GAME MANAGEMENT UNIT 20D

DELTA JUNCTION AREA OFFICE

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DESCRIPTION

Game Management Unit 20D is located in the middle Tanana River Valley of Interior Alaska, approximately 100 miles east of Fairbanks, and is approximately 5,633 mi^2. Most land is in state or private ownership, with some federal land in the Ft. Greely Military Reservation and Ft. Wainwright Donnelly Training Area.

The Tanana River bisects Unit 20D into southern and northern portions (Fig. 1). Both the Richardson and Alaska Highways pass through southern Unit 20D, along with numerous other roads and trails. The Richardson Highway traverses the western portion of northern Unit 20D, otherwise there is no road access.

South of the Tanana River, Unit 20D consists of the lowlands of the Tanana River valley and the foothills and mountains of the eastern Alaska Range. North of the Tanana River the unit consists of lowlands along several major rivers and the uplands of the Tanana Hills.

Communities in Unit 20D (Fig. 1) and their approximate populations include the following:

- Delta Junction (840)
- Big Delta, Deltana area (2,320)
- Ft. Greely Military Reservation (500)
- Dry Creek (100)
- Dot Lake (80)
- Healy Lake (25)

SPECIAL USE AREAS (*Fig. 2*)

<u>Controlled Use Areas</u>:

- Delta Controlled Use Area (DCUA): The DCUA was created in 1971 and encompasses 1,680 mi^2 primarily in southern Unit 20D with smaller portions in Units 13B and 20A. It was established to meet sheep hunter demand for uncrowded hunting conditions and for a walk-in hunting opportunity free of motorized vehicles. The goals are met by conducting 2 drawing permit hunts. The first hunt is August 10–25 with no motorized vehicles. The second hunt is August 26–September 20 with unrestricted access. Seventy-five permits are issued for each hunt.

Based on communications with DCUA hunters, the management goals of providing aesthetically pleasing hunting conditions and addressing conflicts between walking, ATV, air-transport, and horse hunters were met. Results from a DCUA hunter questionnaire in RY03 indicated 96% of respondents (n = 74) agreed with the aesthetic goals of the area and 81% were satisfied with their DCUA hunt. Personal communication between ADFG Biologists and hunters during sheep sealing has also signified high satisfaction with the management goals of the DCUA.

The DCUA has contributed to meeting a ADF&G Dall sheep management plan goal of recognizing diversified human recreational uses of Dall sheep and has also contributed to addressing the issue of increased Dall sheep hunting pressure in the eastern Alaska Range. A repeal of the DCUA would result in the loss of a high-quality walk-in Dall sheep hunting experience that was requested by hunters in the early 1970s. And, if the DCUA did not exist, a re-emergence of conflicts between walking, ATV, air-transport, and horse hunters could be expected.

- Macomb Plateau Controlled Use Area (MPCUA): The MPCUA covers 304 mi^2 in southeastern Unit 20D and was created in 1974 to protect a small area of critical caribou habitat on the Macomb Plateau for the Macomb caribou herd and to regulate hunting. MPCUA regulations restrict motorized vehicles from the area during August 10–September 30. The Macomb Plateau is the core calving grounds for the Macomb caribou herd and the MPCUA is successfully meeting its objective to protect important caribou habitat and to help provide a sustainable harvest for this small road-accessible herd.

  The MPCUA management goals of protecting critical caribou habitat and regulating hunting were met. The Macomb caribou herd size has demonstrated an overall increasing trend since creation of the MPCUA. The 2010 population estimate of 1,800 caribou is the highest herd size recorded for the Macomb caribou herd since the early 1970s. The harvest quota and harvest for the Macomb herd also increased (see Page 6, Macomb caribou herd status).

  The MPCUA has contributed to meeting the intensive management objectives for population size and harvest of the Macomb caribou herd. A repeal of the DCUA would result in motor vehicle disturbance to this small caribou population in their core rutting and calving habitat. Additionally, if the MPCUA did not exist and motor vehicle use was allowed in this area during the RC835 hunt, it would cause an increased rate of caribou harvest. The increased rate of harvest could cause the harvest quota to be achieved earlier in the season therefore reducing the amount of hunting opportunity for this caribou herd.

<u>Other Special Use Areas</u>:

- Delta Junction Bison Range (DJBR): The DJBR is 90,000 acres located in southern Unit 20D, east of Delta Junction. It was created in 1979 by the Alaska Legislature to perpetuate free-ranging bison and diminish bison damage to private agricultural crops. ADF&G produces and enhances bison forage on 2,800 acres of the DJBR to attract the Delta bison herd away from private agricultural land. ADF&G is the primary land manager for the DJBR, which is managed as a multiple use area for activities ranging from hunting and fishing to timber sales and watershed protection. Work continues to increase the amount and quality of bison forage on the DJBR.
- Bison Range Youth Hunt Management Area (BRYHMA): The BRYHMA is 6,380 acres located within the DJBR boundaries and encompasses the two DJBR fields of bison forage. The BRYHMA was created in 2002 to improve ADF&G's ability to meet DJBR legislative mandates and goals and objectives of the Delta Bison Management Plan by: 1) reducing the number of moose hunters in DJBR fields thus reducing the level of human activity and disturbance to bison in the DJBR fields prior to and during the moose hunting season, 2) reducing damage to bison forage crops by large numbers of moose hunters, and 3) providing a safer work site for ADF&G staff conducting DJBR field operations during the moose hunting season by reducing the risk of hunting-related accidents. The BRYHMA is meeting all of its objectives by reducing moose hunting activity via a drawing permit youth hunt. A secondary benefit of the hunt is to introduce a limited number of youth to moose hunting.
- Delta Junction Management Area (DJMA): The DJMA is a 278-mi^2 area surrounding Delta Junction that was created as a moose hunting closed area in 1974 at the request of the Delta Fish and Game Advisory Committee. The area was reduced in size in 1991. Hunting was reestablished in the DJMA in 1996 with a drawing limited to 5 permits. Currently, there are 19 drawing permits available to resident and nonresident hunters, and an additional 6 drawing permits made available to qualified resident and nonresident disabled veterans. The Delta Advisory Committee is satisfied with current DJMA management.

Communities in Unit 20D are represented by two Fish and Game Advisory Committees. Delta Junction, Dry Creek, and Ft. Greely are represented by the Delta Fish and Game Advisory Committee. Dot Lake and Healy Lake are represented by the Upper Tanana–Fortymile Fish and Game Advisory Committee.

BISON

STATUS: Bison utilize southwestern Unit 20D, with summer range including federal land on the Ft. Wainwright Donnelly Training Area and winter range primarily on private agricultural land and state land in the DJBR. The Delta bison herd numbered approximately 406 bison in fall 2011. The current pre-calving (spring) population objective is 360 bison.

The Delta bison herd is managed based on goals and objectives in a 5-year management plan that was developed with public input from the Delta Bison Working Group and approved by the Board of Game. Management goals include maintaining a healthy, free-ranging herd; reducing conflicts between bison and the public; and providing the greatest opportunity to hunt and view bison. The Department began a planning process in winter 2008 to update the Delta Bison Management Plan. A Draft Delta Bison Interim Management Plan was completed in late 2011 and is under internal review by ADF&G.

The Delta bison hunt is one of the most popular permit drawing hunts in the state, with 18,000–19,000 applicants in recent years for up to 120 permits. Hunters must complete a mandatory orientation to learn how to identify bulls and cows, to review land status, and to be informed about other hunt-related issues and topics. The required orientation was placed online for the 2009 hunting season. Regulations allow the hunting season to open July 1, but under the Department's discretionary authority, hunting does not begin until October 1 when local farmers have completed the fall harvest. The July opening date is to allow the Department to use hunting as a tool to reduce bison damage in agricultural areas if necessary. The season closes March 31. The bag limit is 1 bison every 10 years.

Several regulatory changes to the Delta bison hunts were implemented and became effective in 2010. These include: allowing the use of radio communication, including cellular and satellite phones, between bison hunters; prohibiting the take of specific radiocollared bison; and extending the hunting season to allow year-round issuance of permits when deemed necessary by ADF&G.

MANAGEMENT ACTIVITIES: Population management activities for bison include the following:

- Aerial population surveys.
- Ground-based sex and age composition surveys.
- Calculation of pre-calving and pre-hunting herd population estimates.
- Maintenance of 8–12 active radio collars on bison to facilitate locating the herd for surveys.
- Conduct drawing permit hunt.
- Tissue sample collection for use in bison genetics research.

ADF&G bison habitat management activities are directed at administration and maintenance of the DJBR. Bison forage is managed on the DJBR to attract bison away from private agricultural land until fall harvest of crops is completed. Forage management activities include planting annual crops, managing perennial crops, prescribed fires, controlling noxious vegetation, and providing water and mineral supplements for bison.

ISSUES: The highest priority long-term bison management issue is to prevent bison damage to private agricultural crops while maintaining a free-ranging bison herd. This task is accomplished by managing the DJBR to produce bison forage to attract bison away from private land and maintaining herd size through hunting. The DJBR delays bison movement onto private agricultural lands but does not prevent it. In recent years, bison have moved onto agricultural lands mid to late August.

Other bison management issues include 1) cooperating with U.S. Army planners to minimize impacts to critical bison range as the Army expands training facilities on the Ft. Wainwright portion of the bison herd's summer range along the Delta River, 2) addressing delayed spring movement of bison from private agricultural lands to their Delta River calving grounds, 3) managing the bison hunt in a manner that retains hunter access to private land to ensure long-term success of managing the bison population through hunting, 4) working with owners of domestic bison to reduce the chance of domestic bison escaping and joining the wild herd, and 5) communicating with State Agricultural and Animal Health agencies and livestock producers to bring attention to the risk of potential disease transmission from domestic livestock diseases to wild bison.

BLACK BEAR

STATUS: Accurate estimates of black bear population size and trends are not available for Unit 20D due to the difficulty of enumerating black bears. However, black bears appear to be numerous in the forested portions of the unit. In the mid 1990s, a Unit 20D black bear population estimate was extrapolated using research data from adjacent Unit 20A and resulted in a Unit 20D estimate of 750. Hunting black bears is popular in Unit 20D, and bait stations are commonly used in the spring. The current hunting season is open year-round with a bag limit of 3 bears/year. Harvest averages about 17 bears/year.

MANAGEMENT ACTIVITIES: Harvest is monitored by harvest tickets and registration of black bear bait stations. Delta Area staff responds to public calls about nuisance black bears.

ISSUES: No current black bear issues.

GRIZZLY BEAR

STATUS: Accurate estimates of grizzly bear population size and trends are not available for Unit 20D because it is difficult to survey them. In 1993, a Unit 20D grizzly bear population estimate was extrapolated using research data from adjacent and similar portions of Units 20A and 20E. This calculation produced a Unit 20D population estimate of 181–210 bears.

Since intensive management was adopted for Unit 20D in 1995, the grizzly bear hunting season and bag limit has been liberalized to August 10–June 30 with a bag limit of 1 bear/year and no resident tag fee. As part of the Unit 20D intensive management program, the Board of Game adopted an annual harvest goal of 5–15 grizzly bears/year. No population size goal has been established.

Prior to implementation of intensive management in Unit 20D, grizzly bear mortality averaged 8 bears/year. Grizzly bear mortality increased after hunting regulations were liberalized. Mortality (hunting, defense of life and property, nuisance bears killed on a hunting license, etc.) is meeting the Board's goal, with a mean annual kill of 12 bears/year.

MANAGEMENT ACTIVITIES: Harvest is monitored by requiring grizzly bear hunters to have their bears sealed. Occasionally nuisance grizzly bears threaten life and property around Delta Junction and staff is asked to address these issues.

ISSUES: Grizzly bears are an important predator on moose and caribou calves. Their role in the Unit 20D intensive management program should be regularly evaluated.

CARIBOU

Macomb Caribou Herd

STATUS: The Macomb caribou herd is small and ranges primarily in the Alaska Range foothills of southern Unit 20D. In the 1980s the herd size was 700–800. Herd size decreased in the early 1990s to a low of 458 in 1993, due to severe summer and winter weather and poor calf survival. Hunting was discontinued in 1992 but resumed in 1997.

In December 1994 the Board determined that human use of the Macomb caribou herd is the preferred use and adopted intensive management for this herd in Unit 20D. In March 1995 the Board adopted a Macomb caribou herd population goal of 600–800 caribou with a harvest goal of 30–50/year.

When intensive management was adopted in 1995, the fall herd size was estimated to be 477, with 10 calves:100 cows and 39 bulls:100 cows. The Macomb caribou hunting season had been closed since 1992 and remained closed through 1996. A registration permit hunt resumed in 1997, and during 1997–2003 harvest averaged 30 caribou/year but the season had to be closed by emergency order most years. Regulatory changes in 2004 resulted in a registration permit with a season of August 15–25 and a harvest quota of 25, and motorized access restricted in the MPCUA and DCUA portions of the herds range. As herd size has increased in recent years, the hunting season dates were extended to August 10–27 in 2008, which allows two days of motorized hunting on August 26–27 after Delta Controlled Use Area restrictions end. The harvest quota was increased to 50 caribou/year in regulatory year 2008–2009 (RY 08), and to 70 caribou/year in RY 10, which meets the intensive management harvest objective. Harvest was 68 in RY10 and 73 in RY11. In fall 2010, the Macomb caribou herd was meeting the population goal with an estimate of at least 1,800 caribou, and a composition of 26 calves:100 cows and 32 bulls:100 cows.

MANAGEMENT ACTIVITIES: An annual aerial population estimate and composition survey is conducted in the fall. Active radio collars are kept on 8–12 caribou to facilitate locating the herd for population estimates. Harvest is managed by registration permits.

ISSUES: The primary management issue with the Macomb caribou herd is meeting intensive management harvest goals without overharvesting a small, road accessible herd.

FURBEARER

STATUS: All furbearer species endemic to Interior Alaska are present in Unit 20D. Species of highest interest to trappers include lynx, marten, wolverine, wolf, and red fox. The most intensive trapping effort occurs along the road system in southern Unit 20D from a combination of part-time and full-time trappers. Reports from trappers suggest that lynx numbers were lower in 2011 compared to the previous 2 years.

MANAGEMENT ACTIVITIES: Trappers are required to seal lynx, river otter, wolf, and wolverine. Harvest data are analyzed. A questionnaire is sent to trappers annually to assess their impression of population trends. An annual snowshoe hare population trend survey is also conducted.

ISSUES: Working with trappers to improve techniques to avoid capturing nontarget species. This is especially important for inexperienced trappers.

MOOSE

STATUS: Moose are distributed throughout about 4,400 mi^2 of moose habitat in Unit 20D. The Board of Game has determined that human use of moose is the preferred use and adopted intensive management with a moose population objective of 8,000–10,000 and a harvest objective of 500–700 moose/year. The fall 2011 Unit 20D population estimate south of the Tanana River is 4,134 (2.2 moose/mi^2), ratios with of 35 calves:100 cows and a bull:cow ratio of 30 bulls:100 cows. The latest population estimate of 2,411 moose (0.8 moose/ mi^2) north of the Tanana River was generated in 2004. Preliminary Unit 20D moose harvest for RY11 is 263. The majority of moose and harvest occur in southern Unit 20D.

