Chapter Four: Habitat, Fish, and Wildlife

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Chapter Four: Habitat, Fish, and Wildlife

AS 38.05.035(g) directs that best interest findings consider and discuss the populations of fish and wildlife species and their habitats in the lease sale area. The North Slope Foothills lease sale area includes a wide variety of terrestrial and freshwater habitats, and a broad diversity of fish and wildlife species that support a host of subsistence, economic, and recreational activities in the area.

The lease sale area is identified as part of a large ecological region classified as Arctic tundra. This region extends across northern Alaska and continues to the east into Canada. The region is characterized by dwarf shrubs changing to very low flattened plants within the north coastal plains.

USFWS

Tundra habitat, looking south toward the Brooks Range, 1002 area ANWR.

Wetlands are common in low-lying areas, mainly supporting sedge and moss covers (CEC 1997). Wetlands are transitional zones between aquatic and terrestrial habitats that are characterized by poor soil drainage, and are primarily of four types in Alaska: bogs, grass wetlands, sedge wetlands, and marshes. Wetlands are used by migratory birds along the flyways, are highly productive habitats, and are important in preserving biological diversity (ADF&G 2006). The USFWS has developed a wetlands inventory for part of the sale area (USFWS 2009f).

The riparian habitats of the region are important to wildlife, birds, and fish. Riparia provide concentrated and diverse habitats, and reserves for other impacted habitats (Naiman et al. 2005). These riparian habitats are locations where terrestrial areas are regularly influenced by fresh water (Naiman et al. 2005). Wildlife seek availability of food, cover, territory, and access to water. The riparian river basin areas of the North Slope Foothills are important habitats within the Arctic region.

A. Ecoregions

The sale area is in the gently rolling foothills of the Brooks Range. The two ecoregion types found in this area are the Brooks Foothills ecoregion, the primary type, and the Brooks Range ecoregion to the south (ADF&G 2006). These are briefly described here.

1. Brooks Foothills

The Brooks Foothills ecoregion is comprised of gently rolling hills and broad ridges north of the Brooks Mountain range. (ADF&G 2006). The foothills are comprised of rolling uplands of moist tundra with outcrops of ridges, mesas, and bluffs such as Gunsight, Table Top, Itigaknit, and Imnavait mountains, Hatbox Mesa, and Tuktu Bluff. The elevation ranges from a low of 500 ft in the valleys of the northern section of the sale area, to a high of 6,000 ft near the boundary of the

Gates of the Arctic National Park and Preserve. Permafrost in the foothills area is generally shallow and surface ice may be present (AEIDC 1975).

The central and eastern portions of the sale area contain several lakes. In addition, wetlands are present in more than 83% of the Brooks Foothills ecoregion. Wetlands are found in the valleys and basins associated with river systems (ADF&G 2006).

Tundra habitats are cold-climate landscapes with vegetation, but are devoid of trees. A short growing season combined with long, cold, dark winters and low precipitation accompanied by strong, bitter, dry winds characterize this habitat. Precipitation is low in the foothills with about 6 to 10 in, and average annual temperature ranges from 9° to 20°F (ADF&G 2006). The precipitation includes snow, which has an average conversion rate of ten in of snow, that translates to one in of water. Winds are generally lighter than found at the coast, but can be stronger through the mountain passes. Cold winter temperatures combined with strong winds produce a chill factor that requires extreme caution in outdoor activities. February is the coldest month, except at Anaktuvuk Pass where January is recorded as the coldest. Average winter temperature is -35° F in the foothills. In July, the average temperature ranges from low to mid-60° F (AEIDC 1975).

The distribution of vegetation in the northern foothills of the sale area is affected by soil conditions, elevation, and drainage. Moist tundra is the dominant plant community of the foothills region. The dominant vegetation type across the foothills is tussock tundra, with willows in the small drainages, wet sedge tundra in old drained lakes, and *Dryas* tundra on the drier ridges (ADF&G 2006). Cottongrass tussocks 6 to 10 in high, with other sedges and forbs and scattered dwarf shrubs, separated by narrow channels, cover large area of rolling terrain. Other plants growing with the cottongrass include small shrubs such as dwarf birch, willows, Labrador tea, and a few herbs like bistort and cloudberry (AEIDC 1975). Prostrate woody shrubs, mosses, sedges and lichen cover the mountainsides and valleys (ADF&G 2006).

The high brush plant community occurs along the floodplains of many large rivers of the Arctic region, particularly in the mountains and foothills. Vegetation along rivers is dominated by willow. The rest of the ecoregion is dominated by vast expanses of mixed shrub-sedge tussock tundra. *Dryas* tundra occurs on ridges, and calcareous areas support sedge-*Dryas* tundra (ADF&G 2006). Soils are usually well-drained gravel, sand, or silt, and the active layer is deeper than in the remainder of the Arctic. Spring floodwaters and floating ice may destroy some vegetation, so the community is constantly changing. Newly exposed gravel bars are invaded by a pioneer flora with such species as horsetail, alpine bluegrass, and dwarf fireweed (AEIDC 1975).

2. Brooks Range

The southern border of the sale area is the Brooks Range ecoregion, and is the northern extension of the Rocky Mountains. This mountain range is a series of high, rugged mountain peaks that extend from the Canadian border across Alaska to the Chukchi Sea. This ecoregion is characterized by steep mountains composed of uplifted sedimentary and metamorphic rock with scattered glaciers about 5,940 ft (1,800 m). The Brooks Range is the main watershed divide between the Arctic and interior Alaska. High energy streams flow northward through steep valleys, and numerous lakes are found in the central and eastern areas of the range. Steep slopes remain barren due to instability. Upper and intermediate slopes contain alpine heath communities, lower slopes have moist sedge-tussock expanses, and shrub communities form along major rivers (ADF&G 2006).

Alpine tundra communities of the Brooks Range ecoregion occur in mountainous areas and along well-drained, rocky ridges. The coarse soil is rocky and dry, and much of the area is a community of low, mat-forming heather vegetation. Exposed outcrops and talus slopes sustain sparse islands of cushion plants and lichens among the rocks. The high brush community, found in areas that have not been disturbed for several decades, includes willows, a few herbs, a variety of mosses and lichens,

and possibly alder and a few well developed stands of cottonwood near springs in the eastern foothills of the Brooks Range (AEIDC 1975).

The low growth plant form protects the vegetation from abrasion by blowing snow and sand in the exposed, windswept habitat. Important plants include mountain avens, willows, and heather. Lichens, especially reindeer moss and other mosses, are common. Grasses, sedges, and a few herbs are also evident. Cushion plants such as moss campion and saxifrages, as well as many lichens, occur in the dry talus communities (AEIDC 1975). Wetlands occupy at least 20% of the Brooks Range ecoregion (ADF&G 2006).

B. Terrestrial Habitats

Terrestrial habitats in the North Slope Foothills area are composed of several overlapping systems that provide important habitat for wildlife, fish and humans.

1. Terrestrial Mammals

The foothills provide habitat for wide-ranging mammal wildlife species including several caribou herds, moose, and muskoxen. The foothills also contain denning sites for brown bears and wolves. The moist tundra provides nesting habitat for small mammals, such as the insular vole (ADF&G 2006). Six ADF&G Game Management Units (GMU) exist in the lease sale area: GMUs 24A, 24B, 25A, 26A, 26B, and 26C (Map 4.1).

a. Caribou

Caribou and other mammals of northern Alaska live in the varied habitats of the coastal plain and nearby uplands. There are three major herds of caribou (*Rangifer tarandus*) present throughout the sale area, the Central Arctic herd (CAH), the Western Arctic herd (WAH) and the Teshekpuk

USGS 2005

Fortress mountain formation (foreground) in the Brooks Range.

caribou herd (TCH). The discussion of the annual lifecycle of the migrating caribou in this section begins with the use of habitat by caribou for calving.

The CAH and WAH caribou herds migrate through the foothills to reach their calving grounds in the Arctic coastal plain. Generally, caribou arrive on calving and foraging areas on the coastal plain in late May to June and summer there through mid-August. Substantial numbers of the WAH spend the summer to the west of the lease sale area in the DeLong Mountains and Utukok Uplands. The CAH is usually found near the Arctic coast between the Colville and Canning Rivers, but at times may move into the foothills of the Brooks Range during the summer months (Lenart *In Prep-b*). The CAH's summer range extends from Fish Creek just west of the Colville River, eastward along the coast to the Katakturuk River (ADF&G 2007). The Etivluk, Anaktuvuk, and Chandler river valleys are particularly important WAH spring migration corridors for pregnant females heading westward toward the Utukok Uplands calving area (Dau *In Prep*). The caribou primarily roam outside of the foothills sale area during spring through the summer months.

