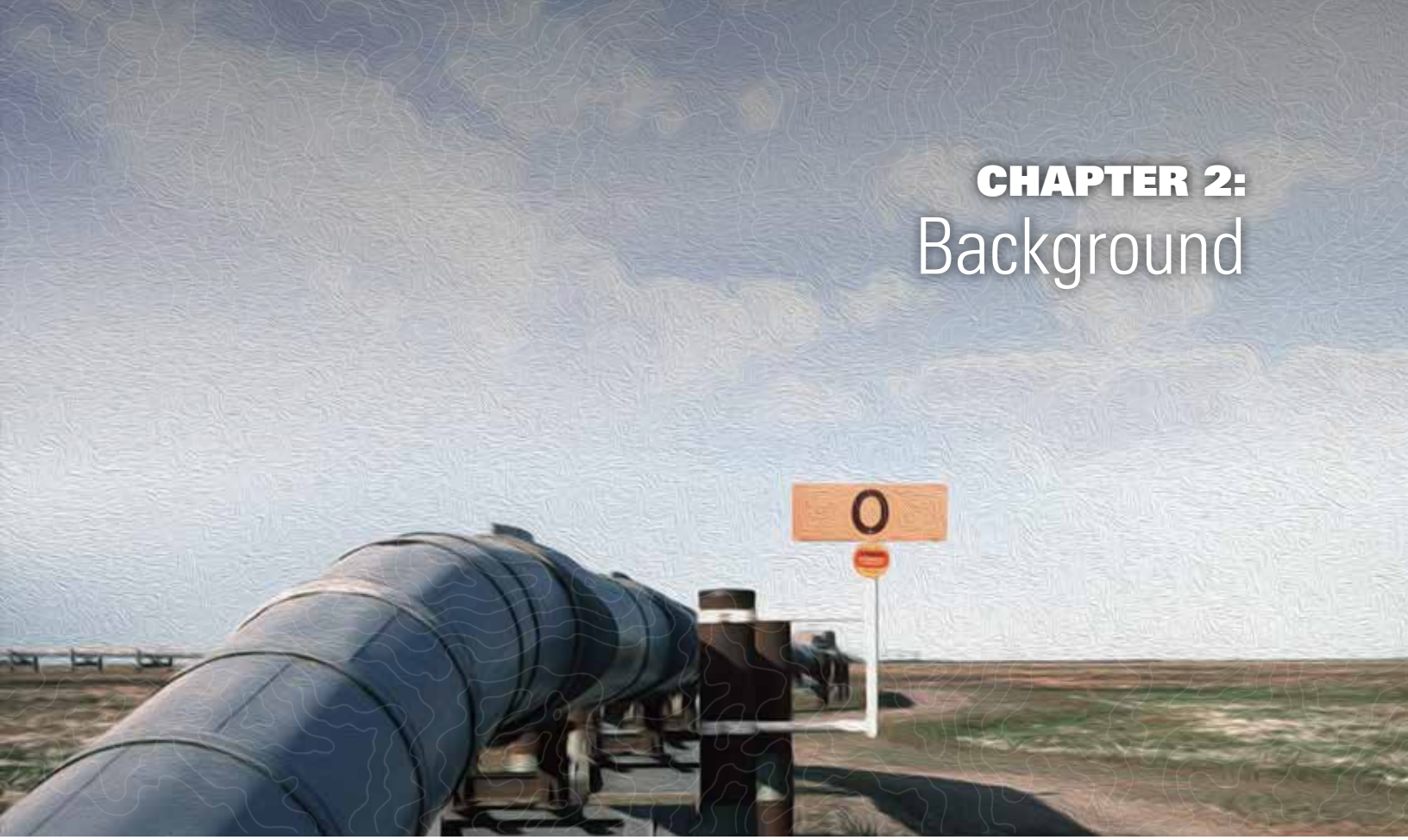


CHAPTER 2: Background

Chapter 2: Background

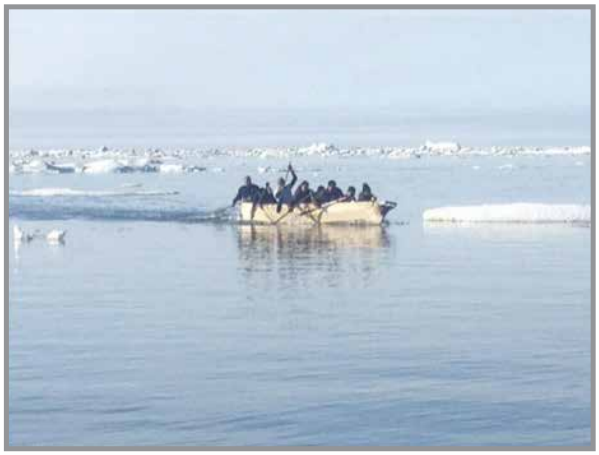
The North Slope Borough (NSB or Borough) encompasses 89,000 square miles of tundra and upland areas. Its boundaries range from the northern extent of the Brooks Range to the Arctic Ocean and from Point Hope on the Chukchi Sea to the Canadian border on the east. The Borough includes all adjacent state waters, generally the coastal waters out to three nautical miles from shore. The region is home to a predominantly Iñupiaq Eskimo population that inhabit the Borough's eight villages.

This remainder of this chapter provides general background information about the NPR-A and the NSB. It begins with an overview of the NPR-A, continues with a summary of management issues, and concludes with a description of oil and gas regulation by federal and state agencies and the NSB. Chapter 3 provides details about the oil and gas resource base on the North Slope.

2.1 Overview of the NPR-A

This section provides an overview of the NPR-A, beginning with a description of the human environment, including settlement history and historic and current use. It continues with a discussion of the natural environment, including geography and geology, fish and wildlife, plans, and climate.

2.1.1 Human Environment



Whaling crew
(Photo: Gordon Brower)

Iñupiaq people have lived in the Arctic for thousands of years, traditionally following the migrations of whale, walrus, seal, caribou, fish, and birds. Over centuries, the Iñupiat developed a rich culture with traditions and values that helped them thrive in challenging Arctic conditions. Their survival depended on close family ties, a strong sense of community and a deep knowledge of and respect for nature. Today, the Iñupiat still look to the land and sea for nutritional and economic sustenance. Despite dramatic changes in technology and lifestyle, especially over the past 50 years, most North Slope Iñupiat still depend on hunting, fishing and gathering for the majority of food they consume. They carry on cultural traditions, pass traditional knowledge to their children and grandchildren, and maintain a close connection to the land and water.

2.1.1.1 Settlement

While no one knows when the first Iñupiat arrived in Alaska, some archeologists speculate it was at least 6,000 years ago and possibly as long as 8,000 years ago - the time period when the first evidence of human occupation was discovered in Southwest Alaska. The Iñupiat were able to survive the harsh climate of the Arctic by adapting to ever-changing conditions and through a keen understanding of the environment around them. The Taġiuġmiut, or "people of the sea," lived along the coast, while the Nunamiut, "people of land," lived inland. Many tribes occupied the northern area of Alaska, each an autonomous unit. Few year-round settlements existed, and the people traveled across the North Slope with the seasons to take advantage of the bounty of plants, birds, land animals, and marine mammals.

Towards the end of the nineteenth century, the U.S. government encouraged people to move to centralized locations where their children could be schooled. As a result, smaller settlements were abandoned and some seasonal sites were used less often. During formation of the NSB, however, the communities of Nuiqsut and Atqasuk were resettled. Today, there are eight communities within the Borough including Point Hope, Point Lay, Wainwright, Barrow, Atqasuk, Nuiqsut, Anaktuvuk Pass, and Kaktovik.

Half of the NSB's communities are situated within the NPR-A, including Nuiqsut near the Colville River Delta, the inland community of Atqasuk, the coastal community Barrow located at the confluence of the Beaufort and Chukchi seas, and Wainwright located southeast of Barrow on the Chukchi Sea. Other NSB communities located outside of the NPR-A include Point Lay and Point Hope to the West, Anaktuvuk Pass to the South, and Kaktovik to the west near the Canadian border.

The NSB, a subdivision of the State of Alaska, formed in 1972, and its 2013 population was estimated to be 9,727 people (Alaska Department of Commerce, Community and Economic Development 2014). Approximately 55% of the NSB's residents identify as Alaska Native, mostly Iñupiat. In addition to the permanent local population, about 11,000 oil field workers are employed on the North Slope, mostly in the area from Prudhoe Bay east to the Alpine Development Project.

2.1.1.2 Historic Use of the NPR-A and Adjacent Area

The Iñupiat have always travelled long distances for subsistence hunting and gathering and to visit with friends and relatives in other settlements. They traveled throughout the region on foot and by use of dog teams, kayaks and umiaqs. Historical trade routes involved a network of trails throughout the North Slope, including several routes through the NPR-A that are connected to Northwest Alaska (See Figure 2-1).

Seasonal harvest patterns responded to biological cycles, proximity of resources, environmental conditions, and ease of travel. The search for marine mammals, including bowhead whales, beluga whales and seals, occurred in coastal waters adjacent to the NPR-A. Inland areas were used to harvest caribou and fish. With the introduction of outboard motors and snow machines, it became possible to cover large distances in shorter time periods.

A 1977 study identified 119 traditional land use sites, many of them within the NPR-A (NSB 1980a). Information about traditional use of the area that is now designated as the NPR-A is documented in the Traditional Land Use Inventory database maintained by the Iñupiat History, Language and Culture (IHLC) Division of the NSB Department of Planning and Community Services.

2.1.1.3 Current Use of NPR-A by Residents of the North Slope Borough

Current use the NPR-A includes transportation, hunting, fishing, and gathering of subsistence resources.

