The Bristol Bay region has in the past decades experienced the expansion and more recent decline of the Mulchatna Caribou Herd (MCH). It has provided seasonal habitats, and the entire BLM block is important caribou habitat over the long term. The area has in various years provided winter range, calving aggregations and post-calving aggregation habitats for caribou (Hinkes et al. 2005).

The most significant wintering area for the MCH during the 1980s and early 1990s was along the west side of Iliamna Lake north and west of the Kvichak River, including the areas of BLM unencumbered lands there. More recently, the MCH has wintered scattered throughout its expanded range due to overgrazing of the traditional winter range areas (Woolington 2003).

Since 1993, the MCH has shifted its core calving grounds to an area near unencumbered BLM lands on the upper Nushagak and Mulchatna Rivers (Hinkes et al. 2005; Woolington 2003). The MCH does not move as one body, as a distinct herd. It is not predictable as to being in particular places at definite times. Biologists have noted, however, that a trend has been established in recent years. Most of the herd moves to the western side of its range during the fall, back to the middle part of its range for calving, into the upper Mulchatna River drainage for postcalving aggregations, widely dispersed throughout its range in late summer, after which it forms into large groups to once again move westward in fall (Woolington 2003). Study of the MCH distribution map in relation to unencumbered BLM lands places the MCH squarely (but not exclusively) on BLM unencumbered lands in the western Iliamna-Kvichak-Nushagak-Mulchatna watersheds for much if not for all of the year (Hinkes et al. 2005) (Figures 3.12 and 3.13) .

Moose run a close third in importance in the subsistence diets of Bay planning area residents, although moose are relative newcomers to the region and may not yet have populated all available habitat (ADF&G 2005a). ADF&G Harvest records between 1983 and 2002 indicate that Game Management Units 9 and 17 provided 7% of the total moose harvest in Alaska (ADF&G 2004). Moose hunting in this region by hunters from outside of Alaska provides an exceptional setting for those seeking a remote fly-in or boat-in experience and a trophy harvest. The entire Kvichak-Iliamna-Alagnak BLM land block is important moose habitat. Although many riparian areas along rivers and streams lie outside BLM unencumbered lands, nevertheless BLM lands in this block also provide winter, calving and breeding habitat as well as providing for yearlong and migratory movements to and from seasonal ranges (Figures 3.14 and 3.15). Both riparian and wetlands vegetation types are important for moose. During fall and winter, moose eat large quantities of willow, birch, and aspen twigs, which draw them to the riparian zones. Spring is a time when moose graze as well as browse, and they take advantage of sedges, horsetail, pond weeds, and grasses. During summer moose rely on vegetation in the many shallow ponds, including those on BLM lands in this block, also eating forbs, and birch, willow and aspen leaves (Rausch and Gasaway 1994) (Figures 3.14 and 3.15).

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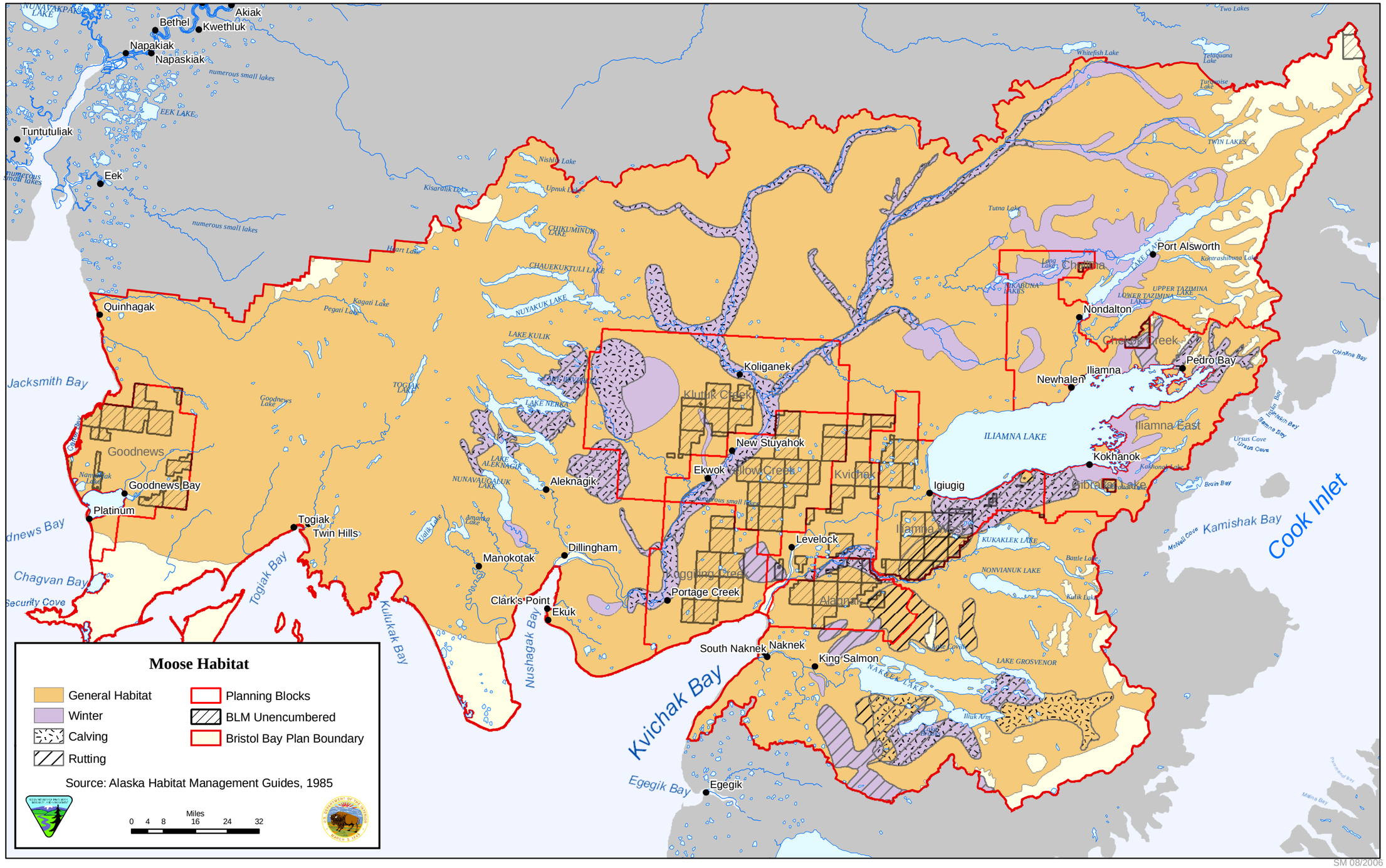

Figure 3.14 Moose Habitat - Bay Plan Overview

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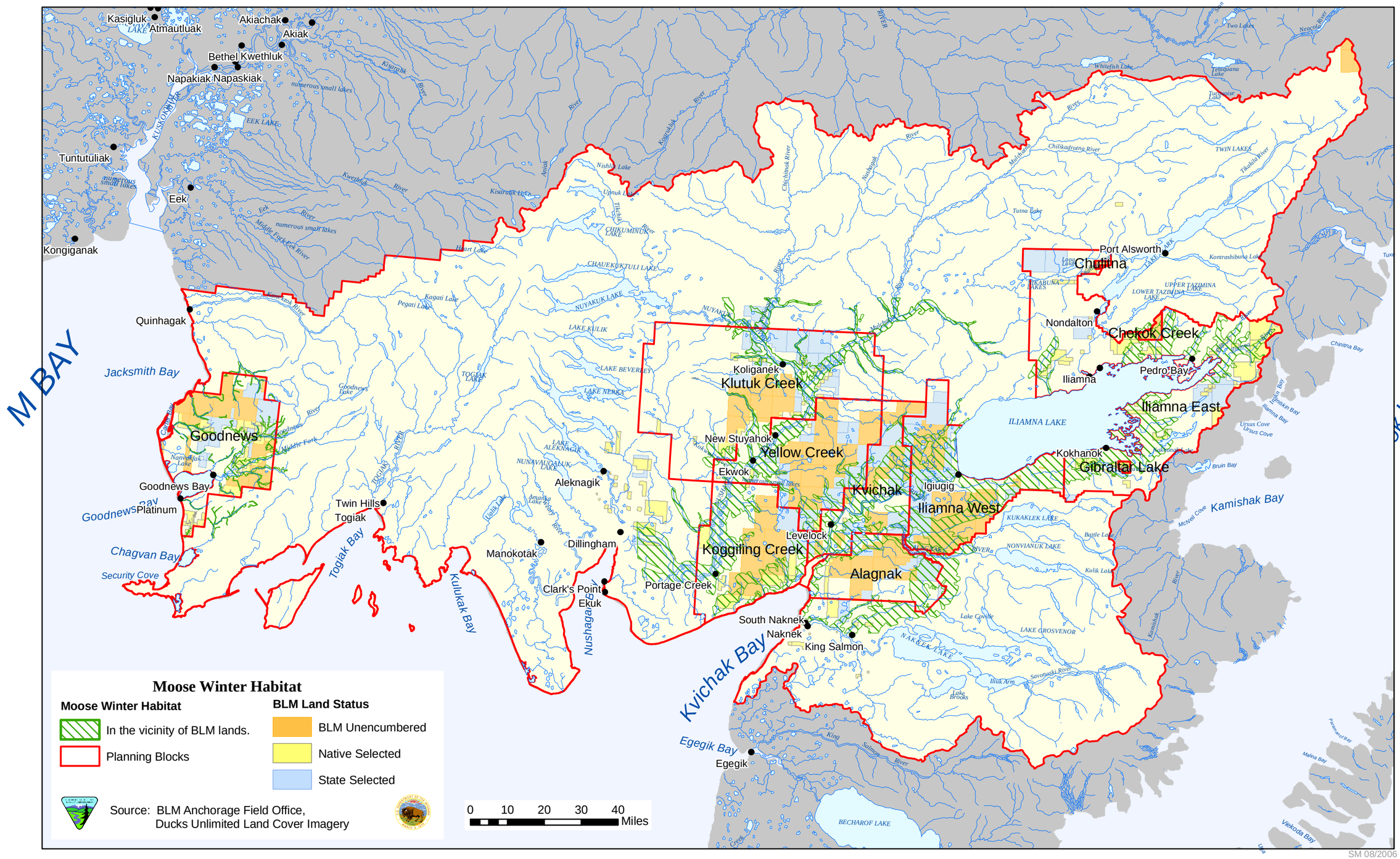