Caribou wander widely and are very efficient at moving across both boggy and rugged terrain. Caribou must keep moving to find adequate food. This distributes feeding pressure and tends to prevent overgrazing. They commonly travel vast distances to reach suitable foraging sites on widely separated season 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 (ADF&G 1994d).

Distribution of caribou on the coastal plain can change dramatically within a 24-hour period. The frequency and extent of movement and habitat use during summer is influenced by weather and insect avoidance. Caribou move, sometimes running long distances, from inland feeding areas to windswept, but vegetation-free areas near the coast that offer relief from the insects, but return to forage when insect harassment subsides. Further inland, caribou may move to river bars, ridge tops and bluffs (ADF&G 1994d). Caribou also tend to congregate on gravel drilling pads and roads which are generally raised above the tundra and more exposed to the elements. Man-made pads and roads may allow the caribou to remain in preferred foraging habitat (Pollard et al. 1996).

Movement within the North Slope area between the summer and winter ranges is inconsistent, but predominately north-south along river corridors through mountain passes, but some may take routes straight over mountains (Map 4.2). Caribou populations, migration routes, wintering and summer ranges and other habitat uses vary over time and are difficult to predict.

Fall migration southward for the CAH occurs between mid-August and early November, primarily along the Itkillik, Kuparuk, Sagavanirktok, and Ivishak river valleys. During the rut in October, large concentrations can be found from Galbraith Lake to the upper Sagavanirktok River and Accomplishment Creek on the north side of the Brooks Range to the Chandalar Shelf and upper Chandalar River, located outside of the sale area on south side of the range.

Annual selection of winter range for portions of the herd appears to change over time. 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 1994d). On the north side of the range caribou are usually found east of the Dalton Highway in the area of the upper Sagavanirktok River foothills and some as far east as the Canning River, but may be found west of the highway in the uplands of the Itkillik, Kuparuk, and Toolik River drainages. Since the mid 1990's many CAH caribou have wintered on the south side of the range from Chandalar Shelf to as far east as the Arctic Village area (Lenart *In Prep-b*).

DCRA 2006

Caribou near Deadhorse.

i. Caribou Herd Characteristics

The CAH frequently mixes with the TCH where their ranges overlap along the Colville River. Occasionally the CAH mixes with the Porcupine caribou herd along the Canning River and south side of the Brooks Range. The CAH's winter range is located in the northern and southern foothills and mountains of the Brooks Range (ADF&G 2007). Comingling of the CAH with the WAH is uncommon, but has occurred in the Galbraith Lake area and also on the south side of the range.

The WAH caribou are as likely to climb directly over mountain ridges and use the major river systems west from the Anaktuvuk River for both fall and spring migration. Most of the WAH do not move east of the Anaktuvuk River; however, in some years tens of thousands may migrate along the Anaktuvuk River and through Anaktuvuk Pass. Much of the herd winters to the south of Anaktuvuk Pass, although some may winter in the mountains and foothills between Anaktuvuk and Howard Passes and as far north as Umiat, near the Colville River (Dau *In Prep*).

The TCH usually migrates during October and November and winters on the Arctic coastal plain with some animals wintering in the foothills and mountains of the Brooks Range. Beginning in the early 2000s most of the herd began wintering between Teshekpuk Lake and Anaktuvuk Pass. A portion of the herd migrates in a broad front using all major drainages from the Anaktuvuk River. The TCH may use the Brooks Range for wintering with a few animals that may be found over on the south side of the range (Parrett *In Prep*).

ii. Population Status

In recent years the CAH and TCH populations have been increasing, while the WAH has declined since 2003, as discussed below.

The range of the Central Arctic herd (CAH) extends from the northern foothills to the Beaufort Sea, and from the Colville River to the just east of the Canning River. Tracking of the CAH from 1985 to 1990 showed migration throughout the sale area (Geomatics 2002). In 2002 the herd was estimated to be 31,857 caribou (ADF&G 2007). By 2008 the CAH has continued to expand to an estimated 66,772 caribou (Dau *In Prep*).

The Western Arctic herd (WAH) ranges over approximately 140,000 mi^2 (363,000 km^2) of northwestern Alaska, including the Brooks Range and its northern foothills, west of the trans-Alaska pipeline (ADF&G 2007). The herd population in 2003 was 490,000, and has declined to 377,000 caribou in 2007 (Dau *In Prep*).

The Teshekpuk herd (TCH) ranges near Teshepuk Lake and in the western portion of the lease area. The population in 2002 was estimated at 45,166 caribou (ADF&G 2007 citing to Carroll 2003). In 2008, the herd is estimated at over 64,000 caribou (Dau *In Prep*)

b. Moose

Moose (*Alces alces gigas*) are currently distributed across the North Slope region, but concentrated along riparian habitat of major rivers flowing north from the Brooks Range. Riparian shrub habitats are important for many Arctic herbivore animals, especially in the winter (Butler and Keilland 2008). Breeding populations have migrated north and become established on the lower Colville River and Kavik rivers, the northern extent of the moose's range (Map 4.3).

Following the snow melt, usually in May, moose may disperse across the tundra coastal plain. Many move into small tributaries and hills surrounding riparian habitat, and some migrate as far as the foothills of the Brooks Range (ADF&G 2008b). Calving occurs during this period in May, where cows may be widely dispersed. Rutting occurs between late September and early October when large congregations may be observed (ADF&G 1986b). Most moose follow riparian corridor habitats during winter. Lenart (2008) reports that moose are limited to use of riparian habitat in winter in GMU 26. In the lease sale area, the largest winter concentrations of moose are found in the inland portions of the Colville River drainage (ADF&G 2008b).

i. Population Status

The moose count for GMU 26B and 26C peaked in the late 1980s, with a count of about 1250-1350 moose (Lenart 2008). Between 1997 and 2008 the population steadily increased. The estimated moose count in 2005 for Game Management Unit (GMU) 26A was 1,048 (ADF&G 2008a). The population in GMU 26B was 400 to 550 moose during the years of 2004 through 2008 (ADF&G 2008b). The estimated population in GMU 26B is approximately 550 to 650 moose (Lenart 2008).

c. Brown Bear

Brown bears (*Ursus arctos*), also known as grizzly bears, may be found throughout the sale area. Bears hibernate in dens in a variety of terrain ranging from pingos and stream and lake banks at low elevations to mountain slopes near the crest of the Brooks Range (ADF&G 2006; Map 4.4).

USFWS

Brown bear.

Brown bears on the coastal plain travel along the major river corridors and feed in riparian areas the majority of the time (Shideler and Hechtel 2000).

Bears were found to be most numerous in the mountain habitats, as are found in the lease sale area of the North Slope Foothills (Shideler and Hechtel 2000, citing to Rausch 1953 and Bee and Hall 1956). They normally emerge in April or May. Adult males emerge first, followed by single females, then females with young. In spring they are commonly found along major river valleys and later move to smaller tributaries and poorly drained areas to feed (ADF&G 1986b). They are typically solitary except where food sources are concentrated, such as streams or carcasses (ADF&G 1994c).

During the summer, bears most frequently feed on grasses and forbs in wet sedge meadows, around late snow bank areas, and tussock tundra, and in the fall tend to use the floodplains, dry ridge areas or mountain slopes to feed on roots, berries, and ground squirrels (ADF&G 1986b). Bears prey on both calf and adult moose, muskoxen, and caribou, and can detect carrion and human garbage more than a mile away (ADF&G 1994c).

The highest concentrations of bear are found each fall in berry feeding areas along the Colville, Itkillik, Chandler, Anaktuvuk, Sagavanirktok, and Ivishak rivers (Map 4.4). The bears enter their dens around September to early October and remain there until spring.

i. Population Status

The population in 1989 in GMU 26A west was estimated at 400 bears, and for 26A east was estimated at 500 to 720 bears. The GMU 26A is divided into east and west along the 159° W longitude (Carroll 2007). From the survey period ending in 2003 the estimate for GMU 26B was 269 bears, and over 390 bears for GMU 26C based on a previous survey in 1993 (Lenart 2007). Currently, the density is estimated to be stable or possibly increasing slowly based on consistent habitat conditions and low harvest rates. In general, productivity for brown bears in the North Slope region is low to moderate and variable, and declines from west to east, with greater densities in the North Slope foothills (Carroll 2007; Lenart 2007).

d. Muskoxen

Muskoxen (*Ovibos moschatus*), also called omingnak or the bearded one, are large mammals that have been reestablished in 1969-1970 into Alaska's Arctic habitat (USGS 2009). Muskoxen are not migratory, but they may move in response to seasonal changes in snow cover, vegetation, and natural behavior.