Today, a complex network of trails and ice roads, which may change annually, spread throughout the Borough (see Figure 2-2). In addition to the routes between villages, there is an elaborate winter trail system within the NPR-A used by subsistence hunters. During the summer, motor boats provide access along the coast and to inland hunting camps and cabins by river access.

Coast Guard ice breaker in Barrow
(Photo: Gordon Brower)

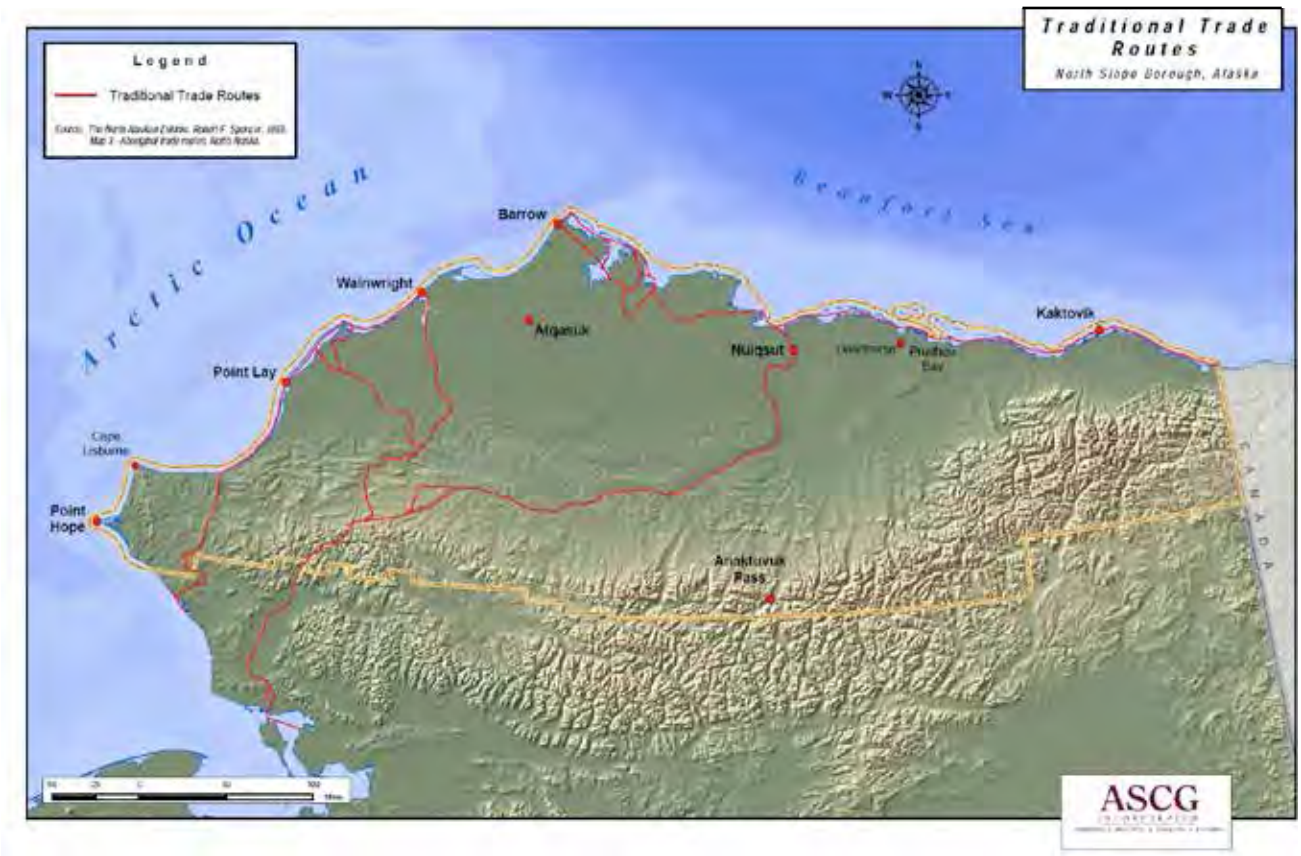


Figure 2-1: Traditional Trade Routes in the NSB
Source: NSB 2005

The subsistence use of residents on the North Slope is extensive both in terms of the geographic extent and in the variety of fish, wildlife, plants, and other materials. While many different species are important for subsistence use, some of the most used species in the NPR-A and adjacent waters include caribou (*tutu*), bowhead whale (*aġviq*), bearded seal (*ugruk*), ringed seal (*natchiq*), walrus (*aiviq*), moose (*tuttuvak*), sheep (*imnaiq*), musk ok (*umiŋmak*), polar bear (*nanuk*), brown bear (*akłaq*), blue fox (*qianġaqtuluk*), red fox (kayuqtuq), cross fox (*qianġaq*), lynx (*niutuiyiq*), silver fox (*qiġñiqtaq*), wolf (*amaġuq*), wolverine (*qavvik*), Arctic cisco (*qaaktaq*), Arctic char/Dolly Varden (*paikluk/iqalukpik*), broad whitefish (*aanaakliq*), burbot (*tittaaliq*), white-fronted geese (*niġliq*), Canada geese (*iqsraġutilik*), brants (*niġliñġaq*), snow geese (*kaŋnuk*), king eider (*qiŋalik*), and common eider (*amauligruaq*).

All eight villages of the NSB use the NPR-A to some extent for inter-village travel and for subsistence purposes. Barrow, Nuiqsut, Wainwright, and Atqasuk are located within or immediately adjacent to the NPR-A. Although Point Hope, Point Lay and Anaktuvuk Pass are located outside of its boundaries, residents of these villages use the subsistence resources of the NPR-A. Located about 180 miles from the eastern boundary of the NPR-A, Kaktovik residents occasionally use some its resources, especially the area around Teshekpuk Lake. Appendix C provides more details about subsistence use areas for each village.

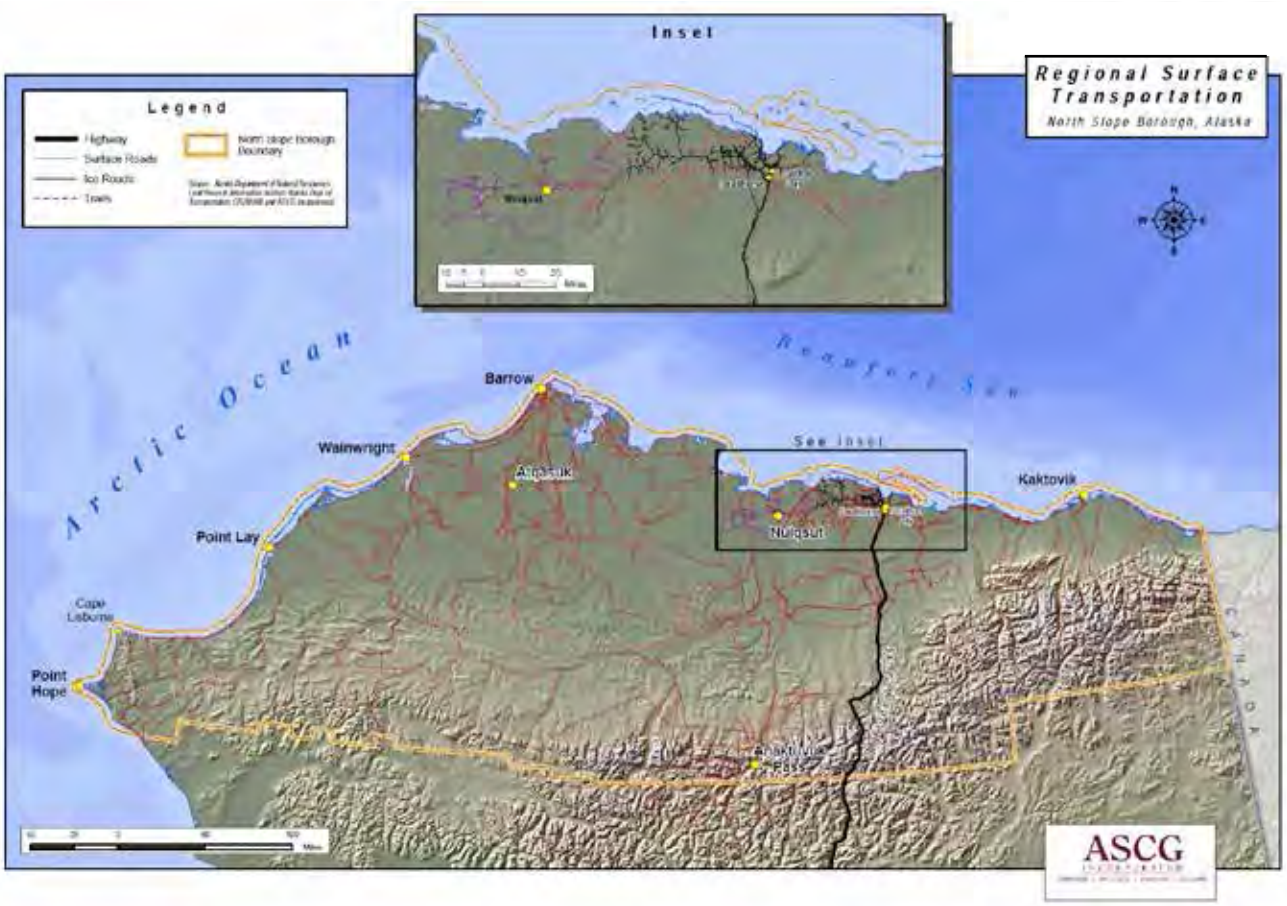


Figure 2-2: Regional Surface Transportation in the NSB
Source: NSB 2005

2.1.2 Natural Environment

This section provides an introduction to the natural environment of the NPR-A. It provides background on geography, geology, fish, wildlife, plants, and climate of the area.