Figure 3.15 Moose Winter Range

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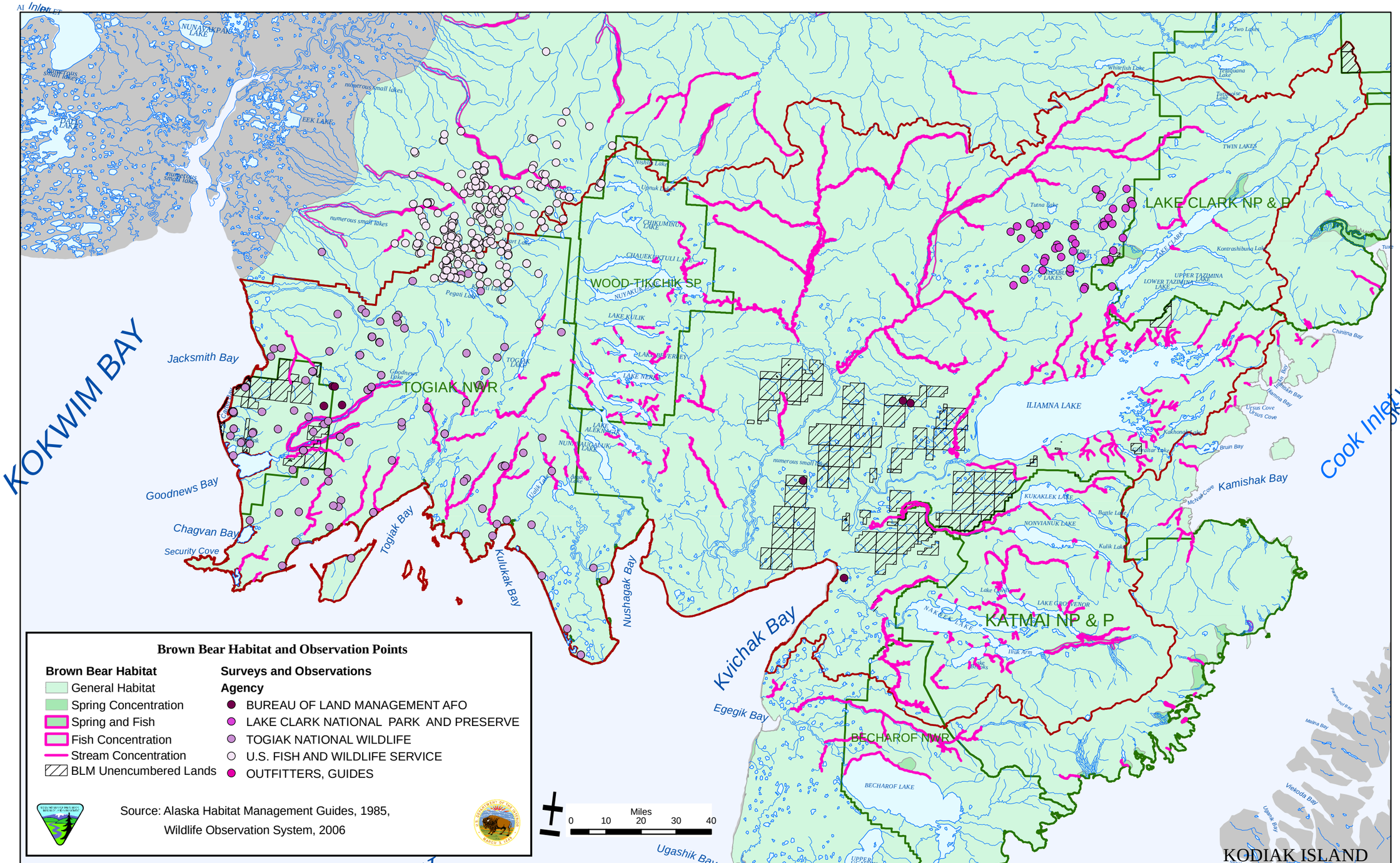

Figure 3.16 Bear Habitat and Concentration areas

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Brown bears are found throughout the planning area, and are sought after by trophy hunters and occasionally by subsistence hunters (Figure 3.16). Game Management Units 9 and 17 together produced 25% of the state's brown bear harvest during the reporting period (ADF&G 2004). As with moose, non-Alaska resident hunters seek a remote hunting experience and a trophy harvest (Figure 3.16).

Records of the numbers of caribou, moose, and brown bears taken specifically on BLM-administered lands from year to year are not kept. Patterns of use for humans and animals can shift over time. Examples of such shifts in the Bay planning area include the long-term changes in patterns of widespread range use that the Mulchatna caribou display, and the fact that not all prime moose habitat may currently be utilized. Alaska Department of Fish and Game Community Profile Database and Harvest Records (ADF&G 2004b) are the primary source for the following discussion. Information about General Management Units and Uniform Coding Units have been included as a means to orient the reader to the location of the discussion within the planning block(s) and to link the information to its source.

c) Wildlife and Wildlife Habitat Relative to Specific BLM Unencumbered Lands in the Bay Planning Area

(1) Iliamna Block (6 blocks) (Portions of GMU 9(B); UCUs 0202, 0203, 0301, 0303, 0701)(Portion of GMU 9(C); UCU 0701)(Figure 3.2).

The Iliamna area is mountainous terrain which includes glaciers and ice fields of the Neacola, Aleutian, and Chigmit Mountains to the northeast of Iliamna Lake, with alpine tundra giving way as elevation decreases to dense tall willow and alder shrub thickets, coniferous and mixed conifer/deciduous forested glacially carved river valleys and rounded bedrock hills. Large, deep glacially carved lakes are scattered throughout the glacier scoured bedrock hills. Iliamna Lake and Lake Clark are examples of the very large glacially carved lakes that dominate the region.

The BLM lands that lie west and south of the communities of Iliamna, Iguigig and Kokhanok are dominated by terminal moraines that reflect the succession of major glacial periods since the early Pleistocene (Biekman 1980). The youngest of these moraine features occurs in a wide arc within 20-25 miles of the lower portions of Iliamna Lake and is a terrace of repeating small broken terminal moraines deposited as the last glaciers receded (Biekman 1980). Conifer timber consisting of black spruce in bogs with hundreds of lakes and associated narrow riparian shorelines, patchy deciduous forest on well-drained sites and wet tundra wetlands dominate the habitats found here (USDI BLM 1994). This moraine is drained by Kaskanak, Ole, and Ben Courtney Creeks, all of which flow into the Kvichak River that is the outlet of Iliamna Lake (Figures 3.20 and 3.21). South of the Iliamna block, the Alagnak River, locally known as the Branch River, flows around the southern boundary of this most recent moraine complex (Figure1.2). This morainal area is a transition zone between the habitats of tundra and trumpeter swan population distributions. Trumpeter swans are a Special Status Species.

The substantial salmon fishery resources in this area and the large lakes provide for high densities of brown bear. Bears can be found everywhere in the planning area, predictably near the most abundant resources available at the time. In spring caribou and moose calves attract them, and in summer they congregate on salmon streams, following the salmon upriver into tributary streams. They are opportunistic omnivores and they range widely.

Figure 3.20 Kaskanak Creek, Northwest Iliamna Block. View North.

Figure 3.21. Tundra Lake on BLM Lands West of Lake Iliamna.

Figure 3.22. Ole Creek, Southwest Iliamna Block.

Kaskanak Creek crosses and provides drainage for BLM-administered lands (Figure 3.20). BLM blocks of land are dotted with thousands of large and small shallow lakes and ponds that provide moisture for riparian habitat, summer water-dependent vegetative habitat, and tundra (Figure 3.21).

Residents of the communities of Pedro Bay, Port Alsworth, Aleknagik, Dillingham, Ekwok, Igiugig, Iliamna, Kokhanok, Levelock, Manokotak, Nondalton, and New Stuyahok use BLM lands in the Iliamna Block for a wide variety of subsistence hunting and gathering activities during their yearly round of seasonal activities (Wright et al. 1985; Morris 1983, 1985, 1986, 1991; Endter-Wada and Levine n.d.; Fall et al. 1986; Chythlook and Fall 1988; Schichnes and Chythlook 1985; ADF&G 2004b) (Appendix D).

- Nondalton (Iliamna East) - trapping, hunting black bear, moose, and caribou
- Pedro Bay (Iliamna East) - hunting brown bear, moose, and sheep
- Port Alsworth (Iliamna East) - gathering berries, hunting moose, caribou, black bear, waterfowl
- Iliamna (Iliamna East and West) - hunting caribou, moose, waterfowl, and trapping
- Igiugig (Iliamna East) - hunting moose, caribou, waterfowl, and trapping

In Game Management Unit 9(B), UCUs 0202 and 0203 include two large blocks of BLM unencumbered land located immediately west of Lake Iliamna. Except for one, the BLM Special Use Permit holders in this area have operations on either Native-selected or State-selected BLM lands in the Lake Iliamna area (Figures 3.2 and 3.23).

Figure 3.23. Chekok Creek, View North East. BLM lands in the background are in GMU 9(B) UCU 0303.

A smaller block of BLM unencumbered land is located in Iliamna East in UCU 0303, on the northeast side of Lake Iliamna on Chekok Creek (Figure 3.2). UCU 0303 comprises only 206 mi², of which 10% is BLM unencumbered lands, located in the Chekok Creek drainage (Figure 3.23). One of six Special Use Permit guides maintains a camp on BLM unencumbered lands in this UCU, which is accessed by aircraft for hunting caribou, moose, and brown bear. However, there is also some use of boats for hunting brown bear. Six percent of all brown bears harvested in GMU 9(B) during the reporting period 1983 - 2002, were harvested in UCU 0303. The majority of them were taken by hunters from outside of Alaska. This region is known for trophy bear hunting opportunities. Subsistence hunting for brown bear in this region does not usually take place every year, but is more likely to occur once every several years. The only GMU 9(B) community recorded as having hunted brown bear in this UCU is Iliamna.

These three UCUs are second in importance for moose harvests in GMU 9(B) for the reporting period from 1983 - 2002. UCUs 0202 and 0203 vary in size from 463 mi² to 580 mi², and each is comprised of between 34% and 39% BLM unencumbered lands. Over half of the hunters have been from out of state in the southern UCU, and from outside of the region in Alaska for the northern UCU. Approximately 9% of moose hunters in these UCUs are local residents of the communities of Igiugig, Iliamna, King Salmon, Naknek, South Naknek and Pedro Bay. Moose harvest in this area was declining through 2002. Approximately ¾ of moose hunters are accessing UCU 0202 by aircraft and ¼ by boat. Moose hunters are accessing UCU 0203 primarily by boat, closely followed by fly-ins.

In East Iliamna one or two hunters from out of state have been consistently present to hunt moose. In addition, Alaskans from outside the region hunted moose in this area. Until 1999 residents of this GMU were also hunting moose in the Chekok Creek area. The local moose hunters are residents of Iliamna and Port Alsworth. In addition, subsistence use area map data gathered in 1982 for Pedro Bay suggest that members of that community subsistence hunt Dall sheep on BLM unencumbered lands in the Chekok Creek drainage, along with moose and brown bear (Morris 1986). There are no ADF&G Harvest records

further documenting sheep hunting in UCU 0303. However, the fact that Dall sheep have been hunted in this area by Pedro Bay residents was also reported to McClenahan by community members in the 1990s (McClenahan 2004, Pers. Comm.). Harvest records indicate that the Unit 9(B) communities of Iliamna, Nondalton, and Port Alsworth and the Unit 9(C) communities of King Salmon and Naknek hunt sheep in Unit 9(B). It is possible, if not recorded, that these communities have also used UCU 0303 to hunt sheep in the past (Figure 3.17).