Muskoxen use riparian cover habitats along river corridors, flood plains and foothills in all seasons. Animals select moist sedge habitats during late winter and the spring calving seasons. In research conducted about muskoxen they found that upland shrub habitat was selected only during calving. Bare cover was selected in all seasons except spring. Mountain terrain was avoided in all seasons (USGS 2009, citing to Reynolds 1998).

Adult females, young animals, and some males live in social groups year round. Other males are solitary in summer and live in groups in winter (USFWS 2009d). In research studies, seasonal changes in movements, activity and habitat are related to forage availability and the energy budgets of the animals (USGS 2009, citing to Jinfors 1980, Thing et. al. 1987). Researchers observed groups of muskoxen along river corridors and uplands during summer and winter field surveys (USGS 2009, citing to Wilson 1992).

Calving occurs from late March or April through mid-June (USGS 2009). In summer and fall muskoxen are found along major river drainages, such as the Canning River, where they feed on dried sedges and grasses (USFWS 2009d). The rut occurs during August through October.

DCRA 2009

Muskox.

The strategy of muskoxen during calving and winter seasons is to conserve energy by restricting movements and activity, and selecting habitats with low snow cover (USGS 2009; Reynolds 1998). Winter foraging sites were frequently narrow windblown bluffs adjacent to rivers where snow accumulation was low (USGS 2009, citing to Nellemann and Reynolds 1997). These animals 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 1994h).

i. Population Status

Muskoxen have dispersed from the Arctic National Wildlife Refuge (ANWR) westward into eastern GMU 26A, but are currently at low population numbers. The population in 1995 had expanded westward to the Itkillik River (USGS 2009, citing to Reynolds 1998). Precalving surveys in GMU 26A east and 26B during the 1990's showed a steady increase in muskoxen before stabilizing at about 250 to 300 animals by 2003. A decline to an estimated 216 animals was observed in 2006, but has since stabilized (Lenart *In Prep-a*)

e. Dall Sheep

Dall sheep *(Ovis dalli dalli)* live on ridges, dry meadows and steep mountain slopes (USFWS 2009a; Map 4.5). Dall sheep eat grasses, sedges, broad-leaved plants, and dwarf willows. Dall sheep may also supplement their diet with the use of mineral licks (USFWS 2009a).

Movement occurs seasonally between summer and winter ranges (USFWS 2009a). They roam in small social units of a female ewe and groups of lambs and yearlings, or a group of male rams. Habitats with light snowfall allow access to winter forage, while heavy snows can cause declines in population (USFWS 2009a).

Lambing occurs in late May or early June in the most rugged cliffs available on spring ranges. Ewes and calves remain until the lambs are strong enough to travel. Lambs begin feeding on vegetation within a week after birth and are usually weaned by October (ADF&G 1994f).

The Dall sheep's summer range is relatively widespread with an abundant, wide variety of forage, and many sheep may travel miles to visit mineral licks. Winter diet is much more limited and consists primarily of dry, frozen grass and sedge stems available when snow is blown off the winter ranges. Some populations use significant amounts of lichen and moss during winter (ADF&G 1994f). There is no current information on the size of the Dall sheep population in the lease sale area at this writing.

f. Furbearers

i. Wolves

Wolves (*Canis lupus*) exist in a wide variety of habitats, and are primarily found in the mountains and foothills along major rivers. Some wolves are solitary hunters, and some may hunt in pairs. Others may change packs or move to new areas. In winter wolf packs stay together to hunt. Wolves hunt caribou, Dall sheep, moose, small rodents, birds and ground squirrels (USFWS 2009b).

ADF&G conducted a survey in 2008 within GMU 26A, that covered an area of 17,800 km^2, extending to and including the Killik River drainage to the west, the Anaktuvuk River drainage to the east, the Colville River drainage between the mouths of the Killik and Anaktuvuk rivers to the north, and latitude 68°17' to the south. The results of this survey indicated a calculated density of 3.3 wolves/1,000 km^2 for wolves that were visibly seen by researchers, and a calculated density of 4.4 wolves/1,000 km^2 for all wolves within the study area (Carroll *In Prep*).

ii. Other Furbearers

Several other terrestrial mammals have been documented in the sale area. Red fox (*Vulpes vulpes)* are relatively common; whereas, Arctic fox (*Alopex lagopus*) seldom range into the sale area. The southern boundary of known habitat for the Arctic fox is the southern extent of the coastal plain (Burgess 2000, citing to Smits and Slough 1993). Other common furbearers in the region include, as follows: the river otter (*Lutra canadensis*), Alaska marmot (*Marmota broweri)*, and the snowshoe hare (*Lepus* americanus). Information on the abundance and distribution of these species is limited (ADF&G 1994a).

Other mammals found in the Arctic region include the Arctic hare, Arctic ground squirrel and lemming (CEC 1997). The USFWS has reported that other mammals are also found on the Arctic Refuge, an area located directly to the east of the sale area: wolverines; shrews; beavers; muskrats; voles; coyotes; lynx; black bear; and weasels (USFWS 2009c).

There is no current information on the size of the other furbearer populations in the lease sale area at this writing.

2. Terrestrial Birds

Alaska's tundra supports numerous migratory bird species, providing important breeding, nesting, rearing, staging, refugia, and overwintering habitat (ADF&G 2006; CEC 1997; Table 4.1.; Map 4.6).

Some bird species known to nest in the Arctic near the lease area are the red phalarope, northern phalarope, pectoral sandpiper, semipalmated sandpiper, buff-breasted sandpiper, dunlin, lapland longspur, and savannah sparrow. Several species of relatively common waterfowl nest in wetlands, listed as follows: tundra swan, Canada goose, northern pintail, long-tailed duck (old squaw), common eider, king eider, and spectacled eider. Arctic and red-throated loons breed on small lakes, as do sabine's gulls and Arctic terns (Office of the Governor of Alaska 1995).

Table 4.1. Some bird species that may be found in the North Slope Foothills lease sale area.

	Habitat Type												
	Forest				Shrub				Tundra			Water	
Common Name	DF	CF	CD	WDF	DS	LS	MS	TS	MT	WT	ADT	LP	RS
Red-throated loon												*	*
Pacific loon												*	
Common loon												*	
Yellow-billed loon												*	
Horned grebe												*	
Red-necked grebe												*	
Tundra swan												*	
Trumpeter swan												*	
Greater white-fronted goose										*			
Snow goose										*			
Emperor goose										*			
Canada goose										*			*
Brant										*			
Mallard												*	*
Green-winged teal												*	
American widgeon												*	*
Northern pintail												*	*
Northern shoveler												*	
Canvasback												*	
Greater scaup												*	
Lesser scaup												*	
Common eider													*
King eider										*			
Black scoter												*	*
White-winged scoter												*	*
Surf scoter													*
Harlequin duck												*	*
Old squaw												*	
Common goldeneye												*	
Bufflehead												*	
Red-breasted merganser												*	*
Golden eagle											*		
Bald eagle		*	*									*	*
Northern harrier				*	*	*			*	*	*		
Sharp-shinned hawk			*	*									
Northern goshawk			*	*									
Red-tailed hawk	*	*	*	*									
Rough-legged hawk											*		
Osprey												*	*
American kestrel			*	*									
Merlin			*	*					*				
Peregrine falcon			*						*		*		
Gyrfalcon									*		*		
Spruce grouse		*	*										
Ruffed grouse	*		*										
Sharp-tailed grouse		*	*	*									
Willow ptarmigan						*			*	*	*		

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Table 4.1. Page 2 of 4.