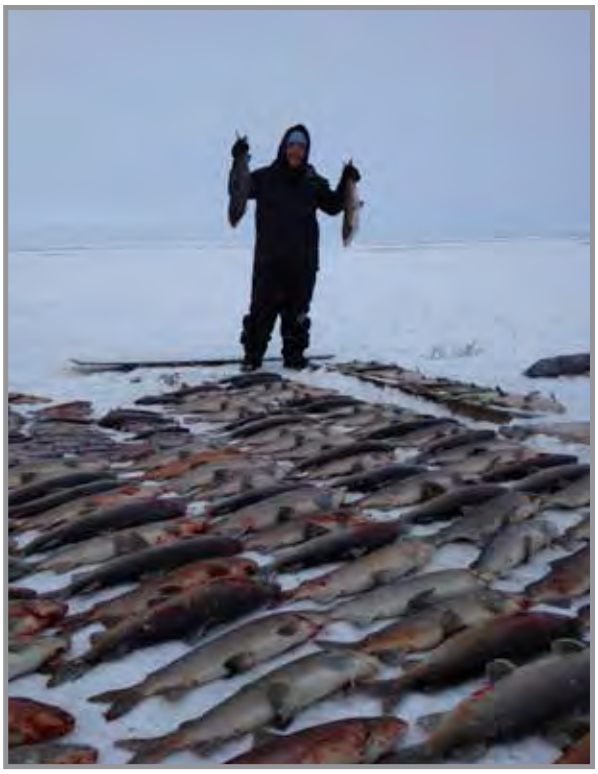
2.1.2.1 Geography and Geology

Geography: The NPR-A is located entirely within the NSB in the area north of the Brooks Range and West of the Colville River. At about 37,000 square miles (23.5 million acres) the NPR-A represents approximately 38.9% of the Borough. It is slightly smaller than South Korea or the State of Indiana. It encompasses three broad physiographic areas called provinces: the Arctic Coastal Plain, the Arctic Foothills and the Arctic mountains of the Brooks Range (BLM 2012a).

- **Arctic Coastal Plain:** The Arctic Coastal Plain represents about 46% of the BLM-managed land in the NPR-A (BLM 2012a). Relatively flat treeless tundra covers most of the Coastal Plain with some low hills called pingos. About 20% of the Coastal Plain is covered by freshwater lakes that freeze in the winter. Most lakes are oriented to the north and northwest due to the effect of winds acting on melting ice which over time results in elongated lakes at right angles to the prevailing wind direction. The eastern

NPR-A has many small lakes, but there are fewer lakes in the western part. The 315 square mile Teshekpuk Lake is the largest north of the Brooks Range. An area of sand dunes occurs between the Kuk and Colville rivers. The Colville River, the largest river in Alaska's Arctic, forms the eastern boundary for most of the NPR-A.

- **Arctic Foothills:** The Arctic Foothills area makes up 51% of the NPR-A (BLM 2012a). These small mountains mark the northern edge of the Brooks Range. The tundra-covered foothills are mostly oriented east to west. They begin at about 500' in elevation and rise to 1,600 feet. Less than one percent of the foothills area is covered by water. While a number of rivers flow north through NPR-A, the 220-mile Colville River is the longest river. It is oriented west to east for a majority of its course, turning north in its lowest 80 miles to reach the Arctic Ocean.



Subsistence fisherman in NPR-A
(Photo: Gordon Brower)

- **Arctic Mountains:** The Arctic Mountains province represents about two percent of the NPR-A. This part of NPR-A includes the northern limits of the Brooks Range with mountains reaching 4,500 feet at the Continental Divide.

Soils: The lack of glacial coverage north of the Brooks Range has resulted in surface soils composed of fine-grained deposits of clay, silt and sand. Soils were deposited by wind and water. The BLM estimates that more than 95% of the NPR-A may be considered wetlands (BLM 2012a). There are few gravel sources in NPR-A other than in the Colville River and areas near the Brooks Range.

The NPR-A is located in an area of continuous permafrost with the active layer thawing each summer between two and four feet deep. Much of the Coastal Plain soils are considered to be ice rich permafrost which is highly unstable when disturbed. Permafrost soils form a network of large polygons visible from the air. These polygons are caused by cracks in the tundra that fill with ice wedges.

Minerals: Mapping of hardrock minerals in the NPR-A has occurred mainly in the Foothills and Brooks Range areas where a number of occurrences and deposits are located. In the Coastal Plain, mineral resources are mainly coal, oil and natural gas. Deposits of coal lie below a large

portion of NPR-A. About 32,000 square miles of coal-bearing rocks exist is what is known as the Nanushuk Group, an area west and north of the Colville River.

Estimates of the mean technically recoverable hydrocarbon resources in the NPR-A over the past for decades have varied widely. Estimates range from 900 million barrels of oil and 52.8 trillion cubic feet of gas (Houseknecht et al. 2010) to 10.6 billion barrels of oil and 61.4 trillion cubic feet of gas (Bird and Houseknecht 2002).[5] To date, none of the 17 billion barrels of oil and natural gas liquids produced from the North Slope has been from the NPR-A. The first commercial oil production from the NPR-A is scheduled for late 2015.[6] Chapter 3 provides more detailed information about oil and gas resources on the North Slope, including those in the NPR-A.

2.1.2.2 Fish and Wildlife Resources

The NPR-A and its adjacent marine waters support a wide variety of fish and wildlife. Habitats may be categorized into a number of different groups: Upland areas; rivers, streams and lakes; exposed high energy costs; barrier islands and lagoons; rocky islands and sea cliffs; wetlands; and estuaries. Each type of habitat provides important needs to fish and wildlife, either during a specific part of the year or during different life stages. This summary relies on more extensive information provided in the 2012 EIS for the NPR-A (BLM 2012a) and in the NSB Draft Coastal Management Plan (NSB 2007).

Land Mammals: Many different species of land mammals may be found in the NPR-A. Large mammals include caribou, brown bear, moose, muskox, Dall sheep, gray wolf, wolverine, and Arctic fox and red fox. Small mammals include Arctic ground squirrel, marmots, ermine, least weasel, lemming, snowshoe hare, vole, and shrew. While all land mammals are important, caribou play a large part of the subsistence diet for villages around the NPR-A.

Three caribou herds may be found in the NPR-A: The Western Arctic Herd, Teshekpuk Lake Herd, and the Central Arctic Herd.[7] Caribou migrate over long distances, and although these migrations change from year to year, female caribou generally use the same calving areas from year-to-year. While caribou are thought of as an upland species, they sometimes use barrier islands, regularly feed on vegetation in river and stream floodplains, and have been observed in mudflats. The entire two-mile band along the coast is used for insect relief in the summer. Caribou eat a variety of plants, including lichen, tussock cotton grass and shrubs, such as willow.

Each of the three herds located within the NPR-A is described briefly below.

5: See Table 3-1 in Chapter 3 for a summary of oil and gas estimates for the NPR-A.

6: The first commercial production from the NPR-A will be from Alpine West, an extension of the existing Alpine field. The production will be from a new pad called CD-5.

7: The range of the fourth herd located on the North Slope, the Porcupine Caribou Herd, is located further east of NPR-A.

- **Western Arctic Herd (WAH):** The 140,000 square mile range of this herd extends from the Chukchi Sea to the Sagavanirktok River and from the Beaufort Sea to the Seward Peninsula. The population of the WAH was estimated to be 243,000 in the early 1970s and peaked at 490,000 in 2003. The herd has been declining by four to six percent each year since 2003 (Rosen 2013). The primary calving grounds are located in the Utukok Uplands Special Area in southwestern NPR-A.
- **Teshekpuk Lake Herd (TLH):** This herd generally uses the area west of the Colville River, although its range extends to the Nulato Hills to the south, the Arctic National Wildlife Refuge to the east, and the Chukchi Sea to the west. Although populations fluctuate, the estimated population of the TLH in 2002 was 45,166, significantly higher than the 1981 estimate of 4,000. Calving generally occurs between May to late-June near Teshekpuk Lake. During summer, coastal areas are important for insect relief, and the largest aggregations occur during this period. The Teshekpuk Lake Special Area was created in part to protect habitat used by the TLH.
- **Central Arctic Herd (CAH):** The range of this herd generally extends from the Colville to Canning rivers and from the Beaufort Sea to the southern slopes of the Brooks Range. The summer range extends short distances east and west of this area. As with the other herds, the population of the CAH fluctuate (e.g., from an estimated 5,000 in 1975 to 67,000 in 2008). The CAH calve between the Colville and Canning rivers to the east, and the core area is located around the Sagavanirktok River.

Birds: The NPR-A provides habitat for about 90 bird species from all seven continents (BLM 2012a). Most of these species migrate along the Pacific and mid-continent flyways and are located in the NPR-A between late May and October-November. Year-round residents include ptarmigan, common raven, gyrfalcon and snowy owl.

- **Seabirds:** Seabirds include gulls (glaucous, Sabine's and Ross's), pomarine, jaegers (parasitic and long-tailed), Arctic tern, black guillemot, horned puffin, and Kittlitz's murrelet. Seabirds are present in the NPR-A from May to September-November.
- **Loons:** Three species of loons breed in the NPR-A: Pacific, red-throated, and yellow billed loons. They arrive in late May and breed along the edges of lakes and ponds.

Subsistence bird hunters in NPR-A
(Photo: Gordon Brower)

- **Waterfowl:** Twenty species of ducks geese and swans breed in the NPR-A and spend winters in other states of the U.S. and in

Canada and Mexico. Species of waterfowl include tundra swan, black brant, greater white-fronted goose, lesser snow goose, Canada goose, northern pintail, long-tailed duck, king eider, and common eider.

