

ALASKA'S WESTERN ARCTIC: A RESOURCE SYNTHESIS AND CONSERVATION STRATEGY

INTRODUCTION

From the Colville River west to the Chukchi Sea, western Arctic Alaska represents an immense landscape, largely unchanged in character over the last millennium (Fig. 1). About two-thirds of the western Arctic lies within the National Petroleum Reserve-Alaska (NPR-A), the largest single unit of public land in the nation. Several Native communities occur within the NPR-A, while a combination of state, federal, and Native lands occurs outside its borders (Fig. 2). Much of this region has high values for many species of fish and wildlife, including Alaska's largest caribou (*Rangifer tarandus*) herd, large carnivores, marine mammals, millions of migratory waterbirds, and one of the densest populations of nesting birds of prey in the world. These resources are the foundation for the subsistence culture of the Inupiat Natives who have lived in this region for thousands of years. The wilderness values of the western Arctic rank among the highest on the continent.

A major oil and gas leasing and exploration effort is currently under way in the NPR-A. This new leasing program, in addition to other resource-development activities in the western Arctic, is likely to change this region substantially in the coming decades. The goal of this report is to outline a conservation strategy for the western Arctic emphasizing the protection of priority areas needed to sustain ecological integrity and subsistence and wilderness values.

A SUMMARY OF KNOWN AREAS OF BIOLOGICAL IMPORTANCE

Audubon recently completed a summary and synthesis of selected resources within the western Arctic (Audubon Alaska 2002). Overall, the coastal plain of the western Arctic, including the northeast and northwest planning areas of NPR-A, provides valuable nesting habitat for many species of waterbirds, including the threatened Steller's (*Polysticta stelleri*) and spectacled eiders (*Somateria fischeri*) and the rare yellow-billed loon (*Gavia adamsii*) (Fig. 3). The Teshekpuk Lake region provides important nesting habitat for loons, waterfowl, and shorebirds. It is also a critical goose molting and staging area; among geese using the region is more than 20% of the world's Pacific black brant (*Branta bernicla*). The area south and east of Teshekpuk Lake is the primary calving ground for the Teshekpuk Caribou Herd (TCH) (Fig. 3).

West of Teshekpuk Lake, between Dease Inlet and Smith Bay, lies a high-density waterbird nesting area that includes high-density nesting sites for threatened spectacled eiders and yellow-billed loons (Fig. 3). A high-density waterbird nesting area that is used by both threatened

Steller's and spectacled eiders lies south of Barrow. Another important waterbird nesting area, with high densities of spectacled eider, lies south of Peard Bay, between Barrow and Wainwright. Polar bears (*Ursus maritimus*) are known to den onshore near Peard Bay and Dease Inlet. East and southeast of Atkasuk are a high-density spectacled eider nesting area and two high-density yellow-billed loon nesting areas (Fig. 3). A significant area of peregrine falcon nesting (*Falco peregrinus*) occurs farther southeast, in the vicinity of the southern Ikpikpuk River.

Kasegaluk Lagoon lies southeast of the village of Wainwright along the Chukchi Sea and is an important resource for subsistence users from adjacent villages. This coastal lagoon system, the largest in Arctic Alaska, supports the greatest aggregations of beluga whales (*Delphinapterus leucas*), spotted seals (*Phoca largha*), and black brant along Alaska's Chukchi Sea Coast (Fig. 3). Kasegaluk Lagoon attracts a greater richness and diversity of avian species than any other Arctic Alaska lagoon system (Johnson et al. 1992). The lagoon includes several important seabird colonies, and is an important nesting area for common eider (*Somateria mollissima*), which is an important resource for subsistence hunters. Polar bears are known to den near the lagoon, and grizzly bears (*Ursus arctos*) often concentrate there to feed on marine mammal carcasses. Just east of the lagoon, in the vicinity of Point Lay, lies a high-density waterbird nesting site.

Much of the coastline of the western Arctic, from the Colville River Delta to Point Hope, provides important habitat for fish, seabirds, sea ducks, waterfowl, shorebirds, and marine mammals, including polar bears, beluga whales, and spotted seals (Fig. 3). The offshore marine waters of this region are used extensively by marine mammals, including beluga whales, bowhead whales (*Balaena mysticetus*), spotted seals, and polar bears, as well as by numerous species of seabirds and sea ducks. The marine waters between Cape Lisburne and Icy Cape have been designated by the U.S. Fish and Wildlife Service as Critical Habitat for the threatened spectacled eider (Federal Register 2001).

In contrast to the coastal plain, the upland foothills and Brooks Range have few waterbirds, but provide important habitat for several species of large mammals, including caribou, grizzly bears, wolverines (*Gulo gulo*), and wolves (*Canis lupus*) (Fig. 3). These areas also provide important habitat for several species of raptors. The Utukok River Uplands is the primary calving ground for the Western Arctic Caribou Herd (WACH), Alaska's largest caribou herd at more than 430,000 animals. This herd may be considered a "keystone" population, because it provides critical resources for many other species sharing the ecosystem and is an important subsistence resource for as many as 40 Native villages within the herd's annual range.