Antlerless moose hunting was initiated in fall 2006 in southwestern Unit 20D when southern Unit 20D was estimated to have 7,406 moose (3.9 moose/mi^2). Moose density was highest west of the Johnson River (5.6 moose/mi^2). The calf:cow ratio was 41 calves:100 cows and the bull:cow ratio was 21:100. An abundance of good habitat was created in southwestern Unit 20D in the last 15–30 years from land clearing and several large wildfires which produced an abundance of high quality moose forage, thus stimulating growth in the moose population. Moose browse surveys conducted in spring 2007 indicated that moose were removing 25% of the current annual growth over the winter. Moose twinning rates were moderately low, averaging 24% over the previous 2 years. Consequently, antlerless moose hunts for cows without calves were initiated in southwestern Unit 20D during 2006–2009. The area was subdivided into 3 hunt zones which were managed with a combination of drawing and registration permit hunts.

The general moose hunting season in southern Unit 20D is September 1–15, with a bag limit east of the Johnson River of 1 bull and a bag limit west of the Johnson River of 1 bull with spike/fork or 50-inch antlers or at least 4 brow tines on 1 side. A 278 mi^2 area surrounding Delta Junction is managed as the DJMA where hunting is by drawing permit, with a maximum of 30 permits authorized. Ten drawing permits are also issued for a

6,380-acre portion of the DJBR managed as the Bison Range Youth Hunt Management Area (BRYHMA) to reduce disturbance from moose hunters to the Delta bison herd and DJBR management activities. Each BRYHMA hunter is assigned a 4-day hunt period centered on the first 3 weekends in September. The bag limit is 1 moose per lifetime: either 1 bull with spike/fork or 50-inch antlers or at least 4 brow tines on 1 side, or 1 cow without a calf.

Northern Unit 20D was estimated to have 2,411 moose (0.8 moose/mi^2) in fall 2004, the last population estimate for this area. Ratios were 31 calves:100 cows and 47 bulls: 100 cows. Large wildfires burned in northern Unit 20D in 2003 and 2004 and the number of moose in this area will likely be increasing in the future, providing increased harvest. Access for hunters is good along the Richardson Highway and several major rivers, but poor away from them. The general hunting season is September 1–15 for 1 bull west of the Volkmar River drainage and September 1–20 from the Volkmar River drainage east. The Healy River drainage has an additional hunting season of August 15–28 for a bull with spike/fork antlers to allow residents of Healy Lake village additional opportunity to harvest moose to meet their community needs before the waterfowl hunting season opens in the area.

MANAGEMENT ACTIVITIES: We conduct annual aerial surveys to estimate population size and composition. Aerial surveys are flown in spring to estimate twinning rates in southwestern Unit 20D where moose densities are highest. ADF&G research staff began a project in October 2009 to assess moose movements, short yearling weights, and sightability of moose during aerial surveys in southwestern Unit 20D. Data collection is on-going. We conduct periodic evaluations of browse in southwestern Unit 20D to assess the extent of habitat utilization by moose. We also provide input to Alaska Division of Forestry on how wildfire can affect moose habitat. Public meetings are held to gather comments about moose management and regulations. Signs are posted along the road system to provide moose hunting regulation information to hunters. We address nuisance moose concerns in the Delta Junction area.

ISSUES: The primary issue is managing a high density moose population in southern Unit 20D west of the Johnson River, while much of the high quality habitat created in the last 30 years is aging and will decline in quality in coming years. Therefore, antlerless moose hunts have been conducted in this area as part of the intensive management program, and additional hunts will likely be conducted in the future. An antlerless moose hunt also helps meet the harvest objective. There is some hunter dissatisfaction with the antler restriction regulations in southwestern Unit 20D.

SHEEP

Eastern Alaska Range: Delta Controlled Use Area

STATUS: The Delta Controlled Use Area (DCUA) is 1,495 mi^2 in Units 20D, 13B, and 20A. It was established in 1971 to provide a walk-in hunting opportunity and uncrowded conditions for Dall sheep hunters. Objectives for the DCUA are to manage for a population of 1,800 sheep, with a mean annual harvest of 35 full-curl rams with a mean horn length of 36 inches and mean age exceeding 8 years.

The Dall sheep population in the DCUA was estimated at 1,700 sheep in 2010, slightly below the population objective. The DCUA hunt is split into two drawing permit hunts. The first season, during August 10–25 is for nonmotorized access. The second season, during August 26–September 20 allows motorized access. Seventy-five permits are issued for each season. Hunters have killed an average of 45 sheep/year the last 3 years, exceeding the harvest objective.

MANAGEMENT ACTIVITIES: Aerial surveys are flown to collect data on the number of sheep and their sex and age composition. Two drawing permit hunts are administered for Dall sheep hunters in the DCUA.

ISSUES: Protecting Dall sheep habitat from development and preventing the transmission of diseases from livestock to the Dall sheep population are the primary issues.

Mt. Harper–Goodpaster River

STATUS: The Mt. Harper–Goodpaster River sheep population in northern Unit 20D is a small population of approximately 100 animals that occupy about 240 mi^2 of sheep habitat in the Tanana Hills on the boundaries of Unit 20D with Unit 20B on the north and Unit 20E on the west. These sheep comprise several small subpopulations that persist at low density, separated by areas of unsuitable habitat. Hunting this area is limited by issuing only 4 drawing permits annually for 1 ram with full-curl horns or larger. Three sheep have been harvested in this area in the last 3 years.

MANAGEMENT ACTIVITIES: Aerial surveys are flown to collect data on the number of sheep and their sex and age composition. Hunting is regulated in most of the area by drawing permit, and harvest outside of the drawing permit area is monitored by harvest tickets.

ISSUES: Managing a sustainable harvest for this small population of sheep.

SMALL GAME

STATUS: Small game species of highest interest to hunters in 20D include ruffed grouse, sharp-tailed grouse, spruce grouse, and snowshoe hares. Ptarmigan are also present in 20D, but are pursued by hunters less than the other small game species. Unit 20D is a popular small game hunting destination for grouse hunters from throughout the state. Development of the private agricultural lands and recent wildfires in southern Unit 20D have improved habitat for ruffed and sharp-tailed grouse.

MANAGEMENT ACTIVITIES: Periodically, we conduct ruffed grouse drumming counts and visit sharp-tailed grouse dancing grounds to estimate population trends. Habitat improvement for ruffed grouse was conducted on the DJBR.

ISSUES: Developing habitat improvement techniques for ruffed and sharp-tailed grouse to replace the natural wildfire regime in southern Unit 20D is an important issue.

WOLF

STATUS: Wolves are present throughout Unit 20D. The current population estimate is 100–115 wolves in 12 packs.

The Board of Game has determined that human consumption of moose and caribou is the preferred use for these species and has implemented intensive management in Unit 20D. In March 1995, the Board of Game established a population goal of 15–125 wolves in Unit 20D. The broad range was necessary to allow temporary reduction of the wolf population to low levels if needed to stimulate prey population increases. The Board also extended the wolf trapping season. In October 1995, the Board adopted a wolf predation control implementation plan for Unit 20D. A portion of northern 20D is in the Upper Yukon–Tanana wolf control area.

The wolf hunting season is August 10–May 31 with a bag limit of 5 wolves. The trapping season is October 15–April 30 with no bag limit. Harvest of wolves varies annually and has averaged 45 wolves/year during the last 3 years, with most taken by trapping.

MANAGEMENT ACTIVITIES: Trappers and hunters are required to have wolves sealed to monitor harvest. Population size is estimated from aerial surveys, harvest data, and trapper interviews.

ISSUES: Wolves are important predators on moose and caribou and thus their role in the Unit 20D intensive management program and in the Fortymile Caribou Recovery Program will be monitored closely.

OTHER ISSUES

Forestry: Delta staff cooperates with Alaska Division of Forestry to implement timber sales, wildland fire policies and wildfire management practices to benefit wildlife to improve wildlife habitat.

Mining: A major gold mine, the Pogo Mine, has been developed in the Goodpaster River drainage of northern Unit 20D. Road access has been developed to the mine in this previously roadless area. Although the road is currently closed to the public, some hunters have been using it primarily to hunt Fortymile caribou. Department staff will monitor the improved access into this roadless area and any changes in wildlife resource use that may result.

Big Game Ranching: Interest in big game ranching is increasing in the Delta Junction area, with bison, elk, yak, and reindeer currently being raised in the area. Minimizing the potential negative impacts of big game ranching on wildlife populations is important.

Domestic Livestock Production: Domestic livestock being raised in the Delta Junction area include cattle, horses, sheep, and hogs, with smaller numbers of other livestock such as goats and domestic fowl. These domestic livestock come into close contact with various wildlife species including moose, bison, fox, coyote, and ravens. There is potential for the transmission of domestic livestock diseases to wildlife.

Military Activity: The National Missile Defense Site is being developed on Ft. Greely Military Reservation, and the Army is developing a Stryker force training area on the Ft. Wainwright Donnelly Training area. The influx of people associated with these projects will place an increasing demand on wildlife resources. Continuing expansion of military training facilities is encroaching on wildlife resources and particularly bison migratory routes. Ft. Greely currently is located within an area of high quality moose habitat with a high density of moose. The presence of moose on the Allen Army Airfield on Ft. Greely continues to be a risk to aircraft safety, and it is important to resolve the issue of open gates that allow moose access to the airfield.

Enforcement: The Alaska Wildlife Trooper position in Delta Junction is currently vacant.

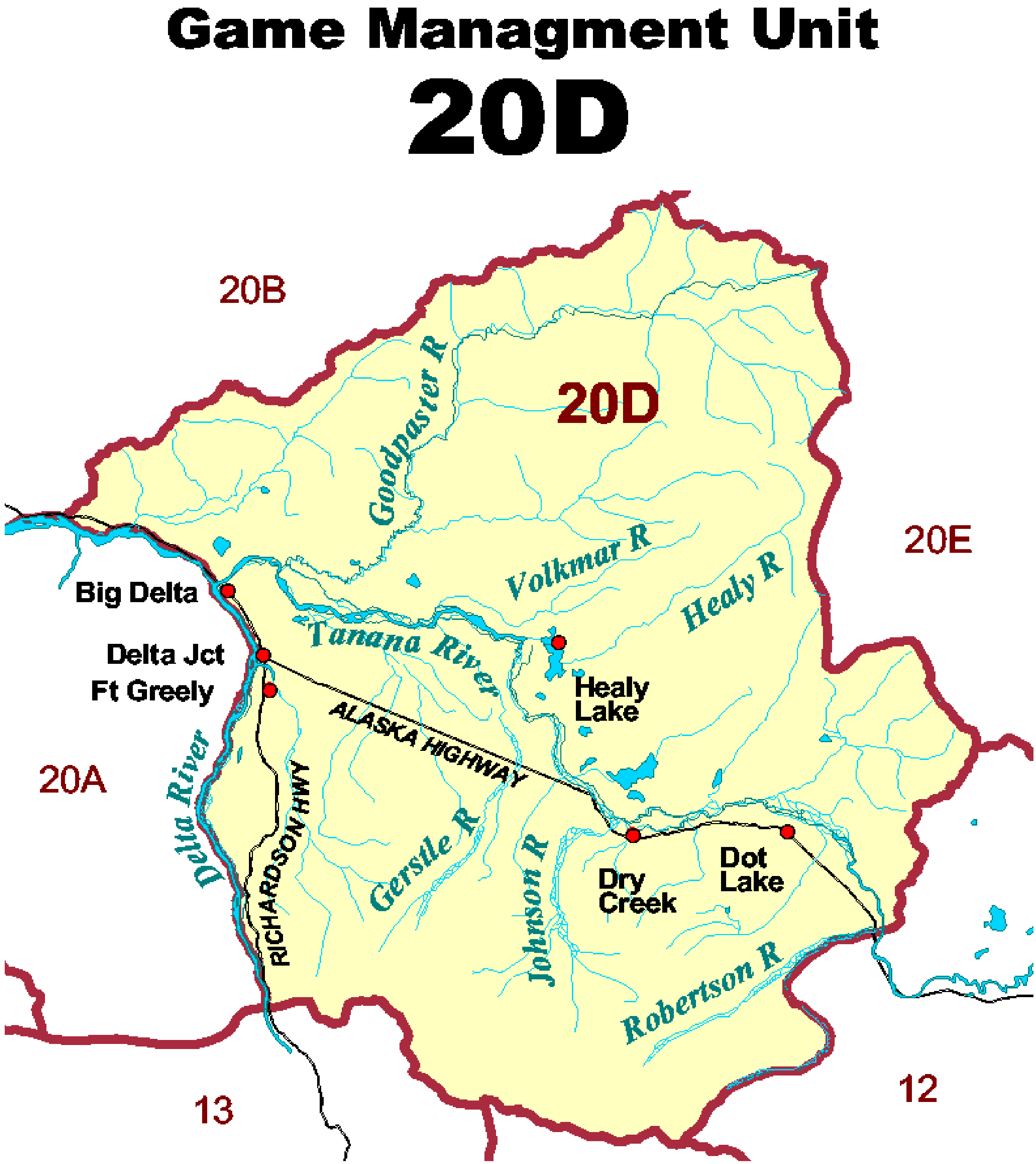

Figure 1. Game Management Unit 20D.

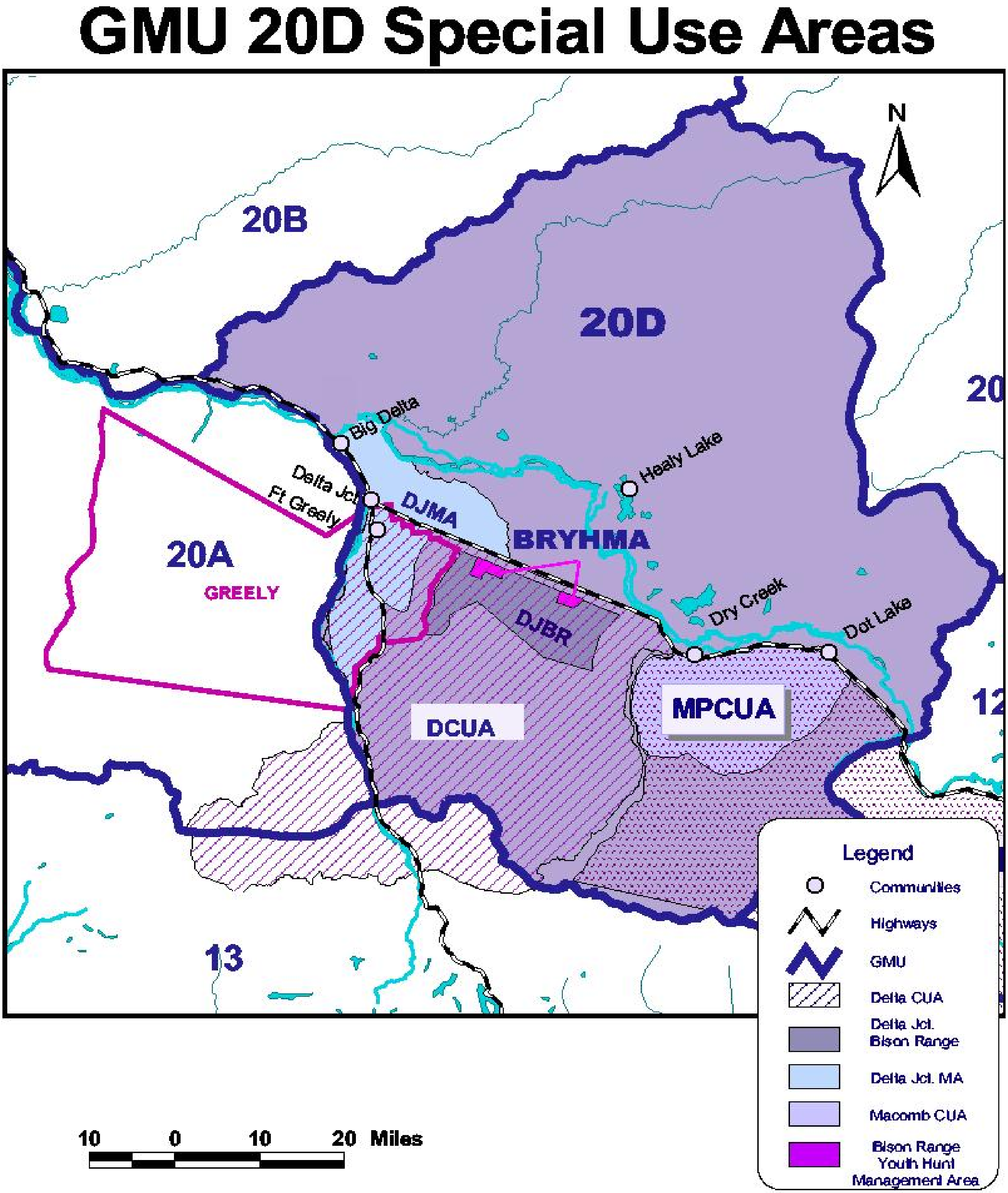

Figure 2. Game Management Unit 20D special use areas.

