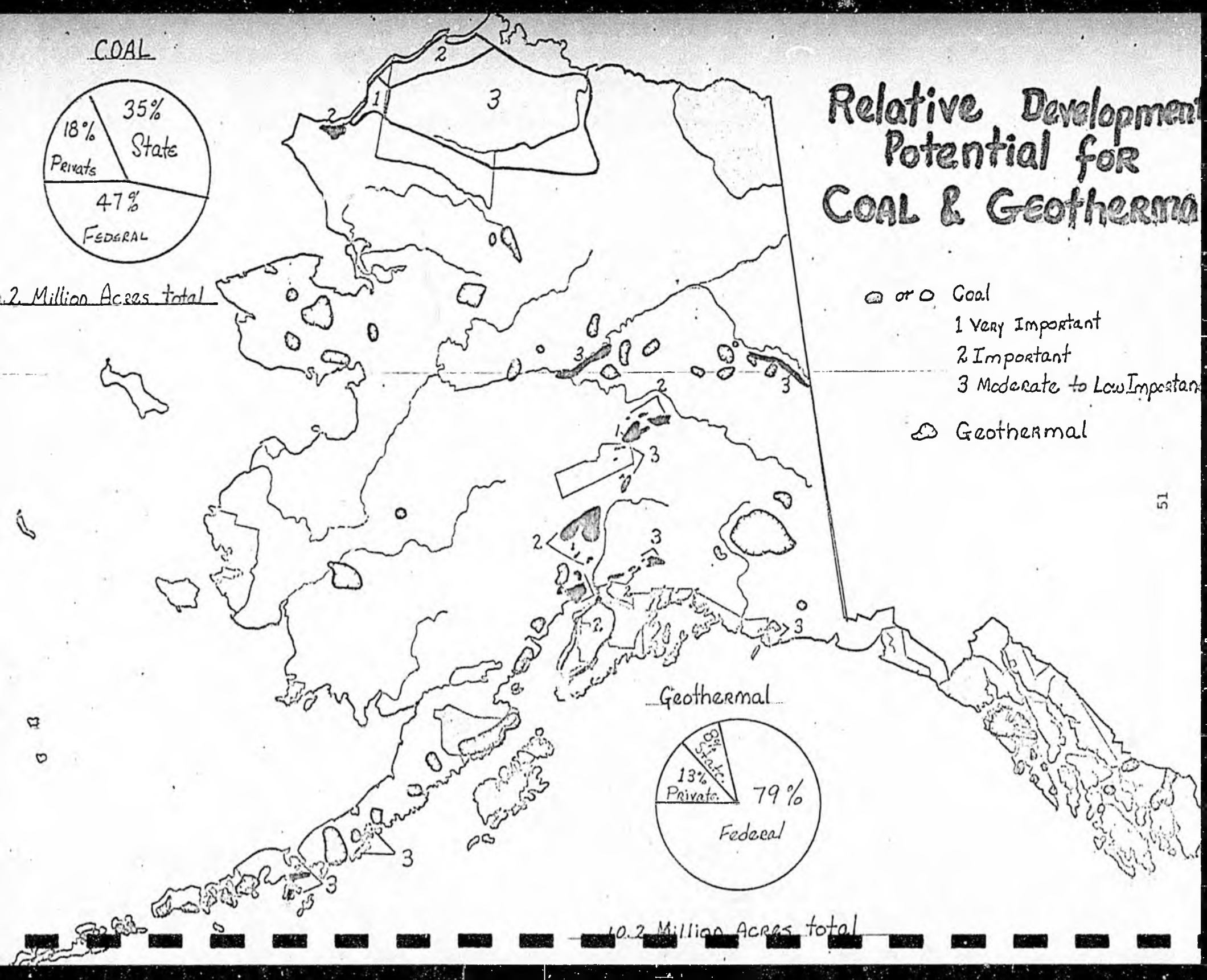
Relative Development Potential for Coal & Geothermal



and ash contents. The largest deposits of coal occur in lowland Arctic regions containing extensive permafrost, which may present technical difficulties. Some coal deposits adjoining the northwest Arctic coast may have coking characteristics. The Nenana coal field is Alaska's operating mine, currently producing for local markets. Of the 23.4 million acres of land having with known and potential coal deposits in Alaska, 6.2 million acres have been identified to be relatively important based on size and type of deposit, accessibility, and market demands.

Most of Alaska's coal must be strip-mined and each operation will require access roads or other means of bulk transportation. Costs of coal production in Alaska, particularly of the remote Arctic fields, will be relatively high and may forestall development.

Of the 6.2 million acres of land with important coal potential, almost 30 percent is located in the National Petroleum Reserve-Alaska. Fifteen percent of the areas with important coal potential are in existing parks and refuges, and up to 5 percent have been contained within proposed new parks and refuges before Congress. No additional coal deposits are contained in any new parks or refuges in one legislative proposal.

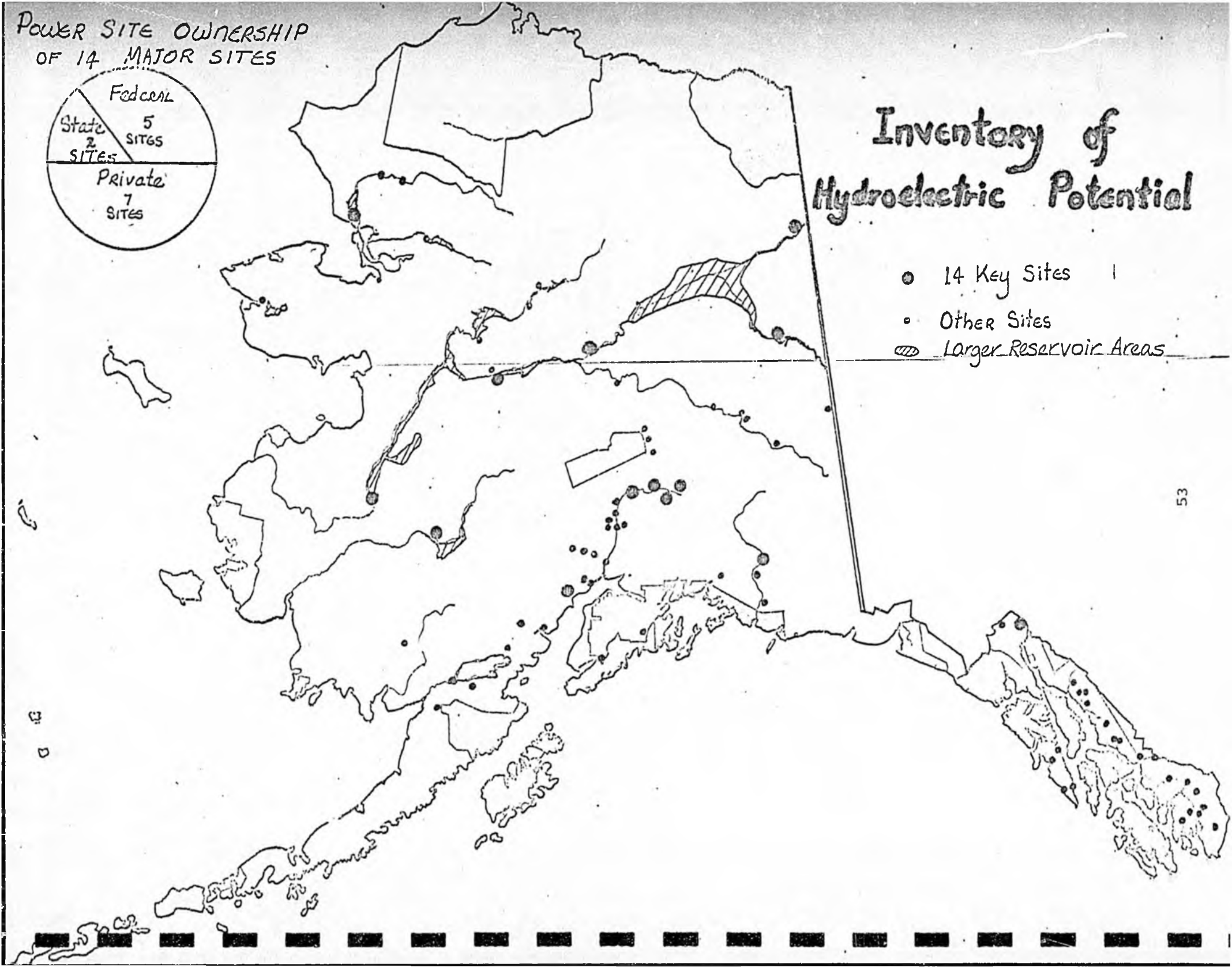
Geothermal

Approximately 75 areas with geothermal energy potential totalling 10.2 million acres are located in Alaska. Those areas with highest potential for energy generation are in the Wrangell Mountains and on the Alaska Peninsula and the Aleutian Islands. Utilization of geothermal resources might include the transfer of heat to nearby communities for space heating or small scale agricultural purposes. Some sites, if found suitable, might be used for on-site electrical energy generation. On-site development may be accompanied by unusually high noise levels. Most geothermal areas are distant from markets which may delay their development.

Existing parks and refuges currently contain 13 percent of Alaska's land with geothermal energy potential, and proposed legislation in Congress contains an additional 19 to 36 percent land with potential within new parks and refuges. Depending upon congressional action on these reserves, 27 to 47 percent of Alaska's land with geothermal possibilities will remain in other Federal ownership where geothermal development could occur. National forests, refuges, or other Federal reserves that are not available for additional State selections contain about one third of the lands in the State having geothermal energy potential. Many of the identified areas lie within mountainous regions or zones of historic volcanic activity having high scenic or scientific values.

Hydroelectric

Seventy-six hydroelectric sites involving relatively low development costs have been identified. Most of these sites are located in central and southeastern Alaska. Twenty-nine are located on lands already incorporated in existing units of the national conservation systems,


POWER SITE OWNERSHIP
OF 14 MAJOR SITES
Federal
5
SITES
State
2
SITES
Private
7
SITES
Inventory of
Hydroelectric Potential
14 Key Sites
Other Sites
Larger Reservoir Areas
53

primarily the Tongass National Forest. Several sites, including some with the highest electrical generation potential and largest reservoirs, are located along major interior river drainages, most notably the Yukon River.

Eleven key major projects involving 14 sites, totalling 23 million kilowatts of installed capacity, are considered to have good potential based on regional distribution, physical suitability, and costs. Eight of these projects have potential installed capacity of at least one million kilowatts each, giving an installed capacity as large or larger than the John Day Dam on the Columbia River or the Hoover Dam on the Colorado River.

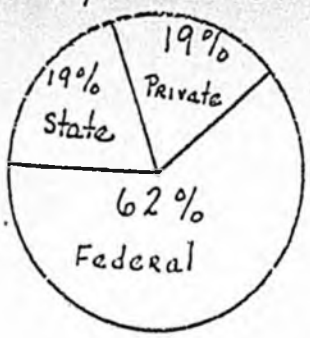
Of these 14 major potential sites, 2 are on State-selected land and 7 are projected to be in private ownership. Five are on Federal lands. None of these major sites or significant portions of their reservoirs are in any existing units of the national conservation systems.

The installed capacity of Alaska's hydroelectric plants that are already in operation is a little over 123,000 kilowatts, with government projects accounting for approximately 60 percent. These projects have been developed at two sites in southcentral where the bulk of the State's population lives, and at 12 sites in southeastern Alaska. Together they produce 16 percent of the State's total electrical energy.

Potential reservoirs at the 14 sites range from 106 square miles (Wood Canyon), to 10,000 square miles (Rampart), often encompassing wildlife, waterfowl, and salmon spawning habitat. One site would utilize an existing 26-square-mile lake and would cause no additional inundation. The development of hydroelectric projects may also affect downstream wildlife habitat, soils, vegetation, and aquatic habitat by regulating or eliminating fluctuating seasonal water flow. Development of three of the 14 sites could affect proposed national interest lands downstream. A number of the proposed projects (mainly on the Yukon) would decrease flood danger to downstream communities, while other communities upstream would have to be relocated to avoid inundation by reservoirs. Potential commercial forest lands and a number of sedimentary basins with potential for oil and gas or uranium would be affected to varying degrees, depending on the number and location of the sites developed. (The Rampart project would inundate one fourth of Alaska's soils with good agricultural potential, according to the Soil Conservation Service.)

Four of the 14 sites and major portions of four reservoirs of the other sites are contained within the spectrum of parks and refuges that have been proposed in Congress. Of the remaining six sites and reservoirs, five are on State or private land near urban areas where a combined annual output of 7.7 billion killowatt hours could be developed. The remaining project has its entire watershed and reservoir on the upper Yukon River in Canada with only generating facilities in Alaska. Its potential annual output is 21.0 billion kilowatt hours.

TOTAL ACREAGE –
78.9 MILLION



Sedimentary Basins
Having Uranium Potential

55

In a 1974 report, the Alaska Power Survey projected that in 1990, Alaskans would require 13.3 billion kilowatt hours of electrical power, and 27.5 billion kilowatt hours by the year 2000. These are mid-range projections based on current trends and growth rates. Low and high projections for the year 2000 range from 14.9 to 58.1 billion kilowatt hours.

Because of the great distances and high costs involved, it is unlikely in the near future that Alaska could meet a portion of the electric power or water demands of the rest of the United States, except possibly to supply energy for local processing of nationally significant resources found within the State.

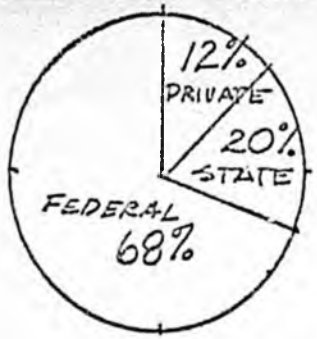
Uranium

Nineteen sedimentary basins favorable for uranium totalling 78.9 million acres are found in low-lying areas around the State. About 34.6 million acres of the lands with uranium potential are in classifications that are not available for State selection, including 16.6 million acres of potential uranium lands in National Petroleum Reserve-Alaska. There is currently no extraction, but some preliminary sampling and fly-over exploration efforts are underway. Low-lying basins with uranium potential often occur in areas of prime habitat for waterfowl and other wildlife. Seven percent of Alaska's land with uranium potential is contained in existing parks and wildlife refuges. An additional 6 to 7 percent of the land with uranium potential is contained the range of proposed new parks and refuges before Congress. Depending on the final size and location of these proposals, 25 to 28 percent of Alaska's land having uranium potential will remain in other Federal classifications where uranium development could be allowed. If uranium development in Alaska becomes feasible, it is likely to involve open-pit mining and floatation mills. The feasibility of an enrichment plant in Alaska would probably depend on an abundance of inexpensive coal or other fuel, and an adequate infrastructure.

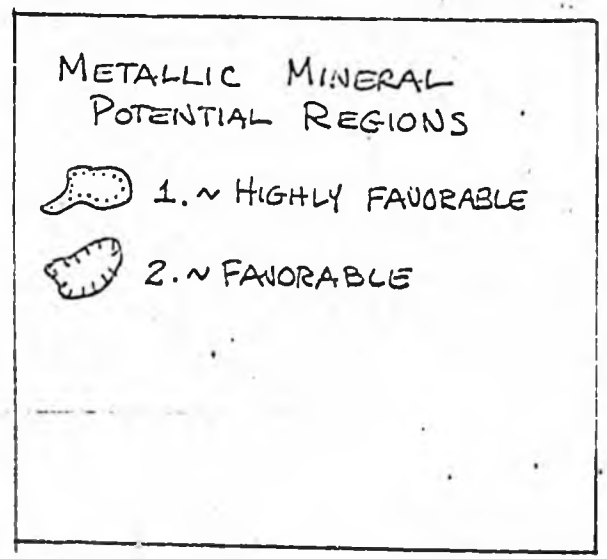
MINERAL VALUES

Alaska contains 18 important minerals that are of national interest. With the exception of gold and barite, all these minerals appear in the 1976 study by the Office of Technology Assessment, being updated in 1977, or the Stockpile Goals list of the Federal Preparedness Agency, October 1, 1976. Gold is included because of its increased use by the electronics industry. Barite is included because the entire statewide demand for barite-rock drilling needs can be met with Alaskan resources. The areas with the highest probability of containing these minerals are identified on the Bureau of Mines Metallogenic Provinces Map for Alaska. Those minerals addressed in this section are antimony, asbestos, chromium, copper, fluorine, gold, iron, barite, lead, mercury, molybdenum, nickel, platinum, silver, tin, titanium, tungsten, and zinc. Alaska also has uranium potential which is discussed in the Energy Values section.

METALLIC MINERALS



TOTAL ACRES ~ 257 MILLION



A number of recognized metallogenic provinces throughout the State have potential for antimony, asbestos, chromium, iron, nickel, platinum, titanium, copper, gold, silver, and molybdenum. Tin and tungsten have potential in several provinces in interior Alaska and on the Seward Peninsula. Provinces with lead and zinc potential are recognized to occur in southeastern, central, and northwestern Alaska. Provinces with potential for barite occur throughout the State, except in Western Alaska and the Alaska Peninsula. The Kuskokwim River area contains potential for mercury, and fluorine deposits are located on the western end of the Seward Peninsula.

Alaska is not the Nation's sole source of any of the identified minerals, though it may have relatively higher potential than other states where there is current extraction. Gold, lead, silver, and tin are currently produced in Alaska, but production is relatively small scale. In the past, Alaska has produced antimony, chromium, copper, gold, mercury, platinum, silver, tungsten, and zinc. Although mineral exploration efforts by both government and private industry are increasing, relatively little is known about Alaska's mineral potential compared to that of the rest of the United States. Future effective demand for Alaska's minerals will be influenced by additional resource information and changes in technology and international and domestic political factors.

The Bureau of Mines has estimated that 251 million acres in the State have some metallic mineral potential based on geological information, known deposits, and past mining history. Seven percent of these lands are included within existing national parks and wildlife refuges. Because the State has an interest in lands of high metalliferous mineral potential, it may make substantial future land selections on this basis. Approximately 46 percent of the Federal lands with mineral potential could be available for additional State selection.

The State, as well as a number of Native corporations, are conducting mineral explorations on lands they have selected. The Bureau of Mines and the U.S. Geological Survey are continuing their exploratory field work activities throughout the State. The Bureau of Mines has made particular efforts in the Brooks Range, central Alaska Range, Glacier Bay National Monument, and in the wilderness study areas in the Tongass National Forest.

With the important exception of oil and gas, high costs of production and exploration in remote Alaska may mean that only larger or higher grade mineral deposits will be feasible to extract in the foreseeable future. The harsh climate shortens the exploration and construction season, and acts to reduce productivity. Local markets are small and higher costs may make Alaska resources noncompetitive in worldwide markets. Lack of transportation and utility infrastructures in most areas of Alaska increase the required capital investment. For those

industries more labor intensive than the oil and gas industry, high salaries matching a cost of living 25 to 75 percent higher than that of the rest of the United States need to be taken into consideration in investment decisions.

Generally, underground mining is less likely to be economically feasible in Alaska except for gold and silver, or for very large higher grade deposits of other base metals. Lower grade underground mines may be precluded by high labor costs that could become more than 50 percent of the total operating cost. Consequently, most future mineral development in Alaska will probably be by open-pit methods.

