers, is no more stable today than it was in 1973 or 1979 when we suffered devastating shortages.

Our own proven petroleum reserves and production capacity are dwindling. Alaska's 20 percent contribution to domestic oil production will begin to fall in the next five years as Prudhoe Bay production declines. By the year 2000, production from all Alaska arctic oil fields will have declined from the current level of 1.8 million barrels per day to about 600,000 barrels per day. Un-

ANWR: What is its petroleum potential?

The geology of the two largest producing oilfields in North America—Prudhoe and Kuparuk—is essentially the same as that which underlies the coastal plain of ANWR.

This fact, together with the evidence of numerous oil seeps and other favorable conditions, largely explains the opinion that the coastal plain of ANWR represents the greatest unexplored oil resource area in North America.

The Marsh Creek anticline, an extremely large geological structure, has long been recognized from surface features and outcrops. In addition, recently acquired geophysical data confirm the existence of other potential oil-bearing structures which may contain reserves compe-

table to Prudhoe Bay and Kuparuk River fields.

In the draft 1002h assessment prepared late last year, seven different geological "plays" or regions of promising geology, were identified—each with characteristics favorable for oil and gas. In-place resource potentials were calculated: There is a 95 percent chance of at least 4.8 billion barrels of in-place oil and a five percent chance of in-place oil resources of 29.4 billion barrels.

If commercial discoveries are made in ANWR's coastal plain—an area which represents less than eight percent of the area's 19 million acres, or half of the land area of the State of Washington—the infrastructure built to accommodate one or more oilfields could also support exploration and development in other areas, such as offshore state and federal acreage to the north of the coastal plain and also, State land to the east of Prudhoe but west of ANWR.

(continued on page 2)

Endicott modules ahead of schedule

By the end of 1986 construction of the large offfield modules for Standard Alaska's Endicott Project were 85 percent complete and ahead of schedule at New Iberia, La.

About 900 contract and Standard Oil Production Company employees are on location, working to complete five major modules, plus additional equipment housed in smaller modules and open skid bases.

Construction status on the individual modules:

- Power Generation/Control Module.....92%
- Utilities and Chemical storage.....87%
- Phase Separation and NGL.....87%
- Seawater and Produced Water.....83%
- Gas Compression.....78%

Early this coming summer the completed modules and other equipment totaling 22,000 tons will be transported to Alaska's North Slope on four barges, which will be pulled by large, ocean-going tugs. The sealift is expected to arrive at Endicott in late July.

ANWR: more than an Alaskan issue (continued from page 1)

America needs jobs—economic activity

Development on the coastal plain of ANWR will generate economic activity and jobs in every State. If a major discovery is made on the coastal plain, billions of dollars will be spent to construct and operate oil field facilities. This spending will involve the manufacturing, construction, transportation and service sectors, and indirect spinoffs in local areas. Some other important facts:

- The U.S. tanker fleet is predominantly employed to transport North Slope oil. Unless new supplies of petroleum are developed, those tankers will be retired and their crews terminated.
- Imported oil accounts for more than one-third of the U.S. trade deficit (\$53 billion in 1984). We can reduce this substantially and enhance our trade opportunities by developing domestic resources within the coastal plain area.
- A recent study by Battelle/DRI determined that oil and gas development on ANWR could increase the U.S. Gross National Product (GNP) by one percent and create more than a million new jobs around the nation.

Environmental integrity—development footprint

Every significant species on the coastal plain has thrived alongside 20 years of oil exploration and production on the North Slope of Alaska and in northern Canada. Caribou and a variety of important bird life co-exist with oil development at nearby Prudhoe Bay. The Central Arctic caribou herd which inhabits the Prudhoe field during part of the year has more than quadrupled in size since oil production began in 1977. Two other major North Slope caribou herds—the Western Arctic herd and the Porcupine Herd, to the east, are also increasing in size, and are expected to soon

Development on the Coastal plain of ANWR will generate economic activity and jobs in every state.

reach historical high levels. Extensive biological studies in northern Alaska and Canada have shown that wolf predation and hunting, not oilfield development, has the greatest impacts on caribou populations.

Through the use of modern technology and development techniques, impact on permafrost, tundra vegetation and water quality can be minimal. The government and oil industry have spent tens of millions of dollars learning how to operate in the arctic without ruining esthetic or habitat values. A little known fact is just how small an area oil-related facilities occupy. For example, during the debate in the late 1980s on whether to allow construction of the trans Alaska pipeline, the newspaper buzz-phrase was "pipeline bisecting Alaska." Maps with the "line" from Prudhoe to Valdez made the pipeline appear unnaturally wide, as if it covered a large area of Alaska. In fact, the 800-mile-long pipeline right-of-way from Prudhoe Bay to Valdez occupies less than 14 square miles!

On the North Slope, the Prudhoe Bay unit involves about 242,000 acres of leased acreage. The Kuparuk River unit, which many geologists

FUELING THE NATIONAL ECONOMY - The map above provides a dramatic visual presentation of the national economic impacts from oil development on Alaska's North Slope from 1980-86. The \$10.5 billion depicted here (\$10,538.2) includes \$6.748 billion in payments by Standard Alaska to U.S. vendors traceable to ZIP

believe to be more typical of what might be found in ANWR, covers about 150,000 acres of leased land. But in both these huge oilfields, and the smaller Milne Point field, to the north, only 8,000 acres are actually occupied by production pads, roads, pipelines or other facilities.

By the time any discoveries in the coastal plain are developed, optimistically by the year 2000, technological progress within the industry will al-

low development to occur using even less space, through new directional drilling techniques and smaller, more compact field production facilities.

Alaska wilderness inventory

Alaska has more than 50 million acres of congressionally designated wilderness lands, which comprise about 15 percent of the state. Alaska also has 70 million acres of other National Wildlife Refuges and National Parks. Eight million acres, or 44 percent of the 19-million-acre Arctic National Wildlife Refuge, has already been designated wilderness.

"Opponents of ANWR development have introduced house Bill 4922 which calls for a wilderness designation of ANWR's coastal plain," comments George M. Nelson, SAPC President. "Such a law would forever prevent oil and gas activity in this vital area."

"We have the new State administration and legislature behind us on the ANWR issue," Nelson adds, "but we must continue to make contact with lower 48 Congressmen and Senators, State governors and administrations, as well as business leaders. We need to make a concerted effort to

show the nation that exploration of ANWR's coastal plain is not simply a State or regional issue or an oil industry issue. We need to convey to the 100th Congress that ANWR is also a national issue which could have far-reaching implications for our country's economy and national security."

During November and early December, SAPC mailed nearly 2,500 ANWR information packets to businessmen and lawmakers in the lower 48. The cover letters for each of the packets described the specific economic benefits Alaska petroleum development has provided that particular state.

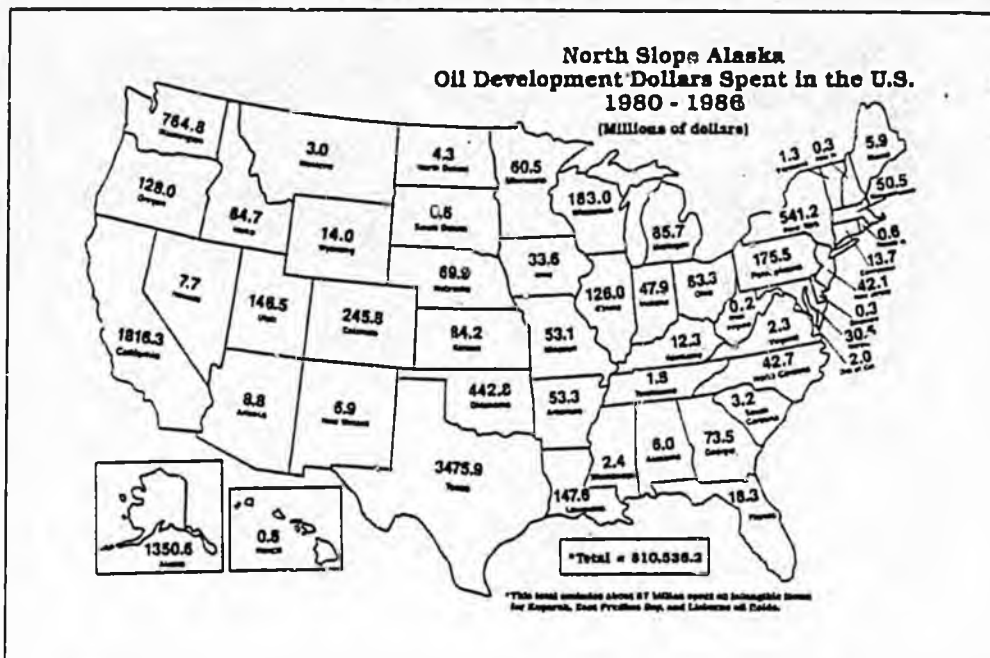
"It's impressive enough that petroleum revenues have been providing about 85 percent of Alaska's income," commented George Nelson. "But the widespread impact of Alaska's oil industry really strikes home when you consider billions of dollars which have gone to State and local economies in the lower 48, not to mention, federal taxes."

SAPC's Roger Herrera, who has recently been making presentations on ANWR to various groups in the lower 48, says that educating the nation on the strategic importance of

ANWR will be a difficult job. "The arctic coastal plain is a long ways from where most people live," says Herrera. "As in the D-2 land battle in the 1970s, Congressmen who haven't been to the arctic can't conceptualize ten thousand acres—let alone the 1.5 million acres they would designate wilderness under House Bill 4922. They have no frame of reference in discussing such huge chunks of land—or in the case of the coastal plain—how relatively little area the oil industry is considering for exploration."

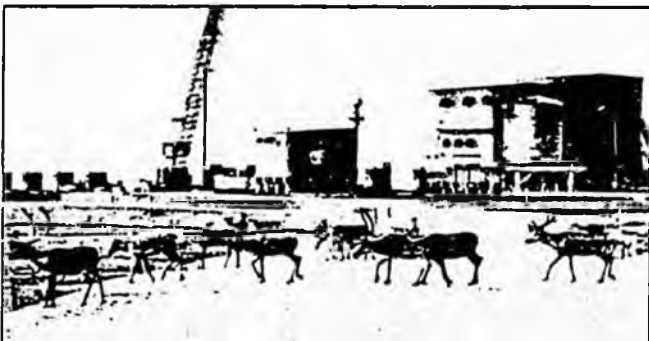
"The upcoming debates on ANWR will often take emotional tactics completely outside the realm of logic and fact," Herrera continues. "If we can keep the dialogues on a steady, logical course, and stick to the facts, I think Congress will agree that it is in the nation's best interest to allow exploration and development in the coastal plain—that the petroleum industry is capable of operating in this area without adversely affecting the environment."

Ed. Note: Intercom will closely follow upcoming ANWR debates and dialogues, and will occasionally feature special interviews on the subject.



coders \$3.668 billion in payments by ARCO, Alaska Inc. for tangible items for the East side of Prudhoe Bay, Kuparuk and Lisburne and \$124 million in payments by Conoco to develop Milne Point (1983-86). It does not include about \$7 billion on intangible items for Kuparuk, East Prudhoe Bay and Lisburne oilfields.

Going back to 1974, it is estimated that the cost of developing the Prudhoe, Kuparuk, Milne Point, Lisburne and Endicott fields has exceeded \$36 billion. Conservatively, Standard Oil's share of that amount has been about \$16 billion.



CENTRAL ARCTIC CARIBOU - Since oil production began on the North Slope almost a decade ago, the population of the Central Arctic caribou herd, which now numbers about 18,000, has more than quadrupled. The other two main North Slope caribou herds, the Western Arctic herd and Porcupine Herd, are also reaching historical high levels.



United States Department of the Interior

FISH AND WILDLIFE SERVICE
1011 E. TUDOR RD.
ANCHORAGE, ALASKA 99503

IN REPLY REFER TO:

PSS/PL-0673S

JAN 2 1987

Dear Participant:

As you are aware, the Fish and Wildlife Service is preparing a comprehensive conservation plan (CCP) for the Arctic National Wildlife Refuge. We are going to be holding several public workshops on management alternatives for the Arctic Refuge, exclusive of the "1002" coastal plain area. (The question of oil and gas leasing in the 1002 area is being addressed in a separate report, now being prepared for Congress.) We want to invite you to participate in the planning workshops to assist us in identifying the range of alternatives for managing the fish and wildlife resources and uses of the refuge.

Two workshops are scheduled for Fairbanks and Anchorage:

FAIRBANKS: 1-4:30 p.m. and 7:00 p.m.
Tuesday, January 20, 1987
Federal Building & U.S. Courthouse
Room 314
101 12th Avenue

ANCHORAGE: 1:30-4:30 p.m. and 7 p.m.
Thursday, January 22, 1987
U.S. Fish & Wildlife Service
Regional Office, 1st floor
conference room
1110 E. Tudor Road

As a result of these workshops and other deliberations, several alternatives will be presented in the draft comprehensive conservation plan for the Arctic National Wildlife Refuge.

A workbook is enclosed for your use. It is intended to be used in conjunction with presentations on refuge resource values and uses at the workshops. The workbook includes all of the alternatives we so far have considered. Space is also left for you to develop your own alternative(s). If you can attend the workshops, please bring the workbook with you. If you cannot attend, mail your comments on the alternatives in the workbook, or any new alternatives you want to see considered, to us by February 9, 1987.

We hope that you will join us at the workshops so that we may benefit from your knowledge and insights on the Arctic Refuge. Questions regarding the workshops may be directed to Norman Olson, in Anchorage at 786-3393, and Doug Fruge, in Fairbanks at 456-0250.

Sincerely,

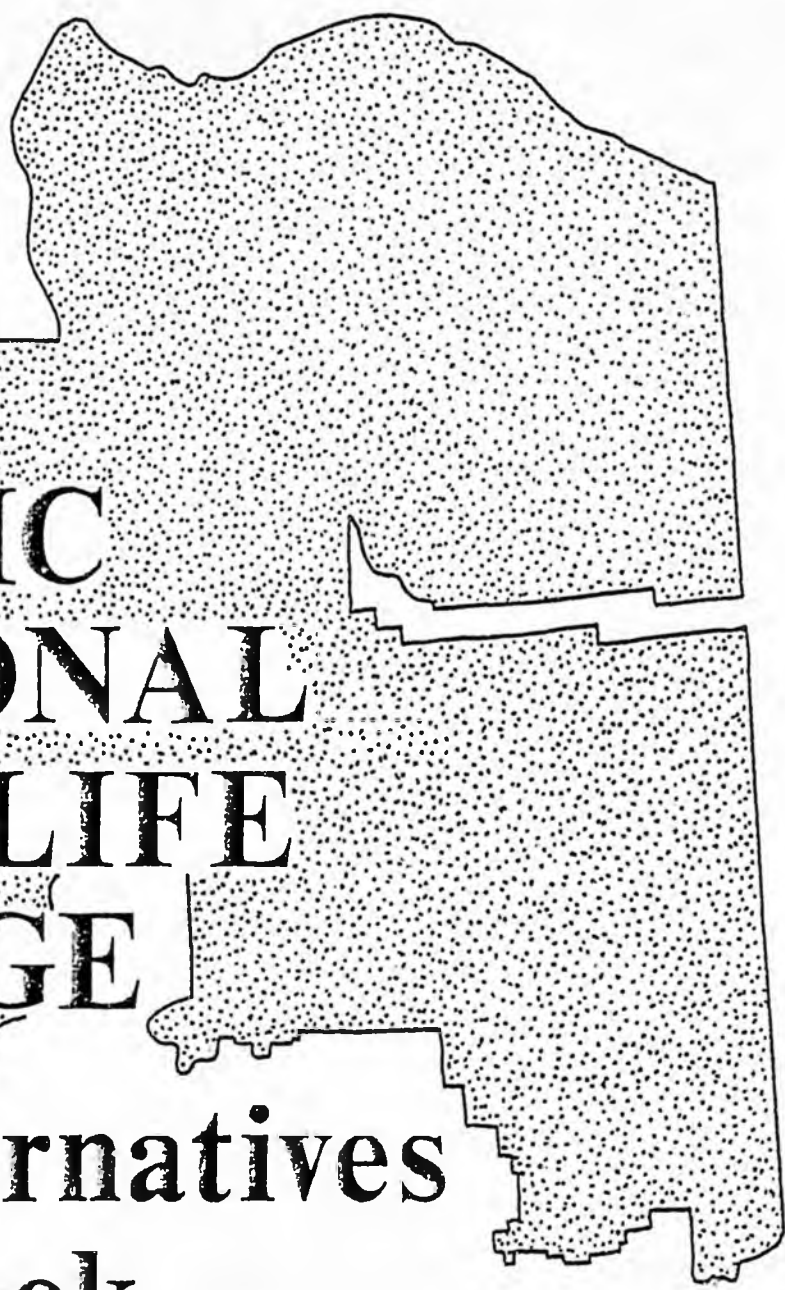
Norman Olson
Norman Olson
Planning Team Leader

Enclosure

**planning
for the future
of the**

**ARCTIC
NATIONAL
WILDLIFE
REFUGE**

**an alternatives
workbook**



Why plan?

The Arctic National Wildlife Range was established by Public Land Order 2214 in 1960, for the purpose of preserving the areas unique wildlife, wilderness, and recreational values. This order culminated extensive efforts begun over a decade earlier to preserve a portion of the Brooks Range and arctic Alaska's great wilderness values. Congress established the Arctic National Wildlife Refuge--enlarging the original Arctic Range and creating the Arctic Wilderness area--with the passage of the Alaska National Interest Lands Conservation Act of 1980 (ANILCA).

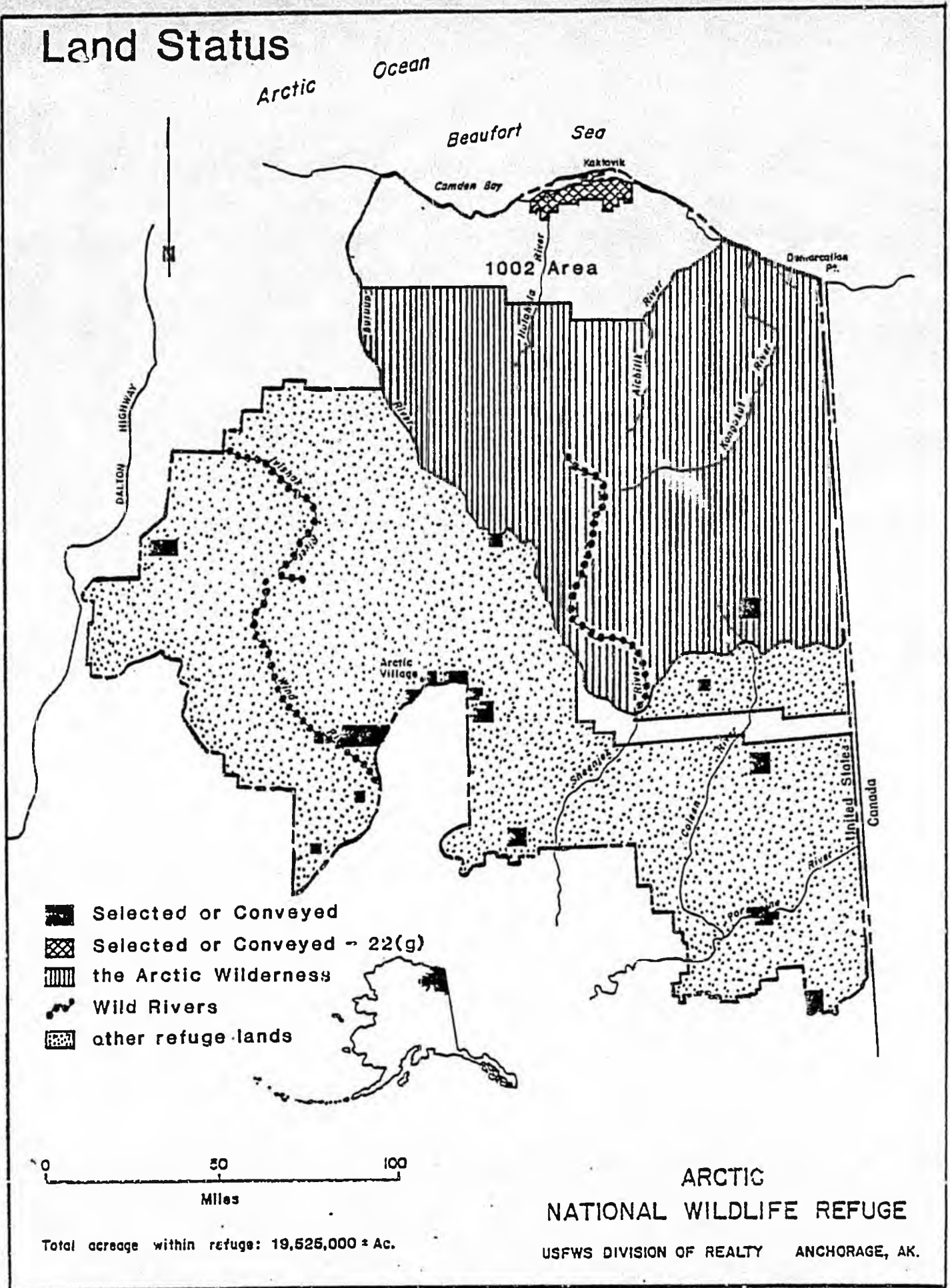
In the Act Congress instructed the U.S. Fish and Wildlife Service to develop a land use plan, called a comprehensive conservation plan, for the new refuge. The plan will tell how the Service intends to achieve the purposes for which the refuge was originally established and subsequently enlarged. In addition to the original purpose of the Arctic Range, the Act identifies the following primary purposes for the new refuge:






1. To conserve fish and wildlife populations and habitats in their natural diversity.
2. To fulfill international treaty obligations of the United States with respect to fish and wildlife and their habitats.
3. To provide opportunities for continued subsistence uses by local residents.
4. To ensure water quality and necessary water quantity within the refuge.

What lands are affected?

The plan will make decisions about management of all public lands that are part of the Arctic National Wildlife Refuge, exclusive of the "1002" coastal plain area. The future management of the "1002" area is currently being addressed in a separate report and recommendation on oil and gas leasing to Congress. This report also addresses oil and gas exploration and development on private lands at Kaktovik, which are subject to Section 22(g) of the Alaska Native Claims Settlement Act. The plan will not apply to any other state or private lands within the refuge, including village and regional corporation lands and individual allotments.

Land Status



-  Selected or Conveyed
-  Selected or Conveyed - 22(g)
-  the Arctic Wilderness
-  Wild Rivers
-  other refuge lands

0 50 100
Miles

Total acreage within refuge: 19,625,000 ± Ac.

ARCTIC
NATIONAL WILDLIFE REFUGE
USFWS DIVISION OF REALTY ANCHORAGE, AK.

What will the plan do?

The plan is intended to show how the U.S. Fish and Wildlife Service will manage the refuge to protect its resources and the values of the lands. It will:

1. Identify and describe wildlife populations, habitats and other special values of the refuge.
2. Designate areas within the refuge according to their most important resources, values and uses.
3. Specify which uses, activities and developments can be allowed in each area while protecting resources.

The plan will also include a wilderness review, which evaluates the suitability of lands for wilderness designation under each of the management alternatives. Depending upon which alternative is subsequently selected by the Service as its preferred alternative, the plan may recommend additional areas for inclusion in the National Wilderness Preservation System.

Finally, the plan will establish corridor boundaries for the Ivishak and Wind rivers, two of the refuge's three wild rivers in the National Wild and Scenic River System. The third river--the Sheenjek--will not require the establishment of a corridor as it is located within the Arctic Wilderness area.

How will the plan be prepared?

The staff of the Arctic National Wildlife Refuge in Fairbanks and a planning team from the U.S. Fish and Wildlife Service office in Anchorage will be responsible for developing the plan. Throughout the planning effort the Service will be seeking participation from individuals, villages, native organizations, federal, state, and local government agencies and other interest groups concerned with the future of the area.

To complete the plan with the most efficient use of money and manpower available to us, the Service has scheduled some of the most important steps in the planning process. The schedule could change as a result of future limits on funding, the size of the workforce, or other unforeseen circumstances such as new information gathered as we learn more about the area. What follows is our best estimate of the steps that will be taken to develop the plan:

1. Information is collected and analyzed--January 1986 to November 1986. Information about natural resources and land uses was gathered and analyzed. Public meetings were held in February, March, and April 1986 to learn the concerns and issues that citizens want the plan to address.
2. Alternatives are developed--November 1986 to February 1987. Several different management options are developed as possible ways of dealing with the issues. As part of the process, workshops will be held with the public to seek comments and recommendations.
3. A draft plan is written--February 1987 to September 1987. The alternatives are evaluated to see which one does the best job of meeting refuge purposes and resolving issues. A draft plan discussing these alternatives is written.
4. Public review--September 1987 to November 1987. The draft plan is distributed to the public. Public meetings are held to learn what changes may be needed to better resolve issues.
5. A final plan is written--December 1987 to May 1988. The draft plan is revised based on comments received from the public. The final plan is distributed to the public and is adopted to become a guideline for managing the Arctic National Wildlife Refuge.