The Colville River, Alaska's largest river north of the Brooks Range, provides important habitat for moose (*Alces alces*), grizzly bears, wolves, passerines, and raptors. The Colville River and its tributaries, particularly the Kogosukruk River, are renowned for high-density

nesting of raptors, including Arctic peregrine falcons, rough-legged hawks (*Buteo lagopus*), gyrfalcons (*Falco rusticolus*), and golden eagles (*Aquila chrysaetos*) (Fig. 3).

Between the Colville River Delta and Barrow, anadromous fish streams include the Colville and its tributaries: Fish Creek, Ikpikpuk, Topagoruk, Oumalik, Meade, and Tuvak rivers. From Point Hope to Barrow, anadromous fish streams include the Kukpuk, Pitmegea, Kupowruk, Kokolik, and Utukok rivers (Fig. 3). Numerous deep-water lakes are found on the coastal plain, especially from Peard Bay to the Colville River Delta.

SUBSISTENCE RESOURCES

Rural living and the subsistence way of life have occupied important niches in the western Arctic for thousands of years and remain fundamental to the people of the western Arctic today. Maintaining the integrity of the western Arctic ecosystem is necessary to the people who depend on this region to meet their subsistence and cultural needs. General subsistence-use areas of the seven villages of the western Arctic cover a large area and overlap in some places (Fig.4). The BLM states, "Most of the NPR-A is used to some extent by one or more villages," and some subsistence users travel from villages in other parts of the North Slope to use the NPR-A (BLM 1996).

Although subsistence harvests differ among communities, caribou, bowhead whales, and fish are the primary resources harvested (BLM 1998). The subsistence users in coastal areas primarily depend on whales, seals, walruses (*Odobenus rosmarus*), waterfowl, and fish. Subsistence users adapted to the terrestrial and inland aquatic region primarily depend on caribou, freshwater fish, moose, Dall sheep (*Ovis dalli*), grizzly bears, furbearers, and edible roots and berries (BLM 1978). The large Western Arctic Caribou Herd is a cornerstone for subsistence use in many villages throughout northwest Alaska. Subsistence use areas are generally concentrated near communities and rivers and on the coastline. Rivers and lakes have traditionally been and currently are important for fishing and as all-season transportation corridors. The coastal plain is dense with lakes and wetlands that host extraordinary wildlife populations and critical breeding and nesting grounds for a wide array of migratory waterfowl. Teshekpuk Lake is particularly valuable to subsistence users because of the TCH, which calves there, and congregations of eiders and molting geese. Subsistence users in western Alaska and on the Alaska Peninsula may harvest waterfowl that nested in or otherwise used habitats in Arctic Alaska.

Barrow subsistence harvest sites include the coastal plain south of Barrow, the area west and south of Teshekpuk Lake, Atqasuk wetlands, Dease Inlet area, Peard Bay, and offshore waters. Kasegaluk Lagoon is a valuable subsistence area for the communities of Wainwright and Point Lay. Atqasuk relies heavily on the coastal plain around the Atqasuk wetlands. Nuiqsut relies on the coastal plain around the Colville River Delta and river corridor. People of

Anaktuvuk Pass largely use the foothills and mountain region of the central Brooks Range outside of NPR-A for subsistence harvesting. The community of Point Hope relies on adjacent coastal areas and offshore waters for subsistence harvesting of marine mammals, fish, and birds, and the uplands for caribou.

WILDERNESS RESOURCES

A variety of distinctive habitats, such as marine coastline, coastal plain, wetlands, rolling foothills, and mountains, exist within the larger boundary of NPR-A (Fig. 1). By definition, there is enough land area within NPR-A for numerous tracts of designated wilderness based on scenic, ecosystem and other values. The 105(c) study (BLM 1978) identified several areas of "high wilderness value"—including 63% of NPR-A—on the basis of aesthetics, wildlife presence, and ecological function (Fig 5). Areas included in this analysis were the DeLong Mountains/Arctic Foothills (for recreation, scenery, wildlife), Utukok River Uplands (caribou calving ground, scenic, archeological and cultural resources), Teshekpuk Lake area (waterbird nesting, molting, research), Colville River Valley (recreation, raptor nesting, moose), Kasegaluk Lagoon (research, marine mammal viewing, recreation, waterfowl habitat), and Ikpikuk River corridor (rare aquatic and terrestrial ecosystems).

The potential for research opportunities within NPR-A are plentiful (Norton 2001). During the 105(c) study, BLM identified 8 archeological sites with interpretation potential, 9 sites recommended for potential natural landmarks, 10 sites nominated for proposed ecological reserve, and 26 sites recommended as potential landform and lifeform natural landmarks (Fig. 6). Koranda and Evans (1975) also identified numerous potential natural landmarks within the NPR-A, and Veireck and Zasada (1972) proposed an ecological reserve system within the western Arctic (Fig. 6). In addition, the western Arctic is a key "indicator region" for global climate change. Manifestations of global warming, for example, are more pronounced in the Arctic than in other parts of the world. For scientists to accurately separate the effects of climate change from other anthropogenic factors, such as industrial development, it is essential to establish some long-term "control" areas as scientific benchmarks.