The amount of land needed for an open-pit mine varies depending on the type of mineral(s) and the size of the deposit. The amount of land needed for a single mine in Alaska may vary from under 100 acres to over 1,000 acres. While only a few acres are needed for the actual mill site, the mine itself may cover several hundred acres. Related tailing piles and settling ponds may use at least as much land as the excavation site (often 2 or 3 times as much). Underground mines may need comparable acreage for milling, settling ponds, and tailings, although the mine itself will involve very little surface disturbance. In some cases, Alaska mining operations will generally need to be larger than other comparable U.S. Mines to be economically feasible in remote areas. Most will require ground transportation and/or nearby airstrips.

In some cases, winter haul roads have reduced or eliminated the need for a permanent access road for equipment and supplies. In the past, however, most extraction has taken place during the summer months. In the future, use of winter haul roads may continue and mining activity may be more likely to occur on a year-round basis.

Of the 170 million acres of Federal lands with mineral potential, 9 to 26 percent have been proposed for additions to new parks and refuges in a range of legislative options before Congress. If Congress establishes any of these legislative options, 107 to 137 million acres will remain in Federal ownership classifications where mineral extraction could be allowed. Due to the nature of geologic phenomena, minerals frequently occur in areas of high scenic beauty. Consequently, many areas proposed for additions to the national conservation systems contain both scenic and mineral values.

The following table summarizes some of the more important variables that may be addressed to determine the potential of the 17 minerals in Alaska of national interest that have been identified. The first column indicates what percent of the identified national resource is in Alaska. In some cases, little is known about a mineral's presence in the State, and some future discoveries may not be anticipated or reflected. The second column indicates if present or past production has taken place. The third column deals with the most likely methods of extraction and related primary processing and transportation needs. The fourth column mentions other factors that may be important in determining national interest in minerals in Alaska.

OF IDENTIFIED U.S. NATIONAL RESOURCE * INTEREST IN ALASKA		OR CURRENT PRODUCTION	TYPE OF OPERATION LIKELY IN THE FUTURE	OTHER FACTORS
Copper	9	Large past production	Mines would probably be open pit or large underground operations. On-site milling of the ore is required, and transportation of the resulting concentrate will require a road or other form of surface access.	If large quantities of copper are extracted from Alaska in the future, it may be possible to have one or more smelters located in the State.
Antimony	5	Past production; small current production in 1976.	Mines could be open pit or very high grade underground operations. Higher grade ores may not require on-site milling, and might be flown out. Lower grade product would require surface transportation.	In the past Alaska production has been from a number of small, high grade mines.
Silver	small	Past and current production	Mines could be underground or open pit. Underground mining for silver is more economically feasible than most other minerals because of its high unit value. On-site milling may not always be necessary. A high grade mill concentrate might be flown out. If by-products occur (antimony, copper, lead, zinc) then the ore will require surface transportation.	In Alaska silver is frequently mined as a principal product. Elsewhere in the U.S. 70 percent is mined as a by-product with other minerals.
Gold	no data	Past and current production	Mines could be placer, open pit, or high grade underground operations. Ore sometimes requires on-site milling. A high grade ore or mill concentrate could be flown out. Gold mine operations commonly produce large amounts of tailings.	In the past, Alaska has had a relatively high proportion of gold mines compared to the conterminous states.
Lead/ Zinc	no data	Past zinc production; and some current lead production	Mines could be open pit or large high grade underground operations. Smaller underground mines could be feasible if combined with high grade silver. The ore requires on-site milling and surface access for transportation.	Zinc has greater potential in than lead. However, they frequently occur together.

MINERALS OF NATIONAL INTEREST IN ALASKA	% OF IDENTIFIED U.S. RESOURCE *	HISTORIC OR CURRENT PRODUCTION	TYPE OF OPERATION LIKELY IN THE FUTURE	OTHER FACTORS
Nickel	3-9	None	Mines could be open pit or high grade underground operations. On-site milling of the ore is required. A higher grade mill concentrate might be flown out, but it generally requires surface transportation.	Most of the State's largest and and best known occurrences are located in Glacier Bay National Monument, which was recently closed to mining by Congress.
Barite	no data	Current production	Mines could be open pit or high grade underground operations. (Current extraction in Southeast is from below the mean high tide line.) On-site milling is required and surface transportation is needed for the milled product.	All current production in Alaska is used to make heavy drilling muds for use within the State. Additional production for Alaskan markets is to begin soon.
Platinum	up to 27	Past production	Similar to gold. All Alaska production to date has been from placer. The only platinum mine in Alaska or the U.S. closed this year after over 40 years of operation.	The future development potential for platinum in Alaska could increase if a cartel formed that would cause a substantial platinum price increase. Most of the world's platinum comes from South Africa, the United Kingdom, and USSR.
Chromium	less than 1	Past production	Mines would likely be open pit or possibly small shallow underground operations for high grade pods. A high grade ore may not require on-site milling. Low grade deposits would probably only be feasible near tidewater or existing transportation systems. Higher grade occurrences may be associated with a number of known ultramafic rock sequences in the State.	Current market prices appear to make Alaska production not economically feasible. But the possibility of a cartel by major producers could substantially increase the world price as well as Alaska's chromium development potential. Most of the world's chromium comes from South Africa USSR, Turkey and Rhodesia.
Tin	well over half	Past production	Mines could be open pit or placer operations. Open pit mines will require milling while the placer operations may not. A high grade ore or mill concentrate might be flown out. Lower grades need surface transportation.	The current international supply and demand is stable, but if market conditions change in the future, Alaska's tin resource could have increased development potential.

OF IDENTIFIED U.S. ATIONAL RESOURCE NTEREST IN ALASKA *	OR CURRENT PRODUCTION	TYPE OF OPERATION LIKELY IN THE FUTURE	OTHER FACTORS
Tungsten	less than 1	Past production	Mines could be open pit, high grade underground or possibly placer operations. All types would require on-site milling. Surface transportation for the mill concentrate would probably be necessary.	Sometimes tungsten occurs as a by-product from gold placer mines.
Fluorine	22	None	Mines would probably be open pit. On-site milling of the ore is required and surface transportation would be needed. (Financing needed for infrastructure costs may allow only large operations to be economically feasible.	Tentative production schemes have been proposed for a large deposit on the Seward Peninsula. However, its development may render the operation not economically feasible at this time.
Asbestos	no data	Insignificant past production.	Mines would probably be open pit operations. On-site milling is required and surface transportation for the mill concentrate would be needed. Asbestos mines will need at least 100 acres tailings, settling ponds, etc.	There has been some question about possible air or water pollution from the mine site resulting from waste fiber.
Molybdenum	3	None	Mines would probably be large open pit operations. The ore requires on-site milling, and the resulting concentarate needs surface transportation. Tidewater operations could utilize barges or ocean freighters.	A major deposit was recently discovered in southeast Alaska that could be developed in the future if environmental and marketing conditions allow.
Mercury	4	Past Production	Mines could be small to medium open pit or high grade underground operations. An on-site "retort" process (heat separation) would be required. Larger operations may also have milling. Retort product might be flown out.	Increased demand for mercury in the near future is in doubt due to industrial conservation efforts. In several decades, demand may increase again.

NERALS OF ATIONAL NTEREST IN	% OF IDENTIFIED U.S. RESOURCE IN ALASKA *	HISTORIC OR CURRENT PRODUCTION	TYPE OF OPERATION LIKELY IN THE FUTURE	OTHER FACTORS
Iron	7	None	Mines could be open pit or placer operations. On-site milling is generally required. The product needs inexpensive surface transportation like ocean freighters or railroad.	Some of Alaska's lode and placer beach deposits are magnetic which makes milling significantly cheaper.
Titanium	no data	None	Titanium would probably be mined as a by-product or co-product with iron near tidewater.	The Bureau of Mines has assessed the titaniferous content of many of Alaska's beach sand deposits and has not found high grade deposits.

*Office of Technological Assessment, 1976. This column reflects only known resources without regard to future potential discoveries.

RENEWABLE RESOURCES

Timber

Approximately 140.2 million acres of Alaska is forested, including 22.5 million acres of coastal forest and 117.7 million acres of interior forest stands. Coastal forests primarily of western hemlock and Sitka spruce with larger trees and higher growth rates are generally more productive than the interior forest types containing aspen, birch, balsam poplar, and black and white spruce in colder, drier climates. Of the 22.5 million acres of coastal forest, 5.6 million acres are considered commercial timber lands (based on annual growth rates of at least 20 cubic feet per acre). Wood volume for this area is estimated at 35 billion cubic feet.

Interior forest types fall into these three broad categories: lowland spruce-hardwood, bottomland spruce-poplar, and upland spruce-hardwood, totalling 117.7 million acres, with varied commercial potential. Existing parks and refuges contain about one percent of these interior forests lands. Existing national forests do not contain any interior forest types.

In 1968, the Forest Service's Alaska Forest Survey determined that 22.4 million acres of the interior forest types are defined as commercial, (based on the 20 cubic feet per acre annual growth), with a volume of 14.2 billion broad feet. This includes 9 billion cubic feet of merchantable trees 5 inches or larger in diameter. In 1976, in a report to Congress, the Forest Service reduced its estimate of commercial interior forest lands to 12.4 million acres. This more recent estimate excluded some forest lands on the basis of relative inaccessibility and high development costs. Bottomland forests along Alaska's major interior rivers often have larger tree size and higher growth rates. About half of these stands will be in State and private ownership. Upland spruce-hardwood stands on good sites on southerly slopes often have good growth rates also. About 36 percent of these upland forests are included in State or private ownership.

Large-scale commercial logging occurs primarily in southeastern Alaska, most of it within the Tongass National Forest, and, secondarily, on the southcentral coastal forest. Besides providing watershed and habitat values, Alaska's timber is utilized to produce pulp, cants, and chips, with a variety of uses. Very little dimensional lumber is produced, although some small mills, including several in the interior, produce house logs for local use. Generally, clearcutting is the only currently economically feasible method of timber harvest in Alaska. Because other U.S. markets for Alaska's resources are relatively remote, other Pacific Rim countries may be more likely to utilize Alaska forest products. Markets for Alaska's timber products are almost entirely foreign, with Japan the leading buyer. The timber industry in the Tongass National Forest is a major contributor to the southeastern local economy.

Tree species similar to those of Alaska's interior forests are found in Scandanavian countries where the harvesting of timber is relatively intensive. However, a generally milder climate and more highly developed social infrastructures presently increase the relative timber potential in Scandanavia.

Of the 117.7 million acres of interior forest land, legislation before Congress has incorporated from 6.2 to 28.5 million acres in proposed new parks and wildlife refuges. Up to 14.9 million acres of interior forest lands may also be included in proposed new national forests. Depending on the extent of new parks and refuges, 49.0 to 71.4 million acres of interior forest land could remain in other Federal classifications where timber harvest might be allowed. Some of this Federal land may be selected by the State of Alaska.

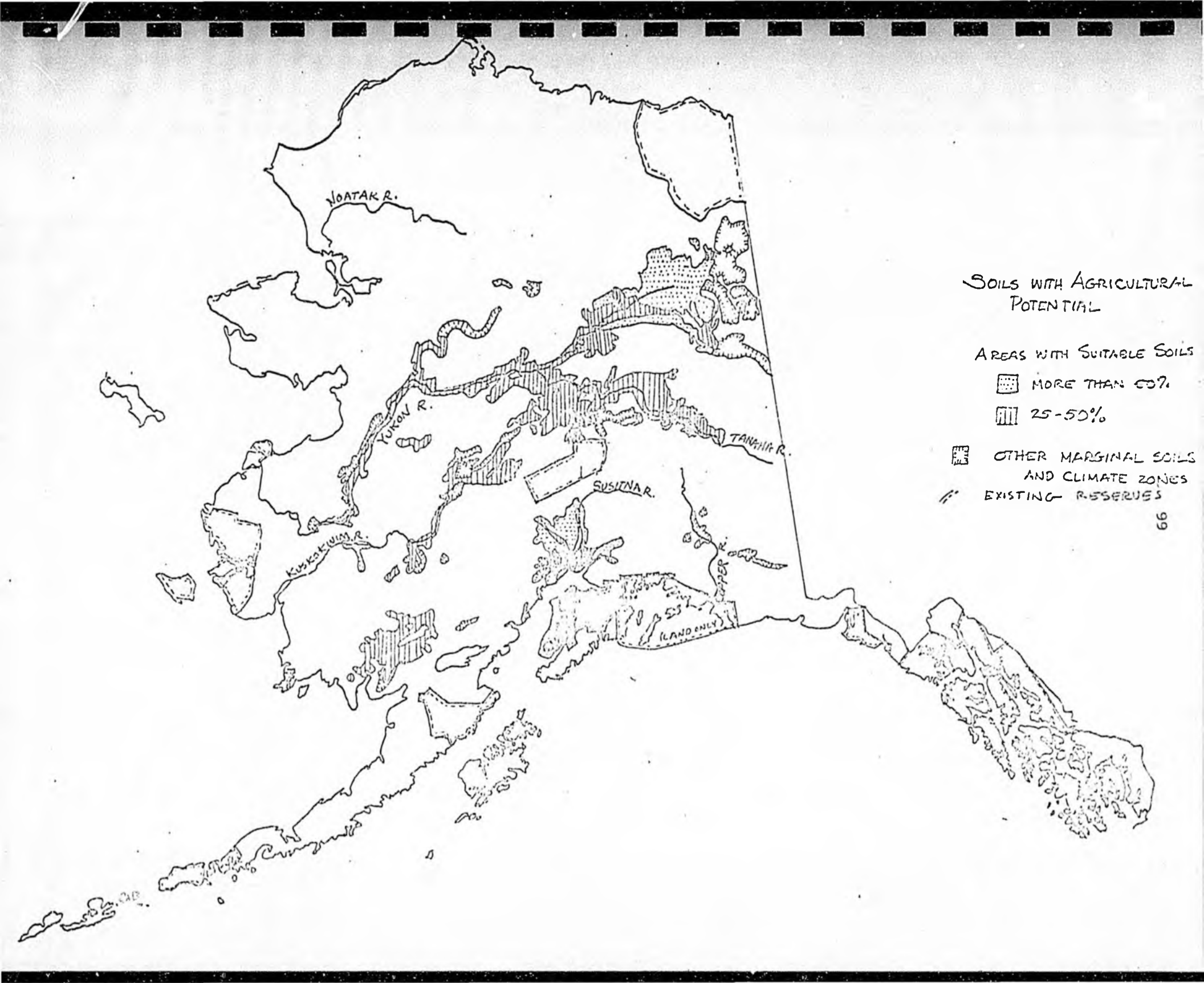
Cultivable Soils

Recent data from the Soil Conservation Service indicates that Alaska may have up to 102.3 million acres of soils with some agricultural potential. However, 81.9 million acres of this is considered poor because of severe soil, temperature, or rainfall limitations which are difficult to overcome and would require special treatment to grow even the hardiest crops.

What remains is 16.7 million acres of good soils and 3.8 million acres of fair soils. "Good" soils are those having few, if any, critical limitations. They can support all of the common Alaskan crops successfully using ordinary management practices. They are at least 18 inches deep, well-drained, and on slopes of less than 7 percent. They have adequate rainfall and are less likely to be subjected to flood, drought, frost, or wind erosion. "Fair" soils have identifiable soil or climate limitations that can be overcome by careful management and special practices. They are at least 10 inches deep, may be subject to short periods of excessive soil moisture during the growing season, and are on slopes of less than 12 percent. They are more likely to be subject to flood, drought, frost, or wind erosion.

The 20.5 million acres of good and fair soils are located primarily in the interior drainages of the Tanana, Yukon, and Kuskokwim Rivers and in the Bristol Bay and Cook Inlet Basins. Over half of the soils with good potential in Alaska occur on lowlands adjacent to the major interior rivers. About one quarter of Alaska's good soils are located in the Yukon Flats.

Soils in Alaska are suitable for growing crops of barley, oats, potatoes, and grasses for hay and silage. Other crops that have been produced successfully on a small-scale or family basis include cabbage, lettuce, carrots, celery, cauliflower, brussel sprouts, broccoli, turnips, peas,



SOILS WITH AGRICULTURAL POTENTIAL

AREAS WITH SUITABLE SOILS

MORE THAN 50%

25-50%

OTHER MARGINAL SOILS AND CLIMATE ZONES

EXISTING RESERVES

strawberries, and raspberries. Tomatoes and cucumbers are grown successfully in greenhouses. Significant agricultural research and experimentation has occurred in Alaska, and a variety of crop strains suitable for northern production have been developed.

At least half of the State's good and fair soils are likely to be divided among State and private landowners in the near future. Units presently within existing national conservation systems have relatively little acreage of cultivable soils.

Alaskan agriculture is currently small-scale and produces for local market only. There are under 75,000 acres of farms, mostly located in the Matanuska-Susitna Valley near Cook Inlet and in the interior Tanana Valley. To date, production and transportation costs have made the produce competitive only in local markets. Unlike most other kinds of natural resource development, agriculture implies permanent settlement and the cost of providing schools, roads, and other community facilities and services.

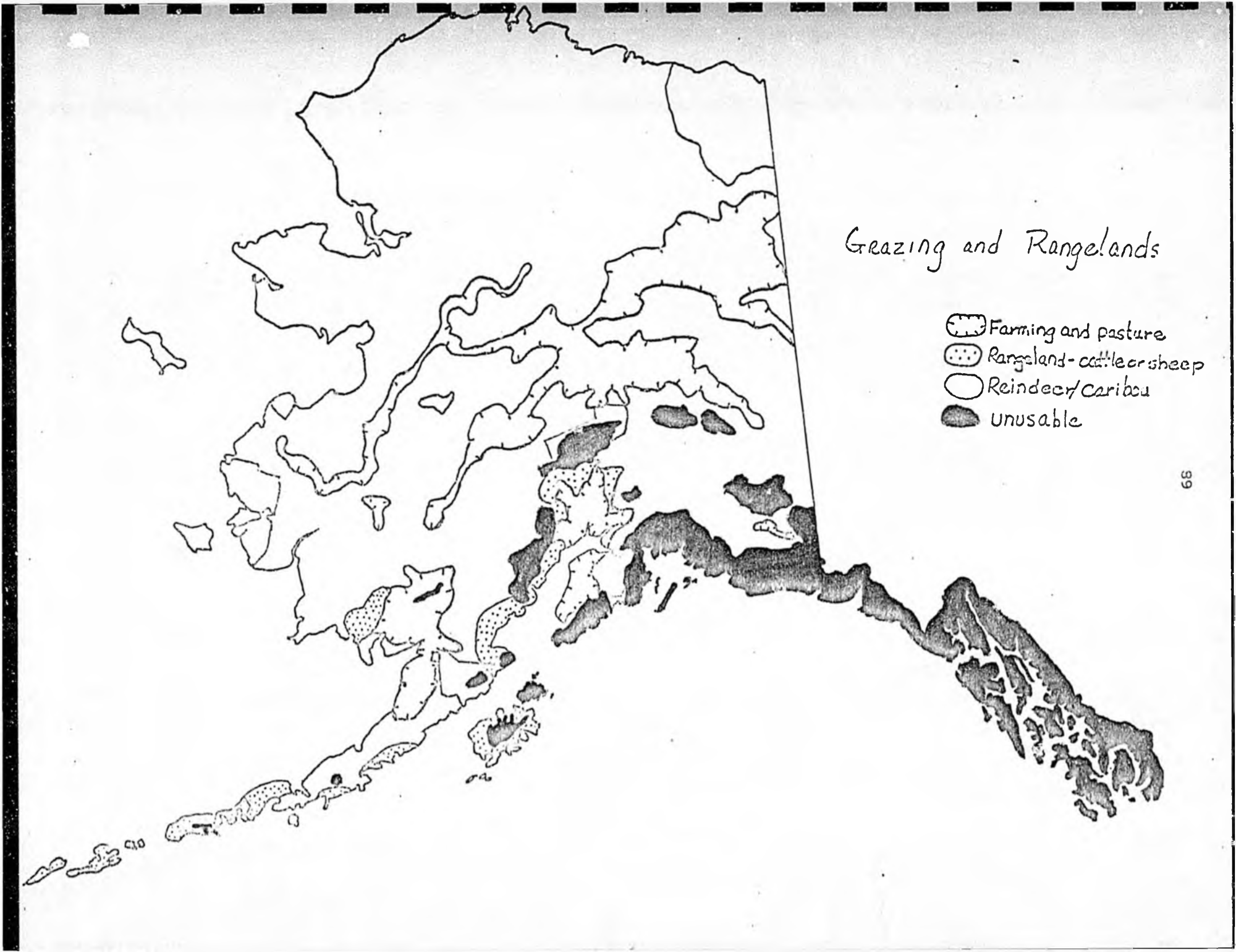
The feasibility of developing some agricultural soils in the future may depend upon flood control and irrigation facilities that could be constructed as part of several proposed hydroelectric projects, especially along the major interior rivers. However, some reservoirs have the potential for inundating large areas of cultivable lowlands.