	Habitat Type												
	Forest				Shrub				Tundra			Water	
Common Name	DF	CF	CD	WDF	DS	LS	MS	TS	MT	WT	ADT	LP	RS
Rock ptarmigan					*				*	*	*		
Sandhill crane									*				
Semipalmated plover												*	*
Black-bellied plover									*	*			
Lesser Golden plover						*			*	*	*		
Bar-tailed godwit										*			
Whimbrel									*		*		
Lesser yellowlegs				*					*	*		*	*
Solitary sandpiper													*
Spotter sandpiper													*
Wandering tattler											*		
Red-necked phalarope										*		*	
Red phalarope										*		*	
Long-billed dowitcher										*		*	
Stilt sandpiper										*			
Common snipe				*					*	*			
Ruddy turnstone					*	*	*				*		
Surfbird											*		
Dunlin										*			
Sanderling													*
White-rumped sandpiper										*			
Western sandpiper					*						*		
Least sandpiper									*	*			
Semipalmated sandpiper										*			
Baird's sandpiper					*						*		*
Pectoral sandpiper										*			
Upland sandpiper				*					*				
Buff-breasted sandpiper									*				*
Parasitic jaeger									*	*	*		
Pomarine jaeger										*			
Long-tailed jaeger					*				*	*	*		
Bonaparte's gull												*	
Herring gull												*	
Glaucous gull										*		*	
Mew gull										*		*	*
Glaucous-winged gull										*		*	
Sabine's gull										*		*	
Arctic tern												*	*
Short-eared owl				*	*	*			*				
Great-horned owl	*	*	*										
Great Gray owl		*	*										
Snowy owl									*	*	*		
Boreal owl		*	*										
Northern hawk-owl	*	*	*	*				*					
Belted kingfisher												*	*
Northern flicker	*		*										
Downy woodpecker	*		*										
Hairy woodpecker	*	*	*										

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Table 4.1. Page 3 of 4.

	Habitat Type												
	Forest				Shrub				Tundra			Water	
Common Name	DF	CF	CD	WDF	DS	LS	MS	TS	MT	WT	ADT	LP	RS
Three-toed woodpecker		*	*										
Black-backed woodpecker		*	*										
Olive-sided flycatcher		*	*	*									
Say's phoebe				*							*		
Alder flycatcher							*	*					
Horned lark					*				*	*	*		
Tree swallow			*	*								*	*
Violet-green swallow	*	*	*	*								*	*
Bank swallow												*	*
Cliff swallow			*									*	*
Gray jay		*	*	*				*					
Common raven		*	*	*	*	*	*	*	*	*	*	*	*
Black-capped chickadee	*	*	*	*						*	*		
Siberian tit		*											
Boreal chickadee		*	*	*									
Arctic warbler						*	*	*					
Ruby-crowned kinglet	*	*	*	*			*	*					
Swainson's thrush	*		*				*	*					
Gray-cheeked thrush		*	*	*			*	*					
Varied thrush	*	*	*					*					
American robin	*	*	*	*		*	*	*	*	*			
Northern wheatear									*		*		
Bluethroat						*			*	*			
Northern shrike				*			*	*					
American (water) pipit					*				*		*		
Yellow wagtail					*				*	*			
American dipper													*
Bohemian waxwing	*		*	*				*					*
Orange-crowned warbler	*		*					*					
Yellow-rumped (myrtle) warbler	*	*	*					*					
Blackpole warbler		*	*					*					
Yellow warbler			*					*					
Wilson's warbler	*		*				*	*					
Northern waterthrush	*		*					*					*
Savannah sparrow				*	*	*			*		*		
American tree sparrow			*	*	*	*	*	*	*				
Dark-eyed junco		*	*	*									
Golden-crowned sparrow				*			*	*					
White-crowned sparrow			*	*		*	*	*					
Fox sparrow				*			*	*					
Lincoln's sparrow				*		*	*						
Smith's longspur					*						*		
Lapland longspur					*				*	*	*		
Snow bunting					*						*		
Rusty blackspur	*	*	*	*			*						
White-winged crossbill		*	*										
Pine grosbeak	*	*	*										

-continued-

Table 4.1. Page 4 of 4.

	Habitat Type												
	Forest				Shrub				Tundra			Water	
Common Name	DF	CF	CD	WDF	DS	LS	MS	TS	MT	WT	ADT	LP	RS
Common redpoll	*	*	*	*			*	*	*				
Hoary redpoll	*	*	*	*			*	*	*				
Rosy finch					*								
Northern phalarope[a]													
Spectacled eider[a]													
Whistling swan[a]													

Source: NPS 2000.

Notes: These bird species have been documented in the Gates of the Arctic National Park, which is adjacent to the lease sale area. All listed species have not necessarily been documented in the lease sale area itself.

Habitat types are: DF - deciduous forest; MT - moist tussock tundra; CF - coniferous forest; WT - wet sedge tundra; CD - coniferous/ deciduous mix; ADT - alpine/ dry tundra; WDF - woodland/ dwarf forest; LP - lakes and ponds; DS - dwarf shrub mat (to 18 inches high); RS - rivers and streams; LS - low shrub thicket (to 3 ft tall); MS - medium shrub thicket (about 6 ft tall); TS - tall shrub thicket (over 6 ft tall).

[a] Not documented by NPS for Gates of the Arctic National Park, but has been documented in the lease sale area.

The Colville River Bluffs contain nesting and feeding habitat for the peregrine falcon and other raptors (ADF&G 2006). Moist tundra areas found mainly between the rivers are home to snowy owls, ravens, and northern harriers (AEIDC 1975). Representative bird species include the following: snow, Brant and Canada geese; yellow-billed, Arctic, and red-throated loons; whistling

DCRA 2004

Tundra swans.

swans; long-tailed ducks; gyrfalcons; willow and rock ptarmigan; red-necked phalarope; parasitic jaeger; snowy owls; hoary redpoll; and snow bunting (CEC 1997). Moist tundra also provides nesting habitat for Baird's, stilt and buff-breasted sandpipers (ADF&G 2006).

Specific information is lacking for most of the birds found in the lease sale area. Some species of common interest are discussed here for which there is documented information: the tundra swan; and the peregrine falcon.

Tundra swans arrive to the Arctic coast in late May and early June in the Arctic Refuge, which is located directly east of the sale area. They nest on sedge habitat in upland tundra near river deltas on the coastal plain (Smith et al. 1993). During the summer the swans move around locally, feeding on submerged and emergent aquatic plants. Adults molt from mid-July through August and fall migration begins late September (Johnson and Herter 1989). In September flocks of family groups depart, returning to the Arctic coastal plain the following year (USFWS 2009e).

There are several bird species that may be found in the lease sale area that are currently identified or nominated as threatened or endangered under the federal Endangered Species Act. The species that may be found in the lease sale area are the spectacled eider (threatened), the Stellar's eider (threatened), and the yellow-billed loon (proposed candidate).

C. Freshwater Habitats

Freshwater habitats of the North Slope Foothills area include: several large river systems; an abundance of lakes, streams, and wetlands; and numerous seasonal ponds and creeks. They serve as movement corridors, provide habitat for spawning, rearing and overwintering, vegetative cover, are significant sources of detritus, and are frequently migrations corridors for wildlife (ADF&G 2006). Freshwater habitats range from small, intermittent streams to large rivers, and from small ponds to large lakes. Water sources for these habitats include glacial melt, snowmelt, precipitation, and groundwater such as springs and upwelling areas. Lake and pond habitats are influenced by substrate, bathymetry, and geologic structures (ADF&G 2006).

The anadromous waters in the lease sale area are the Colville, Sagavanirktok, Ivishak, Nanushuk, Echooka, Saviukviayak, Itkillik, Anaktuvuk, Kanayut, Lupine, Ribdon and Canning rivers, portions of the Chandler River, and Accomplishment, Upper Section, Lower Section, Flood, Cobblestone, May creeks (Johnson and Klein 2009; Map 4.7). Other major waterways are located in the sale area, but have not been established as being determined to be anadromous waters. These river systems include the Kuparuk, Killik rivers and their tributaries.

The type of habitat provided by streams and rivers is defined by the substrate, which ranges from large boulders, cobble, gravel, glacial silt, clay, and mud. Stream and river morphology also contributes to defining the habitat, including such characteristics as straight, meandering, or braided; and morphologic complexity is an important contributor to habitat quantity and quality (ADF&G 2006).

The freshwater habitats of the Arctic are home to many species of fish (Table 4.2.). There are multiple types of fish lifestyles found in the Arctic freshwaters. Those fish that spend most of their lives at sea, and return only to spawn, are termed anadromous fish. Examples are some salmon species, i.e. pink, chum, Chinook and coho. Species that spend summer feeding at sea, and move to freshwater rivers and streams in late summer and fall, to spawn and live for the winter, are called amphidromous fish. Some examples of these fish are Dolly Varden, Arctic char, Arctic cisco, and broad whitefish. Fish that reside in freshwater for their entire lifecycle are called resident fish, such as Arctic grayling, burbot and lake trout (Reynolds 1997).