KNOWN AREAS OF INDUSTRIAL POTENTIAL

Oil: The U.S. Geological Survey (USGS) recently completed a resource assessment of NPR-A (USGS 2002). The USGS study area does not encompass all of Audubon's western Arctic study area (as defined in this report); therefore, the USGS study area is not entirely representative of all petroleum resource potential in the region. Nonetheless, the study is the most recent comprehensive assessment of petroleum reserves in the NPR-A to date, and it serves as the primary data source for the summary of oil potential. The USGS assessment documented likely oil and gas accumulations, or "plays," by using archival data, coupled with advanced technology.

Encompassing both federal and nonfederal (state and Native) lands, the assessment area included 22.5 million and 1.7 million acres (9.1 million and 0.68 million ha), respectively, totaling 24.2 million acres (9.8 million ha). The report identified potential reserves based on size, location, distribution, and a technical recovery factor. The volumes of potentially recoverable oil and gas, including a probabilistic range of uncertainty, were reported as 95%, 5%, and mean values. The volume of technically recoverable oil within the total study area is between 5.9 and 13.2 billion barrels (95% and 5% probability), with a mean value of 9.3 billion barrels. The majority of the oil resources are expected to be located in northern NPR-A, although they are not expected to be uniformly distributed (Fig. 7). The highest potential oil resources of the Northwest Planning Area are in the northeast corner of the Northwest Planning Area along the Barrow Arch between Smith Bay and Dease Inlet (BLM 2003).

Gas: The natural gas potential for the NPR-A is substantial. According to the USGS (2002), the estimated volume of "nonassociated" gas is between 40.4 and 85.3 trillion cubic feet (tcf) (1.1 and 2.4 trillion cubic meters [tcm]) (95% and 5% probability), with a mean value of 61.4 tcf (1.73 tcm). With the use of mean estimates, the USGS 2002 report identified 4 specific plays containing approximately 60% of the technically recoverable nonassociated natural gas resources. The largest gas accumulations are expected to be distributed in the central and southern portions of the NPR-A study area (Fig. 8).

Coal: The northern Alaska coal province contains the largest coal resource in the entire United States and ranks among the top coal-bearing formations occurring in the world (BLM 1998). An estimated 400 billion to 4 trillion tons (360 billion-3.6 trillion metric tons) of high-quality coal underlie 30,000 mi² (77,700 km²) of northern Alaska (Dworsky and Ducker 1991). These reserves are thought to represent 40% of total bituminous coal reserves remaining in the United States and about one-ninth of the world's reserves (Arctic Slope Regional Corporation 2001).

Most of the known coal deposits in the western Arctic underlie the NPR-A. High-quality bituminous coal is distributed from the Chukchi Sea coast east 300 mi (483 km) through NPR-A and terminates in the Arctic foothills of the Brooks Range just south of Umiat (Fig. 9). Less valuable subbituminous coal runs parallel to the north of the bituminous belt, along the northern foothills and under the coastal plain. Coal is located at various depths throughout the region and is visible from the surface in many places. The quantity, quality, and exact location of all the coal deposits are not fully known, and estimates are broad. Although realistic assessments of coal resources contained within the western Arctic are probably not possible, studies estimate between 2 trillion and 4 trillion tons of coal underlie the region (Plafker and Berg 1994).

Minerals: The western Arctic contains a "world-class mineral belt" (Mowatt 1991). The world's largest known zinc resources are located in the western Brooks Range. As much as 25

million tons (22.67 metric tons) of high-grade zinc are estimated to reside in 4 deposits near the Red Dog Mine, just 40 mi (64 km) from the southwest corner of NPR-A. The hard-rock mineral potential of NPR-A resides south of the Colville River and stretches into the northern flank of the Brooks Range. Mineral surveys in the mountains of the NPR-A have revealed rich deposits of high-grade metallic and associated nonmetallic minerals such as zinc, lead, silver, chromium, barite, fluorine, phosphate, nickel, copper, and the platinum group (Dworsky and Ducker 1991). The NPR-A and much of the surrounding federal land currently remains withdrawn from mineral exploration.

The description of the distribution of hard-rock mineral resources is generalized because the western Arctic has not been thoroughly studied or explored (Fig. 9). No mineral occurrences have been identified in much of the coastal plain and in the northeast NPR-A. Mineral deposits of potential significance are located within the Brooks Range, particularly in the DeLong Mountains. The southern region of the Arctic Foothills is thought to contain phosphate rock, oil shale, and zinc, lead, silver, barite, chromite, platinum group elements, copper, and fluorite (Dworsky and Ducker 1991).