The range of proposed additions to parks, refuges, and forests contain varying proportions of the potential agricultural soils in Alaska. All of the legislative options would place large portions or all of the Federal lands with good soils in the Yukon Flats within a national wildlife refuge or other classification. Other smaller tracts of cultivable soils found in the State have generally not been included to any significant extent in other proposed parks or refuges.

Lowlands with tillable soils frequently support high density waterfowl and furbearer populations, most notably in the Yukon Flats area which contains 4.7 million acres of good soils.

Rangelands

Alaska has about 18.6 million acres of land that may be suitable for domestic livestock grazing, primarily cattle and sheep. This includes 195,000 acres of good grazing lands principally on Kodiak and the Aleutian Islands where domestic livestock could successfully graze most of the year. The remainder is somewhat limited by a shorter growing season, periods of excessive wetness, or a predominance of less palatable vegetation. Over 20,000 dairy and beef cattle, sheep, goats, and horses are currently grazing on 1.5 million acres. The areas of greatest grazing potential are the Aleutian Islands, Alaska Peninsula, Kodiak Island, and scattered other locations in southcentral and interior Alaska and the Bristol Bay region. The grazing season in interior and


Grazing and Rangelands
Farming and pasture
Rangeland - cattle or sheep
Reindeer/Caribou
Unusable
89

on the coast north of Kodiak is limited to three or four months each year. Supplemental feeding and shelter is necessary during the winter months especially for cattle. Greatest potential would be achieved under a livestock economy with hardy range animals, development of forested grassland in proximity to croplands, and some shelter or controlled environment. Introduction and cultivation of grasses may extend the grazing season to approxmiately seven months. Domestic livestock grazing frequently overlaps wildlife habitat of a variety of species. Expansion of the use of Alaska's potential grazing lands could mean increased predator control, range competition with caribou or moose, and increased potential for wildlife disease.

Sheep in Alaska are raised primarily for wool production. Nearly the entire population of sheep is grazed year-around on Umnak and Unalaska Islands on Federal public domain lands or on private lands. Sheep are generally more self-sufficient than cattle, and are more suitable for the remote Aleutian Islands because they require less meat processing and transportation infrastructures than beef cattle. Sheep generally do not require supplemental winter feeding.

Less than 2 percent of the beef consumed in Alaska is raised in the State. Half of this comes from Kodiak Island, and most of the balance is from dairy cattle in the Matanuska-Susitna Valley near Anchorage. Dairying, which generally requires extensive landholdings, is currently threatened by urban expansion from the Anchorage area. Other areas in interior Alaska and the undeveloped Susitna lowlands could support expansion if they were made available.

Of the 18.6 million acres of potential domestic grazing lands in Alaska, from 3 percent to over half are contained in proposed parks and refuges.

Semidomesticated reindeer and musk-oxen are also raised in the State. Unlike domestic stock, these animals can survive in the harsher climate of northern and western Alaska. Lands suitable for reindeer grazing are present in nearly all lowland and upland areas of the State where wild caribou range. Much of Alaska's potential reindeer grazing lands have been selected by private corporations and the State of Alaska, but large amounts will remain on Federal lands. Currently there are eight to ten herds on several Bering Sea Islands, the Baldwin and Seward Peninsulas, and the Aleutian Islands, totalling 25,000 to 35,000 animals. Reindeer make a significant contribution to the economy of a number of rural Alaskans. Research to determine the commercial value of the hair and meat of the musk-oxen has been underway for several years. Potential musk-oxen range exists on the Seward Peninsula and along the Arctic coastal plain. Proposals before Congress for new parks, wildlife refuges, and forests have included varying amounts of rangelands for semidomesticated animals. In any case, a large portion of Alaska's rangelands will be on State, private, or Federal public domain lands where grazing might be allowed.

Fisheries

Alaska has valuable fisheries, both freshwater and marine. Marine fish and shellfish harvested in Alaska include salmon, halibut, sable fish, pollock, herring, king and tanner crab, and shrimp. Marine and anadromous commercial fisheries in the Gulf of Alaska and Bering Sea are harvested by several Pacific Rim countries prompting several past and current international fishery treaties. Significant foreign take of Alaska salmon and other fisheries has been one of the contributing factors leading to the recent U.S. enactment of a 200-mile fishery jurisdiction zone. Because of increasing number of U.S. and foreign fishing vessels competing for Alaska's marine fisheries, the State has legislatively instituted a limited entry fisheries program.

Commercial fishing is one of Alaska's major industries. In the years 1965-1970, prior to construction of the Alaska oil pipeline, average July employment in the fishing industry accounted for 17 percent of the State's total employment, and 37 percent of the employment in the coastal regions. During 1975, Alaska fisheries contributed nearly 438 million pounds or about 9 percent of the total U.S. catch. Value of the Alaska harvest was $143,836,000 or 14.8 percent of the value assigned to the total U.S. catch. The value of the salmon industry alone has totalled nearly $700 million from 1960 through 1974 with an average of approximately $46 million annually.

Many rural inhabitants depend upon fish as a primary food source to meet their subsistence needs. Some also participate in the commercial harvest of marine waters or major inland rivers. Substantial quantities of salmon, white fish, and other fish are caught for human and sled dog consumption.

Sport fisheries are an important factor in the State's tourism industry. Sport fishing has grown significantly since 1960. License sales have nearly tripled since 1961. In 1973, a statewide survey indicated that a total of 174,278 sport anglers caught an estimated 2.4 million finfish.

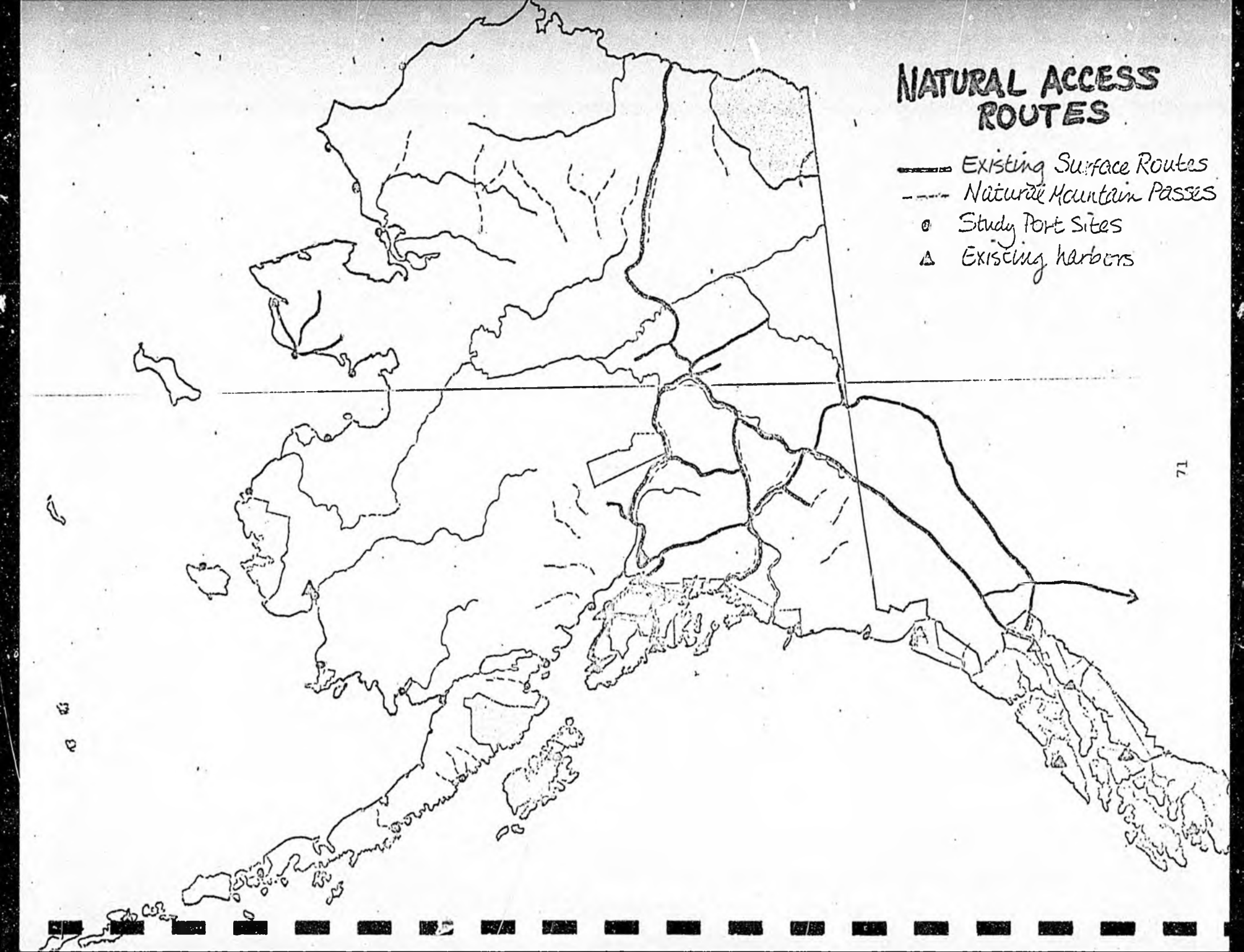
The State of Alaska conducts a fisheries improvement program designed to increase the availability of natural spawning and rearing areas. Artificial rearing of salmon stocks, and proposals for expanded and additional hatchery facilities are also part of the State's program.

Present ownership allocation as well as proposed containment of fisheries habitat in national conservation units are referenced earlier under "Fish". New units of national conservation systems and wilderness designation of some areas could impact State fishery management programs to some degree, particularly in the Bristol Bay regions.

OTHER USES

Natural Access Routes

Natural access refers to those physical features of the State that facilitate surface transportation or offer opportunities for the development


NATURAL ACCESS ROUTES
Existing Surface Routes
Natural Mountain Passes
Study Port Sites
Existing harbors

of transportation facilities. Among these features are major inland waterways for boat and barge travel, protected marine waterways of southeast Alaska and Prince William Sound; natural deep water harbors, numerous lakes and rivers allowing aircraft landings in remote areas, frozen ground and rivers in the winter for some cross-country movement of heavy equipment, mountain passes through major mountain ranges, and major river valleys.

Access to most parts of Alaska is currently achieved by air and water transportation. There is no ground access to western Alaska or the Alaska Peninsula, from the existing road system and only recently has a pipeline construction haul road extended north of the Yukon River to the Arctic region. The existing interconnecting road system is restricted to central Alaska and the northern corner of southeastern Alaska. A marine highway system of ferries operates between larger communities in the interisland-mainland waterways of southeast Alaska and Seattle. Other routes of this State-operated system are in Prince William Sound and between the Kenai Peninsula and Kodiak Island. Major airports or those suitable for larger jet aircraft are scattered at 26 locations. Numerous gravel airstrips are located at most of the 200 or more villages around the State and at mining or other resource development sites. Two railroads operate in the State: , the U.S. Government-owned Alaska Railroad from Seward to Anchorage and Fairbanks; and a Canadian-owned railroad between Skagway--an ocean port, and Whitehorse, Yukon Territory. Barge service operates in the summer on six major rivers and along much of the Alaska coast, and many lesser rivers are traveled by smaller craft.

Certain physical features of Alaska pose barriers to development of surface transportation facilities and routes. Among these are major mountain ranges and glaciers, major rivers and their attendant ice jams and flooding, permafrost, and vast areas of low wetlands. In some cases, natural routes or factors allow ground access through or across such obstacles, while others require certain construction methods. Development of surface facilities over many routes and across major barriers is extremely expensive.

Mountain passes or river corridors through major mountain ranges are limited. Between the southeastern tip of Alaska to Cook Inlet over a 1,000 mile distance, 10 basic natural routes breach the coastal mountains between the Gulf of Alaska and inland areas to the east or north. Roads have been built through four of these routes and railroads through three. Limited water transportation occurs in three others. A single route crosses through the Wrangell Mountains from the Chitina River valley to the White River valley of interior Yukon Territory. Nine natural routes pass through the Alaska Range, a 660-mile barrier across Alaska from the Canadian border to Iliamna Lake. Three routes contain ground transportation and communication facilities. Across the 600-mile-long Brooks Range in northern Alaska, about 10 basic natural routes

pass through the mountains between interior Alaska and the Arctic lowlands. More options exist on the western end of the Range. Anaktuvuk Pass in the center of this range is a historic route for foot and sled-dog travel. A winter haul road was developed over the route with the advent of North Slope oil exploration, however, it is no longer in general use. Atigun Pass, 60 miles east, is now crossed by the trans-Alaska oil pipeline and a gravel haul road constructed to facilitate installation of the pipeline. Alaska Peninsula crossings across the Aleutian Range from suitable harbors along the Pacific coast are limited. Other mountain ranges in the State tend to present fewer barriers to surface crossings.

In contrast with mountain crossings, many natural access routes follow the length of major river valleys. These routes may extend hundreds of miles and provide access to many of Alaska's communities.

Barriers relative to natural deep-water ports are also significant. Where some harbors exist, surrounding terrain excludes or hinders surface connections inland. Few good deep-water areas exist along the western and northern coasts in the relatively shallow waters of the extensive continental shelf. Those present may be extremely important. Seasonal ice pack effects seasonal use of these western and northern ocean waters and may extend as far south in the Bering Sea as the southwestern tip of the Alaska Peninsula.

Though many physical features of Alaska, such as wet lowlands, river crossings, or rough terrain, can be overcome by applied engineering techniques used elsewhere, permafrost soils pose special problems for development of transportation facilities. Large quantities of gravel, which may be limited in some locations, are necessary to overlay the tundra and insulate underlying soils to prevent thawing, subsidence, and erosion. Gravel is often available only in stream beds, and its removal can disturb aquatic habitats.

Most present transportation needs outside central Alaska are met by water and air modes. However, future resource development or land use in remote areas of the State may justify further ground transportation for people, processed goods, raw materials, or transmission of energy or communications. Additional surface facilities between some communities that may be necessary or desirable will cross presently undisturbed areas. Some of these areas are proposed for additions to the national conservation systems.

Proposals for new parks or refuges contain as many as nine and as few as seven of the natural routes through the Brooks Range, possibly all of five routes through the Alaska Range, and as many as three (two already partially used) routes through the Gulf Coast Mountains.

As many as seven major valleys or lowland basins identified as possible future routes by the Bureau of Land Management for transporting energy or other resources in whole or in key portions, are under deliberation for designation as new parks or refuges.

One harbor lying south of Katmai National Monument with potential for use and several possible Alaska Peninsula crossings would be wholly or partly contained within park and refuge proposals. Other suitable harbors along the Pacific coast of the Alaska Peninsula adjoin private lands.

Lands for Community Expansion and Habitation

Most Alaska towns and villages have developed on sea coasts and river banks. All except one are located at elevations below 2,000 feet, and the vast majority below 1,000 feet. The waterways have provided transportation corridors and harbors and ready access to foodstuffs and other resources. Set on low lying coastal lands or river floodplains, built on permafrost soils, or situated in active earthquake zones, many communities are exposed to one or more natural hazards.

Approximately 22.2 million acres of large tracts physically suitable for settlement have been identified in various areas of Alaska. Half of these lands are in Federal ownership, and the other half is divided among the State and private owners. Location rather than physical characteristics, however, appears to be the most important factor in community development. Lands desired for settlement are generally near areas already settled and existing transportation routes. Most such lands in Alaska are in State or private ownership. Foreseeable demands for lands for community expansion and year-round settlement in Alaska will be met by State and private lands. Even in southeastern Alaska which will remain almost entirely in Federal ownership, the State is entitled under the Statehood Act to select 400,000 acres from the Tongass National Forest for "community development and recreation purposes."

Unlike the land market for year-round settlement, demands for lands for seasonal recreational use are more widely dispersed. With the extensive use of small aircraft in Alaska, remote sites unsuitable for year-round habitation are becoming increasingly attractive as recreational property. Many of these sites lie well beyond State and private lands surrounding major population centers and are located on Federal lands. However, substantial land of high recreational value on riverbanks and lakeshores in most regions of Alaska has been selected by the State and private corporations.

As resource development occurs, there will be needs for some degree of settlement in remote locations. In developing certain resources, principally energy resources and minerals, permanent settlement may not be required. With few exceptions, temporary labor forces and facilities will likely satisfy industry's requirements. Agriculture and timber processing, on the other hand, may imply permanent occupancy.

Most lands that may be needed for community settlement are not found in existing or proposed national interest withdrawals, although some areas physically suitable, especially in the Yukon Flats, have been incorporated within proposals now under discussion. The Lake Clark and Lake Iliamna areas and major valleys adjoining the Wrangell Mountains, in particular, are areas of growing recreational use by Alaska's resident population and have been included in some proposals for new national interest reservations. Private or State lands in these areas, however, afford opportunities for recreational settlement.