How can you get involved?

The U.S. Fish and Wildlife Service wants to hear your ideas about the planning needs for the Arctic National Wildlife Refuge, and we hope you will encourage other members of your community to participate in the planning effort. At various stages in the process, planning team members and refuge employees will be holding public meetings and visiting with local residents in villages near the refuge. Public meetings also will be held in Fairbanks and Anchorage. Other meetings will be scheduled to hear comments from leaders of Native organizations, representatives of state, local, and other federal agencies, members of conservation and sportsmens groups, industry officials, and others who may be concerned about the refuge.

To make sure that your ideas are heard, watch for posters, newspaper ads, and other announcements telling when the planning team will be visiting in your area. Plan to attend the public meeting in the nearest community to your home, or visit with the planning team members individually. You may also offer comments in person at the Arctic National Wildlife Refuge office in Fairbanks. If you would like to send written comments or request more information about refuge planning, write to:

Refuge Planning Team,
U.S. Fish and Wildlife Service,
1011 E. Tudor Road,
Anchorage, Alaska 99503.

What are Management Categories?

In developing management alternatives, management categories ranging from intensive management to designated wilderness have been used. A management category is a set of refuge management directions applied to an area--in light of its resource values and existing or potential uses--to facilitate management and accomplishment of refuge purposes. The management categories used to develop the preliminary management alternatives for the Arctic National Wildlife Refuge are:

Intensive Management. This category is designed to accommodate economic development and a wide variety of resource management techniques while protecting refuge resource values. Natural processes may be modified and the influence of human activities may be evident. Permitted management practices may include highly manipulative techniques, such as mechanical manipulation of vegetation, and construction of artificial impoundments and dikes. The construction of administrative sites, public use facilities, and transportation systems also may be permitted.

Moderate Management. This category encompasses undeveloped areas where habitat and public use are managed to provide varied benefits in a natural setting. Existing fish and wildlife populations would be maintained, while providing limited opportunities for economic development. Motorized access for traditional activities would be permitted, subject to reasonable regulation.

Minimal Management. This category is intended to maintain the existing conditions of areas which have high fish and wildlife or other resource values. Subsistence, recreational uses, and traditional motorized access would continue, while economic development would not be permitted. Unlike designated wilderness, lands in this category could be reclassified administratively by the Service if it is determined that such a change is necessary or desirable. Areas proposed for designation as wilderness would be placed in minimal management until actually designated by Congress.

Wild River. The upper Sheenjek, Ivishak and Wind rivers were designated by Congress as wild rivers, within the Wild and Scenic River System, in the ANILCA. The goal of this category is to protect and enhance the values for which the rivers were designated, while providing for public recreation and resource uses that do not adversely impact those values. Management under this category is similar to minimal management. Traditional motorized access, hunting, fishing, trapping are permitted. Economic developments generally are not permitted within the corridors.

Designated Wilderness. Refuge lands can only be included in the wilderness system through congressional designation. Once an area is designated as wilderness by Congress, activities such as mineral and sand and gravel leasing, surface disturbing activities and certain motorized uses would be legislatively prohibited. Other activities and uses permitted in wilderness would be similar to those allowed in minimal management.

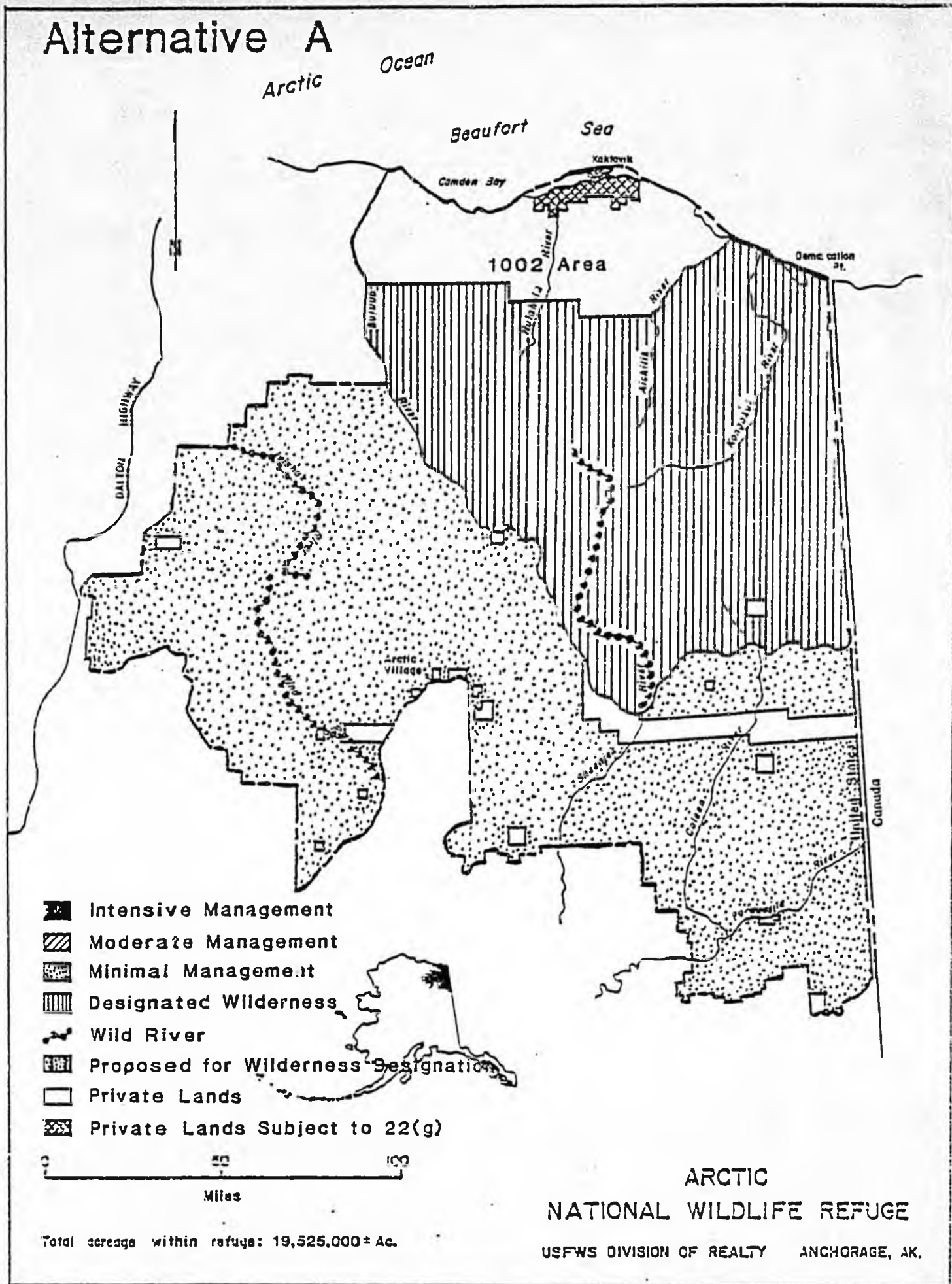
What activities and uses would be permitted?




ACTIVITIES AND USES	MANAGEMENT CATEGORIES				
	Intensive Management	Moderate Management	Minimal Management	Wild River Management	Designated Wilderness
SUBSISTENCE--hunting, fishing, trapping, etc.	YES	YES	YES	YES	YES
CABINS--for use by local residents for subsistence	YES	YES	YES	YES	YES
ACCESS--use of snowmachines, motorboats, and aircraft	YES	YES	YES	YES	YES
RECREATION--hunting, floating, etc.	YES	YES	YES	YES	YES
PUBLIC ROADS	NO	NO	NO	NO	NO
TRANSMISSION LINES/PIPELINES	YES	NO	NO	NO	NO
SAND AND GRAVEL LEASING	YES	NO	NO	NO	NO
COMMERCIAL TIMBER HARVEST	YES	YES	NO	NO	NO
OIL AND GAS STUDIES--					
surficial geology	YES	YES	YES	YES	YES
geophysical testing	YES	YES	YES	YES	YES
core sampling	YES	YES	YES	YES	NO
seismic activities	YES	YES	YES	YES	NO
OIL AND GAS LEASING*	NO	NO	NO	NO	NO
HARDROCK MINING--including placer mining	NO	NO	NO	NO	NO

* Section 1003 of ANILCA prohibits oil and gas leasing unless authorized by an Act of Congress.

Note: Areas proposed for wilderness designation would be placed in minimal management until actually designated by Congress.

Alternative A



-  Intensive Management
-  Moderate Management
-  Minimal Management
-  Designated Wilderness
-  Wild River
-  Proposed for Wilderness Designation
-  Private Lands
-  Private Lands Subject to 22(g)

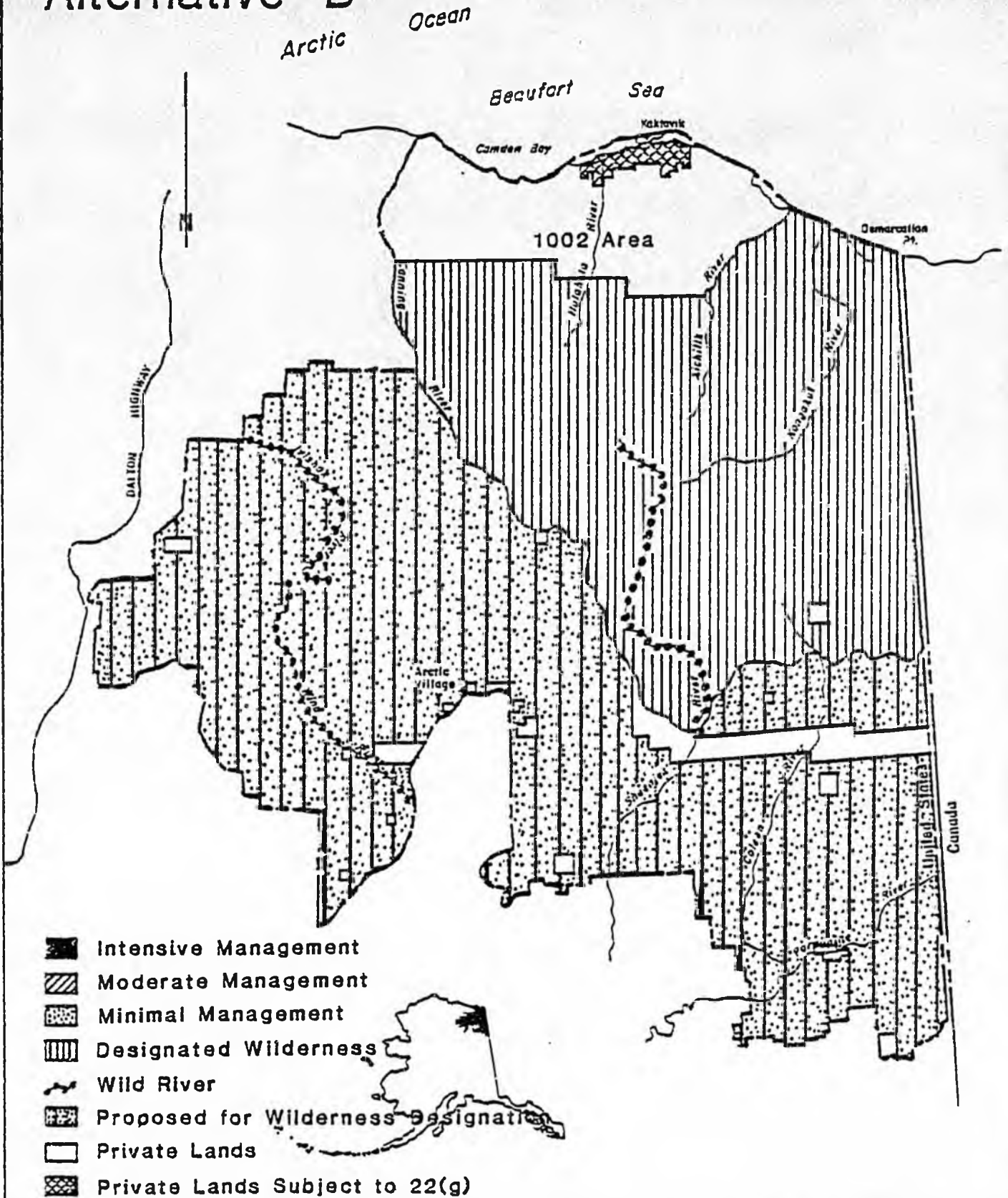
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




Alternative A represents the no action alternative. It reflects the way refuge lands are currently being managed.

Intensive Management	0 acres
Moderate Management	0 acres
Minimal Management	9,800,000 acres
Designated Wilderness	8,000,000, acres
Proposed for Wilderness Designation	0 acres

Comments:

Alternative B



-  Intensive Management
-  Moderate Management
-  Minimal Management
-  Designated Wilderness
-  Wild River
-  Proposed for Wilderness Designation
-  Private Lands
-  Private Lands Subject to 22(g)



Total acreage within refuge: 19,525,000± Ac.

ARCTIC
NATIONAL WILDLIFE REFUGE

USFWS DIVISION OF REALTY ANCHORAGE, AK.

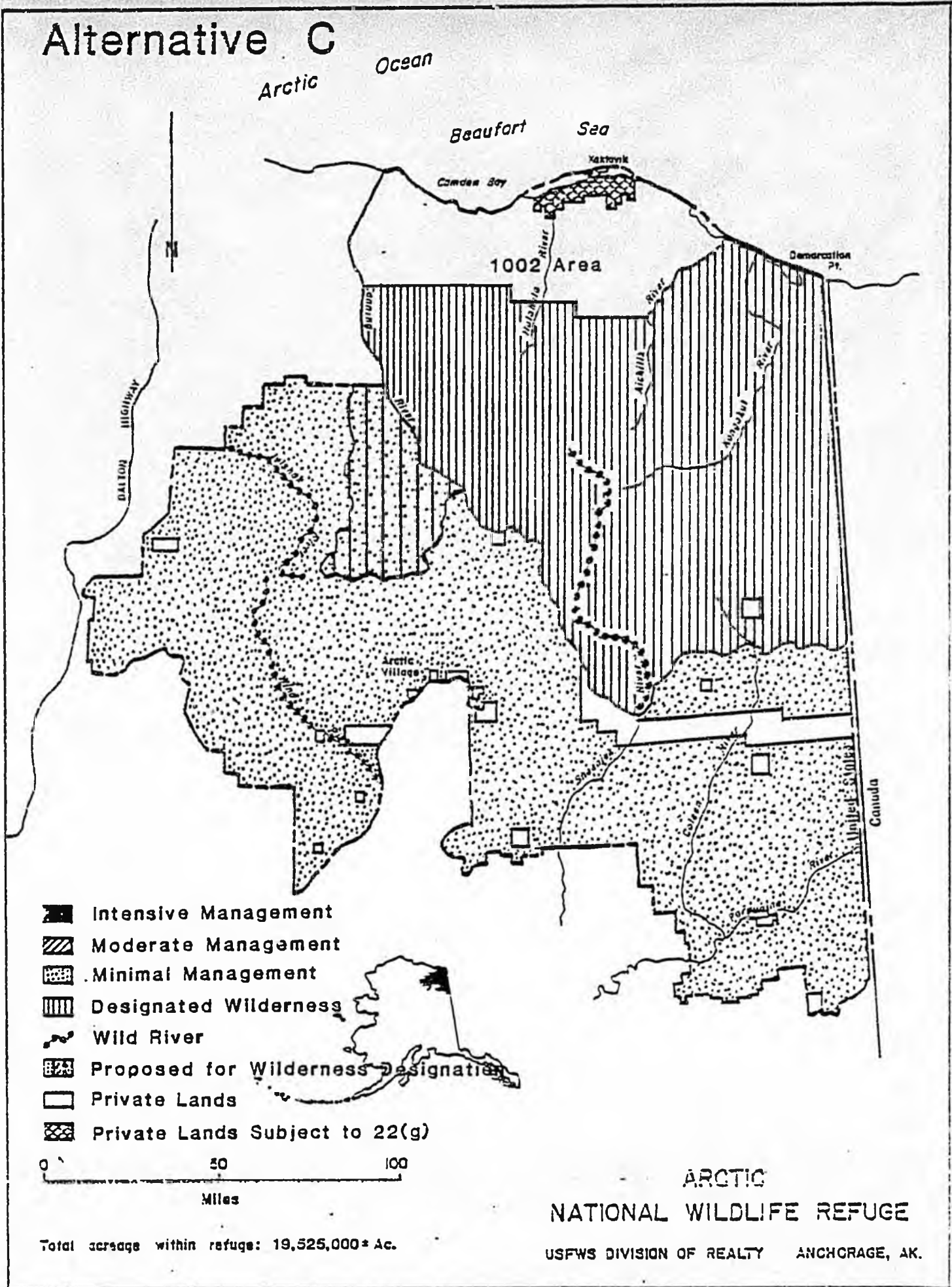
Description:

Alternative B represents the maximum amount of non-wilderness refuge lands that would be suitable for designation as wilderness.

Intensive Management	0 acres
Moderate Management	0 acres
Minimal Management	0 acres
Designated Wilderness	8,000,000 acres
Proposed for Wilderness Designation	9,800,000 acres

Comments:

Alternative C



Total acreage within refuge: 19,525,000 ± Ac.

ARCTIC
NATIONAL WILDLIFE REFUGE
USFWS DIVISION OF REALTY ANCHORAGE, AK.

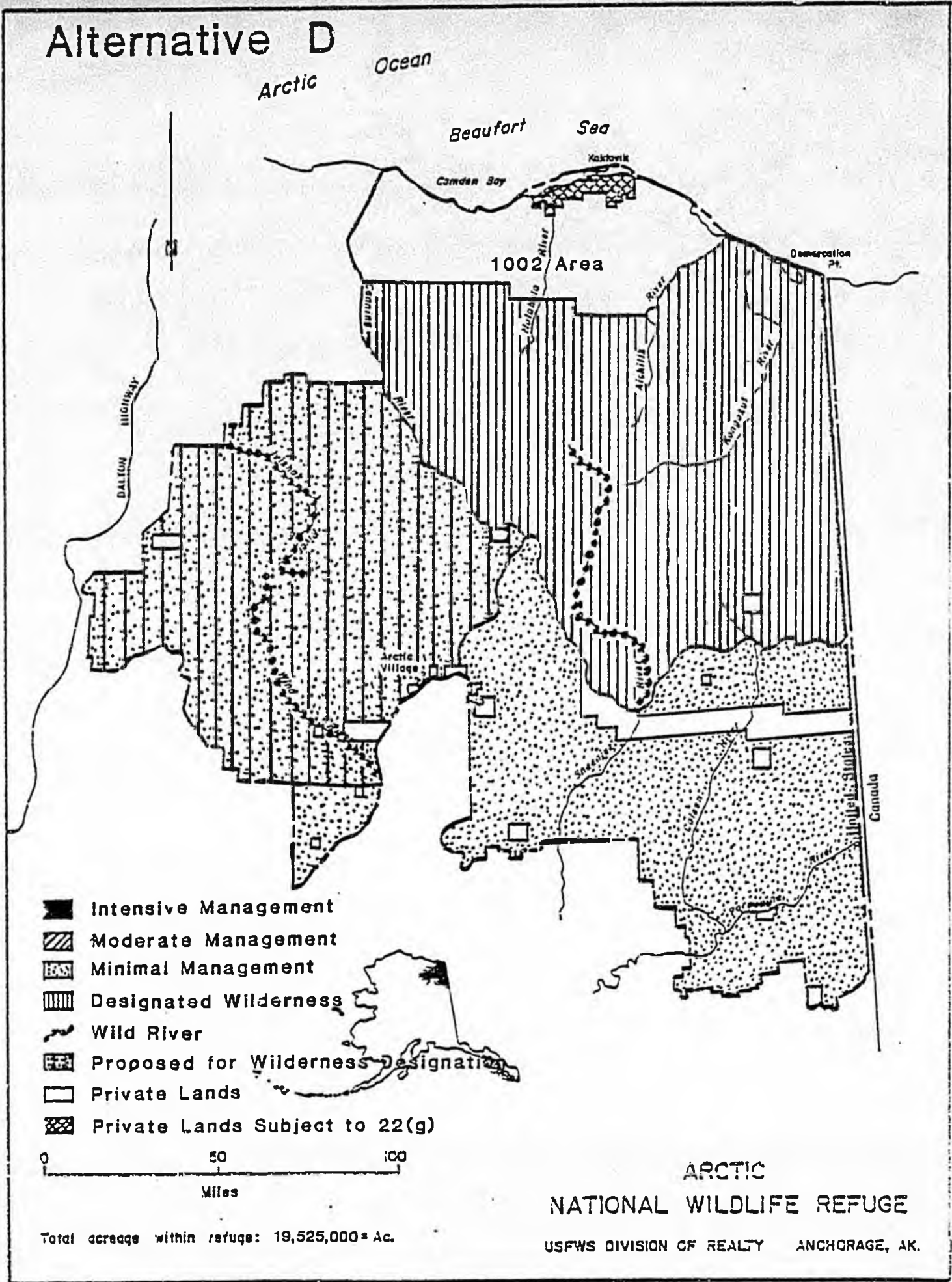
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


Alternative C would expand the existing Arctic Wilderness by adding the Marsch Creek drainage. As a result, the entire Canning River drainage located within the refuge would be included in the Arctic Wilderness.

Intensive Management	0 acres
Moderate Management	0 acres
Minimal Management	9,170,000 acres
Designated Wilderness	8,000,000 acres
Proposed for Wilderness Designation	630,000 acres

Comments:

Alternative D



-  Intensive Management
-  Moderate Management
-  Minimal Management
-  Designated Wilderness
-  Wild River
-  Proposed for Wilderness Designation
-  Private Lands
-  Private Lands Subject to 22(g)

0 50 100
Miles

Total acreage within refuge: 19,525,000 ± Ac.

ARCTIC
NATIONAL WILDLIFE REFUGE

USFWS DIVISION OF REALTY ANCHORAGE, AK.

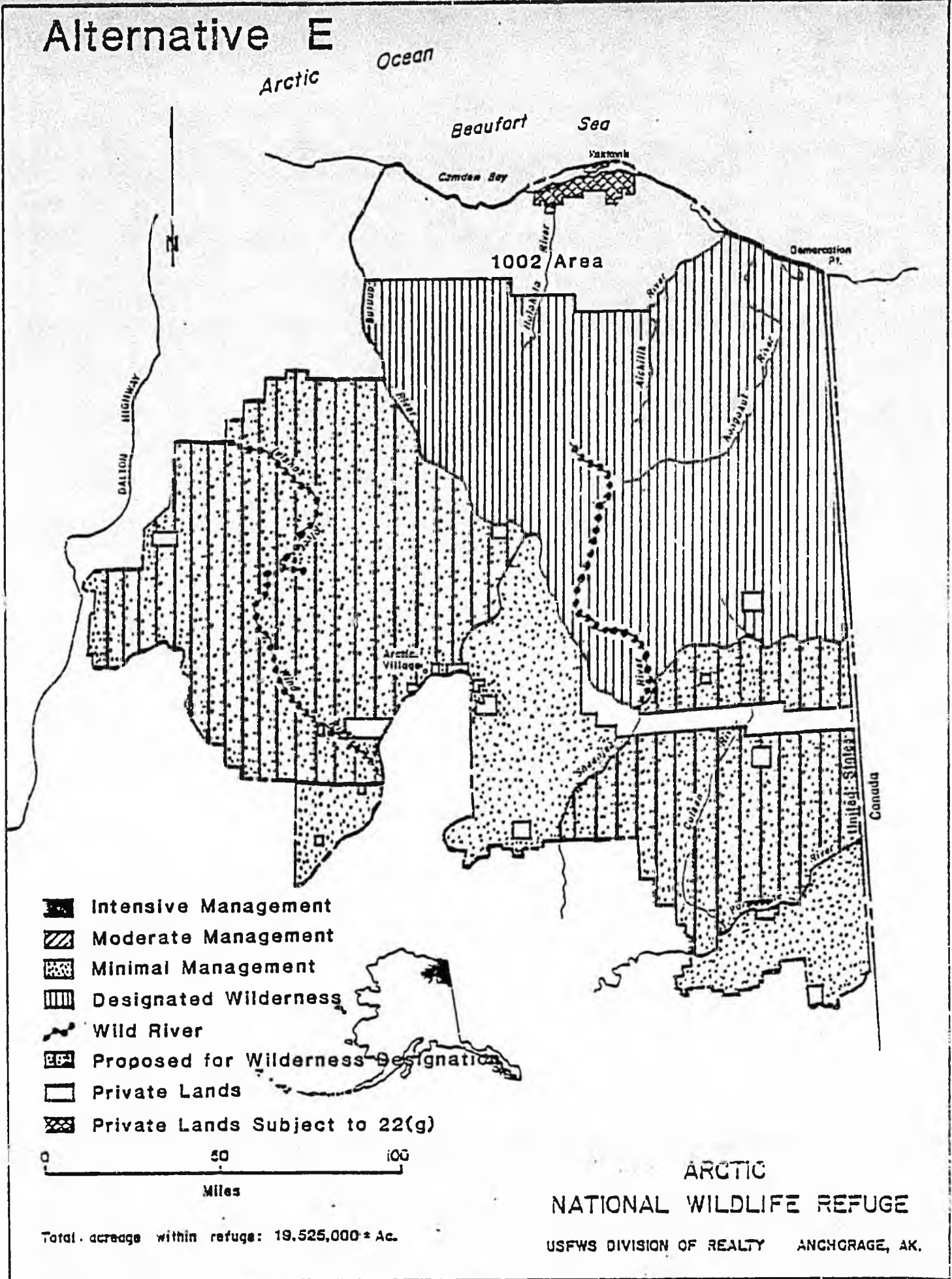
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
Alternative D would expand the existing Arctic Wilderness by adding the entire area within the refuge west of the Canning and Chandalar rivers. As a result, the entire Brooks Range within the refuge would be placed in wilderness.