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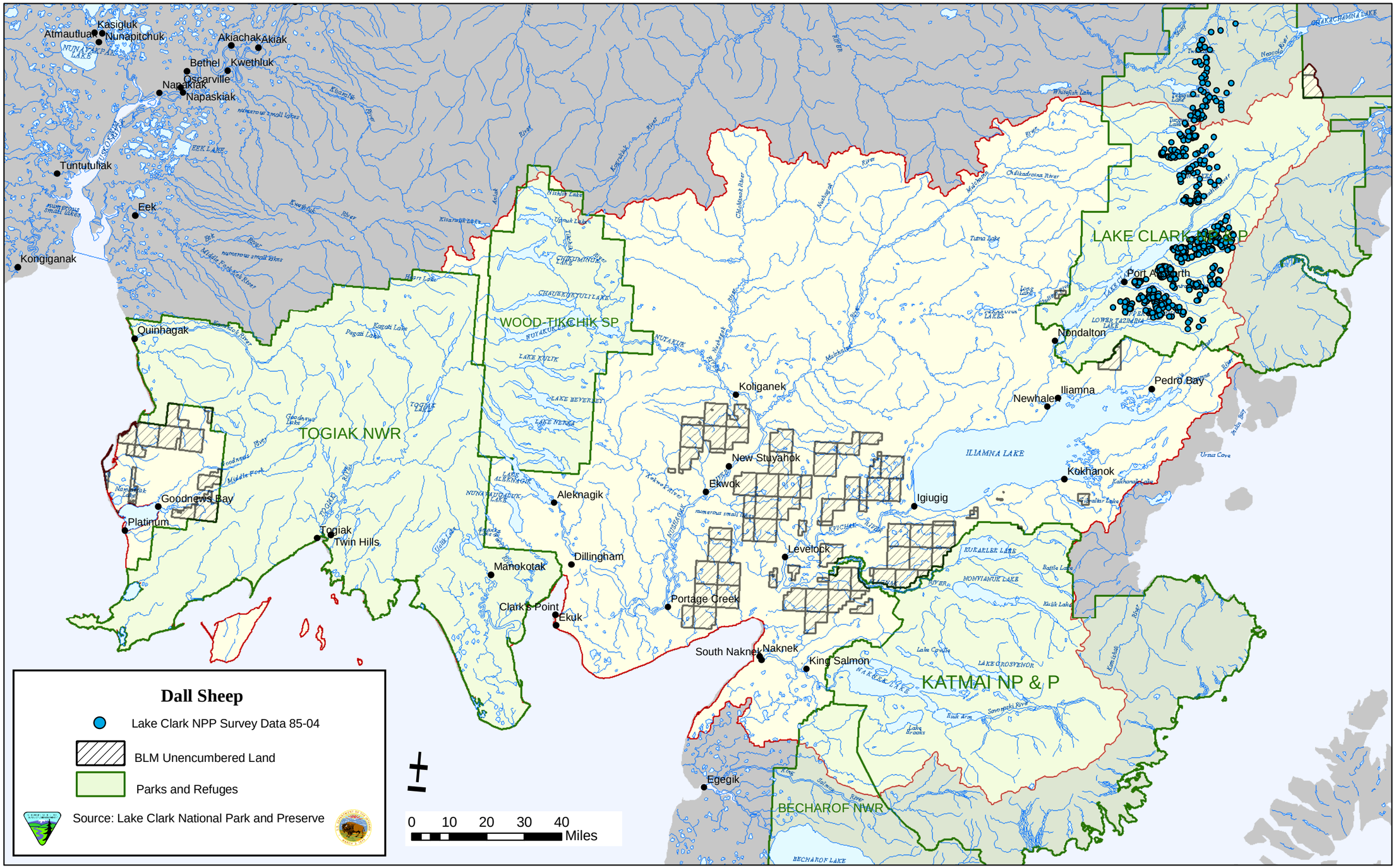

Figure 3.17. Dall Sheep Observations

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The southern portion of the West Iliamna blocks were second in importance for caribou harvest between 1983 and 2002. Over half were taken by non-local Alaska residents. Over one-quarter were harvested in the southern portion of the block by local subsistence hunters from residents of Igiugig, Kokhanok, King Salmon, Naknek, and South Naknek. A lesser number of hunters from out of state were harvesting in the northern part of the block. The general trend for caribou harvests in the northern portion is downward as of 2002. The overall trend for hunters from outside of this region hunting in the southern portion seems to be declining, while attempts by local subsistence users appeared to be increasing as of 2002 in the southern portion. At the same time, the numbers of animals in the Northern Alaska Peninsula Caribou Herd nearest to the Unit 9(C) communities have been in serious decline, precluding much opportunity to hunt them. Caribou hunters are hunting caribou in this area primarily using aircraft, with some use of boats.

A small but significant part of the southwesternmost portion of the Iliamna blocks is within GMU 9(C) UCUs 0701 and 0703. This area is to the north of the Alagnak River drainage, and is discussed under the Alagnak Block.

A small isolated piece of BLM unencumbered land that makes up less than 2% of 808 mi² UCU 0301 is located in the northernmost corner of the Iliamna Block at the Chulitna River (Figure 3.2). Another small isolated piece of land is located south of Lake Iliamna near Gibralter Lake where it makes up less than 1% of 761 mi² UCU 0701 (Figure 3.2). Due to their size they will not be detailed here.

(2) Alagnak Block (2 blocks) (portions of GMU 9(C) in UCUs 0701 and 0703)(Figure3.1.)

The Alagnak Blocks of BLM unencumbered lands lie in a strategic and picturesque region east of Kvichak Bay and south of the Alagnak River (Figure 3.1). Residents of the communities of King Salmon, Naknek, South Naknek, Egegik, Levelock, and Kokhanok use BLM lands in this block for a wide variety of subsistence pursuits during their annual round of seasonal subsistence activities (Wright et al. 1985; Morris 1983; Wright, Morris, and Schroeder 1983; Krieg et al. 1996; Endter-Wada and Levine n.d.; Fall et al. 1988; Chythlook and Fall 1988; Schichnes and Chythlook 1985; ADF&G 2004b) (Appendix B).

- Levelock - hunting caribou, moose, waterfowl, trapping, and gathering vegetation
- King Salmon - hunting moose and trapping
- Naknek - hunting moose and caribou and trapping
- South Naknek - hunting moose, caribou, and waterfowl and gathering vegetation

Hunters hunting in these UCUs access them primarily by aircraft for moose, caribou, and brown bear hunting, except for caribou in UCU 0701, where snowmachines and 4 wheelers are the principal modes of transportation. A small number of boats are used in both UCUs for moose hunting, and in UCU 0701 for brown bear hunting.

Figure 3.24. Coffee Creek.

UCU 0701 is 598 mi² and is 50% BLM unencumbered lands adjacent to the Alagnak River. UCU 0703 is 478 mi² and contains 4% BLM unencumbered lands adjacent to the Alagnak River. This portion of GMU 9(C) has been a moderately productive area for moose during the reporting period from 1983 - 2002, particularly the westernmost block. However, harvests have declined since peaks between 1990 and 1994. The majority of hunters trying to harvest moose in this portion of the block since 1990 have been subsistence users, residents primarily of the GMU 9(C) communities of King Salmon, Naknek, and South Naknek, but also several residents of the GMU 9(B) communities of Kokhanok, Igiugig and Levelock, the Unit 9(D) community of Cold Bay, and the Unit 9(E) community of Chignik. Subsistence hunters have been less consistent in their use of the eastern portion of area, but their efforts picked up between 1988 and 2002. Nonresident moose hunting has been four nonresident hunters per year attempting to harvest, declining in recent years. The remainder, Alaska resident hunters from outside of the region, is made up of one or two hunters per year between 1999 and 2002.

Caribou harvests in the area of the western portion of this block were robust in 1992, 1993, and 1998. However, the numbers of caribou harvested in the area have been declining since the 1990s. The hunters most actively seeking to harvest caribou in this area are the Unit 9(C) residents of King Salmon and Naknek, followed by Alaska residents from other GMUs. Only since 1999 have hunters from outside of Alaska attempted to harvest caribou here, up to 15 per year in the eastern portion. Hunting effort has been declining.

Harvest of brown bears has been strongest in the eastern portion of the area, primarily by hunters from outside of Alaska, and harvest effort is increasing. Since 1997, the majority of hunters in the western portion of the area have been residents of GMUs 9(B) and 9(C), from the communities of Iliamna, Levelock, King Salmon, and Naknek. Subsistence hunters do not take bears every year, but may once every several years. Bear fat is greatly appreciated, particularly by the Elders, and is shared throughout a broad sharing network.

(3) Kvichak blocks (8 blocks) (portions of GMU 9(B) in UCU 0201, 0202 and 0203)(Figure 3.1)

These smaller but very important blocks of BLM unencumbered lands are most proximate to the Kvichak River, but for the most part are not located immediately on the river. The two next-to-most northern pieces of land in this block are crossed by Ben Courtney Creek. The area consists of rolling tundra-covered hills and open spruce parklands, with wide floodplains vegetated with wet tundra, grasses, and deciduous brush (Figures 3.25 and 3.26).

The following Bay area communities use BLM lands in the Kvichak Block for several subsistence pursuits (Morris 1983; Endter-Wada and Levine 1992; Fall et al. 1984; Wolfe et al. 1984; ADF&G 2004b) (Appendix D).

- Iliamna - hunting moose and waterfowl, trapping, gathering vegetation
- Igiugig - trapping, hunting waterfowl, caribou, and moose
- Dillingham - hunting caribou and moose

Portions of the 554 mi² GMU 9(B) UCU 0201 are located in the Kvichak Blocks as well as the Yellow Creek Block of BLM unencumbered land. The BLM unencumbered blocks taken together comprise 32 percent of the UCU, with the Kvichak blocks being smaller than the Yellow Creek block. The two Kvichak blocks are located in the southwestern portion of this UCU. A complete description of the moose harvest in this UCU is provided under the heading, "Yellow Creek Block," below, and will not be repeated here. Bear Creek crosses the southwesternmost piece of land in this block (Figure 1.4).