The lease sale area contains habitat important to populations of anadromous, amphidromous, and resident freshwater fish (Map 4.7). Numerous oligotrophic lakes that lack plant nutrients and contain

a large amount of dissolved oxygen are located primarily in the central and eastern foothills area. These lakes vary in size from a few acres to thousands of acres. The lakes provide unique habitat for lake trout and lake resident Arctic char, two species with narrow environmental tolerances. The lakes also support significant populations of Arctic grayling, lake trout and whitefish (ADF&G 2006).

Table 4.2. Some waterways and fish species found in the North Slope Foothills lease sale area.

Freshwater Species	Anadromous Species
Sheefish	Least cisco
Round whitefish	Bering cisco
Lake trout	Arctic cisco
Arctic char	Broad whitefish
Northern pike	Humpback whitefish
Lake chub	Pink salmon
Longnose sucker	Chinook salmon
Trout-perch	Chum salmon
Burbot	Coho salmon
Ninespine stickleback	Rainbow smelt
Slimy sculpin	Arctic lamprey
Threespine stickleback	Dolly Varden
Alaska blackfish	
Arctic grayling	

Source: USFWS 2010.

A critical and limiting habitat factor affecting the freshwater fish populations is the available suitable habitat in the winter. Fish overwinter areas represent a small percentage (about 3%) of the total water volume available during the summer (Schmidt et al. 1989). Fish that overwinter in Arctic freshwaters rely on these protective havens for the success of their populations. The fish of all stages may crowd into the same unfrozen river area for the entire winter (Schmidt et al. 1989). Different fish species overwinter in dissimilar habitat types. For example the Arctic char are found in the middle and upper rivers, as compared to other anadromous species that prefer deep pools and river deltas for overwintering habitats (Schmidt et al. 1989, citing to Craig and McCart 1974). The anadromous fish populations have reduced risk of extinction by spreading their members over different overwintering sites (Schmidt et al. 1989, citing to Craig 1989).

1. Dolly Varden

Dolly Varden is an amphidromous species that summers in coastal waters and returns inland to spawn and overwinter in northern rivers. In the north these fish spend their lives migrating between salt water habitats to freshwater overwintering areas in rivers in locations of spring upwelling (Viavant 2008; Scanlon 2008). Dolly Varden spawn and rear in fresh water prior to smolting, but feed as adults in marine waters. At maturity, usually around age 5 or 6, Dolly Varden return to spawn in the stream from which they originated (ADF&G 1994g). Dolly Varden spawn in streams

during fall from mid-August to November. Hatching of eggs may occur in March, and they emerge in June. Dolly Varden remain in freshwater locales for several months or years before migrating to coastal waters. They usually migrate to the sea in their third or fourth year during September and October (ADF&G 1986b).

Rivers in the lease sale area known to support significant populations of Dolly Varden and Arctic char include the Canning, Sagvanirktot, and Anaktuvuk rivers (Map 4.8). The fish return to overwinter in fresh water each winter because they cannot tolerate the super-cooled water temperatures of the arctic sea water, and must overwinter in fresh water for five or more winters before spawning (Viavant 2008).

Fish use strategies to survive the winter by locating safe havens from predators, and live in areas free of anchor ice and rich in groundwater fed tributaries. To reduce energy loss, fish metabolism and oxygen requirements reduce, fish move to deeper groundwater fed sections, and benthic feeding in

fish crowded zones occurs. Fish have been found to winter in the same river areas year after year (Reynolds 1997). Winter is the limiting, most critical period for Alaskan freshwater fish habitats (Reynolds 1997, citing to Craig 1989 and Johnson 1976).

Overwintering locations may be different from spawning, because non-spawning fish from neighboring tributaries may concentrate in a single river drainage. The upper Ivishak River provides overwintering areas used also by fish from the Ribdon, Lupine and Echooka rivers (Scanlon 2008).

The Ivishak, Anaktuvuk and Kongakut rivers have documented overwintering populations of Dolly Varden (Viavant 2007, citing to Bendock 1980, 1982, 1983; Craig 1989; Furniss 1975; Yoshihara 1972, 1973; Viavant 2008; Winters 2000). Aerial monitoring of Dolly Varden in the Ivishak River in 2006 resulted in a count of 5,411 in a known overwintering area (Viavant 2008).

2. Arctic Grayling

Arctic grayling (*Thymallus arcticus*) are resident fish, and can be migratory, or may remain in the same section of a stream. They seek the deep reaches on lower clear rivers, and tolerate low oxygen

ADF&G

Colville River.

regimes over long winter seasons (Reynolds 1997). They may move into river deltas and coastal waters near to the shore after spring break-up, and spawn in May and June in the northern foothill streams. Adults leave these smaller feeder streams shortly thereafter to spend their summer in the main streams and rivers. Juveniles remain in the foothill streams throughout the summer and leave for deeper water before freeze-up in September (ADF&G 1994b).

3. Broad Whitefish

Broad whitefish (*Coregonus nasus*) are found in Arctic Ocean drainage river systems, and are amphidromous in lifestyle. After spawning, usually at age 4 or 5, these fish migrate back downstream during freeze-up to overwinter under the ice in deep freshwater pools and lakes. Broad whitefish use the lakes and river pools for summer feeding areas, and in some cases, overwintering habitat (Gallaway et al. 1997). It is possible that on some North Slope river drainages, all members of a population may occupy a single spring fed pool during winter (Reynolds 1997, citing to Craig, 1978). They migrate out of the larger rivers, such as the Sagavanirktok, during spring breakup in early June. After spending summer feeding in shallow bays and lagoons along the coast they return to their gravel spawning areas in the foothill streams in late July and August (ADF&G 1986b).

Broad whitefish have been found to live in deep freshwater lakes connected to river systems, with some living in the lakes year round (Gallaway et al. 1997, citing to Bond 1982, and Bond and Erickson 1985). The lack of connected deep, freshwater lake systems in the Sagavanirktok River has created a disjunct spawning population of broad whitefish. The lack of suitable overwintering habitat places severe constraints on these fish populations (Gallaway et al. 1997).

4. Salmon

Chum salmon (*Oncorhynchus keta*) are found in the Arctic Ocean from Canada west to the waters of Siberia, and are anadromous fish. They are known locally as dog salmon. After spending the summer in freshwater rivers, they migrate to the sea where they spend one or more of their winters at sea. Chum salmon then return to spawn in the side channels of large northern rivers (ADF&G 1994e).

Pink salmon (*O. gorbuscha*) are anadromous fish native to Arctic coastal waters. Adult fish migrate into rivers between late June and mid-October. Most spawn within a few miles of the coast, and may spawn in the intertidal zone or mouth of streams. Pink salmon mature in two year cycles, making odd-year and even-year populations unrelated. This population is the smallest of the Pacific salmon found in North America (ADF&G 1994i). The egg stage of the pink and chum salmon are the only part of the population that overwinters in Arctic rivers (Reynolds 1997).