Intensive Management	0 acres
Moderate Management	0 acres
Minimal Management	4,570,000 acres
Designated Wilderness	8,000,000 acres
Proposed for Wilderness Designation	5,230,000 acres

Comments:

Alternative E



-  Intensive Management
-  Moderate Management
-  Minimal Management
-  Designated Wilderness
-  Wild River
-  Proposed for Wilderness Designation
-  Private Lands
-  Private Lands Subject to 22(g)

0 50 100
Miles

Total acreage within refuge: 19,525,000 ± Ac.

ARCTIC
NATIONAL WILDLIFE REFUGE
USFWS DIVISION OF REALTY ANCHORAGE, AK.

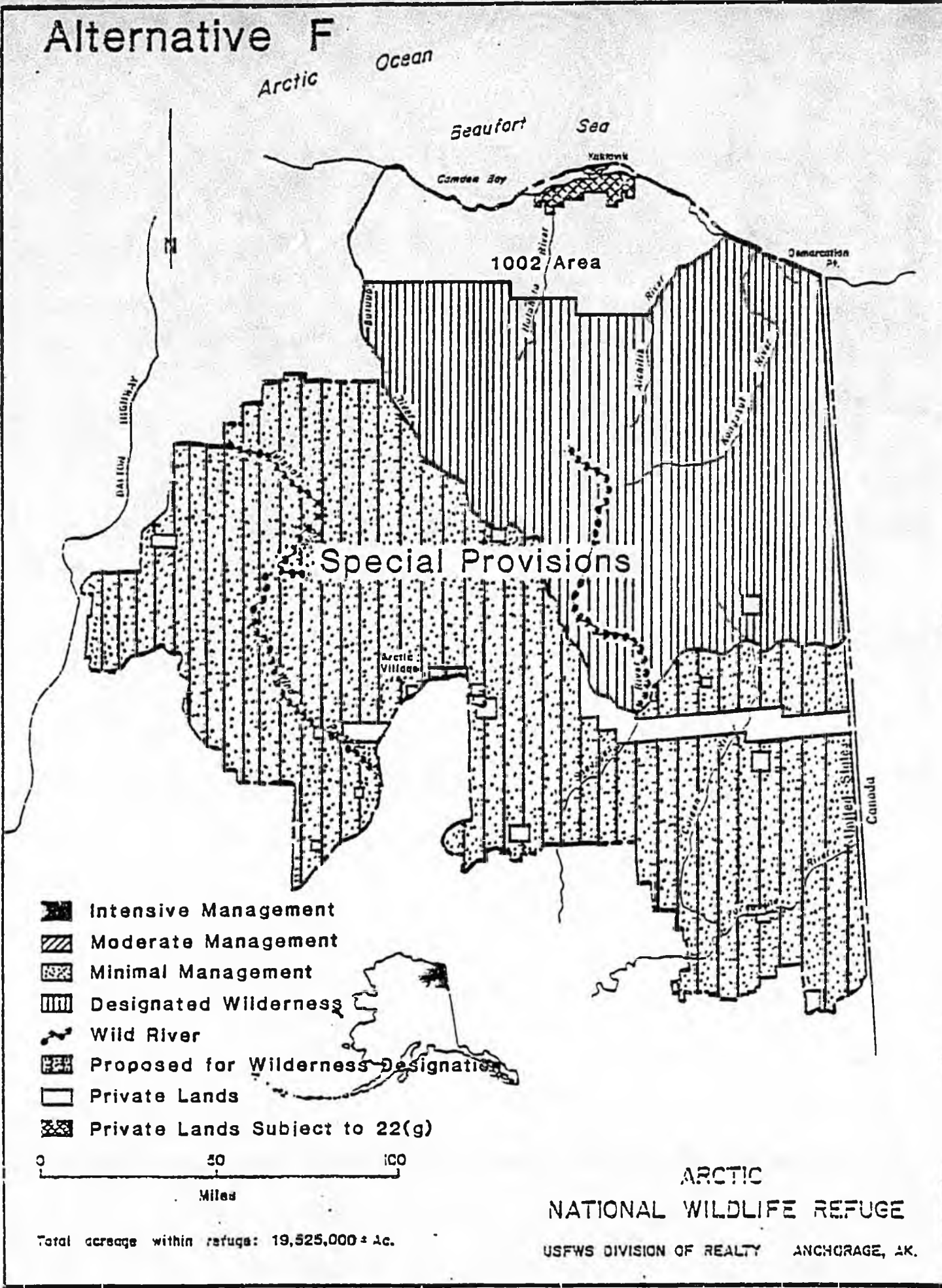
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






Alternative E would expand the existing Arctic Wilderness by adding the entire area west of the Canning and Chandalar Rivers as well as the area lying between the Sheenjek and Porcupine Rivers. This would result in both the entire Brooks Range within the refuge and a large part of the boreal forest south of the Brooks Range being placed in wilderness.

Intensive Management	0 acres
Moderate Management	0 acres
Minimal Management	1,800,000 acres
Designated Wilderness	8,000,000 acres
Proposed for Wilderness Designation	8,000 000 acres

Comments:

Alternative F



-  Intensive Management
-  Moderate Management
-  Minimal Management
-  Designated Wilderness
-  Wild River
-  Proposed for Wilderness Designation
-  Private Lands
-  Private Lands Subject to 22(g)

0 50 100
Miles

Total acreage within refuge: 19,525,000 ± Ac.

ARCTIC
NATIONAL WILDLIFE REFUGE
USFWS DIVISION OF REALTY ANCHORAGE, AK.

Description:

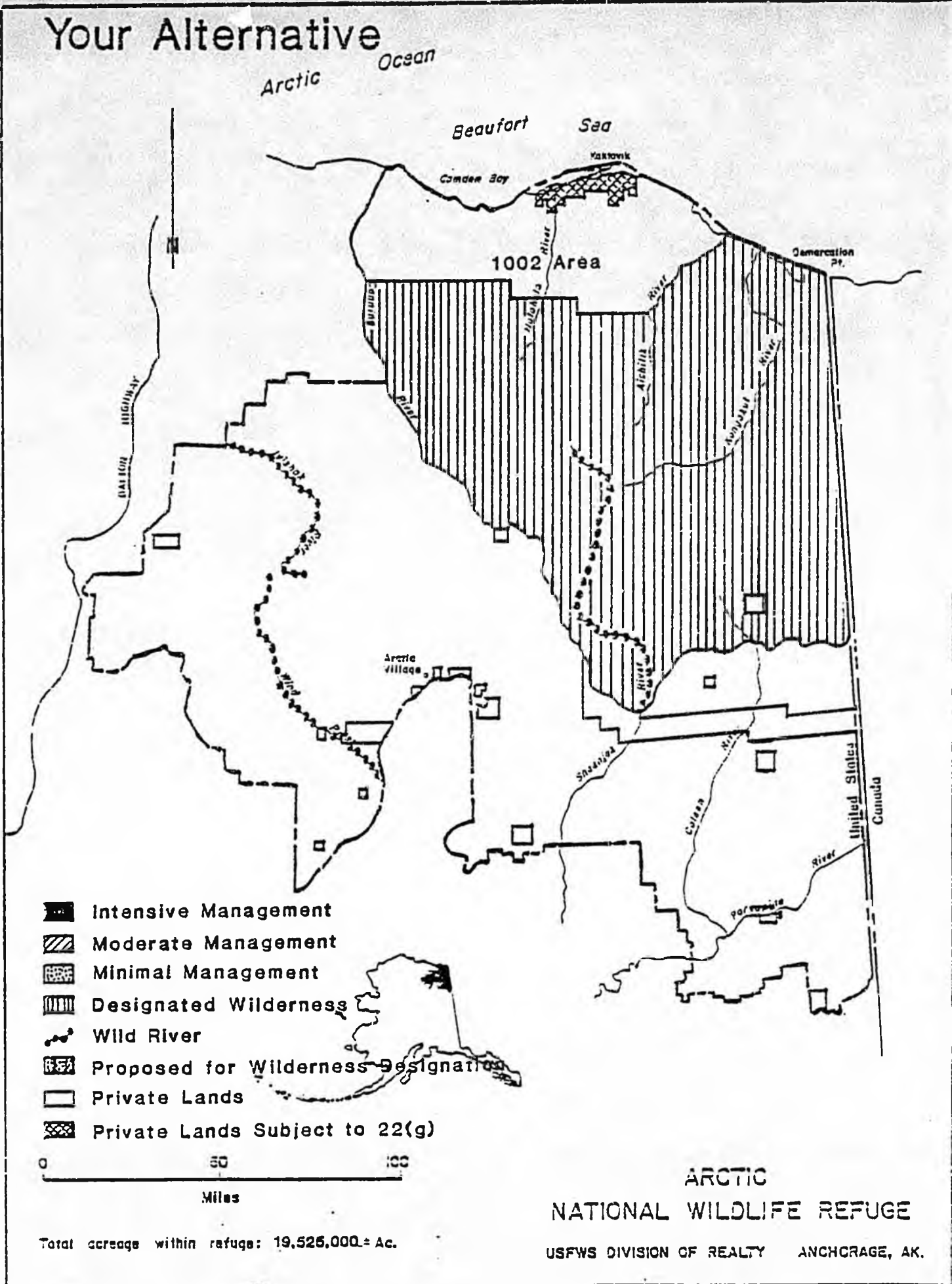
Alternative F, like Alternative B, would place the entire non-wilderness area within the refuge in wilderness. In addition, this alternative would provide an additional layer of protection on refuge lands by adopting the following special provisions:









- no new administrative facilities or recreational development
- limiting the size of recreational groups
- no helicopter access
- no motorboats in high mountain lakes
- no aircraft landings on the tundra
- identifying specific aircraft landing zones
- etc.

Intensive Management	0 acres
Moderate Management	0 acres
Minimal Management	0 acres
Designated Wilderness	8,000,000 acres
Proposed for Wilderness Designation	9,800,000 acres

Comments:

Your Alternative



-  Intensive Management
-  Moderate Management
-  Minimal Management
-  Designated Wilderness
-  Wild River
-  Proposed for Wilderness Designation
-  Private Lands
-  Private Lands Subject to 22(g)

0 50 100
Miles

Total acreage within refuge: 19,525,000 ± Ac.

ARCTIC
NATIONAL WILDLIFE REFUGE

USFWS DIVISION OF REALTY ANCHORAGE, AK.

Description:

My suggested alternative would _____

Staple

fold here

Stamp

Arctic Refuge Planning Team
U.S. Fish & Wildlife Service
1011 E. Tudor Road
Anchorage, AK 99508


Alaska State Legislature
Representative Niilo Koponen

Pouch V
Juneau, Alaska 99811
(907) 465-4992

542 4th Avenue, Suite C
Fairbanks, Alaska 99701
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MEMORANDUM

FEBRUARY 23, 1987

TO: all legislators
FROM: Rep. Koponen 
RE: Yukon Position on ANWR

Our actions on the very important topic of oil development in the 1002 area of the Arctic National Wildlife Refuge are of international concern. It is sometimes overlooked that we have treaty obligations with Canada. To help legislators understand the perspective of our neighbors, I have distributed these excerpts from the journal of the Yukon Legislative Assembly.



The Tuvalu Legislative Assembly

Number 67

3rd Session

26th Legislature

HANSARD

Wednesday, January 28, 1987 — 1:30 p.m.

Speaker: The Honourable Sam Johnston

MINISTERIAL STATEMENTS

Meeting with the hon. Joe Clark regarding Alaskan Sale "97" and "1002" Lands

Hon. Mr. Penikett: I wish to report to the Legislature today on our government's recent meeting in Toronto with the hon. Joe Clark, federal Minister for External Affairs.

As you are aware, our Legislature recently expressed its concern on two matters of great concern to Yukoners: the Alaskan Sale 97 lands, offering possible oil leases in an area of the Beaufort Sea under jurisdictional dispute; and the Sale 1002 lands offering possible oil leases within the Arctic National Wildlife Refuge in an area of sensitivity to the Porcupine caribou herd. Our telex to Mr. Clark of December 8, 1986, expressing our concern, was acknowledged in a letter from Mr. Clark on December 30, inviting us to discuss matters further with him. This we did last Friday in Toronto.

Our meeting produced a better understanding between our governments of our respective concerns and of the importance and priority we attach to these issues.

On the Sale 97 lands, we learned from Mr. Clark that the United States government has put the exploration leases it intended to offer in the disputed area of the Beaufort Sea in escrow for an unspecified period of time. In effect, this indefinitely postpones the issuance of leases without abandoning their claim to the area under dispute. Mr. Clark indicated that, for the time being, this was a preferred position, offering the opportunity to carefully weigh future options for pursuing Canada's claims. Clearly, this does not resolve the issue, but the decision by the United States does allow our governments to consider the most opportune time and method for advancing our interest in the area.

Mr. Clark also committed the federal government to discussions between our governments over possible interventions on the Alaskan 1002 lands. Clearly, he recognizes the potential impacts development in the Arctic National Wildlife Refuge would have on the Porcupine caribou herd's calving grounds. We stressed to Mr. Clark our opposition to any development in the area that would negatively affect the herd's population and strongly urged the federal government to consider a similar position. It was our understanding from our meeting that the federal government would take a position on the matter after our officials have the opportunity to meet in Ottawa next week. Subsequently, they will make a representation to the United States government on that development.

In our discussions concerning an international treaty to protect the Porcupine caribou herd, Mr. Clark indicated his belief that a negotiated agreement would be preferable. Such an agreement would hold the same force in law without requiring further lengthy delays prior to congressional approval.

Both the Yukon and federal governments remain committed to the long-term health of the Porcupine caribou herd and the protection of

our mutual interests in the Beaufort Sea. We will continue to meet with one another, and with Alaskan officials, to ensure just that.

Mr. Phelps: The problem with this Ministerial Statement, and some others, makes us, on this side, wonder why news that has already been disseminated throughout the Yukon and the media has to be regurgitated here.

We are in support of the position that has been taken by this government on the issue of Sale 97 Lands and the Alaskan 1002 lands. We are pleased to see that they have had these meetings, and we fully support these actions. With regard to the concept, a negotiated agreement would be preferable to trying to have a treaty ratified in the U.S. That is a position that we find acceptable. In fact, in previous years, we had active discussions with the Alaskan government to see whether even a lower level agreement might be put in place to delay a higher level agreement between the two nations — that is, an agreement between the territories and Alaska, or even Yukon, in order to get something in place to try to protect the calving grounds on the Alaskan side of the border.

Once again, we support the actions taken, and we are pleased to see that the government does see this as a priority.

Speaker: This then brings us to Question Period. Are there any questions?



The Yukon Legislative Assembly

Number 58

3rd Session

26th Legislature

HANSARD

Tuesday, January 6, 1987 — 1:30 p.m.

Speaker: The Honourable Sam Johnston

consulting Canada without considering the transboundary effects on Canada; and without looking at the total cumulative effects of all the developments on the caribou, polar bears, snow geese and musk oxen.

A presentation was also made by the Council for Yukon Indians and additional interventions are being made tonight in the village of Katovik, Alaska by the Porcupine Caribou Management Board and the Band Council of Old Crow. On Friday of this week my Deputy Minister and a representative from the Executive Council Office will make a further intervention in Washington, D.C.

Further to these initiatives, the federal government hopes to present its position on the issues to the United States Department of Interior at a meeting in Ottawa to be held on January 23. The Yukon government will also be represented at that meeting.

It is a little ironic and very disturbing that the US government is proposing to reduce protection for the wildlife of the Arctic Coastal Plain after years of urging Canada to do a better job of protecting resources on our side of the border. Now, we have a national park and a special management mechanism in place and have, in effect, caught up with the U.S. They seem to be headed in the opposite direction.

It is even more disturbing that they would write an impact statement that only makes passing reference to the effects in Canada when, in fact, several important subsistence species are involved and most of the negative socio-economic effects would be experienced in Canada generally and by Old Crow in particular.

The Yukon government is deeply concerned about moves toward oil and gas drilling in Alaska that could have unfortunate and unnecessary long-term effects on the ability of the Old Crow people to harvest the Porcupine caribou herd, as they have traditionally harvested the herd for generations.

In light of these circumstances, we have instructed our officials to make very strong statements on behalf of our government and in the interests of the people of Old Crow and the people of the Yukon in the north. Copies of the statements that were made in Anchorage have been tabled before the Legislature.

Mr. Phelps: I would like to take this opportunity to say that I am, and our side is, very pleased to see these significant steps being taken by our government on behalf of the Old Crow people, the indigenous people of Yukon, all Yukoners and all Canadians.

Several weeks ago, during debate of the motion pertaining to this issue, I said that the protection of our north, our sovereignty, our environment, our people, requires constant vigilance by the Government of Yukon. I am very pleased to see that the government is in constant vigilance in that respect.

I want all groups including this government, to know that this side supports them. In particular, we support the Old Crow Band Council and the people of Old Crow in their efforts to dissuade the powers that be from doing anything precipitous with regard to the environment on the Alaskan North Slope.

We hope that the government will make known to the people in the United States the unanimous feelings of the Members of this Legislature as expressed in debate of Ms. Kassi's motion on the subject.

Mr. McLachlan: I would highly endorse the actions of the Minister and his department. However, I have a concern about the method of presenting our position to the United States Department of the Interior. My concern is that we could greatly improve the impact of our position if we were to be accompanied by a representative of the federal government sooner rather than later when we meet with them this Friday.

It is essential that the U.S. government is made to recognize our opposition to this type of development on the Arctic National Wildlife Refuge coastal plain. In the past, the U.S. government would appear to respond only to powerful lobbying by those groups that oppose such a move. If we hope to persuade the Alaskan government of this most delicate refuge, we must use all of the government clout available. This government must insist that the federal government take a very active role in supporting our position on this matter immediately.

MINISTERIAL STATEMENTS

Yukon Government Presentations to U.S. Department of Interior Hearings on the future of the Arctic National Wildlife Refuge, Coastal Plain

Hon. Mr. Porter: Mr. Speaker, I am pleased to announce today that I have taken steps to ensure that the Yukon government, as well as several major interest groups, are making comprehensive presentations to the United States Government, opposing their proposal to open up the heart of the Porcupine caribou herd calving grounds to oil and gas development in Alaska. These presentations represent the actions we are taking to implement the unanimous motion of this House several weeks ago.

Yesterday in Anchorage, officials of the Department of Renewable Resources spoke to a number of very serious omissions in the draft environmental impact statement. The Department of Interior is proposing to open up a vast area on the Northern side of the Arctic National Wildlife Refuge to oil and gas leases: without first



The Yukon Legislative Assembly

Number 51

3rd Session

29th Legislature

HANSARD

Tuesday, December 9, 1988 — 1:30 p.m.

Speaker: The Honourable Sam Johnston

GOVERNMENT MOTIONS

Motion to Waive Standing Order 27

Hon. Mr. Porter: I would like to request unanimous consent of the House to waive Standing Order 27 with respect to notice in order to deal with Motion 67 standing on the Order Paper.

Speaker: Is there unanimous consent?

Some Members: Agreed.

Unanimous consent granted

Motion No. 67

Speaker: It has been moved by the Government Leader THAT the Speaker forward the following Address to the Prime Minister of Canada:

WHEREAS the Yukon Legislative Assembly has gone on record in support of the 141st Meridian as the offshore boundary between the Yukon and Alaska; and

WHEREAS recent initiatives by the Government of the United States to sell offshore petroleum exploration leases violate this boundary;

THEREFORE BE IT RESOLVED THAT this House urges the Government of Canada to assert Canadian sovereignty in Arctic waters by insisting that the Government of the United States respect the 141st Meridian as the international boundary from the Beaufort Sea coastline to the North Pole.

Hon. Mr. Penikett: Over the past several days, considerable attention has been given to two United States energy development initiatives.

As you are aware, the first concerns a proposal to open the Arctic National Wildlife Refuge to exploitation of oil and gas. This government has expressed its concern over the potential impact on the Porcupine caribou herd habitat by way of a motion standing in the name of the Member for Old Crow and passed by this House following an eloquent intervention by the Leader of the Official Opposition on December 3. As you will recall, this motion called upon the Government of Canada to ensure that an international agreement on caribou be concluded prior to any decision being made with respect to industrial activity within the refuge.

The second initiative concerns the proposed sale of 8.58 million hectares of offshore oil and gas leases in the Beaufort and Chukchi Seas. Our concern with this proposed sale is twofold.

In the first instance, at least two of the proposed lease blocks extend eastward across the 141st Meridian into waters claimed by Canada and forming part of the Yukon offshore. The United States has disputed Canada's claim to this part of the offshore and has stated that its policy is to reserve its rights in all disputed areas. Under this policy, leases can be sold in this territory and development could be approved prior to resolution of the dispute.

Despite repeated requests by the United States to begin negotiations on a number of boundary disputes, and despite the motion passed in this House in May of this year, asking that the Government of Canada assert its sovereign claim to this area, the Minister of External Affairs has, so far, taken no action. In fact, he has expressly stated to his U.S. counterparts that he is not prepared to discuss any of Canada's boundary issues at this time.

"There are, no doubt, many mysterious processes in the world of high diplomacy and there are, no doubt, many subterranean passages to the hearts and minds of the powers that be in Ottawa. I must say that for those of us who are plain folk, ordinary citizens, even legislators in a little corner of the world like this, that we find Mr. Clark's attitude and the attitude of the Canadian government curious, given his repeated commendable statements regarding the assertion of Canadian sovereignty in the Arctic. I am therefore calling on this House to allow me to point out to Canada's Minister

of External Affairs the Yukon's economic and environmental interests in the disputed area and to express our opinion that discussions be held immediately to confirm the 141st meridian as the official northern boundary between the two countries.

I should also like to point out that later this week I will be tabling in this House our response to the Report of the Special Joint Committee on Canada's International Relations. This communication to the Minister of External Affairs reaffirms this government's position regarding our offshore boundary. It will further point out that our interest in the offshore should not be bargained away for any U.S. concessions during negotiations on other, more visible, boundary disputes.

I said that our concern with regard to the proposed offshore lease was twofold.

Notwithstanding our obvious interest in the boundary issue, we are also very concerned with the environmental implications of the proposed offshore development in the Beaufort.

The environmental Impact Statement prepared for the Sale 97 lands indicates that there is an 82 percent chance of an oil spill greater than 1,000 barrels occurring during the expected life of the project. The Yukon, therefore, must obviously be concerned with the effect such a spill would have on the sea mammals, fish and birds that do not respect any boundaries and move freely from U.S. to Canadian waters, and that these animals are a resource upon which northern aboriginal people depend.

This government has therefore decided to intervene at public hearings into the EIS scheduled for Anchorage, Alaska later this month. At that time we will make known our concerns regarding the environmental issues and will use the opportunity to again stress our objection to the sale of leases in what we profoundly believe are Canadian waters.

"It is our view that the United States has no right whatsoever to issue leases in Canada. I would encourage all Members of this House to support this motion in order that a very clear message can be sent to the Right Hon. Joe Clark and to the Government on this issue, which is of great symbolic, material, economic and environmental significance to the Yukon and to Canada.

Mr. Phelps: I once again am pleased to stand in the House and support what I hope will be a unanimously passed motion, because the jurisdictional problems of the Yukon and the north and indeed in the Beaufort Sea are problems that seem continuous. The fight has to be continuous. They are problems that I have long held are critical to the future of Yukoners and to future generations of Yukoners. I honestly believe that many people do not understand just how beautiful that country is up there and how great the potential resources are, including the Porcupine caribou herd.

Over the course of the sittings that I have partaken in over the last year and a half, I have undertaken to put forward motions about that jurisdictional issue. Back on July 18, 1985, I rose on matter of pressing urgency to put forward a motion vis-a-vis the dispute between the NWT and the Yukon, as to which territory has jurisdiction to the north of the Yukon's coastline. I am pleased to say that at that time the motion, as I am sure this one will be, was passed unanimously.

