Chapter Three: Habitat, Fish, and Wildlife

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A. Habitats

Habitats that support natural resources of the sale area include the coastal zone, Arctic plain, and northern foothills of the Brooks Range. Freshwater streams and lakes, aquatic plants, wetlands, tussock meadows, and riverine corridors provide species higher up in the food chain with essential nutrition and shelter. Important fish and wildlife species that depend on habitats of the North Slope Areawide sale area are described in Section B of this chapter.

1. Coastal Habitats

Much of the sale area falls within the coastal zone of the Alaska Coastal Management Program, where activities are subject to the North Slope Borough Coastal Management Program once a new plan is in effect. The boundary of the coastal zone extends inland approximately 25 miles. To protect fish spawning and overwintering habitats, the coastal zone also includes certain river corridors, including the Colville, Miluveach, Itkillik, Anaktuvuk, Chandler, Sagavanirktok, Shaviovik, Kavik, and Canning (NSBCMP, 1984b).

Along the Beaufort Sea coast, adjacent to the sale area boundary, saltwater-dependent habitats merge into freshwater habitats. Salt water intrudes in soils and groundwater flows. Coastal vegetation is influenced by sea spray as far as two to three miles inland. Stream slope and freezing action in winter generally determine the distance at which salt water reaches upstream (ADGC, 1985).

The coastal zone supports optimum waterfowl and shorebird nesting habitat, caribou calving and feeding grounds, and polar bear denning sites. The coastal zone is indirectly influenced by activities outside of the sale area. For example, caribou wintering in the Brooks Range are influenced by the availability of food in their preferred summer habitat on the Arctic coastal plain (DGC, 1985). The coastal zone provides important spawning habitat for marine fish and invertebrates. These creatures in turn provide waterfowl and marine birds with plentiful sources of food (DGC, 1985). Rivers flowing into the Beaufort Sea host species that are indirectly influenced by the coastal zone. At a minimum, the coastal zone includes the extent of coastal wet tundra habitat, a range roughly corresponding to the 200-foot contour (DGC, 1985).

The tundra surface is marked by lakes, thaw ponds, frost cracks, and polygonal ground formations. Successive freezing and thawing of moisture-laden soils causes frequent draining and reforming of lakes and surface peat. The soil beneath the tundra freezes each winter, thaws in spring, and is saturated with salt water or fresh water throughout the summer. The freeze-thaw process causes these lakes to reform each year. Tundra and grasses of the barrier islands are also exposed to freeze-thaw processes (AEIDC, 1975).

The vegetation habitats of the sale area can be roughly divided into two eco-regions: the Arctic plain and the northern foothills. Additionally, wetland habitats occur across the North Slope and throughout the sale area, and their characterization is of key interest to scientists, ecologists, government, and industry.

2. Arctic Plain

The distribution of vegetation types on the Arctic plain is strongly associated with microtopographic features which affect soil drainage. Wet soil conditions support wet graminoid herbaceous communities dominated by sedges or grasses. Dwarf scrub communities grow where soil conditions are drier, such as at thaw lake margins, along river bluffs, or other more elevated areas which provide a rooting zone above the standing water table (USGS, 1995).

Most sedge communities are dominated by *Carex aquatilis* and *Eriophorum angustifolium* (narrow-leaf cottongrass). Mosses (usually *Scorpidium spp*. or *Drepanocladus spp*.) may be common (USGS, 1995). Grass communities on the Arctic plain are dominated by *Dupontia fischeri* and *Alopecurus alpinus* (mountain foxtail); however, *Arctophila fulva* (pendent grass) dominates in surface waters of 15 centimeters to 200 centimeters in depth. Dwarf scrub communities include *Dryas integrifolia*, *Vaccinium vitis-idaea*, *Cassiope tetragona*, *Arctostaphylos alpina*, *Arctostaphylos rubra*, *Salix reticulata*, and *Salix phlebophylla* (USGS, 1995). Secondary species include common names of lousewort and buttercup in the wetter sites, and heather and purple mountain saxifrage in the raised, drier habitats (AEIDC, 1975).

3. Northern Foothills

The distribution of vegetation in the northern foothills region of the sale area is also affected by soil conditions, elevation, and drainage. Major streams flowing from the Brooks Range are controlled by bedrock. Plant communities in lakes form concentric bands that correspond with water depth. Lakes deeper than 1.5 meters do not usually support aquatic plant life (USGS, 1995).

Plant communities are commonly dominated by mesic graminoid herbs and dwarf scrub. Mesic graminoid herbaceous communities are commonly dominated by tussock-forming sedges, and include *Eriophorum vaginatum* and *Carex bigelowii*. Low shrubs, such as *Betula nana* (dwarf arctic birch), *Empetrum nigrum* (crowberry), *Ledum decumbens* (Labrador tea), and *Vaccinium vitis-idaea* (mountain cranberry) may also dominate plant communities along with sedges. Mosses and lichens are common between tussocks (USGS, 1995).

Dwarf scrub communities are dominated by *Dryas spp*., ericaceous species, and *Salix reticulata* and *Salix phlebophylla* (prostrate willows). Low scrub communities are dominated by *Alnus crispa* (alder), and *Salix lanata*, *Salix planifolia*, and *Salix glauca*. Mosses are commonly abundant (USGS, 1995). These plant communities provide an important source of nutrition for caribou as they forage on their summer range.

Waterbirds depend on or prefer certain habitat types, and attempts have been made to rank the value of these habitats, especially on the Colville River. Large ungulates (caribou, muskoxen) are equally dependent on vegetation habitats of the North Slope. Most of the oil field areas are considered wetlands.

4. Wetlands

Wetlands are lands where saturation with water is the dominant factor in determining the nature of soils and the types of plant and animal communities living in the soil and on the surface. Wetlands occur where the water table is at or near the surface, the land at least periodically supports plants that grow partly or entirely in water (hydrophytes) and the substrate or surface is saturated with water or covered by water at some time during the growing season each year (Cowardin, et al., 1979).

Concern over wetland loss from gravel infilling associated with oil and gas development and its effects on calving, migration, nesting, and brood rearing, drives classification studies. Bergman et al. (1977) identified eight wetland designations related to birds (see Table 3.1).

Table 3.1 Wetland Designations

Class Designation	Cover type
Class I. Wetland Tundra	Wet sedge meadow, sedge, willow
Class II. Shallow-Carex	Wet sedge meadow, sedge, willow
Class III. Shallow-Arctophila	Wet grass-sedge meadow
Class IV. Deep-Arctophila	Wet grass-sedge meadow, discrete lake
Class V. Deep-open	Discrete lake, tapped lake
Class VI. Basin-complex	Wet sedge meadow
Class VII. Beaded streams	Barren
Class VIII. Coastal wetlands	Midgrass-herb, halophytic sedge, halophytic grass-sedge, halophytic herb

From Meehan and Jennings, 1988.

Meehan and Jennings (1988) studied the distribution and behavior of birds on the Colville delta, and derived nine habitat classes for large waterbirds (tundra swan, greater white-fronted goose, Pacific loon, yellow-billed loon, and brant):

- **Discrete lake** habitat includes lakes and estuarine waterbodies, similar to Bergman's Class V.
- **Tapped lake** habitat includes lakes that are hydrologically connected to a river system. In spring, flooded channels breach these lakes, allowing sediments and salt water to infiltrate. This class is also similar to Bergman's Class V.
- **Wet-moist flooded tundra** habitat includes wet sedge polygonal ground (Bergman's Class I) and moist sedge willow (Bergman's Class II).
- **Wet graminoid** habitat is found along lakeshores and polygonal ponds. Similar to Bergman Classes III and IV, the largest stands on the Colville delta are located in its south-central portion (located within the sale area). This habitat includes dominant species, *Arctophila fulva* and *Carex aquatilis*.
- **Wet-moist polygon** habitat includes moist to wet low tundra meadows, near-lake ponds and margins, flooded basins, and polygonal ground. Similar to Bergman Classes I and II, this habitat is the most abundant vegetation cover on the Colville delta. This vegetation type was used by nesting Pacific and yellow-billed loons, tundra swans, and white-fronted geese.
- **Brackish flat** habitat, similar to Bergman's Class VIII, is found along the fringe of the delta, river channels, and tapped lakes. This habitat type has been associated with high brant use.
- **Shrub dominant** habitat consists of low willow communities on riverbanks, terraces, and dunes. Most bird use was low, and there was no equivalent Bergman class.
- **Barren** habitat includes partially vegetated dunes, grass-forb lakeshore, and partially vegetated and unvegetated floodplain. Similar to Bergman's Class VIII, this habitat is of low use by most birds and covers about 30 percent of the Colville delta's total area.
- **Sedge-tussock tundra** habitat, found in the western part of the delta, has no comparable Bergman class.

Meehan and Jennings (1988) ranked the importance of habitat classes relative to usage by key bird species. Discrete lakes were used the most, followed by wet-moist polygons, brackish flats, wet graminoid, and wet-moist flooded tundra. Tapped lakes and shrub-dominant areas received an equal amount of use after the top six, followed by sedge-tussock tundra and barrens which were used the least. The authors caution that although the classes may apply to habitats across the North Slope, the ranking should only be applied to the Colville River delta.

In a remote sensing study of snow goose brood-rearing habitat on the Sagavanirktok River delta, Burgess and Ritchie (1988) followed the classification scheme of Walker and Weber (1980) to derive a similar habitat classification (see Table 3.2).

Table 3.2 Snow Goose Brood-Rearing Habitat Classification

Plant Community	Description	Dominant plant species
Moist Graminoid	moist upland sites, dry low-centered polygons and polygon rims	*Carex aquatilis, Dryas integrifolia, Salix arctica*
Wet Graminoid	wet areas in sand dune regions	*Carex aquatilis, Dupontia fischeri, Salix ovalifolia*
Wet Coastal Saline Graminoid	coastal estuaries and lagoon area normally flooded with salt water part of the year	*Carex subspathacea, Dupontia fischeri, Eriophorum angustifolium*
Very Wet Graminoid	pond and lake margins	*Carex aquatilis, Arctophila fulva*
Dry Coastal Bluff Barrens	coastal bluffs and ridges	*Dryas integrifolia, Sedum rosea*

From: Pollard, et al, 1992:4

More complex vegetation classification systems have been developed for oil and gas development proposals; some are species specific and some focus on terrain types. Field surveys are expensive, and increased complexity in project proposal documents provides agencies with more information to make permitting decisions. For example, in the Alpine Development Project, habitats on the Colville delta are described with 24 habitat types, a system developed by Viereck, et al. (1992) and modeled after Cowardin, et al. (1979).

For the purposes of carrying out the provisions of Section 404 of the Clean Water Act, Cowardin, et al. (1979) developed a wetlands classification system for the U. S. Fish and Wildlife Service (USFWS). Subsequently, a Corps of Engineers Wetlands Delineation Manual was developed for use by USACE field inspectors who make wetland determinations (USACE, 1987:7). A supplement to the manual was issued in 2007 (USACE, 2007). Since 1979, numerous classification systems have been developed for wetland habitat characterization. Today, the USACE may use many classification systems in making wetland determinations. The more information and detail on site-specific characteristics, the better USACE is able make wetland determinations (Carpenter, 1997).

Regardless of the habitat class system used in planning, the important points to consider are which plant species are associated with various life stages of important animals (feeding, nesting, incubation, brood rearing, etc.), and what is the most appropriate and practical way to identify those terrains and important species. For caribou, some plant species may provide greater nutritional value for migrating, gestating, and newborn animals. Because nearly all of the North Slope is wetland habitat, uplands are rare and may become more valuable to species like caribou, especially during the insect season. Non-wetland habitats include pingos, high-top polygons, steep riverbanks, gravel bars, and dunes (Carpenter, 1997). The following section discusses the sale area's fish and wildlife with references to key supporting habitats.

B. Fish and Wildlife Species and Habitats

1. Fish

Important fisheries are found within the sale area. Freshwater fish present include arctic grayling, lake trout, northern pike, burbot, and several species of whitefish and ciscoes (Ott, 1995). Many area fish species are amphidromous or anadromous. Amphidromous is "a term used to describe fish that spawn and overwinter in rivers and streams, but migrate during the ice-free summer from freshwater into coastal waters to feed." Anadromous fish mature in the sea and enter freshwater rivers and streams to spawn; salmon and arctic ciscoes are examples (BLM, 2005). Stream-resident arctic char occur in the Sagavanirktok and Colville drainages but are not known to be amphidromous in these systems. Dolly Varden also occur in both drainages, and include amphidromous and stream-resident forms (Ott, 1997).

Nearshore waters and lagoon systems provide migration corridors and important feeding habitat for amphidromous and anadromous fishes (USF&WS, 1987). Summer river runoff combined with melting coastal ice creates warm, brackish conditions in nearshore areas, particularly near the mouths of rivers (BLM, 2005). These warmer nearshore waters contain an abundance of amphipods, isopods, euphausids, coelenterates, and chaetognaths (Gertler, 1988), which provide important food sources for amphidromous and anadromous fishes.