IN EXISTING NATIONAL CONSERVATION SYSTEMS

Value or Resource	Total statewide Units*1	Portion of Total in in Existing Conservation Systems	Location of Containment NPS = National Park System. NWRS = National Wildlife Refuge System NFS = National Forest System
Wilderness	200≠MA primitive	75,000 acres	NWRS: Chamisso, Bering Sea, Tuxedni, Simeonof, Hazy Islands, Forrester Is.,
Wildlife Habitat-designated reserves and other areas			NPS: 1 park, 2 monuments NWRS: 16 refuges, 2 ranges State: 7 refuges and sanctuaries, 10 critical habitats, 4 large parks.
Waterfowl habitat (high density)	37.9 MA in 20 acres	3.4 MA(9%)	0.46 MA in Chugach and Tongass National Forests 2.9 MA in NWRS: Clarence Rhode, Cape Newenham, Izembek
Key Migratory Bird Habitats	27+ areas		NWRS: Arctic, Clarence Rhode, Hazen Bay, Nunivak Aleutian, Kenai NFS: Chugach, Tongass
Unique and Endangered Species			
Perigrine Falcon	7+ significant habitat areas	3 areas	NWRS: Aleutian Islands NFS: Chugach and Tongass Forests
Bald Eagle			NFS: abundant on the two forests NWRS: Kodiak, Aleutain Islands
Aleutian Canada Goose	1 nesting area	1 nesting area	NWRS: Aleutian Islands
Emperor Geese	1 major nesting area		NWRS: Clarence Rhode, Hazen Bay
Trumpeter Swan	1 major nesting area		NFS: Chugach
Taverners Geese	Coast from Bristol bay to Arctic Plain		NWRS: Arctic, Clarence Rhode, Hazen Bay, Cape Newenham
Dusky Canada	1 major nesting area		NFS: Chugach

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*1 M.A. = Million acres

Value or Resource	Total statewide Units*[1]	Portion of Total in in Existing Conservation Systems	Location of Containment NPS = National Park System NWRS = National Wildlife Refuge System NFS = National Forest System
TERRESTRIAL MAMMALS			
Dall Sheep	25 areas of range	4 areas	NPS: Mt. McKinley NWRS: Kenai NMR, Arctic NWR NFS: Chugach
Caribou	6 major herds, 7 minor herds	8%	NWRS: Arctic NWR NWRS: Kenai NMR, Izembek, Aleutian Islands NPS: Mt. McKinley
Polar Bear	Arctic Coast	%	NWRS: Arctic NWR
Glacier Bear	Northern Gulf Coast	%	Glacier Bay N.M., Yakutat unit,-Tongass N.F., Chugach NF
Musk-oxen	1 large herd 5 small herds		Chugach NF NWRS: Nunivak NWRS: Arctic, NWR, Clarence Rhode
Brown-grizzly bear & wolf	Common to most of Alaska		NPS: Mt. McKinley, Katmai, Glacier Bay, NWRS: Arctic, Kenai, Kodiak, Izembek, Aleutian Islands NFS: Tongass, Chugach
MARINE MAMMALS			
Ribbon Seal	Cape Wales to Cape Newenham		NWRS: Clarence Rhode, Bering Sea, Hazen Bay, Nunivak Cape Newenham
Ringed and Bearded seal	north of Cape Newenham		NWRS: Arctic, Clarence Rhode, Bering Sea, Hazen Bay, Nunivak, Cape Newenham, Chamisso
Pacific walrus	north of Umnak Island		NWRS: Arctic, Clarence Rhode, Bering Sea, Hazen Bay, Nunivak, Cape Newenham, Chamisso, Izembek, ~~Pogoslof~~, ~~St. Lararia, Hazy Island, Forrester Island~~.

Value or Resource	Total statewide Units*[1]	Portion of Total in in Existing Conservation Systems	Location of Containment NPS = National Park System. NWRS = National Wildlife Refuge System NFS = National Forest System
MARINE MAMMALS (cont.)			
Stellar Sea Lion	Gulf of AK, Aleutian Is., (not Cook Inlet)		NPS: Katmai, Glacier Bay, NWRS: Aleutian, Semidi, Simeonof, Kodiak, Izembek, Bogoslof, St. Lazaria, Hazy Is., Forrester Is.
Northern Fur Seal	Gulf of AK, Aleutian Is., Pribilof Is.		Same as Stellar S. Lion & Pribilof NFS: Chugach & Tongass
Harbor Seal	common to most of AK's coast		All except Kenai NMR and McKinnley NP
Sea (ter	Gulf of AK, Aleutian Islands		NPS: Katmai, NWRS: Aleutian, Izembek, Simeonof, Kodiak, Bogoslof, St. Lazaria, Hazy Is., Forrester Is. NFS: Chugach, Tongass
FISH			
variety of aquatic habitats			All reserves listed under Wilderness
LANDSCAPES			
Physiographic Divisions			
Pacific Mountain System			NPS: Mt. McKinley, Glacier Bay, Katmai NWRS: Kenai, Kodiak, Izembek, Aleutian Islands NFS: Tongass, Chugach
Intermontane Plateaus		small area,	NWRS: Arctic, Clarence Rhode, Bering Sea, Unimak, Cape
Rocky Mountain System		eastern section	NPS: Mt. McKinley NWRS: Arctic
Arctic Plain		small area	NWRS: Arctic

Value or Resource	Total statewide Units*[1]	Portion of Total in in Existing Conservation Systems	Location of Containment NPS = National Park System, NWRS = National Wildlife Refuge System NFS = National Forest System
MOUNTAIN SYSTEMS-MAJOR RANGES			
Brooks Range			NWRS: Arctic NWR
Alaska Range			NPS: Mt. McKinley
Aleutian Range			NPS: Katmai NWRS: Izembek, Aleutian Islands
Wrangell Mtns			NPS
Talkeetna Mtns			NPS
Chugach-Kenai			NWRS: Kenai NFS: Chugach State: Chugach SP
St. Elias-Fairweather			NFS: Tongass NPS: Glacier Bay
Coast Range			NFS: Tongass
Major U.S. Mountain Peaks over 14,500 feet high	16 peaks	6 peaks	5- Mt.McKinley NP, 1(partial) Glacier Bay NM.
VOLCANOS			
	100+ 40 active	24	NPS: Katmai NWRS: Izembek, Aleutian Islands, Bogoslof
Volcanic Calderas			
Lava flow areas	3+		
Maars	5		
Other volcanic features			

Value or Resource	Total statewide Units*[1]	Portion of Total in in Existing Conservation Systems	Location of Containment NPS = National Park System NWRS = National Wildlife Refuge System NFS = National Forest System State = parks, refuges, sanctuaries and critical habitat designations.
GLACIERS & GLACIAL FEATURES			
Ice Fields (major)			
Major Glaciers			
Tidewater Glaciers			
Notable Fiords			
SAND DUNES			
Major			
Minor			
COASTAL FEATURES			
Scenic Fiord			
Scenic Rocky Mountains			
Other			
LAKES			
Large Moraine-dammed			

Value or Resource	Total statewide Units*[1]	Portion of Total in in Existing Conservation Systems	Location of Containment NPS = National Park System NWRS = National Wildlife Refuge System NFS = National Forest System State = parks, refuges, sanctuaries and critical habitat designations.
ENERGY RESOURCES			
Uranium	78.1 M.A. or 19 basins	7% or portions of 7 basins	NPS: McKinley NWSR: Arctic, Clarence Rhode, Hazen Bay, Kenai NFS: Tongass
MINERALS			
Copper	at least 39 provinces	portions of 19 provinces	NPS: McKinley, Katmai, Glacier Bay NWRS: Cape Newenham, Kodiak, Kenai, Hazy Is. NFS: Tongass, Chugach
TIMBER			
Commercial coastal	5.6 M.A.	90%	NFS: Tongass, Chugach
interior (all types)	117.7 M.A.	very small	NPS: McKinley, Katmai NWRS: Arctic, Kenai, St. Lazaria, Hazy Is, Forrester Is.

REFERENCES

Relative to this section, the Commission will make available additional information and analysis of environmental, social, and economic factors. Further descriptions and detailed information about Alaska's natural values, developable resources, and their uses may be found in the following materials, as well as references cited in their bibliographies. Special reference should be made to the Commission's inventory of over 1,000 resource map overlays for the entire State.

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MAJOR ISSUES AND OPTIONS: GENERAL RECOMMENDATIONS

WHAT MEANS SHOULD BE USED TO PROTECT WILDLIFE, WILDERNESS, AND SCENIC VALUES OF NATIONAL INTEREST IN ALASKA?

The primary decision to be made in assuring protection of natural values of national interest in Alaska is what means--management systems designation, regulations, planning, and study provisions--will be employed. Section 17(d)(2) suggests the inclusion of outstanding natural areas in one of the existing national conservation systems as new national forests, wildlife refuges, parks, or as wild and scenic rivers.

In its deliberations and study over the past 4½ years, the Commission has considered many combinations of management designation for the national interest (d)(2) lands. Before it, as there is now before the Congress, have always been the broad options of placing maximum (d)(2) areas in one or the other of the named management and classification systems; of placing minimum areas in single use systems and relying largely upon Federal and State environmental laws and regulations; or of recommending new management or classification systems.

Before it also were the major problems presented by each option, as well as the probable effect of each option on national, State, and Alaska Native interests. The Commission sought that combination of land management units, managers, and planning and classification systems which would best protect identified wildlife, wilderness, and scenic values, and which would create the fewest or solve the most management and use conflicts.

INCLUSION IN EXISTING FEDERAL CONSERVATION MANAGEMENT AND CLASSIFICATION SYSTEMS

Section 17(d)(2) indicates one of the major courses of action open to the Congress in protecting the national interest in wildlife, wilderness, and scenic values in Alaska. This is to place lands in the named Federal management systems--National Park, Wildlife Refuge, and National Forest--and in an existing Federal classification system, the National Wild and Scenic Rivers System.

The consequences of making what are, in effect, congressional classification decisions on a broad scale may vary depending upon the size, location, and predominant values of the particular (d)(2) units and the management system designated for each. The statewide combination of unit management designations and (d)(2) lands in relation to surrounding State and privately owned lands, particularly those held by Alaska Native corporations, and the consequences of each, have as much variety as there are numbers of management units, managers, and resource demands.

National Parks

By national standards, many of the (d)(2) areas as well as other Alaska lands have qualities that merit their consideration for inclusion in the

National Park System. Those areas of superlative wilderness, wildlife, or scenic value should be identified to focus decisions on designations of new parklands. The concept of a wilderness park, though not unique to Alaska, may be met in Alaska from many lands remaining in a natural state.

In those units designated for management by the National Park Service, use or management conflicts will usually be resolved in favor of the protection of natural, scenic, wildlife, or historical values. Park Service natural areas, exemplified in Alaska by the present Mt. McKinley National Park and Katmai and Glacier Bay National Monuments, are managed to place primary emphasis on the preservation of natural features and systems. Uses such as timber harvesting, mineral prospecting, mining, and the extraction of minerals or the removal of soil, sand, gravel, and rock are prohibited. Hunting is also prohibited, as is livestock grazing. Commercial fishing is sometimes allowed, including at Glacier Bay National Monument. Sport fishing is usually permitted. Transportation corridors and rights-of-way for private or corporate entities may be excluded entirely or require congressional action in natural and historic parks, unless specified upon establishment of the park. Hydropower development is generally precluded in natural areas, although resulting reservoirs are a basis for several recreation acreas in the National Park System elswhere in the Nation.

Recreation areas and national preserves are categories under Park Service management which may allow some uses compatible with the park purpose. In recreation areas, outdoor recreation is recognized as the dominant or primary resource management objective, though degree and kind of use may be affected by natural or historic values. Harvesting of timber, mineral prospecting, and removal of nonleasable minerals under applicable regulations may be permitted if such uses will not significantly impair the values of the area. In recreation areas and preserves, hunting or fishing may also be permitted governed by applicable State laws with Park Service designation of zones and periods during which no hunting or fishing is permitted for reasons of public safety.

Placing maximum acreages in the National Park System under present law and policies--particularly as natural areas or areas which now, or later, may be placed in wilderness classification--will mean foregoing the greatest number of present and potential resource uses of the land, e.g. mining, sport hunting, hunting for subsistence purposes, grazing, farming, and timber production. Placing maximum acreages in the National Park System in national recreation or national preserve categories may not totally preclude these uses, but maximum regulation would result. It will be difficult, without congressional action, to provide surface transportation corridors through park units, regardless of category.

Additional Federal control of wildlife, including resident species, would result. Large areas of wilderness, by law or management policy, are likely. Fewer areas would be open for sport hunting, even in national

recreation or national preserve categories. And, it is likely that two groups of Alaska visitors would be deterred to some degree by choosing the option of maximum acreages in the National Park System--visitors seeking wilderness hunting experiences if new parks largely preclude hunting, and visitors requiring modern visitor accommodation or desiring mechanized travel into remote scenic areas. National Park Service's long history of meeting visitor needs may raise expectations for services inconsistent with wilderness preservation.

National parks immediately adjoining privately owned lands or lands belonging to the State of Alaska may enhance the value of those adjoining lands for some purposes, such as for the provision of visitor or intensive use recreational facilities. Indirect effects on other lands also need to be considered. Among these "off-site" consequences of national park designation may be the application of air and water quality standards automatically assigned to or sought for parklands under present provisions of the Clean Air Act and may inhibit resource development activities on adjoining Federal, State, or privately owned lands.

At the same time that creation of extensive new parks, followed by wilderness classification, may provide the highest degree of protection for wilderness, wildlife and scenic values, this option may also create more conflicts with other resource needs of Federal lands to meet national needs for energy and other minerals, and may also create the most conflict with the use of lands in State, Native corporate, and other private ownership.

Wildlife Refuges

Through congressional action, several species of wildlife are protected by Federal regulation through such laws as the Endangered Species Act, the Migratory Bird Treaty Act, and the Marine Mammal Act. Much of Alaska's wildlife, however, are resident species traditionally under the management of the State of Alaska with the Federal Government maintaining responsibility on Federal lands for the protection of the habitat. Habitat management varies somewhat with the system and agency. National Park Service management is generally more passive, allowing natural processes to make the successional changes in habitat except where restoration or maintenance is achieved through prescribed burning. The Fish and Wildlife Service and Forest Service have active habitat manipulation programs in some areas applying a variety of tools. However, the largest part of wildlife refuge and forest acreage is not manipulated and directly managed only through protection measures.

The Wildlife Refuge System is maintained "for the fundamental purpose of wildlife conservation and rehabilitation." Refuges are established for the restoration, preservation, and management of wildlife and wildlands habitat; and for the protection and preservation of endangered or threatened species and their habitat. Only those uses which are compatible with the primary purpose are allowable by permit of the Secretary of the Interior. The Secretary may permit hunting, fishing, public recreation and accommodations, and access and easements for powerlines, pipelines,

and roads, whenever he determines that they are compatible with the refuge's purpose. In theory, the uses may include mineral location, leasing, exploration, and development, but, these practices are seldom allowed. The 20-year record, in Alaska, of the Swanson River and Beaver Creek oil and gas fields in the Kenai National Moose Range point to the ability of the Service to allow oil and gas leasing under strict environmental control.

The Federal-State relationship with respect to management of resident game species is a major issue. Although refuge lands opened to hunting are governed by the laws and regulations of the State, the Federal refuge manager has the authority to deny access to the refuge or to specify the mode of access. The refuge manager also has the authority to impose more strict, but not more liberal, regulation than that imposed by the State for the taking of fish and game resources from the refuge. This dual authority for fish and game management, coupled with the interdependent nature of habitat and species management, will require a high degree of Federal-State cooperation, if the wildlife which is counted as one of Alaska's greatest resources is to be protected.

Because of the arctic nature of much of Alaska, upland grazing mammals must range over many acres to sustain life. The large caribou herds of Alaska are extremely migratory. Many of Alaska's major caribou herds annually cross State and Native-owned lands, as well as areas within existing and proposed national interest withdrawals. There are numerous similar examples of State, Federal, and Native areas that together provide habitat for specific groups of migratory wildlife.

Because of the location of most proposed refuges in lowland areas where many predominantly Native villages are located, heavy reliance may be placed on the game stocks of the proposed refuge to meet subsistence needs. Proposed refuges may be traversed by navigable streams and contain navigable lakes where the State holds subsurface title to the submerged lands.

The physiographic concurrence in many instances of potential oil and gas basins within areas of high density waterfowl habitat, prompts a close look at the allowance of this use in new refuges, and may require from Congress explicit direction to the Service to open certain areas of high petroleum potential to oil and gas exploration and leasing. (An effect on State and Native interests of placing maximum acreages within the Wildlife Refuge System may be that revenues from oil and gas leasing on Federal lands will not be distributed under the Mineral Leasing Act. The Mineral Leasing Act, as amended by the Alaska Statehood Act and the Alaska Native Claims Settlement Act, provides for payment of 2 percent of revenues from these uses to Alaska Native corporations and 90 percent of the 98 percent remaining to the State of Alaska. Law pertaining to the The Wildlife Refuge System, U.S.C. Title 16, § 715s, however, provides for payment of only 25 percent to local governments and the balance in a dedicated fund for refuge management.)

The major "off-site" consequence for the use of other Federal, State, and privately owned lands adjoining or near wildlife refuges may not only be the application of air and water quality standards, but also the application of the so-called reserve water right doctrine to Federal reserves, which reserves to a refuge, for example, all waters necessary for refuge purposes. Since many proposed refuges are identified for their migratory and shorebird breeding and nesting characteristics, this doctrine may have future long-range effect on uses of adjoining lands requiring quantities of water.

Refuges to some degree have a built-in conflict between wilderness preservation and other allowable resource management. While most of a refuge may be found suitable for wilderness designation, portions may be excluded from wilderness recommendations to accommodate certain kinds of habitat manipulation, as well as possible development of renewable and nonrenewable resources.

Maximum refuge designations raise access and transportation corridor conflicts similar to those raised by maximum park designation.

National Forests

Lands with timber and range value, attendant wildlife habitat, recreational, primitive, watershed, and other values may be placed under the management of the Forest Service in the Department of Agriculture. The Forest Service has primary responsibility for the protection and development of the Nation's forestry resources. With its research mission, particularly in silviculture, the Forest Service has developed a particular set of expertise not only in timber management, but in the management of lands to meet multiple-use demands. The Forest Service permits, with regulation, timber cutting, grazing, mining, hunting, fishing, and trapping, in addition to general outdoor recreation activities, and has broad authority for classification of land areas of special interest for scenic, geological, historical, botanical, and zoological values.

Fewer use conflicts are seemingly presented by large acreages under Forest Service management because multiple uses are allowed. The competition among uses of national forest lands, however, is growing stronger with increasing demand for wilderness and recreation uses and habitat concerns. Protection of natural values in national forests may be enhanced by the recent adoption of long-range standards by the Service under the Forest and Rangeland Renewable Resources Planning Act and emphasis on environmental assessment of agency decisions and adoption of a public process of determining allowable uses.

Also serving to reduce conflicts with adjoining landholders, this Service with a long history of multiple use and sustained yield direction, has had extensive contact with local residents and has delegated considerable decision-making authority to its local officers.

Transportation corridors, hydroelectric development, and mining activities may be more readily allowed on national forest lands than on either park

or wildlife refuge lands. Like the Wildlife Refuge System, the National Forest System provides habitat management with hunting and fishing governed by applicable law and regulations of the State. As a means of coordinating Federal-State management, Sikes Act agreements have been signed by the U.S. Forest Service and the State of Alaska. Sikes Act agreements are valuable tools for the coordination of habitat and fish and game management activities, but fall short of the comprehensive coordinated Federal-State planning and management which may be required in some areas.

Wild and Scenic Rivers System

Alaska's rivers, as discussed in the preceding section, are widely relied upon for access and transport. Access to many regions of the State is only by air or water. Rivers in many instances are the only means for transport of supplies and provide the readiest access to foodstuffs and other natural resources on adjoining lands. While most Alaska rivers remain largely undisturbed, uses of them are of significant and often singular importance.