Then again, in May of 1986, I was pleased to put forward a motion regarding the issue at hand. At that time, once again, the motion was passed unanimously. That motion read:

"THAT it is the opinion of this House that the 141st meridian forms the offshore boundary between the Yukon and the State of Alaska and the Beaufort Sea; and THAT the Government of Yukon should urge the Government of Canada to initiate additional measures to assert Canadian sovereignty in Arctic waters including giving consideration to basing its proposed new Polar Class 8 icebreaker at a deep water port at King Point on Yukon's North coast should such a port be constructed."

"In March, 1986 I had the pleasure of appearing before the Special Joint Parliamentary Senate Committee on Canada's International Affairs. At the time of the hearings on March 20, I indicated our concern over this issue and stated that we understand that the United States government has indicated that it is ready to start negotiations with Canada to resolve boundary disputes on the west

coast and that Canada has accepted. It has also been agreed that the boundary between B.C. and Washington State off the Strait of Juan de Fuca and between B.C. and Alaska off the Dickson Entrance will be negotiated first, leaving the Alaska and Yukon boundary on the Beaufort Sea to be negotiated at a future date.

Yukoners are concerned that if this approach is taken the Beaufort boundary could be used as a pawn in order for Canada to achieve a better boundary arrangement off the west coast. Yukoners' fears are not unfounded, as our experience with Canada in negotiating a new Canada-U.S. Salmon Treaty has shown. I went on to state, in no uncertain terms, our position with regard to the issue.

The point is simply that if there is a forgotten place in the world, it is Yukon's north. If there is a place that seems to always play second fiddle, it is our coastline and our resources, at least in the minds of others. So, it is extremely important that we continue to voice our concerns and to unanimously try to ensure that these matters will be resolved in a final way and in a manner that is satisfactory to Yukoners.

I would like to take the opportunity to remind Member of the House of some of the problems that preceded the last 18 months. We had a situation where the COPE claim, which was the claim of Inuit peoples resident in the NWT, which was signed without any participation by the Yukon, despite the fact that the Yukon had been assured that it would be considered in negotiations. The agreement-in-principle was signed in 1978 without any such consultation with the Yukon, and it was a document that gave away not just the Beaufort Sea, but the entire north coast of the Yukon, including Herschel Island. It gave that important land away, back to Canada, to be used as a new kind of park known as a wilderness park.

" This government fought tooth and nail, not only to fight its way into the negotiations that took place after that, but to try to ensure that we would not lose the coastline. Finally, six years after that unfortunate incident, success was attained, but that was one battle and not the war. The fight goes on. We are going to have to continue to exercise diligence to ensure that we do not lose land to overlapping claims, to ensure that the jurisdictional dispute between our territory and the NWT is resolved satisfactorily. It is also critical that we make our position completely clear to the Department of External Affairs and to the Government of Canada.

I have no problem, as Leader of the Conservative Party in Yukon and of the Official Opposition, in unanimously supporting this motion and being critical, publicly, whenever Canada is derelict in its duty to Yukon, no matter what party is in power in Ottawa.

It is for those reasons that I now urge the government to be more diligent in constantly updating and reminding the other jurisdictions of our concerns with respect to our heritage — north Yukon — to continue the fight for preservation of the habitat of the Porcupine caribou herd, and to take whatever steps are necessary to try to fight off this latest intrusion into our Beaufort Sea.

Hon. Mr. Porter: I would like to thank the Leader of the Official Opposition for his remarks on this particular motion today, and would like to join him in some of the comments that he has put forward.

Like the Leader of the Official Opposition, I have had the particular pleasure of spending considerable time in the North Slope region of both the NWT and the Yukon. I have worked in the operations of the rigs out in the Beaufort Sea, as well as participated in some of the traditional whaling camps offshore. I have also spent much time flying over the area and, as recently as this summer, have had the opportunity to visit Herschel Island.

There is no question that that part of the Yukon, which very few Canadians and Yukoners know about, is an extremely important part of our territory. Like the Leader of the Official Opposition has pointed out, it is a very beautiful part of the territory. It is a landscape that is very different from the rest of the Yukon. Unlike many parts of southern Yukon, which contains very rugged mountains with huge icefields and other terrain, the mountains in northern Yukon are very gentle, and there is a lot of open tundra flowing into the ocean.

" I think that if people were able to have the opportunity to see that

part of the world they would agree with me and the previous speaker that this is an area worth protecting and worth preserving.

On the question of the COPE claim and what has resulted from the COPE claim, clearly now we are at the position as governments to begin looking at the implementation of that claim. As a result of the COPE claim, Canada has reserved a portion of the area in question as a national park. We have the second newest national park in Canada created on the North Slope of the Yukon, called the Northern Yukon National Park. As we stated earlier in debates on the supplementary that is before the House, the Department of Renewable Resources is leading the way in the government for the implementation of those aspects of that claim and we are also working with other governments and the Inuvialuit toward establishing a territorial park on Herschel Island.

So, clearly, Canada, as a country, with the participation of the people of the Yukon, has demonstrated its interest and is moving to protect its interest. We have made very clear statements as to how we feel about that particular area and we have made some very concrete moves of a management nature to reflect the degree of feeling that we have with regard to that part of the world.

With respect to the question of the Porcupine caribou herd and negotiations, last week we passed a motion in this House clearly demonstrating the Yukon's opposition to what was intended by the oil and gas interests to explore that area prior to having a solid agreement of an international nature between Canada and the United States with respect to the Porcupine caribou herd. Things seemed to have happened very quickly last week. We debated the motion in the House one day and the next day our negotiators came back from Seattle with an initialled agreement. I would like to point out for the record, that in fact things did not happen simply in a two-day period. Negotiations with respect to the international agreement have been going on for years. Over a year ago we completed an in-Canada agreement between the Canadian jurisdictions on the Porcupine caribou herd and since that point there has been considerable time spent on trying to bring the Americans to the table and to conclude an agreement. There has been an awful lot of leg work done with respect to speaking to people in rural Alaska and speaking to interests in Anchorage and Juneau, as well as participating in meetings between ourselves, the Canadian government, and the U.S. officials concerned with that particular issue.

At the present point, an agreement has been initialled by the negotiators. The process now calls for the principals to the negotiations to review what has been put forward by the negotiators, and I expect that the Cabinet of Yukon will be reviewing that agreement within the next two to three weeks and will be making its views known.

I am happy to hear that the Government Leader has stated on behalf of our government that we intend to pursue the public process that is accorded to all of those who wish to speak on the issue of the environmental statement issued by the U.S. Department of the Interior. It would be my intention that we give full expression to our position with respect to the caribou agreement. If we should find that the caribou agreement does not afford the resource the necessary protection it deserves, then I would suggest that this government should be in a position to exhaust all avenues to articulate the position of the people of the Yukon. If that means going to Juneau and meeting with the Governor's office or going through to Washington to be able to knock on the doors of Congress to make our views known, then I think that the issue before us and the issue of the protection of the Porcupine caribou herd deserves nothing less than that.

" With respect to the long-term view of the initiative that we are concerned with, there is no question that there is legal uncertainty with respect to rights to the offshore Yukon of the Beaufort. We have had cases on the books with respect to initiatives in the eastern part of Canada where legal challenges have been made that question the federal authority on the question of jurisdiction. There have been cases in British Columbia — which are of provincial versus federal interests — in terms of who owns the resources that are contained offshore and who has rights to explore them.

In some cases, there have been negotiated agreements between the federal government and the province concerned. Those agree-

ments have taken the nature of participation in terms of management of the resources and sharing of the revenues that have flown from exploitation of those resources.

There is no question in some people's minds that there are legal arguments on both sides of the issue as to whether or not we, as the Yukon, enjoy legal jurisdiction. Those are questions that are pending in some areas. Those are questions that are being asked and researched and studied by people in the academic field.

I think that we should fight vigorously on this question to keep the door open for the future. Although, at the present time, we do not enjoy provincial status and we do not enjoy jurisdiction over our resources in the Yukon, the day will come when the Yukon will have that opportunity, when we will be able to negotiate our way into Confederation on an equal basis with all of the rest of the provinces in Canada. We should make sure that, when that day arrives, we do enjoy equal opportunity to own the resources and do benefit from the exploitation of those resources.

It would be my position that supporting this motion and supporting Canada's initiative to assert Canadian sovereignty in this area, in the long term, will protect the Yukon's interest to be able to enjoy the day when it does have constitutional, entrenched ownership of those resources, and that those resources are then utilized by the generations yet to come.

This motion is a very important motion, in not only the immediate term, but it is a motion that sets the tone for Yukon's constitutional development for the future as well.

Mr. Nordling: I support the motion of the Government Leader, and I am sure it will receive unanimous support of this House.

This issue is not new to the Legislature. It has been discussed many times before and, most recently, in May of 1986 when, as the Leader of the Official Opposition said, he brought forward a motion in the House, the first part of which was that it is the opinion of this House that the 141st Meridian form the offshore boundary between the Yukon and the State of Alaska in the Beaufort Sea.

The second part of the motion called for Canada to initiate additional measures to assert Canadian sovereignty in Arctic waters. It is important that Canadians do assert sovereignty over Arctic waters, or we stand to lose them.

It appears that the American plan is to assert its sovereignty by selling oil leases over waters east of the 141st meridian in the hope of obtaining ownership or a further claim to that area. The Americans are arguing that the boundary line should be drawn at right angles to the shoreline where the 141st meridian meets the Beaufort Sea.

If we do not take immediate action, this may become the accepted method of determining that boundary. You can bet that if that stretch of coastline, at the intersection of the 141st meridian and the Beaufort Sea, slanted the other way at a right angle from the coast and gave Canada a huge chunk of the waters north of Alaska, the Americans would have none of it. We must speak up now and play a role to make sure that this huge piece of our offshore territory is not traded off as a concession for east coast or west coast offshore settlements.

There is no question that we will be pushed. If we do not show an interest, we will be taken advantage of by both the federal government and the Americans. I do not advocate breaking protocol or doing anything rash at this point. I understand that the squeaky wheel gets the grease, but let us not start a fight with the big boys right now, not until it is obvious that it is our only option.

We should encourage talks to start immediately, and then insist on being present, even as observers if we are not given direct input, so that the federal negotiating team who will be negotiating on our behalf will at least feel our presence and be aware of our concern while the talks are going on. I strongly support the Government Leader's motion, and by having as many as we have had in the House speak on it, I am sure that he will be able to go to the Government of Canada with a clear mandate from this House.

Hon. Mr. Kimmerly: I was not intending to speak, however, the positions put forward by the Member for Porter Creek West were slightly less forceful than the positions put forward by the

Leader of the Official Opposition and the government. I am rising simply to say that if persons reading the debate note an inconsistency, the position of the government is that we should maintain a forceful position throughout.

» The Leader of the Official Opposition was closer to the mark.

Mr. McLachlan: I, too, rise in support of the motion of the Government Leader. I was very surprised last week to hear the Minister of Indian and Northern Affairs say only that the issue was provocative. It is far more than provocative. It is extremely dangerous. Part of the problem is that the Prime Minister and the Minister of External Affairs are engaged in a hand-holding exercise with the President of the United States. They are reluctant to abuse the hand that is feeding them.

It is surprising that the Minister of External Affairs, who is also a former Prime Minister of Canada, has not taken any stronger action with the United States.

As soon as the prospect of finding oil or natural gas becomes a possibility, and a dollar can be made off the leases in the sea, it will not be sufficient then to leave the matter for discussion around a boardroom table in Ottawa. The stakes go up too high and too fast. I would urge all Members to follow the actions of the Government Leader and the Leader of the Official Opposition in taking the strong hand, taking the upper route and making sure that the government in Ottawa knows very well our position and our feelings.

Motion No. 67 agreed to

Mark A. Fisher

The Buffalo of the North: Caribou (*Rangifer tarandus*) and Human Developments

A.T. BERGERUD¹, R.D. JAKIMCHUK², and D.R. CARRUTHERS²

ABSTRACT. The demography, movement, and behaviour patterns of eight caribou populations (Kaminuriak, Nelchina, Central Arctic, Fortymile, Porcupine, British Columbia, Newfoundland, and Snøhetta) exposed to industrial activities or transportation corridors are reviewed. Behaviour patterns of caribou encountering transportation corridors are explainable in terms of adaptive responses to natural environmental features. There is no evidence that disturbance activities or habitat alteration have affected productivity. Transportation corridors have adversely affected caribou numbers by facilitating access by hunters. There are no examples where physical features of corridors or associated disturbances have affected numbers or productivity. Caribou apparently have a high degree of resilience to human disturbance, and seasonal movement patterns and extent of range occupancy appear to be a function of population size rather than of extrinsic disturbance. The carrying capacity of the habitat is based on the space caribou need to interact successfully with their natural predators. Caribou must not be prevented from crossing transportation corridors by the construction of physical barriers, by firing lines created by hunting activity along a corridor, or by intense harassment — a loss in usable space will ultimately result in reduced abundance.

Key words: caribou (*Rangifer tarandus*), disturbance, wolves, predation, overharvest, access

RÉSUMÉ. L'article examine les données ayant trait à la démographie, aux déplacements et au comportement de huit populations de caribous (Kaminuriak, Nelchina, Arctique central, Fortymile, Porcupine, Colombie-Britannique, Terre-Neuve et Snøhetta) exposées aux activités industrielles et aux corridors de transport. Le comportement des caribous ayant contact avec les corridors de transport peut être expliqué comme réaction d'adaptation aux traits naturels du milieu. Les corridors de transport ont affecté de façon défavorable le nombre de caribous en facilitant l'accès aux chasseurs. Il n'existe aucun exemple dans lequel les aspects physiques des corridors ou des problèmes associés ont touché le nombre ou la productivité. Le caribou possède apparemment un niveau élevé de résistance aux interventions humaines, et son déplacement saisonnier et la portée de sa distribution semble varier en fonction des variations en population plutôt que des dérangements extrinsèques. La capacité de soutien de l'habitat est fondée sur l'espace dont a besoin le caribou pour réagir de façon satisfaisante face à ses prédateurs naturels. Le caribou ne doit pas être empêché de traverser les corridors de transport par la construction de barrières physiques, par les lignes de tir créées par la chasse le long du corridor ou par des harcèlements intenses: il en résulterait une perte d'espace qui entraînerait éventuellement une réduction des nombres.

Mots clés: caribou (*Rangifer tarandus*), dérangement, loups, prédation, surchasse, l'accès aux chasseurs

Traduit pour le journal par Maurice Guibord.

INTRODUCTION

During the past decade, considerable research has been carried out on disturbance to northern mammals. In particular, various pipeline projects and proposals became the focal point of environmental concerns, debate, and public hearings. The Trans-Alaska Oil Pipeline (TAPS) is now an operating system, and continued research (Cameron and Whitten, 1976, 1980) is providing information on the response of caribou to that development and its ancillary activities. Klein (1971, 1973) examined issues of potential concern involving caribou populations, including obstruction of movements and various types of direct disturbance to populations and their habitats. Natural gas pipeline proposals in Canada and the U.S.A. stimulated baseline research and disturbance studies sponsored by government, industry, and academic institutions. The implications of aircraft disturbance received considerable attention (Miller and Gunn, 1979), supplementing earlier quantitative evaluations of caribou responses to noise (McCourt and Horstman, 1974) and roads (Surrendi and DeBock, 1976).

With increased interest in disturbance as a facet of impact assessment, considerable debate on its significance to wildlife took place within the profession and in public fora (Jakimchuk, 1978). In the early and mid-1970s, bio-energetic impacts were postulated as a concern related to industrial developments (Geist, 1975).

A panel discussion at the First International Reindeer/Caribou Symposium in 1972 was devoted to the implications to caribou of northern development; several papers on disturbance-related topics were presented there and at the Second International Reindeer/Caribou Symposium in 1979. These symposia brought together an enormous amount of research, much which is relevant to evaluating the significance of disturbance to caribou populations. The literature available on human disturbance to northern large mammals is compiled in Shank's (1979) annotated bibliography and review containing over 551 references. Sopuck *et al.* (1979) have also completed a comprehensive review of general wildlife impacts including disturbance to large and small mammals. Klein (1980) expanded his 1971 assessment of the effects of obstructions on caribou.

In a casual examination of the existing literature, one may find evidence to support virtually any conclusion regarding the significance of disturbance to large ungulates (Shank, 1979). This uncertainty is largely a result of the emphasis being placed on individual and group observations which are then extrapolated to the population level, and of the great variation in information ranging from anecdotal notes to quantitative studies. To date, there have been no studies directed specifically at establishing the effect of specific disturbance(s) on the population dynamics of caribou. The difficulties involved in such a study are obvious. However, in a number of

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cases the status of populations has been analyzed in relation to disturbance forces operating within their environment (Klein, 1971, 1980; Bergerud, 1974a; Calef, 1974).

We agree with Shank's (1979:5) comment, "In actuality, there is a potentially infinite universe of manners in which human activity can influence animal populations and merely demonstrating that one factor is not operative does not negate the influence of the remainder of possible factors. In other words, the only way in which population responses can be shown not to be influenced by disturbance is to study population dynamics."



FIG. 1. The location of caribou herds described in this study. 1) Nelchina; 2) Fortymile; 3) Central Arctic; 4) Porcupine; 5) Kaminuriak; 6) British Columbia; 7) Interior; and 8) Avalon.

In this paper we will assess the impact of human disturbance on the demography of eight caribou herds (Fig. 1): the Porcupine, Nelchina, Central Arctic, Fortymile, and Kaminuriak herds; herds in British Columbia and Newfoundland; and the Snøhetta herd in Norway. We have conducted field studies of five of these herds. We have selected these particular herds because they have been mentioned as possibly being adversely affected by human impacts and some demographic statistics are available to evaluate those assertions. In our assessment of human impacts we go beyond simple correlation reasoning which links a response to a coincident event. Instead, we examine data on reproduction and mortality rates, the underlying causes of the observed rates, changes in population size, herd movements, and range use. Our objective is to show how simple correlation reasoning on the effects of human disturbance on caribou obscures alternative explanations and may lead to untestable generalizations and insupportable conclusions.

We define human disturbance very broadly to include hunting impacts, manipulation of predator populations, development disturbance (transportation corridors and physical structures), and habitat modifications such as logging and flooding.

DEMOGRAPHIC CASE HISTORIES

Porcupine Herd

In 1961 Skoog (1961) estimated 110 000 to 117 000 animals in the Porcupine herd. Lentfer (1965) estimated 140 000 in 1965, and subsequent population estimates fell within the

range of 100 000-110 000. In 1972, LeResche (1975) estimated 93 000-103 000, and in the same year Roseneau and Stern (1974) estimated 90 000-107 000. In 1977 Bente and Roseneau (1978) estimated 105 000. Hinman (1981) reported an estimated 110 000 animals in 1980. Over the past 20 years the Porcupine herd has remained stable at 100 000-110 000 animals (Fig. 2).

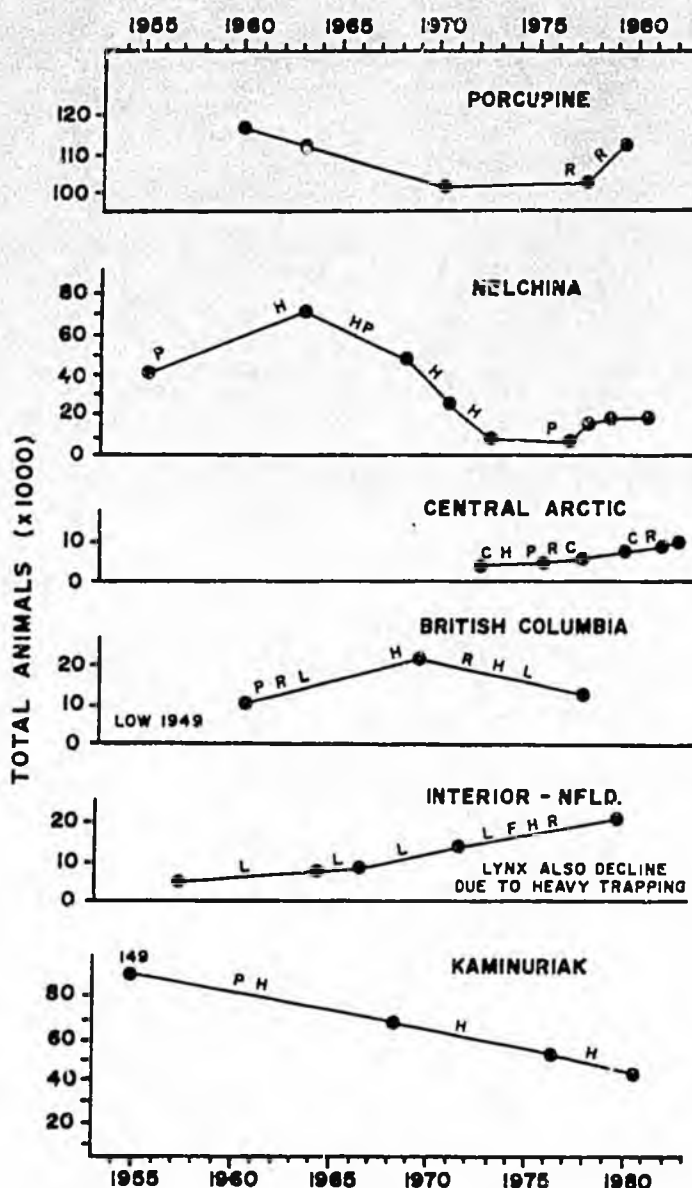


FIG. 2. Trends in population size of (a) Porcupine, (b) Nelchina, (c) Central Arctic, (d) British Columbia, (e) Interior Newfoundland, and (f) Kaminuriak caribou herds, 1949-1981, compared with presence of disturbance features (Skoog, 1968; Bos, 1975; Hawkins and Calef, 1977; Bergerud, 1978; Hinman, 1981; Pitcher, 1982; E. Mercer, pers. comm. 1982; Whitten and Cameron, 1983). Key: P = predator control; H = hunting; C = construction; R = roads; F = flooding; L = logging.

Yearling recruitment has been 10-11% of the total population in July from 1971 to 1980 (Fig. 3) and calves of the year show a similar level of stability at 15-23% of the fall population (Bente and Roseneau, 1978; Hinman, 1981; Jakimchuk *et al.*, 1974; Roseneau and Stern, 1974). In the same period, hunter kill accounted for <3% of the population (Jakimchuk

et al., 1974; Calef, 1974, 1975; Hinman, 1981). Since at least 1971, the Porcupine herd has consistently ranged over a 240 000-km² area.

No estimates of wolf (*Canis lupus*) predation rates are available for the Porcupine herd although Jakimchuk *et al.* (1974) observed 131 caribou kills during late winter surveys in 1971. Wolf numbers are thought to be low to moderate over the range. Martell and Russell (1983) estimated 5% annual adult mortality from all sources other than hunting.

Since the late 1960s construction of the Dempster Highway has bisected portions of the winter range of the herd in northern Yukon. In 1950 new construction transected a major spring migration corridor in the northern Richardson Mountains. The highway was completed in 1978, and at that time a five-mile no-hunting corridor was established along the highway. Crossing of the highway by caribou and use of winter ranges south of the highway have continued to the present time.

Nelchina Herd

The Nelchina herd was first estimated at 10 000 animals in 1945 (Skoog, 1968). Estimates from 1948 to 1954 varied from 5000 to 13 200 animals (Skoog, 1968; Bos, 1975). Calf percentage averaged near 15% (range = 13-17%) in 1951 and

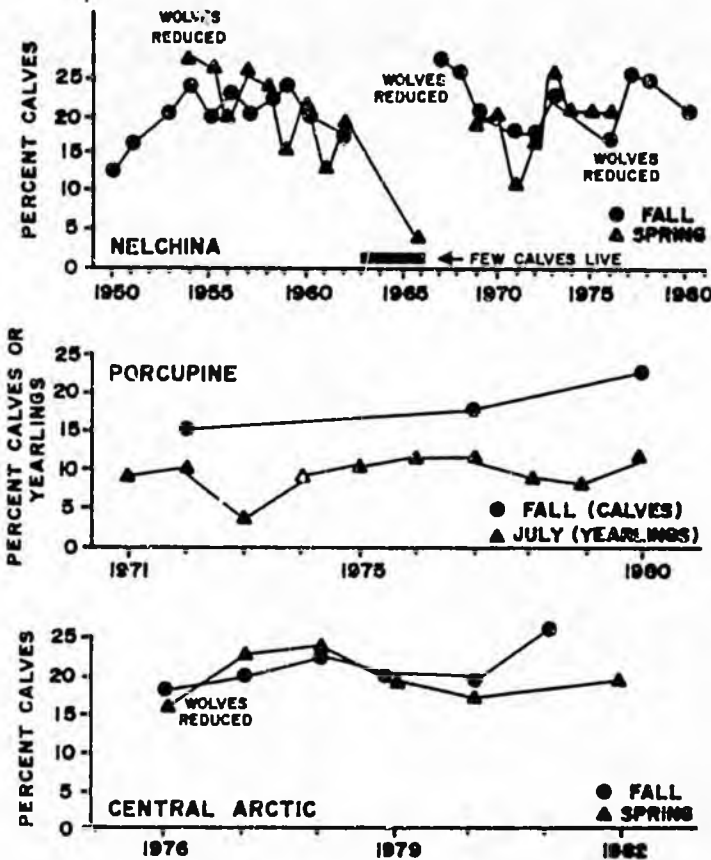


FIG. 3. Trends in calf production and recruitment for the (a) Nelchina, (b) Porcupine, and (c) Central Arctic caribou herds, 1952-1981 (Skoog, 1968; Bos, 1975; Bente and Roseneau, 1978; Doerr, 1980; Hinman, 1981; D. Russell, pers. comm. 1982; Whitten and Cameron, 1983).