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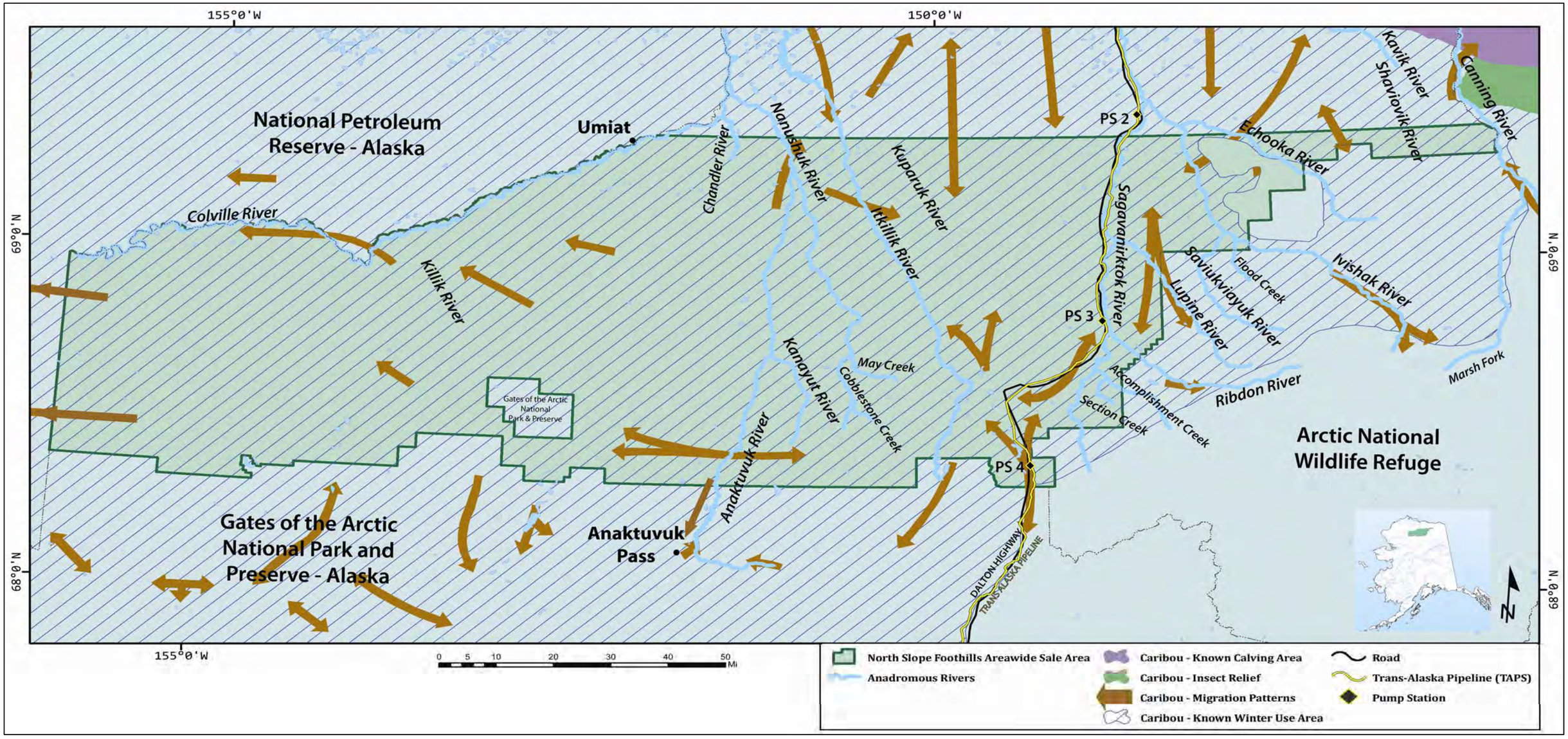
E. Maps

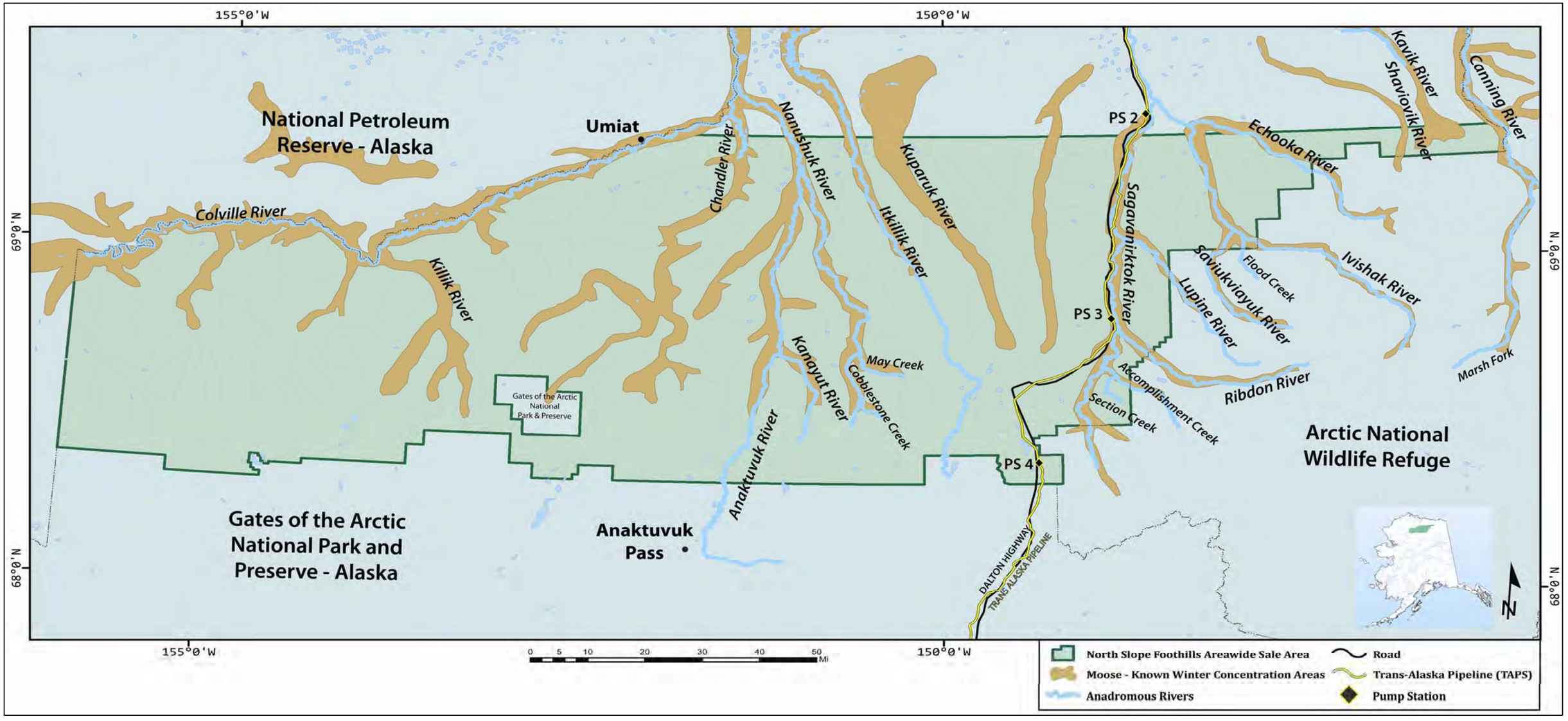
Source: ADF&G 1986a.

Map 4.1. ADF&G Game management units (GMUs) in the North Slope Foothills lease sale area.



Source: ADF&G 1986a.

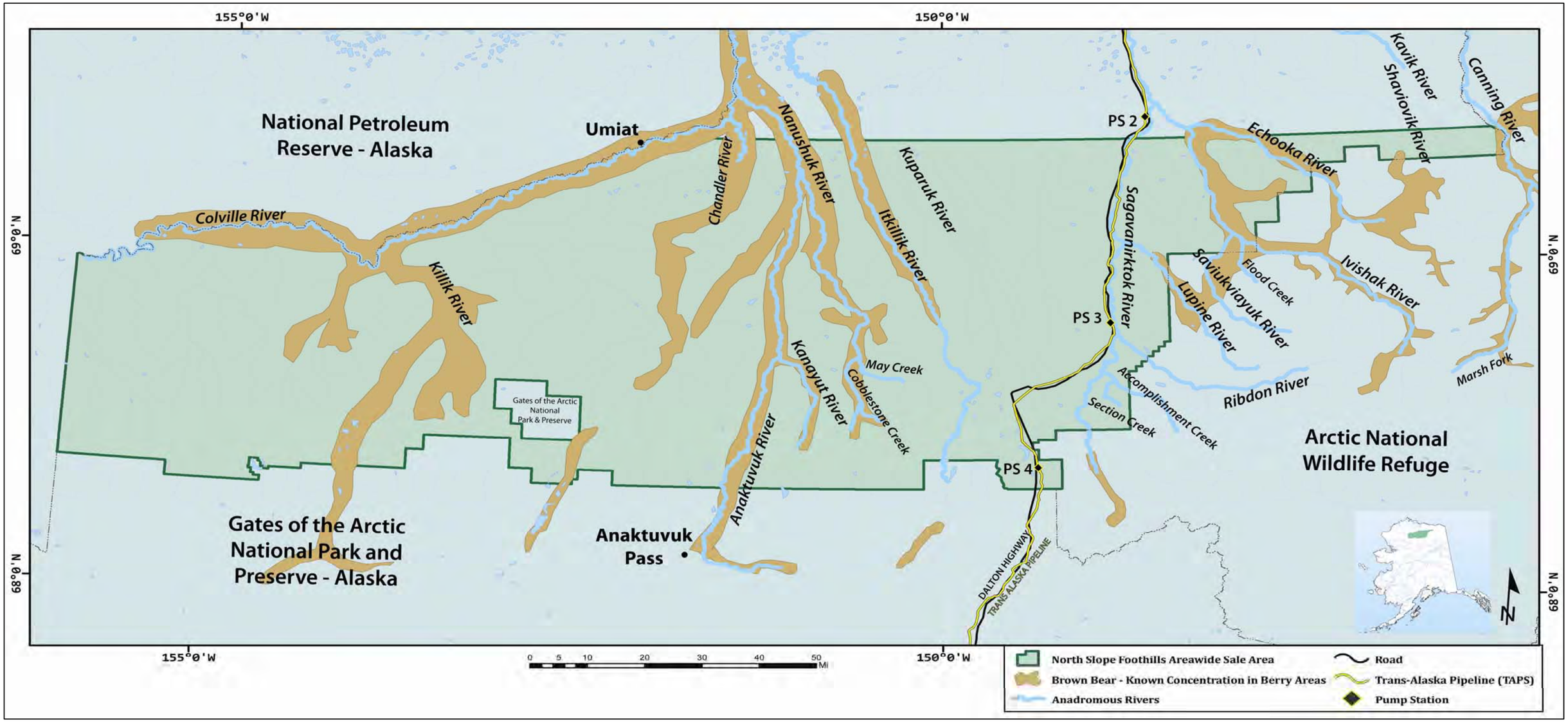
Map 4.2. Caribou habitat in the North Slope Foothills lease sale area.