The Wild and Scenic Rivers System is a congressional classification established in 1968. As designation of a wilderness area under the Wilderness Act does not change the proprietorship of the area, neither does designation of a wild and scenic river in many cases. It does establish certain controls on riverfront development and use, however. All rivers in the national system must be substantially free flowing, have high quality water, and be of sufficient length to provide a meaningful experience for the river traveler. Regulation and management of rivers in the system vary somewhat depending on which of three categories--wild, scenic, or recreation--are applied, and the agency assigned to administer the river.

Wild rivers are essentially in a primitive state and inaccessible except by trail. They are free of impoundments, with watersheds or shorelines essentially primitive and waters unpolluted. Scenic rivers, or sections of rivers, are free of impoundments, with shorelines and watersheds still largely primitive and undeveloped, but accessible in places by roads. Recreational rivers are readily accessible by road or railroad, may have some development along their shorelines, and may have undergone some impoundment or diversion in the past.

Any use, such as hydroelectric projects which would change the free-flowing characteristic of the river, would be precluded; and depending upon the management system of surrounding lands or the river category, hunting or mining may be denied on the river corridors designated. Even within larger management units which allow mining and the acquisition of title under the 1892 Mining Act, some restriction may be placed on the mining operation by classification of the river as a part of the Wild and Scenic River System. For instance, the issuance of a patent to any mining claim affecting lands within the system confers title only to the mineral deposits and such rights to the use of only those surface resources

that are reasonably required for carrying on prospecting or mining operations. Minerals in lands which constitute the bed or bank or are situated within any river designated as a wild river will be withdrawn, subject to valid existing rights, from all forms of appropriation under the mining laws and from operation of the mineral leasing laws. No such withdrawals are made in scenic or recreational river areas, but safeguards against pollution of the river and unnecessary impairment of the scenery within the area are provided for by strict regulation even where mining is allowed.

With almost all of Alaska's rivers meeting the criteria for designation as units of the Wild and Scenic Rivers System, Commission review was on a statewide basis to assure that representative rivers were considered. Of chief concern to Alaska residents has been possible restrictions of this classification upon hunting, fishing, and other subsistence activities, as well as the use of the rivers for transport.

Wilderness System

The Wilderness Act of 1964 provides the statutory basis for study and designation of wilderness. The Act gives general definitions and guidelines for identifying candidate areas and for their management once designated as wilderness. Nearly all Federal lands may now be subject to review as potential wilderness study areas. Wilderness study normally includes mineral reconnaissance and assessment with the submission of findings to Congress by the President and congressional designation. Lands to be presented for wilderness status must be undeveloped Federal land of no less than 5,000 roadless acres. This criteria would apply to much of Alaska.

Subject to prior existing rights, policies for wilderness areas are determined by management principles of the administering agency, and, except as otherwise provided, there are no roads, motorized access, permanent structure, or commercial enterprises. Where already established, use of aircraft and motorboats may continue; and fire, insect, and disease control may be undertaken. State and private lands within wilderness are guaranteed rights to customary modes of access. Water development projects may be permitted on national forest wilderness. During the wilderness study period, uses may be restricted pending congressional designation.

Wilderness classification may create many of the same use and management conflicts cited in the previous discussion on National Park and Wildlife Refuge Systems, particularly with respect to access or transportation corridors or means through areas classified as, or under study for wilderness. Recreation of certain kinds, subsistence activities, oil and gas and other mineral exploration and development, might be precluded or made impractical, or less easy, by preclusion of roads or exclusion of motorized vehicles.

DESIGNATIONS IN OTHER EXISTING FEDERAL LAND MANAGEMENT SYSTEMS

National Resource Lands

Congress has the option of designating minimum new units of existing National Park, Wildlife Refuge, and National Forest management systems and Wild and Scenic Rivers and Wilderness classification systems. Federal lands in Alaska not included in one of the conservation management systems would then revert to the (d)(1) category for classification and management by the Bureau of Land Management along with other (d)(1) lands.

Remaining State land entitlement of approximately 33-35 million acres must be met from the (d)(1) or (d)(2) lands.

After proper classification, some other lands could be classified to permit transfer out of Federal ownership. Claims to certain lands could be made under the 1872 Mining Law, the Homestead Act, or other public land laws. The Bureau of Land Management also has interim managing authority at present over the (d)(2) lands, lands selected by, but not yet conveyed to Native corporations, and surface management of National Petroleum Reserve-Alaska.

The recently passed Federal Land Policy and Management Act of 1976 confirms BLM management on the basis of "multiple use and sustained yield," unless otherwise specified by law. General policy articulated in the Act also directs retention in Federal ownership in most instances. However, the homestead laws, for example, continue to apply in Alaska for 10 years, while they have been repealed for the rest of the Nation. Mining on BLM lands is conducted under the 1872 Mining Law, and hunting is allowed with seasons, bag limits, methods, and means of harvest set by the Alaska Department of Fish and Game. BLM's new organic act gives this agency enforcement and closure authority on lands under its jurisdiction. Lands under BLM management are now eligible for study and classification as wilderness under the Wilderness Act, as are rivers eligible for nomination under the Wild and Scenic Rivers Act. Other classifications in recognition of natural features and recreation sites may also be made.

Like the forest lands, national resource lands under BLM management would permit a variety of uses with fewer use conflicts, but would present greater difficulties in the protection of wildlife, wilderness, and scenic and other natural values.

CREATION OF NEW CLASSIFICATION AND/OR MANAGEMENT SYSTEMS

A new management system

One option available as an alternative to existing management and classification systems is to restructure an existing agency, create a new Federal agency, or even a joint Federal-State agency with classification and management responsibilities for lands now withdrawn under Section 17(d)(2). Through the establishment of such an agency it would be possible to reduce some duplication of effort and expertise in Federal land management. But the diversity of Alaska's Federal lands, the values they contain, and the variety of public interests, are such that within such a management structure it would soon be necessary to develop divisions serving many of the same purposes and needs now met by the existing Federal land managing agencies. Many land units would be singled out for management and protection of dominant values.

The chief benefit from the establishment of an Alaska Office of Land Management would be its ability to tailor standards, criteria and regulations to the unique size and predominantly wild character of Alaska's lands. Alaska seldom fits national standards and criteria. As has been noted much of Alaska could qualify as wilderness under the Wilderness Act; most of its rivers qualify as wild or scenic rivers; most of its lands qualify for inclusion in conservation management systems.

Certain problems may result from removing Federal land management in Alaska from the mainstream of r ional policy making and funding. There would also be a time lag for such an agency to become functional, to say nothing of the necessity to test its regulations and decisions through the courts. A further detriment might also be the tendency to give a one-dimensional across-the-board treatment to a variety of lands and resources.

A new classification system

A new means of classification could be instituted without necessarily establishing a corresponding new management authority. Classification actions could be implemented by an existing land management agency. The presence of numerous State and private inholdings in areas of nationally important scenic and wildlife values and the ecological relationship of Federal lands to adjoining State and private lands are not easily considered in existing classification systems where the State does not participate. Current classification of Federal lands may have no correlation to classification of State lands of similar character, and Federal, as well as State, land management objectives may be frustrated, as a result. Joint Federal-State classification of some land areas is, therefore, an option to be considered.

PROTECTION OF NATURAL AND HISTORIC VALUES ON LANDS NOT FEDERALLY OWNED:

The Federal Government has options through which it can achieve certain interests or carry out preservation programs on lands not in its ownership or jurisdiction.

Cooperative Programs and Agreements

Many acts provide for cooperation between the Federal and State governments in wildlife protection, restoration, and management. Some make funds available to the States, transfer certain authorities to manage some wildlife species such as marine mammals, and encourage private landowners to maintain wildlife habitat. One of the most recent is the Sikes Act which provides for expanded cooperative Federal-State wildlife programs on national forests, national resource lands, and military reservations, with federal funds helping support such cooperative endeavors. While some of these programs are clearly mandated by law, others involve voluntary cooperative agreements, which may be limited in scope and duration, and may change depending upon the dispositions of new unit managers or bureau directors. There are many cooperative agreements between Federal agencies and often between Federal and State agencies usually dealing with a single subject matter or a single geographic area.

Two Federal programs are concerned with identification of natural areas and historic sites of national significance. National Natural Landmarks and National Historic Landmarks are generally identified regardless of their location or ownership. The administrators or owners of designated sites are encouraged to manage the areas in a manner that preserves the qualities identified in the site. Federal funds may be applied in part towards preservation of historic sites. Landmarks are also afforded certain means of protection from federally funded projects such as a road which might have adverse impact on a site. Long term protection is dependent on the owner or administrator who may decide to use the area or site in a manner that would degrade or destroy the landmark values.

Another option of broad involvement with respect to Federal interests is through cooperative planning and management. This can be applied to specific areas, adjoining national parks or wildlife refuges, or other Federal reserves that contain a mix of land ownership or interests. In certain instances, broader areas, regions, and subregions are specified for cooperative planning and management.

Boundaries for such cooperative planning and management areas that may involve several State and Federal agencies and interests, borough governments, and the private sector, can be established legislatively or by the executive branch.

In some instances the flexibility implicit in such arrangements involving negotiations toward the accommodation of all interests may jeopardize the goals of single or primary purpose withdrawals or unduly restrict certain land uses.

Land exchanges

Areas of high scenic, primitive, or wildlife values integrally related to existing or proposed park and wildlife refuge units have been selected by the State or Alaska Natives. For those areas perceived to have long lasting values to the Nation, an available option is to consider land exchanges. Such exchanges could take place in the general vicinity of the area in question or could be far removed involving Federal lands elsewhere in the State. With respect to Native corporation lands, exchanges for new lands in other Native corporation regions of the State may be affected by certain factors. For example, an exchange area close to corporate selections by another regional corporation might influence the development opportunities for a particular resource. This could be a positive or negative impact in some cases. With respect to State lands, new substitute State lands might be removed from a zone of greater State interests.

Proximity of land areas to national park or wildlife refuges may enhance or diminish the value of such lands to State or private owners, depending on their character and location. Other lands in Federal ownership may have more real value to State and private owners for resource development and revenue generation purposes. On the other hand, adjoining lands may afford opportunities for more intensive recreational use and development of facilities than allowed in the parks and refuges and be of potential profit to the State and private owners.

Another option raised with respect to State selected lands that have not yet been patented in certain areas of high natural values is for the Congress to revoke these selections if this can legally be done. The State also has an option of relinquishing certain selections if it wishes. This course may only be taken if the State is assured of selection rights in areas of particular interest to the State.

Joint Classification Areas

Within the existing land ownership pattern in Alaska, two general situations emerge relative to national interests in natural values. Large blocks of federally owned land exist with known natural values and renewable surface resources but largely unknown subsurface values. On the other hand are areas of mixed land ownerships adjoining existing or proposed key park or wildlife refuge lands which may have in addition to natural values meriting Federal protection, developable resources of Federal, State, or private interest. Each government manager or owner using its own classification system might classify lands in an incompatible manner.

Without regional governments in much of rural Alaska, there has not been time to formulate coordinating mechanisms on a regional level. Thus, there is need of a coordinative body in which Federal and State governments fully participate, both at a Federal and State level.

An option available relative to these factors where there is high Federal interest in scenic, primitive, wildlife, or other related values, but where there is State interest or concern for other uses or values, is to establish a joint land use classification area with classification participation by both governments. The joint classification area concept can be applied singly to either Federal or State land units or to areas of combinations of Federal and State lands and even private lands, on a voluntary basis. Using a single classification system, environmental protection, resource development, transportation needs and other interests would be worked out to protect various interests to the extent possible. This could be accomplished through a separate joint planning and classification mechanism or through an effort involving the Federal and State land managers.

Joint classification areas could be administratively or legislatively established. Complementary legislation by the Congress and State legislature may be appropriate. Veto power could be provided for the Federal and State governments regarding classification on respective lands if felt improper. Administration of lands within joint classification areas could be assigned to a Federal or State agency managing an adjoining large reserve, or the Federal and State governments could administer their respective lands assigning preferred agencies.

State Area Designations

Several areas of scenic or other natural values of national significance have been selected by the State of Alaska as part of its general land entitlement under the Statehood Act. The State can designate such areas for protection of their natural values as State parks or wildlife sanctuaries or classify them as critical habitat. Areas already designated and classified in these protective categories are shown on the accompanying map, and others have been proposed.

Two particular national programs which allow for the incorporation of State-owned areas of administered in national systems are the National Wild and Scenic Rivers Systems and the National Trails System. Certain wildlife habitat, scenic, and recreational areas designated by the State adjoin existing or proposed national parks and refuges. Their management can complement that of the Federal reserves. For example, a State park adjoining a national wilderness park may afford opportunities for visitor accommodation and intensive recreational uses that are not compatible with wilderness. State tideland and submerged land areas of significant habitat have been designated in some instances adjacent to national wildlife refuges to complement the values of the Federal reserve.

Existing Regulations

Several Federal laws and regulations apply to State as well as Federal lands and act to protect and preserve environmental values. Provisions of the Coastal Zone Management Act, and those pertaining to clean air, water quality, and solid waste management are particularly significant. While these laws help protect certain natural values, they do not altogether govern or control certain land uses so as to maintain primitive values, restrain development from critical or significant habitats, or prevent degradation of scenic values.

Application of certain air or water quality standards to classes of Federal reserves such as parks may have impact on adjoining lands. Stringent standards may require any resource development activity to institute pollution batement systems and increase costs to industry on State and Native-owned lands.

GENERAL RECOMMENDATIONS

Systems Designations

The Commission found that application of existing classifications and management systems to some of Alaska's lands had merit where there was a clear and outstanding value to be protected or managed by the system. But the Commission also determined that there are circumstances and conditions over many of Alaska's lands that indicated a need for a combination of a high degree of environmental protection and flexible land classification over time in response to new knowledge and changing needs. To provide a consistent basis for designating lands for different systems and classifications the Commission adopted the policies set fourth below.

Additions to National Parks, Refuges, and Forests

With respect to additions to areas already in national parks, wildlife refuges, and forests in Alaska, the Commission believes they should be made for the purpose of including lands with complementary resource values or completing or enhancing ecosystems or other natural features and otherwise improving unit boundaries for administrative purposes. This involves such areas as upper portions of watersheds, uncontained sections of significant scenic or geologic features, the remainder or addition of an important habitat, lands on both sides of a river, lands perceived to complete an ecosystem for an animal species or complex of wildlife, or inclusion of particular lands for recreation purposes.

New Units of Existing National Land Systems

New units in the National Park, Wildlife Refuge, or National Forest System should be established in Alaska only in those areas which have outstanding values appropriate for management by that system. Commission

criteria for the determination of the appropriateness of an area for management under an existing system are listed as follows:

National Wildlife Refuge System:

(1) The basic criteria is assigning land to the National Wildlife Refuge System should be a finding that the lands are a key part of a national network of lands and waters associated with wildlife, particularly migratory birds and endangered species.

(2) In addition, recommended areas for new refuges in Alaska should be oriented primarily towards migratory bird habitat, particularly waterfowl and shorebirds, with emphasis on endangered species. Unit boundaries generally shall encompass the highest density nesting areas and other key migratory bird habitat. If much of the high density waterfowl habitat found in a proposed area is to be transferred to Native corporations, medium density habitat can be included to help offset in part some possible future habitat loss on the private lands for the general area.

(3) Uplands habitats added to the National Wildlife Refuge System should be limited primarily to additions to those existing national wildlife refuges and ranges in Alaska that were initially reserved for protection of upland game species. This policy is based on a Commission finding that diversity of upland wildlife and habitat is already well represented in existing national wildlife refuges and ranges.

National Park System:

Recommended units for the National Park System should include areas of superb scenery; superlative, exemplary, rare or unique natural features; archaeological or historical sites, buildings, or objects of exceptional value or quality; or recreational opportunities of national value.

National Forests:

National forests exist to protect and conserve forests, rangelands, and watersheds. Values within these areas that are planned and managed for are recreation, wilderness, wildlife and fish, range, timber, land and water values, and the needs the areas meet for human and community development through natural resource management activities. New forest units should contain some or all of these elements and be in locations where they can best serve national needs for these values.

Institutional Recommendations

The Commission recommends that Congress adopt the following approach in addressing wilderness and wild and scenic river designations in the (d)(2) legislation:

Wilderness

A comprehensive preliminary assessment to determine areas of prime wilderness potential is particularly necessary in Alaska where nearly all of the Federal lands meet the national study criterion of at least 5,000 roadless areas. Proposed areas should be evaluated in a statewide context. Individual proposals should be evaluated as they relate to other existing and potential wilderness areas throughout the State. The goal should be a wilderness system that includes a range of environments and is rationally distributed around the State.

New units and additions to the National Park, Wildlife Refuge, and Forest Systems should be studied to determine their suitability for wilderness designation within three years of the establishment. This recommendation is in accordance with congressional practices in other new areas established and studied in recent years.

Lands which may be classified under a new system should be studied to determine their suitability for wilderness designations prior to classification.

Wild and Scenic Rivers

From the many candidate rivers in the State meeting wild, scenic, or recreational river criteria previously established, the Commission has selected entire, mainstreams, or segments of over 50 rivers for which it makes recommendations. These rivers were selected on the basis of developing an initial statewide system of protected rivers of differing characteristics in the various natural regions of Alaska. In addition to a free-flowing provision for rivers and possession of various natural, historic, and recreational attributes, other factors were considered by the Commission in its selections. These included approaching identification and selection on a statewide basis, provision in the National Wild and Scenic Rivers Act for inclusion of State owned, designated and administered rivers; inclusion of some rivers with potentially complex land ownership problems, but considered to be of prime value and public interest; study and positive evaluation by the Bureau of Outdoor Recreation and others; and that many other suitable rivers presently exist in Alaska for future study and consideration.

Four categories of river recommendations are made by the Commission at this time.

1. Rivers primarily on Federal lands recommended for immediate designation.

2. Rivers primarily on Federal lands recommended for designation as potential rivers to be further studied and evaluated in the context of classification of surrounding lands to determine whether they should be incorporated in the National Wild and Scenic River System. The Commission makes this recommendation in the belief that the river study should be part of the larger planning process for an area. River classification should not occur before other classifications in the same area are commended, but the identified rivers should receive interim protection.

3. Rivers recommended for potential designation flowing through a mix of Federal and Native corporation selected lands. These rivers are recommended because they are believed to have fine attributes, but the bordering private lands raise issues to mutually resolve if possible before final recommendations can be made. The comments made for group 2 apply here as well.

4. In addition, certain rivers or sections of rivers in State ownership are recommended for study by the State of Alaska for possible inclusion in the National Wild and Scenic Rivers System. The Commission believes that, in several instances, the Wild and Scenic Rivers System should include entire rivers and, for this purpose, State and private as well as federally owned segments of a river should be studied for possible designation.

New Classification System

From the Commission's extensive study on (d)(2) lands, it became clear that for much of the (d)(2) lands, conditions and circumstances were different from those for which the existing systems were generally designed. In summary, these circumstances are:

1. The unique national value of large expanses of primitive, scenic, and wildlife habitat areas in Alaska.

2. Limited knowledge of subsurface resources.

3. Dependence of rural people on extensive areas for subsistence living involving fish, game, and plants.

4. Relative absence of development or trends at present.

5. Concern for minimizing possible conflicts with owners and users of lands adjoining Federal reserves.

Considering these and other factors, the Commission recommends:

1. A new national classification system for some of Alaska's national interest lands with known natural values.

2. Joint classification areas composed of: (1) land units in the new Federal classification system; and (2) areas of other Federal or State lands or in combinations that contain values of concern adjoining parks, wildlife refuges, wild and scenic rivers, or units of the new classification system.