Many of the fishes that winter in freshwater habitats and river deltas of the sale area disperse along the coast to feed in the prey-rich nearshore waters, which may extend several miles offshore (BLM, 2005). Amphidromous fish typically leave rivers and enter the nearshore waters of the Beaufort Sea during spring breakup, from mid- to late June. They initially occupy open-water leads near shore before dispersing along the coast to feed as the ice cover melts and recedes. Small fish tend to remain near overwintering rivers such as the Colville, while larger fish may migrate distances of 80 miles or more in search of feeding habitat. It is during this summer period that coastal fishes achieve most of their annual growth and accumulate fat and protein reserves needed to survive the Arctic winter (BLM, 2005, citing Fechhelm). Migration back to rivers varies by species, but most amphidromous fish return to fresh water, where they spawn, by mid-September (ADNR, 1991a).

The Colville River supports an abundance of fish, composed of at least 20 species, the dominant species being whitefishes and ciscoes. Other species found in the Colville River include chum and pink salmon, Dolly Varden, arctic grayling, burbot, ninespine stickleback, and slimy sculpin. Lake trout, northern pike, and Alaska blackfish are rare inhabitants of the lower Colville River and delta (BLM, 2005). Like other North Slope rivers, the Colville discharges fresh water into the Beaufort Sea, forming a zone of warmer brackish water along the coast. This zone is an important factor affecting the distribution and abundance of all Beaufort Sea fish because of its importance to amphidromous and anadromous species for feeding and migrating.

As with most amphidromous fish species, whitefish spend much of their life cycle in salt water. They feed in salt water during the summer, but, unlike other amphidromous fish, generally remain in freshwater plumes extending out from river mouths and in marine waters of lower salinity. As with arctic char, these species move upriver around mid-August and spawn in late September or October (Roguski et al., 1971).

Arctic cisco are among the most abundant anadromous fish captured in the Prudhoe Bay and Sagavanirktok delta areas. They inhabit the nearshore environment and spawn in the fall. The Colville River is a major overwintering area for cisco. During the ice-free period cisco undertake extensive migrations through the nearshore area (NSBCMP, 1984a). No spawning areas for arctic cisco have ever been identified in Alaska (BLM, 2005); arctic cisco of the Colville River are migrants from natal streams and tributaries of the Mackenzie River delta system in Canada. Newly hatched arctic cisco from Canada move westward into the Alaska Beaufort Sea during late July to early August, especially in years with a prevalence of easterly winds. Thus, these fish must pass through the area of coastal development associated with the Prudhoe Bay and Kuparuk oil fields. Arctic cisco of the Colville River delta spend most of the summer feeding in nearshore coastal waters, and then return to the river's channels and lakes in September and October to overwinter (Fechhelm and Griffiths, 1990).

Non-migratory freshwater fishes inhabit fresh water year-round. Virtually all arctic grayling are found exclusively in fresh water throughout the year (Ott, 1997). Dolly Varden and broad and humpback whitefish are amphidromous (BLM, 2005) and remain in fresh water for several months or years, depending on the species, before migrating to coastal waters, returning to inland waters to spawn and overwinter (ADNR, 1990). A lack of overwintering habitat is the primary factor limiting Arctic fish populations. Rivers freeze to the bottom over much of their lengths, leaving only the deeper sections available for overwintering habitat (Sousa, 1992). The Colville River provides the most consistently available overwintering habitat (Baker, 1987). Broad

whitefish also use ephemeral stream systems to move into lake habitats of adequate depth for overwintering (Morris et al. 2006).

Table 3.3 Important Amphidromous and Anadromous Fish Streams Located Within the Sale Area

Stream Name	Dolly Varden	Whitefish	Pink Salmon	Chum Salmon
Anaktuvuk River	X			
Canning River	X	X	X	X
Chandler River	X	X		
Colville River	X	X	X	X
Colville River Delta	X	X	X	X
East Badami Creek	X			
East Creek		X		
East Sagavanirktok Creek	X			
Echooka River	X			
Fawn Creek		X		
Itkillik River	X	X	X	X
Ivishak River	X			X
Kachemach River		X		
Kadleroshilik River	X			
Kalubik Creek	X			
Kavik River	X			
Kuparuk River		X		
Little Putuligayuk River		X		
Miluveach River	X	X		
No Name River	X			
Putuligayuk River	X	X		
Sagavanirktok River	X	X	X	X
Sakonowyak River		X		
Shaviovik River	X			
Staines River	X	X	X	
Ugnuravik River		X		
Unnamed Lake, west of West Dock	X			
West Fork Kalubik Creek	X	X		

Source: Ott, 1997

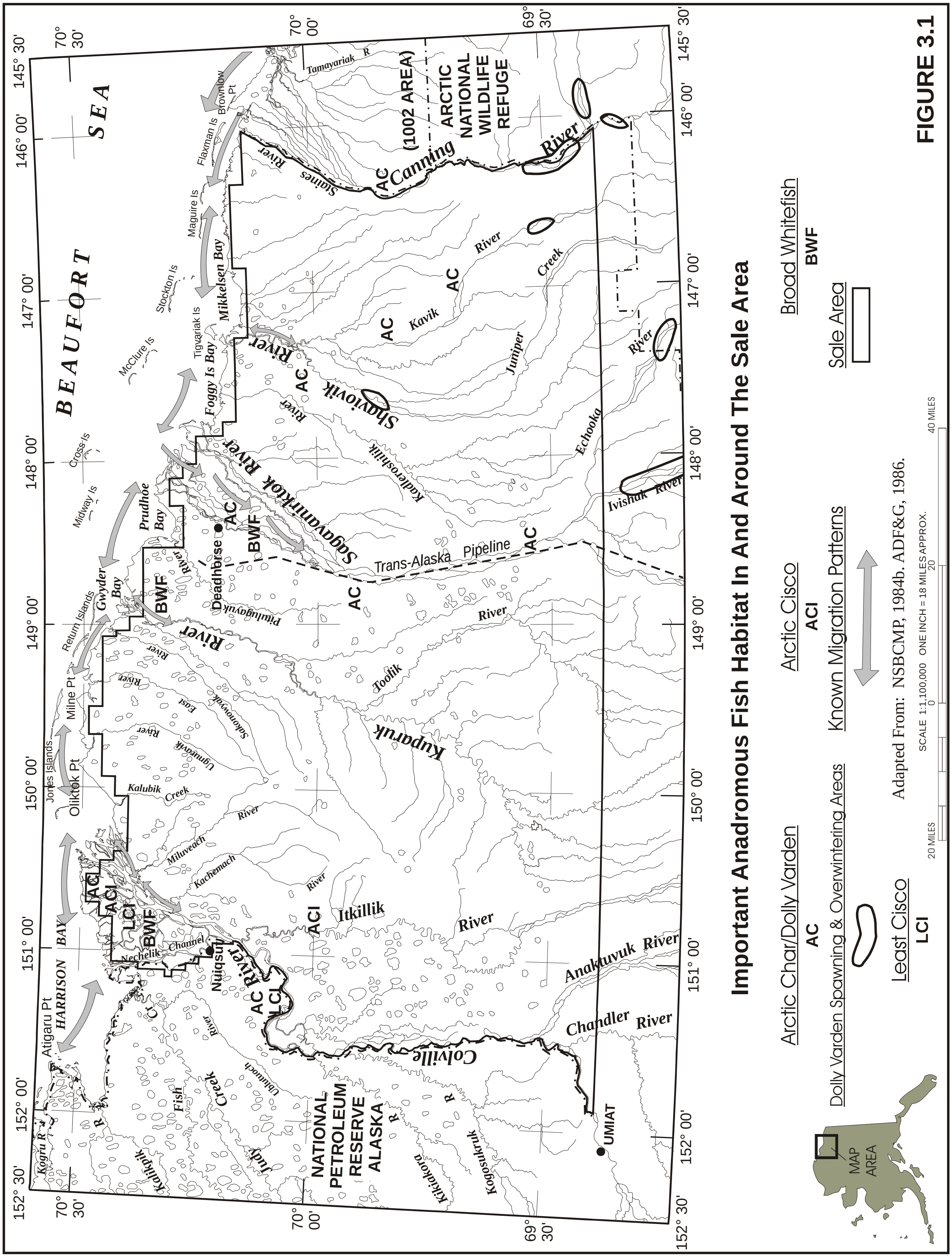


FIGURE 3.1

Important Anadromous Fish Habitat In And Around The Sale Area

Adapted From: NSBCMP, 1984b. ADF&G, 1986.

2. Birds

Major concentrations of birds occur in and near portions of the sale area (see Figure 3.2 and Table 3.4). Very important nesting and breeding areas for waterfowl include the deltas of the Colville, Sagavanirktok, Kuparuk, and Canning Rivers, Fish Creek, and Simpson Lagoon (MMS, 1996a). A variety of bird species are found among the several habitat types of the sale area.

The deltas of the Colville, Sagavanirktok and Kuparuk Rivers provide important breeding and brood-rearing habitats for tundra swans, black brant, snow geese, and Canada geese. Howe Island, located in the Sagavanirktok River delta, is the location of one of the few known snow goose nesting colonies in the United States (Sousa, 1992). The Return Islands, Jones Islands, McLure Islands, Cross Island, and Lion Point are important for nesting common eider. Thousands of long-tailed ducks concentrate near Flaxman Island to molt (Bright, 1992). Greater white-fronted geese are also found nesting and rearing in the major river deltas and other coastal plain areas (Ott, 1997).

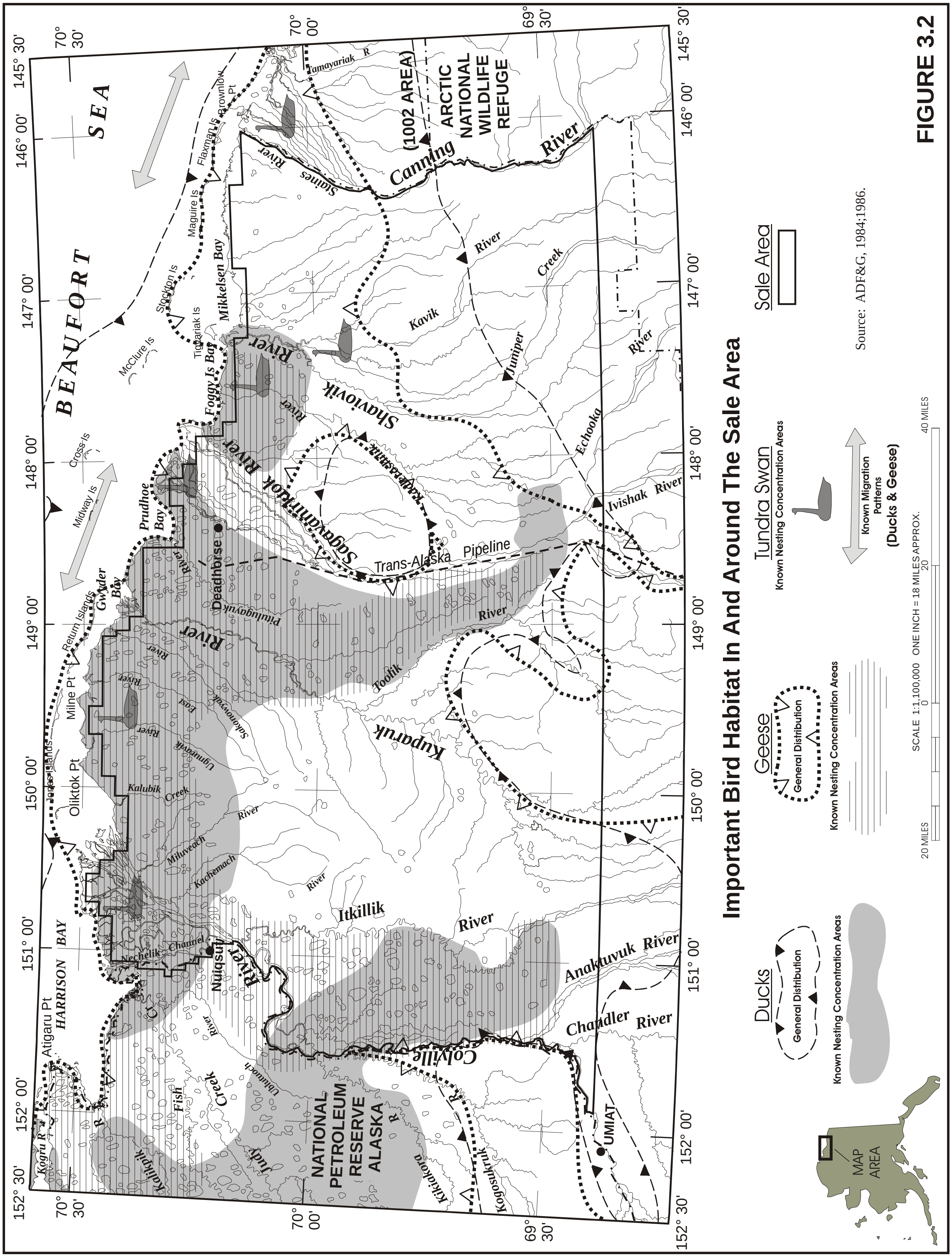
The most abundant marine and coastal species include red phalarope, northern pintail, long-tailed duck, glaucous gull, and king and common eider. Nearly all of these species are migratory and are found in the Arctic seasonally, generally from May through September. Shortly after spring migration, most shorebird and waterfowl populations disperse to nesting grounds, primarily on tundra and marshlands of the Arctic slope. Beginning in late June, large concentrations of long-tailed ducks and eider occur in coastal waters inshore of islands where the birds feed and molt before fall migration. Use of lagoons and other coastal habitats peaks in August to late September before and during the fall migration (MMS, 1996a). Among the least abundant species in the sale area are Steller's eider and spectacled eider. Both are listed as threatened under the federal Endangered Species Act.