Note: Moose are found throughout the lease sale area (spring – fall).

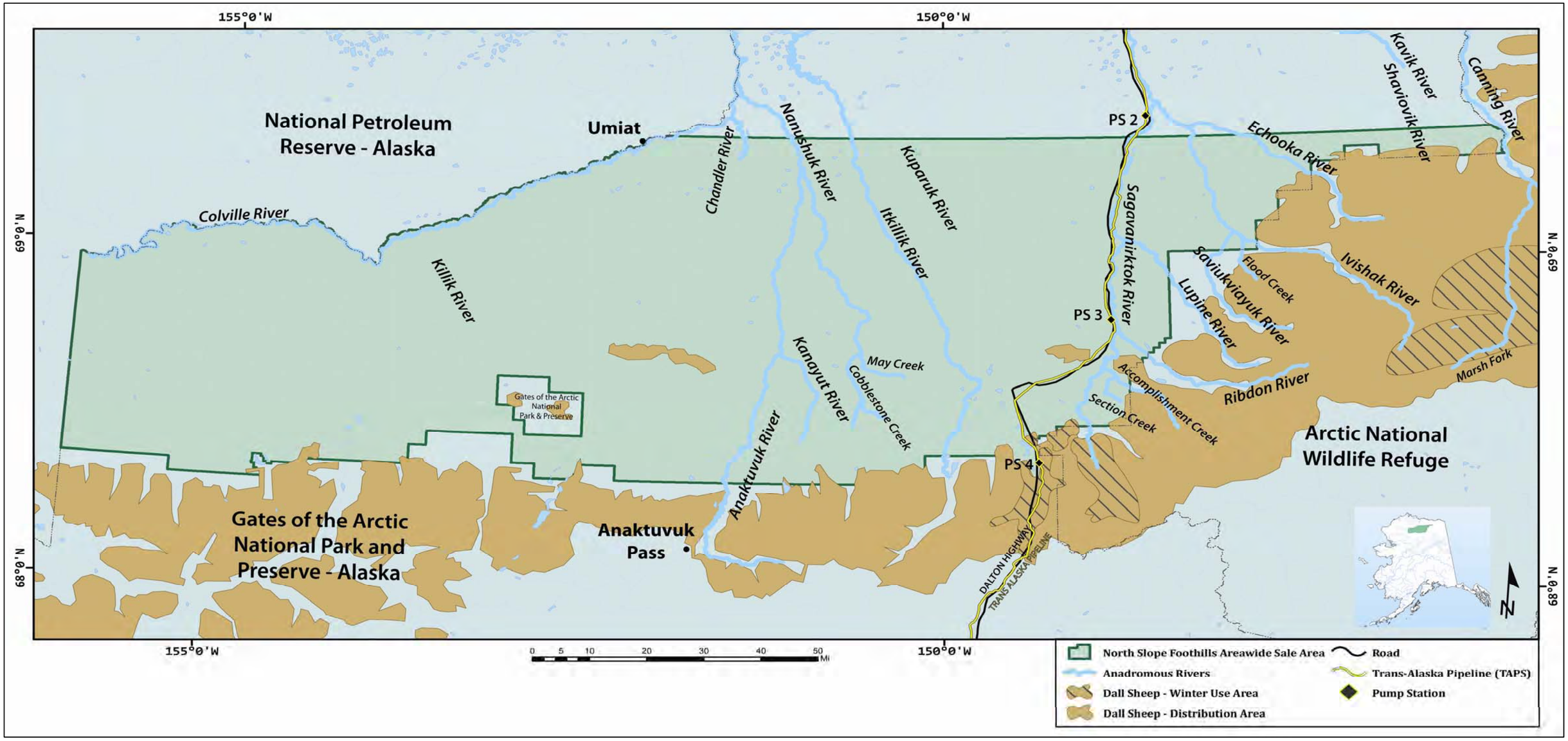
Source: ADF&G 1986a.

Map 4.3. Moose habitat in the North Slope Foothills lease sale area.



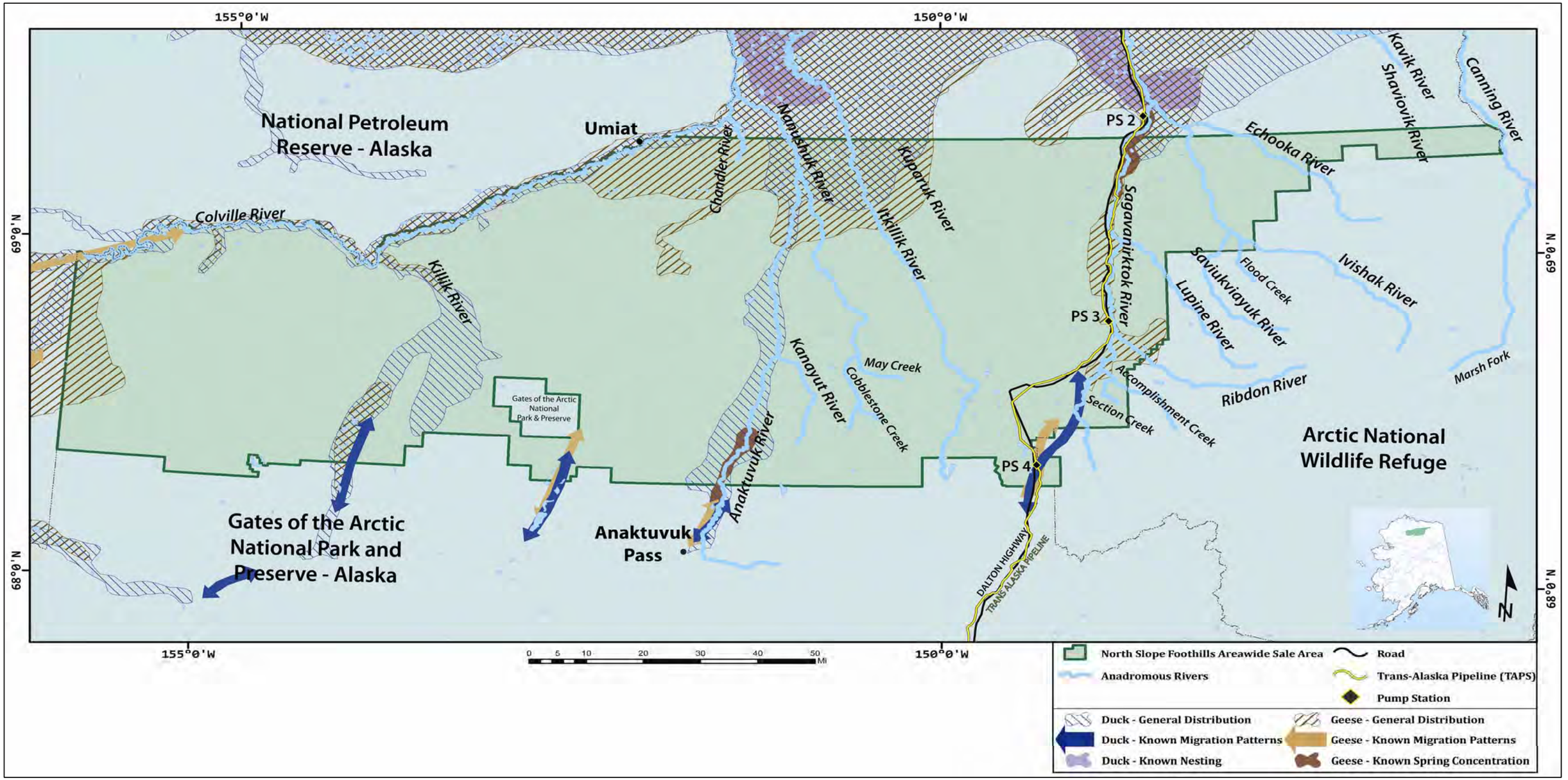
Source: ADF&G 1986a.