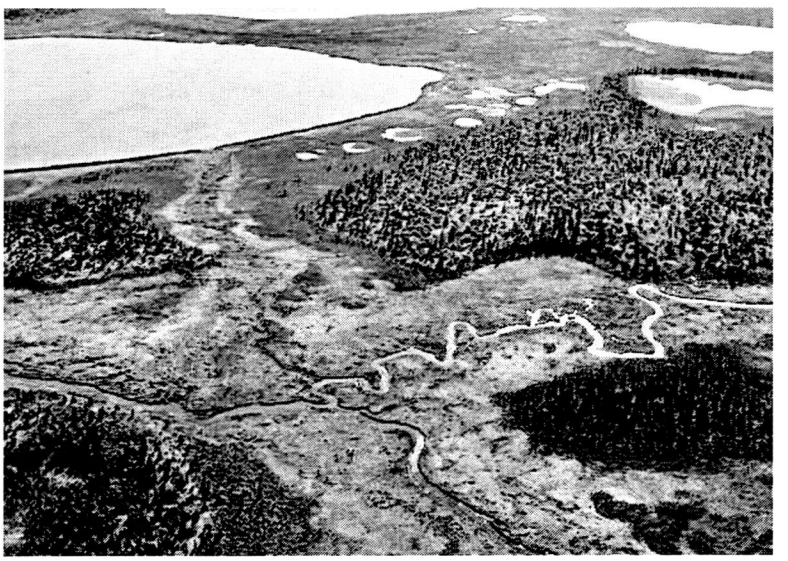

Figure 3.25. Confluence of Branches of Ben Courtney Creek.

Figure 3.26. Headwaters of Ben Courtney Creek.

Portions of UCU 0202 contain two blocks in the southeastern portion of unencumbered BLM land in the Kvichak Block. Since portions of UCU 0202 are also located in the Iliamna Block, the activities in this UCU will not be repeated here.

UCU 0203 contains the northernmost four small blocks within the Kvichak Block. Since a portion of the Iliamna Block is also within UCU 0203 and has already been discussed in that section, the reader is referred to the Iliamna Block discussion for details. Some of these more northerly Kvichak blocks are more likely to be vegetated by the substantial riparian areas of the Kvichak River and the confluences of its major tributaries than are the southern blocks, which are somewhat removed from the river banks. That would suggest a higher probability of moose concentrations as well as a greater chance that boat-traveling moose hunters would harvest moose on these BLM lands during the times of the year that moose are on the river utilizing the riparian areas.

(4) Yellow Creek Block (one block of unencumbered land) (portions of GMU 9(B) in UCU 0201 and GMU 17(C) in UCUs 0901 and 0501)(Figure 3.27).

The Yellow Creek Block is located in a relatively flat, slightly elevated area of the Bristol Bay Plain between the Nushagak and Kvichak River drainages. The area is dominated by thousands of large and small kettle lakes and small drainages. Yellow Creek, one of the most prominent tributaries of the Kvichak River, drains the eastern portion of this piece of BLM land in a southeasterly direction (Figure 3.27). In the western portion, the land is drained by Klutuk Creek and other small creeks that flow to the west and empty into the Nushagak River. Copses of spruce dot the landscape, which is dominated by wet tundra. The lakes and drainages support mixed deciduous growth (Figures 3.29 and 3.30).

Residents of the communities of New Stuyahok, Manokotak, Levelock, Kokhanok, Iliamna, Igiugig, Ekwok, Dillingham, and Platinum use the Yellow Creek Block of BLM lands to carry out a wide variety of subsistence activities during their yearly round. The following communities use the Yellow Creek Block

for the following subsistence purposes (Morris 1983, 1991; Schichnes et al. 1990; Schichnes and Chythlook 1987; Wolfe et al 1987; Wright et al 1987; Fall et al. 1984; ADF&G 2004b) (Appendix B).

- Iliamna - trapping
- Aleknagik -hunting caribou
- Ekwok - hunting caribou and moose
- Dillingham - trapping and gathering wild vegetables
- Platinum - hunting caribou

Figure 3.27. Upper Yellow Creek , View North West.

Yellow Creek block is located in the UCUs that are the most significant for harvesting moose of all those containing BLM unencumbered blocks in the Bay planning area. In GMU 9(B) UCU 0201 is 32% BLM unencumbered land in this 554 mi² area. GMU 17(C) UCU 0501 is 1326 mi² and includes 26% BLM unencumbered land, and UCU 0901 is 505 mi² and is 40% BLM unencumbered land. Yellow Creek block shares UCUs 0801 and 0901 with Klutuk Block.

Fifty-four percent of moose hunters in the northern part of the area were subsistence users, local residents from Igiugig and Levelock in GMU 9(B), and from King Salmon, Naknek, and South Naknek in GMU 9(C). Seventeen percent were non-local Alaska residents, and 27% were non-residents, making this area important for resident hunting for nearby villages, but also somewhat important for guided and non-guided hunting by hunters from outside of Alaska. Moose hunters access this area primarily by boat, with some use of aircraft.

Between 1983-2002, 829 moose were harvested from UCU 0501. Hunting in the western portion of this area steadily increased during the reporting period between 1983 and 2002. Between 1983 and 1989, between 9 and 20 moose were harvested annually; between 1990 and 1995 annual harvest numbers were from between 13 and 46 animals. Between 1996 and 2002, annual moose harvest numbers were between 34 and 105 animals, with the greatest numbers falling in 2001 and 2002. Hunters from outside of Alaska have played a very small role in harvests in this area, and have made no effort since 1994. Residents of GMU 17(C) communities Aleknagik, Clarks Point, Dillingham, Ekwok, Manokotak, New Stuyahok, and Portage Creek were the principal harvesters. Other GMU 9 and 17 communities harvesting in this area are King Salmon, Koliganek, Naknek, Pilot Point, Port Moller, and Togiak. The remainder are Alaska residents from outside of the region. Moose, caribou, and brown bear hunters access this area with a mix of boats, snowmachines, and aircraft.

The northern area is also very important for the residents of GMU 17, who accounted for 74% of the hunters attempting to harvest moose, and for 78% of the moose harvested during the reporting period 1983 - 2002. Residents of GMU 17(C) communities included those from Dillingham, Clarks Point, Ekwok, and New Stuyahok, from the 17(B) community of Koliganek, and the 17(A) community of Togiak. Hunters from outside of Alaska accounted for 6% of those hunting for moose in this area, and for 7% of the moose harvested during the reporting period. The remainder were Alaska residents from outside of the region. Moose harvests peaked in this UCU in the late 1990s and have been declining. Moose hunters access this area using boats, snowmachines, and aircraft.

Caribou hunters in the western part of this unit were successful during the reporting period 1983 - 2002, but harvest numbers declined to 19 animals in 2002. Leading in harvest are the residents of the GMU 17(C) communities of Aleknagik, Clarks Point, Dillingham, Ekwok and Portage Creek. Other GMU 9, 17, and 18 communities harvesting in this area are Chevak, King Cove, and Koliganek. Hunters from outside of Alaska account for only 19% of the harvest for the reporting years. The northern portion of this planning block lies in an area where hunters have also been very successful. This portion and the equally promising western section are discussed in the "Klutuk Creek" section, below.

Only 15 brown bears were harvested in the western portion during the reporting period 1972-1999, four of them by hunters from outside of Alaska and the rest (where the residency is known) by residents of the GMU 17(C) community of Dillingham. Hunting effort has remained at one or two hunters per year during the reporting period. Hunting success in the other areas were roughly similar during the reporting period.

(5) Koggiling Creek Block (portions of GMU 9(B) in UCU 0101 and portions of GMU 17(C) in UCU 0501 (Figure 3.28).

As one proceeds west across the Nushagak River to the Koliganek area, and southward to the shores of Bristol Bay, the character of the habitat changes to older, more eroded moraines that are more gently rolling terrain and lowlands dominated by wet tundra, small patches of deciduous and mixed forest and once again thousands of large and small lakes with their associated riparian shorelines (Figure 3.28). The Koggiling Creek Block, like the Yellow Creek Block, is situated at the juncture of the Nushagak and Kvichak river drainages. The block is drained to the east by King Salmon Creek and Copenhagen Creek, which flow into the upper reaches of Kvichak Bay, and to the west by Koggiling Creek which flows into the Nushagak River to the north of Keefer Cutoff (Figure 3.28). The western portion of this area transitions to spruce woodland as one travels west toward Wood-Tikchik lakes. This region hosts high-density tundra swan nesting populations, and is one of the five high productivity waterfowl production areas in Alaska (USFWS 2005). The communities of New Stuyahok, Levelock, Dillingham, and Naknek use BLM lands in the Koggiling Creek Block for a variety of subsistence activities (ADF&G 2004). The following communities use these BLM lands for the following subsistence resources (Schichnes and Chythlook 1991; Wolfe et al. 1983; Wright et el. 1985; Fall et al. 1984; Wolfe et al. 1983; Morris 1985; Krieg et al. 1998; ADF&G 2004a) (Appendix D).

- New Stuyahok - caribou and waterfowl hunting, trapping
- Dillingham - trapping
- Naknek - hunting waterfowl

Activities in GMU 9(B) UCU 0101 are discussed in detail under the Yellow Creek and Klutuk Creek Blocks, and will not be repeated here. Hunters access this area to hunt caribou and brown bear using aircraft, and moose using a mix of boats and some aircraft. In the southern portion, hunters use a mix of boats, snowmachines, and aircraft to hunt moose, caribou and brown bear.

Figure 3.28. King Salmon Creek.

(6) Klutuk Creek Block (Two blocks) (portions of GMU 17(B) in UCU0101 and GMU 17(C) in UCUs 0801 and 0901 (Figures 3.29 and 3.30).

BLM unencumbered lands in the Klutuk Creek Block are also part of an older glacially formed landscape of more eroded moraines and gently undulating terrain of wet tundra-dominated lowlands, copses of spruce, and fewer large and small lakes and ponds than are found in the Yellow Creek Block. As one proceeds westward, the size of the trees and the density of the spruce forests and mixed deciduous forests increase. The larger block of BLM land is drained to the southwest into the Nushagak River most prominently by Klutuk Creek (Figures 3.29 and 3.30). The smaller block, situated to the southwest, sits adjacent to the Kakwok River and one of its main tributaries, which also flows into the Nushagak River. The residents of the communities of New Stuyahok, Manokotak, Ekwok, and Dillingham use the Klutuk Block of BLM lands for a wide variety of subsistence resources in their annual round of seasonal subsistence activities (Chichnes and Chythlook 1987; Wolfe et al. 1987; Wright et al. 1987; ADF&G 2004b) (Appendix B).