CUMULATIVE EFFECTS OF OIL AND GAS ACTIVITIES

In March 2003, the National Research Council (NRC) (2003) released a study on the cumulative environmental effects of oil and gas activities on Alaska's North Slope. The NRC concluded there are important cumulative effects from past and present operations on the North Slope. Wildlife have been affected by oil and gas activities in different ways, including direct mortality and displacement, enhanced predator populations, reduced reproductive rates of birds due to predation, and altered distribution of caribou. Oil development has displaced and reduced reproductive output of the caribou in the Central Arctic Herd west of the Sagavanirktok River. Impacts of the current extent of industrial activity have eroded wildland values over an area far exceeding the area of direct effects. An area of 1,000 mi² (2,590 km²) has been affected by one of the world's largest industrial complexes. Industrial activities on the North Slope have compromised wildland and scenic values over broad areas. In general, management decisions on the North Slope have been made in the absence of a comprehensive plan. Additional highlights from the NRC report follow.

- Physical effects on the environment have been reduced by use of new technologies, but valid concerns about future impacts still exist. Future development in areas where surface water is limited may result in cumulative effects different from those observed at Prudhoe Bay. Ice roads may not be a viable alternative to gravel in areas with few lakes. Climate change means a shorter period in which there is an active frozen layer, decreasing the time for winter operations and increasing environmental impacts.
- Removal of oilfield structures and restoration of affected habitats are significant

concerns. Although industry has reduced the area of gravel pads (size of footprint), little progress has been made on restoring sites affected by gravel fill. No comprehensive estimates exist for the cost of dismantling and removing the estimated \$50 billion of infrastructure developed over the last 30 years. Only 1% of the habitat on the North Slope affected by gravel has been restored and the NRC finds it unlikely that most of the disturbed habitat will ever be restored.

- The observed and additional impacts of industrial development are expected to grow in the future. Although future development likely includes more satellite fields on small gravel pads, the road network will grow, as will the gravel-covered footprint. No major oil spills have occurred on the North Slope or in the ocean, but the threat of a large marine spill is real. A major oil spill in marine habitats would significantly impact seals, polar bears, and molting waterfowl. More human activity along the coast and near shore may influence the suitability of some areas for use by denning polar bears. If development moves into the Teshekpuk Lake area of NPR-A, it may influence molting waterfowl. Oilfield development exacerbates adverse effects of insect harassment on caribou.
- Information gaps make it hard to assess the full extent of cumulative effects. No large-scale, long-term monitoring system has been established on the North Slope. There is need for study of the “zone of influence” of industrial activities and facilities beyond the immediate footprint of development. If resources in addition to oil and gas are developed (e.g., coal), future development scenarios could change dramatically.
- Comprehensive planning, long-term ecosystem-level research, and a protected-areas strategy are important needs on the North Slope. If cumulative effects are to be more completely assessed and tracked, there is need for protected areas as benchmarks for science. There is a need to establish some sites on the North Slope like those in the National Science Foundation's Long-Term Ecological Research Program.

CONSERVATION STRATEGIES

A major concern regarding land management in the western Arctic is that the same pattern of incremental, piecemeal development that has occurred in the central Arctic could be repeated as industry moves westward. In the absence of a comprehensive conservation strategy, expanding industrial development over the next 25-50 years may have significant impacts on individual fish and wildlife populations, subsistence use opportunities, wilderness values, and the integrity of the greater ecosystem. Resource managers have an extraordinary opportunity to develop a proactive conservation strategy for the western Arctic before conservation options are foreclosed by unplanned development. Major industrial development of this region has already

begun in the northeast and southwest portions of the western Arctic. The focus of this synthesis is on identifying areas of known biological importance to help resource managers minimize environmental impacts associated with future industrial development in the western Arctic.

The Ecological Society of America (2000) has developed a set of ecological principles for managing land uses. Several ecological guidelines particularly relevant to the western Arctic include:

- Examine the impacts of local decisions in a regional context;
- Plan for long-term change and unexpected events;
- Preserve rare landscape elements, critical habitats, and associated species; and
- Retain large contiguous or connected areas that contain critical habitats.

The ecological integrity of the western Arctic will depend, in large part, on balancing industrial development with conservation measures, including a protected-areas strategy for this region. A protected-areas strategy would minimize risks from unplanned industrial development to sensitive populations of fish and wildlife. Creation of key protected areas also would provide a scientific benchmark for measuring future habitat and population changes and determining the cause of such change. Audubon Alaska's (2002) synthesis of western Arctic resources identified known areas of biological importance. To conserve these areas, we recommend applying the following conservation measures, with increasing protection applied to the most valuable and sensitive resources.