GAME MANAGEMENT UNITS 20A, 20B, 20C, 20F AND 25C

FAIRBANKS AREA OFFICE

Area Biologist: Don Young
Assistant Area Biologist: Tony Hollis

DESCRIPTION

The Fairbanks Area includes approximately 40,000 mi^2 in central Interior Alaska. The area is roughly bordered by the Yukon River and Ray Mountains on the north and the Alaska Range to the south. It includes the Tanana drainages as far east as the Salcha and Delta Rivers, and Tanana and Yukon drainages as far west as the Tozitna and Cosna Rivers. Game Management Unit 20C, and large portions of Units 20F and 25C are remote, roadless areas. Units 20A and 20B surround Fairbanks and include neighboring communities linked by the road system.

<u>Communities (approximate size)</u>
Healy–Ferry–Lignite–McKinley Park (1200)
Anderson (500)
Central (125)
Nenana (500)
Fairbanks North Star Borough (95,000)
Manly Hot Springs (75)
Rampart (50)
Minto (250)
Tanana (300)

<u>Conservation Units</u>
Administered by Bureau of Land Management
- Steese National Conservation Area
- White Mountains National Recreation Area

Administered by the National Park Service
- Denali National Park and Preserve

Administered by the Alaska Department of Fish and Game
- Minto Flats State Game Refuge
- Creamers Field Migratory Waterfowl Refuge

Active Advisory Committees (AC)
Tanana–Rampart–Manley
Fairbanks
Minto–Nenana
Middle Nenana River
Central

Special Areas

Unit	Areas	Restriction	When Enacted	Purpose	Meeting Objectives
20A, 20D	Delta CUA[1]	No motorized vehicles or pack animals for big game hunting[2]	1971	Provide for aesthetically pleasing hunt conditions	Yes
20A	Wood River CUA[1]	No motorized vehicles except aircraft for big game[3]	1976	Address conflicts between ATV and airplane/horse hunters	Yes
20A	Yanert CUA[1]	No motorized vehicles except aircraft for big game	1973	Address conflicts between ATV and airplane/horse hunters	Yes
20A	Ferry Trail MA[4]	Caribou hunting by permit; antler restrictions for moose hunting	1990	Address caribou/moose management issues	Yes
20A	Healy-Lignite MA[4]	Hunting by bow and arrow only	1990	Address safety concerns (closed 1973 – 1989)	Yes
20B	Minto Flats MA[4]	Moose hunting by permit; No aircraft or airboats for moose hunting; no aircraft for beaver trapping prior to March 1.	1979 1996	Address moose management and user conflict issues	Yes
20B	Fairbanks MA[4]	Moose hunting by bow and arrow only	1982	Address moose management issues	Yes
20B	Creamer's Field MWR[6]	Hunting and trapping by registration only	1966	Address management issues	Yes
20B	Lost Lake CA	Closed to taking big game w/ firearms and crossbows within ½ mi. of lake	≤1962	Address safety concerns	Yes
20B	Birch Lake CA	Closed to taking of big game within 1/2 mile of lake	≤1962	Address safety concerns	Yes
20B	Harding Lake CA	Closed to taking of big game within 1/2 mile of lake	≤1962	Address safety concerns	Yes

[1]CUA = Controlled Use Area
[2]Aug. 5–Aug. 25
[3]Aug. 1–Sep. 30
[4]MA = Management Area
[5]CA = Closed Area
[6]MWR = Migratory Waterfowl Refuge

BLACK BEAR

STATUS: Black bears are common in all units. Harvest peaked in the late 1990s, but has since shown moderate declines. Average annual harvest rates are below the estimated maximum sustainable exploitation rate in all units, except possibly the central portion of Unit 20B. We do not believe the high harvest of black bears in central Unit 20B is of biological concern because surrounding units receive relatively little hunting pressure and provide reservoir areas that serve to repopulate potentially over-harvested areas. The continued high harvest of black bears in the heavily hunted central Unit 20B supports this hypothesis. Spring bear hunting at bait stations is especially popular in Unit 20B. High hunter effort and harvest near Fairbanks likely reduces black bears nuisance problems.

MANAGEMENT ACTIVITIES: Bait station registration, sealing, tooth aging, and responding to complaints about nuisance bears are the primary management activities. Sealing data in Unit 20B provides the sex and age composition and location of harvest, while harvest reports provides sex and harvest location for bears harvested in the remainder of the area.

ISSUES: Regulations requiring the salvage of the hide and meat have been the subject of many proposals in recent years. Arguments generally revolve around the palatability of black bear meat during the fall when bears feed on fish. This concern does not pertain to black bears in the Interior, where they generally do not feed on fish. Another issue involves conflicts between bear baiters and the general public, particularly landowners in areas surrounding Fairbanks. Bear baiting had been an issue within the Chena Recreation Area (CRA) where the CRA Citizens Advisory Board has lobbied Fish and Game to eliminate bear baiting in the CRA due to perceived conflicts. This issue was successfully addressed through education (i.e., bear baiting clinics required prior to registering a bait station) and, within the CRA, by working cooperatively with Department of Natural Resources, Parks and Recreation Division, CRA staff.

GRIZZLY BEAR

STATUS: Grizzly bears are present in all units, but are most numerous in the mountainous portions of Units 20A and 20C followed by the higher elevations in Units 20B, 20F and 25C. Harvest is generally low except for portions of Units 20A and 20B. High harvests resulted in reduced numbers of bears in Unit 20A during the 1980s, but more conservative seasons resulted in population recovery by 2000. In general, grizzly bear seasons and bag limits have been liberalized over the past decade and harvests have increased.

MANAGEMENT ACTIVITIES: Sealing, tooth aging, and responding to complaints about nuisance bears are the primary management activities. Sealing data provides sex and age composition and location of the harvest.

ISSUES: Management issues typically relate to season length, especially in Units 20A and 20B, where the seasons are shorter (September 1 – May 31) than the remainder of Unit 20 (August 10 – June 30) and where predator management remains an issue because of Intensive Management. Generally, hunters feel that grizzly bears seasons should be further liberalized to reduce predation on ungulates.

CARIBOU

DELTA CARIBOU HERD

STATUS: This herd declined dramatically in the early 1990s from about 11,000 to 4,000 caribou, prompting closure of a popular hunting season and implementation of a ground-based wolf control program (1993–1995). After termination of the wolf control program, the herd continued to decline slowly to an estimated 2000 caribou in 2005. Herd size is currently estimated at approximately 3000 animals. The Board authorized a small drawing permit hunt (up to 100 permits) for bull caribou in 1996. Bull:cow ratios remain high and large bull:cow ratios continue to exceed objectives. Between 1996 and 2003, annual harvest averaged 35 bulls (range 22–50). In 2004 the Board authorized up to 150 permits be issued and mean harvest has since increased to 47 (25–70 during RY04–RY09). Since the early to mid 2000s, the Delta herd has been mixing with the Nelchina herd along the western Denali Highway in Unit 13. This presents difficulty in standard population and composition surveys, and puts members of the Delta herd at risk of harvest under the seasons and bag limits of the Nelchina herd.

MANAGEMENT ACTIVITIES: Standard population and composition surveys are conducted annually. A small number of radiocollared animals are maintained to facilitate surveys.

ISSUES: This has long been a very popular caribou hunt. Issues include the number of permits issued in the drawing hunt and the lack of intensive management efforts to increase the size of the herd. Mixing with the Nelchina herd in Unit 13 puts the Delta herd at risk of overharvest under the seasons and bag limits (State and Federal) for the Nelchina Herd.

WHITE MOUNTAINS CARIBOU HERD

STATUS: This small herd numbers roughly 600 caribou and primarily inhabits western Unit 25C. It receives little harvest because of poor access. The general fall season is limited to bulls, while caribou of either sex may be taken during a winter registration permit hunt (Dec. 1–Mar. 31). Herd numbers appear stable. Mixing with the Fortymile herd along the Steese Highway, which was first observed in 2000, has been more frequent and has complicated harvest management.

MANAGEMENT ACTIVITIES: Standard population and composition surveys are conducted annually in cooperation with the Bureau of Land Management. A small number of radiocollared animals are maintained to facilitate surveys.

ISSUES: Annual harvest has traditionally been within sustainable limits, and often low. About 20 caribou were taken per year during 1990–2007. Harvest rose sharply in 1999–2001 because of the presence of Fortymile herd animals in the White Mountains herd hunt area, and because White Mountains caribou became more accessible due to their distribution. Average annual harvest for these 3 years was 47. Harvest returned to historic levels in 2002–2011.

DENALI CARIBOU HERD

STATUS: This herd currently numbers roughly 2000 animals and primarily inhabits Unit 20C within Denali National Park. The herd was closed to harvest after a decline in the early 1970s and it remains closed even under federal subsistence regulations. Intensive long-term research by the National Park Service and the U.S. Geological Survey enhance the herd's value as a control population for management and research efforts on other Interior herds.

MANAGEMENT ACTIVITIES: The National Park Service and U.S. Geological Survey annually conduct population estimation and composition surveys along with numerous research investigations.

ISSUES: There is local interest in opening the Denali caribou herd to limited harvest of bulls. The department has opposed such a hunt because herd numbers and bull:cow ratios are below management objectives and because of the herd's value as a control population.

FURBEARER

STATUS: Beaver are abundant in the Fairbanks area. Trapper reports suggest marten numbers in recent years have been low, although numbers have fluctuated wildly both temporally and spatially. Hare numbers appeared to have reached their peak in 2009 and lynx numbers are currently in decline. Coyotes appear to be abundant resulting in many public proposals to liberalize seasons and bag limits to reduce predation on ungulates, primarily sheep lambs. Marten, lynx, and wolf are the more commercially important species in the Interior. Trapping effort near road-accessible areas is moderately high, but trapline densities are low away from the road system.

MANAGEMENT ACTIVITIES: Sealing provides harvest data for lynx, wolf, wolverine, and otter. Beaver cache surveys are conducted annually in the lower Chena River drainage as part of a management program designed to manage beaver in this area for viewing and education opportunities while minimizing property damage.

ISSUES: Lack of demand for beaver pelts and high beaver survival had increased property damage caused by beaver from flooding and tree cutting along roadways and near residential areas in past years. An extended beaver season since 2004 has alleviated many of those problems and sparked more interest in harvesting beaver in the Fairbanks area.

MOOSE

STATUS: In Unit 20A, moose are found at moderate to high densities (2.0–3.0 moose/mi^2). Liberal antlerless hunts in RY04–RY08 reduced moose densities from an estimated 3.0–3.5 moose/mi^2 in 2003. Unit 20A has the lowest productivity of any wild moose population studied in North America and, despite reductions in moose densities, improvements in productivity have not yet been observed. Thus, habitat conditions remain a concern as high moose densities over the past decade resulted in heavy browsing. Despite the low productivity, calf survival is relatively high, likely due to high harvest rates of predators. In Unit 20B, moose also are found at moderate to high densities (2.0–2.5 moose/mi^2), but densities vary more widely than Unit 20A from greater than 4 moose/mi^2 in the Minto Flats Management Area to less than 1 moose/mi^2 in eastern Unit 20B. Moose populations in most of Units 20C, 20F, and 25C are low and no trends in population parameters are apparent from harvest data or anecdotal information.

Unit 20B is the most heavily hunted unit in the Fairbanks Area during the general hunting season with >2,500 hunters reporting, followed by Unit 20A with >1,200 hunters reporting. The Fairbanks area accounts for approximately 25% of the statewide moose harvest, with most (80%–90%) of that harvest in Units 20A and 20B. The Board approved harvest of antlerless moose by drawing permit in portions of Unit 20A and 20B in the mid 1990s and these hunts have been reauthorized annually. In 2002 the Board approved drawing permit hunts for calf moose in Unit 20A to help meet Intensive Management (IM) harvest objectives. In 2004 the Board approved a registration hunt for antlerless moose during a September 1–December 10 season to substantially increase the harvest of female moose in order to reduce moose numbers from an estimated 16,000–18,000 to the IM population objective of 10,000–12,000 moose. The season was extended (Aug. 25–Feb. 28) in 2006 to meet IM objectives, especially in the more remote portions of the unit. In 2008, public opposition to the antlerless hunts resulted in the hunt period being shortened to Jan. 10–Feb. 28 and the bag limit changed prohibiting the take of calves and cows accompanied by calves. In response to public concerns primarily about the take of antlerless bulls and mid–late term pregnant cows in the late winter hunts, the opening date was moved up to Oct. 1 in 2010.

MANAGEMENT ACTIVITIES: An intensive moose research project is ongoing in Unit 20A. Population estimation and composition surveys are conducted in Units 20A and 20B on an almost annual basis. The National Park Service periodically conducts surveys within Denali National Park in Unit 20C, and the Department completed a population estimate in the eastern half of Unit 20C in 2011. Population estimation surveys were conducted in Unit 25C in 1997 and 2007 with funding from the Bureau of Land Management. In addition, the Bureau of Land Management has radiocollared moose to investigate moose movements and habitat use in Unit 25C.

A large (75,000 acre) prescribed fire has been planned for over 15 years in western Unit 20A to improve wildlife habitat. That project has not been completed due to difficulty in realizing acceptable burning conditions and that project is no longer funded. However, approximately 200,000 acres burned in 2 separate fires in the western (Fish Creek) and central Tanana Flats (Survey Line) in 2001, 120,000 acres burned in 2006, 220,000 acres burned in 2 separate fires in 2009, and approximately 20,000 acres burned in 2011. We conducted intensive moose surveys within the boundaries of the 2001 Fish Creek and Survey Line fires in 2003 and 2008 as the initial and early phases of monitoring the potential changes in moose density and composition over time. These intensive surveys are planned at 5-year intervals to monitor potential changes in population trends in the burns. Smaller scale habitat improvement projects have been completed in the Fairbanks Area, primarily along Nenana Ridge in Unit 20B to improve ruffed grouse habitat, which also improved moose habitat, although their value in terms of browse is now in decline.