ADF&G Subsistence Division subsistence use area maps drawn up in the 1980s and 1990s indicate that the following communities were utilizing the following subsistence resources on BLM lands:

- Ekwok - caribou and moose hunting
- Aleknagik - caribou hunting
- Dillingham - caribou and moose hunting

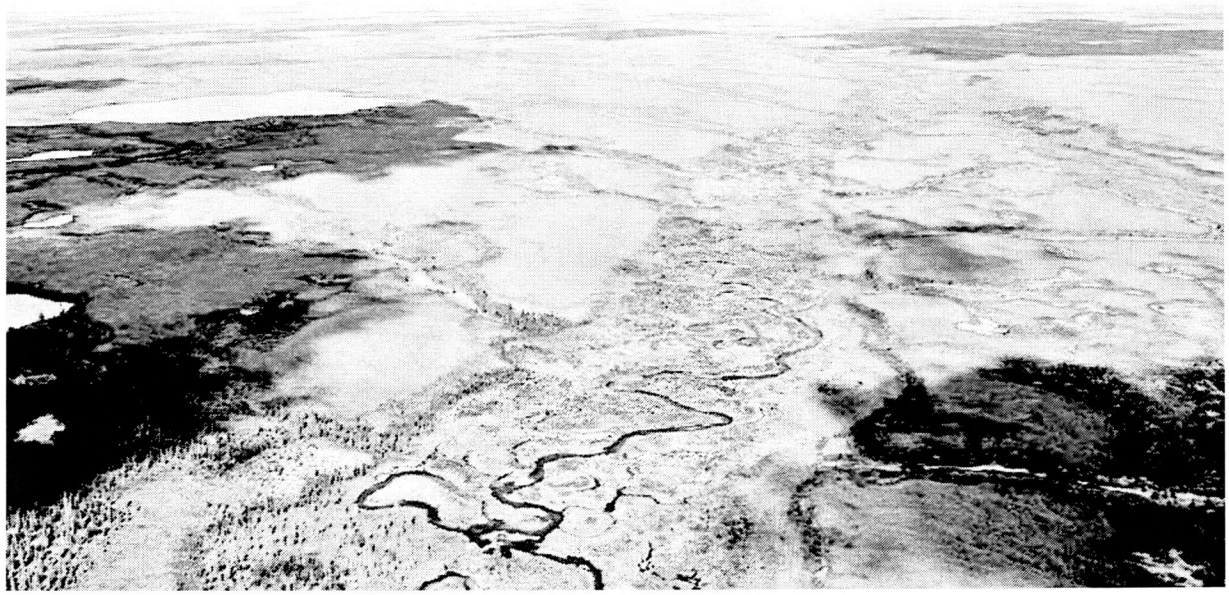

Figure 3.29. Klutuk Creek.

BLM-administered unencumbered lands in the important GMU 17(B) are limited to the southcentral part of the GMU, to a portion of UCU 0101, near the community of Koliganek. This UCU comprises 454 mi² and is made up of 31% BLM unencumbered lands. In the western portion of this block and in surrounding lands, GMU 17(C) 0801 is 198 mi² and is 29% BLM unencumbered land. In the southeast portion of the block and surrounding lands, GMU 17(C) 0901 is 505 mi² and contains 40% BLM unencumbered lands.

During the reporting period 1983-2002, the northern area provided a good moose harvest. The overall moose harvest trend has been upward since 1983; the number of moose harvested per year between 1995 and 2002 doubled, or in a few cases more than doubled the number taken per year between 19983 and 1994. This northern area is important to local residents, who took 55% of the moose reported harvested there. Hunters from the GMU 17(C) communities of Dillingham, New Stuyahok, and Ekwok, the 17(B) community of Koliganek, the 17(A) community of Togiak, and the 9(C) community of King Salmon hunted for moose in this area. It is also important to guided and nonguided hunters from outside of Alaska, who harvested 29% of the moose taken in this area. 11% were taken by Alaska residents from outside this region. Moose hunters use aircraft and boats to hunt moose in this area, as well as some snowmachines.

Caribou hunting in this northern area was the best of all areas where BLM unencumbered lands are located in the Bay planning area for the reporting period 1998-2002. The nonresident hunter numbers trying were consistently larger than those of Alaska residents, with nonresident numbers declining from a high in 1999. The second highest number of caribou hunters in this area was Alaska residents from outside the region. GMU 9 and 17 residents accounted for the smallest number of hunters hunting in this area, with a marked increase in 2002. They were from the GMU 17(B) community of Koliganek, the 17(C)

community of New Stuyahok, the 17(A) community of Togiak, the 9(C) community of King Salmon, and the 9(D) community of King Cove. Residents of the lower Alaska Peninsula communities sometimes subsistence hunt and fish in Bristol Bay when they are present on breaks during the commercial fishing season. Caribou hunters primarily use aircraft for access in this area, followed by boats, four-wheelers, and snowmachines.

During the reporting period 1984 - 2001 only 9 brown bears were harvested in this northern area. Hunters were fairly balanced among hunters from outside of Alaska, Alaska residents from outside of the region, and residents of GMU 17 (Dillingham and Koliganek). Bear hunters primarily use aircraft to access this area; however, some use boats and snowmachines.

In the western portion of this area, a total of 160 moose were reported harvested during the reporting period 1983-2002, with 333 hunters attempting to harvest during the same period. Only a very small number of hunters from outside of Alaska attempted to hunt moose in the western area during the reporting period. Rather, this is most important for moose hunters from the Bristol Bay region, for the GMU 17(C) communities of Dillingham, Aleknagik, Ekwok, Manokotak and New Stuyahok, the 17(B) community of Koliganek, the 9(B) community of Pedro Bay, and the 9(C) community of King Salmon. Hunters from these communities harvested 73% of all the moose taken in this area during the reporting period. Moose are primarily hunted by accessing the area by boat , followed by snowmachines and aircraft.

The western area is also good for harvesting caribou. During the reporting period 1998-2002, 51% of hunters were from outside of Alaska, 37% were residents of the Bristol Bay region, and only 12% were Alaska residents from outside of the region. Local communities harvesting in this area include the GMU 17(C) communities of Dillingham, Ekwok, and New Stuyahok, the 17(B) community of Koliganek, and the 9(C) community of King Salmon. Caribou harvest trends in this western area have been downward since 1998. Access to this UCU for caribou hunting is primarily by aircraft, with some use of boats, 4 wheelers, and snowmachines.

During the reporting period 1985-2001 only a few bears were harvested in the western area, three by residents from outside of Alaska, and two by GMU 17(C) residents of Ekwok and New Stuyahok. The residency of the remainder of hunters is not known. Bear hunting has remained consistent at one or two bears harvested a year in this area. Access for bear hunting occurs using aircraft and boats.

The southeast area has also been good for moose harvesting. However, nearly twice as many hunters attempted to harvest than were actually able to harvest a moose during the reporting period 1983 - 2002. This southeast area is very important for the residents of GMU 17, who accounted for 74% of the hunters attempting to harvest moose, and for 78% of the moose harvested. Residents of GMU 17(C) communities included those from Dillingham, Clarks Point, Ekwok, and New Stuyahok, from the 17(B) community of Koliganek, and the 17(A) community of Togiak. Hunters from outside of Alaska accounted for 6% of those hunting for moose in this area, and for 7% of the moose harvested during the reporting period. The remainder were Alaska residents from outside of the region. Moose harvests peaked in this area in the late 1990s and have been declining. Moose hunters access this area using boats, snowmachines, and aircraft.

Caribou hunting effort and the 300 caribou harvested in the southeast area during the reporting period from 1998 to 2002 are fairly evenly divided among nonresidents, Alaska residents from outside of the region, and local residents. Hunters from outside of Alaska accounted for 37% of hunters trying for caribou in this area, and for 40% of the caribou harvested. Residents of GMUs 9 and 17 accounted for 32% of hunters attempting to harvest, and for 30% of the caribou harvested during the reporting period. The remainder are accounted for by Alaska residents from outside the region. The GMU 17(C) communities of Aleknagik, Dillingham, Ekwok, Manokotak, and New Stuyahok used the southeast area during this period, as did the 17(B) community Koliganek, the 9(C) communities of King Salmon and Naknek, and the 9(B) community Port Alsworth. The greatest majority of caribou hunters access the area by using aircraft, but a few use snowmachines, boats, and 4-wheelers.

Hunters from outside of Alaska accounted for the harvest of the majority of the brown bears harvested in the southeast area during the reporting period from1990 to 1997. No harvests by residents of the Bristol Bay region were reported during this period. Bear harvests in this area dropped off after 1994. Access for brown bear hunting is by aircraft.

Figure 3.30 . Klutuk Creek in regional perspective.

Only a very small portion of GMU 18, and all of the unencumbered BLM-administered land lies within the westernmost part of the Bay planning area. The communities closest to BLM-administered lands in this region are Goodnews Bay, Platinum, Quinhagak, Togiak and Twin Hills, and these are the communities primarily using BLM lands in this block for a wide variety of subsistence resources during the yearly round of seasonal subsistence activities (ADF&G 2004). ADF&G Subsistence Division subsistence use area maps gathered in the 1980s and 1990s indicate that the community of Platinum was using BLM lands in the Goodnews Block for hunting waterfowl, trapping, and gathering plants.

(7) Goodnews Bay Block (GMU 18; UCUs 1701 and 1801)(Figures 1.3, 3.3 and 3.31)

The Goodnews block lies on Alaska's west coast and is surrounded by the Togiak National Wildlife Refuge. Habitats are varied, and include beaches, ocean spits, tidal mud flats, coastal salt marshes, and coastal wetlands in a narrow zone between Kuskokwim Bay and the front of the Ahklund Mountains (Figures 1.3 and 3.31). This narrow complex of habitats forms a funnel for large numbers of migratory waterfowl and shorebirds from the Yukon Delta, Western Alaska and the North Slope. These migratory birds include T&E Species. The area is important nesting, molting and brooding habitat for several special status species including Steller's eider and bristle-thigh curlew, white-front geese, emperor geese,

and numerous sea ducks (Seppi 1997, Peterson et al. 1991, Shaw et al. 2005). The Carter Spit area is on the southern fringes of the Yukon Kuskokwim Delta WHSRN site, which is of global importance. This and adjacent unnamed spits and wetlands are important for the abundance and variety of birds and plants. Sea bird nesting colonies also occur on BLM-managed lands in Goodnews Bay (Peterson et al. 1991, Shaw et al. 2005). The Ahklun Mountains are non-forested alpine tundra with willow-lined drainages and tall shrub (willow and alder) thickets skirting the bases of the hills and occurring in scattered patches throughout.

Figure 3.31. Takiketak, View South.

UCU 1701 is 2,308 miles², of which 10% is BLM unencumbered lands within the Bay planning area. There is less than one percent moose habitat on these lands, and only one moose was recorded killed during the recording period 1983-2002, although 25 hunters attempted to harvest a moose. All of the hunters except one were from the GMU 18 communities of Bethel and Quinhagak. Currently there is a moratorium on hunting moose in this region, with a multi-entity effort to grow the moose population. In the past, moose hunters accessed this area by boat. UCU 1801 contains 1,495 mi², of which 5% is BLM unencumbered land. Less than 2% of this UCU is suitable moose habitat. During the reporting period, only 15 hunters attempted to harvest moose and only six moose were harvested during the reporting period from 1983 to 2002. Of the six moose harvested, five were taken by GMU 18 residents of Bethel and Goodnews Bay. The remainder of the hunters in this area were from Alaska communities outside of this region. This area is also part of the moratorium on moose hunting. In the past, moose hunters used boats and some aircraft to access the area.