1. Apply best management practices to all development projects throughout the planning area for all phases of operation from exploration through development and restoration;
2. Apply special management stipulations, both spatially and temporally, to protect specific resource values (e.g., spectacled eider nesting areas, caribou insect relief habitat); stipulations should be developed in consultation with species experts from state and federal resource agencies and universities;
3. Expand existing designated special areas to include additional geographic areas of biological importance not previously recognized;
4. Designate additional special areas where necessary to highlight specific areas of biological importance;
5. Establish no-surface activity zones within some special areas, where necessary to protect particularly sensitive biological resources;
6. Establish no-lease areas within some special areas to further protect specific biological "hot spots" and sensitive biological resources;
7. Create a regional network of permanent protected areas to conserve rare and sensitive habitats and populations and establish scientific benchmarks for long-term ecological research and monitoring;
8. With respect to state lands, establish state critical habitat areas surrounding state lands

- and waters that include high-value and/or sensitive fish and wildlife habitats; and
9. Where multiple land or water jurisdictions overlap, develop co-management agreements to safeguard fish and wildlife habitat values.

CONSERVATION STRATEGY FOR THE WESTERN ARCTIC

The western Arctic is a vast region with abundant fish, wildlife, ecosystem, subsistence, and wilderness values. Known areas of biological importance within the western Arctic have been identified and mapped (Fig. 3). Specific recommendations for a conservation strategy to protect key biological hot spots within 4 major regions of the western Arctic are summarized below. A general overview map of this strategy is depicted in Figure 10.

Northeast Planning Area

Two administratively designated special areas occur within the Northeast Planning Area of NPR-A, the Teshekpuk Lake Special Area (TLSA) and the northeastern portion of the Colville River Special Area (CRSA). Both of these special areas require special management considerations to conserve their high biological values.

Teshekpuk Lake Special Area: The TLSA, approximately 1.75 million acres (708,000 ha), encompasses highly vulnerable and important habitats, including a high percentage of wetland and riparian communities and significant wildlife populations, including black brant and other waterfowl nesting, molting, and staging areas, as well as the calving grounds for the Teshekpuk Caribou Herd (TCH) (Fig. 3). The TLSA is also a particularly important nesting area for threatened spectacled eiders and rare yellow-billed loons (Fig. 3).

The TLSA has significant wilderness and subsistence values and represents an important ecological benchmark for future research and monitoring activities of Arctic wetlands. The border of Teshekpuk Lake was identified by the U.S. Bureau of Land Management (BLM) (1978) as an area of concentrated archeological sites. The area around the lake was identified by the U.S. Geological Survey (USGS) as a potential landform and lifeform natural landmark (BLM 1978), proposed by Veireck and Zasada (1972) as an ecological reserve, and proposed by Koranda and Evans (1975) as a potential natural landmark (Fig. 6).

The final environmental impact statement and record of decision for oil and gas leasing in the Northeast Planning Area further recognized the unique values of the TLSA by prohibiting leasing in and around Teshekpuk Lake and restricting surface activity in a band around the western and southern portion of the lake (BLM 1998) (Fig. 10). This action was taken to protect the unique and sensitive habitat values of that region. The findings of Audubon Alaska's (2002) western Arctic synthesis suggest that the conservation measures applied to the TLSA, including the no-lease and no-surface activity zones, were justified on biological grounds and should

remain in place. However, the existing TLSA does not protect all the important caribou and waterbird values that occur just outside the special area boundary to the southeast. An additional area of about 93,000 acres (37,600 ha) should be considered for inclusion in the TLSA, slightly expanding it to the southeast (Fig. 10). A portion of this expanded special area should also be given consideration as a no-surface activity zone to protect waterbird nesting and caribou calving areas. The Ikpikpuk River should be protected with a 2 mi (3.2 km) no-surface activity zone on each side of the riverbank, except where strategic crossing areas may be necessary.

Colville River Special Area: About 27% of the 2.4-million-acre (970,000 ha) CRSA occurs within NPR-A's Northeast Planning Area. The Colville River is one of the most important raptor nesting areas in Alaska and in the world, accounting for approximately 100 pairs of peregrine falcons, as well as numerous pairs of gyrfalcons, rough-legged hawks, and golden eagles. These raptors use river- and stream-side bluffs, cliffs, banks, and escarpments along the Colville River for nesting (Fig. 3). The Colville and its tributaries provide one of the most diverse and abundant habitats for songbirds on the North Slope. The Colville River corridor also has high habitat values for moose and large carnivores, including wolves and grizzly bears.

Nominated for National Wild and Scenic River status in 1980, the Colville River was determined to be eligible for inclusion in this system (BLM 1998). In addition to possessing wildlife and subsistence values, the Colville River watershed includes several proposed national natural landmarks and important archeological sites. Portions of the river corridor (including the lower portion within the Northeast Plan Area) were proposed by Veireck and Zasada (1972) as an ecological reserve and Koranda and Evans as a potential natural landmark (Fig. 6). There are very few places in the United States where such a large and intact river system remains in a wilderness setting, largely untouched by development or heavy recreational use. Strong conservation measures should be applied to the CRSA. The whole special area should have rigorous conservation protections and the entire west bank of the river should be included in a 1 mi (1.6 km) no-surface activity zone. From Ocean Point to within 1 mi (1.6 km) east of Umiat, an additional 1 mi (1.6 km) buffer should be applied resulting in a 2 mi (3.2 km) no-surface activity zone along the west bank of the Colville River to protect high-density raptor nesting habitat. The no surface activity zone could be modified where a few designated crossing sites may be necessary.