- **Shorebirds:** At least 29 species of shorebirds breed in the NPR-A, including American golden plover, semipalmated sandpiper, pectoral sandpiper, dunlin, long-billed dowitcher, red-necked phalarope, and red phalarope. They are generally present in the NPR-A between May to September. The northern part of NPR-A provides important habitat for these species.
- **Raptors:** Falcons, hawks, eagles, and owls represent raptors that may be found in the NPR-A, but only the snowy owl and gyrfalcon overwinter. Cliffs above the Colville and other provide nesting habitat for several species of raptors. The Colville River Special Area was created to protect unique habitat in this area used by raptors.
- **Other Species:** Other species of birds that inhabit the NPR-A include willow and rock ptarmigan and passerines (i.e., perching birds).

The Teshekpuk Lake Special Area was created in part to protect habitat important for waterfowl nesting, breeding, and molting. In addition, this area includes important habitat for tundra swans, black brant, greater white-fronted geese, lesser snow geese, northern pintails, king eider, spectacled eiders, Steller's eiders, and yellow-billed loons.

Fish: Fish species on the North Slope may be categorized into several groupings: Anadromous, freshwater and marine. Anadromous fish use both fresh and saltwater during different times of the year (or during different periods of their life).[8] Anadromous fish generally spawn in freshwater and may overwinter in in river deltas and upstream reaches. Anadromous fish include Dolly Varden/Arctic char, broad whitefish, humpback whitefish, least cisco, Arctic cisco, Bering cisco, Sheefish, rainbow smelt, and salmon (mostly humpback and chum, although in recent years king, coho and sockeye salmon have been caught in the NSB). The only commercial fishery on the North Slope targets Arctic cisco in the lower Colville River.

Marine fish spend all of their life in saltwater or brackish water. These fish species include Arctic cod, saffron cod, capelin, Pacific herring, Arctic flounder, and clams.

Freshwater species spend all of their life in rivers or lakes. These species include Arctic grayling, lake trout, blackfish, northern pike, sucker, round whitefish, burbot, nineback stickleback, and suckers.

Marine Mammals: Over 21 species of marine mammals occur in the Chukchi Sea, and many of these species occur in the Beaufort Sea. Some of these species occur near the sea ice

8: Amphidromous fish are a type of anadromous fish that make many migrations between freshwater and saltwater.

year while other species may be associated with sea ice during only part of the year. Marine mammals include bowhead whale, polar bear, ringed seal, spotted seal, bearded seal (oogruk), Pacific walrus, killer whale, harbor porpoise, beluga whale, gray whale, and other species.

Endangered Species: Eight species that occur in the NPR-A and adjacent marine waters are listed under the federal Endangered Species Act. Endangered species include bowhead whales, humpback whales and fin whales. Threatened species include spectacled eiders, Steller's eider, polar bear, bearded seal (Beringia district population), and ringed seal (Arctic subspecies). In November 2010, the U.S. Fish and Wildlife Service designated critical habitat for polar bear which includes areas within the NPR-A, but the U.S. District Court vacated the Final Rule that designated the critical habitat in January 2013.[9]

2.1.2.3 Plants

The vegetation in the NPR-A is typical of Arctic areas with representation of small shrubs, herbaceous plants, mosses, and lichens (BLM 2012a). While individual plant species may be found in different areas of the NPR-A, their frequency of occurrence varies according the three physiographic provinces (Arctic Coastal Plain, Arctic Foothills and Arctic Mountains). The amount of moisture is a major determinant for the type of plant communities that may occur in an area.

Vegetation in NPR-A is represented by dwarf shrubs, herbaceous plants, and lichens and mosses. The BLM classifies ground cover into seven categories: water, aquatic, flooded tundra, wet tundra, moist tundra, shrub, and barren ground. Satellite images have been used to create vegetation maps that have been checked through onsite observations. A map of the entire Borough illustrates the distribution of vegetation types (North Slope Science Initiative 2013).

Shrubs represent the most common vegetation cover in the NPR-A at over 44%. Tussocks, however are also located in the shrub category, and the BLM estimates that about 65% of the NPR-A is covered by tussocks. Tussocks are clumps of cotton grass that provide an important food for caribou. Tussocks are sensitive to disturbance from off road travel and ice roads. Wet areas, however, are the least vulnerable to off road winter travel because they freeze before the tundra is opened to travel.

Nine plants considered to be rare on Alaska's North Slope may be found in the NPR-A. BLM has designated 12 sensitive species, including Whitlow-grass, Adam's Whitlow-grass, oriental Junegrass, Drummond's bluebell, arctic poppy, Sabine grass, Alaskan bluegrass, circumpolar cinquefoil, and grassleaf sorrel.

The role of fungi and microbial life is important in the Arctic. Fungi reduce organic material to sugars and mineral nutrients that are distributed to plants through mychorrihizae. Eighty

9: Case 3:11-cv-00025-RRB Document 96 Filed 1/11/13.

percent of plants in the Arctic depend on this source of food. Lichens, an association between fungi and algae, are a critical food source for caribou, muskox and other animals (CAFF 2001).

As noted in the next section, vegetation communities are changing in response to warming temperatures.

2.1.2.4 Climate

Because the North Slope is entirely above the Arctic Circle, the winters involve periods where the sun does not rise above the horizon, and during the summers there are periods where the sun does not set. For much of the year, the tundra, rivers and lakes are frozen. Landfast ice generally forms in November or December near Barrow, and by mid-to late-June no landfast ice is present. The coastal plain generally freezes earlier than in the Foothills, and breakup occurs later than in the Foothills.

Most of the NPR-A receives little annual precipitation. For example, the average annual precipitation at Umiat is about 5.5 inches per year (BLM 2012a). While it may snow anytime during the year, the ground is usually covered with snow between October and May. Snow cover is about 10 inches along the northern coast and 15 inches near the Foothills. Spring break up occurs earlier near the Foothills and continues north and freeze-up begins along the coast first.

While temperature varies in different areas of the NPR-A, its annual mean temperature is about 10° F. The average maximum temperature in at Umiat is about 19.9° F, and the average minimum temperature is 1.5° F. On the Coastal Plain, temperatures fall below freezing between mid-October and May. February is the coldest month (average temperature of -21° F), and July is the warmest month (average temperature of 46° F). Extreme temperatures can range from -56° to 78° F. In the Brooks Range and Foothills areas, the average January temperature -14° F, and the average summer temperature is about 50° F (BLM 2012a, NSB 2005).

Climate Change: A warming trend that began about 30 years ago continues today in the Arctic (NOAA 2013). Although there are year-to-year variations, this warming trend has resulted in reduced snow and ice cover which in turn adds to the warming by absorbing heat. During 2012, new record lows were observed for the extent of sea ice, snow cover and permafrost temperatures. The sea ice in September represented the lowest cover since satellite records began in 1979.

According to predictions by the Scenarios Network for Alaska and Arctic Planning, summer and winter temperatures will increase in the NPR-A, with winter temperatures increasing by 18° by the 2090s. Precipitation is also expected to increase in the summer and winter, although precipitation forecasts are more uncertain than temperature predictions (Scenarios Network for Alaska and Arctic Planning 2011).

Climate change is currently affecting Arctic Alaska, including the NPR-A.

- **Erosion:** Thawing permafrost and the loss of sea ice cover is resulting in increased erosion along the coast. For instance, the rate of erosion east of Point Barrow has doubled in the past 50 years from 20 feet to 45 feet per year (University of Colorado at Boulder 2009).
- **Sea Ice:** Multi-year sea ice has declined 50% since 2005.
- **Acidification:** Marine arctic waters are becoming more acidic.
- **Fire:** As the climate continues to warm, there will be more frequent fires in the Alaska Arctic (Breen et al. 2013).
- **Vegetation:** Vegetation cover is changing. Above-ground plant biomass has increased by as much as 26% since 1982 (NOAA 2013). The extent of shrub cover has increased during the past 50 years (Sturm et al. 2001). Along the northern coast, areas with low elevations have been inundated by saltwater which has resulted in sedimentation and subsidence. As a result, the previous vegetation has been replace by salt tolerant species which in turn has resulted in black brant seeking this new habitat for molting rather than inland (Tape et al 2013).
- **Ecosystem Change**s: Climate changes are affecting the foundation of the food web on land and in marine waters. Habitats for many species are changing, including diminished sea ice which is affecting ringed seals, walrus and polar bear. A reduction in sea ice could also affect the entire marine ecosystem through changes to plankton, plants and animals on the low end of the food chain.

Scientists predict that current climatic trends will continue in the future. The length of the summer season is expected to increase between by between three and six weeks by the end of the century (Scenarios Network for Alaska Planning 2011). The active layer of permafrost, that is, the soil layer that melts in the summer, is predicted to become much deeper by midcentury. As the permafrost thaws and temperatures rise, water in lakes and ponds may diminish through evaporation and drainage.

Climate change will likely have significant consequences for plant and animal life, the people who live on the North Slope, and commercial activities. Plants and animals may face a loss of habitat and ecosystem instability, and new species may enter the area (USDOI 2013). Natural hazards are expected to increase, including erosion and storm surges. Erosion may uncover landfills and hazardous wastes and damage archaeological sites. Impacts to residents may include changes in availability of subsistence resources, threats to drinking water sources, and diminished food security. Climate change has already led to increased commercial activity, such as a 30% increase in U.S. Arctic shipping between 2008 and 2010. It may also lead

to increased interest in commercial fisheries, tourism and oil and gas. As has already been demonstrated, the shorter winter periods have led to a decrease in the winter tundra travel season.