For the most part, caribou have been largely absent from most of GMU 18 for over 130 years and have only recently begun to drift back in. Caribou were not plentiful in UCU 1701 during the reporting period 1994-2002, and only 46 were harvested during that time. Eight were taken in 1994, followed by a general decline and low harvest numbers until 2000, when 15 were harvested. An additional 12 were harvested in 2002. Few hunters from outside of Alaska attempted to harvest caribou in this UCU. A great majority of

them were harvested by the GMU 18 communities of Bethel, Goodnews Bay, Kasigluk, and Quinhagak, the 17(A) communities of Togiak and Twin Hills, and the 17(C) community of Dillingham. Transportation for caribou hunting is by aircraft, boat, and snowmachine.

During the reporting period between 1994 and 2002, 32 caribou were harvested in UCU 1801. Only four were harvested by hunters from outside of Alaska. The largest number, 22 or 69% were harvested by residents of the region, including residents of the GMU 18 communities of Bethel, Chevak, and Goodnews Bay, the GMU 17(C) communities of Aleknagik, and Manokotak, and the 17(A) communities of Togiak and Twin Hills. Hunting effort increased dramatically in 2002. Caribou hunters use aircraft, boats, and snowmachines to access this UCU.

The harvest of brown bears in UCU 1701 has varied from one to three animals taken approximately every other year during the reporting period 1984-2002. During that time, 16 brown bears were harvested by hunters from outside of Alaska, and only one was harvested by a resident of the GMU 18 community of Bethel. The remaining five were harvested by Alaska residents from outside the region. Aircraft and some boats are used to access the area.

Between 1971 and 2002, 18 brown bears were reported harvested in UCU 1801. The harvest of brown bears in UCU 1801 has varied from one to three animals taken approximately every other year during the reporting period 1971-2002 except for 1984, when ten were harvested. Only two bears were taken by hunters from outside of Alaska during the reporting period, and the rest were harvested by residents of the GMU 18 communities of Goodnews Bay and Platinum. Snowmachines, aircraft and boats are all used by bear hunters as modes of transport to this UCU.

d) Large Mammals

(1) Caribou

Caribou (*Rangifer terandus*) inhabit treeless tundra, high mountain, and coastal areas in the Bay planning area, where they have occupied various regions in cycles of up to 150 to 200 years (ADF&G 2005; Whitaker 1980). When boreal forests are available, herds may choose to winter there. Calving areas are usually located in mountains or on open, coastal tundra. Caribou tend to calve in the same general areas year after year, but migration routes may vary. Being herd animals, caribou must us a wide area to find food. Large herds may migrate long distances of up to 400 miles between summer and winter ranges. In summer, caribou eat the leaves of willows, sedges, flowering tundra plants and mushrooms. Beginning in September, they eat lichens, dried sedges, and small shrubs such as blueberry (Valkenburg 1999). Figures 3.8, 3.9, 3.10, and 3.11 show vegetation types for many BLM lands in the planning area. Figures 3.12 and 3.13 provide information about caribou ranges. Their chief predators are humans and wolves, but brown (grizzly) bears, wolverines, lynx and golden eagles may pray on the young (Whitaker 1980).

Two large caribou herds occupy tundra habitats on BLM lands in the Bay planning area. They are the Mulchatna Caribou Herd (MCH) and the Northern Alaska Peninsula Caribou Herd (NAPCH). A third, smaller more resident herd, the Nushagak Peninsula Caribou Herd (NPCH) is currently occupying the Nushagak Peninsula on the Togiak NWR. Numbers for all herds combined in the Bay planning area have ranged between 200,000-350,000 over the last decade, but in the last 3 years herds have experienced significant declines to between 85,000-100,000 animals (Woolington 2003; Woolington 2005, Pers. Comm).

The 1999 photo census of the MCH indicated a population size of 160-180,000. The aerial photocensus in 2002 provided a minimum estimate of 147,000 caribou in the MCH, and the 2004 photo census indicated a population estimate of 85,000 (Woolington 2003; Woolington 2005, Pers. Comm.)

The MCH has demonstrated somewhat unusual behavior in making significant shifts in calving ranges and winter ranges in the last two decades. The traditional way to identify caribou herds has been the discrete and consistent use of long term calving areas (Valkenberg 1999). During the 2000-2002

reporting period, the MCH did not move into the traditional wintering areas along the west side of Iliamna Lake, north of the Kvichak River, but animals scattered throughout their range. Approximately 10,000 to 20,000 caribou spent most of their winter in southern GMU 9(B) and southeastern GMU 17(B). In March, 2002, many of these caribou moved south to the King Salmon-Naknek area for a short time before returning to the lower Mulchatna River area (Woolington 2003).

While an objective assessment of the condition of the MCH winter range has not been made, Taylor (1989; Woolington 2003) reported that the carrying capacity of the traditional wintering areas had been surpassed and that in order to continue growing, the herd had to seek other range. The 2003 ADF&G Caribou Management Report noted that portions of the range were showing signs of heavy use in the form of extensive trailing along migration routes, trampling and heavily-grazed vegetation in some summer/fall range near the Tikchik lakes. Signs of heavy use are also evident on traditional winter range on the north and west sides of Iliamna Lake (Woolington 2003). Arctic tundra vegetation can take from 35 to over 100 years to recover.

All of the Bay planning area communities are dependent on these caribou herds as a staple in subsistence diets. Based on information from one study year, for the 17 Bay planning area communities that were surveyed, large land mammals (caribou, moose, bear, and Dall sheep) comprised 24% of the subsistence diet, and 13% was caribou (ADFG 2005). Harvest pressure on the MCH may increase as caribou become more plentiful near the villages; however, less pressure may be put on the local moose populations (Woolington 2003). Wolf densities follow the fluctuations in caribou numbers (Skoog 1968). Wolf predation rates traditionally were low, but probably increased as the herd grew and provided a more stable food source for wolves. Many local residents in the Bay planning area report an increase in wolf populations in the past several years (Woolington 2003).

The Northern Alaska Peninsula Caribou Herd (NAPCH) is distributed throughout the northern Alaska Peninsula and the eastern Bristol Bay regions, primarily in Game Management Units 9(C) and 9(E). The NAPCH is an important subsistence resource for the residents of this region. (Woolington 2003). The herd is currently restricted to limited permit hunts and a bag limit of 1 bull. This herd has fluctuated from a high of 20,000 animals in the early 1940s to a current population of 1,200 or fewer (Sellers 2003a). Current habitat condition, nutritional deficiencies, parasites, and diseases are believed to be the primary problems causing the decline (Squibb 2005, Pers. Comm.). Scientific studies carried out between 1995 and 2001 demonstrate that the NAPCH is under moderate nutritional stress (Valkenburg et al. 1996; Sellers et al. 1998a, 1998b, 1999, 2000; Woolington 2003).

The low bull:cow ratios noted in the last 4 years (i.e. 25.7 bulls to 100 cows in fall 2002) in the MCH have been reflected in the trend of composition of fewer bulls and more cows in the harvest as well. Opportunity to harvest large bulls has declined, and this also is contributing to decline in hunter demand and participation (Woolington 2005).

Nushagak Peninsula caribou are localized and harvest is governed by a limited permit system for local subsistence users only. Demand is expected to remain high from local users (Aderman 2004, Pers. Comm.). Currently Nushagak caribou are hunted under limited drawing permit hunts only.

Current management practices allow for annual monitoring at a moderate level in order to document the short and long term fluctuations in productivity, disease, seasonal habitat selection, movements, population trends, accessibility for the major herds only, providing significant contributions to local, regional, and State economies and life styles. ADF&G has limited specific baseline or monitoring guidelines, goals, and objectives that are measurable or achievable have been established for habitat, species populations, or uses of caribou in the Bay planning area. No specific BLM management guidelines have been established. Consistent BLM criteria to define and determine resource condition are not available at this time.

ADF&G management goals and objectives for caribou in Game Management Units 9 and 17 include (Sellers and McDonald 2003; Woolington and McDonald 2003):

- Reduce the Northern Alaska Peninsula Caribou Herd midsummer population objective of 15,000 - 20,000 caribou to 12,000 - 15,000 with an October sex ratio of at least 25 bulls: 100 cows.
- Maintain the Mulchatna Caribou Herd at a population of 100,000 - 150,000 with a minimum bull:cow ratio of 35:100.
- Manage the Mulchatna Caribou Herd for a maximum opportunity to hunt caribou.
- Manage the Mulchatna Caribou Herd in a manner that encourages range expansion west and north of the Nushagak River.

(2) Moose

Moose (*Alces alces*), a relative newcomer to this region, occupy or appear to be moving into suitable habitats throughout the Bay planning area and are a high value recreational and subsistence species. Moose is the world's largest member of the deer family, and those found in Alaska are the largest of all moose.

Moose are found throughout the Bay planning area particularly in riparian habitats. They are most abundant in areas that have recently burned, in areas that contain willow and birch shrubs, on timberline plateaus, in well-watered wetland tundra areas in small lakes and ponds, and along rivers and streams. They are generally limited by their requirements for food, availability for cover, and the depth of winter snow. In fall and winter moose eat large amounts of willow, birch, and aspen twigs. In spring and summer they graze on grasses, forbs and the leaves of trees and shrubs as well as various aquatic plants (Rausch and Gasaway 1994). In summer and fall moose use wetland areas, lakes and ponds. Moose habitats are more restricted to high forage value riparian and tall shrub/mixed open forest types in winter, where they browse on woody plants, including willow, aspen, and birch. Calving and rutting concentrations take place in winter range habitats.

Moose populations are stable to increasing in the western portion of the planning area especially notable on the Togiak Refuge in GMU 17(A) and the Goodnews drainage and is stable to decreasing in GMU 9 (Aderman 2001, 2005). Recent radio tracking of GMU 19 moose north of the Bay planning area indicate significant movement into the planning area from GMU 19 during the winter period.

No intensive field surveys have been carried out on BLM-administered lands in the Bay planning area. Figures 3.8, 3.9, 3.10 and 3.11, provide information about vegetation types on most BLM-administered lands in the planning area. Figures 3.14 and 3.15 show moose range. A preliminary study of riparian areas on BLM lands in the Bristol Bay area suggests that of 2,193,902 acres of BLM lands, 12,852 acres are estimated to be riparian habitat. In the Goodnews Bay riparian study area of 315,052 acres of BLM lands, approximately 7,996 acres are estimated to be riparian habitat. No previous study has defined riparian areas for this region (BLM AFO 2006).