BLM recently included the Kogosukruk and Kikiakrorak rivers within the CRSA. Audubon recommends that the small area of habitat (approximately 155,000 acres [62,000 ha]) located between these river systems be added to the CRSA (Fig. 10). The addition of this important riverine habitat would minimize habitat fragmentation, simplify management, and further protect an area that includes high-density raptor nesting. Audubon recommends a 2 mi (3.2 km) no-surface activity zone around each side of the Kogosukruk River and a 1 mi (1.6 km) no-surface activity zone around each side of the Kikiakrorak River, except where essential transportation

crossings may be allowed.

Southern Ikpikpuk River: The southern Ikpikpuk River and adjacent wetlands, encompassing about 100,000 acres (40,000 ha), has high values for fish and wildlife (Fig. 3). The area south of the river is a relatively high-density nesting area for peregrine falcons. This interior coastal plain, which borders the Northwest Planning Area, should be designated as a new special area to protect nesting peregrine falcons and aquatic resources (Fig. 10). This new special area would overlap both the Northeast and Northwest planning areas. In fact, the entire Ikpikpuk River system should be combined into this special area. Audubon recommends a no-lease core zone for the southern lobe and a 2-mi (3.2 km) no-surface activity zone along both sides of the river running north to the TLSA. A designated crossing area could be identified along the river corridor where necessary.

Fish and Judy Creeks: No-surface activity zones should be established within 2 mi (3.2 km) on either side of Fish and Judy creeks, except for strategic crossing areas, to protect fish and aquatic habitats and subsistence values.

Pik Dunes: No surface activity or crossing should be allowed in the Pik Dunes area.

Northwest Planning Area

Audubon Alaska's (2002) western Arctic synthesis suggests that 4 additional sites within the Northwest Planning Area merit special management considerations.

Dease Inlet-Meade River: Adjacent to and west of the TLSA, the Dease Inlet-Meade River area encompasses about 1.8 million acres (728,450 ha). This area provides important wetland habitat for waterfowl, loons, and shorebirds (Fig. 3). Species nesting here in high densities include yellow-billed and red-throated loons (*Gavia stellata*), black brant, greater white-fronted geese (*Anser albifrons*), king eider (*Somateria spectabilis*), and the threatened spectacled eider. Dease Inlet includes an important haul out for spotted seals and both sides of the outer inlet are used by polar bears for denning. The outer coast, including Elson Lagoon, includes a seabird colony and is identified as an Important Bird Area. Caribou use the area east of Dease Inlet for insect relief habitat. The area also includes a high density of deep-water lakes. The very productive wetlands complex of Dease Inlet-Meade River should be designated as a new special area (Fig. 10).

The northeastern portion of the proposed special area, that adjoins the TLSA and lies east of Dease Inlet, should be protected as a no-lease area to conserve its high-density waterbird nesting habitat, TCH insect relief habitat, and polar bear denning habitat (Fig. 10). Both the inlet and Elson Lagoon should be designated a no-surface activity zone within the special area. On the northwest side of Dease Inlet, we recommend stipulations to protect spectacled eider nesting

habitat and polar bear denning habitat. South of Dease Inlet, within the proposed special area, we recommend applying conservation stipulations to protect high-density nesting sites for threatened spectacled eiders and for yellow-billed loons. Waterbird and mammal stipulations should be developed in consultation with species experts from FWS, USGS, and ADF&G.

Peard Bay: Located east of Wainwright and west of Atkasuk, Peard Bay and adjacent wetlands to the south encompass 950,549 acres (384,682 ha). The area is characterized by lowland wet and moist tundra vegetation. Peard Bay provides high-density shorebird and waterfowl habitat, and includes abundant high-density nesting areas for the threatened spectacled eider (Fig. 10). Peard Bay also encompasses a known denning area for polar bears and has been identified by Audubon as an Important Bird Area. This area's high wildlife values justify its designation as an additional special area within NPR-A. Audubon recommends designating Peard Bay as a no-lease area. This area would also serve as an important scientific control area for future research addressing the effects of industrial development and global climate change on wildlife and habitat.

Kasegaluk Lagoon: The northern portion of Kasegaluk Lagoon just east of the NPR-A western boundary encompasses an area of about 266,700 acres (107,900 ha). This area provides important marine mammal habitat, particularly for beluga whale summer concentrations and spotted seal haul outs (Fig. 3). The area is also used by grizzly and polar bears that seasonally feed on marine mammals. Kasegaluk Lagoon has the richest avian diversity of any coastal lagoon system in Arctic Alaska, providing important habitat for waterfowl and shorebirds. The lagoon is particularly important to Pacific black brant for molting and fall staging. Kasegaluk Lagoon is also an important subsistence area for the communities of Point Lay and Wainwright. This area has been recommended by USGS as a potential landform and lifeform natural landmark (BLM 1978) and as a potential natural landmark by Koranda and Evans (1975). Audubon recommends special area designation for the northern portion of Kasegaluk Lagoon. Because of the lagoon's unique habitat values for birds and marine mammals, the entire special area should be zoned as a no-lease area within the Northwest Planning Area. Kasegaluk Lagoon should be given strong consideration for permanent protection because of its subsistence and scientific values.