2.1.3 NPR-A Oil and Gas History

Long before contact with Westerners, the ancestors of today's Iñupiat discovered oil seepages and oil shale in Northern Alaska. Around 1830, an agent from the Hudson Bay Company reported oil seepages around Cape Simpson (Roderick 1997). Charles Brower, a Yankee whaler, had oil from Cape Simpson assayed in San Francisco, but he determined the deposit was so far away that "it was of no use to anyone" (Blackman 1989). Interest in development of oil and gas resources in what is today NPR-A began at the turn of the 20th century. This section describes important milestones during three periods: Early history, mid-20th century activity, the period between 1974 and 1982, and the period between then and 2013.

2.1.3.1 Early History – 1900 - 1930

A report by the U.S. Navy in 1900 provided the first written documentation that provided details about petroleum resources in the region by verifying oil shale deposits along the Etivluk River. The U.S. Geological Survey (USGS) followed this report in 1901 by completing first comprehensive survey for the region. The survey results, published in 1904, noted the presence of geological formations that could have petroleum deposits as well as natural oil seepages near Cape Simpson.

These investigations led President Warren Harding to issue an executive order establishing the 37,000 square-mile National Petroleum Reserve in 1923.[10] The reserve was later named National Petroleum Reserve No. 4 (Pet-4) and renamed National Petroleum Reserve-Alaska (NPR-A) in 1976.

By the time President Harding designated the reserve, "three of the prerequisites for the occurrence of petroleum were already known to be present: source rocks, such as organic marine deposits, including oil shale; potential reservoir rocks, including limestone and sandstone; and favorable structures, such as anticlines" (Gryc 1985, p. C10). Around this time, applications for prospecting permits for petroleum were received for Cape Simpson, Peard Bay, Meade River, Kupowruk River, and Kokolik River.

Between 1923 and 1926, the USGS conducted surveys in the interior of the reserve. The result of these surveys was published in 1930 in USGS Bulletin 815. This report provided the first topographic maps of the area along with an analysis of the petroleum and coal resources.

10: Executive order No. 3797-A.

2.1.3.2 Mid-20th Century Activity

The demand for new petroleum resources sparked by World War II resulted in a renewed interest in the potential oil and gas resources of Alaska. The 1943 Public Land Order 82 issued by the Secretary of the Interior withdrew areas for petroleum development in Alaska. The U.S. Bureau of Mines investigated known seepages in the reserve, and in 1944 the USGS completed another reconnaissance of the area which led to an exploration program.

Between 1944 and 1952, the Navy conducted the Pet-4 exploration effort which resulted in drilling of 91 wells (59 cased exploratory wells and 32 uncased core tests). The first oil discovery occurred at Umiat, a site on the Colville River about 65 miles south of Nuiqsut. Oil was also found at Cape Simpson and Fish Creek. Gas was discovered at Umiat, Barrow, and Gubik with several other gas prospects identified at Meade, Square Lake and Wolf Creek. This drilling program resulted in development of the South Barrow Gas Field in 1949 which was used to support federal complexes in Barrow. None of the other discoveries were considered to be commercially viable at the time.

Between 1953 and 1973, the Navy drilled an additional 17 wells at the Barrow Gas field. In 1965, the program was expanded to supply the City of Barrow with gas in addition to the federal complexes.

The Pet-4 program resulted in more complete information for the reserve as well as a base for future scientific efforts. USGS Profession Papers 301-305 document information gathered during this program, including well histories, maps and a geophysical report. Operations based in Barrow eventually became the Naval Arctic Research Laboratory (NARL) which is currently used by the NSB Wildlife Management Department and the Ilisagvik College.

Unlike current exploration practices, the Pet-4 exploration program involved the use of tracked vehicles across the tundra. Drill pads and roads were constructed by removing the top layer of the tundra. This practice led to permafrost thawing and ultimately scarring of the tundra that is still apparent today. The Navy drilled its early wells with limited resources. Reserve pits and pads were not used, and for about half of the wells, the well heads were removed leaving open holes.

Between 1958 and 1966, the BLM offered 19 million acres to the east and west of NPR-A for oil and gas leasing. Gas was discovered to the east of NPR-A, and these lands were eventually selected by the State of Alaska.

2.1.3.3 1974 – 1982 Period

The U.S. Navy initiated a second drilling program beginning in 1974 in response to the 1968 oil Prudhoe Bay discovery and shortages in oil from the 1973 Arab oil embargo. In 1975, the U.S. Navy awarded Husky Oil NPR Operations, Inc. a five-year contract to manage the exploration

project. Between 1974 and 1982, 28 test wells were drilled, and 14,800 miles of seismic data were collected.

1974-1977: The Navy drilled seven test wells in the Northeast corner of the reserve and four additional wells near Barrow which resulted in the discovery of the East Barrow Gas Field. Wells drilled during this period used five-foot thick gravel pads.

1976: In 1976, Congress passed the Naval Petroleum Reserves Production Act (Public Law 94-258) which changed the name of NPR-4 to the National Petroleum Reserve-Alaska and required studies of the reserve's resources. It also gave the Secretary of the Interior responsibility for the reserve which it delegated to the U.S. Geological Survey (USGS).

1975-1982: Beginning in 1977, the USGS took over responsibility for the drilling program from the U.S. Navy, including completion of new studies, management of the exploration program, management of the Barrow Gas Fields, and remediation of previous areas disturbed during oil and gas exploration. A 1977 Memorandum of Understanding (MOU) with BLM gave USGS responsibility for the South Barrow Gas Field and shared responsibility for surface areas with the BLM.

Between 1975 and 1982, the Navy and USGS oversaw drilling of 28 wells by the Husky Oil Company. In 1980, the act establishing NPR-A was amended to require an expedited oil and gas leasing program.

During the exploration program, Camp Lonely, a distant early warning (DEW) line site at Pitt Point, served as the operation center. This site was chosen for its existing infrastructure which included a gravel pad, air strip, barge landing, and an existing water and sewer system. About 100 exploration workers lived at the camp. None of the wells drilled during this period were of commercial value except a gas well at Walakpa located 14 miles from Barrow which was only large enough for local use. Six new wells were drilled to supply Barrow with additional gas.

The drilling program was characterized by the following practices.

- Use of ice airstrips for most drilling sites with some gravel air strips.
- One season pads.
    - Continued use of thick pads for some areas – elevated about 5 feet.
    - During the program, thick pad was modified to use 2 layers, first layer composed of local materials excavated from the reserve pit covered by a thaw-stable materials from a borrow site.
    - Use of 50-210 pilings to support the drill rig (14-25 feet below soil).
    - A thin pad pioneered at South Meade site with reduced thickness to 2 feet

(from 5 feet). The thin pad design allowed pilings to be cut off at the above the surface of the ground.

- Year-round drill pads.
    - Use of thick pads for all-season pads where more than 350 days were needed for drilling. Use of Styrofoam for insulation because of cost of gravel.
- Use of ice roads to access the drilling sites.
- For 12 wells that could be drilled during a single season, pioneered use of a thin pad design that used two-layers.

Beginning with the 1977-1982 exploration program, new environmental protections were instituted. Most activities were scheduled for the period when the ground was frozen. During other periods of the year, rolligons were used for tundra travel because of their low impact from balloon tires.

2.1.3.4 Period 1982 - Present

The BLM held four lease sales in NPR-A between 1982 and 1985, and a fifth sale was cancelled due to legal challenges and a lack of interest by oil companies. During this period, the BLM offered 8.8 million acres for leasing, it leased 1.3 million acres, and it received $84.5 million in bonus bids. Private oil and gas exploration companies began drilling in 1983.

Renewed interest in oil and gas exploration in the area began after the 1996 announcement by ARCO of a commercial oil discovery at the Alpine field located in the mouth of the Colville River. The oil discovery occurred in 1994. Production began in 2000 and through the end of 2010, 349.4 million barrels of oil were produced (AOGCC 2013). Interest in exploration in the area was due to the fact that the Alpine oil field was in a new geologic play in the Jurassic section. Table 2-1 summarizes major milestones in the NPR-A.

Table 2-1: Major Milestones in the NPR-A

Date	Event
1901	First USGS investigation in the region.
1923	President Harding established the National Petroleum Reserve by an Executive Order.
1923-1926	First exploration of NPR-4 by the U.S. Navy and USGS.
1941	USGS issued reports on possible oil provinces in Alaska.
1944-1952	The Navy drilled 91 wells during the Pet-4 Drilling Program.
1953-1974	Navy drilled 17 wells in the Barrow Gas Field.
1952-1958	Federal geological studies continue and several major oil companies begin exploration.
1958	USGS began a series of professional papers on NPR-4, including a 1959 paper on possible petroleum provinces in Alaska.
1963	Exploratory drilling begins near NPR-4.
1968	Atlantic Richfield Corporation discovers Prudhoe Bay Field.
1974	U.S. Navy renews exploration in NPR-4 in response to the Arab oil embargo.
1975-1982	U.S. Navy and USGS drill 28 wells using U.S. Husky Oil Company.
1976	Naval Petroleum Reserve Production Act renames the reserve as NPR-A and transfers management responsibility to the Department of the Interior.
1981	Arctic Slope Regional Corporation received conveyance of the W.T. Foran Well.
1982	Responsibility for oil and gas management transferred to Minerals Management Service from USGS in January and later that year transferred to the BLM.
1982-1983	BLM holds its first lease sale in NPR-A and companies conduct geophysical surveys, and the Brontosaurus well is drilled.
1984	Barrow Gas Field Transfer Act gives the NSB ownership of 19 wells.
1984	BLM receives no bids for the 4th lease sale in NPR-A, so it cancels the 1985 sale.
1995	Alaska Department of Environmental Conservation approves closure of 27 reserve pits.
1996	Commercial discovery announced for Alpine field in the Colville River Delta.
1998	BLM issues an IAP/EIS to initiate an oil and gas leasing program.
1999	Lease sale held for the Northeast part of NPR-A. Most leases were located the near Nuiqsut and in an area between Teshekpuk Lake and Ikpikpuk River.
2000	Production begins at Alpine (Colville River Unit).
2001	Phillips Alaska Inc. announced discovery of a likely commercial field in NPR-A.
2002	BLM holds a lease sale in June. U.S. Army Corps of Engineers plugs 2 Umiat wells.