Table 3.4 Breeding Season Abundance and Nest Density of Some Shorebird Species on the Arctic Coastal Plain

Species	Abundance on Arctic Coastal Plain	Highest Density (nests per square mile)*
American golden-plover	common	1.6
Baird's sandpiper	uncommon	0.1
Bar-tailed godwit	uncommon	0.3
Black-bellied plover	uncommon	0.9
Buff-breasted sandpiper	uncommon	1.1
Dunlin	uncommon/common	3.7
Pectoral sandpiper	common/abundant	21.5
Red phalarope	common	4.0
Ruddy turnstone	uncommon	data not available
Semipalmated sandpiper	common/abundant	14.4
Stilt sandpiper	uncommon	1.2

* Nest densities are reported in various studies – most data came from studies along the Colville River delta and Point McIntyre.

Source: Adapted from BLM, 2005



Important Bird Habitat In And Around The Sale Area

FIGURE 3.2

Source: ADF&G, 1984;1986.

Table 3.5 Birds and Bird Habitats Common to the Sale Area

Common Name	Scientific Name	Offshore Areas	Barrier Islands/ Lagoons	Estuary	Wetlands Tide flat	Rivers, Lakes, Streams	Uplands
Yellow-billed loon	*Gavia adamsii*	X	X	X	X	X	
Pacific loon	*Gavia arctica*	X	X	X	X	X	
Red-throated loon	*Gavia stellata*	X	X	X	X	X	
Tundra swan	*Cygnus columbianus*			X	X	X	X
White-fronted goose	*Anser alibifrons*			X	X	X	X
Snow goose	*Chen caerulescens*			X	X	X	X
Canada goose	*Branta canadensis*			X	X	X	X
Black brant	*Branta bernicla*		X	X	X	X	X
Mallard	*Anas platyrhynchos*				X	X	X
Pintail	*Anas acuta*				X	X	X
Green-winged teal	*Anas crecca carolinensis*				X	X	X
American wigeon	*Anas americana*				X	X	X
Northern shoveler	*Anas clypeata*				X	X	X
Greater scaup	*Aythya marila*				X	X	X
Lesser scaup	*Aythya affinis*				X	X	X
Common eider	*Somateria mollissima*	X	X	X	X	X	
King eider	*Somateria spectabilis*	X	X	X	X	X	
Steller's eider	*Polysticta stelleri*	X	X	X	X	X	
Spectacled eider	*Somateria fischeri*	X	X	X	X	X	
Long-tailed duck	*Clangula hyemalis*	X	X	X	X	X	
Surf scoter	*Melanitta perspicillata*	X	X	X	X	X	
White-winged scoter	*Melanitta deglandi*	X	X	X	X	X	
Red-breasted merganser	*Mergus serrator*			X	X	X	
Rough-legged hawk	*Buteo lagopus*			X	X		
Northern Harrier	*Circus cyaneus*				X		X
Golden eagle	*Aquila chrysaetos*				X		X
Gyrfalcon	*Falco rusticolus*				X		X
Peregrine falcon	*Falco peregrinus*				X		X
Willow ptarmigan	*Lagopus lagopus*						X
Rock ptarmigan	*Lagopus mutus*						X
Semipalmated plover	*Charadrius semipalmatus*		X		X	X	X
American golden plover	*Pluvialis dominica*		X		X	X	X
Killdeer	*Charadrius vocifeurs*		X		X	X	X
Black-bellied plover	*Pluvialis squatarola*		X		X	X	X
Bar-tailed godwit	*Limosa lapponica*				X	X	X
Buff-breasted sandpiper	*Tryngites subruficollis*		X		X	X	X
Long-billed dowitcher	*Limnodromus scolopaceus*				X	X	X
Ruddy turnstone	*Arenaria interpress*		X		X	X	X
Common snipe	*Capella gallinago*		X		X	X	X
Whimbrel	*Numenius phaeopus*		X		X	X	X
Spotted sandpiper	*Actitis macularia*		X		X	X	X
Pectoral sandpiper	*Calidris melanotos*		X		X	X	X
Rufus-necked sandpiper	*Calidris ruficollis*	X		X	X	X	
White-rumped sandpiper	*Calidris fuscicollis*		X		X	X	X
Dunlin	*Calidris alpina*		X		X	X	X

Common Name	Scientific Name	Offshore Areas	Barrier Islands/ Lagoons	Estuary	Wetlands Tide flat	Rivers, Lakes, Streams	Uplands
Baird's sandpiper	*Calidris bairdii*		X		X	X	X
Sanderling	*Calidris alba*		X		X	X	X
Semipalmated sandpiper	*Calidris pusilla*	X		X	X	X	
Red phalarope	*Phalaropus fulicaria*	X	X	X	X	X	X
Northern phalarope	*Phalaropus lobatus*	X	X	X	X	X	X
Parasitic jaeger	*Stercorarius parasiticus*	X	X		X		X
Pomarine jaeger	*Stercorarius pomarinus*	X	X		X		X
Long-tailed jaeger	*Stercorarius longicaudus*	X	X		X		X
Glaucous gull	*Larus hyperboreus*	X	X	X	X	X	X
Thayer's gull	*Larus thayeri*	X	X	X	X	X	X
Herring gull	*Larus argentatus*	X	X	X	X	X	X
Mew gull	*Larus canus*	X	X	X	X	X	X
Black-legged kittiwake	*Rissa tridactyla*	X					
Sabine's gull	*Xema sabini*	X	X	X	X	X	X
Arctic tern	*Sterna paradisaea*	X	X	X	X	X	X
Thick-billed murre	*Uria lomvia*	X					
Black guillemot	*Cepphus grylle*	X	X				
Short-eared owl	*Asio flammeus*				X		X
Snowy owl	*Nyctea scandiaca*				X		X
Horned lark	*Eremophila alpestris*				X		X
Common raven	*Corvus corax*				X		X
Black-billed magpie	*Pica pica*				X		X
Robin	*Turdus migratorius*				X		X
Gray-cheeked thrush	*Catharus minmus*				X		X
Northern shrike	*Lanius exubitor*				X		X
Wheatear	*Oenanthe oenanthe*				X		X
Bluethroat	*Luscinia avacica*				X		X
Arctic warbler	*Phylloscopus borealis*				X		X
Yellow wagtail	*Motacilla flava*				X		X
Water pipit	*Anthus spinoletta*			X	X		
Wilson's warbler	*Wilsonia pusilla*				X		X
Hoary redpoll	*Carduelis hornemanni*				X		X
Common redpoll	*Carduelis flammea*					X	X
Savannah sparrow	*Passerculus sandwichensis*					X	X
Tree sparrow	*Spizella arborea*						X
White-crowned sparrow	*Zonotrichia leucophrys*					X	X
Fox sparrow	*Passerella iliaca*					X	X
Dark-eyed junco	*Junco hyemalis*					X	X
Lapland longspur	*Calcarius lapponicus*					X	X
Snow bunting	*Plectrophenax nivalis*					X	X

Source: Ott, 1992:4. ADNR, 1990:21.

Northern pintails are among the Arctic coastal plain's most common duck species (BLM, 2005). Numbers fluctuate from year to year and, **though** no significant population trends have been reported in the sale area, declines in northern pintail populations have been documented in the lower 48 states and Canada (BLM, 2005, citing to USFWS, 2003). Northern pintails winter from Southeast Alaska, throughout much of the central and southern U.S., and into Mexico and the Caribbean (BLM, 2005).

Long-tailed ducks are common in the sale area and together with northern pintails make up about 85 percent of the total Arctic coastal plain duck population (BLM, 2005). Male long-tailed ducks begin moving in

late June to protected coastal areas in lagoons and large lakes for molting (Ott, 1997). Nests consist of small, cup-like hollows. Long-tailed duck **clutches** of 9 to 12 eggs are common, but most number 5 to 10 eggs. In the Beaufort Sea area, most eggs hatch from July 16 to July 28. Female long-tailed ducks lead their young to the nearest water shortly after the young have hatched and dried. Male long-tailed ducks begin moving in late June to protected coastal areas in lagoons and large lakes and form massive molting flocks (Ott, 1997). Fall migration begins in late September or early October (Johnson and Herter, 1989). Populations on the Arctic coastal plain fluctuate, but have shown declining population trends over their range as a whole. Long-tailed ducks winter along the east and west coasts (BLM, 2005).

Red phalaropes are common migrants and breeders throughout the Beaufort Sea coast. They appear in the sale area in late May or early June. Nesting takes place in hummocky, moss-sedge tundra interspersed with numerous ponds. Females usually lay four eggs; however, if **breeding** is delayed, clutch size is reduced. Males incubate the eggs and care for the young until shortly before they are fledged. The fledging period is 16 to 18 days. Males then abandon the young and depart the breeding area. Adult migration commences from early June to mid-August. The young depart the nesting areas from mid-August to early September (Johnson and Herter, 1989). Phalaropes winter at sea in the Pacific and Indian Oceans, and off the coasts of west and South Africa (BLM, 2005).

Glaucous gulls are common migrants and breeders in the Beaufort Sea area. They usually arrive in the sale area during May. Glaucous gulls select several types of nesting sites, depending on availability. Pairs nest either on low islands and sandbars near or on the coast, or on inland river bars or small islands in lakes. They are most common on barrier islands immediately offshore from rivers that flood in the spring and thereby protect the nests from foxes. On level terrain, nests may be as much as a meter high and are composed of vegetation. Occasionally, nests consist of a simple depression in the beach and have little or no lining material. Egg-laying begins in mid-June and continues through late June. The normal clutch size is three eggs and hatching begins in the second week of July. Chicks are attended by both parents until they fledge in 45 to 50 days. During the breeding season these gulls prey heavily on the eggs and chicks of other birds. Fall migration begins in mid-September with the young remaining somewhat later than most adults (Johnson and Herter, 1989).

King eiders remain the Arctic coastal plain's most abundant eider species even though counts of migrating birds passing Point Barrow suggest the king eider population has declined by approximately 56 percent since 1976 (BLM, 2005). Despite reports of earlier declines, Larned et al. (2003) recorded an increasing trend between 1993 and 2003 for king eiders on the Arctic coastal plain. King eiders winter as far north as open water is available in the Bering and Chukchi Seas and through the Aleutian Islands to Kodiak Island (BLM, 2005).

Common eiders are abundant in the Beaufort Sea area. Sometimes called Pacific eiders, these sea ducks arrive in the sale area from late May to early June. Nearshore coastal distributions conducted on the Arctic coastal plain during nesting surveys suggest that breeding pairs are most numerous along the coast between the Colville River delta and the Canadian border (BLM, 2005). Common eiders most frequently nest on barrier islands and spits from mid- to late June. Clutch sizes range from 1 to 10 eggs, but usually number 4. Nests are usually placed in well-protected areas near logs, in driftwood, between rocks, or in thick vegetation. Young are usually led directly to water soon after they hatch. Fledging occurs from 6 to 12.5 weeks after hatching. Males then leave nesting areas for molting areas in the vicinities of Point Lay, Icy Cape, and Cape Lisburne in western Alaska. Females and their young begin the fall migration in late August or early September (Johnson and Herter, 1989). Most Beaufort Sea common eiders likely winter from the Bering Sea pack ice south to the Aleutian Islands and Cook Inlet (BLM, 2005).

Tundra swans are common breeders on the coastal plain of the North Slope. The Colville River delta supports densities of breeding tundra swans that are three to five times greater than other Arctic areas of

Alaska. Tundra swans begin nesting during the last week of May and the first two weeks of June. Nests are large (approximately 1 meter high and up to 2 meters in diameter) and widely scattered. The nests are generally located on sedge tundra. After hatching in late June or early July, broods are reared in nesting territory (Smith et. al., 1993). Adults molt from mid-July through August. Fall migration occurs from late September to early October. Surveys have suggested an increasing trend in tundra swan numbers on the Arctic coastal plain since 1986, though populations declined in both 2001 and 2002 (BLM, 2005). Tundra swans winter along the east and west coasts of North America, from the Aleutian Islands to California and from Maryland to North Carolina (Johnson and Herter, 1989).