South Ikpikpuk River: The southern Ikpikpuk River and adjacent wetlands, encompassing about 100,000 acres (40,000 ha), have high values for fish and wildlife (Fig. 3). The area southeast of the headwaters of Ikpikpuk River is a relatively high-density nesting area for peregrine falcons. This interior coastal plain, which borders the Northeast Planning Area, should be designated as a special area to protect anadromous fish habitat and nesting peregrine falcons. In fact, the entire Ikpikpuk River system should be combined into this special area. Audubon recommends a no-lease core zone for the southern lobe and a 2-mi (3.2 km) no-surface activity zone along both sides of the river running north to the TLSA. A designated crossing area could be identified along the river corridor where necessary.

There are also small portions of 2 designated special areas within the Northwest Planning Area of the NPR-A. The small western portions of the TLSA occur along the northeastern boundary of the planning area and the central portion of the CRSA occurs along the very southeastern extent of the planning area.

Teshkepuk Lake Special Area: Two small portions of the TLSA (116,359 acres [46,540 ha]) extend across Ikpikpuk River into the Northwest Planning Area. Both portions have high fish and wildlife habitat values, particularly for high-density waterbird nesting, including yellow-billed loons. The area also has value as insect relief habitat for the TCH. Special conservation stipulations should be developed and applied in this portion of the TLSA to protect waterbird and caribou populations. Audubon recommends a 2-mi (3.2 km) no-surface activity zone along each side of the Ikpikpuk River, except where strategic crossings may be necessary. This region west of Teshkepuk Lake was also identified by Koranda and Evans (1975) as a potential natural landmark (Fig. 6).

Colville River Special Area: The central portion (approximately 20%) of the 2.4-million-acre (970,000 ha) CRSA occurs within NPR-A's Northwest Planning Area. The Colville River is one of the most important raptor nesting areas in the world. The Colville and its tributaries also provide diverse and abundant habitats for songbirds, ungulates, and large carnivores, including wolves and grizzly bears. In addition to possessing outstanding wildlife, subsistence, and recreational values, significant portions of the river corridor (including the portion within the Northwest Plan Area) were proposed by Veireck and Zasada (1972) as an ecological reserve and Koranda and Evans (1975) as a potential natural landmark (Fig. 6). There are very few places in the United States where such a large and intact river system remains in a wilderness setting, largely untouched by development or heavy recreational use. Strong conservation measures should be applied to the CRSA. Audubon recommends that the entire special area within the Northwest Plan Area should be protected as a no-lease zone (Fig. 10). At the very minimum, a 2 mi (3.2 km) no surface activity zone should be applied to the north bank of the Colville. This portion of the Colville River along with the upper drainage to the west should be considered for permanent protection as well as National Wild and Scenic River designation. Audubon recommends considering a future land exchange along the southern bank of the Colville River south of the Northwest Plan Area. Permanent protection of both sides of this river would safeguard its wildlife, subsistence, and recreational values.

Southern Area of NPR-A

Two designated special areas are encompassed within the southern portion of the NPR-A, the Utukok River Uplands Special Area (URSA) and the southeastern portion of the CRSA. Both of these special areas merit rigorous management consideration for their extraordinary biological values, and several adjacent areas also have high wildlife and wilderness values.

Utukok River Uplands Special Area (URSA): The URSA is the largest of the existing designated special areas in the NPR-A at 3.86 million acres (1,544,000 ha), and it occurs entirely within the southern area of NPR-A. This area was designated because it encompasses much of the primary calving area for Alaska's largest caribou herd, the WACH, which is considered a keystone population for the western Arctic (Fig. 3). The Utukok River Uplands also provide important habitat for wolves, wolverines, and grizzly bears. Cliff-nesting raptors, including Arctic peregrine falcons, gyrfalcons, golden eagles, and rough-legged hawks, nest along riparian drainages in the URSA (Fig. 3). The Utukok River Uplands offer seasonally abundant wildlife and little human disturbance and, therefore, prime wilderness value (BLM 1978). The URSA has many archeological sites (BLM 1978) and has been proposed for an ecological reserve system (Veireck and Zasada 1972) and a potential natural landmark (Koranda and Evans 1975) (Fig. 6). Because of these multiple and varied values, the URSA should be considered for a no-lease zone with permanent protection of its wildlife, subsistence, and wilderness values.