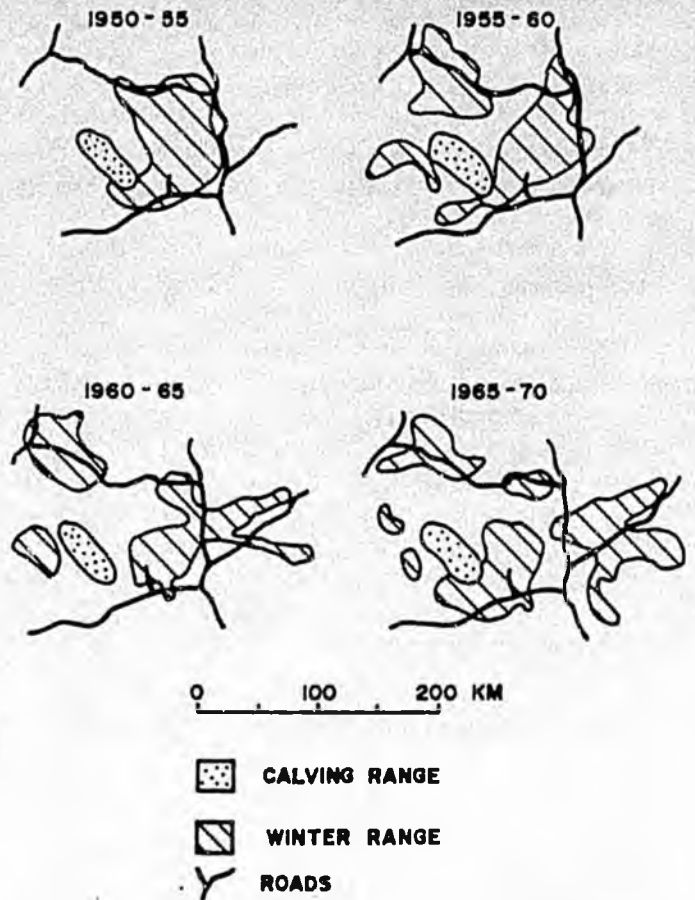


FIG. 4. Increase in extent of winter ranges used by the Nelchina herd, 1950-1970 and in 1973 (adapted from Hemming, 1971 and Bos, 1974).

1952 (Alaska Dept. Fish and Game Files). In the period 1948-1954, 200+ wolves were removed from the Nelchina range and by 1953 only 12 wolves were estimated to be present; these increased to possibly 425 animals by 1965 (Rausch, 1967). Wolves were again reduced and McIlroy (1976) estimated 300 in 1966-67.

The first systematic caribou census was conducted in February 1955 and estimated 40 000 caribou (Fig. 2; Watson and Scott, 1956). Clearly the early counts were too low. Now a unique opportunity was available: the status of both prey (caribou) and predator (wolves) was established and the interactions of the two could be documented. Skoog (1968) began his intensive studies of the herd in the presence of increasing, known, and unmanaged wolf populations.

Following wolf removal, calf survival was high and calves soon exceeded 20% of the herd (Fig. 3). The herd increased, reaching 71 000 in the winter of 1962-63 (Fig. 2; Skoog, 1968). The increase in numbers was followed by increased movement (Skoog, 1968:649) and range expansion (Fig. 4) across the Richardson Highway.

The herd declined rapidly from 48 000 in 1967-68 to 10 000 by 1972-73 (Fig. 2; Bos, 1975), coincident with an increase in wolf numbers (Rausch, 1967), a decrease in calf survival, and heavy incidence of hunting as the herd crossed the Richardson Highway. The survival of the 1964, 1965, and 1966 cohorts

was extremely low (Fig. 3; Bos, 1975). This low survival coincided with high wolf numbers, but when wolves were reduced in 1966-67 calf survival improved (Fig. 3). Coincident with a lack of recruitment, harvests of > 10% of the herd apparently occurred in many years between 1961 and 1971 (calculated from Bos, 1975). This heavy harvest was the major cause of the decline (Doerr, 1980).

The herd continued to migrate across the Richardson Highway as it declined, even in the presence of intense human disturbance from hunting. As the herd increased between 1955 and 1962, it expanded its range to include the same area it had ranged in the 1880s prior to the construction of most of the surrounding transportation corridors (Fig. 5). As the herd increased it crossed the Denali, Taylor, Glenn, and Richardson highways (Fig. 5). Roads were not a barrier to movement but did permit human access which greatly contributed to overharvest and subsequent decline.

The herd continued to decline after 1972 (Hinman, 1981), and in 1976 protective measures (a hunting closure in 1976 and permit-only hunting since 1977, and a wolf control pro-

gram) were implemented by the Alaska Department of Fish and Game. By 1981 the herd had increased to a full population of 20 730 and was considered to be increasing (Pitcher, 1982). Fall calf percentages have varied from 18% in 1976 to > 20% in subsequent years. Construction of the Trans-Alaska oil pipeline, generally parallel to the Richardson Highway, was underway during the mid-1970s. The pipeline, which bisects herd migration routes, was completed in 1977 during the period of the arrested decline of the Nelchina herd (Fig. 2). The increase in numbers and productivity of the herd which has continued to the present commenced during the actual construction period.

TABLE 1. Trends in population size for the Fortymile caribou herd

Year	Population	Source
1920s	500 000	Murie (1935)
1940s	10 000	Skoog (1956)
1950s	50 000	Davis <i>et al.</i> (1978)
1960s	Decreasing	Davis <i>et al.</i> (1978)
1968	30 000 - 40 000	Skoog (1968)
1972	15 000	LeResche (1975)
1975	4000	Davis <i>et al.</i> (1978)
1981	12 000	Hinman (1981)

Fortymile Herd

Davis *et al.* (1978) have provided a comprehensive review of the population dynamics of the Fortymile herd that is not reviewed here. The herd's numbers have fluctuated greatly in the twentieth century (Table 1). Some authors have implied that hunting along the Steese Highway may have resulted in range abandonment for the Fortymile herd in Alaska (Calef, 1974; LeResche, 1975).

As the herd has increased or decreased, its range has also expanded or contracted (Fig. 6). When the herd declined in the

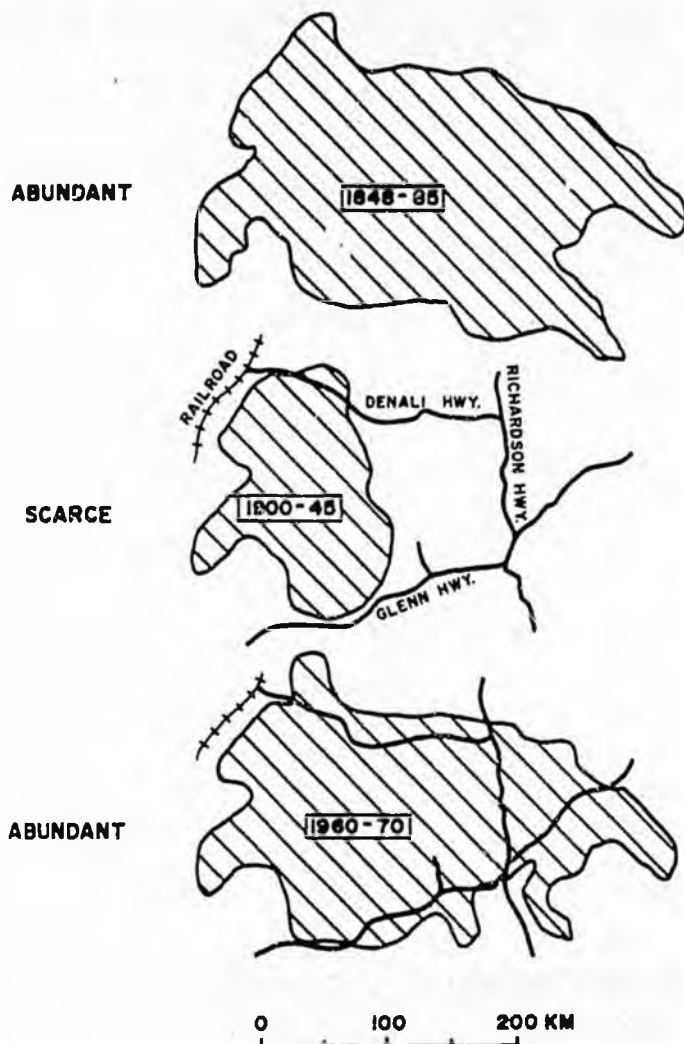


FIG. 5. Comparison of the range used by the Nelchina herd when it was abundant (1848-1885 and 1960-1970) and when it was scarce (1900-1945) (adapted from Hemming, 1975).

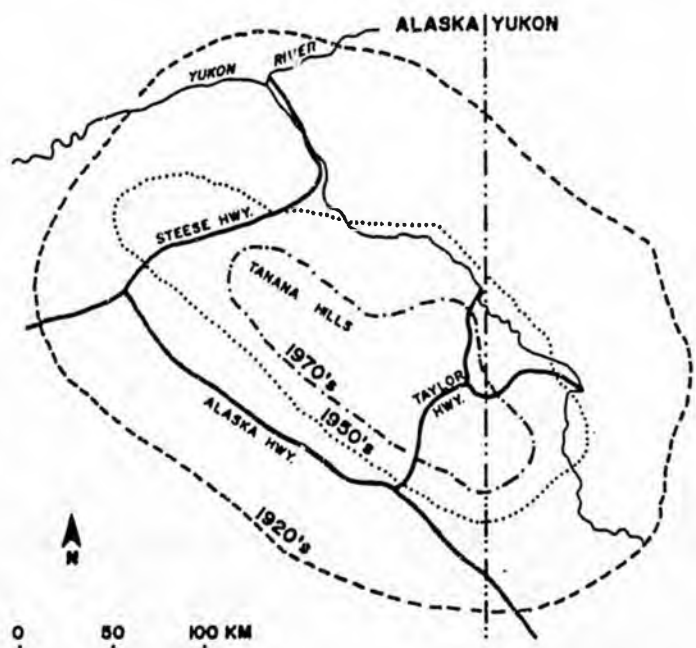


FIG. 6. Distribution of the Fortymile herd between the 1920s and 1970s (adapted from Davis *et al.*, 1978).

1960s and 1970s it stopped crossing the Steese Highway, but continued to cross the Taylor Highway (Davis *et al.*, 1978). The size of overall range of the herd has been positively correlated with abundance (Hemming, 1971; LeResche, 1975; Skoog, 1956; Davis *et al.*, 1978).

Davis *et al.* (1978:ii) concluded their review on limiting factors by stating: "From 1970 through 1972 harvests greatly exceeded the yearling recruitment rate and contributed greatly to the population decline...and...circumstantial evidence... strongly suggest[s] that predation is likely the major factor responsible for the continuous caribou decline since 1960..." We believe that the major impact of the Steese and Taylor highways has been to allow access by hunters, thereby contributing to the overharvest and decline of the herd; no barrier effect or range abandonment has been documented.

Central Arctic Herd

Skoog (1968) described caribou in Alaska's central arctic region prior to 1950 as the "Central Brooks Range herd". Thereafter the herd was thought to have merged with the Western Arctic herd. Child (1973) reviewed available information on caribou in the region and concluded that approximately 3000 caribou summered in the area around Prudhoe Bay in the early 1970s. Roseneau *et al.* (1974) believed that these caribou calved in the region, and referred to them as the Central Arctic herd. Cameron and Whitten (1976) considered these caribou a discrete subpopulation of 4000-6000 animals, characterized by synchronous and uniform north-south movements and fidelity to a calving ground on Alaska's North Slope. Recent calving grounds were subsequently described by Cameron *et al.* (1981). By 1982 the herd had increased to 9000 animals (Whitten and Cameron, 1983) (Fig. 2).

During the early period of development of the Prudhoe Bay oil field and before construction of the Trans-Alaska Pipeline System (TAPS), there were at least 30 000 caribou occupying the current range of the Central Arctic herd (Child, 1973). With the decline of the Western Arctic herd in the early 1970s, the number of caribou in the area declined to 5000 (Cameron and Whitten, 1976). We believe that the Central Arctic herd is a remnant of the Western Arctic herd that roamed the North Slope west of the Canning River in the recent and historic past (Skoog, 1968; Roby, 1978). Continued growth of both herds is likely to result in their integration, and the creation of new patterns of distribution and movement. Since 1976, increased numbers (1200-15 000) of Western Arctic caribou have been observed wintering in the range of the Central Arctic herd (Carruthers, 1983).

Studies of caribou response to the TAPS corridor in this region commenced in 1974 (Cameron and Whitten, 1976; Roby, 1978). The objectives of these studies centered on the postulated barrier and disturbance created by the TAPS and associated haul road and the implications to caribou range use and herd viability and integrity. These studies were initiated along the TAPS corridor (Sagavanirktok River valley) at a time when understanding of overall range use and movements was incomplete and affinities with adjacent herds were not

recognized as important considerations.

Roby (1978), Cameron *et al.* (1979), and Cameron and Whitten (1980) have reported local "abnormalities" in caribou distribution and group composition along the TAPS corridor, which they interpret as avoidance of the corridor. They conclude that this behaviour potentially can reduce the productivity of the herd and may result in "fracturing" of the herd. These effects have not been demonstrated during eight years of research and the consequences appear to be absent based on available demographic data which indicate a healthy, expanding population (Figs. 2, 3; Hinman, 1981; Whitten and Cameron, 1983).

The natural mortality rate is unknown but is considered to be low in view of the low wolf population after 1977 (Cameron and Whitten, 1979). Prior to 1977 wolves were "common" on the range of the Central Arctic herd (Roby, 1978; Cameron and Whitten, 1979). Between 1977 and 1979 "at least three active packs" were reduced to "two to three individuals" by legal and illegal hunting (Cameron and Whitten, 1979:34). Short-yearling recruitment between 1976 and 1978 increased from 16 to 24%, and averaged 22% after 1978 (Fig. 3; Cameron and Whitten, 1983).

Mortality from hunting appears to have been low (<2%) since 1976 (Cameron and Whitten, 1979; Hinman, 1981). Prior to 1976 there were no controls on hunting of the Central Arctic herd and the pre-1976 harvest is unknown (Cameron and Whitten, 1979).

The construction of the Dalton Highway (North Slope Haul Road) began in April 1974 and was completed in September 1974. The 122-cm-diameter Trans-Alaska Pipeline System was constructed parallel to the road and the Sagavanirktok River in 1975 and 1976. A small-diameter natural gas pipeline (buried) was constructed beside the Dalton Highway in 1976 and 1977. During this period hunting was restricted within 8 km of the Dalton Highway.

The Central Arctic herd continued to migrate north and south, parallel to the TAPS and the Dalton Highway, during and after this construction period. Between 1973 and 1982 the herd had increased at an average annual rate of 13%. Productivity in June was high (85 calves/100 cows) (Banfield *et al.*, 1981). Mortality rates probably decreased after 1976 because of legal and illegal wolf hunting, and hunter harvest of caribou is believed to have declined as a result of implementation of controls. The construction and operation of two pipelines and the Dalton Highway through the center of the range of the Central Arctic herd and the proliferation of oil field facilities in the Prudhoe Bay area were not correlated with a negative demographic response by the herd between 1974 and 1982.

At this time the Western Arctic herd, adjacent to the Central Arctic herd, is increasing (Davis and Valkenburg, 1983; Davis *et al.*, 1980). We predict that, as the Western Arctic herd increases, it will expand into the range now occupied by the Central Arctic herd. If that happens it could merge with the Central Arctic herd, with the result that behaviour of the latter herd will no longer be distinct and its current range use may change. We make this prediction now because, if the Central Arctic herd should abandon or alter its range, it would surely

be attributed to human disturbance rather than to the natural spacing shift of a large, mobile population.

British Columbia Herds

Caribou were common in the 1930s in B.C. but declined to low numbers in the 1940s and early 1950s (Bergerud, 1978). This decline coincided with an expansion in numbers and distribution of moose (*Alces alces*) and wolves (Hatter, 1950). Poisoning programs between 1940 and 1963 caused a decline in the wolf population. The caribou population then increased and reached at least 20 000 animals by 1968-1970 (Fig. 2; Bergerud, 1978). The population then declined again; by 1977-78, when many of the herds were censused, the population was down to 10 000 animals. A census of many of these herds in October 1982 indicated a further decline of approximately 50% (Bergerud, unpubl.).

The decline of caribou north of Prince George has been attributed to heavy predation on calves and to overharvest of adults resulting from increased hunter access along new transportation routes (Bergerud, 1978). In 1979 and 1980 young caribou calves were radio-tagged and followed for several months. Predation by wolves and bears was the major cause of mortality (R. Page, pers. comm. 1982).

Several herds were overharvested during the period of declining numbers. For example, the Pink Mountain-Prophet River herd declined from at least 3500 animals in 1969 to possibly only 300-400 animals in 1978. The increased harvest occurred because the Alaska Highway provided hunter access to caribou that came unusually far east, and because hunters travelled seismic lines via snowmobile to reach the animals. Other herds that were obviously overharvested because of increased hunter access included the Telkwa herd, the Tweedsmuir herd, and the Atlin herd (Bergerud, 1978). Helicopters were used to reach the Telkwa herd; the Tweedsmuir herd was accessible from boats travelling up a reservoir created by damming, and access to the Atlin herd was provided primarily by mining roads.

The decline of caribou in central B.C. south of Prince George (Yellowhead herd) was attributed to overhunting and to habitat destruction from logging (Bloomfield, 1980). He included as secondary adverse effects of development: (1) road and habitat barriers to movement; (2) herd displacement; (3) loss of range continuity; (4) increased access; and (5) harassment of caribou. Bloomfield (1980) provided little demographic evidence in support of his view that habitat destruction and harassment *per se* were major factors in the decline. He did not measure reproductive or adult mortality rates, nor did he record animals in poor condition or find starved animals. He found one animal illegally killed.

The Yellowhead Highway and nearby railroad (in the Fraser River valley) are not barriers to caribou movement. The caribou seek both the road and railroad corridors in periods of deep snow. There has been a number of collisions of caribou with trains (K. Child, pers. comm. 1982). The caribou also risk death on the paved highway, which they seek out to escape adjacent deep snow and possibly also to lick salt. The animals

are habituated to the heavy traffic and remain on the paved surface in the presence of traffic (K. Child, pers. comm. 1982). At Kootenay Pass, B.C., animals cross the main highway and use the corridor under the adjacent power line (Johnson and Todd, 1977). Several animals have been killed by vehicles. The animals commonly remain on the side of the road unless approached by people on foot.

Bloomfield (1980:713) also believed harassment was a factor in the decline of the Yellowhead herds: "Harassment can result in diminished growth and reproduction, avoidance or abandonment of critical areas, injury or death." His reference for this generalization was his thesis (Bloomfield, 1979). But during his study he did not measure growth or birth rates, nor did he document avoidance or abandonment of range, or harassment. Such undocumented generalizations, we believe, confound our understanding of caribou behaviour and demography.

The caribou in central and southern B.C. did not decline because of habitat destruction or harassment *per se*. Calf survival is higher for caribou in disturbed central and southern B.C. than in northern B.C. where habitats have not been logged (Figs. 7, 8). In southern and central B.C. the animals commonly make use of arboreal lichens on the branches of freshly cut trees. Ritcey (1980:4), speaking of the decline in central B.C. south of the Yellowhead area, said, "Since productivity has remained high we can only assume that mortality factors not related to nutritional deficiencies are responsible for any possible reduction in numbers."

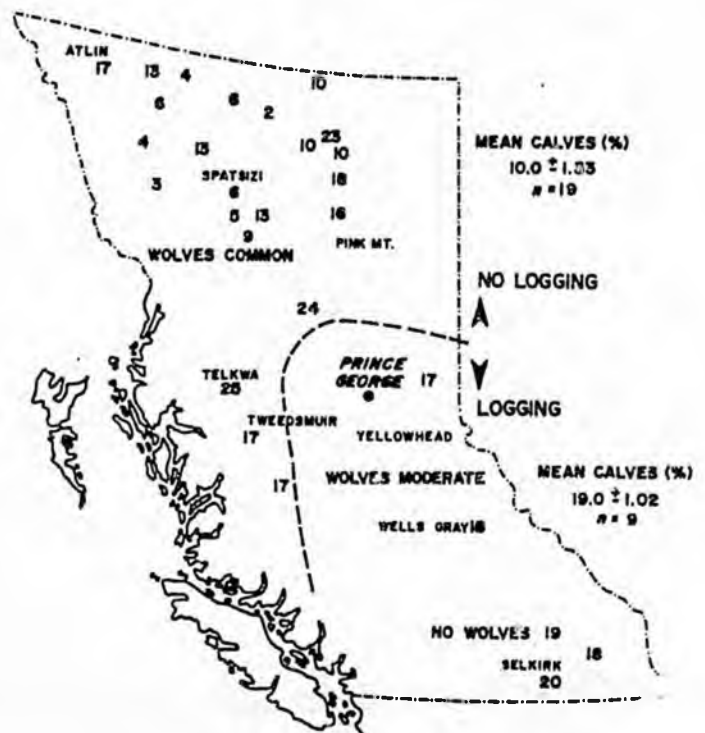


FIG. 7. The location of B.C. caribou herds and the percentage of calves in 1970 and 1977; comparison is between herds in northern British Columbia, where wolves were common and the forest was not logged, vs. those in southern British Columbia, where there were few wolves and much of the forest has been logged (Bergerud, 1978).

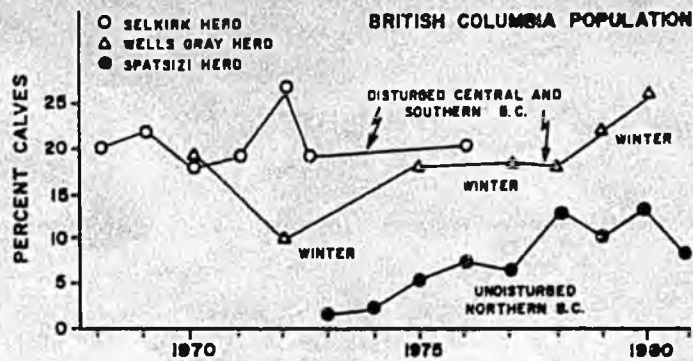


FIG. 8. Percent calves in composition counts: two herds in disturbed central and southern British Columbia vs. one in undisturbed northern British Columbia (Freddy, 1974; Bergerud, 1978).

The mortality factor that precipitated the decline of herds in southern and central B.C. was increased hunting, facilitated by increased access from an expanding network of public and private roads. The decline of the Yellowhead herds was a direct result of hunting and poaching (Fig. 9). Loss of food and cover habitat were not causative factors in the decline.

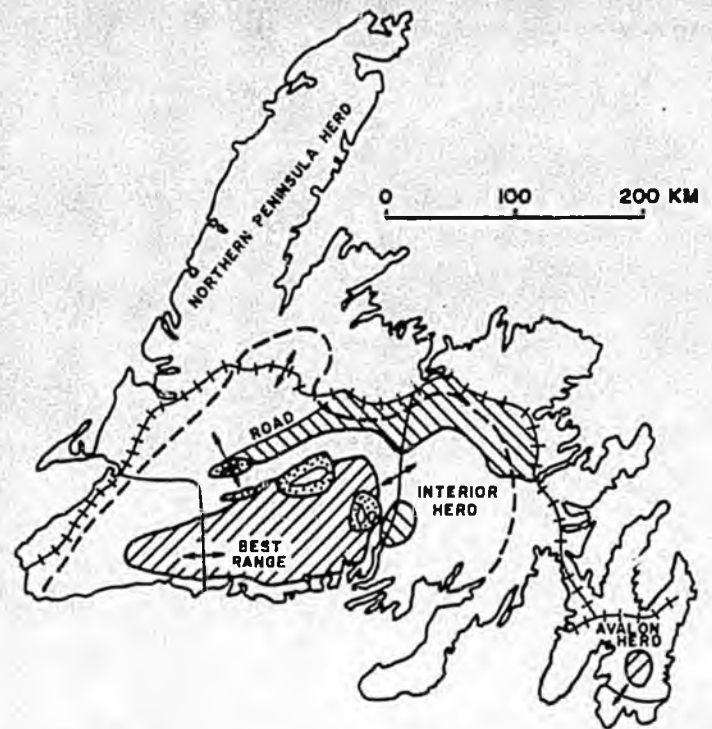


FIG. 10. Distribution and movements of Newfoundland caribou herds (Interior and Avalon) in relation to roads, logging, and flooding.