Date	Event
2003-2005	BLM evaluates 136 exploration wells and uncased core wells. 2004 Legacy Wells Summary Report prioritizes sites with greatest risk.
2004	BLM holds a lease sale with activities restricted by the U.S. District Court.
2005	The court lifted restrictions for the 2004 sale, and BLM issues an amended EIS.
2005-2013	BLM completes cleanup for several priority wells.
2006	BLM holds September lease sale. Alpine satellites CD-3 & CD-4 production begins.
2008	BLM holds a September lease sale with 150 parcels covering 1.6 million acres.
2009	First units formed in NPR-A: Bear Tooth and Mooses Tooth Units
2010	BLM holds August lease sale with 28,444 acres leased for $799,995.
2011	BLM holds December lease sale with 119,987 acres leased for $3.6million.
2012	BLM holds November lease sale with 160,088 acres leased for $898,900. Final IAP/EIS issued in November for future management of NPR-A. EPA and ACOE approve permit for bridge to CD-5 (Alpine West).
2013	BLM issues the final Record of Decision for the IAP/EIS. 11.8 million acres available for oil and gas leasing. About 11 million acres, including 3.1 million acres within Teshekpuk Lake Special Area, not available for leasing. Cassin first discovery well since Units were formed.

Sources: BLM 2013a, BLM 2012b

2.1.4 BLM Management Authority for NPR-A

The Department of the Interior (DOI) has delegated management authority for NPR-A to the BLM. This section provides a brief overview of a number of federal laws that guide its management of the NPR-A.

Federal Land Policy and Management Act of 1976 (FLPMA): Sometimes referred to as the BLM organic act, FLPMA gives broad authority to regulate use, occupancy and development of public lands administered by the BLM. One of the provisions of FLPMA requires the DOI secretary to "take any action necessary to prevent unnecessary or undue degradation of public lands" (43 USC § 1732). FLMPA also requires development of land use plans that involve the public (43 USC 1712).

Naval Petroleum Reserves Production Act of 1976 (NPRPA): This act, as amended, renamed the NPR-A, and it provides the BLM with its management authority for the reserve. It requires "an expeditious program of competitive leasing oil and gas . . ." and mitigation of "reasonably foreseeable and significantly adverse effects on the surface resources . . ." (42 USC § 6506a). The act requires the Secretary of the Interior to protect "environmental, fish and

wildlife, and historical or scenic values" (42 USC § 6503b). Implementing regulations for the act may be found at 42 CFR Part 2360.

Amendments to the Act removed requirements of FLPMA for land use planning and wilderness study (42 USC § 6506a(c)). As a result, the BLM prepares and analyzes its Integrated Activity Plans and development plans under the authority of the National Environmental Policy Act, and it considers management issues related to potential wilderness areas under discretionary authority in the Alaska National Interest Lands Conservation Act.

The NPRPA authorizes the creation of special areas in the NPR-A that contain significant subsistence, recreational, fish and wildlife, historical, or scenic value. Oil and gas activities in these areas may be restricted by measures in records of decisions for oil and gas exploration and development. The five special areas created for the NPR-A are discussed below.

- **Teshekpuk Lake Special Area:** Designated in 1977, the primary purpose of this area is to protect important habitat that is important for high numbers of waterfowl and shorebirds that nest, stage and molt in this area, and for calving, migration and insect relief habitat for the Teshekpuk Caribou Herd. The area was expanded in 1998 to include the Pik Dunes. The 2013 Record of Decision (ROD) doubled this special area to 3.65 million acres.
- **Colville River Special Area:** The Secretary of the Interior designated this area in 1977 to protect the Arctic peregrine falcon which was listed as an endangered species (it has since been removed from this status). The area was enlarged in 1998 and now encompasses 2.44 million acres of the Colville, Kogosukruk and Kikiakrorak rivers, including bluffs and riparian habitat. It is considered one of the most important regional habitats in North America for raptors. The lower portion of this area includes the North Slope's highest concentration of moose, raptors and passerine birds.
- **Utukok River Uplands Special Area:** In 1977 the Secretary of the Interior designated this area in the southwestern NPR-A to protect habitat used by the Western Arctic Caribou Herd for calving and insect relief. At that time the herd was in decline – it peaked in 2003 and has been declining since then at a rate of four to six percent a year. The 2013 ROD decision expanded this area to 3.87 million acres.
- **Kasegaluk Lagoon Special Area:** This 97,000-acre area was created in 2004 because of its importance for marine mammal habitat and also for its unique habitat. It includes extensive lagoons and barrier islands.
- **Peard Bay Special Area:** Established in 2013, this 107,000-acre area was created to protect three types of habitats: Haul-out areas for marine mammals, nearshore waters for marine mammals and a high-use staging and migration area for shorebirds and waterbirds.

Other Laws and Directives: Other federal laws and directives also direct management of the NPR-A, a few of which are described in following bullets.

- **National Environmental Policy Act:** This act requires preparation of environmental assessments and environmental impact statements for federal actions.
- **Government-to-Government Consultation:** Executive Order 13175, issued in 2000, requires regular and meaningful consultation and collaboration between federal agencies and tribes in the development of federal policies that affect tribes.
- **Environmental Justice**: Executive order 12898 requires that federal agencies address the disproportionate effects of their actions on minority and low-income populations.
- **American Indian Religious Freedom Act:** This act requires consultation with Alaska Native religious leaders when developing management plans.
- **Alaska National Interest Lands Conservation Act (ANILCA):** Section 810 of ANILCA addresses potential impacts to subsistence. Under this section, the BLM provides a notice and public hearing process if significant restrictions to subsistence use will result from an action. Evaluations and proposed findings are prepared under Section 810.
- **Annual Lease Sales:** On May 14, 2011, President Obama directed the DOI to conduct annual oil and gas lease sales in NPR-A.

2.1.4.1 BLM Planning Documents

In November 2012, the BLM completed an Integrated Activity Plan/Environmental Impact Statement (IAP/EIS) for the entire reserve (BLM 2012a). The BLM acted as the lead agency, and cooperating agencies included the NSB, State of Alaska, U.S. Fish and Wildlife Service (USFWS), and the Bureau of Ocean Energy Management (BOEM). In February 2013, the Secretary of the Interior adopted a Record of Decision (ROD) which included most of the elements of the preferred alternative in the November 2012 Final IAP/EIS. The ROD replaced the January 2004 ROD and amends the 2008 Colville River Special Area Management Plan. Existing 10-year leasing deferrals in the Northwest NPR-A ROD and 2008 Northeast NPR-A Supplemental ROD, however, will be honored until expiration of deferral periods.

The February 2013 ROD for the IAP/EIS provides some new direction for management of the NPR-A as summarized in the following bullets (BLM 2013b).

- **Areas Open for Leasing:** About 11.8 million acres of the 22.8 million acres of subsurface managed by BLM in the NPR-A are available for oil and gas leasing. However, 1.57 million acres in the northwest of the Reserve would not be available for leasing until January 2014 when a 10-year deferral expires.

- **Areas Closed to Leasing:** About 11 million acres are not available for leasing, including special areas and some of Beaufort Sea waters in Dease Inlet and near Barrow.
- **Infrastructure:** Infrastructure, including pipelines, would be allowed in over 14 million acres. Non-subsistence permanent infrastructure is prohibited in 8.4 million acres of 11 million acres closed to leasing, including 1.1 million acres in and around Teshekpuk Lake and 7.3 million acres in the southwestern part of the refuge.
- **Special Areas:** The ROD doubles the size of the Teshekpuk Lake Special Area (from 1.76 million acres to 3.65 million acres), expands the Utukok River Uplands Special Area (from 3.87 million acres to 7.06 million acres), and creates a new 107,000-acre Peard Bay Special Area.
- **Buffer Areas:** The ROD creates a ½ mile buffer on either side of segments of 12 rivers.
- **Working Group:** In an attempt to gain a better understanding of local knowledge about economic, subsistence, and social interests, a new NPR-A Working Group has been established with members from tribes, local governments and Native Corporations.
- **Measures:** Stipulations and Best Management Practices identified in the preferred alternative of the Final IAP/EIS have been incorporated into the ROD. These measures address a number of issues and include requirements for studies, monitoring and visual resource management.

According to the BLM, the 2013 ROD will remain in place until the underlying analyses in the IAP/EIS are no longer adequate under NEPA.

2.2 Management Issues

While this section addresses impacts from oil and gas activities, there are significant benefits at the local, state and federal levels. Oil and gas revenues have improved the quality of life for all Alaskans, including North Slope residents. Local and state oil revenues provide funding for water and sewer facilities, schools, health clinics, fire stations, and local roads and airports. The Arctic Slope Regional Corporation and local village Native corporations have businesses that provide oil field services and the corporations receive royalties for developments on their land. In addition, some individuals from NSB villages also are employed by oil companies.