Several adjacent lands should be considered for additions to the URSA. Northwest of the existing special area, an ecological linkage could be made along the Utukok River drainage, achieving connectivity between the URSA and northern Kasegaluk Lagoon (Fig. 10). This connection would link together the entire ecosystem from the Brooks Range to the Chukchi Sea. This area was identified by BLM (1978) as having high wilderness values. Extending the URSA to the south would encompass additional portions of the primary calving area for the WACH as well as encompass high-density wolf, grizzly bear, and raptor nesting habitats (Fig. 3) and would abut the Noatak National Preserve. Total area for potential north and south additions to the URSA represent about 1.89 million acres (756,000 ha). The URSA, including these additions, should be considered for permanent protection to conserve its unique biological, subsistence, and wilderness values. Audubon also recommends that the Utukok River be considered for National Wild and Scenic River designation.

Colville River Special Area: Over half of the 2.4-million-acre (970,000 ha) CRSA, occurs within the southern area of NPR-A. This special area was designated because of the high wildlife values of the river corridor, particularly for nesting raptors and large mammals, including the primary calving area for the WACH (Fig. 3). Adjacent areas both north and south of the upper CRSA have high habitat values for raptors, caribou, and large carnivores. These lands were also identified as having high wilderness values and archeological sites (BLM 1978) (Figs. 5, 6). Lands north and south of the western portion of the CRSA should be designated as additions to the CRSA (Fig. 10). These additions would add approximately 2 million acres (800,000 ha) to the special area. Audubon recommends that the upper CRSA and southern addition be designated a no-lease zone and provided with permanent protection to conserve their unique wildlife, subsistence, and wilderness values. In addition, the Colville River should be considered for designation as a National Wild and Scenic River.

The URSA and western CRSA, with proposed southern additions about the Noatak National Preserve. This region serves as an important ecological linkage zone for north-south migratory movements of the WACH. Special management considerations should be made to ensure that this migratory corridor remains available for this large caribou herd to migrate unobstructed between summer and winter ranges. The WACH is a subsistence mainstay for about 40 Native villages in northwestern Alaska.

Region West of NPR-A

Several important habitat areas occur west of the NPR-A, including Kasegaluk Lagoon, DeLong Mountains, and coastal habitats.

Kasegaluk Lagoon: The southern portion of Kasegaluk Lagoon, south of Icy Cape, lies outside of the NRP-A. These lands represent a mix of state and Native ownership. The lagoon and adjacent lands and waters have very high values for marine mammals, waterbirds, shorebirds, and seabirds, and the offshore waters to the southwest have been designated as critical habitat for the threatened spectacled eider (Fig. 3). Kasegaluk Lagoon is an important subsistence use area for the villages of Wainright and Point Lay. State lands and waters should be given special management consideration to protect their high biological and subsistence values. Audubon recommends that state lands and waters within Kasegaluk Lagoon be designated as Critical Habitat Areas under state law (Fig. 10). We further suggest that the state and Native landowners consider a co-management agreement to protect the habitat values within the entire Kasegaluk Lagoon ecosystem.

Wetlands East of Point Lay: A high-density nesting area for waterbirds lies east of Point Lay just outside the western border of NPR-A (Fig. 3). State lands in this area should be considered for designation as a state critical habitat area to protect those important waterbird nesting habitats (Fig. 10).

De Long Mountains and Foothills: The region west of NPR-A, along the northern foothills of the De Long Mountains, is important habitat for the WACH (primary calving area, summer range, and insect relief habitat) and large carnivores (Fig. 3). Special management consideration should be provided to this important region, particularly because it affects the long-term conservation of the Western Arctic Caribou Herd. Audubon recommends that adjacent state and federal lands lying west of the NPR-A border within the primary calving area of this herd should be considered for designation as critical habitat (Fig. 10). In addition, we recommend that major landowners in this western portion of the WACH range consider developing a co-management agreement that addresses the habitat needs of the herd. During summer, there are substantial east-west movements of caribou along the De Long Mountains and foothills during insect season. Maintaining an unobstructed east-west movement corridor in this region will be an important management consideration for conservation of the herd, which is so

important to subsistence users in northwestern Alaska.

Cape Lisburne: The coastline from south of Point Hope to Cape Lisburne encompasses several Important Bird Areas for eiders and seabirds (Fig 3). This area includes the largest seabird colonies along Alaska's the western Arctic. Special management considerations should be provided to this biologically rich coastline. Several of these important sites are included within the existing Alaska Maritime Wildlife Refuge (Fig. 10).

Rivers, Streams, and Lakes

For major anadromous rivers on public lands within the western Arctic, Audubon recommends a minimum 1 mi (1.6 km) no-surface activity buffer on both banks of the river, except where strategic crossings may be necessary. For all other streams and fish-bearing, deep-water lakes, we recommend a minimum .5 mi (.8 km) no-surface activity buffer on each bank of the stream or around the lake. Additional rivers within the western Arctic (such as the Utukok) should be reviewed and considered for their potential designation as National Wild and Scenic Rivers.

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