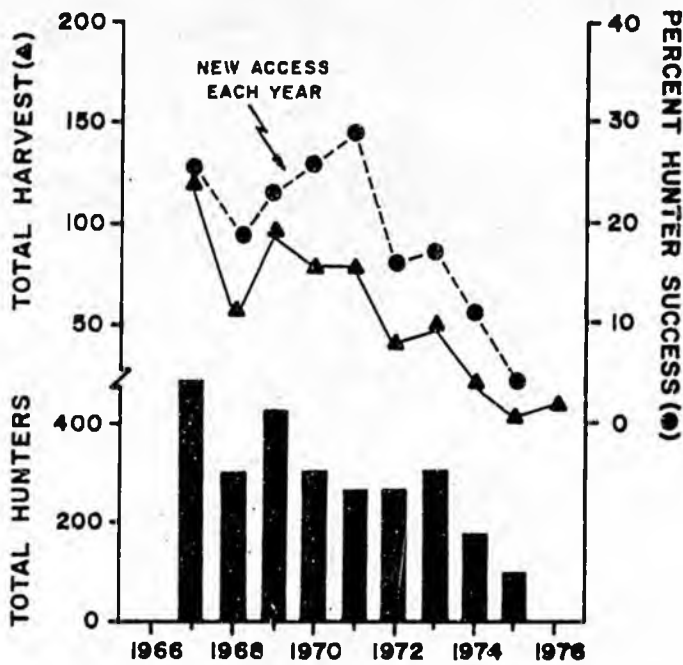
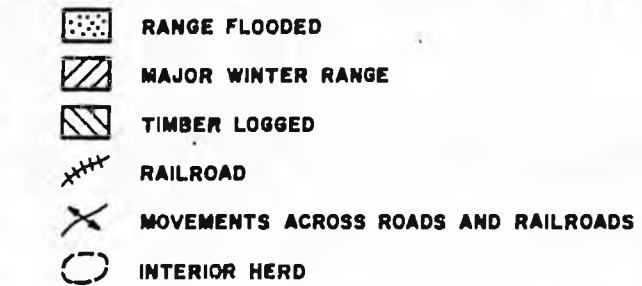


FIG. 9. Decline of the Yellowhead herds based on hunting statistics (Bergerud, 1978).

Newfoundland Herds

The Interior herd of Newfoundland has been exposed to considerable human disturbance. Large areas of former winter range have been flooded since 1970, coincident with the construction of roads and canals. Over 75% of the original forest has been logged (Bergerud, 1971), and the range has been bisected by logging roads and two public highways (Fig. 10). The herd is also the most intensively monitored in North America. Calf percentages are determined in spring, and the herd is counted at intervals. Demographic statistics now span



25 years, from 1956 to 1981, embracing the interval of extensive development.

The caribou in Newfoundland may have numbered 40 000 animals around 1900 (Bergerud, 1971). The Newfoundland railroad was built across the caribou range between 1890 and 1897 (Dugmore, 1913). Caribou from the Northern Peninsula, White Bay Downs, and the White and South Hills historically migrated south to the east of Grand Lake. These herds intersected the railroad near Howley, the Gaff Topsails, and Millertown Junction (Fig. 11). More than 400 hunters (Millais, 1907) massed at these crossings each fall to slaughter the animals. The estimated 15 000 animals in these herds were eliminated by hunting in a period of about 15 years (Bergerud, 1971). Even though these animals met a firing line of hunters (Millais, 1907:102), they continued to cross the railroad until the herd was nearly destroyed.

A Newfoundland herd not discussed in Bergerud (1971), the Topsails herd, now ranges on both sides of the railroad in the area where the Northern Peninsula herd used to migrate south (Fig. 11). This herd numbered less than 300 animals in the

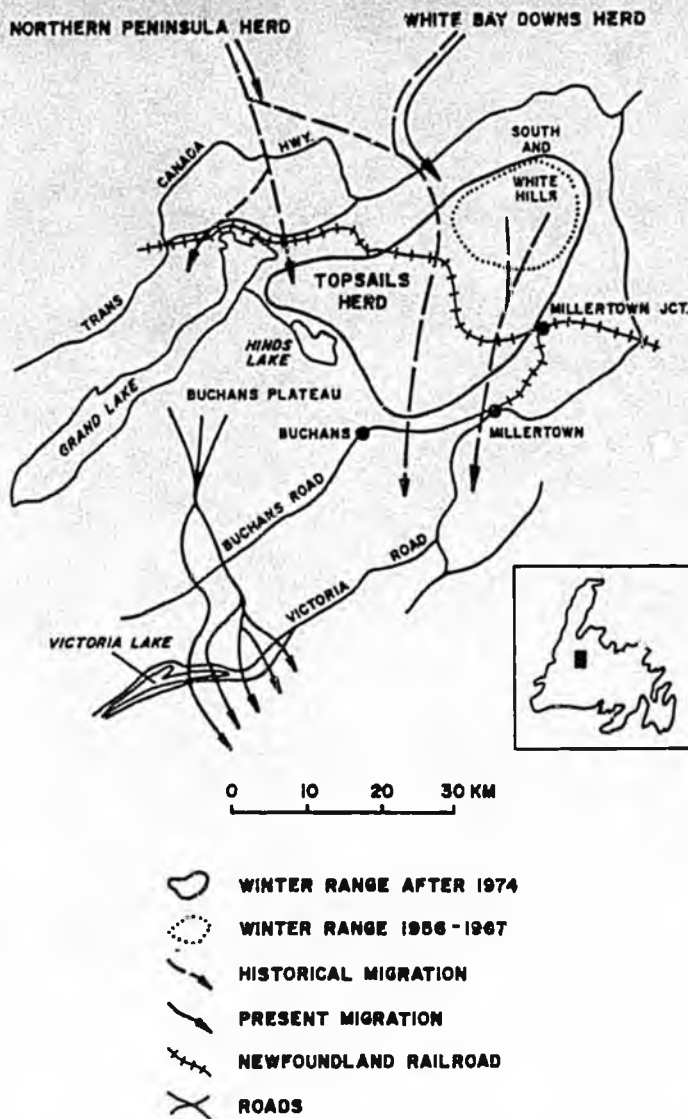


FIG. 11. Migration and distribution of caribou in central Newfoundland in relation to transportation corridors.

1950s and wintered in the White and South Hills. The herd presently consists of 2000 caribou, which freely cross the railroad that bisects their range. The area is open flat tundra and the trains can be seen and heard at great distances.

There are now over 20 000 caribou in the Interior herd (E. Mercer, pers. comm. 1982; Fig. 2), though their numbers are currently limited by illegal hunting (E. Mercer, pers. comm. 1982), which is more prevalent because of the expanded road network and the advent of the snowmachine. Nevertheless, the Interior herd has increased at $r = 0.06$ for the past 15 years (Fig. 2). Calf survival has been high and percent parous females has consistently been $> 80\%$ (Fig. 12). The herd has remained productive, even as its size has tripled and as development has resulted in destruction of lichen ranges, the removal of much of the original timber, and the bridging of the range by public and private roads, hydro lines, and canals.

The Avalon herd of Newfoundland provides a second example of caribou crossing a road as range expansion accompanied a growing population. As the herd increased, from 125 animals in 1956 to 3000 animals in 1979 (Bergerud, 1971; E.

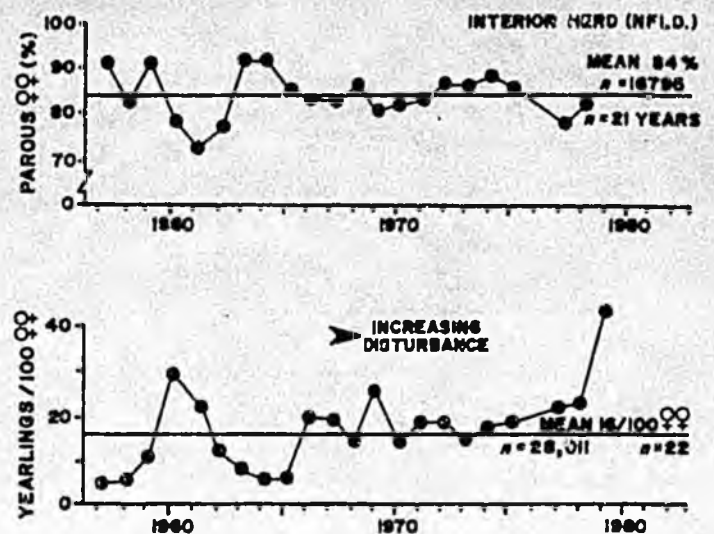


FIG. 12. Counts of yearlings/100 females and percent parous females in June in the Interior herd, Newfoundland (Bergerud, 1971; Fong and Mercer, 1975; Newfoundland Wildlife Files).

Mercer, pers. comm. 1979), it expanded its range south until it encountered a road across the south end of the peninsula (Fig. 10). In July 1978 Bergerud observed hundreds of caribou, mostly females and calves, just north of the road within sight of the fast-moving traffic and accompanying clouds of dust. The animals had habituated to the traffic and could be approached to within 100 m. In the summer of 1980, 500 animals crossed the road and again in 1981 several hundred crossed. The animals in this herd had no tradition of crossing this road and had no experience with other roads.

Kaminuriak Herd

Our intent is to evaluate the impact on the Kaminuriak herd of the Hudson Bay Railroad to Churchill, Manitoba. The railroad was constructed between 1925 and 1931 south of the Churchill River (Fig. 13). Banfield (1980) believed that the Kaminuriak herd increased throughout its range in the early 1940s. Subsequently the herd showed a continuous decline, from 145 000-149 000 animals in the period 1949-1955 to 63 000 animals in 1968 (Fig. 2); Banfield, 1954, 1980; Loughrey, 1955; Parker, 1972). Berger (1977) felt that the barrier effect of the railroad might have contributed to the decline in the herd's population.

The southward movement of the herd has varied through time. Parker (1972), in his review of historical records, concluded that barren-ground caribou were seldom south of the Churchill River before 1900. The distribution observed by Hanbury in 1904 (Parker, 1972) was similar to that documented by Parker in 1966-1968. In both periods the animals were north of the Churchill River.

Two southward penetrations across the Churchill River occurred in the twentieth century, one around 1900 and the other starting about 1935 (Parker, 1972). Lawrie (1948, in Parker, 1972) stated that the first heavy migration along the railroad began in 1935, and that caribou were even more plentiful in 1942. In 1945-46 extended movements brought caribou for the first time in 40 years to God's Lake, Cross Lake, and Oxford

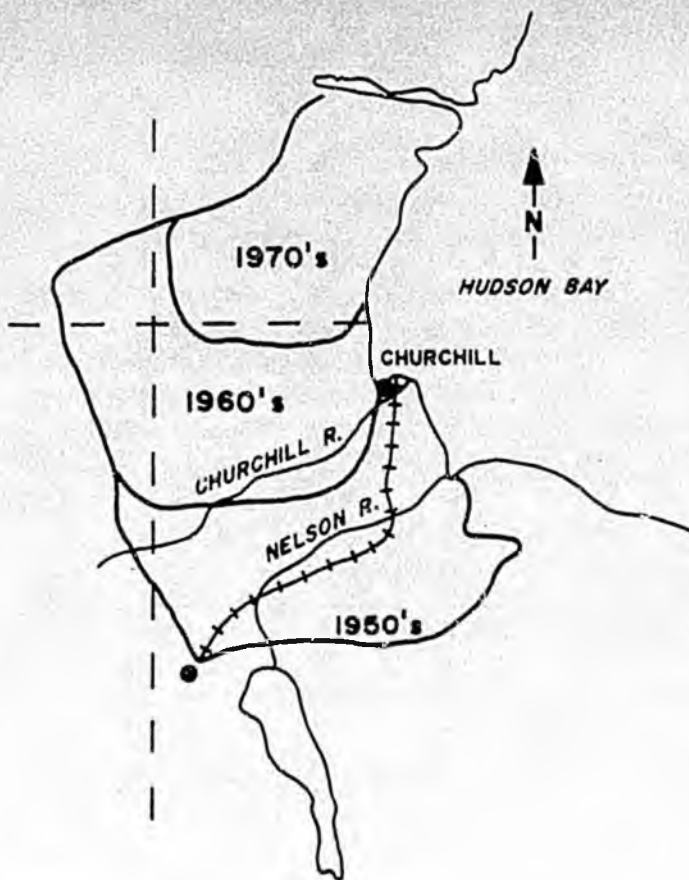


FIG. 13. Distribution of the Kaminuriak caribou herd between the 1950s and 1970s (Simmons *et al.*, 1979).

House. Banfield (1973) documented crossings of the railroad between 1947 and 1953; the migrations ceased after the winter of 1957-58.

Additionally, Parker (1972) concluded that the population increases in the late 1940s resulted in greater penetration southwards. Simmons *et al.* (1979) have provided a distribution map of the herd by decades (Fig. 13). They show that the herd was as far south as the railroad in the 1950s (Fig. 13) and had more northerly range in the 1960s and 1970s. This expansion and contraction of range according to fluctuations in numbers is comparable to that discussed for the Nelchina and Fortymile herds.

In summary, historically the Kaminuriak herd seldom came as far south as the Churchill and Nelson rivers, making only one known crossing prior to 1935. The herd first started crossing the railroad four years after its construction, and the animals continued to cross the corridor as long as the herd was abundant in the 1940s and early 1950s. As the population declined, the herd no longer came as far south as the railroad. The railroad did not act as a barrier; however, it did provide access to the herd in some years, thereby indirectly contributing to a greater kill than would have occurred in its absence. Banfield (1954), who was actually at the crossings in the 1950s, described the crossing as a normal occurrence for many years. The decline of the Kaminuriak herd has resulted from excessive harvests (Banfield, 1954, 1980) coincident with low calf survival due to wolf predation (Parker, 1972; Miller and Broughton, 1974), and possible shifting of part of

the herd (Heard *et al.*, 1981; Donaldson, 1981).

Snøhetta Herd

Klein (1971) reported that construction of a railroad across the wild reindeer range between Knutsho (eastern) and Snøhetta (western) range in Dovrefjell National Park in Norway was a barrier to reindeer migrating between the ranges, and this resulted in extensive deterioration of vegetation on the Snøhetta range. This is the most widely quoted example of a transportation corridor acting as a barrier.

Two of us (RDJ and ATB) visited the Dovrefjell crossing in 1979. We examined the crossing site and discussed it with E. Gaare and T. Skogland who have studied this population over 10 years. They estimated that the herd had contained about 1000 animals in 1900; it had been depleted by overhunting. The herd was subsequently protected, and increased. Most of the animals wintered on the Snøhetta range but a portion of the herd (250) wintered across the valley on the Knutsho range.

The herd subsequently declined. Skogland and Mølmen (1980:134) stated: "During the period 1920-25 it is believed that the reindeer in the area numbered a few hundred. With such small numbers large scale seasonal migrations ceased. During this period (1921) the railroad across Dovrefjell was completed...after this period...migrations ceased entirely."

During the second world war, hunting was limited and the herd increased until it numbered 15 000 by 1960 (4.4 animals $\cdot \text{km}^{-2}$) (Thomson, 1977; Reimers, 1975; Skogland and Mølmen, 1980). In 1956, during a winter with heavy snow, a few hundred animals crossed the railroad and highway and wintered on the Knutsho range. Migration across the railroad has been maintained ever since, with 1/3 of the winter population migrating (Skogland and Mølmen, 1980); these researchers report that most of the crossings take place at night when traffic is lightest. They conclude: "It appears that no type of technical installation poses immediate avoidance reaction as long as it does not physically restrict the animals' presence. The same appears true of access roads. It is the human presence on or nearby the road that induces avoidance reaction" (Skogland and Mølmen, 1980:140).

The obstacles at Dovrefjell include a high board snow-fence with an opening made for the caribou to pass through, a wire fence over which they must jump, the railroad, a major highway used by large trucks, a telephone line, and a river. We have never seen comparable obstacles in North America. Although the migration stopped coincident with railroad construction, now the animals cross not only the railroad but the two fences and the major highway. It is not apparent how the railroad alone could have halted the migration: the supposed cause, the railroad, is still present but the supposed effect of no-migration is absent. The halt in migration was probably a result of a contraction of the range because the herd's numbers were low.

DISTURBANCE THROUGH HARASSMENT

Human harassment of ungulates has been purported to cause death, reduced reproduction, and abandonment of ranges

(Geist, 1978). This hypothesis can be tested for caribou with data from the Interior herd in Newfoundland. In June 1959 and June 1964 ATB severely harassed the females on the Pot Hill calving grounds. Each day females with newly-born calves were hazed by helicopter for prolonged periods to ascertain parous condition and to see if the females would run. All those that did not run had dead calves nearby; those calves that were investigated all had been bitten by lynx (Bergerud, 1971).

TABLE 2. Percent calves (Sept-Oct) and percent parous females at Pot Hill, Newfoundland, compared with percentages for adjacent, undisturbed calving populations. Numbers in parentheses are disturbed populations. (Bergerud, 1971)

Year	Pot Hill		Grey River		Sandy Lake % Calves
	% Calves	% Parous Females	% Calves	% Parous Females	
1958-59	16.0	nd	16.7	92	13.0
1959-60	(20.1)	(77)	nd	80	17.5
1960-61	nd	66	9.9	nd	10.8
1961-62	nd	83	13.0	71	4.4
1962-63	3.3	90	5.7	89	8.5
1963-64	4.3	95	8.9	nd	13.6
1964-65	(6.3)	(96)	9.2	84	12.3
1965-66	nd	93	8.3	79	10.8

This disturbance was severe; the same animals were chased day after day. The calving area of the Pot Hill herd is only 200 km² but the animals did not abandon the area. Calf survival of the 1959 and 1964 cohorts was comparable to survival of cohorts born before 1959 and between 1959 and 1964, and similar to that of calves on two adjacent undisturbed calving grounds (Table 2). Also, the females of the Pot Hill herd were highly productive in 1960 and in 1965, one year after harassment (Table 2). The number of females on the Pot Hill calving ground increased in 1965, the year after the disturbance (Bergerud, 1971). Lynx predation was the major cause of death on all three adjacent calving grounds (Bergerud, 1971).

Another example of extreme disturbance of calving females occurred on Brunette Island, Newfoundland, in 1980. On 29 May seven females were chased by helicopter, and darted and drugged with M-99 (Etorphine). One female had a newborn calf; the other six females gave birth 1 June (n = 2), 2-3 June (n = 1), 7 June (n = 1), 9 June (n = 1), and date unknown (n = 1). None of the darted females abandoned their very localized range, and all were repeatedly seen near where they were drugged (H. Butler, pers. comm. 1980). The physical condition of those seven calves from hazed females was compared to that of four calves from non-hazed mothers in the fall (one calf from a non-hazed dam had died between spring and fall). Comparisons were made of calf antler length, physical size, and general activity level. H. Butler noted no difference between experimental and control groups.

At the other extreme of the gestation period, the Newfoundland Wildlife staff captured several hundred swimming female caribou from the Buchans herd in 1962 and 1963, two to five weeks post-conception. Some animals were pulled into boats and hogtied; others were driven into lakeside traps. Animals were held up to several days in tightly crowded cor-

als. Sixty-two of these females were seen the next spring, and most were accompanied by calves. Pregnancy rates for the herd were higher than in the previous three years (Bergerud, 1971).

In another example, this one in Manitoba in April, Miller *et al.* (1971, 1975) captured migrating gravid females in nets. They reported that 81% (n = 21) of those captured were accompanied by calves in mid-June, compared to 80% (n = 1148) of animals classified on the calving ground at the same time. Similar observations were made in Alaska by Valkenburg *et al.* (1983). They concluded that helicopter chasing, capture, and handling of gravid female caribou in the spring did not affect production or survival. They observed similar calf production between captured (84%, n = 43) and other females (78%, n = 7835) and similar survival rates in the fall (61% for captured vs. 64%, n = 354, for others).

We do not suggest that harassment is either unimportant or acceptable; however, there are data to suggest that caribou and other deer species (Hamlin, 1982) can withstand periodic severe disturbance without adverse effects on productivity and survival. This level of resilience has long been noted in large domestic mammals.

CARIBOU RESPONSES TO LINEAR FEATURES

Numerous authors, in discussing factors governing caribou movement and its orientation, have variously referred to caribou following paths of "least topographic resistance" or "most favourable physiographic features" (Banfield, 1954; Kelsall, 1960, 1968; Skoog, 1968; Miller *et al.*, 1972; Bergerud, 1974b; McCourt *et al.*, 1974). Our observations of migratory movements of caribou herds now suggest a broader concept. During spring migrations, the caribou of the Porcupine herd travel up the axis of the rugged Richardson Mountains; on summer movements they ascend steep slopes in the Brooks, British, and Ogilvie ranges where caribou have been observed at higher elevations than Dall's sheep. Such anomalies may be better explained by the concept that caribou move in response to paths of least *energetic* resistance, consistent with their learned directional orientation. Such a concept explains many discrepancies which are not explained by either topographic or orientation factors alone. This principle also has a direct bearing on understanding reported responses to man-made linear features, obstructions, and barriers, and the associated energetic costs of "deflections" of movements.

Parker (1972) and Kelsall (1968) showed how cows of the Kaminuriak and Beverly herds oriented to calving grounds despite the use of divergent winter ranges. Indeed, they followed a path of least topographic resistance. However, the traditional migration routes of other herds include precipitous mountain terrain and dangerous rivers. Movement traditions and behaviour may be evolutionary adaptations involving factors such as insect harassment, predation, range utilization, and the comparative energetic costs of travelling shorter, more difficult routes vs. longer, easier ones (Jakimchuk, 1980; Reichman and Aitchison, 1981). Movement behaviour probably has both a phylogenetic and an ontogenic origin which

enable caribou to respond to a variable extrinsic environment while maintaining traditions such as those described by Bergerud (1974b) and Skoog (1968).

There are numerous well-documented examples of the "least energetic resistance response". Caribou avoid swimming lakes during summer movements, and they travel single-file in deep snow but fan out where travel is unimpeded. They cross rivers and large lakes at narrow points and follow wind-blown ridgetops, despite steeper topography, when valleys are clogged with snow. This principle is observed in the similar responses of caribou to natural and man-made features encountered in their movements, and may account for much of what has been termed deflection, or paralleling man-made objects in response to disturbance.

As early as 1960 Kelsall (1960) noted that caribou would deflect from their course in order to take advantage of frozen lakes providing easier (less energetic) travel, but would abandon the route if it turned many degrees off their course (traditional orientation). The differential use of seismic lines and winter roads documented by McCourt *et al.* (1974) and Decker (1976) is identical to Kelsall's (1960) description. The associated "deflections" were oriented along the caribou's line of travel, and were not followed if they deviated from the intended travel route (Mccourt *et al.*, 1974; Kelsall, 1960). The energetic benefits derived from behaviour observed in response to natural and man-made linear features may in fact exceed the energetic costs of deflections as calculated by Geist (1975).

Paralleling behaviour appears to be, at least in part, a natural response to find the path of least energetic resistance. In a study of trail systems in northeastern Alaska, LeResche and Linderman (1975:54) found that: "Caribou follow contours in hilly terrain, use gentle slopes and passes, travel in narrow lines in steep areas; *course natural obstacles* [emphasis ours] before crossing them (see also Skoog, 1968); and follow previous caribou trails."

The foregoing examples of "natural deflections" are useful in explaining caribou responses to berms and other linear features in terms of their potential energetic and dislocation impacts. For example, it has always puzzled us that berms are perceived to represent physical barriers when berm-like features (eskers) and steep mountain ranges are commonly encountered in caribou range and are readily traversed by caribou. Thus the paralleling of "apparent obstacle effects" reported by Urquhart (1971, 1972), Surrendi and DeBock (1976), and Hanson (1980) can be explained in a manner which also accounts for apparently different thresholds of response to obstacles.

Hanson (1980) reported a barrier threshold of 1.2 m; Cameron and Whitten (1976) found that caribou crossed the haul road at a mean height of 1.43 m, selecting significantly lower heights over higher sections. Paralleling and selection for lowest crossing points explain the apparent difference in "barrier" thresholds for the same population. During migrations, Kaminuriak caribou unhesitatingly crossed drift fences 1.0–1.5 m high and jumped fences > 2 m high (Miller *et al.*, 1972). The most logical explanation for these observations is

that caribou actively seek the path of "least energetic resistance" rather than respond to physical barriers with a fixed threshold height.

That hypothesis, however, does not explain the "retreat behaviour" reported by Surrendi and DeBock (1976) and Hanson (1980). Retreat from berms or roadways may reflect responses to stimuli other than obstacle height (e.g. hunters, or perception of an earlier route). Control data on normal directional variations in movement are not available from those studies.