Map 4.4. Brown bear habitat in the North Slope Foothills lease sale area.



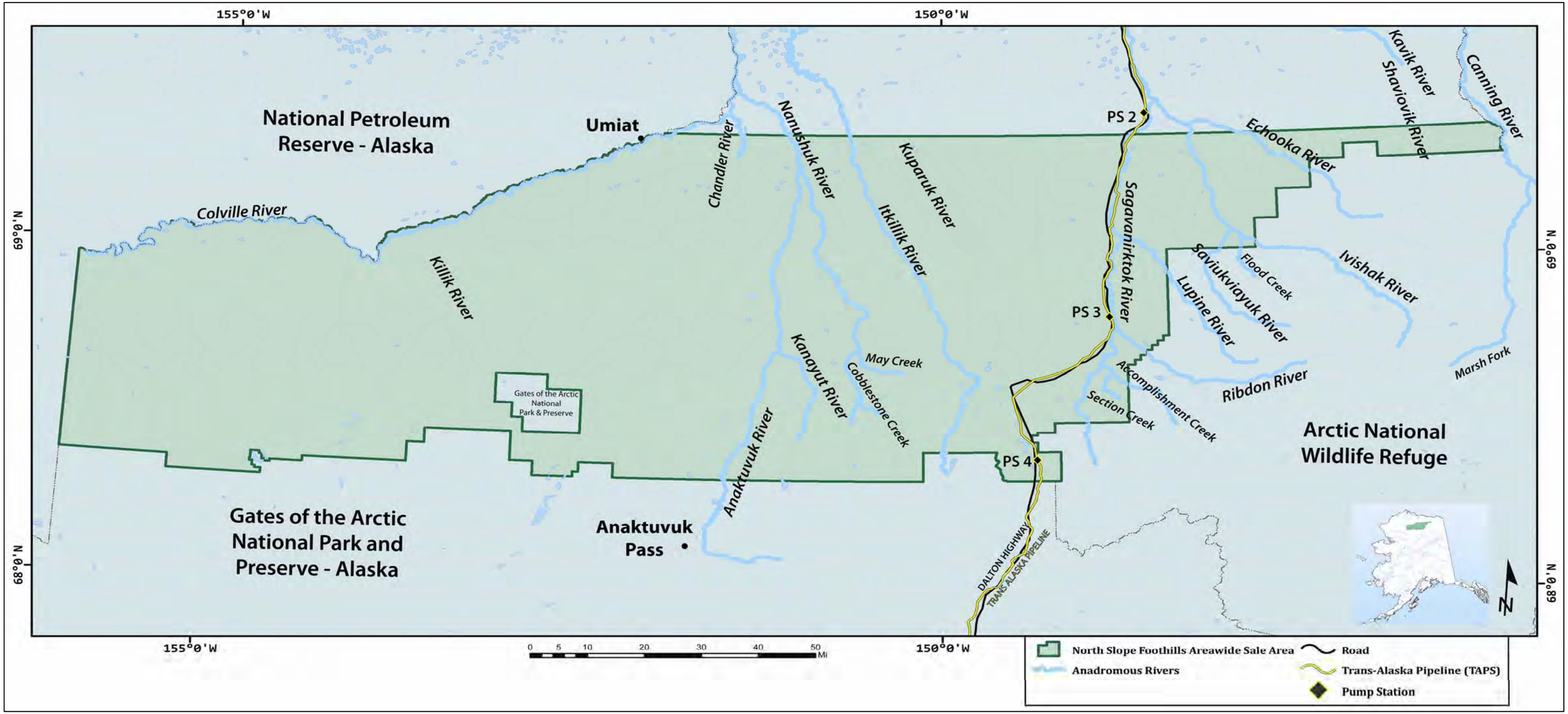
Source: ADF&G 1986a.

Map 4.5. Dall sheep habitat in the North Slope Foothills lease sale area.



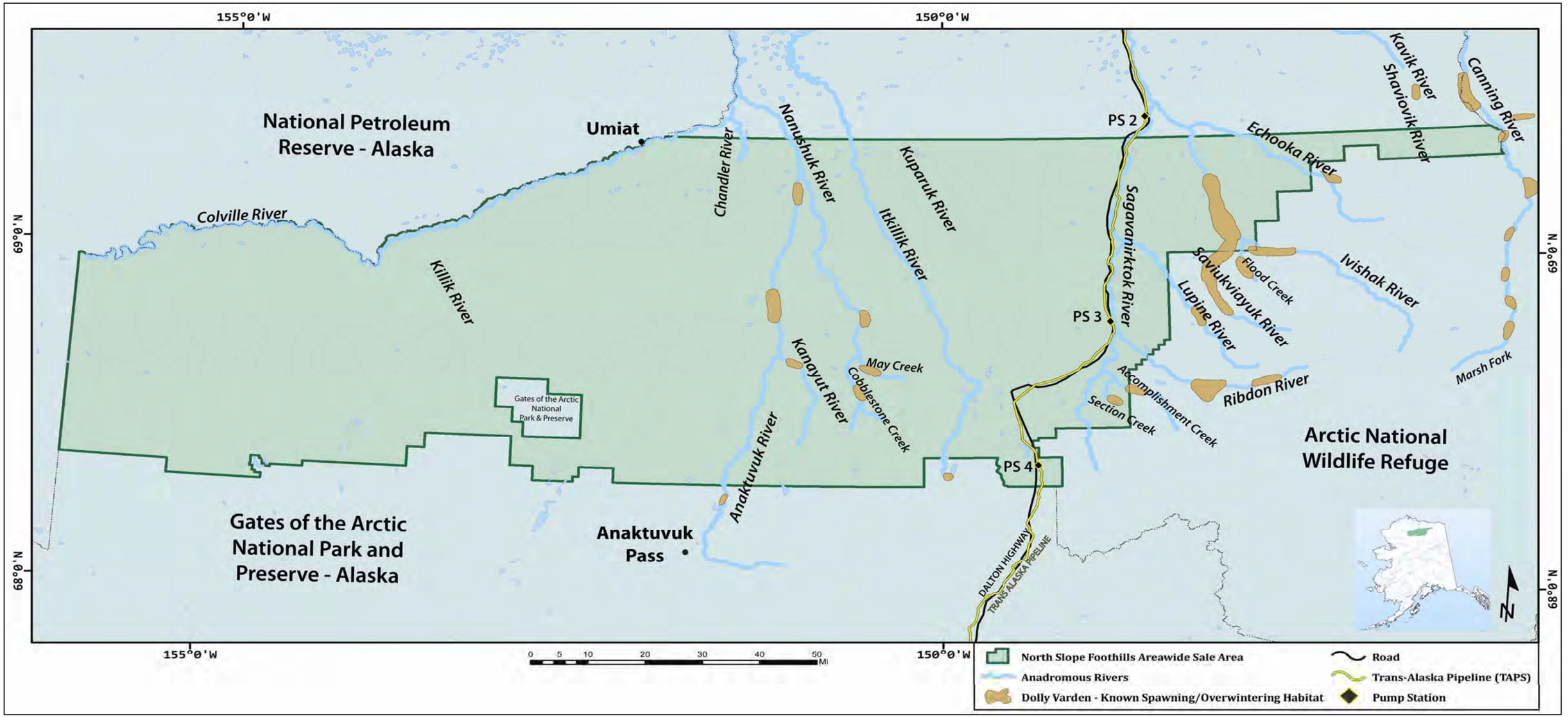
Source: ADF&G 1986a.

Map 4.6. Duck and goose habitat of the North Slope Foothills lease sale area.



Source: Johnson and Klein 2009.

Map 4.7. Catalogued anadromous streams within the North Slope Foothills lease sale area.



Source: Winters 2000.

Map 4.8. Known spawning or overwintering habitat of Dolly Varden in and near the North Slope Foothills lease sale area.