We have conducted browse surveys in various Interior units since 2000. Central Unit 20A showed the highest browse removal rate of any survey area during 2000–2010, indicating that moose in Unit 20A are heavily using their forage resources. Moose twinning rates, short-yearling calf weights, and reproductive delays and pauses during that period also show that moose in central Unit 20A are experiencing the lowest nutritional level of any moose population we know of in Alaska.

ISSUES: Past regulatory changes in Unit 20A, which were designed to reduce the harvest of bulls to sustainable levels and increase the harvest of cows and calves, have been controversial, but successful. Regulatory changes included a shorter, then longer, general season, unitwide antler restrictions for resident and nonresident hunters, drawing permit hunts for "any bull" and drawing and registration hunts for antlerless moose.

Antlerless moose hunts remain controversial and divisive and public opposition tends to wax and wane. The take of calf moose and cows accompanied by calves in antlerless hunts has been a highly volatile issue and regulatory changes have ensued in Unit 20A and parts of Unit 20B. During RY04–RY11 thousands of hunters acquired registration and drawing permits and hunted antlerless moose in Units 20A and 20B. Local public sentiment has been mixed regarding antlerless hunts: the Middle Nenana AC usually opposes them; the Minto-Nenana always supports them; and the Denali Borough has written 2 resolutions opposing both antlerless hunts and IM legislation.

The Minto Flats Management Area in Unit 20B is unique in terms of moose management in that a limited registration hunt with an either sex bag limit runs concurrent with a 15-day, antler-restricted general season. In 2004, the Board rescinded the Tier II hunt that was in place during 1996–2003 and replaced it with the registration hunt. The distribution of permits for the limited registration hunt has been fraught with problems and no solution has yet been identified.

Access restrictions for moose hunting are also controversial. Aircraft and airboats are not permitted for moose hunting in the Minto Flats Management Area. Motorized vehicles other than aircraft are not permitted in the Wood River and Yanert Controlled Use Areas in Unit 20A.

Finally, entry to some military land is prohibited. This is especially controversial in portions of Unit 20A with excellent moose hunting.

SHEEP

ALASKA RANGE (UNIT 20A)

STATUS: Sheep numbers in Unit 20A declined in the early 1990s from 5,000 to about 2,000 sheep, as estimated in an extensive survey in 1994. No clear trend in sheep population dynamics is apparent from subsequent trend area surveys. We believe that productivity has improved and that the population may be increasing. Harvest data supports this hypothesis as the number of rams taken has doubled from 1992–2001 (mean=49) to 2007–2011 (mean=99).

MANAGEMENT ACTIVITIES: A small trend area is surveyed annually in the drainages of the upper West Fork of the Little Delta River, Dry Creek, and Wood River located in the central mountains of Unit 20A.

ISSUES: The primary issue among sheep hunters seems to be the apparent high harvest of sub-legal rams (i.e., primarily 7/8 curl), which lead to the Board adopting regulations to seal sheep horns to curb this apparent illegal harvest. Predator management to enhance sheep populations remains an issue.

TANANA UPLANDS AND WHITE MOUNTAINS

STATUS: Approximately 600–750 sheep are found in relatively isolated areas of suitable habitat. There is no evidence that severe winters of the early 1990s affected the status of sheep in these areas.

MANAGEMENT ACTIVITIES: Trend areas encompassing a large portion of suitable sheep habitat are surveyed annually in conjunction with Bureau of Land Management and U.S. Fish and Wildlife Service.

ISSUES: Horn breakage found in mature rams in portions of the White Mountains is of interest and concern to hunters pursuing sheep there.

WOLF

STATUS: Wolf numbers increased in Unit 20A following a wolf reduction in 1993-1994, and appear to be stable at moderately high levels. Conversely, wolf numbers began to decline in Denali National Park by 1995 (Unit 20C) following an abrupt increase and peak in numbers concurrent with harsh winters in the early 1990s. Data on wolf abundance in Units 20B, 20F and 25C is lacking, but anecdotal information suggests wolf numbers are stable in these units.

MANAGEMENT ACTIVITIES: Sporadic surveys, including radiotelemetry surveys, incidental observations, and sealing constitute recent management activities. Research in Unit 20A provided considerable information on the status of wolves in that area through 2000. Radiocollared wolf packs from a research study on dog lice in wolves has concluded, but those packs still assist in estimating wolf numbers and pack dynamics.

ISSUES: Wolf harvest in Unit 20A has been declining (mean=72, 1996–2000; mean=65, 2001–2005; mean=51, 2006–2010). Wolf control continues to be controversial. The Board has identified Unit 20A for Intensive Management. A ground-based wolf control program to reverse the decline of the Delta caribou herd was implemented in 1993, but wolf control was suspended in early 1994. Since then, there have been no intensive management efforts to increase the size of the Delta caribou herd.

SMALL GAME

STATUS: The overall status of small game populations is largely unknown. Anecdotal information and spring hare surveys suggests hare numbers peaked in 2009. Based on drumming count surveys at Clear and along the Tanana River near Fairbanks, grouse numbers are currently low and likely at or near the bottom of the cycle. Ptarmigan numbers still appear to be low and stable. Hunting small game is popular along road-accessible areas.

MANAGEMENT ACTIVITIES: Ruffed grouse drumming counts have been conducted annually in Units 20A and 20B. Grouse wings are collected from hunters in the most popular grouse hunting areas. The wings provide an index to annual juvenile recruitment into the grouse populations and proportions of the 3 grouse species in the harvest.

ISSUES: None.

OTHER ISSUES

Other issues potentially affecting wildlife or wildlife users include forestry, fire management, oil and gas exploration in the Minto Flats State Game Refuge and Healy Basin, military activities, Eielson AFB to Ft. Greely railroad extension. As communities in the area grow and expand, nuisance wildlife management activities and urban wildlife issues are expected to increase.

GAME MANAGEMENT UNITS 21B, 21C, 21D & 24

GALENA AREA OFFICE

Area Biologist: Glenn Stout
Assistant Area Biologist: Nate Pamperin
Wildlife Technician: Carl Roberts

DESCRIPTION

The Galena Area office with management responsibilities for Units 21B, 21C, 21D and 24 (totaling approximately 51,134 mi^2) is located in Galena. The Area Management Biologist is currently stationed in Fairbanks, as are the Assistant Area Management Biologist and Wildlife Technician (shared with the Regional Office). The only road access is the Dalton Highway in Unit 24A. Access to other parts of the area is limited to travel by boat on the rivers, aircraft, and snowmachine during winter. Moose, caribou, and bears are important food sources for local rural residents and provide hunting opportunity for numerous nonlocal hunters. Fur trapping is an important traditional and economic activity.

Game Management Unit 21B contains approximately 9,311 mi^2. It consists of the Yukon River corridor between Tanana and Ruby, including the Nowitna River. The Nowitna National Wildlife Refuge occupies most of the unit south of the Yukon River. Ruby is the only village within Unit 21B.

Unit 21C contains approximately 3,670 mi^2. It consists of the Melozitna River drainage upstream from “the rapids” near the mouth, and the Dulbi River drainage upstream from Cottonwood Creek. There are no villages or year-round residents in Unit 21C.

Unit 21D contains approximately 12,110 mi^2. It consists of the Yukon River drainage from Blackburn Island upstream to Ruby, and the Koyukuk River drainage downstream from Dubin Point. Part of the Koyukuk Controlled Use Area is included within Unit 21D. Federal conservation areas in Unit 21D include parts of Koyukuk National Wildlife Refuge and parts of Innoko National Wildlife Refuge. Villages within Unit 21D include Galena, Koyukuk, Nulato, and Kaltag.

Unit 24 contains approximately 26,060 mi^2 and is divided into 4 subunits: 24A, 24B, 24C, and 24D. It consists of the Koyukuk River drainage from the headwaters in the Brooks Range and east of the Dalton Highway, downstream to Dubin Point. The Kanuti Controlled Use Area, part of the Dalton Highway Corridor Management Area, and part of the Koyukuk Controlled Use Area are included within Unit 24. Federal conservation units include parts of Koyukuk National Wildlife Refuge, parts of Gates of the Arctic National Park and Preserve, and Kanuti National Wildlife Refuge. Bureau of Land Management oversees some other federal lands in Unit 24. Villages within Unit 24 include Coldfoot, Wiseman, Bettles, Evansville, Anaktuvuk Pass, Alatna, Allakaket, Hughes and Huslia.

CONTROLLED USE AREAS

STATUS: There are 2 moose hunting controlled use areas (CUAs) in the Galena Management Area: the Koyukuk CUA and the Kanuti CUA.

KOYUKUK CONTROLLED USE AREA: The Koyukuk CUA was established in 1978 to reduce participation of nonlocal moose hunters and reduce hunter conflicts by prohibiting the use of aircraft. However, by 1986 the number of hunters arriving by boat from outside the unit equaled the number of hunters who previously accessed the area by aircraft. The Koyukuk CUA occupies 4,791 mi^2 in northern Unit 21D and southern Unit 24 and overlaps with a large portion of the Koyukuk National Wildlife Refuge. A moose hunter checkstation has been operating on the Koyukuk River since 1981. It enables accurate determination of the number of hunters using the river to access the Koyukuk CUA within Unit 21D and accurate collection of biological data from harvested animals. It is also used to educate local residents on licensing and reporting requirements, to inform nonlocal hunters about regulations specific to the area and the locations of private property along the river, and as a means of monitoring compliance with regulations. The CUA, the mandatory checkstation, and the registration and drawing hunts are all elements for managing this high profile hunting area and, in combination, have succeeded in meeting the objectives of the moose management plan.

There has been little change in the boundaries or basic elements of the Koyukuk CUA (i.e. no fly-in moose hunting) since its creation. However, there have been a variety of changes to the type of moose hunts that the Department manages in the CUA, as discussed in the moose section of this overview. Currently, an unlimited number of resident hunters can hunt in the CUA on a subsistence registration hunt (RM832). Conditions for the registration hunt include keeping all the meat on the bone of the hindquarters, forequarters, and ribs, and sawing off the upper half of one antler and turning it in to ADF&G. Alternatively, there are a limited number of permits available for a drawing hunt. Conditions for the drawing hunt include keeping the meat on the bone of the hindquarters, forequarters, and ribs. Drawing hunt permittees are allowed to retain the entire antler without cutting the antler. For the drawing hunt, 258 permits were allowed in RY03, while only 50 permits were allowed each year during RY04–RY07. Because of improving bull:cow ratios, the number of permits in RY10 and RY11 was increased to 136 permits, but will be 118 permits in RY12. Implementation of the drawing permit hunt was a result of the Koyukuk River Moose Hunters Working Group’s recommendations and it effectively reduced hunter numbers within the Koyukuk CUA. Although regulatory changes did improve bull:cow ratios in the CUA from 2001 to the present, as expected those changes were not effective in growing the moose population. The moose population decline, which occurred from approximately 1994 to 2004, was likely the result of poor calf survival and low yearling recruitment. The status of the moose population for the Galena Area is described in the moose status section below.

KANUTI CONTROLLED USE AREA: The Kanuti CUA was implemented in 1979, apparently to address the same issues that were identified when the Koyukuk CUA was established. The Kanuti CUA occupies 1,885 mi^2 of Unit 24B; the size of the area was reduced in 2010 from 2,183 mi^2. The Kanuti CUA overlaps much of the Kanuti National

Wildlife Refuge. In 1992 federal land within the Kanuti CUA was closed to moose hunting except for federally qualified users, so interpretation of the effectiveness of the CUA regulation is unclear. Although a few hunters who hunted the state navigable river corridor accessed the Kanuti CUA from the Dalton Highway in the past, most use within this CUA is by residents of the Unit 24 communities of Alatna, Allakaket, Bettles, Hughes, and Evansville. Overall, the federal closure that overlaps the Kanuti CUA has a greater impact on current hunting patterns in the Kanuti CUA, except for the lower Alatna River area that is mostly state land, where the federal closure doesn't apply.

MANAGEMENT/RESEARCH ACTIVITIES: A checkstation has been operated on the Koyukuk River within the Koyukuk CUA since 1981 (31 consecutive years). The Koyukuk River moose management planning effort was implemented in 1999 to deal with issues related to these CUAs. The Koyukuk CUA was the main focus of attention because of the large number of hunters using the lower Koyukuk River. A wolf predation control implementation plan was developed for Unit 24B in 2011, which overlapped a large portion of the Kanuti CUA, and the management activity focus has shifted from the Koyukuk CUA to the upper Koyukuk River drainage.

ISSUES: Crowding of hunters is one of several factors that contribute to conflict among user groups. The Koyukuk and Kanuti CUAs restrict all hunters to the navigable rivers within those areas. This potentially has the effect of concentrating nonlocal hunters in the same areas as local hunters, which likely increases hunter conflicts. The drawing/registration permit system that was implemented in the Koyukuk CUA in 2000 has proven to be a far more effective way to regulate hunter numbers and disperse the distribution of hunters throughout the Unit. Hunter conflicts between local and nonlocal hunters appeared to subside temporarily in the early 2000s following implementation of the Koyukuk River Moose Management Plan. More recently (2010-2011), hunter conflicts appear to be increasing even though hunter numbers are lower than the late 1990's and moose numbers are relatively stable compared to the late 1990's.

Harvest monitoring and moose population data collection has improved since the CUAs were established and analysis of perceived competition among user groups can now be accomplished. Because harvest does not exceed sustainable yield (demand is less than supply), we can demonstrate that competition has not occurred in these areas. However, within the Koyukuk CUA, regulated and sustainable levels of harvest were accomplished through the adoption of the drawing/registration permit system, not as a result of the CUA restrictions. The management objectives in both areas provide for abundant levels of harvest for subsistence hunters, as well as abundant numbers of mature bulls for hunters who prize trophy quality bulls.

The Department's original analysis of the proposal to establish the Koyukuk CUA in 1978 identified the following problems: 1) aircraft hunters were believed to be wasting meat; 2) lack of moose population data; 3) lack of harvest data; 4) poor reporting compliance; 5) local vs. nonlocal conflict; 6) boat hunter vs. airplane hunter conflict; 7) out-of-season illegal harvest by local hunters; 8) poor calf survival. Problem #1 was addressed because fly-in opportunity was eliminated; however no information was presented to substantiate that meat had been wasted. Problems #2 and #3 were resolved because data collection improved, not because the CUA was implemented. Problem #4 was resolved with the checkstation and permit implementation, not because the CUA was implemented. Problem #5 was not resolved. Problem #6 was addressed because fly-in opportunity was eliminated, but the conflict was not resolved. Problems #7 and #8 were not addressed.

BLACK BEAR

STATUS: Black bears are numerous in most of Units 21B, 21C, 21D, and 24. No population estimation surveys have been conducted. There is no closed season for black bears in these units, which are an important species taken for food by local residents. Household surveys indicate local harvest is approximately 30–45 bears annually in Units 21B, 21D, and 24. Nonlocal hunters take an unknown, but probably small number of black bears, usually incidental to other hunting activities.

MANAGEMENT/RESEARCH ACTIVITIES: There is no requirement for sealing black bears. Subsistence household surveys and anecdotal information are used to monitor population status.

ISSUES: There is no efficient and cost effective way to monitor black bear population dynamics in this area. During years of low berry abundance, reports of black bears frequenting village dumps and fish camps are common. Bears taken in “Defense of Life or Property” (DLP) are usually not reported. Black bears are significant predators of moose calves, and poor moose calf survival is likely the primary reason for moose population declines in the Galena Management Area.