Today much of moose habitat in the Bay planning area is believed to be pristine. The distribution of habitat quality and quantity that supports moose populations may decline in localized areas, especially those adjacent to village areas, while that of less populated areas will fluctuate with natural events such as fires or succession, as well as any future increased levels of human use and infrastructure development. In most years, the most important natural force responsible for enhancing moose habitat has been the scouring of gravel bars and low-lying riparian areas by ice and water during spring thaw, especially on the Nushagak and Mulchatna rivers and the lower reaches of their major tributaries (Woolington 2002). In the past, lightning-caused fires have not been prevalent in the Bay planning area (Cella 1996, Pers. Comm.; Figures 3.34a,b and 3.35). However, the region currently is experiencing a warming and drying trend that may produce more fire-favorable conditions. In addition, the current trend is encouraging expansion of the type of tall shrub growth that moose prefer.

In portions of the Bay planning area moose are currently among the most productive herds in Alaska and are expanding to new habitats in the western portion of the Bay planning area in the Nushigak, Togiak and Goodnews Bay drainages. Moose numbers appear to be in decline in the eastern portion of the Bay planning area west of the Kvichak drainage (BLM 2002 unpublished data). These animals are highly

valued for subsistence and general hunting as well as non-consumptive uses. The Bay planning area includes all or portions of State Game Management Units (GMUs) 9(B), 9(C), 17(A), 17(B), 17(C) and 18.

Unit 9(C) outside Katmai National Park had approximately 500 to 600 moose, and there were approximately 200 moose in Unit 9(B) in 2001 (ADF&G 2002). The moose population in Unit 17(A) was 652 in 2001 (Aderman and Woolington 2003), the population in 17(B) was estimated to be 1953 in the western portion of the unit (Woolington 2004), and the population in 17(C) north of the Igushik River was estimated to be approximately 3,000 moose in 1999 (Woolington 2004). A gross estimated population in the Bay planning area is around 7,500 to 10,000 moose.

Moose are the most visible large mammal for viewing in Alaska for residents and visitors. Overall consumptive and non-consumptive demand for moose is generally increasing due to a great many factors. The supply is stable to increasing in GMU 17, and is especially notable recently in the Goodnews drainage in GMU 18 (Aderman 2001, 2005) and is stable to decreasing in GMU 9. Generally, demand occurs in areas where moose habitat is accessible by boat and aircraft. Competition for this resource indicates overall that supply generally meets demand. The situation may intensify in the future in localized areas and regions should there be increased access and infrastructure development that extend into currently remote areas with limited accessibility. Consumptive users target areas exhibiting high success and accessibility. These areas may become over harvested in a matter of a few years. Refugia in inaccessible remote areas allow natural selection to operate naturally.

Consistent criteria to define and determine moose habitat and resource conditions have not been established by BLM AFO, and so are not available at this time.

Alaska Department of Fish and Game Goals and Objectives for moose management in GMUs 9, 17, and 18 include (Seavoy and Bente 2004):

- Allow the Unit 18 moose populations to increase to the levels the habitat can support.
- Maintain healthy age and sex structures for moose populations within the Yukon and Kuskokwim river drainages (this includes the Goodnews Block of BLM lands).
- Determine population size, trend, and composition of Unit 18 moose populations.
- Achieve a continual harvest of bulls without hindering population growth.
- Improve harvest reporting and compliance with hunting regulations.
- Minimize conflicts among user groups interested in moose within and adjacent to Unit 18.
- ADF&G population objectives are not comparable between GMUs but fall within a gross cumulative range of approximately 10,000 to 10,500 moose (ADF&G 1999).
- Allow the lower Kuskokwim River moose population to increase above its estimated size of 75-250 moose to at least 2,000 moose.
- Maintain the current age and sex structure with a minimum of 30 bulls: 100 cows for the Kuskokwim River moose.
- Conduct seasonal sex and age composition surveys for the Kuskokwim River moose as weather allows.
- Conduct winter census and recruitment surveys in the established Unit 18 survey areas.
- Conduct fall and/or winter trend counts in Unit 18 to determine population trends.
- Conduct hunts consistent with population goals.
- Improve educational outreach and hunter contacts.

(3) Brown (Grizzly) Bears

Brown/Grizzly bears (*Ursus arctos*) are found throughout the Bay planning area with seasonal aggregations at sites of abundant food, including at caribou and moose calving locations in spring and on the many productive salmon rivers and streams in the summer. In fall they take advantage of the seasonally available berries. Den sites are used in winter, and are usually located at higher elevations. Denning areas appear to be used consistently from year to year. After bears emerge from their dens anywhere from April until June they graze on sedges and grasses and scavange for whatever might

present itself. Current habitat in the Bay planning area is highly productive and sustains a vigorous and relatively stable bear population at this time (Figure 3.16). Considerable tolerance of bears in bush communities occurs as bears are common visitors to local dumps, fish camps and homes.

Bear management is a primary function of the various agencies in the Bay Planning area. GMUs 9(B), 17(A), 17(B), 17(C), and 18 fall within the Western Brown Bear Management Area where Federal and State agencies coordinate annual management and monitoring efforts. The Togiak NWR, ADF&G, BLM, and Regional Office of the USFWS are in the process of finalizing the Togiak Refuge and BLM Goodnews Bay brown bear density and population estimate. ADF&G, USFWS, NPS and BLM coordinate other bear census and density estimates as well as harvest monitoring.

Southwestern Alaska brown bears are the most sought-after brown bear populations globally due to accessibility, large size and trophy quality. Commercial guiding, outfitting and viewing for brown bear is a significant contributor to stability, diversification and value of regional and local economies and personal income. The Bay planning area overlaps Game Management Units 9(B), 9(C), 17(A), 17(B), 17(C) and 18. Guides/outfitters are required for out-of-State brown bear hunters, and brown bear opportunity contributes to the Bay planning area economy. The planning area encompasses Katmai National Park and other bear viewing areas that draw thousands of visitors annually as well as provide a reservoir of harvestable bears that venture outside the Park. Up to 2500 brown bears two years old and older occupy the Bay planning area (ADF&G 1998, 1999). This resource provides for up to 90 hunters annually for a harvest range of approximately 60-80 bears annually.

Area management varies from drawing permits to registration permits, alternate year open seasons and general open hunting depending on specific area, demand, accessibility and brown bear population status. Public demand for brown bears is in most cases being met and trends appear to be increasing bear populations (ADF&G 2000). Current local concern in specific rural areas regarding brown bear predation on caribou and moose and the impact to those dependent upon subsistence resource populations has contributed to incentives to reduce large predators, including brown bears.

Sustained yield. The management practices the past decade have resulted in a generally stable yield of high quality bear opportunity and harvest. Current situations involving declining caribou and moose populations are causing a reassessment of bear management from a focus on trophy and high quality bear resource to one of predator reduction to enhance other species of high interest.

Consistent BLM criteria to define and determine brown bear habitat and ecosystem condition are not available at this time. However, brown bear habitat in the eastern portion of the Bay planning area is believed to be good to excellent, based on the number of bears inhabiting the area, and habitat in the western portion is believed to be good as well, though bear densities appear to drop off as one moves west in the planning area (Dewhurst 2000).

Consistent BLM criteria to define and determine brown bear habitat and ecosystem condition are not available at this time. The Alaska Department of Fish and game management objective for brown bear in these units is (Woolington and McDonald 2001):

- Maintain a brown bear population that will sustain an annual harvest of 50 bears composed of at least 50% males.

(4) Black Bears

Black bears (*Ursus americanus)* inhabit riparian areas and forested uplands which overlap with brown bear habitats to large degree. Black bears (Ursus americanus) are distributed throughout suitable habitat in the Bay planning area but do not extend southward beyond the Alagnak River or into the Goodnews Bay area at this time. Forest provides escape cover for black bears. From November to late April black bears are in their dens, a specialized seasonal habitat requirement. Black bears are omnivorous. Most of

the diet consists of vegetation, grubs, beetles, crickets and ants. Bears also eat small to medium-size mammals or other vertebrates and a variety of fish.

No interagency or non-governmental collaborative effort or focus on black bear management is in place at this time.

Black bears are not a popular game animal in the Bay planning area, but they are used to some extent for subsistence purposes. In this remote region, the non-resident makes up 72 to 85% of the hunters, other Alaska residents comprise around 15 to 22% of hunters, and local residents up to 6%. Reported harvest and defense of life and property (DLP) mortality for the past 10 years has varied from 13 to 30 animals, and has increased as greater numbers of hunters seeking Mulchatna caribou have incidentally taken black bears (ADF&G 1998, 1999, 2000).

International involvement in gall bladder and illegal bear parts trade can unfortunately be a demand of local consequence. No objective data are available for the population of black bears, nor for their densities, key denning areas, or other aspects of bear populations in GMUs 9, 17 or 18. However, local resident' concerns indicate that black bear populations in some areas are declining (ADF&G 1999, 2000). Brown bear-dominated habitats occur in GMU 9 and 18, where black bear densities are very low and black bears are limited by lack of favorable black bear habitat, as well as by brown bear predation and competition for food sources, although it must be said that both bears are omnivorous and seldom fail to find something to eat (Whitaker 1980; ADF&G 1999). Black bears are in low demand in the Bay planning area for the commercial tourism industry or for watchable wildlife opportunities for Alaskans. Neither illegal harvest nor unreported harvest data are gathered or estimated for black bears by ADF&G.

Under existing black bear management, sustainable levels of harvest, population characteristics and abundance, distribution, or habitat are established for some areas. Guidelines and thresholds that would initiate other management opportunities or options are not established for all areas within the Bay planning area. Populations are generally moderate to high in suitable habitats. Harvests are generally below levels that are considered to be sustainable. Interest in black bears also involves the predation black bears may be responsible for relative to ungulate populations and is a damage control issue and/or nuisance bear issue in and around areas of human habitation. Subsistence harvest and utilization of black bear in the planning area is limited although the majority of the harvest is local resident oriented. Black bear bag limits are liberal (two to three bears per year) in those Game Management Units (GMUs) within the planning area. The black bear scenario is expected to remain stable in the near future and depending upon natural factors such as declines in brown bear populations or expansion of black bear habitat, capable of increasing ranges and numbers.

(5) Dall Sheep

Dall Sheep (*Ovis dalli)* in the Bay planning area occupy habitats in the southwestern portions of the Alaska Range in the northeast planning area including Lake Clark National Park and Preserve, extending as far south as the mountains between Lake Clark and Lake Iliamna. Historically sheep were present in portions of Katmai National Park until the volcanic eruption of 1912 displaced them. Sheep prefer rocky mountainous areas (Figure 3.17).