Black brant are common migrants and breeders along the Beaufort Sea coast. These small, coastal geese, weighing 2.5 to 5 pounds or 1.1-2.3 kilograms, nest on islands in the deltas of the Colville and Sagavanirktok Rivers. Nesting takes place in June. Black brant normally lay four to eight eggs and do not re-nest if their first attempt at nesting fails. Newly hatched goslings leave the nest within 48 hours and move to nearby tidal flats where they spend the brood-rearing period. Brood rearing ends and the fall migration begins around the second week of August. Some brant remain in the Beaufort Sea area until late September or early October (Johnson and Herter, 1989). Brant populations on the Arctic coastal plain appear to be increasing since 1992 (BLM, 2005); however, overall numbers in recent years have shown slow downward trends (BLM, 2005, citing USFWS, 2003).

Snow geese nest in three colonies in Alaska according to ADF&G, including one in NPR-A in the Ikpikpuk River delta (1,100 nests) (MMS FEIS 2007, citing Ritchie et al 2006), one in Kaseleguk Lagoon at the Kukpowruk River delta adjacent to the Chukchi Sea coast (50 nests), and one on Howe Island, which is located in the sale area. In 1990, 380 to 450 snow goose nests were counted on Howe Island. In the past, the colony has been decimated by fox predation; however, the island is isolated by discharge from the Sagavanirktok River early in spring, generally preventing foxes from reaching the island in most years (Winters, 1997). This island also is important for black brant nesting (Sousa, 1992).

Snow geese arrive in the Sagavanirktok River delta during the last week of May and occupy nesting habitat on Howe Island in the first days of June. Most adult females arriving on the breeding grounds have already paired and copulated and have well-developed eggs in their oviducts. They lay their eggs within four days to a week after they arrive in nests of grass and bits of willow built on high ground. Clutch size is three to six eggs which usually hatch during the last week of June or the first week of July. Goslings fledge at about seven weeks. They leave the brood-rearing areas by approximately August 15 to August 20 and congregate in immense flocks on the coastal tundra to feed almost continuously. Snow geese and black brant from the Howe Island colonies often move to the Kadleroshilik River delta to rear in the salt marshes (Ott, 1992). Half of the snow geese from the Howe Island colony take their broods to the Kadleroshilik River salt marshes for the months of July and August (Sousa, 1992). Fall migration begins in the second or third week of September (Johnson and Herter, 1989). Howe Island colony snow geese winter primarily in northern California and southern Oregon (BLM, 2005).

Canada Geese arrive along the Arctic coast during the last two weeks of May and the first week of June. They nest primarily away from the sea coast, on bluffs along the Colville River. However, some isolated pairs have been found nesting in moderate densities in coastal wetlands near Prudhoe Bay. They usually lay their eggs during the first or second week of June. The clutch size may vary from 1 to 10 eggs, which hatch within the first two weeks of July. After the goslings have fledged in mid-August, flocks begin dispersing along the Beaufort Sea and begin their southward migration. Populations on the Arctic coastal plain have ranged from lows near 3,000 in 1989 and 1994 to highs near 47,000 in 1986 and 1999 (BLM, 2005).

Greater white-fronted geese are common breeders along the Beaufort Sea coast. They reach Beaufort Sea breeding areas from the second week of May to the first week of June. Females usually select nest sites on well-vegetated (scrub willow tundra) and well-elevated habitat near lakes or rivers. Eggs are laid during the

last half of May or the first two weeks of June. The female lays her eggs in a slight depression, building the nest as she completes her clutch of four to seven eggs. The incubation period varies from 23 to 28 days. Breeding adults usually molt when goslings are two to three weeks old. Fall migration may begin as early as August 10 with the last greater white-fronted geese leaving Alaska by the end of September (Johnson and Herter, 1989).

Pacific loons are the most abundant loon species of the Arctic coastal plain; aerial surveys conducted over the past decade indicate the region's population is stable. Pacific loons frequently return to nest at the same lake or pond in successive years (BLM, 2005). Average clutch size is two eggs, which require an incubation period of 23-25 days; young birds fledge in 60-65 days (Ehrlich, P., Dobkin, D., and Wheye, D., 1988). Wintering areas include the Pacific coast from southeastern Alaska to Mexico.

Red-throated loons are less abundant than Pacific loons on the Arctic coastal plain. Although recent surveys conflict — Mallek et al., 2003 reported increasing trends while Larned et al., 2003 observed decreasing trends in the regional population — the birds are relatively common on the sale area's Colville River delta (BLM, 2005). Clutch size averages two eggs, with length of incubation ranging from 24-29 days. Young birds fledge in 49-51 days (Ehrlich et al., 1988). Red-throated loons winter along the west coast from the Aleutian Islands to northwestern Mexico, and on the east coast from the St. Lawrence River to the Gulf of Mexico.

Yellow-billed loons are the least abundant loon species on the Arctic coastal plain (BLM, 2005). The greatest Yellow-billed loon concentrations in Alaska are found on the North Slope, with the highest densities between the Meade and Ikpikpuk Rivers, on the Colville River Delta, and in areas west, southwest and east of Teshekpuk Lake (USF&WS, 2006a). Yellow-billed loons arrive in the sale area in late May. They concentrate during spring with other species of loons in early-melting areas off the deltas of the Sagavanirktok, Kuparuk, and Colville Rivers. The yellow-billed is the largest of the loons (30-36 inches long) and one of the largest diving birds in North America (ADF&G, Undated). Yellow-billed loons prefer gently sloping shores of deep tundra lakes as nest sites. The nest is usually a built-up mound of turf and mud on the shoreline of a lake or occasionally on the shoreline of a large river. Egg laying begins as early as the second week of June and hatching takes place in July and early August. The normal clutch size is two eggs. The age at which yellow-billed loons fledge has not been recorded precisely but may be similar to common loon chicks, which is 45 days. The peak fall migration for yellow-billed loons is in late August or early September (Sousa, 1995; Johnson and Herter, 1989). The population in the Arctic coastal plain has been stable since at least 1986 (BLM, 2005). A Conservation Agreement has been developed as a cooperative effort among local, state, and federal resource agencies for the conservation of this species. The purpose of this agreement is to protect Yellow-billed loons and their breeding, brood-rearing, and migrating habitats in Alaska, such that current or potential threats in these areas are avoided, eliminated or reduced to the degree that they do not cause the species to become threatened or endangered from these threats is the foreseeable future (USF&WS, 2006a). A petition seeking Endangered Species Act protection for the yellow-billed loon was filed on April 5, 2004, and a 90-day finding that the petition presented substantial information indicating that ESA protection may be warranted was made by the USFWS on May 30, 2007 (50 C.F.R. § 17). A status review to determine if listing the yellow-bill loon is warranted is underway and is expected to be completed by February 2009.

a. Species of Special Concern:

The State of Alaska's Species of Special Concern List includes any species or subspecies of fish or wildlife or population of mammal or bird native to Alaska that has entered a long-term decline in abundance or is vulnerable to a significant decline due to low numbers, restricted distribution, dependence on limited habitat resources, or sensitivity to environmental disturbance. The following bird species present in the sale area are listed by the State of Alaska as Species of Special Concern. The list was last amended in October 1998.

Arctic peregrine falcons nest south of the sale area primarily on bluffs along the Colville River from Umiat to Ocean Point, and at Franklin and Sagwon Bluffs in the Sagavanirktok River drainage. Additional nest sites may occur at other locations. Arctic peregrine falcons are present on the North Slope from late April through September. Nesting begins by mid-May, and the young birds fledge from late July to late August. Immature peregrine falcons from the Colville to the Sagavanirktok River drainages move toward the Beaufort Sea coast in mid- to late August. Peregrine falcons generally have left the North Slope by late September (Ott, 1997).

Steller's eiders and **spectacled eiders** are also listed as Species of Special Concern. More on these birds of the sale area is included below.

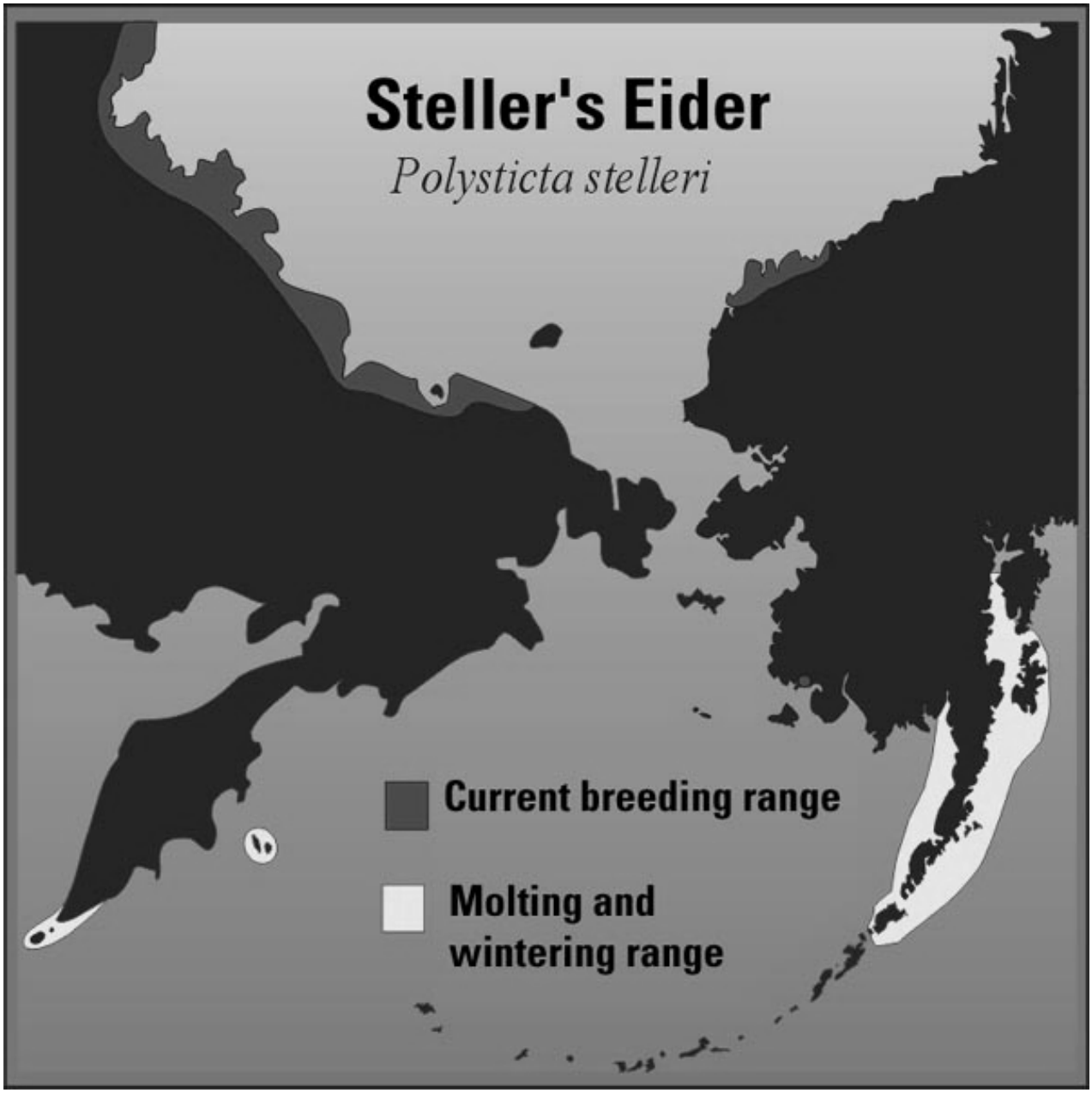
b. Threatened Bird Species:

Steller's eiders were listed as threatened under the federal Endangered Species Act on June 11, 1997, because of a reduction in the number of breeding birds and a suspected reduction of breeding range in Alaska (BLM, 2005). The birds are known to breed in Arctic Russia and Alaska (Figure 3.2a); their range on the Arctic coastal plain is thought to have once extended from Wainwright east to Canada's Northwest Territories. Steller's eiders are currently reported to range east at least as far as Prudhoe Bay, though no recent records place them east of the Sagavanirktok River. Very few sightings are currently reported east of the Colville River (BLM, 2005). Steller's eiders nest on tundra habitats often associated with polygonal ground near the coast and inland. The nest is a deep cup in the tundra; it consists of curly, coarse grasses and various mosses and lichens and is well lined with down and feathers. Females lay between 6 to 10 eggs and incubate them for about three weeks. Hatching along the Beaufort Sea apparently begins during the first or second week of July. Most young are probably ready to fly by August. Steller's eiders migrate from the Beaufort Sea during late September and early October (Johnson and Herter, 1989).