The impacts of oil and gas will likely increase as oil and gas development expands. In recent years, industry has expressed interest in increasing its activities in the Beaufort and Chukchi seas, the NPR-A and the Foothills area north of the Brooks Range.

This section provides an overview of issues raised during the scoping meetings for the 2012 IAP/EIS (BLM 2012a). Some of these issues are discussed in more detail in Chapter 4 with

proposed solutions discussed in Chapter 5. The final chapter briefly addresses issues that are outside the scope of this report.

- **Subsistence:** Researchers estimate that the Iñupiat derive over 50% of their nutritional needs from subsistence activities including hunting, fishing and whaling (Shepro et al. 2003, Wernham 2007). All villages use subsistence resources in the NPR-A to some extent, and many issues raised by residents relate in some way to the subsistence way of life. Residents have noted negative impacts to subsistence from oil and gas activities, including localized impacts to air quality, increase noise and a reduction in areas available for subsistence activities. For instance, while areas near oil and gas infrastructure are generally not closed to local residents, many hunters do not feel comfortable hunting in these areas. Some residents have expressed the need for compensation due to impacts from oil and gas activities.

- **Health Impacts:** Impacts to human health are an important and increasingly voiced concern of residents and public health providers on the North Slope. Subsistence is also considered the cornerstone of social, spiritual and physical health. Thus, impacts to subsistence activities or resources have associated effects to cultural health and social welfare. Examples of reported impacts include increased incidence of diabetes and hypertension associated with reduced consumption of subsistence foods, heightened community stress and anxiety, and a sense of being disconnected from the land and Iñupiaq culture. In light of past oil and gas activities and future prospects for development in the North Slope region there is a high potential for impacts to human health in the area (Wernham 2007).

- **Wildlife:** Disturbance to wildlife, especially caribou, is an important concern to residents. Impacts occur from aircraft as well as on-the-ground activities.

- **Economy:** The cash economy has become important to area residents, even to those who practice subsistence full time. Money is needed to purchase equipment, fuel and materials for subsistence pursuits, as well as for housing, utilities, food and clothing. One of the most voiced economic concerns is the need for local hire. Another less voiced concern relates to the ability to sustain the cash part of the local economy once the oil resources are depleted.

- **Areas Available for Leasing:** The amount of area available for leasing is a recurring issue for the BLM in this and previous plans for oil and gas lease sales.

- **Teshekpuk Lake:** Concerns about the impact of oil and gas activities in the Teshekpuk Lake area are a concern due to the high oil and gas potential in this area, the value of habitat for waterfowl and caribou (calving and insect relief), and subsistence activities.

- **Wilderness:** Some stakeholders believe more area should be protected for its wild

character. No areas are currently designated as wilderness areas in NPR-A, and the BLM is no longer considering designation of wild lands in its planning process. The BLM considered a wide range of alternatives, some of which would protect wild lands.

- **Wild and Scenic Rivers:** While no areas have been formally designated as wild and scenic river, previous planning identified 22 rivers that would be eligible for such designation. These rivers continue to meet the criteria for wild and scenic rivers.
- **Special Areas:** The areas designated as special areas and corresponding restrictions are an issue for both those who promote development and those who support increased restrictions.
- **Land Rehabilitation:** Restoration of land degraded from previous activities is an important concern. This issue is discussed in more detail in Section 2.2.1.
- **Climate Change:** A changing climate has current and future management implications for the NPR-A. Changes in numbers and distribution of plants and animals as well as timing of migrations affect NSB residents. Increased erosion and flooding pose safety issues and potential pollution from landfills and contaminated sites.
- **Studies and Monitoring:** The focus of future studies and requirements for monitoring is an ongoing concern.
- **Cumulative Impacts:** Impacts from past, current and future activities in the NPR-A, other areas of the North Slope and adjacent waters are an important concern. Cumulative impacts to North Slope fish and wildlife resources, subsistence activities, and the health and cultural well-being of communities are just beginning to be understood. New stresses to the Arctic environment from a changing climate are adding complexities to the understanding cumulative impacts. This issue is discussed in more detail in Chapter 6.

2.2.1 Sites Needing Cleanup and Rehabilitation

Historic activities have resulted in degradation of some sites in the NPR-A as well as future risks of contamination. This situation mostly applies to activities that occurred prior to the environmental legislation of the 1970s, including oil and gas exploration, DEW-line stations, and military operations. Cleanup activities began in the early 1970s and continue today.

2.2.1.1 Legacy Well Clean Up Program

The U.S. Navy and the U.S. Geological Survey (USGS) oversaw oil and gas drilling programs in what is now NPR-A between 1944 and 1982 (BLM 2013a). During that period, 136 wells were drilled which are known as legacy wells. The U.S. Navy started a program to rehabilitate the

drill sites in 1971, and this program was continued by the USGS through 1984. The BLM currently administers a cleanup program for the NPR-A legacy wells. As of spring 2013, it involved estimated costs of $86 million for plugging 18 wells and cleanup of contaminated soils (BLM 2013c). BLM conducted an assessment of the 136 legacy wells and determined 50 require remediation, 18 wells are being used by USGS for scientific research and 68 wells need no further action by BLM. Some of the 18 wells being used by the USGS for measuring soil temperatures may need cleanup when the wells are no longer part of the research program. The agency has developed a strategic plan to clean up the legacy well sites (BLM 2013d).

Abandoned oil well
(Photo: Gordon Brower)

The 68 wells that require no further BLM action include wells conveyed to the NSB, wells that have been remediated and shallow test boreholes that have no risk of contamination. Nineteen of the 68 wells were transferred to the NSB under authority of the Barrow Gas Field Transfer Act.

BLM's assessment categorized wells as having no, low, moderate or high risks for contamination. It involved an evaluation of surface risks to air, water, vegetation, wildlife, and visual resources. The assessment also involved an evaluation of risks to subsurface resources and other risks such as impacts to public health and natural resources.

BLM's strategic plan involves an adaptive management approach that will involve future monitoring of the wells and evaluation of the effectiveness of the plan. The plan involves a phased approach with an initial focus on the area near Barrow and the Simpson Peninsula which is located southeast of Barrow.

In addition to clean up of drill sites, there has been an ongoing effort to remove drums left behind during exploration and seismic survey operations, resulting in the abandonment of empty 55 gallon drums. The following bullets summarize this effort.

- 1976 Navy picked up 9,019 barrels
- 1977 USGS cleaned up olds sites and rehabilitated recent drill sites. 16,743 barrels crushed, 485 tons of debris collected, burned or stockpiled.
- 1978 1,235 tons of debris burned or stockpiled
- 1979 10,000 tons of debris burned or stockpiled for later disposal

2.2.1.2 Other Contaminated Sites

In addition to the oil and gas exploration activities, other sites were contaminated during other

activities, including military operations and operation of the DEW-line stations. A search of a database maintained by the Alaska Department of Environmental Conservation revealed there are 420 contaminated sites on the North Slope (Alaska Department of Environmental Conservation 2013a).

2.2.2 Federal Responsibilities under the Barrow Gas Field Transfer Act of 1984

This section provides an overview of Public Law 98-366, known as the Barrow Gas Field Transfer Act of 1984, which was signed into law June 17, 1984. The act is supplemented with agreements with the NSB and the Arctic Slope Regional Corporation.

This act responded to a federal obligation to supply energy to villages of the North Slope that was becoming too costly to continue. The act filled a need to provide a steady energy supply to villagers and federal facilities in the Barrow area. The significance of this legislation is worth note for the following reasons.

- Subsurface estate to the Barrow and Walakpa gas fields and their related support facilities were conveyed to the NSB, along with the right to continue to explore for, develop and produce gas for local use.
- The Barrow Gas Fields are exempt from Federal Pipeline Safety Regulations to the extent set out in the Barrow Gas Field Transfer Act of 1984, including any documents adopted by the Pipeline Safety Act.
- The act provided the right of the NSB to exploit gas and entrained liquid hydrocarbons from federal test wells in the NPR-A for local village utility uses from lands included within terminated, expired or surrendered federal onshore oil and gas leases with NPR-A. It also included leased areas, with the consent of lessee and under mutually agreeable terms and conditions, to exploit and use gas and entrained liquid hydrocarbons from non-producing wells capable of production, including capped wells, in federal oil and gas leases with NPR-A.
- Additional lands at Cape Simpson and Drenchwater Creek were also conveyed to the NSB under the assumption that they would assist in generating operational funding for the gas fields.
- Ukpeagvik Inupiat Corporation (UIC) and Arctic Slope Regional Corporation (ASRC) were granted alternative land selection and gravel rights in exchange for their interests in the Barrow/Walakpa gas fields.

The North Slope Borough agreed to accept responsibility for the following provisions.

- The installation of any necessary production and transportation equipment and any treatment necessary to produce and use gas and entrained liquid hydrocarbons.

- Transportation of gas.
- Reimbursing the federal lessee, if any, for use of any of its equipment required for production, treatment, and transportation of such gas and entrained liquid hydrocarbons.
- All costs associated with abandonment and reclamation of land and facilities involved with NSB use of any federal test well or lands within a terminated, expired or surrendered lease.
- Determination of the wholesale price for natural gas and entrained liquid hydrocarbon in accordance with a prescribed formula. Provision on a nondiscriminatory basis natural gas supplies to federal agency users including, but not limited to, the Public Health Service, federal activities at the former Naval Arctic Research Laboratory, and the U.S. Air Force, at a fair market rate.

2.3 Oil and Gas Regulation

2.3.1 Overview

Oversight of oil and gas management, planning, leasing, exploration, development, production, and restoration activities fall within the responsibilities and jurisdictions of many federal, state and local agencies. In addition to the NSB, these include state and federal agencies listed in Table 2-2.