Sheep are very loyal to their home ranges. Ewes lamb in particularly rugged cliffs in their spring range, where they remain a few days until the lambs are strong enough to travel (Heimer 1994). In winter the entire herd feeds together on woody plants that include dry frozen grasses, willow, sedge stems, sage, crowberry, cranberry, and sometimes lichen and mosses. Foods available for consumption vary from range to range. In spring the herd splits into two groups. One consists of ewes, lambs, and yearling rams, and the other is made up of older rams. The oldest member of the group is its leader. Their summer forage is grasses, sedges and forbs. In late fall the rams compete as they try to gather harems of ewes. Wolves are the main predator, but lynx, wolverine, bears, and eagles also prey on sheep (Whitaker 1980).

The Bay planning area supports populations of Dall sheep only in Lake Clark National Park today, although historic accounts report Dall sheep in other areas of the western portion of the Bay planning area, and simple carved sheep horn spoons (that is, too plain to be trade goods) were located in the PaugVik village site located in Naknek, occupied from at least 1100 A.D. until 1910 (Dumond and VanStone 1995). Sheep may have been more widespread in the mountainous eastern portions of the Bay planning area in the past, and opportunity for restoration may be a remote possibility in suitable habitats.

The general remoteness and inaccessibility of BLM sheep habitats and current management of habitat and harvest is anticipated to remain unchanged in the future. Dall sheep populations and habitats are largely pristine. In the Bay planning area, sheep are primarily affected by natural events in their current habitats and distribution. The Dall sheep resource is expected to remain healthy and vigorous. However, Heimer (1994) suggests that they are extremely susceptible to disease introduced by domestic livestock.

(6) Wolf

Wolves (*Canis lupus*) are considered both big game and furbearers in Alaska. Wolf populations and densities are dependent on many factors the most important being the presence and abundance of prey species. Large ungulates, particularly newborns and calves (or lambs) of the year, including moose, caribou, and Dall sheep provide late fall, winter and spring prey in the Bay planning area. During the summer when wolf pups are in or near the den or rendezvous sites beaver, ground squirrels, lemmings, hares, birds including upland game birds and fish are important dietary items.

Densities of wolves and pack structure and territory size depend on prey abundance and distribution. In the Bay planning area wolves are widespread. Estimates by ADF&G (2000) suggest a Bay planning area population of 780-835 wolves in 40-60 packs. Wolves are a valuable fur animal and used for personal use and Native crafts.

For GMU 17, wolves are reported to prefer the major drainages of the Nushagak and Mulchatna rivers, where they are believed to live in established territories where they take advantage of the caribou as they migrate through these territories (Woolington 2003). In that portion of interest for Bay planning purposes, wolves inhabit the Kilbuk Mountains from Whitefish Lake to the southernmost tip of Unit 18 near Cape Newenham. Wolf distribution is believed to change with caribou availability. Some resident wolf packs remain throughout the year but must shift to other dietary resources when caribou return to Unit 17 to calve (Seavoy 2003). Caribou distribution on the upper Alaska Peninsula is predominantly on the Bristol Bay Plain.

Wolves are carnivorous, and moose, caribou and to a more limited extent Dall sheep are their primary prey. Wolves also dine on salmon when they are available. During summer, small mammals including voles, lemmings, ground squirrels, snowshoe hares, beaver, and occasionally birds and fish are eaten (Stephenson 1994). Wolves serve an important function in maintaining the herd health and equilibrium with their habitats of large herbivores. They are considered a highly valued component of Alaska's fauna (Stephenson 1994).

Wolf density has been estimated to be up to one wolf per 25 square miles in favorable habitats (Stephenson 1994). Between 1992 and 1999 wolf estimates ranged from 780 to 835 animals, and the number of wolf packs were estimated at between 40 and 60 for the Bay planning area (ADF&G 2000). Based on the increasing trend in reported harvest, trapper questionnaire data, reported sightings, other reports by the public, and anecdotal information, the wolf population in the Bay planning area increased between 1999 and the most recent published estimates in 2001. In all of GMUs 9, 10, 17, and 18 it is estimated that there were between 1,050 and 1,200 wolves in from 77 to 96 packs in 2001 (Woolington 2003; Sellers 2003b; Seavoy 2003).

Wolves as well as wolverines are classified as fur bearers in addition to being game species in Alaska. Over the last decade harvests of wolves have varied widely and are a reflection of fur prices, access, predator control concerns and population changes. An overall estimate of populations is not available for

the BLM management units in the planning area. Wolves are hunted and trapped primarily by local residents, but wolves are also harvested opportunistically by non-local hunters. Successful wolf harvests have been the result of relatively few participants, which have steadily increased since 1996. From 50 to 260 wolves were harvested each year from 1992 to 1999 in Game Management Units (GMUs) within the Bay planning area (ADF&G 2000). During this time, between 40 and 98 trappers/hunters were responsible for the majority of the documented harvest in the Bay planning area (ADF&G 2000).

Harvest methods vary widely from area to area depending on access methods, climatic conditions, terrain, and population availability. In some areas, wolves are readily accessible with snow machines whereas in other areas aircraft access for trapping or shooting is the major method of taking. Wolf hunting methods such as same-day airborne hunting, aerial gunning, bounty systems, poisons and a wide variety of predator control methods are still in demand; however, these are still limited by highly polarized public support. An unknown number of wolves are harvested for subsistence that is not reported. They are used for clothing and Native cultural and craft purposes. This unreported harvest may be significant in some areas, but varies with year, access and abundance of wolves.

Fluctuations in wolf numbers are expected to continue, and adaptive management of wolves and their prey bases is necessary to balance predator/ prey (moose and caribou) relationships with the high demand of human use for both groups of species. No current BLM activity is directed at maintaining minimum or viable wolf populations or maintaining subsistence opportunity for harvest. Overall, the management of wolves is moving toward a more planned approach that is dependent upon specific data.

e) Furbearers

Furbearers include those species of mammals that are routinely sought after by licensed trappers who place commercial value on the animals' pelts. Furbearers found in the planning area include wolverine, wolf, coyote, red fox, Arctic fox, Canada lynx, marten, otter, mink, weasel, beaver, and muskrat (ADF&G 2005; Whitaker 1980).

Wolverines (*Gulo gulo)* are widely distributed and travel widely throughout their range. Wolverines are still of high value in the fur market and are pursued by trappers and hunters for that reason. The Bay planning area enjoys widespread distribution of wolverines and in some cases expanding and increasing populations, based on contacts with local residents and trappers. GMUs 9 and 17(B) produce the greater harvest of wolverines from the GMUs in the Bay planning area.

Beaver (*Castor canadensis)* are widely distributed and increasing in the Bay planning area in streams and lakes in riparian and aquatic habitats. In many areas beaver also occur in treeless tundra areas where tall and low shrub materials are available near streams. Beaver eat the bark of favored deciduous trees and shrubs. Currently beaver are widespread and abundant throughout their available habitat. The Goodnews area has a rare phenotype pelt coloration that is unique and only occurs in that area.(Van Dael 2005, Pers. Comm.)

Muskrat (*Ondatra zibethica)* are widely distributed throughout the wetland habitats in the Bay planning area but are currently uncommon to scarce in most areas. Minor use of muskrat for food and personal use of fur occurs but the price for muskrat pelts is very low and the quality of muskrat fur from this region is moderate to poor. Harvest is very low.

Coyote (*Canis latrans)* arrived in Alaska around 1915 and have rapidly expanded since that time. Coyotes are widespread the Bay planning area and occur west to Goodnews Bay. Coyotes are not abundant or common in the planning area. A few are harvested incidental to hunting or trapping fox, wolverine, wolf or lynx. Healthy wolf populations tend to dampen the rate of increase and movement of coyotes into new areas.

Arctic fox (*Alopex lagopus)* occur along the west coast of the Bay planning area along marine beaches primarily. Foxes eat carrion, microtine rodents, lemmings as well as seasonally available birds and eggs. Population densities are linked to fluctuations in small rodent populations, with periodic peaks

approximately every 4 years. Arctic foxes are occasionally taken in the Bay planning area but are used for subsistence and personal use and normally are not sold as fur.

Red fox (*Vulpes vulpes*) including red, cross and black color phases, occur in the Bay planning area. Red fox are omnivorous and diets often change seasonally but may consist of carrion, plant material, rabbits and other small mammals, ptarmigan, birds, eggs, and invertebrates.

Canada lynx (*Lynx Canadensis*) are classified as a furbearer in Alaska.

River otter (*Ljutra canadensis)* are abundant and widespread throughout the Bay planning area and inhabitat stream and lake riparian habitats. They primarily prey on the rich fishery resources as well as mussels, clams, insects, frogs, small mammals, birds or eggs, and vegetable matter.

Both least and short-tailed weasel (ermine) occur in the Bay planning area. Least weasels are sparsely distributed and utilize forest and tundra habitats where they feed on mice, voles, insects, small birds and worms. Short-tailed weasels occur throughout a wide variety of habitats but prefer brushy, forested and broken terrain. Prey includes microtine rodents, mice, shrews, birds, eggs, ptarmigan, hares, fish and insects. Weasels are also preyed upon by a variety of avian and mammalian predators including owls, hawks, lynx, fox, coyote and mink. Fur value is low but ermine is popular to trim parkas, and Native craft items and tourist items.

Fur bearer populations in the Bay planning area are assumed to be healthy and are under the present circumstances under-harvested, according to anecdotal information. This is a diverse group of species and each is unique in its habitat requirements, productivity, distribution and population dynamics.

The popularity of trapping fur bearers has declined in recent years due to price declines and world demand declines. These species also play an important role in ecosystem functions. Demand for fur bearers is significantly dependent upon fur prices, population fluctuations, access, weather conditions, personal use, Native crafts, raw material needs, and accessibility of the resource.

Commercial and subsistence demand are primary drivers for fur bearer harvest, however; much of this harvest does not require reporting and harvest is not monitored. Required sealing (wolverine, wolf, marten, river otter, beaver and lynx) and monitoring do not account for subsistence take for personal use. Fur bearer species not requiring sealing are harvested but data provide only gross minimum estimates. Currently no monitoring of demand is being conducted. Poor fur prices have decreased participation in recent years (ADF&G 1998). The lack of efficient means to estimate and directly monitor populations, general low overall demand and participation, and lack of reliable snow conditions for fur harvest in the Bay planning area hampers development of population objectives for furbearers. Voluntary trapper questionnaires, opportunistic observation and sealing requirements are the current management tools in use. This appears sufficient at this time for the relatively low trapping effort.

f) Small Mammals

Small mammals include a wide variety of shrews, mice, microtine rodents (lemmings, meadow voles), non-game and small game species such as pika and porcupine. These species and their fluctuating abundance and cycles are keystone to the ecosystem function.

g) Marine Mammals

Marine mammal species occur in nearshore and offshore areas of the Bay planning area, but do not occur on coastal BLM lands, with the possible exception of beluga whale which may travel miles up rivers in pursuit of salmon prey.