GRIZZLY BEAR

STATUS: The grizzly bear populations in Units 21B, 21C, 21D and 24 are believed to have been stable or slowly increasing during the past 10 years, based on field observations, nuisance reports, and hunter sightings. Historically, grizzly bears were an important source of food and hides for local residents. Despite liberal seasons, hunting pressure by both local and nonlocal hunters is low. Annual harvests from Units 21B, 21C, and 21D usually total less than 10 bears. Annual harvests from Unit 24 are usually less than 20 bears.

MANAGEMENT/RESEARCH ACTIVITIES: Management activities involve monitoring harvest through sealing certificates and administering hunts. No surveys have been conducted. Units 21D and 24 have a subsistence registration permit hunt in which grizzly bears taken do not have to be sealed unless the hides are transported out of the units.

ISSUES: Management objectives for grizzly bears are to maintain these populations at levels that will sustain a minimum annual reported harvest of 25 within Units 21B, 21C, 21D and 35 within Unit 24. Present harvest levels are well below that. Unreported harvest is estimated to be approximately 10 bears per year in Units 21B, 21C, and 21D and 5 bears each year in Unit 24. The combined reported and unreported 5-year average harvest was estimated to be 18 bears in Units 21B, 21C, 21D and 21 bears in Unit 24.

Local residents report concerns about increased numbers of grizzly bears. Residents of Huslia, who rely on black bears as a subsistence food source, report that grizzly bears are occupying traditional black bear dens. Some local residents believe that grizzly predation on black bears has substantially reduced the availability of black bears. More importantly, those residents believe black bear hunting has become a riskier endeavor due to the likelihood of encountering a grizzly bear at den sites. Grizzly bears are significant predators of moose calves, and poor moose calf survival may be the primary reason for moose population declines in this area.

CARIBOU

STATUS: Four caribou herds are resident in the Kokrines Hills (Units 21B and 21C), Ray Mountains (Units 20F, 24A and 24B), and Hodzana Hills (Units 24A and 25A). Each herd is associated with and named for a mountain peak within the range of mountains where they calve. The Ray Mountains herd numbers approximately 1,500–1,800 caribou, The Hodzana herd is approximately 800–1,200 caribou, the Wolf Mountain herd is approximately 350–550 caribou, and the Galena Mountain herd is 80–100 caribou. Total annual harvest from the 4 herds seldom exceeds 20. The Western Arctic Caribou Herd is frequently found in northern Unit 24 and occasionally travels into the western-most portions of Units 21D and 24. During winter 2003–2004, up to 200,000 Western Arctic Herd caribou wintered in northern Unit 24, but since then have numbered only 20,000–30,000 each winter in the Zane Hills and Purcell Mountains of Units 24C and 24D.

MANAGEMENT/RESEARCH ACTIVITIES: Harvest monitoring is accomplished through the statewide general harvest ticket system. Information on caribou numbers and distribution of the 4 resident herds was obtained through cooperative studies involving ADF&G, U.S. Fish and Wildlife Service (USFWS), and Bureau of Land Management (BLM). We radiocollared 145 caribou between 1992 and 2009; however only about 40 radio collars are still active. Periodic radiotracking flights provide information on seasonal distribution. Annual composition flights using both fixed-wing and helicopter are conducted in July and October. Surveys of the Ray and Wolf Mountain herds have included aerial photography from fixed-wing aircraft during post-calving aggregations. Typically however, surveys of the 4 herds are conducted opportunistically. ADF&G staff in Region 5 oversees management of the Western Arctic caribou herd.

ISSUES: Due to limited access, hunters take few caribou from the 4 resident herds. The management objectives for these caribou herds are to maintain harvest at a level that allows the herds to grow. However, harvest is largely self-limiting because of difficult access and it appears that predation is likely restricting herd growth. Lichen ranges are lush and the early calving date and the large body size of both calves and adults indicate good nutrition. The Galena Mountain Herd has experienced a sharp decline in estimated herd size over the past 3 years from over 300 animals to less than 100. The Department uses emergency orders to announce season openings in a portion of the Unit 21D to allow winter harvest of the Western Arctic Herd caribou east of the Koyukuk River, while providing adequate protection for the Galena Mountain and Wolf Mountain herds. Apparent shifts in migratory patterns of the Western Arctic Herd in northern Unit 24 has occasionally made it difficult for Anaktuvuk Pass residents to obtain caribou in early fall.

MOOSE

STATUS: Moose were reported in Units 21B and 21C historically, but are relatively new additions to Units 21D and 24. Local residents reported first observing moose tracks in those units during the 1930s. Colonization of moose in those areas was slow until federal predator control in the 1950s allowed rapid expansion of local populations. Moose densities range from low to moderate over most of the area, with very high densities in localized areas of high quality habitat. Generally, aerial trend count area surveys conducted in 1998–2003 showed declining calf:cow and bull:cow ratios. Surveys demonstrated declines of 16–25% from 1994 to 2001 in Unit 21D and 30–50% in Unit 24 from 1993 to 2004. Populations have apparently stabilized since the early 2000s, due primarily to excellent productivity during 2003–2006. However, record snow accumulations in the lower Koyukuk and Middle Yukon during winter 2008–2009 may negatively impact moose numbers in those areas.

MANAGEMENT/RESEARCH ACTIVITIES: Galena management staff conducted fall sex and age composition surveys, spring twinning surveys, and contacted hunters in the fall. We conducted 6 population estimation surveys in portions of Unit 21D from1987 to 2011; 2 in Unit 21B in 2001 and 2008; and 8 surveys in Unit 24 from 1999 to 2011. Hunter checkstations are operated during September near the mouth of the Nowitna River and 15 miles upstream from the village of Koyukuk on the Koyukuk River. The lower Koyukuk River drainage in Units 21D and 24 downstream from Hughes is within the Koyukuk Controlled Use Area (KCUA), and hunts in the KCUA are managed by drawing and registration permits. Surrounding the KCUA within 21D are 5 other drawing/registration permit areas and in Unit 21B there are 4 drawing/registration permit areas. Harvest monitoring for the rest of the Galena area is by harvest report cards and door-to-door subsistence surveys.

A 1997 browse quality assessment conducted by a researcher from the University of Alaska in the Three Day Slough area of Unit 21D suggests that browse quality was very high compared to other similar willow species in the Interior. The Department estimated the spring 2006 browse removal rate to be 5.3% (95% CL: 4.3%–6.3%). A removal index extrapolated to shrub counts and species composition in Unit 24B yielded a browse removal rate of 8.8% (6.8%–10.8%). To date, both these browse removal values are the lowest removal rates estimated in Interior Alaska and are statistically similar to the removal rate and removal index in adjacent Unit 24C (5.5% and 8.5%, respectively).

A cooperative moose management project was initiated by ADF&G, USFWS, National Park Service (NPS) and BLM in March 2008 with the deployment of 58 VHF and GPS radio collars. An additional 30 radio collars were deployed in 2009 and 37 collars in 2011 to replace mortalities and increase sample size to 125 total moose. In addition to monthly relocations to provide distribution information, other benefits that will result from this study include twinning surveys, survival rates, and sightability estimates. The Department also cooperated with the USFWS Koyukuk National Wildlife Refuge and NPS in research project to understand moose calf weight dynamics, survival rates, and moose distribution in the lower Koyukuk and Middle Yukon River areas.

The Department sponsored the Koyukuk River Moose Hunters Working Group that was organized in 1999 to develop a detailed management plan to address moose hunting concerns. The Board of Game endorsed the group's Moose Management Plan for the Koyukuk River at the winter 2001 statewide meeting.

ISSUES: The key issues for moose management in the Galena Management Area are 1) low abundance of moose in Units 24B and 24C, 2) predator-caused mortality, 3) moose hunter conflicts, and 4) hunter compliance with antler cutting. Further details regarding moose hunting concerns as they relate to the KCUA, are discussed in the Controlled Use Areas section of this overview.

Moose occur at low density in Unit 24B, and the current population estimate is below the Intensive Management population objective established in 2006. Residents in the Upper Koyukuk River Drainage in Unit 24B have experienced difficult moose hunting for many years, due to the low density of moose in the area. The difficulty in obtaining a moose has been compounded by increasing fuel prices. Baseline biological data were collected in Unit 24B since 1989, and those data corroborate the moose population estimates and the concerns of local subsistence hunters.

Population estimation survey density on the Kanuti National Wildlife Refuge was 0.67 moose/mi^2 in 1993, but was stable and averaged 0.33 moose/mi^2 during 1999–2011. Moose density on the refuge and the remainder of Unit 24B, likely followed trends similar to those observed throughout the Galena Management Area and other regions in Alaska following the repeal of Land and Shoot wolf hunting regulations in 1991. The moose population now appears to be stable at low density with small annual fluctuations.

Subsistence Division household surveys in Alatna and Allakaket estimated harvest was nearly 40 moose/year in 1997–2002, while total estimated harvest among all hunters in Unit 24B was 83–109 moose (RY07–RY09). Based on the 2010 estimated observable population of 2,600 moose and a harvest of 82 moose, the harvest rate was 3.2%, which was below the management objective harvest rate of 5% (24B IM objectives; population = 4,000–4,500, harvest = 150–250). Harvest of predators on moose (wolves, black bears, and grizzly bears) is low (20–30 wolves/year, 20–30 black bears/year, 3–8 grizzly bears/year).

Habitat in the UKMA is excellent as demonstrated by the high twinning rates (avg. = 57%; 2008–2011) with low browse utilization in 2007 (browse biomass removal = 5.3%, removal index = 8.8%), and does not explain poor calf survival or poor yearling recruitment. High fire frequency in Unit 24B has resulted in a high proportion of early seral vegetation communities; however, relatively few fires of significant size have occurred within the UKMA portion of 24B in the last 30 years, due to fire suppression activities and other factors. Winters are marked by severe cold weather, but winters with deep snow (>36 in) likely to influence moose habitat selection or cause high energy use occurred in only 9 of the last 20 years. The Department has assessed the moose population in Unit 24B, and developed an Intensive Management (IM) Plan to address the unique situation for this area.

Bull:cow ratios in the heavily hunted Nowitna River portion of Unit 21B remain a concern. These ratios have increased from 15–20 bulls:100 cows with approximately ⅓ of the bulls being yearlings during 2000–2003, to nearly 30 bulls:100 cows in 2011. During the period of low bull:cow ratios an increasing number of nonlocal residents hunted this area, and eventually success rates among local residents declined. This caused local hunters to either shift the area in which they hunted or change the season in which they hunted. As more hunters shifted to hunting the winter season, more cow moose were harvested, which accelerated the rate of the moose population decline. With increasing bull:cow ratios in recent years, local village harvest has steadily increased.

Residents of communities in the area served by the Galena area office are generally pleased with the results of the registration and drawing permit hunts and the ability this system affords the Department to manage hunter distribution. However, frustration continues over the realization that hunter management is having little impact on the moose population decline, which is attributable to the poor survival and recruitment of calves and yearlings, not hunting.

Private and federal land ownership and dual management presents challenges to moose management in these units. This is particularly a concern in the upper Koyukuk River drainage near Allakaket, Alatna, and Hughes where the moose population has declined the most and local hunters are struggling to harvest enough moose. Local hunters in these areas are increasingly turning to federal managers to provide for additional hunting seasons, while private corporation lands that fall under State jurisdiction maintain the more restrictive seasons in an effort to prevent further moose population declines.

SHEEP

STATUS: Much of the suitable sheep habitat in Unit 24 is located within Gates of the Arctic National Park and Preserve (GAAR) in Units 24A and 24B. Sheep numbers declined from the mid 1980s until the early 1990s. This decline was likely the result of severe winters from 1989 through 1993. Population estimation surveys conducted in GAAR during summer 1996 indicated that sheep numbers were lower than during the mid1980s but recruitment had begun to improve by 1993. Surveys in 1996 found good numbers of lambs and yearlings, which indicated the population was increasing. During 1998–2002, annual surveys were conducted in a portion of the 1996 surveys area by GAAR staff. Although there were annual fluctuations, the population was considered stable during 1996–2002. However, comparisons with surveys in the 1980s indicated that the sheep population was historically much higher in this area. From 2002 through 2009, ADF&G conducted sheep surveys in part of the upper Chandalar drainage east of the Dalton Highway in portions of Unit 24A and 25A. Total sheep numbers, lamb:ewe ratios and total legal rams have remained healthy throughout 2002–2009. During these 7 years the number of legal rams ranged from 31 to 50 and the lamb:ewe ratio ranged from 18% to 43%, with 32% estimated in the 2009 survey. Total sheep numbers ranged from 989 to 1,539 sheep with 1,517 sheep counted in 2006, 1,310 in 2007and 1,535 sheep counted in 2009. In regulatory years 2008–2009 and 2009–2010 (RY08 and RY09), an average of 57 hunters reported harvesting at least 30 animals in Unit 24, not including unreported harvest that occurred within GAAR on federal hunts.

MANAGEMENT/RESEARCH ACTIVITIES: Sheep populations in Unit 24 are monitored by analyses of harvest reports, occasional fixed-wing aerial surveys, and anecdotal information. The NPS initiated a sheep study in GAAR in 1998 that included assessments of harvest, population status, and movements, mostly north of the Brooks Range. Aerial surveys have also been conducted by ADF&G from 2002 through 2009 in a portion of Unit 24 and Unit 25A.

ISSUES: Dall sheep in GAAR are managed somewhat differently than in most areas of Alaska. Federal law mandates subsistence use as the highest priority consumptive use within the preserve, and the exclusive consumptive use by federally qualified users within the park. Sheep in Unit 24 outside GAAR are managed for diversified human use. Although subsistence hunting is generally localized, the number of sheep in those areas remains sufficient to support current subsistence harvest. Other hunters are generally more widespread, but are restricted to areas outside GAAR. A majority of nonsubsistence hunters access Units 24A and 24B from the Dalton Highway.

WOLVES

STATUS: Wolf harvest in Unit 21B, 21C, and 21D is well below the maximum sustained level the population can support. The Units 21B, 21C, and 21D combined average annual harvest for regulatory years 2005 through 2007 (RY05–RY07; RY begins 1 July and ends 30 June, e.g., RY05 = 1 July 2005 through 30 June 2006) was 57 (range = 48–70) wolves annually, while the allowable harvest was estimated to be at least 124–182 wolves annually. Wolf harvest in Unit 24 is also well below the maximum sustained level the population can support. The Unit 24 average harvest for RY05–RY07 was 63 (range = 53–69) wolves annually, while the allowable harvest was 130–190 wolves annually. The Unit 24 wolf population was stable during 2007–2010 and changed little since regulatory year 1996, with only some localized fluctuations. Wolf numbers were highest (9–11 wolves/1000 km^2) in Unit 24 south of Hughes, moderate and stable (4–6 wolves/1000 km^2) in central Unit 24 (Bettles to Hughes), and variable (6–8 wolves/1000 km^2) in northern Unit 24 (north of Bettles). Estimated wolf population densities were highest and stable to increasing in Unit 21D (9.8–14.2 wolves/1000 km^2), moderate and stable in Unit 21B (4.4–6.7 wolves/ 1000 km^2), and moderate and stable in Unit 21C (5–7 wolves/1000 km^2).