Spectacled eiders were listed as threatened under the federal Endangered Species Act on May 10, 1993, after population declines were reported in important Yukon-Kuskokwin Delta nesting areas (BLM, 2005). The historic breeding range of the spectacled eider includes the coastal tundra areas of the North Slope from Barrow to the U.S.-Canada border (Sousa, 1992). Causes for the declines are not known but may include some combination of reduced food supplies, pollution, over-harvest, lead shot poisoning and increased predation.

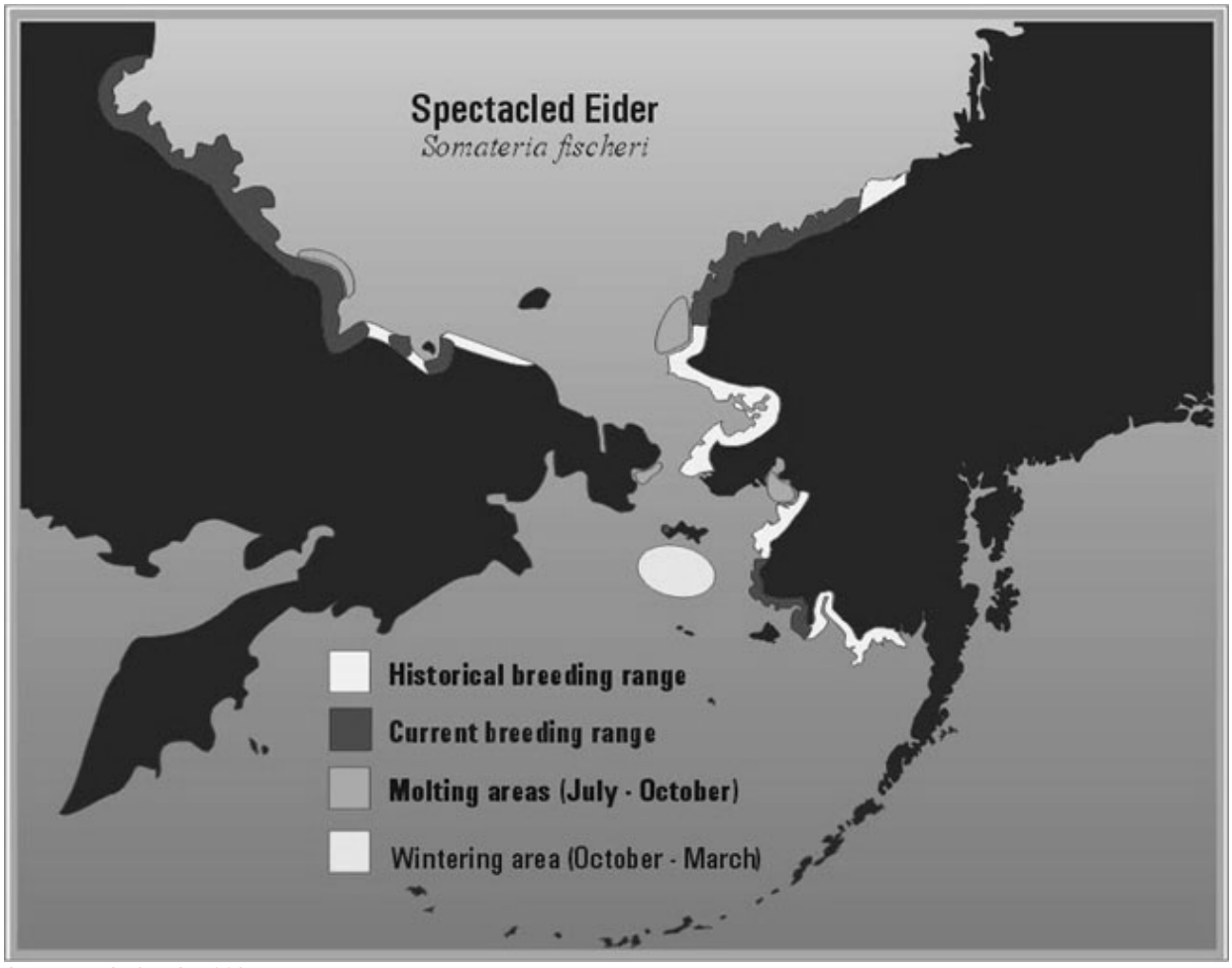
Spectacled eiders occur throughout the sale area (Figure 3.2b). All of the onshore tracts are within the expected breeding range for this species (Sousa, 1997). Important habitats for Arctic-breeding spectacled eiders include large river deltas; tundra rich in lakes; and wet, polygonized coastal plains with numerous water bodies (USF&WS, 1996). Females lay one egg per day and begin incubation with the laying of the last egg. Clutch size averages between 3.8 and 4.5 eggs. Hatching occurs from mid- to late July. Fledging occurs approximately 50 days after hatching. Females and their broods then move directly from freshwater to marine habitats (USF&WS, 1996). During August, productive adults undertake their summer molt. Fall migration from the Beaufort Sea by males may begin in midsummer. Most spectacled eiders have left the coast by September 20 (Johnson and Herter, 1989).

Figure 3.2a Breeding, Molting and Winter Range of the Steller's Eider



Source: USF&WS, 2008b.

Figure 3.2b Range of the Spectacled Eider



Source: USF&WS, 2008a.

3. Terrestrial Mammals

a. Caribou

Caribou (*Rangifer tarandus*) are members of the deer family. Four caribou herds use the coastal habitats within and adjacent to the sale area. A herd is a group of caribou which establishes a calving area distinct from any other group and calves there repeatedly (ADF&G, 1994). The Western Arctic caribou herd ranges over an area that extends approximately from the Colville River to the western coast of Alaska (see Figure 3.3). The Porcupine caribou herd ranges adjacent to the sale area, south from the Beaufort Sea coast, from the Canning River eastward into Canada. The range of the Central Arctic caribou herd extends from the northern foothills of the Brooks Range to the Beaufort Sea and from the Colville River east to the Canning River. A fourth herd, the Teshekpuk Lake herd, occupies the area around Teshekpuk Lake, west of the sale area. Caribou from the Teshekpuk Lake herd have been observed in the Colville River delta seeking relief from insect harassment (Smith et al, 1993). A majority of the Teshekpuk herd winter on the coastal plain. The most common area for wintering is the area around Atqasuk (ADF&G, 2003). A substantial number of Teshekpuk Lake caribou recently (2004-2006) have wintered in the area between the Colville and Itkillik River drainages

and the Dalton Highway. In 2003-2004, about one third of the Teshekpuk Lake caribou herd wintered east into ANWR (Carroll, 2005). See Figure 3.3 showing caribou distribution.

Caribou normally move toward the coast to calve and escape the predators of their winter range. In late May or early June a single calf is born (twins are very rare) mostly within 30 miles of the coast. Coastal areas seem to be preferred calving habitats, but calving occurs further inland as well (Baker, 1987). Newborn calves can walk within an hour of birth. After a few days, they can outrun a man and swim across lakes and rivers. Newborn calves weigh an average of 13 pounds and may double their weight in 10-15 days (ADF&G, 1994). Caribou in North Slope oilfields have grown accustomed to above-ground pipelines, as long as traffic on associated roads is infrequent and does not create a barrier. However, they can be sensitive to human activities in calving areas (OPMP, 2006). The authors of the ADF&G report *Effects of Oil Field Development on Calf Production and Survival in the Central Arctic Herd* write: "Several studies have suggested that, during the calving season in late May to late June, pregnant caribou cows and those with newborn calves avoided areas of disturbance associated with oil exploration and extraction. … During the 1990s, the area of greatest concentration of calving by the western segment of the Central Arctic herd shifted southward as development of oil-related infrastructure occurred in what was originally a major calving area" (Arthur and Del Vecchio, 2004).

The Western Arctic herd calves mainly inland on the NPR-A. The Porcupine herd's calving range is along the Beaufort Sea coast from the Canning River to the Babbage River in Canada. The location of calving areas has changed over time. The Central Arctic herd's calving area has been described as the area between the eastern channel of the Colville River and Kalubik Creek (Smith et al., 1994, citing Lawhead and Cameron, 1988). Current primary calving concentration areas lie between the Sagavanirktok and Canning Rivers in the area south of Bullen Point, and to the southwest of the Kuparuk oil field (Ott, 1997). Lesser used calving areas have also been identified in the area between the eastern channel and the Nechelik channel of the Colville (Smith, et al. 1994; citing Whitten and Cameron, 1985) and in the foothills of the Brooks Range, south of the Colville River delta. Use of calving habitat varies with weather and snow conditions. The fidelity of caribou to their calving areas suggests that certain areas, such as those mentioned above, may be more important than other seasonal ranges.

Caribou summer on the Arctic coastal plain. The Central Arctic herd spends June through mid-August near the Arctic coast between the Colville and Canning Rivers (Whitten, 1995). In midsummer, from mid- to late June through July, caribou are often harassed by hordes of mosquitoes, warble flies, and nose flies. Movement during the summer is closely tied to insect harassment. In response, caribou move from inland feeding areas to windswept, vegetation-free coastal areas where the insects are limited. Sometimes the animals run in frenzies for long distances, stopping to rest only when exhausted or when wind offers relief from the insects (ADF&G, 1994). Most insect relief areas are found within two miles of the coast (ADF&G, 1986b); however, caribou also tend to congregate on gravel drilling pads and roads which are generally raised above the tundra and more exposed to the elements (USACE, 1984). Caribou that remain inland may move to river bars and bluffs to escape these insects. The frequency and duration of caribou movements to and from the coast depend on weather-related changes that affect the number of mosquitoes. Caribou distribution on the coastal plain can change dramatically within a 24-hour period.

The fall migration south begins in September and ends by mid-November. During both the spring and fall migrations, the Central Arctic herd tends to move along or near major river drainages, such as the Itkillik, Kuparuk, Shaviovik, and Canning. Central Arctic caribou generally winter in the northern foothills of the Brooks Range, although substantial numbers have wintered south of the Brooks Range in recent years. Occasionally, some remain on the coastal plain during mild winters. (Ott, 1992).