DISCUSSION

Human Impacts on Caribou Demography

One can draw conclusions about human impacts on population status by correlation reasoning: numbers changing coincident with disturbance. A more precise method is to measure reproductive or mortality rates and, without knowing their cause, correlate these rates with disturbance. One may attain a higher level of confidence by ascertaining reproductive and mortality rates, their causes, and their impacts on population size. The most sophisticated experimental design is to perturb the system (e.g. by removing wolves) and note *predicted* changes using both experimental and control populations.

Many biologists use correlation reasoning and imply cause-and-effect. Bloomfield (1980) noted that caribou declined coincident with habitat change, and he argued cause-and-effect. The Kaminuriak herd had low calf percentages in the 1970s; some Inuit believe that aerial harassment caused this low productivity. But there were few calves also in 1966–1968 (Parker, 1972), prior to extensive exploration in the north. Therefore, the supposed cause is not necessarily an actual one.

The main fallacy in the correlation argument for cause-and-effect is that other possible causes could have occurred simultaneously with the supposed cause. As the forests were logged in British Columbia, logging roads were built. Declines in caribou could have resulted solely from increased mortality from hunting made possible by improved access, and not from the loss of food and cover resources. Correlation evidence is the springboard to hypothesis testing. If habitat destruction is suspected as the cause, there are verifiable test implications. One might suspect low pregnancy percentages, or poor growth, or one might expect to find starved animals. If these test implications cannot be verified against control populations the hypothesis is not sufficient.

We disagree with Klein's (1980:525) statement: "Historically, fractured *Rangifer* ranges through human development activities have led to range abandonment, herd reduction, or extinction...". He has not documented fractured ranges for North American herds, or the demographic statistics of changes in reproductive or mortality rates that could cause such reductions or extinctions. Alternate explanations for caribou declines — unsatisfactory recruitment resulting from predation, and excessive mortality from hunting — are documented (Banfield, 1954; Kelsall, 1968; Bergerud, 1971, 1974a, 1980; Davis *et al.*, 1978).

Caribou probably can be displaced from ranges by complete

habitat alienation, e.g. by agriculture or by extreme and persistent harassment. However, current industrial development activities in North America are not of this magnitude. Caribou in the Central Arctic herd have increased despite the extensive accumulation of structures and transportation facilities within their range, and the Western Arctic herd is expanding into this same development area.

Again we question Klein's (1980:523) conclusion: "Roads, railroads, pipelines, power lines, artificial or altered water courses or other man-made linear features can, independent of other human activities, block, delay or deflect the movements of caribou and reindeer." Clearly a large-diameter pipeline resting on the ground can be a barrier; however, to date there is no unequivocal example of such effects for a North American caribou herd.

In discussing possible barrier effects, Klein (1980) quoted authorities who lacked firsthand knowledge. For example, he cited Justice Berger (1977) with respect to the possible impacts of the Hudson Bay Railroad on the Kaminuriak herd. Justice Berger had based his opinion on Calef's testimony before the hearing; Calef, in turn, had said he did not know about the barrier effect of the Hudson Bay Railroad but that in Norway a railroad had blocked a migratory crossing. Calef was referring to Klein's (1971) reference to the Dovrefjell crossing.

In this review we have provided a more parsimonious alternative cause for many of the examples of hypothesized effects of barriers presented by Klein (1980). When herds have stopped crossing transportation corridors, it has generally been because numbers have declined and ranges contracted. The evidence shows such contractions to be independent of the presence of transportation corridors. Our explanation depends on the naturally evolved tendency of caribou to alter their movements and range in response to changes in their numbers. It does not require the added assumption and restriction that caribou have evolved behaviour in response to artifacts that were not part of their natural environment. The generalization is that caribou do cross transportation corridors.

We believe that some biologists, in their concern for disturbance at the individual level, may have overlooked the major population regulation factors of hunting and predation. At the First International Reindeer/Caribou Symposium, biologists debated the impacts of pipelines and northern development on caribou, yet the herds in Alaska at the time were declining from predation and overhunting (Davis *et al.*, 1980; Doerr, 1980).

We have reviewed the case histories of eight herds where human impacts on caribou demography have been suspected. One documented impact on caribou was an increase in calf survival following a reduction in wolf populations (also see Davis *et al.*, 1983). Calf survival in the Nelchina, Fortymile (Davis *et al.*, 1978), Central Arctic (Cameron and Whitten, 1979), and British Columbia herds increased following wolf reductions. The second documented impact was increased hunting mortality following improved access from transportation corridors; examples were the Nelchina, Fortymile, and British Columbia herds. The expansion of the Nelchina herd brought it in contact with an already existing road network and

resulted in an overharvest. The Kaminuriak herd was little affected by increased access due to roads but was still overharvested.

The Porcupine herd represents a control population, stable in numbers and productivity and little affected by hunting or by predator management. Completion of the Dempster Highway through its range was accompanied by controls of hunting. This "control" population, exposed to a transportation corridor and to other human activities, has not demonstrated any significant demographic changes in response to these developments. There is no convincing evidence from any of the eight herds investigated that habitat loss or disturbance has adversely altered productivity or adult mortality rates, resulting in declines.

There is ample evidence, however, that hunting (much of which is subsistence hunting by native people), and low calf survival due to predation and other factors, are responsible for caribou declines (Simmons *et al.*, 1979; Bergerud, 1980; Davis *et al.*, 1980; Haber and Walters, 1980; Davis and Valkenburg, 1983).

The unsupported belief that human disturbance may adversely affect caribou has had at least one major repercussion. The Canadian Department of Indian and Northern Affairs has enacted "Caribou Protection Measures" which restrict entry and travel in the vicinity of the calving grounds of the Beverly and Kaminuriak herds between 15 May and 31 July. It is now considerably more difficult for biologists to research questions relative to calving — the key to our understanding of caribou demography. The Northwest Territories government requires that researchers obtain a research permit, and is quite prepared to deny access if native communities near the proposed research area do not give consent. Further, native observers are often required to be hired in major research programs.

These are serious restrictions on free movement in Canada and provide the potential for government interference in research by denying access to large areas of northern Canada. We note that ACUNS (1983) also has concerns in this area and has formed a committee to investigate these restrictions on research. The biological justification of these restrictions relative to the dynamics of caribou populations has not been documented.

Predation as a Factor Influencing Sensitivity to Disturbance

Predation is a "prime mover" in the evolution of behaviour patterns in caribou (*sensu* Wilson, 1975). Natural selection acts against those individuals that respond inappropriately. Predation thus reduces the behaviour repertoire of individuals, i.e., animals are more alike than they would be in the absence of predation. This selection results in animals adapted to avoid predation but does not necessarily improve their adaptation to other components of the environment. The reactions and sensitivity of caribou should be evaluated in the context of survival strategies which caribou have perfected in close association and co-evolution with wolves (Bergerud, 1974b).

Male and female caribou have far different parental in-

vestments because of polygynous breeding. The male's fitness depends on intrasexual competition for females. His role in propagation ceases upon breeding. The female must continue her care until the calf has a reasonable chance of survival or dies. Because of these investment differences females can be expected to be more wary and select more predator-free habitats than males, even at the expense of optimal foraging. Thus, disturbance reactions are greatest on the calving grounds after the birth of the calves; here selection is the harshest culler.

Human activity can upset predator-prey relations. After caribou have habituated to the presence of humans, they may seek human activities because of reduced predator abundance. The caribou from Lake Nipigon, Ontario, winter around the Armstrong airport, probably because of favourable foraging in the absence of predators. Moose may show the same response on Isle Royale (R. Peterson, pers. comm. 1981). When we modify the habitat we may aid wolves in their searching effort — a trail built through caribou escape habitat in Pukaskwa National Park, Ontario, is an example. Small reduced stands of climax forest may attract caribou and act as traps — predators know where to search. Logging-road networks become travel routes for wolves (Bibikov, 1980). Haul roads may be avoided by caribou because of increased predator presence (Roby, 1978). Wolves followed a snowshoe track made by ATB and found caribou that previously had been secure on a mountain refuge surrounded by soft deep snow. Seismic lines provide opportunities for wolf ambush, as do roads in forest valleys. The examples are many and will become more explicit when we know more about the strategies used by both caribou and wolves in their interactions. Human activities can potentially affect caribou indirectly through their alteration of predator-prey systems.

We believe that the major environmental variable that permits caribou to co-exist with predators is space. Caribou need extensive areas so as to space themselves far from denning wolves. Again, space is needed that will provide habitats where caribou have a slight advantage such as mobility. The greater the space the greater the chance for dispersal of caribou, which increases the searching time for wolves. Hufaker's (1958) complex space for fluctuating predator-prey oscillations applies to caribou.

As herds increase they take up more space. The Nelchina, Fortymile, and Newfoundland herds faced hunters in firing lines along transportation corridors but continued to migrate to meet their spatial requirements. However, there must be a point where harassment is so continuous and severe that animals will no longer pass. Such potential barriers must be prevented if caribou are to maintain their populations in natural environments.

Adaptability of Caribou

Caribou are perceived by many as not adaptable to the presence of humans. Yet caribou are one of the few large mammals man has been able to domesticate. One basis for this misconception is their unwary behaviour. Caribou escape strategies, i.e. detecting motion, grouping up, and standing

ground or approaching and verifying, which are successful for natural predators, are ill-adapted to men with firearms.

Caribou are as adapted as other North American ungulates to man's presence. When caribou are captured and placed in holding pens they become calm within hours. Moose captured in Newfoundland remained in a state of panic and many died in captivity (Pimlott and Carberry, 1958). Recently ATB placed wild adult caribou in a game farm and within two weeks they could be approached to within 10 m. Within two months the animals would enter a shed and stand on a scale for weighing. The large herds of caribou feeding along the highway on the Avalon Peninsula, along the TAPS corridor, and along the Dempster Highway are comparable to the herds of habituated pronghorn antelope (*Antilocapra americana*) on the Great Plains, which feed beyond rifle range. Caribou, like pronghorns, also crawl under fences (Miller *et al.*, 1972). Caribou wintering at Armstrong, Ontario, may be avoiding predators as are mule deer (*Odocoileus hemionus hemionus*) that visit downtown Waterton, Alberta (Geist, 1980). Caribou may be found on the highway near McBride, B.C., as are road-wise elk (*Cervus canadensis*) in Banff and Jasper National Parks. Caribou learn that chainsaws signal availability of arboreal lichens, just as black-tailed deer (*Odocoileus hemionus columbianus*) approach felled trees to gain access to browse. The sight of caribou standing on the railroad or stopping the Churchill Express recalls the migration of buffalo (*Bison bison bison*) in the past.

But, adaptable as the caribou is, it still has the same problems as the buffalo — overharvest and the need for space. Our conclusion is that caribou can tolerate and adapt to the presence of man if we will permit them to live by not overharvesting. Caribou will cross major transportation corridors and physical obstructions to maintain their space, but there is probably some upper limit to their tenacity. We must not permit the dissection of caribou populations into small discrete units so that they lose their ultimate adaptation — mobility, to seek space to cope with an ever-changing extrinsic environment.

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ANWR

THE NORTHERN LINE

"Behind is a forest that goes to the Arctic ...
And here we must draw our line."

Gary Snyder



The journal of the Northern Alaska Environmental Center

Volume VIII, No. 6, December 1986

Action Alert: Oil lease proposal threatens Arctic National Wildlife Refuge

Director's note: This special edition of the Northern Line is designed to encourage public comment on the fate of the Arctic National Wildlife Refuge coastal plain. The issue includes an overview of the refuge, facts about the coastal plain, and detailed information on the contents of the draft 1002 Report. Please take a moment to read through this information and voice your concerns.

YOUR INPUT WILL MAKE A DIFFERENCE.

The Arctic National Wildlife Refuge is our nation's most northern unit of the National Wildlife Refuge System. No other refuge or park encompasses such a continuum of undisturbed, biologically intact, Arctic and Subarctic habitats—from the interior boreal forest and the central Brooks Range, to the coastal plain bordering the Arctic Ocean. No other area protects habitat for so many healthy populations of national interest species, including grizzly and polar bear, caribou, muskox, Dall sheep, wolf, wolverine, peregrine falcon and gyrfalcon. The annual migration of the 180,000 member Porcupine Caribou Herd between the Arctic Refuge and adjacent areas of Canada is considered by many to be the most spectacular wildlife phenomenon on American and Canadian soil.

When the Arctic National Wildlife Range was established in 1960, the action was seen as the culmination of extensive preservation efforts begun more than a decade earlier. In 1980, Congress passed the Alaska National Interest Lands Conservation Act (ANILCA) which increased the size of the range to 19 million acres and renamed it the Arctic National Wildlife Refuge. Eight million acres of the original wildlife range was designated as wilderness. Twice the House of Representatives voted overwhelmingly to designate the coastal plain, the 1.5 million acres wedged between the Brooks Range and the Beaufort Sea, as wilderness. In the Senate version of the Alaska Lands Act, which finally became law, the coastal plain wilderness was deleted.

In its place, ANILCA called for an assessment of the fish and wildlife resources, and the oil and gas potential of the coastal plain. This provision of the law also required the Secretary of the Interior to assess the likely impact of oil and gas development on refuge values and submit a report and recommendation to Congress. This report, required by Section 1002(h) of ANILCA, (hence the name ten-o-two), is now out for public comment before being finalized and submitted to Congress. It is important to keep in mind that

Section 1003 of ANILCA prohibits further oil exploration and development in the coastal plain unless Congress passes specific legislation to open the area for such use.

When the draft 1002 Report was finally released in November 1986, it recommended that the entire coastal plain be opened up for full oil and gas leasing. The nation is being given a clear choice: preserve intact the unique ecosystem that is the Arctic Refuge, or hack off a crucial chunk of it for environmentally destructive resource development.

Full oil and gas leasing of the Arctic Refuge coastal plain will completely subvert the purposes for which the refuge was established, which include: a) to conserve fish and wildlife populations and habitats in their natural diversity, b) to fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats; c) to provide the opportunity for continued subsistence uses by local residents, and; d) to ensure, to the maximum extent practicable, water quality and necessary water quantity within the refuge. This basic mandate for management of the refuge should be kept in mind when reviewing the recommendations of the draft 1002 Report.



The foothills of the Brooks Range at the edge of the Arctic Refuge coastal plain.

ing that GM will include them in some other future car program

Besides, competition for the new car will be fierce. Mazda Motor Corp. has

they had steadfastly resisted for years. Instead, they had clung to a system of staggered breaks that required 350 extra workers as substitutes to keep the line running. Those 350 now are being laid off.

Local 276's actions don't stop there. Members recently voted three to one to

won't open until September 1987.

Attention From Politicians

Meanwhile, both the Arlington and Jefferson Avenue plants are getting attention from local politicians, something that will happen time and again as similar situations occur. When Texas Gov. Mark White heard that Arlington wouldn't get GM's

Alaskan City Resists Taxes, Police And Zoning Despite Fast Growth

Continued From First Page

suggest a zoning code. "Used to be that at the very mention of the word 'zoning,' a lynch mob would come out of the woodwork," Mr. Mitchell says. "The politicians didn't even have the word in their vocabulary."

"Used to be," in Wasilla parlance, means a couple of years ago. Some old-timers attribute the apparent mellowing of attitudes lately to an influx of Anchorage commuters attracted by the mountain views and modest real-estate prices, rather than by the anti-zoning politics.

After the borough beat its hasty retreat on a valley-wide zoning plan, for instance, Wasilla adopted its own land-use plan. It gives residents the right to formally protest, though not necessarily stop, "incompatible" intrusions, such as junkyards, in their neighborhoods. But most of the town remains essentially unzoned.

"There is considerable resistance here by people to any sort of controls over their lives," says Harold Newcomb, a real-estate investor and a former Wasilla mayor. "They move up here and buy their one acre. They build a house. They put in a septic tank and a water well. Maybe they get a power line, but that's their only connection to the outside world. They become a little kingdom unto themselves. They've got a .44 Magnum and if anybody messes with them, they become a police department, too."

Although the town has a spiraling felony rate and an urban-style drug-trafficking problem, Wasilla seems to have as little use for police as it does for planning. Mr. Newcomb advocated the civilized concept of a police department three years ago, and his plan was promptly derailed by a coalition of Libertarian Party members and "some folks who just didn't want the police snooping around," he says.

Libertarians and Republicans

Mr. Newcomb subsequently lost his bid for re-election to the Libertarians, a considerable force in Alaskan politics. The Libertarians themselves were routed from city hall by the current mayor, Charles Bumpus, a self-described "liberal Republican." Mr. Bumpus's Republicanism might not be recognizable

of authority and tend to be virulently anti-tax, the mayor says. He adds that the town is unlikely to start levying any taxes until residents take the initiative.

"What for?" asks Lester Baker, a mechanic. He and his neighbors, he suggests, are perfectly able to care for themselves and protect their property. "The last guy who drove up past the 'Keep Out' signs" on the gravel road leading to his home outside of town, he says, "my neighbor just got his gun and pulled off two rounds over his head. He peeled out of there pretty quick." Most residents haul their own garbage to the dump, and volunteers man the fire department.

Police protection actually is provided by the state, which can spare only four troopers at any given time to cover Wasilla and the rest of the West Virginia-sized borough. Wasilla also largely depends on state grants to support its 14-person city work force and a bare-bones capital-improvement program.

Are Taxes Inevitable?

With state revenues being battered by slumping oil prices and with growth continuing to overload the town's gravel roads and rudimentary services, however, Mr. Bumpus concedes that taxes may be inevitable. A few small neighborhoods, in a big step for Wasilla, already have agreed to create localized taxing districts to finance sewers and other improvements without putting the tax bite on all residents.

Sheer growth, meantime, keeps eroding the town's frontier spirit. Wasilla (the name came from an Indian term for "breath of air") sprang up in 1917 as a trading post for workers building the Alaska Railroad. In the 1970s, when the energy crisis spurred spectacular growth in Alaska in general, Wasilla attracted the mavericks and developers who disdained taxes and zoning laws.

Even some of these people now lament the effects of the pell-mell growth. Leaky septic tanks have begun to foul the town's two lakes, and unregulated development is jeopardizing the underground aquifer that feeds residents' wells. Rush-hour traffic clogs the town's commercial strip, and on weekends during the

the company didn't consider Leucadia's proposal an offer because it was "vague and full of so many conditions," including that financing be arranged. Leucadia hasn't given details, but a Leucadia attorney said the company would use its borrowing power and GATX assets to finance the acquisition.

"I thought \$38 (a share) is as specific as one can get," said the Leucadia attorney, Stephen Jacobs. He also said the only conditions Leucadia set were typical for any acquisition. Aside from adequate financing, the offer is subject to regulatory and shareholder approval, to a review GATX's finances, and to a definitive merger agreement, Mr. Jacobs said.

GATX said it would provide Leucadia with full financial information if a "specific bona fide proposal" is made. GATX said it would require Leucadia to sign a confidentiality agreement. Leucadia signed a similar agreement last month, when it first expressed an interest in the company, and received information on some of GATX's operations. Leucadia returned the information, as specified in that agreement, which has expired.

Intel to Redeem Warrant Series

SAN FRANCISCO—Intel Corp. said it plans to call for redemption a series of warrants it issued in November 1984 along with 11% senior subordinated notes due Jan. 1, 1994.

The leasing, marine construction, and railroad concern said the transaction would reduce its debt about \$14 million.

Intel said the call date is March 3. It said each of the three million warrants is exercisable into common stock at \$4.75 a share and callable at 50 cents a warrant. The warrants are exercisable through March 24 by payment in cash or the 11% notes.

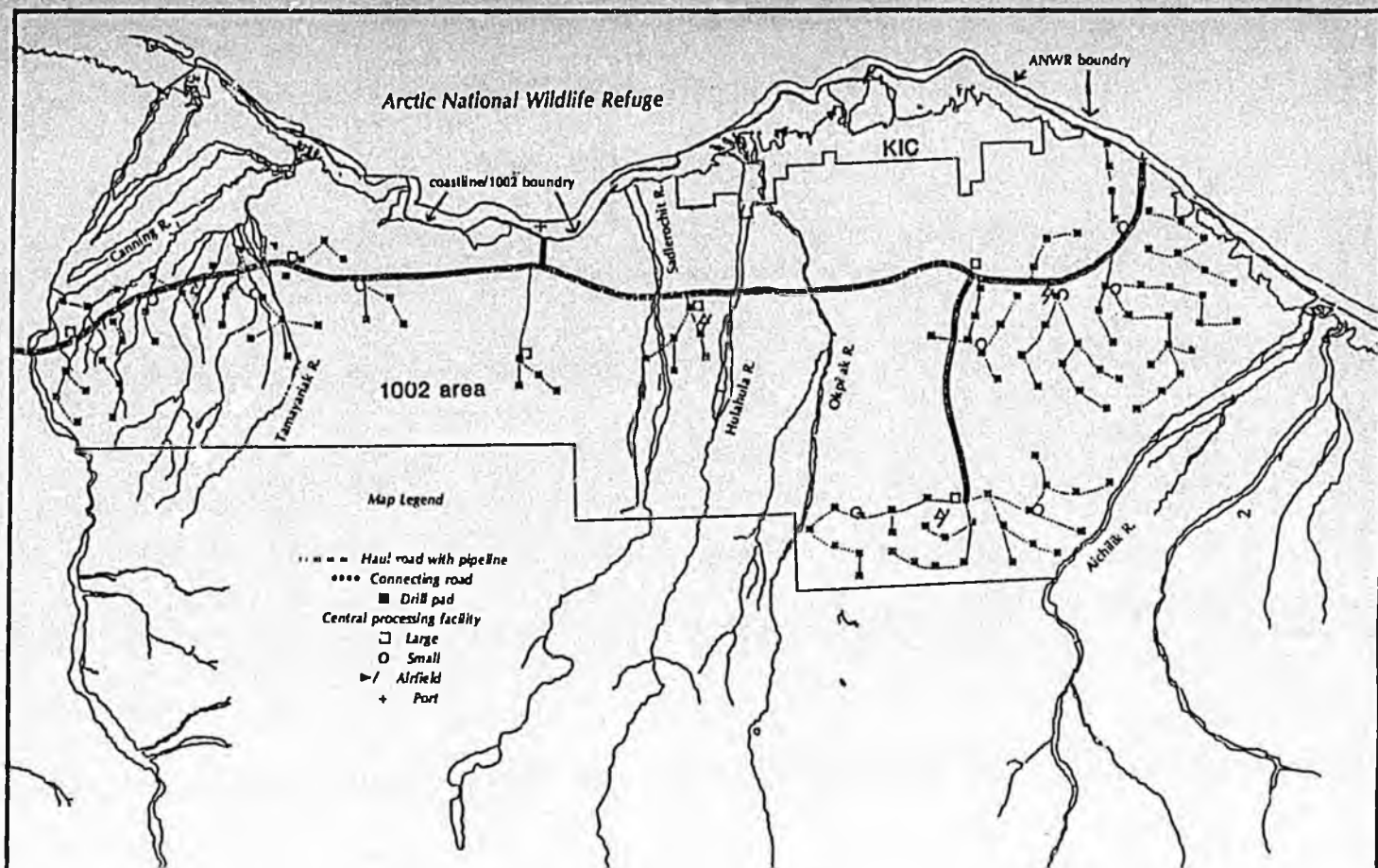
Boeing Says Airline Found Two More Jets With Cracks

By a WALL STREET JOURNAL Staff Reporter

SEATTLE—Boeing Co. said British Airways found structural cracks near the nose of two more 747 jumbo jets during an inspection.

The discovery brings to four the number of older 747s found to have this problem. Earlier this month, the Federal Aviation Administration ordered U.S. airlines to inspect 747s that have made more than 10,000 landings. There are 160 such planes flying domestically. Boeing, an aerospace concern, also alerted international carriers.

The FAA order followed Boeing's discovery of cracks in a Pan American World Airways jet.



U.S. GEOLOGICAL SURVEY

Map of the 1002 area and hypothetical development scenario

The 125 mile stretch of coastline along the Arctic Refuge, most of which is in the 1002 area, is the only section of Alaska's 1100 miles of Arctic Ocean coastline that is currently protected from the environmentally damaging effects of oil development.

Impact of alternatives

The draft 1002 report presents and analyzes five management alternatives for the coastal plain. The five options are: 1) full leasing of the entire 1002 study area; 2) partial leasing within the 1002 area; 3) additional oil and gas exploration including exploratory wells (currently prohibited by ANILCA); 4) no action which would include the 1002 area in the refuge comprehensive planning process currently underway; and, 5) federal wilderness designation for the entire coastal plain. Signed by Assistant Secretary of the Interior Bill Horn, *the draft 1002 Report recommends full leasing of the coastal plain for oil and gas production.*

Resources and the Price of Extraction

On the North Slope of Alaska, there are over 23.6 million acres of federal land in the National Petroleum Reserve-Alaska already committed to oil development. This figure does not include the vast oilfields around Prudhoe Bay or state and federal Outer Continental Shelf (OCS) oil leases.