MANAGEMENT/RESEARCH ACTIVITIES: Wolf population trends were monitored through harvest reports and aerial surveys. In a portion of Unit 21D a wolf study was conducted in 1994 and reconnaissance surveys were conducted in 1999 and 2001 in Units 21D and 21B, respectively. A population estimation survey was conducted in northern Unit 21D and southern Unit 24 in 2000. A wolf reconnaissance survey was conducted in Unit 24B in 2011. Use of snowmachines is the most common method of transportation for trappers and wolf hunters. Wolf harvest has declined, particularly in Unit 24 since the ban on taking wolves and other furbearers the same day a person is airborne. Wolf snaring clinics were conducted in Allakaket, Huslia and Galena during January 2000 and in Hughes, Kaltag and Ruby during December 2001, in Nulato and Galena in 2002 then again in Huslia and Allakaket in 2005, and Nulato in 2007.

ISSUES: Wolf population levels are likely stable throughout the area. While wolf predation on moose is also likely stable, demand for moose by nonlocal and local hunters is intensifying. Local residents of the Galena area recognize the predator–prey relationship between moose and wolves and make a conscious effort to increase wolf harvest when they perceive that moose are declining. There is some local demand for wolf pelts used as parka ruffs and gifts at funeral and ceremonial potlatches. But with depressed fur prices and increasing fuel prices, the incentive to trap wolves is not high enough to encourage trapping at levels needed to cause a positive response in moose recruitment.

FURBEARERS

STATUS: Furbearers have traditionally been an important resource in Units 21B, 21C, 21D, and 24, supplying food, clothing, and items of commerce. Although furbearer populations have always been sufficient to meet local demands, they are subject to cycles of abundance. Furbearers of economic importance found in these units are marten, beaver, lynx, wolves, wolverine, red fox, mink, river otters, and muskrats. Coyotes also occur, but are rare. Weasels and red squirrels are common, but usually not targeted by trappers. Harvest trends for some species are related to markets. Some species, especially beaver, are important food items and taken in high number irrespective of markets. Based on trapper reports, furbearer population levels for the past several years in Units 21B, 21C, 21D, and 24 appear to be stable or increasing.

MANAGEMENT/RESEARCH ACTIVITIES: Harvest is monitored through sealing records, fur export reports, fur acquisition reports, and trapper surveys. The local USFWS office studied the effects of forest fires on marten. Snap trapping for small mammals has provided indices of small mammal abundance in some areas.

ISSUES: Low fur prices for most species have directly affected trapper effort in the area. Furbearer populations are in good condition throughout the area. The current distribution and effort by trappers is light and compatible with the present population levels. The harvest of furbearers is below sustainable harvests, and is not expected to change significantly given the large area, number of trappers, remoteness, and fur prices.

SMALL GAME

STATUS: The overall status of small game populations in Units 21B, 21C, 21D and 24 are largely unknown. Anecdotal information suggests hare numbers were near their peak in 2008 and 2009 in some areas after a low populations during 2001–2005. Spruce and ruffed (locally called willow) grouse are common. Grouse and ptarmigan numbers followed similar trends of decline and increase to hares, and probably peaked in 2009–2010.

MANAGEMENT/RESEARCH ACTIVITIES: None

ISSUES: None

GAME MANAGEMENT UNITS 19, 21A AND 21E

McGRATH AREA OFFICE

Area Biologist: Roger Seavoy
Assistant Area Biologist: Joshua Peirce
Seasonal Wildlife Technician: Cari Eggleston

DESCRIPTION

The McGrath area encompasses over 55,000 mi^2 of diverse habitats in western Interior Alaska, ranging from mountainous alpine to black spruce taiga and open tundra. All drainages of the Kuskokwim River upstream of the village of Kalskag are included, as well as a portion of the middle Yukon drainage (including the Innoko, Iditarod, and Anvik Rivers). Land status is diverse; parts of two National Parks administered by the National Park Service, two National Wildlife Refuges administered by the U.S. Fish and Wildlife Service, Bureau of Land Management (BLM) tracts, State lands, and Native Corporation lands are scattered throughout the area.

The McGrath area office is responsible for managing a wide variety of wildlife species, primarily big game and furbearers. Moose, caribou, grizzly bear, black bear, Dall sheep, and bison are present, and muskoxen are occasionally reported. Furbearers, particularly marten, are important for a variety of uses. Lowland areas (Units 19A, 19D, and 21E) are used largely by local, boat-borne hunters who generally reside within Units 18, 19A, 19D, or 21E. The upland units (19B, 19C, and 21A) are accessible largely by aircraft, and hunters using these upland units are generally from outside the area.

Seventeen villages in the area are represented with advisory committee seats and several village sites not represented remain important to area residents. There are four Fish and Game Advisory Committees, including McGrath, Grayling–Anvik–Shageluk–Holy Cross (GASH), the Central Kuskokwim, and the recently created Stony–Holitna AC (SHAC) which was formed when the old Central Kuskokwim Advisory Committee was divided.

MANAGEMENT AREAS

THE LIME VILLAGE MANAGEMENT AREA: The Lime Village Management Area in Unit 19A includes an 830 mi^2 area around Lime Village where moose hunting is by Tier II permit only. This area continues to delineate this Tier II hunt.

THE UPPER HOLITNA–HOHOLITNA MANAGEMENT AREA: The Upper Holitna–Hoholitna Management Area was established in 1997 and includes all of Unit 19B within the Aniak, Kipchuk, Salmon, Holitna, and Hoholitna river drainages. In this area, all hunters are required to stop at department check stations, and moose and caribou taken by hunters using aircraft must be transported out of the area by aircraft. This area was established to address a perception that meat was not being completely salvaged and the requirement that hunters who fly into the management area must fly out of the area continues to address this salvage issue.

CONTROLLED USE AREAS

UPPER KUSKOKWIM CONTROLLED USE AREA: The Upper Kuskokwim Controlled Use Area (CUA) was originally established in 1981 across a broad area in central Unit 19D. Its purpose was to prevent the use of aircraft for moose hunting in order to reduce competition for moose by hunters using aircraft. In 2001, the CUA was enlarged as a temporary measure to restrict aircraft as predation control measures were contemplated. During March 2008, the board approved a proposal to change this CUA to a corridor near the portions of the rivers in proximity to the Upper Kuskokwim villages. Currently, this CUA includes that portion of Unit 19D extending 2 miles on either side of and including the Kuskokwim River upstream from the mouth of the Black River to the mouth of the Swift Fork, extending 2 miles on either side of and including the Takotna River, upstream of the mouth of the Takotna River to Takotna, and extending 2 miles on either side of, and including the South Fork River upstream from the mouth of the South Fork to Nikolai. Within this smaller 739 mi^2 area, moose hunting using aircraft for access is prohibited. This CUA continues to reduce competition for moose.

HOLITNA–HOHOLITNA CONTROLLED USE AREA: The Holitna–Hoholitna CUA was first implemented for the fall 1992 hunting season in Units 19A and 19B and reviewed again in 2008. It consists of the Holitna River downstream of Kashegelok, the Titnuk River downstream of Fuller Mountain, and the Hoholitna River downstream from the confluence of the South Fork of the Hoholitna River.

The Holitna–Hoholitna CUA was established to limit the number of hunters on those rivers by limiting the horsepower of their outboard motors to an aggregate of 40 hp. Prior to a 2006 moose hunting closure, the Holitna–Hoholitna CUA had accomplished its intended purpose of reducing hunting pressure. Once moose hunting reopens, this CUA is expected to continue to accomplish this purpose.

PARADISE CONTROLLED USE AREA: The Paradise CUA in Unit 21E consists of the area from the west bank of the Yukon River upstream from Paimiut to Eagle Island (45 miles upstream of Grayling) and from the mouth of the Iditarod River downstream along the east side of the Innoko River to Paimiut. It includes 1,954 mi^2 and was established in 1977 to reduce the competition for moose between hunters using boats and hunters using aircraft, who at the time, harvested more moose than local boat-borne hunters. Hunting now is largely by Yukon village residents who use boats. Two nonresident drawing permit hunts in Unit 21E were established beginning in fall 2006 to limit nonresident participation. This CUA has, and continues to, accomplish its intended purpose.

SPECIAL HUNT AREAS:

NONRESIDENT CLOSED AREA IN UNITS 19A AND 19B: The Unit 19A and 19B nonresident closed area includes a 4-mile wide corridor along portions of the Kuskokwim, Holitna, Titnuk, Hoholitna, and Aniak rivers, Aniak Slough, the Salmon, Kipchuk, Owhat, Kolmakof, Holokuk, Chineekluk, Veahna, Oskawalik rivers, Crooked Creek, George River, and the Buckstock and Doestock rivers. The area was established by an ad hoc group of local hunters and guides at the March 2002 Board of Game meeting to eliminate the conflict and competition between local residents, guided nonresidents and nonresident hunters dropped off by transporters. This area was reviewed by the Board in 2010. If and when nonresident hunting returns, this closed area is expected to accomplish its original purpose.

THE TM680 MOOSE HUNT AREA: In Unit 19A, downstream of the George River and Downey Creek drainages, moose hunting is limited through Tier II permits. This was first implemented in 2006.

BISON

STATUS: The Farewell Bison Herd ranges in Unit 19C and eastern Unit 19D. A June 2011 minimum count survey revealed 200 adults, and the herd appears to be stable to increasing.

MANAGEMENT ACTIVITIES: We conduct aerial surveys during spring and fall to assess minimum population size, annual calf production, and recruitment. The herd is radiotracked to determine distribution and to assist in population surveys. We deployed additional radio collars in April 2011 to better assess numbers and determine the range of this herd and approximately 25–30 collars remain active. Two drawing permit hunts are available, one in September and one in March. Management reports are completed every 2 years.

ISSUES: Bison habitat had aged as the Farewell burn shifted from grasses and sedges toward a more forested habitat. We had plans for controlled burns that were not carried out and encouraged fire management plans that allowed natural wildfires to burn. Natural fires occurred within the bison range during the summers 2009 and 2010. The 2010 fire in particular appears to be regenerating quality bison habitat as evidenced by increased calf production in 2011. Twenty-three percent of 261 bison found in June 2011 were calves compared to 17% in 2007 and 15% in 2009). Our population objective for this herd is 300 bison post-hunt/pre-calving. Because the population is lower than 300 the number of permits has been reduced significantly.

This bison herd is proving important for bison conservation because of its genetic makeup. Nearly all studies of Lower 48 bison reveal incursions of cattle genes in the bison genome. The Farewell herd has not had any contact with cattle or cattle–bison crosses and recent examinations confirm that these are plains bison (without domestic cattle genes) that originated from Montana Bison Range stock. The parent stock in Montana now has cattle genes in the population. Therefore, the importance of maintaining a herd of adequate size to maintain genetic diversity is heightened. Our objective to maintain a herd of 300 bison is close to the number others have suggested is necessary to maintain genetic diversity.

BLACK BEAR

STATUS: Black bear populations vary throughout the management area in relation to habitat quality. Although harvest reporting is not required in most of the McGrath management area, we believe harvest is light in all units.

MANAGEMENT ACTIVITIES: Harvest statistics are assessed for Unit 19D, where harvest tickets and reporting are required and we complete a management report every 3 years. The McGrath office periodically processes black bears taken under defense of life and property provisions throughout the area.

In association with predation control programs, we conducted a black bear population estimate in Unit 19D. This included removal of bears during May 2003 and 2004 when an estimated 96 independent black bears were reduced to 4 bears immediately post treatment by moving them from a 528-mi^2 area surrounding McGrath. During spring 2010, we made a preliminary estimate of about 100 black bears in that area.

ISSUES: Black bears have been identified as a primary source of moose calf mortality near McGrath. The board adopted liberal bear seasons and bag limits. The board also adopted a grizzly bear predation control program in a portion of Unit 19D, including public bear snaring by permittees, in an attempt to reduce bear predation on moose. Using black bear hunting and control methods, the public took 11 bears in the summers of 2010 and 21 bears in 2011. Additional bear control measures are being considered for the Unit 19A Predation Control Area.

GRIZZLY BEAR

STATUS: Grizzly bear populations vary throughout the management area in relation to habitat quality. Harvest is extremely light in the lowland units where bear densities are lower. In the uplands (mainly Units 19B and 19C), harvests are moderate to high.

MANAGEMENT ACTIVITIES: Harvest statistics are assessed annually and a management report is completed biennially. Most hunters are required to have their harvested grizzly sealed and resident hunters are no longer required to obtain metal locking tags prior to hunting. However, hunters interested in taking grizzly bears for meat may chose to obtain a registration permit to hunt in the Aniak River drainage in Units 19A and 19B and forgo the sealing requirement. The McGrath office periodically processes bears taken under defense of life and property provisions.

ISSUES: Grizzly bears have been identified as a primary source of moose calf mortality near McGrath. The board adopted liberal bear seasons and bag limits in Units 19A and 19D. The board also adopted a grizzly bear predation control program in a portion of Unit 19D, including public bear snaring by permittees, in an attempt to reduce bear predation on moose. No grizzly bear have been taken under bear control regulations in the 19D East bear control area.

Additional bear control measures are being considered for the Unit 19A Predation Control Area.

CARIBOU

MULCHATNA, RAINY PASS, TONZONA, FAREWELL–BIG RIVER, SUNSHINE MOUNTAIN, AND BEAVER MOUNTAINS.
(Several caribou herds are partially or wholly within the McGrath Area.)

STATUS: The Mulchatna Caribou Herd population peaked in 1996 at 200,000 caribou and declined to 30,000–40,000 animals by summer 2008. During the period of rapid growth (early to mid 1990s) the herd greatly expanded its range, including instances when groups of Mulchatna caribou were found throughout most of the McGrath area. Currently, radiocollared Mulchatna herd caribou are regularly found in Unit 19A south of the Kuskokwim, throughout Unit 19B, western Unit 19C, and southern Unit 19D. The Department of Fish and Game office in Dillingham manages the Mulchatna herd.

The Sunshine Mountain, Beaver Mountain, Rainy Pass, Tonzona, and Farewell–Big River herds are small. June 2011 minimum count surveys of the Beaver and Sunshine herds revealed a total of over 400 animals. Few data are available on the Rainy Pass, Tonzona, and Farewell–Big River caribou herds, but hunter reports, opportunistic sightings, and observations made during surveys for other species suggest that each of these herds number between 500–750 animals.

MANAGEMENT ACTIVITIES: We periodically conduct minimum population surveys within the range of these small caribou herds in Unit 19. The Dillingham area biologist generally informs us regarding work being done on the Mulchatna Herd. Harvest statistics are assessed annually and a management report is written every 2 years.

ISSUES: The Mulchatna herd has declined from its peak and steps are being taken to address that decline. Surveys of the Sunshine and Beaver Mountain herds suggest some growth while the Farewell–Big River, Rainy Pass, and Tonzona herds appear to remain small but stable.

FURBEARERS

STATUS: Overall, furbearer abundance is moderate to high. Marten continue to be the most important furbearer harvested in the area because of its quality, abundance, ease of pelt preparation, and a higher price paid to the trapper compared to other furs.

MANAGEMENT ACTIVITIES: We seal lynx, otter, and wolverine pelts when presented to us and we write a management report every 3 years. Annual aerial beaver cache surveys are conducted, we present trapping seminars in area villages, and we obtain trapper reports during fur sealing.

ISSUES: Trapping is still an important traditional and economic activity, although not as widespread as in previous years. Pelt prices are insufficient to encourage full participation and there is an underutilized harvestable surplus of all furbearer species.