Areas selected and delineated for the new classification system should possess characteristics as follows:

1. Predominate Federal public ownership.

2. Natural or scenic values:

   a. Primitive character of most of the lands and waters.

   b. Wildlife habitats of medium or greater value in terms of habitat quality, variety, and significance or variety of wildlife species present.

   c. Scenic, geological, botanical, zoological, ecological, archaeological, or historical features or values of national interest.

   d. Water fearures--river, lake, or both--which enhance the area scenically, have scientific values, or provide recreation opportunities.

3. Hunting, fishing, and other recreational opportunities.

In addition to the natural values indicated for a new classification of national interest lands, areas with the following characteristics seem particularly suitable for inclusion in the system rather than in existing systems:

1. Lands containing other important resources such as minerals, timber, or range.

2. Areas of mixed land ownerships, in most cases Native corporation selected lands.

3. Lands with very high subsistence oriented uses.

4. Lands adjacent to tracts of high natural values in other systems, to provide complete watersheds, habitats, coherent management units, or otherwise insure their integrity and protection of prime values.

Two kinds of joint classification areas are recommended: (1) units of the new classification system described above; and (2) other

areas of Federal or State lands or combinations which are deemed integrally important to park, wildlife refuge, wild and scenic rivers, or Alaska National Lands units but where other resources occur and resource use development is generally deemed appropriate.

The joint classification areas other than the new classification system lands are recommended to Congress only for those areas where there is a clear interrelation between Federal and State interests, and where coordinated planning is obviously a matter of high priority.

Qualities for identifying and delineating these joint classification areas should include related factors such as:

1. Watershed and water quality concerns.

2. Scenic values.

3. Integral habitat values.

4. Other natural values.

5. Recreational opportunities.

Joint classification areas of this nature should be established by complementary legislation of Congress and the State Legislature. As other needs for joint classification arise in the future, additional joint classification area could be proposed by the continuing commission.

Other general recommendations with respect to the foregoing classifications include:

Boundary Delineation

Boundaries around reserves established to contain natural values have not always been established in the best places with respect to ecological concerns, or easy physical identification. Prior land status and use, political factors, and the rectangular survey system applied to most of the country have influenced boundary delineation in many instances.

With some exceptions due to State and private land selections, boundaries around proposed national interest lands in Alaska can be drawn to contain watersheds and "ecosystems," thereby encompassing a more complete natural unit. Many reserve boundaries are not likely to be surveyed for years or decades because of more pressing survey needs elsewhere, so that natural boundaries easily identified in the field become more important. To the extent they are consistent with the values and uses of the unit, boundaries should follow hydrologic, physiographic, and other natural features that are easily identified on the ground.

Private Inholdings

Generally, boundaries should be drawn to exclude large privately owned areas. However, in some cases, establishing a rational unit requires inclusion of private lands which would become inholdings in the unit.

This concern is somewhat clouded at present because of Native corporation over-selections of land necessary in many cases. Further prioritization of selections for conveyance will help clear this picture.

The Commission adopted the following guidelines in seeking the resolution between containment of national interest natural features in logical units and the rights and needs of Native corporations and the State. Privately owned or projected private lands could be enclosed in accord with the following: (a) scattered small tracts including mineral claims within key areas may be included; (b) relatively small amounts of private lands may be incorporated in peripheral areas where such tracts are inside the best natural boundaries for the unit; (c) Native selected lands may be contained where it appears that these lands are over-selections of low priority to Native corporations and may not be conveyed; and (d) small areas of other Native selected lands may be included as inholdings in the unit where it is believed that the lands have national significance and are better suited for public ownership, and opportunities for alternative selection or a voluntary land exchange are afforded.

Coastal boundaries

Coastal boundaries of proposed units should extend offshore to enclose marine waters and submerged lands which are crucial to the existence of mammals or birds associated with the terrestrial portion of the unit.

Terrestrial ecosystems do not generally end at mean high tide along the ocean coast or at the edge of large lakes. There are often strong interrelations between the land and sea relative to food chains and feeding, hauling and resting areas, and rookeries and migration routes. Sea birds, migratory waterfowl, and marine mammals generally use both the land and sea in concentration areas. Other marine life may be obtained for food along the littoral by terrestrial mammals.

WILDLIFE MANAGEMENT/HUNTING/SUBSISTENCE

Major issues with respect to Alaska's wildlife are the following:

What should be the Federal-State relationship with respect to the management of resident fish and game species in the 17(d)(2) areas? Should hunting be permitted within units of the National Park System? What provisions should be made for subsistence?

The existing Federal-State relationship concerning resident fish and wildlife management is extremely complex. The State has the responsibility for managing resident fish and wildlife except where preempted by Federal law (e.g. Mt. McKinley National Park and the Marine Mammal Protection Act).

Despite the large size of the (d)(2) areas, most cannot be considered complete ecosystems. Migratory habits of many species such as anadromous fish, waterfowl and other birds, and caribou, plus the large range requirements of others, precludes sensible managment on less than a population or herd basis. In most cases, statewide programs are essential for long-term maintenance of the species and the human life-styles dependent on them. Fragmented management can be averted by providing for statewide coordinated resource management.

One of the most sensitive issues involves subsistence. The State of Alaska Constitution allows for preferential treatment of beneficial uses but not on an ethnic basis. The State has given priority to subsistence uses through legislation, regulations, and administrative policies. Many of the subsistence user demands, however, may exceed the limits of the Alaska Constitution.

There is no universally acceptable definition of subsistence, although there is a State law defining it and several Federal and State policies recognizing it. It is apparent that a rigid interpretation of Alaskan subsistence needs will only alienate many of the users and demonstrate bureaucratic insensitivity. Noticeable human use differences geographically and between species are thought to exist.

Subsistence and the (d)(2) Lands

The Commission has long recognized that for many Alaskans, particularly but not exlusively Alaska Natives, subsistence hunting and fishing is and will continue to be a vital source of livelihood. The report, Alaska Natives and The Land, written by the Federal Field Committee for Development Planning in Alaska in 1969, wrote of the Eskimos of the Yukon-Kuskokwim Delta: "Simply put, it must be emphatically said that without the seasonal round of subsistence harvest of fisheries, wildlife, and berries, most people would die."1/

Since the date of that statement, it has been argued that, with the infusion of cash from the Alaska Native Claims Settlement Act, Native peoples are no longer dependent on subsistence. In contrast to these

assertions, surveys indicate that, though the monetarized sector of the Alaska Native economy has increased in recent years, subsistence hunting and fishing still provide large portions of the Natives' diets and employs large parts of their time, even for those living in the large communities.2/

Circumstances affecting the villages economy indicate that the reliance on fish and game to meet subsistence needs will continue for sometime. Further, for many Native people, the year's round of hunting, fishing, and other subsistence gathering is the way of life they have always known. Age-old patterns of life and culture do not change rapidly.

In most small Alaska villages there are limited sources of cash income, and there is little immediate likelihood that new local industry, except in a few cases, will produce markedly more jobs and cash. Cash disbursements to Native villages under the Alaska Native Claims Settlement Act have been minor to date. Thus subsistence hunting and fishing remain a vital source of livelihood for many Alaska villagers.

Even with the infusion of cash from the Alaska Native Claims Settlement Act, subsistence hunting and fishing still provides large portions of the diets of these Alaska Natives and other rural Alaskans and employs large parts of their time, even for those living in the larger communities.3/

In recent years, wildlife resources have been increasingly hunted by Alaska's growing urban populations as well as by sport hunters coming to the State from other areas. Only, a few years ago, it was customary for residents of Fairbanks and Anchorage to drive out of the city in the fall to harvest a moose or several caribou for the winter. But now, game animals have been so heavily hunted near Alaska's growing urban areas, particularly along the road system, that this is no longer possible, except for the lucky hunter. As a result, urban dwellers have extended their reach into more remote lands by chartering small aircraft, using offroad vehicles, or traveling by riverboat. Technology also has allowed rural Alaskans to range farther and take more game than in the past. These changes in both urban and rural Alaska are increasing the competition for scarce wildlife resources.

Some of the lands under (d)(2) withdrawal have long been used by Alaska Natives to meet their subsistence needs. During the Commission's hearings on the use of the (d)(2) lands, speaker after speaker described how Native people hunted, fished, or gathered berries or other subsistence materials from areas under (d)(2) withdrawal. In Alaska, big game animals are extremely migratory, and to hunt them for subsistence purposes involves long trips of often 1-3 weeks.

Regardless of what approach is taken in establishing the Federal-State fish and wildlife management on Federal lands, the system to which the land is assigned and specific boundaries must be carefully selected. Mechanisms for time and area zoning could be considered.

Policy Alternatives Appear to be as Follows:

a. Wildlife Management

(1) Each of the proposed systems could adopt the existing management frameworks peculiar to each agency. Under this option Congress would likely treat exceptions (i.e. hunting in parks, subsistence provisions, etc.) individually in the organic legislation.

(2) Congress could develop some co-equal fish and wildlife management scheme between State and Federal agencies, especially for those systems where extensive or intensive management of the fish and wildlife or their habitat is warranted and desirable.

(3) Congress could consolidate statewide resident species management under the State with guaranteed participation of Federal agencies. Continued trespass and habitat management authority would rest with the Federal land managing agency.

(4) Congress could completely preempt the traditional management role of the State over all (d)(2) lands. This could also be considered individually for each system or area.

b. Subsistence

(1) Management

(a) Leave subsistence under State authority to be treated through its normal administration, regulatory and legislative processes.

(b) Provide for specific subsistence uses by area or for each Federal agency's authority.

(c) Provide for Secretarial discretion by area or for all (d)(2) areas.

(d) Provide policy discretion by establishing relative priority of subsistence use.

(2) User

(a) Provide specific criteria for determining subsistence users by:

- economics
- residency
- past use
- race

(b) Leave user definition to administrative discretion of regulating agency.

c. Hunting in National Parks

(1) Congress could choose to make no special use exceptions for parks.

(2) Congress could make special case-by-case exceptions allowing any combination of hunting, fishing and trapping uses.

(3) Congress could assign key parcels to the National Park System under special categories (i.e. national preserves or national recreation areas) which traditionally allow for these types of uses under cooperative management programs.

With respect to the alternative of having subsistence matters involving fish and game managed largely by the State, the policies established by the Commission of Fish and Game and the Fish and Game Board of Alaska are of interest.

The Fish and Game Board and the Commissioner of Fish and Game recognize that existing cultures and life styles in Alaska are of great value and should be preserved.

The Board and the Commissioner believe that, although limitations on the productivity of fish and game stocks prohibit continued increases in the numbers of subsistence resource users, domestic utilization is still of fundamental importance to many Alaskans. Accordingly it is assigned the highest priority among beneficial uses.

Within legal constraints, fish and game will be allocated to subsistence users on the basis of need. Needs of individuals, families, or cultural groups differ in type and degree, and it is recognized that subjective judgment will be an unavoidable necessity in weighing actual need. Elements considered in establishing the level of need include cultures and customs, economic status, alternative resources (availability of social services), location, and voluntary choice of life-style.

The Board of Commissioner also understand that subsistence requirements will not affect all resources in all areas equally, and recreational and commercial uses will continue to be permitted where and to the extent that they do not interfere with or jeopardize subsistence resource use.

Considering all of the foregoing, the Commission has continued to recommend in favor of a policy which would give preference to subsistence hunting and fishing in areas where there is a conflict for the resource with sport hunting and fishing. But this policy has been made part of an overriding policy which emphasizes preservation or renewing of healthy populations of wildlife and species as the primary objective of State fish and game management.

Commission policy is stated in the Commission's Interim Report to Congress in May, 1976, regarding wildlife management and subsistence, as follows:

(a) the primary objective in fish and wildlife management should remain the preservation of health populations of wildlife species;

(b) State and Federal policy affecting hunting and fishing should recognize subsistence taking as a preferred beneficial use of wildlife resource;

(c) for administrative purposes, a definition of subsistence should be based on local residency; and

(d) subsistence should be controlled through State game regulations utilizing a permit system when necessary.

In regard to wildlife management, hunting in national parks, and subsistence, the Commission recommends that this policy be extended to congressional (d)(2) legislation through the following measures:

Since boundaries of certain National Park System units may also be the boundaries of areas where hunting is prohibited, it is particularly important to delineate park units to avoid areas of heavy subsistence hunting. For the most part, national parks should be no-hunting regions. Where prime park values necessarily overlap exceptionally important areas for subsistence hunting, congressional legislation should provide for continued subsistence activities within the park through a statement of intent or application of Park System categories which would allow subsistence hunting.

Congressional direction to give preferences to subsistence hunting should define those preferred by residency rather than by race, in keeping with the expressed intent of the Claims Act to establish no "permanent racially defined institutions."

Congressional direction to allow hunting should confirm the traditional role of the State in the management resident species of fish and game, although responsibility for habitat management may be in the National Park Service or other Federal agencies.

A number of areas that are relied upon by Alaska Natives and other Alaska residents to meet their subsistence needs have natural values of national importance. One of the Commission's purposes in recommending a new classification system is to make a special provision for continued hunting and fishing where subsistence use areas and national interest lands cannot be separated. The recognition of subsistence as a priority use in taking of fish and game should be incorporated as a basic management guideline extending to all areas under new classification.

TRANSPORTATION AND (d)(2) LANDS

The (d)(2) lands extend across regions where there is virtually no existing ground transportation, except for occasional winter trails. Remote villages near the (d)(2) lands are linked to the State's larger cities by air transportation and, on the coast, by occasional summer barge service. A highway system, comparable to that of other states, exists only in the southcentral part of Alaska connecting Anchorage, Fairbanks, and the Kenai Peninsula, with a link to the Alaska Highway through Canada. In southeastern Alaska, the larger communites are linked by a ferry system. The one major incursion of land transportation into Alaska's vast roadless regions is a gravel haul road adjacent to the trans-Alaskan oil pipeline which runs north from the Yukon River to Prudhoe Bay on the Beaufort Sea.

The possibility of other land transportation routes to remote Alaska has been extensively studied and debated in recent years, and several proposals for pipelines, railroads, and highways have been advanced. Most of these proposed routes have been intended to provide transportation to areas of expected resource development. Proposals for land transportation for movement of people to remote Alaska have been opposed by Native corporations and conservation interests who fear damage to subsistence hunting and fishing and the social disruption that might be brought by the road connections between small villages and Alaska's major cities. Further, the costs of constructing and maintaining roads over hundreds of miles of extremely difficult terrain may indicate that air transportation is a preferable mode for the movement of people in remote sections of Alaska.

In the future, issues of transportation development in remote Alaska will continue to rise, particularly as resource development possibilities materialize. Inevitably, some of these route proposals will involve (d)(2) lands. The (d)(2) areas are, often, so large that potential transportation crossings cannot be entirely avoided. For this reason, the Commission recommends that Congress incorporate a method of deciding about future transportation corridors in its (d)(2) determinations.

At least four major options can be applied to this issue. Lands [(d)(2)] can be placed in systems whose present management authorities and

philosophies are closest to presently perceived access needs. Existing law governing systems could be amended as deemed desirable to more accurately reflect desires regarding access. Congressional reservation of specific corridors in (d)(2) legislation could be effected. Another option is to establish procedures and/or institutions to make future recommendations or designations for access as needs arise.

The following measures are recommended to Congress as an approach to the issue of transportation across (d)(2) lands:

1. No corridors should be designated at this time across any of the (d)(2) lands. This recommendation is based upon Commission participation in a detailed and thorough review of recent Bureau of Land Management transportation corridor proposals (Multi-modal Transportation and Utility Corridor System in Alaska: A Preliminary Conceptual Analysis). The Commission found that no corridors could be justified on the basis of intercommunity needs or known resource development potential at this time.

2. Where possible, without jeopardizing the protection of key natural values, boundaries of (d)(2) areas should avoid potential transportation corridors.

3. Transportation decisions involving any region of the State, including the (d)(2) lands, should be made in the context of statewide planning for a transportation system. Such a system should employ different transportation modes in a manner that will further the economic and social well-being of the State and maintain environmental quality.

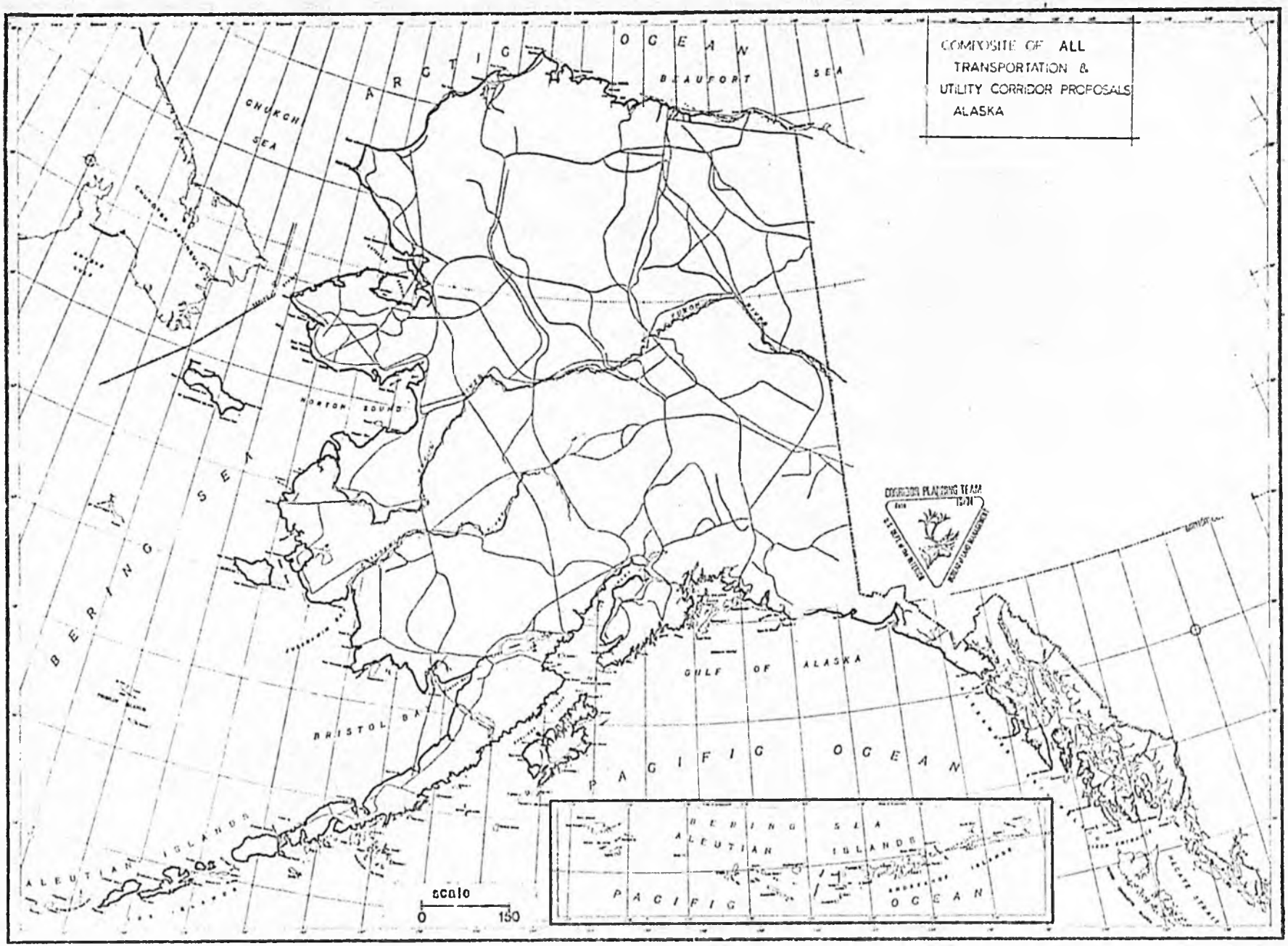
4. The following policies should be established as congressional guidelines for transportation planning:

   a. Transportation planning must be informed by and incorporated within land use planning.

   b. Transportation facilities should be constructed across (d)(2) lands only after finding that no feasible alternatives exist, and that the proposed facilities can be constructed in a manner that will minimize any adverse impact on primary values and designated uses of (d)(2) areas.

   c. In choosing among alternative transportation routes and modes, prime consideration should be given to the route or facility with least adverse environmental, cultural, and social impacts.

   d. Where possible, different transportation modes should be combined in the same corridor so that the number of corridors can be reduced.