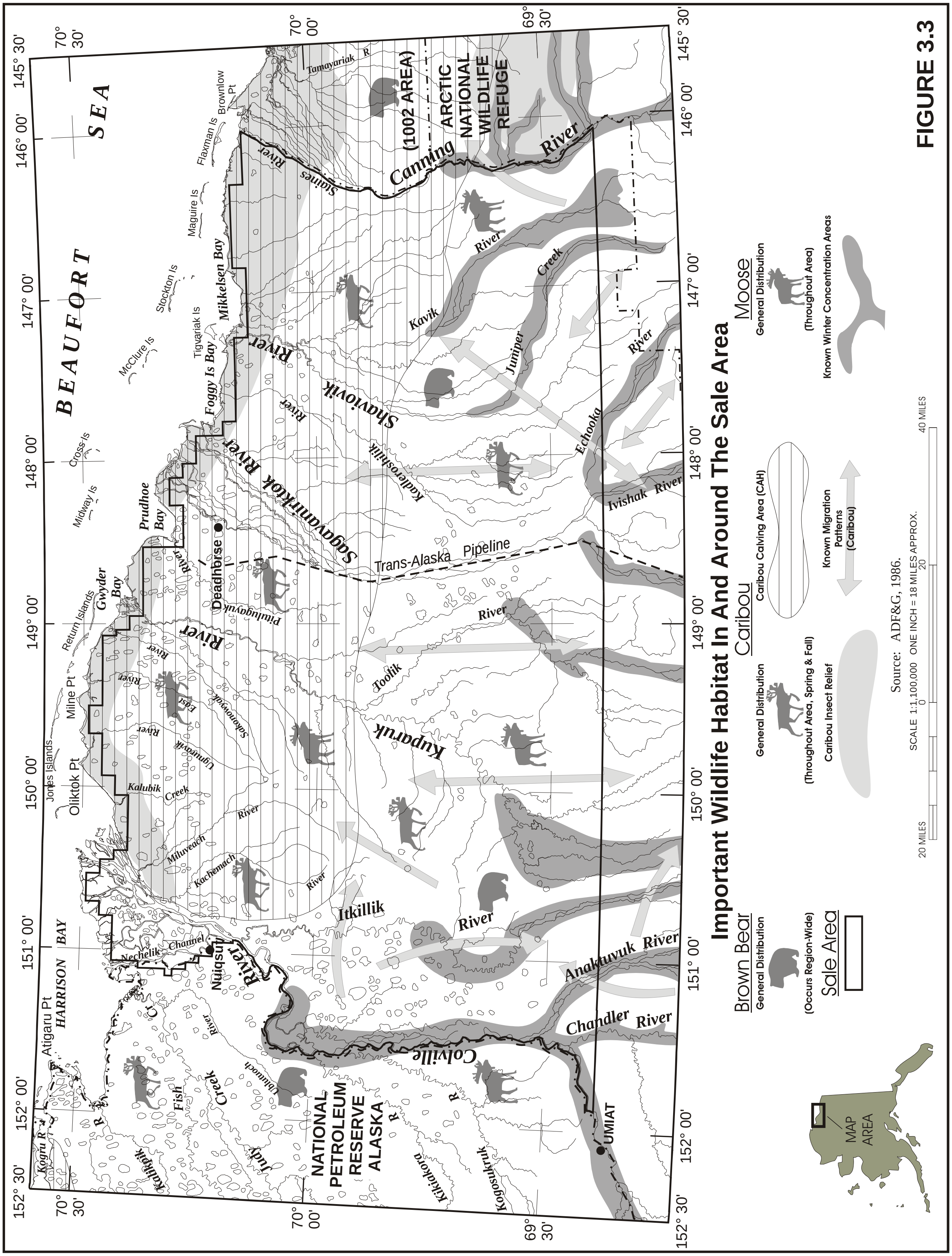


FIGURE 3.3
Important Wildlife Habitat In And Around The Sale Area
Brown Bear
General Distribution
(Occurs Region-Wide)
Caribou
General Distribution
(Throughout Area, Spring & Fall)
Caribou Insect Relief
Caribou Calving Area (CAH)
Known Migration Patterns (Caribou)
Moose
General Distribution
(Throughout Area)
Known Winter Concentration Areas
Sale Area
Source: ADF&G, 1986.
SCALE 1:1,100,000 ONE INCH = 18 MILES APPROX.
20 MILES
0
20
40 MILES
MAP AREA
BEAUFORT SEA
HARRISON BAY
ARCTIC NATIONAL WILDLIFE REFUGE
(1002 AREA)
NATIONAL PETROLEUM RESERVE ALASKA
Trans-Alaska Pipeline
Deadhorse
Nuiqsut
UMIAT
Prudhoe Bay
Gwyder Bay
Foggy Is Bay
Mikkelsen Bay
Canning River
Staines River
Shaviovik River
Sagavanirktok River
Kuparuk River
Toolik
Itkillik River
Colville
Anaktuvuk River
Chandler River
Kavik River
Juniper Creek
Echooka River
Ivishak River
Kadleroshilik
Putuligayuk River
Sakonowyak
Ugnuravik River
Kalubik Creek
Miluveach River
Kachemach River
Nechelik Channel
Fish Creek
Judy
Kikiakrorak
Kogosukruk
Kogru R
Atigaru Pt
Oliktok Pt
Jones Islands
Milne Pt
Return Islands
Midway Is
Cross Is
McClure Is
Tigvariak Is
Stockton Is
Maguire Is
Flaxman Is
Brownlow Pt
Tamayariak R
145° 30'
146° 00'
147° 00'
148° 00'
149° 00'
150° 00'
151° 00'
152° 00'
152° 30'
70° 30'
70° 00'
69° 30'

Caribou must keep moving to find adequate food. This distributes feeding pressure and tends to prevent overgrazing. Caribou are great wanderers and very efficient at moving across both boggy and rugged terrain. They commonly travel vast distances to reach suitable foraging sites on widely separated seasonal ranges. Feeding opportunities are limited in windswept insect relief areas, so caribou move inland to better foraging areas whenever insect harassment temporarily subsides, and return to the coast when harassment increases. In summer, caribou eat a wide variety of plants, apparently favoring the leaves of willows, grasses, and herbaceous and flowering plants. During winter, they use windswept upland areas or areas of lighter snow cover where they can dig through the snow to feed on lichens, "reindeer moss," and dried sedges (ADF&G, 1994).

Historic population counts for all four herd populations are depicted in Table 3.5. Caribou calf survival and adult mortality are primary factors affecting the size and growth of caribou herds. ADF&G's 2002 census of the Central Arctic caribou herd revealed an increase of nearly 14,000 animals since 1995 (Arthur and Del Vecchio, 2004). The Western Arctic herd's population grew to about 450,000 by 1993, primarily because calf survival far exceeded adult mortality until the early 1990s. However, biologists note the apparent decline in the 1999 census was the result of problems with the photo census and not an actual decline in population size (Dau, 2005). There is no evidence that any single factor — including human harvests, predation, environmental contaminants, or disease — is currently limiting the size of this herd. (ADF&G, Undated).

Table 3.6 Historic Population Counts for Caribou Herds

Western Arctic Herd		Central Arctic Herd		Teshekpuk Caribou Herd		Porcupine Caribou Herd	
Year	No. of Animals	Year	No. of Animals	Year	No. of Animals	Year	No. of Animals
1976	75,000	1978	6,000	1982	4,000	1972	100,000
1978	102,000	1981	9,000	1989	16,700	1977	105,000
1980	138,000	1983	12,900	1993	27,600	1982	125,200
1982	171,700	1991	18,900	1995	26,000	1983	135,300
1986	229,400	1992	23,400	2002	45,166	1987	165,000
1988	343,200	1995	18,093			1989	178,000
1991	415,700	2002	32,000			1992	163,500
1993	450,000					1994	152,000
1999	430,000					2001	123,000
2003	490,000						

Sources: Cronin, et al., 1994; ADF&G, Undated; Whitten, 1995; Ott, 1997; Arthur and Del Vecchio, 2004; BLM, 2005 3:50; PCMB, 2006.

A 2001 census of the Porcupine caribou herd indicated that the herd had declined by 29,000 since 1994, to 123,000. Estimates in 2005 based on the parturition and cow-to-calf ratios suggested the herd had declined further, to 110,000-115,000 (PCMB, 2006). Meanwhile, the first photo census of the Teshekpuk Lake caribou herd occurred in 1984 and counted 11,822 caribou. Subsequent counts indicate the herd had grown steadily, numbering 45,166 in 2002.

b. Moose

Moose are the world's largest members of the deer family and the Alaska moose (*Alces alces gigas*) is the largest of all the moose. Moose breed annually and both sexes may begin breeding at an age of 16 to 18 months. Calves are born anytime from mid-May to early June after a gestation period of about 230 days. Calves begin taking solid food a few days after birth. Newborn calves weigh 28 to 35 pounds and within five months grow to more than 300 pounds (ADF&G, 1994).

Rutting occurs during the fall between late September and early October. During this period, moose may aggregate in groups of up to 30 bulls and cows, with movement of individuals between the groups (ADF&G 1986a).

Moose eat a variety of plants, particularly sedges, equisetum (horsetail), pond weeds, and grasses. During summer, moose feed on forbs, vegetation in shallow ponds, and the leaves of birch, willow, and aspen. Willow stands along rivers and streams provide essential habitat for moose. These riparian areas are especially important during winter when forage is mainly confined along major drainages where shrubs will not be covered by drifting snow (Sousa, 1992).

Following the snowmelt, usually around the beginning of May, moose occasionally disperse across the tundra, but are mainly found at varying elevations in the foothills (see Figure 3.3). Calving also occurs at this time. Moose have a high reproductive potential and can quickly fill a range to capacity if not limited by predation, hunting, and severe weather. Deep, crusted snow can lead to malnutrition and subsequent death of hundreds of moose and decrease the survival of the succeeding year's calves. Predation by wolves and bears limits the growth of moose populations in Alaska (ADF&G, 1994).

The North Slope represents the northern limit of moose range in North America; thus, habitat sharply limits the potential size of moose populations. Moose in the sale region are generally associated with narrow strips of shrub communities along drainages. Moose concentrate in winter along portions of the Canning, Kavik, Echooka, Sagavanirktok, and Colville Rivers, and Juniper Creek in the southern portion of the sale area (ADF&G, 1986 atlas). Surveys indicate moose may undertake extensive movements within or between North Slope drainages (Lenart, 2004).

General distribution occurs all across the North Slope, but this has not always been the case. Moose were scarce in Arctic Alaska prior to the early 1950s, when populations expanded and reached high densities in the limited riparian habitat of major drainages (LeResche, R.E., et al., 1974). Dramatic declines in moose populations noted during the early 1990s were probably due to a combination of factors including disease, weather, habitat limitations, insect harassment, and heightened predation by increasing populations of wolves and brown bears. Food supplies vary from year to year, and forage is limited. Moose populations along the Colville and Kavik Rivers are at the northern extent of the species' range and are susceptible to bad winters (Carroll, 1996). A lack of forage could lead to a mineral deficiency which can result in increased predation. Studies conducted on dead animals collected along the Colville River and its tributaries in 1996 suggested disease may have been a factor since in 1996 and 1997 the diseases brucellosis and leptospirosis were found in both dead and live moose sampled (Lenart, 2004).

By 2003, state biologists observed increases in moose populations over much of the region. Surveys found the highest concentrations of moose along the Echooka, Ivishak, Kavik, and Canning Rivers. Moose are also found in the Kuparuk, Toolik and Itkillik River drainages. (Lenart, 2004).

c. Brown Bears

Although taxonomists once listed brown bears and grizzly bears separately, the two are now classified as the same species, *Ursus arctos*. Generally, the term brown bear is used for those found in coastal areas while bears found in the interior areas of Alaska are known as grizzlies (ADF&G, 1994).

Brown bears travel major river corridors in the spring and summer and frequently den along riverbanks in the fall (see Figure 3.3). The bears feed extensively in riparian areas of the sale area in spring and summer because these areas provide them with the greatest diversity of foods. Since the main oil field region is situated between the Sagavanirktok and Colville Rivers — two of the largest riparian areas on the North Slope — brown bears have ample opportunity to encounter oil field facilities and activities (ConocoPhillips, 2005). Past investigations of radio-collared bears in the Prudhoe Bay area revealed an unnaturally high and productive population of brown bears in the oil field, most likely due to the supplemental food supply (garbage) available there (Sousa, 1992). Bear weights vary depending on the time of year. Bears weigh the

least in the spring or early summer. They gain weight rapidly during late summer and fall just prior to denning (ADF&G, 1994).

In the winter, when food is unavailable or scarce, brown bears enter dens and hibernate. During hibernation, their body temperature, heart rate, and other metabolic rates are reduced, and their need for food and water is eliminated. Brown bears enter their dens from mid-October through November (Ott, 1997) where they may spend 5 to 7½ months. On the coastal plain, bears den in low hills, dry lake margins, pingos, and stream banks to within at least 20 miles of the coast (Ott, 1991). Recent ADF&G brown bear research confirms that some of the bears using the oil fields den within a mile of the coast (Ott, 1997). They normally leave their dens in April and early May; adult males emerge first, followed by single females, then sows with young (ADF&G, 1994).

Except for females with offspring and breeding animals, bears are typically solitary creatures and avoid other bears. Exceptions occur where food sources are concentrated such as marine or terrestrial mammal carcasses. In the spring, brown bears are commonly found in major river valleys, such as the Colville and Itkillik. They later move to small tributaries and poorly drained areas to feed.

Mating takes place from May through July with the peak of activity in early June. Brown bears generally do not have strong mating ties. Individual bears are rarely seen with a mate for more than a week. Males may mate with more than one female during breeding season. The young are born the following January or February in a winter den. Litter size ranges from one to four cubs, but two is most common. Offspring typically separate from their mothers as two-year-olds in May or June. In some areas where food is scarce, females may skip one to three years before producing new litters. Bear populations vary depending on the productivity of the environment. In areas of low productivity, studies have revealed bear densities as low as one bear per 300 square miles (ADF&G, 1994).

Brown bears consume a wide variety of foods including berries, grasses, sedges, horsetails, cow parsnips, fish, ground squirrels, and roots of many kinds of plants. In some parts of Alaska, brown bears prey on newborn moose and caribou. They can also kill healthy adults of these species. Bears are fond of all types of carrion as well as garbage in human dumps. Brown bears have an especially good sense of smell and under the right conditions may be able to detect odors more than a mile distant (ADF&G, 1994). During the summer bears most frequently feed in wet sedge meadows, late snow bank areas, and tussock tundra, concentrating on grasses, sedges, and the fruiting and vegetative stems of horsetails. In the fall, bears use the floodplains of large creeks and rivers, dry ridge areas or mountain slopes to feed on roots, berries, and ground squirrels (ADF&G 1986a).

d. Muskoxen

Muskoxen (*Ovibos moschatus*) are stocky, long-haired animals with cloven hooves, slight shoulder humps, and very short tails. Taxonomists classify muskoxen with sheep and goats. Muskoxen as a species have changed little since the ice age and are perfectly adapted to their harsh Arctic environment (ADF&G, 1994).