MOOSE

STATUS: The McGrath area has complex habitat and weather patterns and the status of moose populations varies considerably. In western Unit 19A, we estimated moose densities at 0.38 moose/mi^2 in 2006 and at 0.33 observable moose/mi^2 in 2010. Moose densities in eastern Unit 19A were estimated at 0.28 observable moose/mi^2 in 2005, 0.44 observable moose/mi^2 in 2008, and 0.25 observable moose/mi^2 in 2011. A correction for sightability was obtained during the 2011 survey which resulted in an estimate of 0.43 moose/mi^2. All of these surveys have overlapping confidence intervals and no trend is detectable.

Limited resources preclude moose surveys in Unit 19B but moose populations are thought to be similar to those in portions of Unit 19A. Likewise, no population estimates are conducted in Unit 19C, although we conducted composition and trend surveys in Unit 19C that suggest adequate bull:cow ratios.

In Unit 19D, the 2008 moose surveys indicated low to moderate densities (0.5 moose/mi^2) in most of the area, but densities are higher around McGrath (about 1.5 moose/mi^2) where predation control has been concentrated. Twinning rates remain above 25% near McGrath, but browse utilization data suggest that density dependent effects may become evident.

In Unit 21A, hunters report seeing fewer moose but population estimates conducted by our federal partners are equivocal. We, along with the USFWS, are planning to conduct a geospatial moose population estimate in the near future.

The winter moose population in Unit 21E was estimated at 1.2 observable moose/mi^2 in March 2009 but hunters in the area report declining numbers. A radiotelemetry project has been implemented to provide movement data and allow us to estimate sightability during surveys.

MANAGEMENT ACTIVITIES: We conduct geospatial moose population estimation surveys in eastern Unit 19A, central Unit 21E, and in Unit 19D near McGrath on a 3-year rotating basis. Additionally, we have conducted moose surveys in the McGrath area frequently since the predation control programs began in 2003. We have also conducted geospatial moose population estimation surveys opportunistically in western Unit 19A and plan to assist the Innoko National Wildlife Refuge staff to conduct a geospatial moose population estimation survey in Unit 21A to establish an estimate and monitor the moose population trend.

We conduct annual spring twinning surveys in Unit 21E and in Unit 19D near McGrath. We also conduct fall composition and trend surveys in these areas as well as in portions of Units 19A, 19C, and 21A.

In addition to survey data, we use hunter harvest reports to assess seasons, bag limits, and other moose regulations. Two management reports are written every 2 years, one covering Unit 19 and a second covering Units 21A and 21E.

ISSUES: There is a great diversity of issues concerning moose in the McGrath area. In general, moose densities were low and remain so, except in 19D where a predation control program has been in place since winter 2003–2004. In areas with Intensive Management Plans, moose populations are either stable (as in Unit 21E where predation control has not been implemented), recovering (as in Unit 19D where wolf and bear predation control has been implemented), or we cannot detect recovery (as in eastern Unit 19A where wolf predation control has been implemented). Additional predation control methods, to include bear control, are being considered to encourage moose population recovery in Unit 19A.

The McGrath area has conducted cooperative planning efforts with representatives of multiple user groups including: 1) the Adaptive Wildlife Management plan which focused on Unit 19D East in the 1990s, 2) the Central Kuskokwim Moose Management Plan (June 2004) covering 19A and 19B, and 3) the Yukon–Innoko Moose Management Plan for Unit 21E and a portion of Unit 21A (December 2006). These plans currently guide our moose management decisions.

SHEEP

ALASKA RANGE WEST (UNITS 9, 16, AND 19)

STATUS: Sheep composition and trend surveys are conducted annually in Unit 19C in June or July, depending on weather. In 2010 we observed 34 lambs:100 ewes and almost 4% of observed sheep were full-curl rams which was similar to previous years, suggesting a stable population.

MANAGEMENT ACTIVITIES: To monitor changes in population trend and sex and age ratios aerial sheep composition and trend surveys are conducted in the Unit 19 portion of the western Alaska Range. Sheep horns are sealed when presented at the McGrath office, but the bulk of the sheep taken in Unit 19C are sealed in the field by Department of Public Safety personnel. Harvest reports are analyzed for changes in harvest characteristics and a management report is completed every 3 years.

ISSUES: Guides, transporters, and their clients complain of overcrowding and new guiding regulations are being contemplated. Department of Public Safety personnel suggest that the recently established sealing requirements have improved the quality of sheep taken.

WOLF

STATUS: Wolf populations vary throughout the McGrath management area in response to prey population availability and our management actions.

Wolf predation control programs have been implemented in Unit 19A since 2004 and in Unit 19D East since 2003. Wolf numbers have been reduced by 60%–80% from precontrol levels within the wolf control focus areas in each of these units while maintaining no fewer than 30–36 wolves in Unit 19A and 40 wolves in Unit 19D East.

A partial wolf survey in Unit 21E in March 2009 suggested high wolf densities, consistent with reports from hunters, trappers, and pilots.

In Units 19B, 19C, and 21A, hunters and trappers report high numbers of wolves and during surveys in these areas we see tracks consistent with these observations, but we have not conducted wolf surveys in these units.

MANAGEMENT ACTIVITIES: We periodically calculate wolf population estimates for each unit, based on incidental observations, responses to trapper questionnaires, analyses of sealing documents, prey density estimates, habitat, and comparisons with other areas where population estimation surveys have been completed. Reconnaissance-style wolf surveys are conducted in Units 19A, 19D East, and 21E.

Wolf predation control has been conducted in the Unit 19D East Wolf Predation Control Area since winter 2003–2004. Wolf control is continuing in this area and was reauthorized during the March 2009 Board of Game meeting for a 5-year period beginning in RY09.

Wolf predation control was first implemented in Unit 19A during winter 2004–2005. Wolf control is continuing in this area and was reauthorized during a March 2009 Board of Game meeting for a 5-year period beginning in RY09.

Harvest statistics are assessed annually and a management report is written every 3 years.

ISSUES: The predation control programs in Unit 19A and Unit 19D East have been the dominant issue related to wolf management in the McGrath area. Associated with these are the moose management plans including the Adaptive Wildlife Management Team plan which focused on Unit 19D East in the 1990s, and the current plans including the Yukon–Innoko Moose Management Plan (June 2004) and Central Kuskokwim Moose Management Plan (December 2006) which guide wolf management as well as moose management.

GAME MANAGEMENT UNITS 25A, 25B, 25D, 26B and 26C

NORTHEAST ALASKA AREA OFFICE

Area Biologist: Beth Lenart, Fairbanks
Assistant Area Biologist: Jason Caikoski, Fairbanks

DESCRIPTION

The Northeast Alaska area includes the drainages of the Upper Yukon basin in Game Management Units 25A, 25B, and 25D upstream from Fort Hamlin (upstream from the Dalton Highway Bridge on the Yukon River) and the eastern North Slope (Units 26B and 26C) from the Itkillik River drainage to the Canadian Border. The area encompasses 73,800 mi^2, including more than 26,000 mi^2 of arctic, alpine and subalpine tundra in the eastern Brooks Range and on the north slope, and over 40,000 mi^2 of boreal forest in Game Management Unit 25. The Upper Yukon basin is subject to frequent lightning-caused fires. Abundant successional and riparian shrub habitat and low snowfall provide excellent habitat for moose. The Yukon Flats includes numerous lakes and meadows and is a major waterfowl nesting area. Road access is limited to the Dalton and Steese Highways. The area includes the Arctic and Yukon Flats National Wildlife Refuges, small portions of the Gates of the Arctic and Yukon–Charley National Preserves, as well as large areas managed by the Bureau of Land Management, the State, and additional areas owned by Native corporations.

Game Management Units and areas are:

25A	—	21,300 mi^2
25B	—	9,100 mi^2
25D	—	17,600 mi^2
26B	—	15,500 mi^2
26C	—	10,300 mi^2
Total Area		73,800 mi^2

There are 9 communities (Arctic Village, Beaver, Birch Creek, Chalkyitsik, Circle, Fort Yukon, Kaktovik, Stevens Village, and Venetie) with a total population of about 1,700. In addition, the Prudhoe Bay complex is located in northern Unit 26B.

Advisory committees in the area include:

- Yukon Flats Fish and Game Advisory Committee
- North Slope Fish and Game Advisory Committee
- Eastern Interior Alaska Subsistence Regional Advisory Council

Conservation system units are:

- Yukon Flats National Wildlife Refuge, U.S. Fish and Wildlife Service (USFWS)
- Arctic National Wildlife Refuge, National Park Service (NPS)
- Yukon–Charlie Rivers National Preserve, NPS
- Gates of the Arctic National Preserve, NPS

Controlled use/management areas include:

- <u>Dalton Highway Corridor Management Area</u>

  The Dalton Highway Corridor Management Area (DHCMA) includes land 5 miles east and west of the Dalton Highway from the Yukon River north to the Arctic Ocean, with a total area of about 3,600 mi^2. The DHCMA was established in 1980 and some amendments were made in 1985 and 2002. The area was established based on a perceived need, primarily on the part of communities in Unit 26, to limit access by hunters. Alaska Statute 16.05.789 prohibits hunting with firearms within the corridor; however, regulation allows big game, small game, and fur animals to be hunted in the area by bow and arrow only. No motorized vehicle, except aircraft, boats, and licensed highway vehicles on publicly maintained roads, may be used to transport game or hunters within the DHCMA. Alaska Statute 19.40.210 prohibits the use of off-road vehicles within 5 miles of the highway right-of-way in this area. The DHCMA is achieving its original purpose.

- <u>Prudhoe Bay Closed Area</u>

  The Prudhoe Bay Closed Area encompasses the Prudhoe Bay industrial complex, and extends west to include the Kuparuk River area, with a total area of 432 mi^2. It was established prior to the DHCMA and was based on public safety and security issues associated with the extensive oil field facilities in the area. The area is closed to the taking of big game. In 2002 the Board of Game extended the restrictions on the use of motorized vehicles for hunting in the DHCMA to apply to the Prudhoe Bay Closed Area. This is consistent with statutory intent, and closed a loophole in the regulation. The public generally accepts the restrictions, although difficulty in locating the southern boundary has caused some confusion. The closed area appears to have achieved its purpose.

BLACK BEAR

STATUS: Black bears are common in Units 25D, 25B, and the southern portion of Unit 25A. Black bears are rare in the northern portion of Unit 25A and do not inhabit Units 26B and 26C. Population estimates are largely unknown except for an abundance survey the Department conducted in 2010in a 530 mi^2 area in Unit 25D. We estimated 225 independent black bears in the study area. The relative precision at the 95% confidence level was 21.4%, resulting in a confidence interval of 186–283 independent black bears. This abundance estimate converts to a density estimate of 425 black bears per 1000 mi^2, which documents the highest known density of black bears in Interior Alaska.

MANAGEMENT ACTIVITIES: Sealing of black bears is not required in these units. However, local harvest was estimated from subsistence household surveys in 2008 and 2009. In 2009, CATG estimated 48 black bears were harvested. Additional harvest by non-local residents and non-residents is estimated at 20-40 black bears annually. Current harvest rates are low and well below sustained yield.

ISSUES: Predation by black bears on moose calves has been a long term concern by local residents of Unit 25D. Liberalization of seasons, bag limits, and method of take has occurred within the Unit to provide additional opportunity to harvest black bears. Current season and bag limits for black bears in Unit 25D are more liberal than most interior Units. In addition to a no closed season and a 3 bear annual bag limit, any bear may be harvested including cubs or sows accompanied by cubs. Both a spring and fall baiting season occurs and the use of artificial light associated with customary and traditional activities at den sites is allowed.

GRIZZLY BEAR

STATUS: An estimated 1,430–2,070 grizzly bears occur in the area, with populations north and south of the Brooks Range estimated at 460–710 and 870–1,360 bears, respectively. In most years, the harvest of bears is below current estimates of sustainable yield. Since the mid 1990s, bear populations probably have remained stable because habitat has changed little and harvest was conservative. Grizzly bears are considered to be at low to moderate density on the North Slope and moderate density south of the Brooks Range.

MANAGEMENT ACTIVITIES: Sealing, tooth aging, and compiling and analyzing harvest data are the primary management activities in all units. In Unit 25D, an objective to temporarily reduce the number bears was established with the implementation of the Yukon Flats Moose Management Plan in 2002. This resulted in liberalizing grizzly bear seasons and eliminating the grizzly tag fee requirement.

During the January 2012 statewide BOG meeting, the board authorized a Muskox Recovery program in Unit 26B that authorizes Department personnel to lethally remove up to 20 brown bears annually that are threatening or killing muskoxen in Unit 26B. The program will begin in April 2012.

ISSUES: Typically, management issues relate to season length and bag limits in Units 26B, 26C, and 25A and determining a sustainable harvest rate for each area.

In 2008, the Board liberalized seasons in Unit 26B to provide additional hunting opportunity because harvest rates had been low for the previous 5 years. In 2010, seasons were liberalized further to reduce brown bear predation on muskoxen. Because a predator control program was authorized by the Board during the January 2012 meeting, the 2010 liberalized seasons are no longer necessary. At the March 2012 meeting, the board will consider a proposal to return to the 2008 season in order to remain within sustained yield for bears in Unit 26B.

Current issues involve reducing brown bear predation on muskoxen in Unit 26B and moose in Unit 25D. Regulations have been liberalized in both units in an attempt to achieve these objectives. In Unit 26B, liberalized seasons resulted in a slightly higher harvest; however, data are inconclusive whether this was effective in reducing bear predation on muskoxen. Liberalized seasons in Unit 25D have had little effect on bear harvest levels.

CARIBOU

CENTRAL ARCTIC HERD (CAH)

STATUS: The Central Arctic Caribou herd has grown substantially from 32,000 caribou in 2002 to 70,000 caribou in 2010. The CAH traditionally calved near the coast between the Colville and Kuparuk Rivers on the west side of the Sagavanirktok River and between the Sagavanirktok and the Canning Rivers on the east side. During the early 1990s, the greatest concentration of caribou calving in western Unit 26B shifted southwest as development of infrastructure related to oil production occurred in what was originally a major calving area. No directional shift in distribution of caribou calving east of the Sagavanirktok River was noted. During the 2000s, distribution of calving and postcalving caribou was similar among years. The CAH summer range extends from just west of the Colville River, eastward along the coast (and inland approximately 30 miles) to the Katakturuk River. The CAH winters in the northern and southern foothills and mountains of the Brooks Range. The herd's range often overlaps with the Porcupine caribou herd (PCH) on summer and winter range on the east side and the Teshekpuk (TCH) herd on summer and winter range on the west side and occasionally with the Western Arctic (WAH) in fall and winter to the west.

As the herd grew, large scale movements were documented with caribou moving eastward along the coast to the Canadian border and returning within a few weeks. In addition, during the past few winters, the CAH appears to have expanded it winter range farther south on the south side of the Brooks Range, into more timbered areas, and east toward Arctic Village, frequently overlapping with the PCH.

Harvest pressure is low, with a harvest rate less of than 3% annually, consisting mostly of bulls (>90%). Currently, we estimate approximately 1,400 hunters harvest 1,000 caribou annually from an allowable harvest of 3,000 caribou.