COMPOSITE OF ALL
TRANSPORTATION &
UTILITY CORRIDOR PROPOSALS
ALASKA
ARCTIC OCEAN
BEAUFORT SEA
CHUKCHI SEA
NORTON SOUND
BERING SEA
BRISTOL BAY
GULF OF ALASKA
PACIFIC OCEAN
ALEUTIAN ISLANDS
scale
0
150
BERING SEA
ALEUTIAN ISLANDS
PACIFIC OCEAN

e. Land use within transportation corridors should be strictly controlled to minimize the environmental and social impacts of the transportation corridor on lands within the corridor, as well as adjoining lands.

f. As a matter of general policy, transportation development should not be justified because such development would serve as a subsidy for resource development.

5. For (d)(2) lands placed under existing Federal land management systems, the planning recommendations would be advisory. Final decision about transportation corridors crossing national parks, wildlife refuges, and national forests or areas within the Wild and Scenic Rivers System in Alaska would be made on the basis of existing laws and regulations regarding rights-of-way and corridors.

6. For (d)(2) lands which may be placed in a new classification system, and other lands in joint classification areas, corridors would be designated as part of the classification process. Land management agencies assigned to particular land units would be responsible for approving and administering actual rights-of-way within corridors established by classification.

7. Issues involving minor problems of access across (d)(2) lands, which do not involve designations, would continue to be handled by existing Federal land management agencies.

MINERAL DEVELOPMENT ON (d)(2) LANDS

Mining has played an important role in the history of Alaska. Gold rushes highlighted the pre-statehood era, and expectations that Alaska contained an abundance of mineral wealth were an important argument for statehood. In recent years, oil and gas discoveries in the Cook Inlet and the North Slope have heightened prospects for similar discoveries in geologically favorable basins elsewhere in Alaska.

Miners and other parties with an interest in mineral development have expressed apprehension about the recent changes in Federal land status in Alaska, because of reduction in the area open to claim staking. Differences between mineral and conservation interests have been highlighted by the (d)(2) withdrawals which were intended to place lands in one of the Nation's conservation-oriented land management systems. In recognition of the arguments advanced by the mining community the Department of Interior encouraged by the State, attempted to exclude highly mineralized areas when the boundaries of the (d)(2) withdrawals were established. Despite some exclusions, certain mineralized lands are included within the (d)(2) withdrawals, most notably in the Wrangell and Chugach Mountains, upper Yukon River, central Brooks Range, Mt.

McKinley, Lake Clark, and Kobuk River areas. Thus, the conflict remains to be dealt with by Congress in the forthcoming (d)(2) legislation.

The issue of mineral exploration and development in (d)(2) areas is primarily involved with hardrock minerals. The (d)(2) withdrawals exclude large areas with identified high potential for petroleum development. Further, Federal law pertaining to leasable minerals, i.e. petroleum deposits and coal, is much more compatible with conservation-oriented land management than present law pertaining to hardrock mineral development. The development of petroleum resources falls under the Mineral Leasing Act of 1920. Assuming adequate lease stipulations and proper enforcement, the mechanisms for controlling the location and nature of petroleum exploration and development provided by this Act are adequate as a system of mitigating adverse environmental impact in areas where mineral leasing is permitted.

Hardrock mineral exploration and development, on the other hand, falls under the location-patent system established in the Mining Law of 1872 which gives prospectors an absolute right to stake a mineral claim on any public lands not closed to such activities. This law applies to areas that are open to mineral entry within the National Forest System and to most lands under BLM management, as well as to National Wildlife Refuge System lands when specifically opened to entry. Because of its widespread significance for the (d)(2) decisions, the Commission has devoted considerable study to the impact and implications of the 1872 Mining Law. They found this system to be inadequate for the national interest lands in the following respects:

1. If provides for the acquisition of patent to the land surface and subsurface minerals, but fee title to the surface estate is not deemed a necessary concomitant of mineral development;

2. It allows no method by which the government can effectively control the environmental and land use impacts of mining activity;

3. There is no mechanism which will allow the public to derive a fair return from the extraction of minerals located on the public lands;

4. There is no requirement in the present mining laws that private industry provide resource information to the government on a confidential basis;

5. The assessment work requirement of expending so much time and money per year in mineral claim exploration or development, which is the principal performance standard provided in this law, has often failed to operate as envisioned; and

6. Frequently changing administrative and judicial standards for what constitutes a valuable discovery create uncertainty of lands tenure prior to meeting the requirements of a patent.

Policy alternatives with respect to exploration and development of the locatable group of minerals on (d)(2) lands must deal with two basic questions: Where should mineral development be permitted? What system should be utilized to dispose of hardrock minerals located on (d)(2) lands?

At present, national parks are closed to mineral development for the most part; wildlife refuges are closed unless specifically opened; national forests and national resource lands are open on a multiple use basis; and riverbeds and banks of wild rivers are closed.

Applicable laws or policies could be changed to allow mineral development on lands of certain classifications, or exceptions could be applied to specific areas or portions of areas. Some conflicts between mineral development and other land uses can be avoided by drawing boundaries to excise mineralized areas. Such a resolution is not always possible because of the existence of other considerations, such as the need to protect important scenic features.

Hardrock mineral disposal can continue under existing law; or the law could be changed to provide a modified location-patent system, or a permit and lease system. A number of variations are possible in these latter two systems.

Given the background issues, the Commission's recommendations to Congress on methods of resolving conflicts between mineral values and scenic and other natural values in (d)(2) lands are as follows:

1. Where possible, the Commission recommends that Congress draw the boundaries of new units and additions to the National Park System in a way that would reduce conflicts between park related values and areas of high mineral potential. This approach is based on the assumption that existing law prohibiting mineral development in certain national parklands will continue to apply in the future. The Commission believes that some areas should be maintained without mining in Alaska and that national parks are appropriate areas for closure.

2. In a number of cases where lands with scenic and natural values of national interest are significantly mineralized, the Commission recommends inclusion under a new classification system. Elements of this recommended system pertaining to mineral exploration and development are as follows:

   a. Inventory of the mineral potential of such lands should be conducted by the U.S. Geological Survey and the U.S. Bureau of Mines. Such assessment should include geochemical and geophysical sampling as well as geological mapping. The Commission believes that studies of this nature will provide

adequate preliminary knowledge of the mineral potential to enable informed planning and classification decisions.

b. Following planning and classification under congressional guidelines, mineral exploration and development will be allowed in areas so classified, under a permit and lease system. For leasable minerals and mineral materials, the Mineral Leasing Act of 1920 and the Mineral Materials Act are adequate. For hardrock mineral exploration and development, a lease and permit system should be developed. The Commission has been developing a proposal for such a system, and details will be submitted to Congress in subsequent recommendations.

3. Within the units of National Wildlife Refuge, Forest, and Wild and Scenic Rivers Systems, the Commission recommends that existing legislation, policies, and regulations apply; except that a lease and permit system, referred to in 2.b. above, should be utilized in areas where hardrock mining is permitted. This recommendation is based on Commission findings that the Mining Law of 1872 is inadequate for areas that may be added to existing Federal land management systems or for other (d)(2) lands.

NEW INSTITUTIONS

In the preceding section, the Commission made its general recommendations relevant to existing conservation classification and management systems and policies and how they should apply in Alaska. Needs for a new classification system for certain lands of national importance in Alaska were indicated.

More detailed recommendations follow regarding these new concepts and institutions. In addition, specific recommendations are made regarding transportation planning and mineral exploration and development as they might be applied to the (d)(2) and related lands in Alaska.

Based on differing conditions and characteristics of much of Alaska's lands of national interest, the argument is made for a continuing institutional structure that would:

1. Allow for a process of decision making over time, so that land use choices can be made when new events and information make it timely and appropriate to render a decision.

2. Insure that land use decisions are responsive to changed circumstances without sacrificing responsibility to the national interest.

3. Provide the high level of environmental protection that is warranted by the national value that is found in Alaska's great expanse of natural land.

4. Maintain sufficient flexibility so that environmental protection measures serve to guide rather than to totally foreclose opportunities for future resource development in the national interest.

5. Provide for coordinated State and Federal land planning with an option for voluntary participation by major private corporate landholders of related lands.

Alaska National Lands

Based on these criteria, the Commission has developed a new classification system for many of Alaska's national interest lands to be called the Alaska National Lands System.

Designation of certain Federal lands as part of the Alaska National Lands System would represent a lasting commitment to the national interest in that (1) lands assigned to the system would be permanently withdrawn for Federal ownership; and (2) congressional guidelines for the system would emphasize a high level of environmental protection as a guiding standard when any land use is permitted. Unlike the National Resource Lands, managed by the Bureau of Land Management, Alaska National Lands could not be made available for State selection or other forms of permanent disposal from Federal ownership.

The land classification system which the Commission is proposing to fulfill these needs would provide a new approach to Federal land management.

Instead of subsuming determinations about primary values, or choices between primary use or multiple use under the designation decision, as has been done with the existing Federal land management systems, Congress, in adopting the Commission's proposal would be establishing an institution equipped to handle such decisions as they become appropriate and timely in the future. This approach, substituting a continuing planning institution for determination at this time, is based on a recognition that our foresight in Alaska is very limited and that circumstances affecting the areas proposed for Alaska National Lands may change radically in the future.

The Alaska National Lands System is intended to apply to national interest lands having outstanding wildlife, scenic, and other natural values and renewable and nonrenewable resources, whose real value is not known at this time. The system would be established by Congress, and lands designated for the system would be permanently withdrawn from public ownership by the Federal Government. Guidelines for planning and classification of the Alaska National Lands would be established by Congress, and where classification permits resource utilization, regulations would be directed towards protection of the natural and wild character of the land. Lands thought potentially suitable for wilderness designation would be identified, studied, and could be recommended for inclusion within the National Wilderness Preservation System.

Guidelines for Management

The following management guidelines are recommended to apply generally to lands in Alaska National Lands, both before and after classification:

1. A high level of protection shall be the guiding element in managing uses of the lands.

2. Hunting and fishing shall be allowed in accordance with Alaska Department of Fish and Game regulations and statewide species management plans developed with the participation of the habitat manager. Subsistence uses shall be given priority in the taking of fish and game.

3. Such activities should be allowed as necessary to acquire an adequate knowledge of the area for classification.

The following management guidelines for land uses are recommended to apply after planning and classification in areas where classification permits those uses:

1. Mineral exploration and development shall be conducted through a permit and lease system.

2. Lands suitable for grazing or farming shall be leased for use only at such time as there is a demonstrated justification or necessity.

3. Prior to location of major roads and other transportation facilities, a thorough environmental impact analysis shall be conducted.

4. Timber may be harvested when practical in areas so classified.

Managers for Alaska National Lands

The Commission recommends that units of the Alaska National Lands System be administered by existing Federal land management agencies, with the assignment of a manager to be based on known values and characteristics of units and the adjoining land management system. Minimizing the number of Federal land managers of large areas within regions to the extent practical should be an objective.

Coordinated Planning and Classification Mechanism and Powers

With respect to classification of the Alaska National Lands, the Commission recommends establishment of a continuing joint Federal-State commission. Self perpetuation of the existing joint Commission for Alaska is not intended nor of interest. Rather, the Commission believes that a commission as recommended can take an active and helpful role in resolving Alaska land issues in the future. The commission should have two main types of duties and responsibilities: (1) specific responsibilities for planning and classification of areas; and (2) broad responsibilities for statewide coordinative planning.

Unlike the present Joint Federal-State Land Use Planning Commission, the proposed commission would have more than advisory powers and be permanent in nature. This body would have responsibility for oversight of the Alaska National Lands with authority to plan and classify under congressional guidelines when such actions become timely. Day-to-day management would be assigned, as previously indicated, to an existing land management agency. As a public body, operating under congressional guidelines, a commission would be structured to combine responsiveness to changed circumstances and public interests with a paramount responsibility for protecting national environmental values. The commission would be jointly constituted, including representatives appointed by both Federal and State governments.

In addition, those Federal lands proposed for the Alaska National Lands system, certain other areas where there is a complex Federal-State ownership pattern and where coordinated planning is highly desirable, should be jointly classified. Areas could be established by congressional act and complementary State legislation. Classification of these lands could also be assigned to the proposed joint Federal-State commission.

Joint classification areas should not encompass lands within or recommended as additions to the existing Federal land management systems, nor include State-owned lands that are highly important to the State for settlement and resource development purposes. The Commission believes that both governments have sound reasons for reserving exclusive control over certain lands, and for this reason, does not propose incorporating such lands in joint classification areas. The prerogatives of the different governments would be further preserved by a veto system giving each level of government veto power within its sphere of ownership over joint-commission classifications.

Should other areas emerge after additional State selections are made where joint classifications appear desirable, the commission could recommend their designation.

The commission's broader responsibilities for statewide coordinative planning should include the following elements:

1. Planning and coordination to assist in the satisfactory completion of the land reallocation mandated by the Alaska Statehood Act and the Alaska Native Claims Settlement Act. The commission would strive to effect on ownership pattern most in accord with the interests and capabilities of the major landowners and management units that correspond to natural units to the extent possible. This duty would include findings and recommendations regarding State selections, Federal withdrawals, and land exchanges between Federal, State, and Native entities.

2. Provision of a forum for discussion and coordination of policy-setting and management practices in areas where the Federal and State governments share jurisdiction of the same lands, for example, in areas where the Federal government owns and controls the habitat of wildlife populations managed by the State government. .

3. Coordination of intragovernmental operations of Alaska's Federal agencies and between the Federal and State governments in those area where separate governmental entities own or manage adjacent tracts within interrelated natural systems. Alaska's coastal zone is a prime example of a region where a coordinating mechanism is needed to bring Federal and State governments together to resolve common planning problems.

4. Facilitation and coordination of statewide planning for those land use elements, e.g. wilderness, transportation which should be analyzed on a statewide system basis.

5. Encouragement of voluntary participation in cooperative planning efforts by large private landowners.

6. Broad responsibilities for facilitating and coordinating the planning of a statewide transportation system. With respect to (d)(2) lands placed under existing Federal land management systems, the joint commission's transportation planning recommendations would be advisory. For lands which may be placed in the proposed Alaska National Lands system or for other designated joint classification areas, the joint commission would designated corridors as part of its classification authority. The Federal and State governments would retain veto power over commission transportation designations on Federal or State lands, respectively, just as veto power is retained over other commission classifications.

COMMISSION FINDINGS ON NATIONAL INTEREST VALUES AND RECOMMENDATIONS FOR THEIR PROTECTION

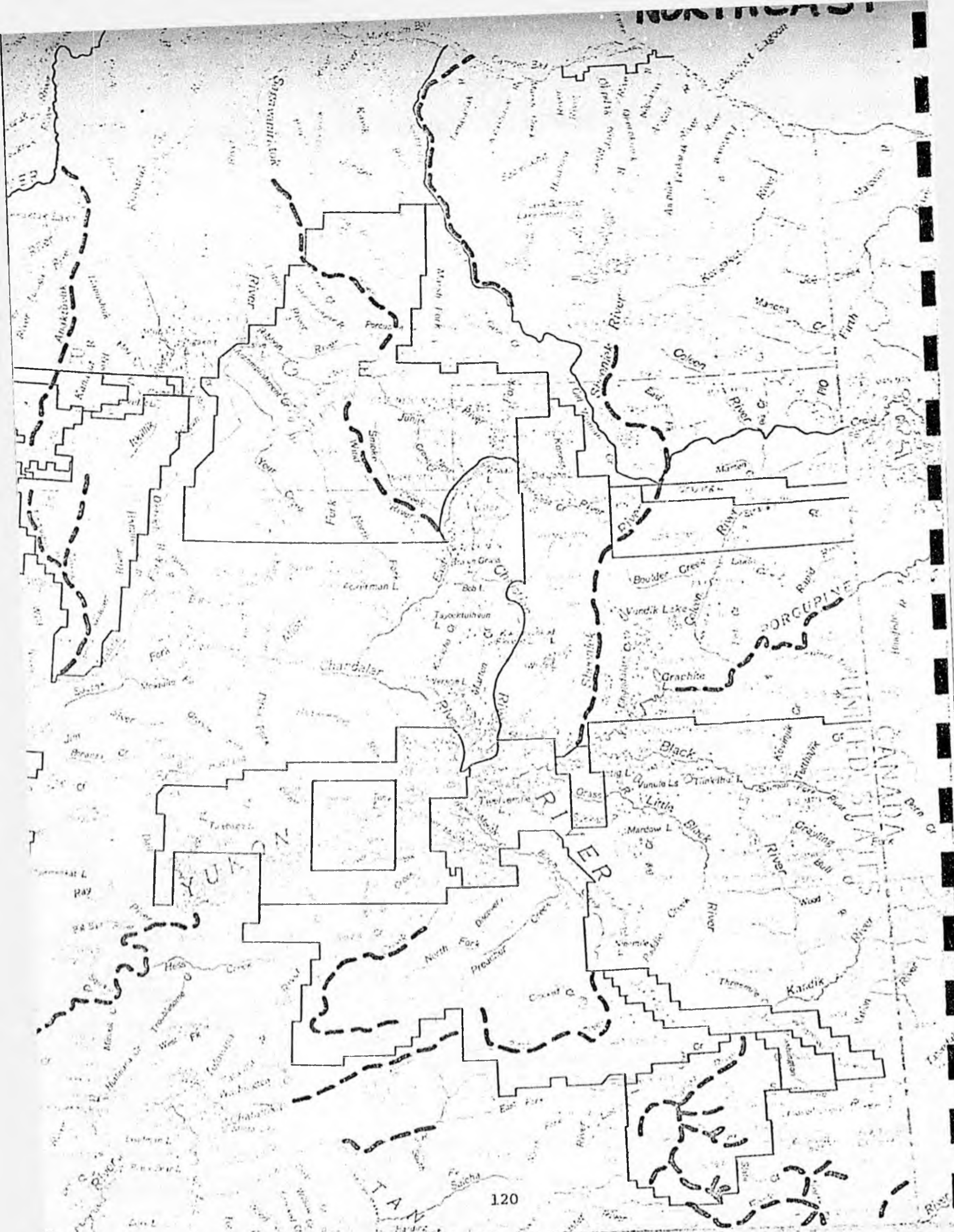
In assessing the natural values and other national interests in (d)(2) withdrawals, the Commission has examined areas adjoining the withdrawals and other locations of high natural value. In some instances, the Commission has found other resource values, in addition to the natural values of (d)(2) lands, to be of sufficient interest or concern to recommend that all or part of some areas not be included in a national conservation system. Correspondingly, the Commission has identified national interests in lands adjoining (d)(2) withdrawals, including, in some instances, lands selected by the State of Alaska or by Alaska Natives. In such instances, some of these lands have been suggested as subjects for future land exchange discussions. Native land selections presently exceed entitlement; and as the land status pattern becomes clearer, some boundary adjustments may be recommended by the Commission to exclude certain lands if selected or to honor State selection rights. The resulting proposals are, therefore, an admixture of lands with complementary values of national interest.