Alaska's original muskoxen disappeared in the mid- or late 1800s as a result of over-hunting. They were re-introduced into the Arctic National Wildlife Refuge (ANWR) in 1969 and by 1974 the population had begun to grow rapidly and spread westward beyond the Canning River and into the sale area (USF&WS 1987; USFWS Survey Summaries 2005). The population continued to grow until 1986 and remained stable until 1998. In recent years, however, muskoxen numbers in ANWR have fallen sharply while populations in state Game Management Unit 26 B, which includes the sale area, began to decline in 2004. Muskoxen declines may have been caused by predation, adverse weather conditions such as icing events, deep snow, and long snow seasons that reduce access to winter forage (USFWS, 2005).

Riparian habitat is preferred by muskoxen for virtually their entire annual cycle. River systems that provide diverse low shrub-forbs and tall willow communities in proximity to relatively snow-free uplands, hillsides, and plateaus are important to muskoxen (Sousa, 1992). Small numbers of muskoxen occur in the Colville River delta, in the area of the lower Itkillik River valley, and the headwaters of the Miluveach and Kachemach Rivers (Ott, 1997). Known wintering areas occur along riverside bluffs in the southwest corner of the sale area, in the vicinity of the Sagavanirktok and Ivishak Rivers, and along the Kavik and Shaviovik River drainages near the coast. During summer they also utilize the Kadleroshilik drainage (Sousa, 1992).

Muskoxen are relatively sedentary in the winter (October-May), possibly as a strategy for conserving energy. They are not migratory, but may move in response to seasonal changes in snow cover and vegetation. Many bull muskoxen move from mixed-sex groups during the summer to bull groups during the winter. Females calve from late April to mid-June. Limited data suggests that the majority of the population calves in the southern portion of the Arctic coastal plain on windblown, snow-free banks within riparian areas, and in upland sites in the foothills. The rutting season generally occurs in August (Sousa, 1992).

Muskoxen eat a wide variety of plants, including grasses, sedges, forbs, and woody plants. In summer and fall, both sexes may be found along major river drainages where they feed on willows and forbs. In winter and spring, muskoxen groups of 10 to 20 animals may be found in uplands adjacent to river drainages which afford forage of tussock sedges and have less snow cover (USF&WS, 1987). Muskoxen are poorly adapted for digging through heavy snow for food, so winter habitat is generally restricted to areas with shallow snow accumulations or areas blown free of snow (ADF&G, 1994).

State and federal wildlife agencies have not opened any muskoxen subsistence hunts in the last three regulatory years, mostly affecting villagers in Nuiqsut and Kaktovik (Lenart, 2007). Predation by grizzly bears and flooding on the Colville River are cited as factors in the decline of area muskoxen.

e. Furbearers

Other species that may be found in the area include arctic fox, red fox, wolf, and wolverine. Information on the abundance and distribution of these species is limited.

Arctic foxes *(Alopex lagopus)* are found within the sale area. Both blue and white color phases occur, with the white color phase more common in northern litters. Young of each color phase may occur in the same litter (ADF&G, 1994).

Fully grown arctic foxes weigh from six to 10 pounds. They average 43 inches in length including the tail, which averages 15 inches in length. Arctic foxes may move long distances over sea ice. A fox tagged along the coast of Russia was captured a year later near Wainwright, Alaska (ADF&G, 1994).

Arctic fox pups are born in dens excavated by the adults in sandy, well-drained soils of low mounds and river cut banks. Most dens have southerly exposure. They extend from 6 to 12 feet underground. Enlarged ground squirrel burrows with several entrances are often used as dens (ADF&G, 1994).

Mating occurs in early March through early April. Gestation lasts 52 days. Litters average seven pups but may contain as many as 15 pups. Arctic foxes are monogamous in the wild. Both parents aid in bringing food to the den and in rearing the pups. Pups begin eating meat when about one month old and are fully weaned by 1½ months. They emerge from the den when about three weeks old and begin to hunt and range away from the den at about three months. Arctic foxes attain sexual maturity at nine to 10 months, but many die in their first year (ADF&G, 1994).

Arctic foxes have prospered in the Prudhoe Bay oil fields, where their population densities are greater than in surrounding undeveloped areas. They commonly feed, den, and rest around development sites (BLM, 2005). Arctic foxes are omnivorous. In summer, they feed primarily on small mammals, including lemmings and tundra voles. They sometimes eat berries, eggs, and scavenged remains of other animals. Many foxes venture onto the sea ice during winter to eat the remains of seals killed by polar bears. In areas where lemmings and voles are the most important summer prey, fox numbers often rise and fall with cyclic changes of their prey. Fewer pups are successfully reared to maturity when food is scarce. There is evidence that competition for food among young pups accounts for some of the heavy mortality in this age group (ADF&G, 1994).

Wolves *(Canis lupus)* are adaptable and exist in a wide variety of habitats including the Arctic tundra along the Beaufort Sea. Wolves are members of the family Canidae. They are highly social animals and usually live in packs averaging six to seven animals (ADF&G, 1994).

Wolves normally breed in February and March, and litters averaging about five pups are born in May or early June. Litters may include from two to 10 pups, but most often four to seven pups are born. Most female wolves first breed when 22 months old but younger females usually have fewer pups than older females. Pups are usually born in dens dug as deep as 10 feet into well-drained soil. Adult wolves generally center their activities near dens, but may travel as far as 20 miles in search of food, which is regularly brought back to the den. Wolf pups are weaned gradually during midsummer. In mid- or late summer, pups are usually moved some distance away from the den and by early winter are capable of traveling and hunting with adult pack members. Wolves are great travelers, and packs often travel 10 to 30 or more miles in a day during winter. Dispersing wolves have been known to move from 100 to 700 miles from their original range (ADF&G, 1994).

In spite of a generally high birth rate, wolves rarely become abundant because mortality is high. In much of Alaska, hunting and trapping are the major sources of mortality, although diseases, malnutrition, accidents, and particularly preying by other wolves act to regulate wolf numbers (ADF&G, 1994).

Wolves are carnivores, with moose and/or caribou as their primary food. During summer, small mammals including voles, lemmings, ground squirrels, snowshoe hares, beaver, and occasionally birds and fish are supplements in the diet. Wolves are opportunistic feeders; very young, old, or diseased animals are preyed upon more heavily than other age classes. Under some circumstances, however, such as when snow is unusually deep, even animals in their prime may be vulnerable to wolves (ADF&G, 1994).

Wolf populations fluctuate according to changes in prey populations (caribou and moose), and hunting by humans. Some of the highest wolf densities around the sale area occur along the Colville River. Surveys near Umiat revealed wolf density increasing from one wolf per square mile in 1987 to 1.6 wolves per mile in 1994. A survey in 1998 estimated 0.6 wolves per square mile. The decline may have reflected sharp decreases in moose numbers between 1992 and 1998 (BLM, 2005, citing Bente, 1998).

Wolverines are the largest terrestrial member of the family *Mustelidae*, which includes weasels, minks, and martens. Its scientific name is *Gulo gulo*, meaning glutton. Wolverines are primarily found in Alaska's wilder and more remote areas (ADF&G, 1994). They frequent all types of terrain and often utilize rivers as territorial boundaries (USF&WS, 1987). Wolverines occur throughout the Arctic coastal plain but are considered more common in the mountains and foothills of the Brooks Range (BLM, 2005).

Wolverines become sexually mature in their second year. Breeding takes place between May and August. After wolverines mate, the embryos float in the uterus until late fall or early winter. This type of reproduction is known as delayed implantation, and allows female wolverines to become pregnant when food

supplies are plentiful and when she is in good physical condition. The abundance of food determines whether a pregnancy will be maintained and the number of young that will be born (ADF&G, 1994).

Litters are born between January and April. In Interior and northern Alaska, most young are born in snow caves. These caves usually consist of one or two tunnels that may be up to 60 yards long. Litters usually number from one to three. Young wolverines, called kits, develop rapidly and are weaned at about eight weeks of age. They leave their mothers at approximately five or six months to forage for themselves (ADF&G, 1994).

Wolverines travel extensively in search of food. They are opportunistic; eating about anything they can find or kill and are well adapted for scavenging. Wolverines can survive for long periods on little food. Their diet varies from season to season depending on food availability. In the winter, wolverines rely primarily on the remains of moose and caribou killed by wolves and hunters or animals that have died of natural causes. Throughout the year, wolverines feed on small and medium-sized animals such as voles, squirrels, snowshoe hares, and birds. In some situations, wolverines can kill moose or caribou, but these occurrences are rare (ADF&G, 1994).

4. Marine Mammals

a. Polar Bears

Polar bears (*Ursus maritimus*) inhabit the coast of the North Slope sale area (see Figure 3.4). They are marine mammals and are protected under the Marine Mammal Protection Act of 1972. On May 15, 2008, the USFWS published a *Final Rule* in the Federal Register listing the polar bear as a threatened species under the federal Endangered Species Act. The USFWS based its listing on the loss of sea ice, which it says threatens and will likely continue to threaten polar bear habitat. The USFWS believes that this loss of habitat puts polar bears at risk of becoming endangered in the foreseeable future, the standard established by the Endangered Species Act for designating a threatened species. This final rule activates the consultation provisions of Section 7 of the Act for the polar bear. The special rule for the polar bear, also published in the May 15, 2008, edition of the Federal Register, sets out the prohibitions and exceptions that apply to this species. It recognizes the adequacy of the existing regulatory structure in protecting polar bears.

The State of Alaska has challenged the listing (Office of the Governor, 2008). The state maintains that there is insufficient evidence to support a listing of the polar bear as threatened for any reason at this time. Polar bears are currently well-managed and have dramatically increased over 30 years as a result of conservation measures enacted through international agreements and the Marine Mammal Protection Act.

Polar bears are distributed throughout the Arctic circumpolar region. Within this region, it is estimated that there are currently 20,000 to 25,000 polar bears (IUCN, 2006), a substantial increase from the early 1970s. Although no Distinct Population Segments have been identified across the Arctic circumpolar region, the IUCN (International Union for Conservation of Nature and Natural Resources) has established 19 management units for purposes of research and management (IUCN, 2006). Two of these overlap Alaska, the Southern Beaufort and the Chukchi Sea sub-populations.

Polar bears and brown bears evolved from a common ancestor and are closely related, as demonstrated by matings and production of fertile offspring in zoos (ADF&G, 1994). At least one successful pairing has occurred in the wild, as confirmed in 2006 by DNA analysis of a hybrid bear shot by a hunter on the southern tip of Banks Island, Northwest Territories (National Geographic News, May 2006). Although polar bears may be similar in size to some southern coastal brown bears, they are considerably larger than the brown bears found along the North Slope (Ott, 1997). Adaptations by the polar bear to life on sea ice include a white coat with water-repellent guard hairs and dense underfur, short furred snout, short ears, teeth specialized for a carnivorous diet, and hair nearly completely covering the bottom of the feet (ADF&G, 1994).

Polar bears breed from late March to May (ADF&G, 1994). During late October and November, pregnant females search for banks, slopes, or rough ice in which to dig a den, either on land or on sea ice (ADF&G, 1994). Litters of one to three cubs are born in December or January (Smith and Walker, 1995). In late March or early April, polar bears emerge from the den with their cubs and begin making excursions to drifting sea ice (ADF&G, 1994). The young remain with the mother until they are about 28 months old (ADF&G, 1994). Females can produce litters about every third year, and polar bears can live to be about 25 years old (ADF&G, 1994).

Radio collar surveys indicate that the Beaufort Sea population dens locally, and is not dependent on reproduction from other known denning areas outside of the region (Amstrup and Gardner, 1994). Polar bears do not exhibit site fidelity in denning, but return only to the general substrate and geographic area upon which they had previously denned: on ice or on land, and in the eastern or the western Beaufort respectively. The most preferred region for land denning is located east of the sale area in the northeast corner of Alaska and adjacent to Canada (Amstrup and Gardner, 1995).

Regehr et al. (2006) compared production indices between two time periods, 1967-1989 and 1990-2006. They found that, in the spring, the proportion and number of adult females with cubs of the year increased significantly between the two periods, but that yearling production was not significantly different. In the autumn, they found that the proportion and number of adult females with cubs of the year was significantly lower in the second time period, but yearling production was not significantly different. Litter size was not significantly different between the two time periods.

Polar bears are usually found near coastlines and the southern edge of sea ice, and they may make extensive seasonal movements related to the ice edge (ADF&G, 1994). This is because their primary food is the ringed seal, which inhabits the Arctic ice (ADF&G, 1994). Bears capture seals by waiting for them at breathing holes and at the edge of leads or cracks in the ice, by stalking resting seals on top of the ice, and by breaking into pupping chambers on top of the ice in the spring (ADF&G, 1994). However, Regehr et al. (2006) found that survival was not clearly related to sea ice coverage. Other prey includes bearded seals, walruses, and beluga whales, and polar bears will eat small mammals, bird eggs, and vegetation. Polar bears also feed on whale, walrus and seal carcasses (ADF&G, 1994).