Table 2-2: Major Regulatory Agencies and Landowners for Oil and Gas Activities

Federal Level	Bureau of Land Management (BLM)
	Environmental Protection Agency (EPA)
	U.S. Army Corps of Engineers (ACOE)
	U.S. Pipeline and Hazardous Materials Safety Administration (PHMSA)
	U.S. Fish and Wildlife Service (USFWS)
State of Alaska	Department of Natural Resources (ADNR)
	Department of Environmental Conservation (ADEC)
	Department of Fish and Game (ADF&G)
	Alaska Oil and Gas Conservation Commission (AOGCC)
Local	NSB Department of Planning and Community Services (Planning Department)
Landowners	Arctic Slope Regional Corporation and local Native corporations

Various approvals must be obtained before an applicant can access a drill site and commence drilling. The major approvals related to oil and gas projects are listed in Appendix D.

2.3.2 Federal Agencies

This section describes the responsibilities of the major federal agencies that have regulatory oversight over oil and gas activities on the North Slope.

2.3.2.1 Bureau of Land Management (BLM)

The primary permitting responsibilities of the BLM for oil and gas activities relate to the following areas.

- Right-of-Way (ROW)
- Application for Permit to Drill and Surface Use Plan
- Threatened and Endangered Species Determination
- Essential Fish Habitat Assessment (EFH)
- Subsistence Monitoring Plan
- ANILCA § 810 Evaluation and Findings
- Archeological and Cultural Resources Clearance
- Waste Management Plan
- Orientation Program

The Naval Petroleum Reserves Production Act of 1976 included new environmental requirements. In order to implement these requirements, the USGS and BLM signed an MOU outlining responsibilities of the agencies. The MOU required USGS to prepare an Annual Plan of Operations for the exploration program.

The Department of the Interior issues an ROD following an EIS for a major federal action, including a lease sale EIS/IAP. For a historic perspective on changes in the decision documents, the following RODs are available from the BLM website.

- October 1998 Northeast NPR-A Record of Decision http://www.blm.gov/pgdata/etc/medialib/blm/ak/aktest/planning/nenpra_feis_1998.Par.36593.File.dat/1998_NE-NPR-A_ROD.PDF
- January 2004 Northwest NPR-A IAP/EIS Record of Decision http://www.blm.gov/pgdata/etc/medialib/blm/ak/aktest/planning/nw_npra.Par.98372.File.dat/nwnpra_rod.pdf
- January 2006 Amendment to the Northeast NPR-A IAP/EIS Record of Decision http://www.blm.gov/pgdata/etc/medialib/blm/ak/aktest/planning/ne_npra.Par.77875.File.dat/nerod_122205final.pdf

- July 2008 Supplemental Integrated Activity Plan Record of Decision http://www.blm.gov/pgdata/etc/medialib/blm/ak/aktest/planning/ne_npra_final_supplement.Par.91580.File.dat/ne_npra_supp_iap_rod2008.pdf
- February 2013 IAP/EIS Record of Decision (https://www.blm.gov/epl-front-office/projects/nepa/5251/42462/45213/NPR-A_FINAL_ROD_2-21-13.pdf)

2.3.2.2 Other Federal Agencies

Many federal agencies beyond the BLM have a hand in permitting exploration and development on the North Slope. A list of major authorizations by these agencies follows.

U.S. Environmental Protection Agency (EPA)

- Air Quality Permits under Clean Air Act
- Hazardous Waste (RCRA) Permits
- NPDES Discharge Permit under Clean Water Act[11]
- Underground Injection Control (UIC) Class I and II Injection Well Permits under the Safe Drinking Water Act

U.S. Army Corps of Engineers (ACOE)

- Section 10 Permits for dredging or construction of structures in navigable waters under the Rivers and Harbors Act
- Section 404 Permits for discharge of dredged or fill material into the navigable waters of the U.S. under the Clean Water Act

U.S. Pipeline and Hazardous Materials Safety Administration (PHMSA)

- Special Permits for pipelines

U.S. Fish and Wildlife Service (USFWS)

- Letter of Authorization for incidental take of marine mammals (e.g., walrus and polar bear)

National Marine Fisheries Service, National Oceanic and Atmospheric Administration (NOAA)

- Incidental Harassment Authorization for incidental take of marine mammals (e.g.,

11: EPA transferred most NPDES permit authority to the Alaska Department of Environmental Conservation, but it retains permitting and enforcement authorities for facilities operating outside state waters and facilities located in Indian Country.

cetaceans and pinnipeds)

Multiple Agencies (Coast Guard, EPA and Alaska Department of Environmental Conservation)

- North Slope Subarea Contingency Plan April 2007

2.3.3 State of Alaska Agencies

A number of state agencies regulate oil and gas activities.[12] These agencies include the Alaska Department of Natural Resources, Alaska Department of Environmental Conservation, Alaska Department of Fish and Game, and the Alaska Oil and Gas Conservation Commission.

2.3.3.1 Alaska Department of Natural Resources

The Alaska Department of Natural Resources (ADNR) issues a number of authorizations and documents for oil and gas activities. The ADNR Division of Oil and Gas issues a Five Year Oil and Gas Leasing Program for the state as well as a Best Interest Finding (BIF) for areawide oil and gas lease sales. The BIFs are good for a ten-year period unless ADNR determines a supplement to the finding is required. Annual areawide sales are held for the North Slope, Beaufort Sea, and Foothills leasing areas. Authorizations by ADNR are listed below by division.

Division of Oil and Gas

- Annual Areawide Oil and Gas Lease Sales (North Slope, Beaufort Sea and North Slope Foothills)
- Exploration Licensing
- Plan of Operation Approvals
- Unit approvals, Expansion and Contraction
- Exploration Tax Credits
- Geophysical Exploration Permits

State Pipeline Coordinator's Office

- Alaska State Pipeline Rights-of-Way

Division of Mining, Land and Water

12: See also Chapter 7, ***North Slope Best Interest Finding 2008, North Slope Foothills Best Interest Finding 2009,***(Alaska Department of Natural Resources 2008a) and ***Beaufort Sea Areawide Final Best Interest Finding 2009*** (Alaska Department of Natural Resources 2009) for summaries of governmental powers to regulate oil and gas by agency.

- Temporary Water Use Authorization
- Permit and Certificate to Appropriate Water
- Land Use Permits
- Material Sale Contract
- Alaska Office of History and Archeology approval

2.3.3.2 Other State Agencies

Alaska Department of Environmental Conservation (ADEC)

- Air Quality Permits
    - Title I (NSR) Construction Permits
    - Title V Operation Permits
- Solid Waste Disposal Permit
- Wastewater Permit
- APDES Discharge Permits and Certification
- Oil Discharge Prevention and Contingency Plans

Alaska Department of Fish and Game (ADF&G)

- Fish Habitat Permit

Alaska Oil and Gas Conservation Commission

- Permit to Drill
- Underground Injection Control Program
- Annual Disposal of Drilling Waste
- Disposal Injection Orders
- Area Injection Orders

2.3.4 North Slope Borough

As a home rule borough, the NSB retains all powers not specifically restricted by its charter or by state law. The Borough has a strong-mayor form of government and a seven-member

Assembly. The mayor appoints one person from each NSB community who are confirmed by the Borough Assembly to serve on the Borough Planning Commission (NSBMC § 2.12.010).

The Planning Commission is responsible for preparing the Borough's comprehensive plan and recommending its approval to the Assembly. Authorized by Title 29 of Alaska statutes, the NSB Comprehensive Plan guides physical, social and economic development. The plan provides the basis of the Title 19 zoning and land use ordinance. In addition, the Planning Commission hears and decides conditional use permits and appeals of decisions of the NSB Department of Planning and Community Services (Planning Department).

The Planning Department administers Title 19, including a permitting program that implements Borough zoning. Each area of the Borough, including offshore waters within its boundaries, is zoned into different types of districts. In addition to the four types of districts that apply only to Barrow, areas are divided into five other zoning districts: Village, conservation, scientific research, resource development, and transportation corridor districts (NSBMC § 19.40). Authorizations for development include administrator approvals under the authority of the Planning Director (NSBMC § 19.60) as well as conditional use permits approved by the Planning Commission (NSBMC § 19.60). Development must meet the standards in Borough policies which are divided into five categories: Village, economic development, offshore development, coastal management and area-wide, and transportation corridor policies (NSBMC § 19.70).

The Borough's planning and zoning powers apply to most lands within its boundaries. Title 19 applies to all private, state, borough and municipally owned lands unless prohibited by state law.[13] It also applies to federal lands, waters, tidelands, and submerged lands within the borough's boundaries, unless preempted by federal law.[14] It does not apply, however, to federally restricted townsite lots or allotments, except as may be allowed by federal law.

The BLM acknowledges the Borough's planning powers and has a policy to consider the NSB land management regulations, but it believes the Borough cannot prohibit activities on federal lands (BLM 2012a, p. 12).

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13: State statutes require state agencies to comply with local planning and zoning requirements unless specifically exempted by the governor. AS 35.30.020 states that a "department shall comply with local planning and zoning ordinances and other regulations in the same manner and to the same extent as other landowners." AS 35.30.030 allows to the governor to grant a specific exemption to AS 35.30.020 if "a department clearly demonstrates an overriding state interest, waiver of local planning authority approval . . ."

14: One of the findings by the Superior Court of Alaska in response to a lawsuit opposing formation of the North Slope Borough supported land use planning in Pet 4 (NPR-A). The record demonstrated that the Borough would implement comprehensive land use planning in Pet 4 and other areas that would be beneficial to the subsistence way of life as well as oil and gas developers (Getches 1973).