The Commission's proposals are presented in major geographic groupings in order to make apparent many natural and socioeconomic interrelationships.

NORTHEASTERN ALASKA

Northeastern Alaska, as delineated here, is essentially bounded on the west by the trans-Alaska oil pipeline, on the north by the Arctic Ocean, and on the east by the Canadian border, and consists of about 95,000 square miles (60,800,000 acres). The southern boundary roughly follows the crest of the Yukon-Tanana uplands. The eastern Brooks Range and Arctic coastal plain, and the upper Yukon River basin are contained within the region. Although historical activity has occurred, most of the region remains in its natural state. All streams are free flowing. Adjoining the Yukon River lies some of the Nation's prime waterfowl habitat. Major caribou herds migrate through the region. Significant populations of Dall sheep and grizzly bear are also present. South of the Brooks Range crest are spruce, poplar, and birch forests, with low brush bogs and shallow lakes predominating in the Yukon Flats. To the north, the alpine tundra of the Brooks Range gives way to the moist and wet tundra of the Arctic plain.

Northward from the summit of the Brooks Range an Arctic climate prevails, with persistent winds and fog along the coast, brief summers, desert-like annual precipitation levels on the Arctic plain, and average temperatures for January of -17°F and in July of +41°F. The climate of the southern interior portions is continental, with 90 frost-free days a year on the average. Precipitation here is also low. Some of Alaska's greatest temperature extremes occur in this area with ranges from -70°F to 100°F.



PORCUPINE
YUKON
RIVER
Black
Little Black
Chandalar
Coleen
Sheenjek
Boulder Creek
Vundik Lake
Mardow L.
Grayling
Kandik
North Fork
Preacher
Salcha
CANADA

Mineralized zones and oil and gas provinces underlie the region. Some of interior Alaska's most extensive stands of timber are found along the Yukon River and tributary streams, as is a significant portion of those lands in Alaska with soils and climate suitable for agriculture.

Although Fairbanks, the largest city of Alaska's interior, lies near the southwestern corner, this region of Alaska is sparsely populated. Several small communities, all of which are well under 1,000 in population and largely inhabited by Athabascan Indians, are located along the Yukon River and its tributaries. There is one small predominantly Eskimo settlement on the Arctic coast. With the exception of the North Slope haul road (currently closed to public use) which follows the trans-Alaska oil pipeline, Alaska's road network does not extend north of the Yukon River. Access to most of the region is by air, or in the summer months by water. Aside from several small mining operations, local sawmills, and current oil exploration there is no significant industry in the Yukon basin. On the Arctic slope, however, the oilfields near Prudhoe Bay are nearly ready for production. Fish and game are still relied upon to a significant degree by local residents to meet their subsistence needs. Tourism has been relatively low, although recreational and sport hunting use is increasing, particularly in the southern portions of the region.

After the entitlement of Alaska Native corporations for land selections in the region has been satisfied, the Federal Government will retain ownership of approximately 70 percent of the lands. These private corporations will own approximately 15 percent of the region. To date, around 15 percent of the land area has been selected by the State and more may be selected by 1984.

The 8.9-million-acre Arctic National Wildlife Range is located in this region. Four withdrawals for study as national interest lands, totalling 13.6 million acres, were made under Section 17(d)(2) by the Secretary of the Interior. They are: a 100-mile corridor withdrawal along the upper Yukon River extending from the Canadian border westward (960,000 acres); two areas adjoining the Arctic National Wildlife Range (2.5 million acres); and the Yukon Flats (10.2 million acres). In addition, three narrow river corridors along the Charley River and Birch and Beaver Creeks were withdrawn for study as possible National Wild and Scenic Rivers.

Yukon Flats Withdrawal and Adjoining Uplands to the North

The Yukon Flats of the upper Yukon basin is one of the largest waterfowl habitats in a natural state in the Nation, with the highest duck nesting density of any large area in Alaska. The primary duck species present are scaup, pintail, and widgeon, and 10 to 15 percent of the North American continent's population of canvasbacks. Canada and white-fronted geese nest here as well. Caribou range through the Sheenjek, Coleen, and Porcupine River drainages. The upper Porcupine River is a key habitat for the endangered peregrine falcon. A variety of other wildlife, including grizzly bears, moose, wolves, and small furbearers, are present.

Several major streams flow freely through the area. A few large lakes of recreational value receiving current use are located in the uplands. Networks of small lakes and streams occur in the lowlands. Mixed spruce-hardwood forests line the major rivers and adjacent slopes.

THE COMMISSION RECOMMENDS TWO LARGE AREAS TOTALLING APPROXIMATELY 2.3 MILLION ACRES AS A NATIONAL WILDLIFE REFUGE TO PROTECT HIGH DENSITY WETLAND WATERFOWL HABITATS AND SOME ADJOINING UPLAND HABITAT AND WILDLIFE VALUES.

SOME 5.5 MILLION ACRES OF SCENIC UPLANDS, UPLAND WILDLIFE HABITAT, AND MEDIUM DENSITY LOWLAND WATERFOWL HABITAT ARE RECOMMENDED FOR INCORPORATION IN THE PROPOSED ALASKA NATIONAL LANDS SYSTEM TO BE MANAGED BY THE U.S. FOREST SERVICE. Taking of fish and game for local subsistence purposes is a common and important practice. Hunting, fishing, and trapping would continue under State regulations and in accordance with Federal interests in wildlife and habitat preservation. Other uses would occur as permitted by wildlife refuge management policies. The primary purpose of the new management system is the protection of the assortment of natural values present, while other compatible uses may be permitted under congressional guidelines after Federal-State classification. Hunting, trapping, and fishing on the new management units are permitted in accordance with State wildlife management plans and regulations developed in coordination with Federal agencies. There has been increasing expression of interest in interior Alaska's forests and possible development of a forest industry within this extensive area. The U.S. Forest Service appears particularly well suited to manage the Porcupine River area because of its research capabilities and the need to develop appropriate silvicultural methods and other management programs for these and similar lands and their several values. Research findings developed here could be of value to other private landholders and State and Federal land administrators in the general area.

TWO OF THE FREE-FLOWING STREAMS, THE PORCUPINE AND SHEENJEK, HAVE BEEN STUDIED AS POSSIBLE WILD OR SCENIC RIVERS AND ARE RECOMMENDED FOR POTENTIAL DESIGNATION PENDING EVALUATION DURING CLASSIFICATION OF THE NEW MANAGEMENT UNIT. THE RAMPART SECTION OF THE YUKON RIVER, DOWNSTREAM FROM THE YUKON FLATS, IS ALSO RECOMMENDED FOR POTENTIAL SCENIC RIVER DESIGNATION PENDING CLARIFICATION OF LAND STATUS IN THE AREA AND FURTHER STUDY AND CLASSIFICATION OF SURROUNDING LAND OR USES OF THE RIVER.

Two potential oil and gas basins, one with potential for uranium underlie portions of the proposed refuge and Alaska National Lands unit, but extend beyond their boundaries onto private and other public lands. Exploration, development, and extraction could be allowed on the new management unit if in compliance with congressional guidelines and where permitted by eventual Federal-State classification. Exploration and development on the proposed refuge would be permitted only at the discretion of the Secretary of the Interior.

Two proposed hydroelectric projects (Rampart and Porcupine), if constructed, would inundate large parts of the proposed units and, therefore, are incompatible with the protection of their natural values. There is

currently no significant demand for the potential power, flood control, or water storage. Accordingly, the Commission has concluded that development of these sites is not now in the national interest. The proposed new management system unit contains portions of metallogenic provinces with potential for copper, silver, gold, nickel, lead, zinc, tin, iron, barite, platinum, chromium, tungsten, titanium, and asbestos. Under the Commission's recommendations, if eventual Federal-State classification allows, the exploration and extraction of these minerals could occur.

A substantial portion of Alaska's potentially cultivable lowlands, as well as some upland soils in climatically suitable zones, lie within the proposed new management unit and refuge. Similarly, some large timber stands which may become commercially valuable are located on portions of the units. Adjoining lands selected by Alaska Native corporations have potential for agriculture and timber harvesting. Proposed boundaries have been drawn to exclude some potentially cultivable areas for possible State selection. Farming and timber harvesting may be permitted on Alaska National Lands units if classification permits.

Particular needs for coordination in this area are:

(1) Large widespread blocks of Native-selected land include significant portions of the best waterfowl habitat. Coordination with these private landowners will be necessary to fully protect the national interests in waterfowl.

(2) The Yukon River is a navigable international waterway involving State interests, and is currently used for transportation and access through the region.

Upper Yukon River and Adjoining Uplands to the South and West

The historic Yukon River flowing from Canada courses through bluffs, bottomland forests, and wetlands, with higher mountains providing scenic backdrop. Structures of historical interest extending back to the Klondike gold rush era, and a significant rock formation sequence and fossil evidence of the geological past are found on the banks. A variety of wildlife including bear, moose, waterfowl, and small furbearers can be seen along the river. Key habitat for peregrine falcon is present. The Commission finds this area to be a particularly scenic section of one of the Nation's major waterways.

The adjacent Yukon-Tanana uplands contain a variety of upland wildlife species including bear, moose, wolves, and furbearers. Scattered groups of Dall sheep occupy the White Mountains and Charley River areas. Caribou range through much of these mountains south of the Yukon River. Several clear water streams flow freely through the area. Mixed spruce-hardwood forests line the valleys and lower slopes, with tundra on the higher slopes. Considerable medium and low density waterfowl habitat is present in and adjoining the Yukon Flats.

HAVING DETERMINED THAT THESE VALUES ARE OF NATIONAL INTEREST, THE COMMISSION RECOMMENDS THAT A RIVER CORRIDOR OF APPROXIMATELY 540,000 ACRES, ABOUT 100 RIVER MILES LONG AND AN AVERAGE OF 9 MILES WIDE, BE SET ASIDE AS A UNIT OF THE NATIONAL PARK SYSTEM. HUNTING, FISHING, AND TRAPPING, WHICH PRESENTLY OCCUR, ARE RECOMMENDED TO CONTINUE IN THE PROPOSED RIVER PARKLAND IN ACCORDANCE WITH STATE REGULATIONS AND IN COORDINATION WITH FEDERAL INTERESTS. The proposed corridor extends to benchlands and ridges and encloses the immediate scenic environment and habitats. The intended primary uses are recreational and scientific, with other uses as permitted by National Park Service policies.

THE COMMISSION ALSO RECOMMENDS A 6.1-MILLION-ACRE ALASKA NATIONAL LANDS UNIT IN THE YUKON-TANANA UPLANDS TO BE MANAGED BY THE BUREAU OF LAND MANAGEMENT. Administration of this unit by the Bureau of Land Management is deemed appropriate because of the multiple values present and the anticipation of multiple classification for future use and preservation. Compatible uses may be permitted under congressional guidelines after Federal-State classification. Hunting, trapping, and fishing would be permitted under State wildlife management plans and regulations developed in coordination with Federal agencies.

THREE OF THE FREE-FLOWING STREAMS, BIRCH AND BEAVER CREEKS AND THE CHARLEY RIVER, HAVE BEEN STUDIED AS POSSIBLE WILD RIVERS, AND ARE RECOMMENDED FOR POTENTIAL DESIGNATION PENDING CLASSIFICATION OF THE ALASKA NATIONAL LAND UNIT. THE CHARLEY RIVER DRAINAGE IS PROPOSED AS A PRIORITY WILDERNESS STUDY AREA TO INSURE THAT ITS NATURAL FEATURES ARE NOT ALTERED PENDING A DECISION ON POSSIBLE WILDERNESS DESIGNATION.

Potential provinces for oil and gas, uranium, and coal, underlie portions of the units, but extend well beyond their boundaries. If Federal-State classification allows, development or extraction in these provinces could be allowed on the proposed Alaska National Land units. Two proposed hydroelectric projects (Rampart and Woodchopper), if constructed, would create reservoirs inundating much of the Yukon River corridor and portions of the adjoining uplands. There is currently no significant demand for the potential power, flood control, or water storage. Construction of these projects is therefore considered not now in the national interest. A metallogenic province with potential for antimony, gold, silver, and molybdenum underlies a portion of both the proposed park and the proposed new management unit, but extends well beyond the recommended boundaries. The proposed Alaska National Lands unit also partially contains provinces with potential for asbestos, chromium, copper, iron, lead, nickel, platinum, tin, titanium, and zinc. Most of three historical gold mining areas are included in the new management unit, with a portion of one in the proposed Yukon River corridor.

Some timber stands of possible commercial value and soils and climate suitable for agriculture are found in the Alaska National Land unit and in the proposed park unit. Opportunities for timber and agricultural development exist in adjoining areas. The Commission has delineated the boundaries of its Yukon River proposal to allow these uses outside of those scenic and wildlife habitat areas immediately adjoining the river.

Particular needs for coordination in this area include:

1. Management of tributaries and watersheds adjoining the park unit may be necessary to protect natural values.

2. The Yukon River is an international navigable waterway involving State and Canadian interests, and is currently used for some transport and access through the region. Two roads from the south connecting with the State's highway network extend to the Yukon River at either end of the proposed park unit.

3. Some significant historical sites in the area are in private ownership or under local public jurisdictions.

Areas adjoining the Arctic National Wildlife Range

Areas adjacent to the Arctic National Wildlife Range to the south and southwest have primary value for their upland game habitat. The area to the southwest lies in the rugged and scenic eastern Brooks Range containing populations of grizzly bear, Dall sheep, and wolf. Habitat for the international Porcupine caribou herd numbering about 100,000 is present in both areas. A number of in their natural state flow through the areas. The area to the south of the existing wildlife range contains additional habitat for bear, moose, and other upland game.

THOSE LANDS, TOTALLING 1.9 MILLION ACRES, DIRECTLY RELATED HYDROLOGICALLY AND ECOLOGICALLY TO THE EXISTING RANGE, ARE RECOMMENDED AS RANGE ADDITIONS. THOSE LANDS FARTHER WEST, TOTALLING 5.6 MILLION ACRES, AROUND THE CHANDALAR RIVER WITH SIMILAR VALUES, BUT LESS DIRECTLY RELATED TO THE RANGE, ARE RECOMMENDED FOR INCORPORATION AS A UNIT OF THE ALASKA NATIONAL LANDS SYSTEM. THE U.S. FISH AND WILDLIFE SERVICE IS RECOMMENDED AS THE MANAGER OF THIS RESERVE. This choice was made in part to help facilitate coordinated management of the wildlife which use habitat in both the Arctic National Wildlife Range and the Alaska National Lands unit.

FOUR OF THE FREE-FLOWING STREAMS, THE CANNING-MARSH FORK, IVISHAK, WIND, AND SHEENJEK, HAVE BEEN STUDIED AS POSSIBLE WILD AND SCENIC RIVERS AND ARE RECOMMENDED FOR POTENTIAL DESIGNATION PENDING EVALUATION IN THE WILDLIFE RANGE AND CLASSIFICATION OF THE LANDS IN THE PROPOSED NEW MANAGEMENT UNIT.

The areas contain some potential for petroleum, copper, nickel, zinc, lead, tin, barite iron, platinum, chromium, tungsten, titanium, and asbestos. These provinces extend beyond the boundaries of the proposed units. Exploration and extraction of these resources may be permitted under Secretarial discretion on the wildlife range extension, and on the Alaska National Lands unit wherever eventual classification may permit.

Use of the withdrawn gas pipeline corridor included within the wildlife range or proposed Alaska National Lands unit will not be precluded by the designation of these units.

Recognizing that the range of the Porcupine caribou herd is extensive and larger than any one management unit or landholding, and subject to change, there is a particular need for coordinated wildlife management in this region.

NORTHWESTERN ALASKA

Northwestern Alaska, as used here, is a 156,000 square-mile area (99,900,000 acres) generally west of the trans-Alaska oil pipeline and northwest of the Yukon River. Included in the region are the western Arctic coastal plain and foothills, the Noatak, Kobuk, and Koyukuk River drainages heading in the central and western Brooks Range, the Selawik River drainage, the Seward Peninsula, and St. Lawrence Island. The area is bounded on the north by the Beaufort Sea, on the northwest by the Chukchi Sea of the Arctic Ocean, and on the southwest by Norton Sound in the Bering Sea. Although historical activity has occurred in various parts of the region, e.g., gold mining on the Seward Peninsula and whaling on the Arctic coast, the region remains largely unaltered from its natural state. Four of Alaska's major rivers run through this region, and all streams are free flowing. Important waterfowl and seabird habitats are found in several areas. The major western Arctic caribou herd migrates through much of the region, and significant populations of grizzly and black bear, Dall sheep, wolf, moose, and other wildlife also reside here. A variety of marine mammals, including seal, walrus, and occasional polar bear, are present in the coastal and offshore areas. The vast treeless tundra of the Arctic plain is marshy, dotted by frequent shallow lakes, and traversed by sluggish meandering streams. The wet tundra of the plains and moist tundra of the foothills give way to the drier alpine tundra on the slopes of the rugged Brooks Range. On the southern slopes of the Range, broad river valleys with scattered spruce-hardwood forests intersperse the tundra-covered mountains. Forest cover is more extensive in the interior river drainages, where it is mixed with areas of muskeg bog and low brush. Most of the coastal zone and Seward Peninsula are covered with tundra and brush.

Precipitation is generally low throughout the region, varying from an annual average of 4 inches on the Arctic coast to around 14 inches in the southern interior river drainages. Greater amounts fall in the mountain ranges. Annual frost-free days vary, with an average of 10 days on the Arctic coast, 93 around Kotzebue Sound, and over 100 days in some sections of the southern interior. Mean daily January and July temperatures for 5 representative locations are:

	January	July
Barrow (Arctic Coast)	-16°F	39°F
Colville region (northern foothills and Brooks Range)	-11°F	45°F
Kotzebue (Kotzebue Sound-Chukchi Sea)	-6°F	53°F
Nome (Norton Sound-Bering Sea)	+4°F	50°F
Galena (lower Koyukuk drainage)	-11°F	59°F

NORTHWEST (A)

FINAL MAP WILL BE
DOUBLE PAGE SIZE