Regehr et al. (2006) estimated the southern Beaufort Sea polar bear population to be 1,526 (95 percent CI = 1,211; 1,841) in 2006, which was not significantly different from a 1986 estimate of about 1,800 polar bears.

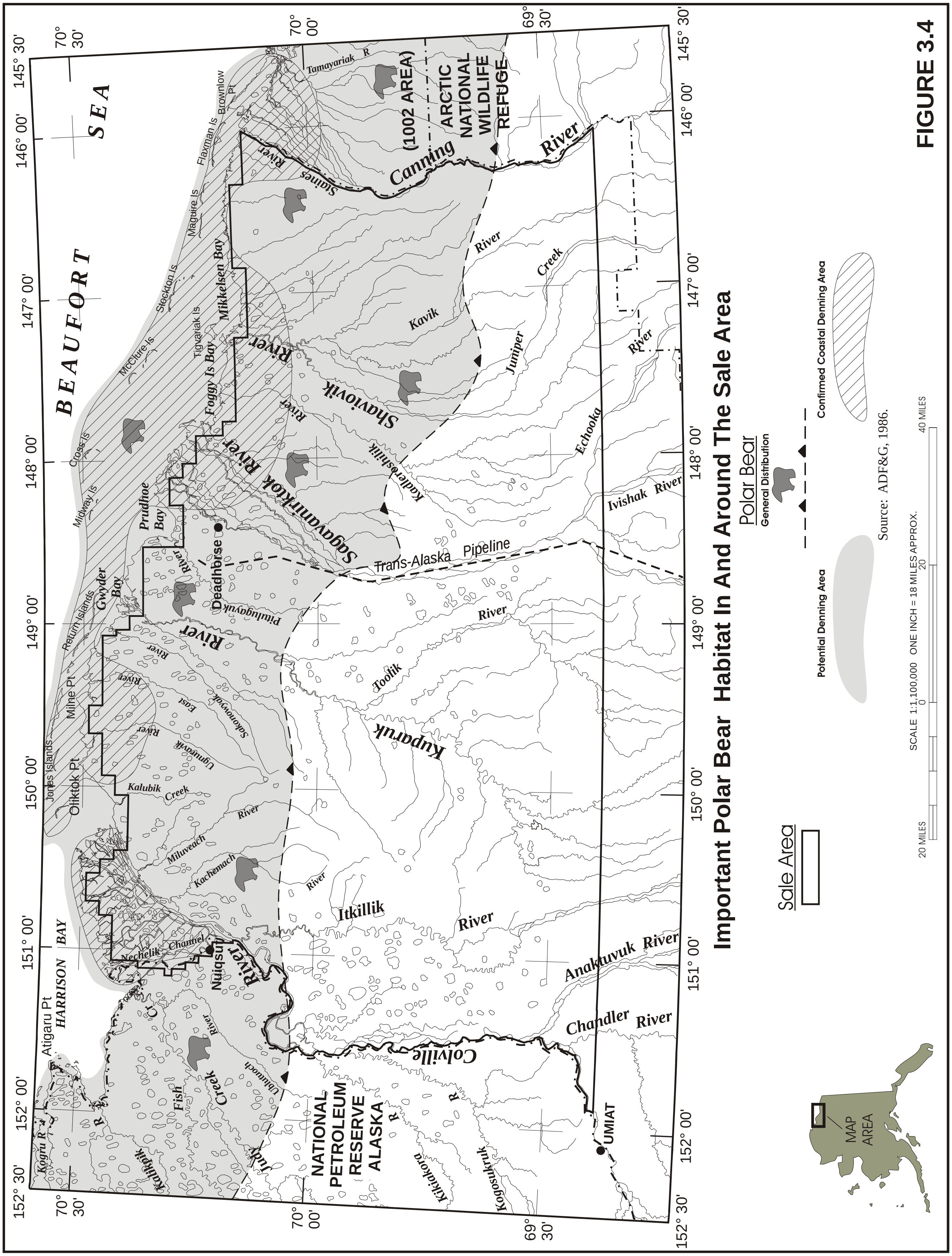


FIGURE 3.4
Important Polar Bear Habitat In And Around The Sale Area
Sale Area
Polar Bear
General Distribution
Potential Denning Area
Confirmed Coastal Denning Area
Source: ADF&G, 1986.
SCALE 1:1,100,000 ONE INCH = 18 MILES APPROX.
20 MILES
0
20
40 MILES
MAP AREA
BEAUFORT
SEA
HARRISON BAY
ARCTIC NATIONAL WILDLIFE REFUGE
(1002 AREA)
NATIONAL PETROLEUM RESERVE ALASKA
Trans-Alaska Pipeline
Deadhorse
Nuiqsut
UMIAT
Prudhoe Bay
Gwyder Bay
Foggy Is Bay
Mikkelsen Bay
Canning River
Sagavanirktok River
Shaviovik River
Kuparuk
Colville
Itkillik River
Anaktuvuk River
Chandler River
Staines River
Kavik
Echooka
Ivishak River
Toolik
Juniper
Kadleroshilik
Putuligayuk
Kalubik Creek
Miluveach
Kachemach
Nechelik Channel
Fish Creek
Ublutuoch
Kogru R
Kikiakrorak
Kogosukruk
Atigaru Pt
Oliktok Pt
Milne Pt
Jones Islands
Return Islands
Midway Is
Cross Is
McClure Is
Stockton Is
Tigvariak Is
Maguire Is
Flaxman Is
Brownlow Pt
Tamayariak R
145° 30'
146° 00'
147° 00'
148° 00'
149° 00'
150° 00'
151° 00'
152° 00'
152° 30'
70° 30'
70° 00'
69° 30'

Pinnipeds

Pinnipeds are aquatic mammals having finlike flippers as organs of locomotion; including ringed seals, spotted seals, and walrus. These species are not present in the sale area but are nearby, along the Beaufort Sea coast. Pinnipeds are protected under the Marine Mammal Protection Act of 1972. Ringed seals are the smallest of the pinnipeds and are the most abundant seal in the Beaufort Sea (ADF&G, 1994).

Ringed seals (*Phoca hispida*) are the smallest and most abundant of the Arctic ice seals. The size of the population is estimated from 40,000 in the winter to 80,000 in the summer. Densities of ringed seals near Prudhoe Bay between 1997 and 2002 ranged from 0.15 to 0.28 seals per mile. The differences may be due, in part, to the timing of surveys, the timing of lair abandonment, or a decrease in the abundance of seals since 1980. During winter and spring, ringed seals are found at the highest densities on stable shore-fast ice and during the summer months along the receding edge of the ice pack (BLM, 2007). Activities of ringed seals on the ice vary with the seasons. During the late spring and early summer, ringed seals use the ice as a solid surface on which to haul out and complete their annual molt. They are usually found near cracks, open leads, or holes where they have rapid access to water. During winter and spring, most of the breeding adults are found on stable land-fast ice. From March through May, during the spring breeding and pupping season, high densities of adults remain on the land-fast ice while sub adults are most numerous in adjacent flow ice zones (LaBelle et al., 1983) (see Figure 3.4).

Females give birth to a single, white-coated pup in snow dens on either land-fast or drifting pack ice during March and April. Female seals build lairs in pressure ridges or under snowdrifts for protection from predators and severe weather. There is some evidence that females lacking maternal experience give birth in drifting pack ice and may be more subject to polar bear predation. More experienced females give birth in land-fast ice and may have higher reproductive success (ADF&G, 1994).

Ringed seals molt in May and June. During this time they spend long periods hauled out on the ice basking in the sun. It is thought that warmer skin temperatures cause the new hair to grow more quickly. When hauled out on the ice, ringed seals are very wary, raising their heads every 20 seconds or so to look around. They rapidly enter the water when they detect an approaching human or other predator (ADF&G, 1994).

The amount of time spent on the ice increases as the molt season progresses. In summer, as the nearshore ice melts, most of the adult ringed seals are found along the edge of the pack ice, seaward of the sale area. Subadults may remain in the ice-free areas. Open leads and cracks in the ice are used by ringed seals to surface and breathe. During the fall, as freeze-up begins, seals will actively keep breathing holes open (Stirling, 1990).

Ringed seals spend much of the summer and early fall in the water feeding. Ringed seals eat a variety of invertebrates and fish. The particular species eaten depends on availability, depth of water, and distance from shore. In Alaska waters, the important food species are arctic cod, saffron cod, shrimps, and other crustaceans. Feeding is greatly reduced during the molt (ADF&G, 1994).

Spotted seals (*Phoca largha*) are commonly seen in coastal waters of northern Alaska during ice-free seasons. The name is descriptive of its markings, consisting of numerous dark, irregularly shaped spots (sometimes encircled by a faint ring) on a lighter background, usually of a brownish yellow color. Spots are most numerous on the back and upper flanks (ADF&G, 1994).

Spotted seals enter the sale area in July and are known to haul-out on the outer islands of the eastern Colville River delta. Spotted seals move out of the Beaufort Sea from September to mid-October as the shorefast ice reforms (Ott, 1997).

They are annual breeders, and mating occurs in late April to early May. Pupping occurs anytime from early April to the first part of May, although the peak is during the first two weeks of April. Pups are nursed for three to four weeks, during which time they more than double in weight. Adult females mate about the same time their pups are weaned (ADF&G, 1994).

They eat a varied diet; principal foods are schooling fishes, although the total array of foods is quite varied. There are geographical and seasonal differences in their prey. Along the coast spotted seals feed on herring, capelin, saffron cod, some salmon (especially in lagoons and river mouths), and smelt (ADF&G, 1994).

Bearded seals (*Erignathus barbatus*) are the largest seal normally found in the seas adjacent to Alaska. Bearded seals are heaviest during winter and early spring when they may reach weights of more than 750 pounds (341 kilograms). From June through September adults usually weigh from 475 to 525 pounds (216-239 kilograms). This seasonal weight loss results from decreased feeding during spring and summer and is most obvious in changes of the thick layer of blubber under the skin. Measured from nose to tip of tail (not including hind flippers), adults average about 93 inches (2.4 meters) (ADF&G, 1994). The majority of the bearded seal population in Alaska is in the Bering and Chukchi Seas. In the Beaufort Sea, the bearded seal is restricted primarily to moving ice during the summer (MMS, 1996a). They may be found in near shore areas during summer in the central and western Beaufort Sea. Their most important habitat during winter and spring is active ice or offshore leads. No reliable estimate of the abundance of bearded seals in the Beaufort Sea is currently available (BLM, 2007).

Female seals are able to breed successfully at age 5 or 6. Males become sexually mature at six or seven years. Bearded seals commonly become reproductively active before they attain maximum growth. The incidence of pregnancy in adult females is about 85 percent. During April, adult male bearded seals begin underwater “singing.” The song is a highly characteristic and complex frequency-modulated whistle, parts of which are audible to humans. Hunters are sometimes guided to a seal by its whistle (ADF&G, 1994).

Females bear a single pup, usually during late April or early May. The average weight of pups at birth is around 75 pounds and average length is about 52 inches. By the end of a brief nursing period lasting from 12 to 18 days, pups increase their weight almost three times, to around 190 pounds. This gain is due mainly to an increase in thickness of the blubber layer (ADF&G, 1994).

Bearded seals eat a wide variety of invertebrates and some bottom fishes. The main food items are crabs, shrimp, clams, and snails (ADF&G, 1994).

Pacific walrus are the largest pinnipeds in Arctic and subarctic seas. The majority of the North Pacific walrus population occurs west of Barrow, although a few walrus may move east throughout the Alaska portion of the Beaufort Sea to Canadian waters during the open water season. They are most commonly found in relatively shallow water areas, close to ice or land. The genus name for the walrus, *Odobenus* (meaning tooth-walker), refers to one of their most prominent characteristics, their tusks. These tusks, which are elongated upper canine teeth, are present in both males and females. They are huge animals; adult bulls often approach two tons in weight, and the females may exceed one ton (ADF&G, 1994).

Most females do not begin to breed until six or seven years of age. Mating occurs during January and February, but growth of the fetus does not begin until about mid-June. This delay in fetal growth is thought to occur in all pinnipeds. Walrus calves are born mostly in late April or early May during the spring migration. They weigh 100 to 160 pounds at birth. Calves are dependent upon their mothers for at least 18 months and occasionally for as long as 2½ years (ADF&G, 1994).

Cows will not abandon their calves, and vice versa. The cows make every effort to rescue their offspring. They often carry their dead calves away from hunters. Walruses, especially young males, will push dead and badly wounded animals (often larger than themselves) off an ice floe, out of hunters' reach (ADF&G, 1994).

Walruses feed mainly on bottom-dwelling invertebrates. Major food items include several different kinds of clams. The rejected shells can be found on the seafloor alongside the holes and furrows made by feeding animals. Other food items include snails, crabs, shrimps, worms, and occasionally seals. Walruses usually find food by brushing the sea-bottom with their broad, flat muzzles. The tusks are probably not used to any great extent during feeding (ADF&G, 1994).