No one knows conclusively how much, if any, oil actually lies beneath the coastal plain. The draft 1002 Report predicts that *there is only a 19% chance that any economically recoverable oil deposits lie beneath the coastal plain.* This 19% chance is called the marginal probability, and makes recoverable oil estimates

"conditional"; that is, based on the rather important condition that there is any oil there at all. It is against this one in five chance for economically recoverable oil that the American public is being asked to sacrifice internationally significant wildlife and wilderness resources.

The rationale provided in the draft report to justify the full leasing recommendation includes the national need for domestic sources of oil and gas and the need to provide for national security. Information included in the draft 1002 Report does not provide sufficient evidence to demonstrate that development of the Arctic Refuge coastal plain would provide enough oil to significantly alter the nation's dependence on foreign oil.

Two kinds of oil resource estimates are frequently made: estimates for oil "in place" (how much oil is down there), and estimates for "economically recoverable oil." Not all the oil in the ground can be extracted, given current technology.

The report presents a range of conditional probabilities of how much oil might be recoverable. Many of the wildly optimistic figures cited by the Department of the Interior in the press are for estimates of oil in place with low probabilities of occurrence. The mean estimate of oil cited in the draft is 3.2 billion barrels with a 40% probability of occurrence. This figure is used in the report as the basis for economic predictions. Using this mean figure, production from the Arctic Refuge under full leasing would equal only

Alaska State Legislature

Fourteenth Legislature — Second Session

Senate Calendar

FRIDAY
April 25, 1986
10:30 a.m.

Official Business of the Senate

One Hundred third Legislative Day

Chaplain: Right Reverend Archimandrite Innocent (Fryntzko) of
St. Nicholas Russian Orthodox Church

SECOND READING OF SENATE BILLS

SB 475 Designating the woolly mammoth as the state fossil
Resources report pg 2463, fiscal zero

SENATE BILLS IN SECOND READING

CSSSSB 391 Relating to the ethical conduct of governmental
(SA) activities
eff. date
Held from 4/23, amendment No. 1 moved and pending

SECOND READING OF HOUSE BILLS

HB 559 Approving the sale of Kuparuk River Unit royalty
oil by the State of Alaska to Petro Star, Inc.
and Chevron U.S.A., Inc.
eff. date
Resources report pg 2282, Finance report pg 2437

CITATIONS

Honoring - Gold King Midget A Amateur Hockey Team 1986 Western Regional
Champions
by Senators Fahrenkamp, Bennett and Coghill;
Representatives Davis, Frank, Koponen, M.W. Miller, Ringstad
and Shultz

In Memoriam - Bessie Barnabas
by Representatives Binkley and M.W. Miller

4.17% of projected U.S. oil demand by the year 2005, 2.57% by 2010.

The report bases its economic predictions on optimistically high oil prices of \$33 and \$40 per barrel, while recent oil prices have been in the neighborhood of \$14 to \$18 per barrel. These calculations produce correspondingly high figures with which to bolster arguments relating to the national interest.

Environmental Damage

One reason cited by Assistant Secretary Horn for proposing full leasing is "the ability of industry to minimize damage as learned from oil and gas activities elsewhere in the Alaskan Arctic." From the same report: "Accidental spills of crude oil and refined petroleum products are an inevitable consequence of oil field development."

Since 1972, there have been 23,000 oil spills that were reported to the Alaska Department of Environmental Conservation. The largest spill was 658,000 gallons. This does not indicate a good industry track record and represents a serious threat to the fragile life forms of the arctic tundra.

Hazardous waste disposal is another serious problem that remains unsolved: there is currently no permitted hazardous waste disposal site on the North Slope. Studies of reserve pit fluid discharges (which occur at every drill pad) at Prudhoe Bay indicate increases in the levels of heavy metals such as zinc, arsenic, and aluminum. The studies note that "along with deteriorations in water quality, the quality and quantity of organisms used as food by North Slope bird species may be decreasing."

Caribou

The Porcupine Caribou Herd stands as a symbol for this threatened ecosystem. Two extremely critical phases of caribou life history take place in the 1002 area: the calving and post-calving periods. Caribou cows with new-born calves are particularly sensitive to disturbance. During the post-calving period caribou store energy for winter survival; disturbances from human activity can cause stress and energy loss at this crucial time. Also at this time, hordes of insects, mainly mosquitoes, emerge to plague the caribou. To avoid the insects, caribou seek out the windy and cool Beaufort Sea coast. The 1002 area provides the most important calving, post-calving and insect relief habitat for the Porcupine Caribou Herd.

Other Species

The 1002 area also provides essential habitat for a variety of other wildlife species. Muskoxen were exterminated from the North Slope by the late 1800's. Today's healthy population in the 1002 area is a result of a reintroduction in 1959 and 1970. The area provides important habitat as well for wolves, arctic foxes, wolverines, brown bears, and polar bears. One hundred and eight species of birds have been recorded on the Arctic Refuge coastal plain, including the threatened arctic peregrine falcon. Most of these birds nest on the coastal plain, others feed, nest, molt, or prepare for the fall migration on the rich tundra vegetation. As many as 300,000 snow geese, or approximately 50% of the Pacific Flyway population, stage on the coastal plain to prepare for their long migratory flight south. Twelve species of fish frequent the rivers and streams of the 1002 area, while many more species inhabit the waters

It is against this one in five chance for economically recoverable oil that the American public is being asked to sacrifice internationally significant wildlife and wilderness resources.

offshore. In summary, the coastal plain is the most biologically important part of the Arctic Refuge because it provides critical habitat for so many resident and migratory species.

Direct Impacts to Fish and Wildlife

The report projects a "population decline or distribution change for 20-40 percent of the Porcupine Caribou Herd." The report also indicates that caribou may be forced to avoid 72,000 acres of insect relief habitat under full leasing. "Depending upon design, pipelines may create a barrier. Those adjacent to or close to active roadways would probably most impede free movement...This is of particular concern in the 1002 area because the probable pipeline/haul road route would bisect the area," said the report.

"Increased noise and disturbance level displacing wildlife throughout the 1002 area..." is one of the unavoidable impacts listed in the report. Another is direct loss of habitat due to ground being physically covered by structures, roads, and other facilities. Displacement and increased harvest of wolverines, direct loss of moose habitat, direct mortality of birds, a decline or change in distribution of golden eagles, a decline in the wolf population: the list goes on and on. "A major reduction or change in distribution of snow geese using the 1002 area could occur through the cumulative effects of direct habitat loss, indirect habitat loss due to disturbance, and direct mortality," is also indicated by the report.

The coastal plain is vital to the ecological integrity of the Arctic Refuge. It is not a separate entity which can be conveniently sliced off without major adverse effects to the whole system.

Mitigation

Measures proposed for mitigation of impacts associated with oil production represent wishful thinking at best. For example, the report says that "...negative effects to muskoxen could be mitigated by standard stipulations prohibiting disturbance, implementing necessary time and area closures, and requiring on-site monitoring." Yet in the next paragraph, the report admits that "...major negative effects upon the muskoxen population from oil and gas development could occur, considering the present management objectives for continued population growth of the herd under natural regulation and the displacement from habitat likely to occur."

Subsistence Values

Native people in both Alaska and Canada depend on Arctic Refuge resources for both cultural and nutritional sustenance. This includes the Inupiat people of the village of Kaktovik and the Athabaskan people of Arctic Village,



Alaska State Legislature

HOUSE CALENDAR

OFFICIAL BUSINESS OF THE HOUSE

NINETY-THIRD DAY

Tuesday

Chaplain: Pastor Jon Paden
Church of Christ

April 15, 1986
Convenes: 10:00 a.m.

29 Passed

SECOND READING OF HOUSE BILLS

HB 463 "An Act relating to criminal trials and restitution."
 -Judiciary report w/CS(Jud), new title, p. 2438:
 An Act relating to authority to compromise certain misdemeanors and to the payment of restitution.
 Zero Fiscal Note
 Zero Fiscal Note w/analysis, House Supplement No. 100
 -Finance report, p. 2568
 -Returned to Rules from calendar, 4/14
 -Rules reported today

HB 542 "An Act relating to corrective management of threatened stocks of game."
 -Resources report w/CS(Res), same title, p. 2417
 Zero Fiscal Note
 -Finance report w/CS(Res), p. 2550

SECOND READING OF SENATE BILLS

CSSB 109 "An Act relating to provision of chiropractic services under the medicaid program."
 (HESS)
 -HESS report, p. 1407
 -Finance report, p. 2085
 Fiscal Note, House Supplement No. 35

SECOND READING OF SENATE RESOLUTIONS

SJR 47 Requesting additional action by the United States to reduce high seas interception of Alaska-bound salmon.
 -Rules report, p. 2599

CITATIONS

Honoring - Dr. Henry I. Akiyama by Senators Kerttula, Ziegler, Ray, Rodey, Ferguson, Sackett, Zharoff, Halford, V.Fischer, Sturgulewski, Abood, Fahrenkamp, Bennett & all other members of the Senate; Representatives M.M.Miller, Duncan

ANNOUNCEMENTS

Minority Caucus	Court Building	Noon
Blood Pressure	Capitol - 2nd Floor	11:30 a.m. to 1:30 p.m.



U.S. FISH AND WILDLIFE SERVICE

Porcupine Caribou Herd crossing a coastal plain river.

Venetie, Chalkyitsik and Fort Yukon in Alaska and the village of Old Crow in Canada. The most important subsistence resource of all is the Porcupine Caribou Herd. "Caribou is the most important food source for the people of Arctic Village..." according to the 1002 Report. Other refuge species used by the people of Kaktovik include Dall Sheep, Arctic Char, Arctic Cisco, ptarmigan, polar bear, numerous species of waterfowl, bearded seal, spotted seal, ringed seal, wolf, wolverine, brown bear, and Arctic-ground squirrel.

Recreational Values Would be Compromised

"An experience in the Arctic National Wildlife Refuge is one you must search out yourself", states the form letter the U.S. Fish and Wildlife Service sends to potential visitors to the refuge. "You will find no packaged trip plans nor trail maps pointing the way...perhaps more than anywhere in America, the Arctic National Wildlife Refuge is a place where the sense of the unknown, of horizons unexplored, of opportunities for self reliance, independence, challenge, discovery and adventure...finding one's own way in a setting unsurpassed in beauty and vastness...make the Arctic Refuge a unique recreational experience." If the 1002 area is developed, the sights and sounds of oil drilling and transportation will dominate the visitor's sensual experiences anywhere from the coast to the Arctic Divide. Aesthetic impacts will extend beyond the 1002 area itself.

Other Problems the Report Fails to Address

Two major problems immediately meet the eye. One is the lack of sufficient water quantity in the 1002 area. The other is the enormous requirement for gravel necessary for building drilling pads and roads on permafrost. The report says "Specific locations and sources of water and gravel for exploration and development activities have not been

identified; and it is understood that these resources, especially water, are not readily available on the 1002 area." The report states that "...as much as 15 million gallons of water may be needed to drill one exploratory well." As for gravel, "Each mile of road occupies about 5 acres and requires approximately 40,000 cubic yards of gravel." In all, 40 to 50 million cubic yards of gravel would be required for construction, operation, and maintenance. "Gravel might have to be mined from upland sites, river terraces, streambeds, lagoons, or other potential sites." How this is to be accomplished without causing severe adverse impacts to fish and wildlife populations and their habitats is not addressed.

The Managing Agency's Biased Record

Throughout the decision making process on the 1002 area, the Department of the Interior and the U.S. Fish and Wildlife Service have demonstrated tremendous disregard for the intent of Congress and have done everything possible to minimize public involvement.

Contrary to the intent of Congress as expressed in ANILCA and appropriation bills, the Department of the Interior has spent over \$300,000 appraising land values in order to develop land exchange agreements with private Native corporations. These proposed exchanges would remove subsurface mineral rights from the public domain in the 1002 area. These secret negotiations, known within the Department as "Project M or Megatrade", have compromised the objectivity of the 1002 report and created additional vested interest pressures to open up the area.

Originally, the agency had no intention of allowing a public review of the draft 1002 report. A successful lawsuit, undertaken by Trustees for Alaska with the support of many other local and national conservation groups, required the Department of the Interior to hold public hearings and take public testimony before submitting the

ALASKA PROFESSIONAL SPORTFISHING ASSOCIATION

Chris Goll
President
4127 Raspberry
Anchorage, Alaska 99502
(907) 243-7894



Ron McMillan
Secretary/Treasurer
3318 West 30th Avenue
Anchorage, Alaska 99517
(907) 248-1714

April 12, 1986

Re: HB 93 (Finance),
Recreational Rivers bill

Dear Representative:

The Alaska Professional Sportfishing Association is the largest association of professional sportfishing guides, lodges and outfitters in Alaska. It is a statewide organization interested primarily in furthering our industry and maintaining the high quality sportfishing upon which we depend.

In behalf of our Association, I urge passage of HB 93 (Finance). It establishes six recreational rivers in southcentral Alaska. Several of the rivers are important to the guide, air-taxi, and sportfishing industries. Lake Creek, Talachulitna River, Deshka River, the Talkeetna River and Alexander Creek offer high quality salmon and trout fisheries that support air-taxi services, riverboat services, and in the case of the Talalchulitna, several lodges.

HB 93 (Finance) helps assure that the quality sportfishing, fish and wildlife habitat, and public access will be maintained. I am pleased that HB 93 protects existing commercial activities within the six river corridors, and I agree with the provision allowing management of commercial activities, including guiding. My hope is that these provisions will protect existing operations, allow for expansion that is compatible with quality guiding and quality sportfishing, and will prevent these rivers from developing problems so apparant on the Kenai. I used to guide on the Kenai and no longer do because of the changes in the character of the experience I could offer my clients.

HB 93 (Finance) strikes a good balance. I support the bill as it stands and urge consideration of one amendment if it would not jeopardize passage of the bill.

That amendment concerns land disposal. I appreciate that the bill would close to land disposal those lands within the corridors that are within a half mile of the rivers. However, I agree with the position of the Wildlife Federation of Alaska that the full designated river corridors, which average about a half mile on each side, should be closed to land disposal. The present language, "within one-half mile upland of the meander of the

"The Keepers of the Streams"

final report to Congress. The public involvement opportunities currently established are the Department's attempts to minimally comply with the mandate set forth by the courts as a result of litigation.

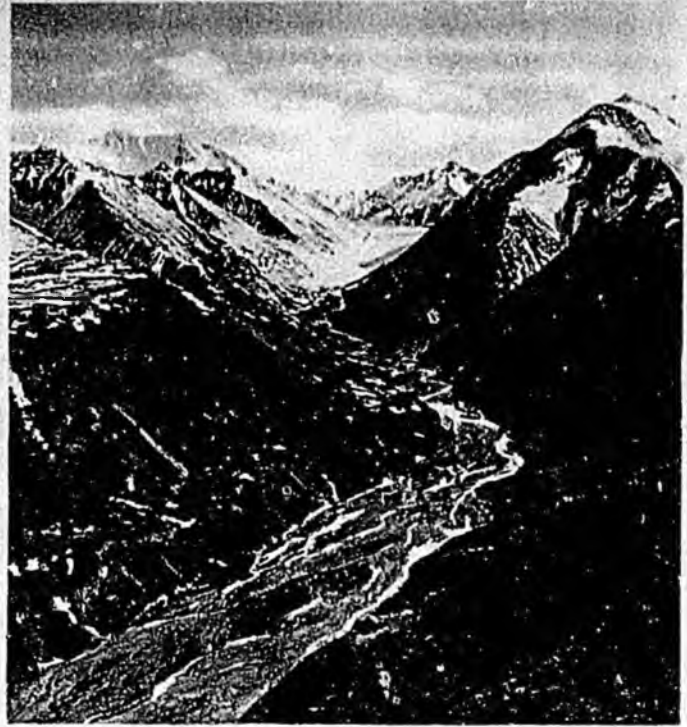
Comments desperately needed

Key points to include in your comments:

- ★ Support Alternative E which recommends wilderness designation for the entire Arctic Refuge coastal plain.
- ★ The report finds that there is only a one in five chance of finding economically recoverable oil beneath the coastal plain. Moreover, these estimates assume that oil would be priced at *more than double* what it is now.
- ★ Despoiling Alaska's premier wilderness refuge and jeopardizing its internationally significant wildlife and wilderness resources is *not in the national interest*.
- ★ Full oil and gas leasing of the coastal plain could be disastrous for the more than 180,000 caribou that use the area for calving and post-calving insect avoidance. This is the nation's only opportunity to protect virtually the entire range of one of the largest and only internationally migratory caribou herd in the world.
- ★ Caribou are vital to the subsistence way of life of Native people in both Canada and Alaska; adverse impacts on the caribou population will result in adverse impacts on subsistence.
- ★ The report looks at the 1002 area in isolation, rather than examining in detail the cumulative effects of oil and gas development on adjacent state and federal leases and offshore on the outer continental shelf.
- ★ The disposal of hazardous wastes associated with oil development presents a serious long term problem that has not yet been adequately addressed.
- ★ Further efforts towards energy conservation and creating viable alternative energy sources can better provide for our future energy needs than sacrificing the Arctic Refuge for a few days supply of oil.

The 60-day comment period for the draft 1002 report ends January 23, 1987.

Three public hearings, where people can voice their concerns, are scheduled for Kaktovik, Anchorage, and Washington, D.C. on January 6, 5, and 9 respectively. The public hearing in Anchorage will be located in spaces 1 and 2 of the Egan Convention Center. The hearing will begin at 9:00 a.m. and continue until all testimony is received. Please arrive early to be sure you can testify!!



The glacial headwaters of a coastal plain river.

For more information contact the Northern Alaska Environmental Center.

Legislation was introduced in the House of Representatives by Morris Udall during the 1986 Congressional session to protect the coastal plain as wilderness. The bill is expected to be reintroduced early in 1987, and we hope a similar bill will be introduced in the Senate. If you can, please send a copy of your letter to Senator Bennett Johnston, Chairman of the Senate Energy and Natural Resources Committee, with a note asking him to sponsor legislation to include the area in the National Wilderness Preservation System. Also, a copy to Governor Cowper will help show him there is support inside the state for preservation of these wildlands.

Mail Your Comments To:

U.S. Fish and Wildlife Service
Attn: Division of Refuge Management Resources
2343 Main Interior Building
18th and C Streets, N.W.
Washington, D.C. 20240

Senator Bennett J. Johnston
Senate Energy and Natural Resources Committee
Senate Office Building
Washington, D.C. 20510

Honorable Steve Cowper
Governor, State of Alaska
Pouch A
Juneau, Alaska 99801

have questions regarding any amendments, please feel free to call me at 344-5235 in Anchorage.

Sincerely,

A handwritten signature in cursive script that reads "Russ Redick".

Russ Redick
Executive Director
Alaska Sportfishing Association



Environmental organizations working for the Arctic Refuge

The following groups are working together to save the Arctic National Wildlife Refuge:

Alaska Center for the Environment
Defenders of Wildlife
National Audubon Society
National Parks and Conservation Association
Northern Alaska Environmental Center
Sierra Club
Southeast Alaska Conservation Council
The Wilderness Society
Trustees for Alaska

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THE NORTHERN LINE

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of
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Letters to the editor should bear the writer's signature, but names may be withheld upon request. We reserve the right to edit letters to fit space requirements.

NAEC is a nonprofit, educational organization dedicated to the preservation of the environment of the Arctic and interior Alaska, and the wise management of our natural resources.

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Fairbanks, Alaska

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Anchorage, AK 99501





Alaska Sportfishing Association

3605 Arctic Blvd., Suite 800 • Anchorage, Alaska 99503

April 12, 1986

Re: HB 93 (Finance),
Recreational Rivers

Dear Representative:

The Alaska Sportfishing Association has long supported passage of a strong recreational rivers bill. HB 93 (Finance) accomplishes that.

Alaska sells more than 200,000 sportfishing licenses annually. Our association has more than 2000 members, most of whom are in southcentral Alaska. As the recently retired supervisor of ADF&G, Sportfish Division for southcentral Alaska, I am familiar with the six rivers designated by HB 93 as recreational rivers.

They are important and popular salmon and trout sportfisheries. According to ADF&G sportfish harvest surveys, these six rivers attract approximately 100,000 person days of sportfishing each year. For example, according to ADF&G sportfish harvest surveys, the Little Susitna has about 35,000 person days of fishing each year; the Deshka (Moose and Kroto) has 23,000; Lake Creek has 15,000; Alexander Creek has 10,000; Talchalitna River has 5,000, and the Talkeetna has 8,000.

The rivers provide diverse fishing opportunities, from the crowded king salmon fisheries at the mouths of the Deshka River and Alexander Creek, to the quiet float trips for salmon and rainbow trout in the Talchalitna River and Moose, Kroto and Lake Creeks. The Little Susitna is good for coho and kings and is part of the Nancy Lakes canoe system. The Talkeetna has excellent trout fisheries at the mouths of several clear water tributaries, and even the mainstem offers good trout fishing when the silt clears in September.

The Finance Committee has done a good job, and I appreciate their efforts. We particularly want to compliment Representatives Cotton, Larson, Pourchot, Larson, Rieger, Frank, Uehling and the other members of the Finance Committee. If you

ANWR

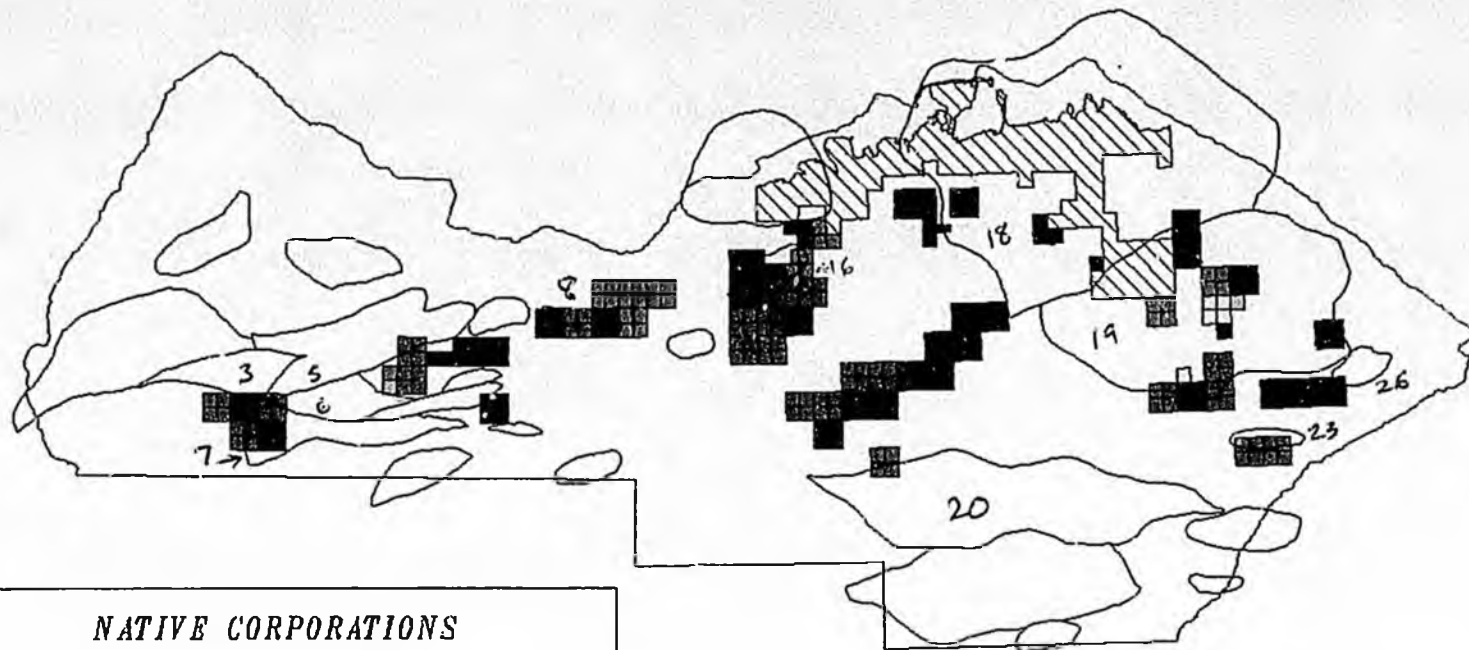
LAND TRADES-

DOI,











ANGSA,

STATE

NATIVE LAND EXCHANGE SELECTIONS ARCTIC NATIONAL WILDLIFE REFUGE - 1002 AREA



NATIVE CORPORATIONS

-  EXISTING KAKT'OVIK INUPIAT CORP.
-  DOYON
-  GANA-A' YOO
-  AKHIQ-KAGUYAK
-  NATIVE LANDS GROUP
-  OLD HARBOR *(Texas)*
-  KONIAG
-  NATIVE LAND GROUP / AKHIQ-KAGUYAK POOL
-  NATIVE LANDS GROUP / OLD HARBOR POOL
-  SEISMICALLY MAPPED STRUCTURES

0 MILES 20
0 KILOMETERS 32

U.S. FISH & WILDLIFE SERVICE
REGION 7 - ALASKA

GRAPHICS BY
BRANCH OF IRM/GIS



DATA SOURCE
BUREAU OF LAND MANAGEMENT
JULY 1987