MANAGEMENT ACTIVITIES: Parturition rates and calf:cow ratios are determined in early and late June by monitoring radiocollared cows. A photocensus is attempted every 2–3 years to estimate population size. Fall composition surveys will be conducted annually for the next 2 years and then biennially. Approximately 20–30 new radio collars are deployed annually on female caribou to maintain 60–80 active radio collars to assist in estimating parturition rates, calf:cow ratios, seasonal distribution, and conducting photocensuses and fall composition surveys. In addition, 5–10 radiocollared bulls are maintained to assist in photocensuses and composition surveys.

ISSUES: Current harvest is approximately 1,000 caribou and the intensive management harvest objective is 1,400–1,600 caribou. In 2010, the BOG liberalized the bag limit from 2 to 5 caribou for both resident and nonresident hunters to increase hunting opportunity and harvest. Although the number of caribou hunters increased by approximately 200 hunters in Unit 26B in 2010; the Department believes that most of the increase was due to displaced hunters from the Mulchatna and Fortymile caribou herds. In 2010, the Fortymile caribou hunt opened later than in previous years. Some public were concerned that the 5 caribou bag limit in Unit 26B would attract more hunters. However, only 10 hunters harvested 5 caribou in 2010 and 15 hunters harvested 4 caribou. This suggests that most hunters only harvested caribou they were able to properly take care of.

Although access is restricted along the Dalton Highway (AS 16.05.789 prohibits hunting with firearms and AS 19.40.210 prohibits off-road vehicle use within 5 miles of the Dalton Highway), a large number of hunters use the highway in August and early September and some controversial issues affecting caribou hunting in Unit 26B have occurred, particularly during the previous 10 years. The increase in the number of archers and other hunters using the Dalton Highway prompted several public proposals in previous years related to hunt quality and other conditions of the hunt. Some of the issues are wanton waste, poor hunter ethics, stalking caribou that are already being hunted, and traffic concerns with commercial industry. There has been disagreement among the hunting public as to reasonable solutions to these issues. These issues are present in any hunt that occurs along a road; although the conflicts with commercial trucking are likely more common along the Dalton Highway because it was not built to accommodate other kinds of traffic. The Dalton Highway was originally constructed to facilitate building the oil pipeline and accessing the Prudhoe Bay oilfield complex. Commercial truck traffic remains the dominant traffic on this road. In addition to concerns directly along the highway, there has also been an increase in the number of hunters using boats to access areas off the highway, particularly the Ivishak River. Some hunters have expressed frustration related to hunting ethics (e.g. transporters going up and down the river dropping off hunters near other camps), similar to those observed along the highway. Therefore, even though the CAH could sustain a substantial increase in harvest, conflicts among hunters, and between hunters and commercial trucking companies, tour companies, and other users of the Dalton Highway would likely rise as the numbers of hunters increases.

Recognizing that the herd has grown substantially, there still are concerns that as more infrastructure is put in place, the calving grounds will shift to less preferred habitat and possibly affect the population if the herd is nutritionally stressed.

PORCUPINE HERD (PCH)

STATUS: The Porcupine caribou herd (PCH) declined from 178,000 caribou in 1989 to 123,000 caribou in 2001. A photocensus was not conducted between 2001 and 2009 due to inadequate caribou aggregations. However, a successful photocensus was conducted in 2010 which resulted in a population estimate of 169,000 caribou.

The PCH migrates between Alaska and Yukon and Northwest Territories in Canada. In the 1980s and 1990s, most of the PCH calved along the coast in the Arctic National Wildlife Refuge, Alaska, often in the 1002 area. Since 2000, the PCH primarily calved farther east, between the Kongakut River in Alaska to the Babbage River, Yukon, in Ivvavik National Park. Caribou that calve in Canada move into Alaska shortly after calving. Postcalving distribution also changed in recent years in that the herd often does not remain on the coastal plain in large aggregations, but moves south into the mountains in the Brooks Range, including south of the Continental Divide. This distribution has made it extremely difficult to complete photocensuses because caribou are more scattered, in smaller groups, and in steep terrain. Winter distribution varies annually and in some years a portion or most of the PCH winters in Alaska between the Middle Fork Chandalar River and the border, while in other years most of the herd winters in Canada.

The PCH is lightly hunted in Alaska and harvest in Alaska is of minimal management concern. Between 50 and 125 caribou are reported harvested annually by nonlocal residents of Alaska and nonresidents. We estimate that 400–700 caribou are harvested annually by Arctic Village and other Yukon Flats residents during years that a large proportion of the herd winters in Alaska. There is little information about harvest levels or composition in Canada; however, harvest is thought to average 4,000 caribou annually when the herd is accessible via the Dempster Highway.

The PCH is internationally co-managed through an agreement with the U.S. and Canada and the establishment of the International Porcupine Caribou Board. The purpose of the agreement and role of the board is to promote international coordination and co-management of the PCH and its range. However, regulatory jurisdiction is segregated between countries.

MANAGEMENT ACTIVITIES: Parturition rates and calf:cow ratios are estimated in early and late June by monitoring radiocollared cows. A photocensus is attempted every 2–3 years to estimate population size. Fall composition surveys are conducted occasionally when funding is available. Approximately 20–30 new radio collars are deployed annually on female caribou to maintain 100–110 active radio collars to assist in estimating parturition rates, calf:cow ratios, seasonal distribution, and conducting photocensuses. In addition, 10–20 radiocollared bulls are maintained to assist in photocensuses and composition surveys.

ISSUES: Obtaining frequent photocensuses of the herd has been the primary management concern in Alaska. Poor herd aggregations resulted in nearly a decade long period (2001–2009) when the size of the herd was unknown. Although a photocensus was completed in 2010, obtaining reliable photocensuses of the herd on intervals of 2–3 years may continue to be challenging.

Regulating harvest and obtaining accurate harvest rates in Canada has been the primary management concern for wildlife management agencies in Canada. A decline in herd size during 1989–2001, followed by an absence of a population estimate derived from photocensuses during 2002–2009, prompted the development and implementation of a Harvest Management Plan (HMP) by the Porcupine Caribou Management Board (of Canada). The plan allows for unrestricted harvest when the PCH is $\geq$115,000, institutes a voluntary bull-only harvest if herd size is 80,000–115,000, institutes a mandatory bull only harvest with annual limits if herd size is 45,000–80,000, and prohibits harvest (except for ceremonial purposes) if herd size is $\leq$45,000. The plan also requires harvest reporting, regardless of herd size or harvest regime. The HMP was implemented for the 2010–2011 hunting season.

FURBEARERS

STATUS: Furbearers are common and distributed throughout Units 25A, 25B, and 25D. Furbearers are most abundant in the Yukon Flats in Unit 25D especially when lynx are at the apex of their population cycle. Currently, lynx are near the low of their population cycle. Species of most importance for local trappers include lynx, marten, fox and beaver. Observations by trappers, pilots, and Department staff indicate that the muskrat population in Unit 25D is increasing. Populations were low during the previous 10 to 15 years.

In Units 26B and 26C, arctic fox, red fox, wolf and wolverine are the most common furbearers. Fox and wolf populations fluctuate to a great extent, often as a result of rabies outbreaks.

MANAGEMENT ACTIVITIES: Sealing records, fur export reports, direct communication with trappers, and the results of a trapper questionnaire are used to monitor population and harvest levels of furbearers.

ISSUES: Trapping has been historically important in the culture and to the economy of the Yukon Flats, but trapping activity is presently low due to declining fur prices (except for marten) and other social and economic changes.

MOOSE

UNITS 25A, 25B, AND 25D

STATUS: Moose in Unit 25A are at a low density (~0.20 moose/mi^2) because much of Unit 25A consists of less suitable habitat including mountainous terrain and tundra of the Brooks Range. Most moose in Unit 25A are distributed in the lowlands and riparian habitats of major Brooks Range drainages. Annually, 100–120 hunters harvest 30–50 moose in Unit 25A. The number of hunters and harvest has been stable.

Moose in Units 25B and 25D are distributed throughout the area and are an important resource for local communities. However, population density is low compared to other areas in Interior Alaska, ranging from 0.20 moose/mi^2 to 0.35 moose/mi^2. There is widespread concern about the low density of moose in Units 25B and 25D, which includes substantial areas with excellent moose habitat. Limiting factors include predation by black bears, grizzly bears and wolves, as well as hunting. Predation by black bears and grizzly bears are the major source of calf moose mortality during summer, accounting for over 80% of the calves born during a 2-year study by the USFWS in western Unit 25D.

In Unit 25B, 75–100 hunters reported harvesting 30–40 moose annually. In eastern Unit 25D, 60–100 hunters reported harvesting 15–35 moose annually. In addition, 10–30 moose are reported taken annually in western Unit 25D under Tier II and federal subsistence permits. However, a large proportion of the harvest by local residents is not reported. A harvest-monitoring project conducted by the Council of Athabascan Tribal Governments (CATG) indicates that local residents harvest 150–200 moose annually in 25D and 25B.

MANAGEMENT ACTIVITIES: Population and composition surveys in Unit 25D are conducted regularly in cooperation with the Council of Athabascan Tribal Governments (CATG) Natural Resources Department and Yukon Flats National Wildlife Refuge. A major management effort took place in 2001 and 2002 in which the Yukon Flats Cooperative Moose Management Plan was developed and implemented. This effort focused on community and agency initiatives that together could maintain or increase moose abundance, especially in key hunting areas near local communities. We continue to work from the 2002 Yukon Flats Cooperative Moose Management Plan.

Unit 25D Intensive Management Update: During 2008–2011, the Department explored options for implementing an Intensive Management (IM) program in a 530-mi^2 area surrounding the village of Beaver. This area primarily consisted of private lands. The IM plan concept was community based and participation by the community was important for success. The plan focused on achieving 4 specific objectives:

1) Increasing black and brown bear harvest
2) Increasing wolf harvest
3) Accurate reporting of harvest of moose, black bears, and wolves by local communities
4) Eliminating cow harvest.

Several management activities were performed to accomplish these objectives:

1) A commitment by the Beaver Tribal Council and Council of Athabascan Tribal Government (CATG) to acquire grants and provide financial incentives to increase the harvest of wolves and bears. (Objectives 1 and 2)
    a. Purchased wolf hides for educational purposes
    b. Conducted black and brown bear derbies
    c. Provided black bear baiting clinic in Beaver in 2008
    d. Provided fuel reimbursement for a pilot to aid in wolf trapping near Beaver in 2006 and 2007

e. Organized 2 moose management meetings in Beaver in August 2008 and October 2010; providing travel and food.

2) Conducted wolf snaring clinics. (Objective 2)
   a. ADF&G conducted wolf snaring clinics in Beaver in 2007 and in Venetie in 2009.

3) Obtained harvest information from local communities. (Objectives 3 and 4)
   a. CATG conducted household harvest surveys in 7 communities in the Yukon Flats during the 2008–2009 and 2009–2010 regulatory years, under the guidance of ADF&G Division of Subsistence.
   b. Funding for surveys provided by CATG via a grant provided by USFWS, Beaver Tribal Council, and ADF&G.

4) Determined the abundance of black bears in the IM area to assist in determining if liberalized methods for taking black bears could reasonably be expected to reduce black bear abundance, resulting in increase moose calf survival. (Objective 1)
   a. Survey funded and conducted by ADF&G and USFWS in 2010.

5) Conducted a wolf abundance survey to determine removal rate needed for IM area. (Objective 2)
   a. ADF&G conducted a wolf survey in western Unit 25D in 2009.
   b. USFWS in cooperation with ADF&G conducted a wolf predation rate study in 2009–2010.

6) Conducted GSPE moose surveys of the IM area to assess changes in prey response to potential increased predator harvest. (Objectives 1, 2, 3, & 4)
   a. ADF&G conducted moose population surveys of the IM area in 2008 and 2009.

Results from above management activities indicated the following:

1) Participation by local communities to report harvest of moose, bears, and wolves was good, but accuracy of the data was undetermined. Preliminary results from 2008 and 2009 indicated 104 and 123 moose were harvested. No cow moose were reported, including potlatch, and almost all moose were taken in September when the legal hunting season was open. Preliminary results from the harvest surveys in 2009 indicated 2009 indicated 48 black bears, 14 brown bears, and 20 wolves were harvested.

2) Results of the black bear population estimate indicated that black bear abundance is very high and liberalization of bear seasons and methods of take are unlikely to result in a reduction in bear abundance. We estimated 186−283 (95% CI) black bears in the study area (530 mi^2).

3) Wolf density was 11.4–13.9 wolves/1000 mi^2 in western Unit 25D (98−120 wolves) in March 2009, similar to previous surveys conducted in the Yukon Flats.

The average number of wolves sealed annually in all of Unit 25D during 2007−2010 was 36, indicating that harvest was not high enough to affect the wolf population.

4) Kill rates by wolves in the Yukon Flats was similar to other populations where moose occurred at higher densities and limit the recruitment of moose to the population.

5) Moose density in the IM area was 0.34 moose/mi^2 in 2008 and 0.41 in 2009. Current survey techniques may not be able to detect small changes in the size of a moose population where densities are low, making it more difficult to determine the success of a program.

Present evaluation of a community based IM program in 25D indicates it is not currently practicable. Progress has been made in obtaining harvest data from local communities; but the level of accuracy of the data is undetermined, particularly for moose. Black bear abundance is very high and local efforts to reduce abundance via liberalized seasons and incentives are not reasonably achievable through hunting only. Efforts made by local communities to provide financial incentives and snaring clinics did not result in an increase in the harvest of wolves at a level necessary to affect the wolf population. Department or public conducted predator control is currently not permitted on federal land, which surrounds all of the communities.

ISSUES: Chronically low moose numbers in Unit 25D continue to be a major concern. Both local and nonlocal users are concerned about predation by wolves and bears and the illegal harvest of cow moose. Although the number of nonlocal moose hunters in Unit 25D is small (≤30), their presence is sufficient to cause concern among local residents.

Approximately 65% of Unit 25D is on federal land and the remainder is state and private owned lands. Identifying state, federal, and private lands and determining the appropriate regulation is often confusing and difficult for hunters in the field. Staff from ADF&G and Yukon Flats National Wildlife Refuge continue to work with the local advisory committees to align state and federal seasons when feasible.

Some issues have arisen from the public regarding increased moose hunting in the Sheenjek and Coleen drainages in Unit 25A; although the data indicates the number of hunters has been relatively stable.

UNITS 26B AND 26C

STATUS: The moose population in Units 26B and 26C declined dramatically during the early 1990s, probably due to a combination of factors including disease, weather, predation by wolves and grizzly bears, and possibly insect harassment. In Unit 26B, the population gradually increased during the 2000s, and peaked at 550−650 moose during 2006−2009. Beginning in 2010, we observed fewer moose and during 2010 and 2011, we estimated the population at 450−500 moose. In addition, the proportion of 10-month-old calves observed in April surveys was lower during 2009−2011 (8%) compared to 2006–

2008 (16%). Moose numbers in central Unit 26C remained stable at approximately 50–60 moose during the 2000s. In fall 2011, moose were surveyed in southeastern Unit 26C in the upper Kongakut and Firth–Mancha drainages where 339 moose were observed. Including eastern Unit 26C, I estimate over 400 moose in all of Unit 26C, recognizing that the eastern portion has a migratory component to its population.

In 2006, harvestable surplus was estimated at 15 bulls in Unit 26B (excluding the Canning River drainage) and a moose season was opened to resident hunters because the population objectives were met. It includes a general season for 1 bull for 14 days during February 15–April 15 and a limited drawing permit (up to 30 permits) for 1 bull during September 1–14. Since the season was opened in 2006, 3–8 moose were harvested annually under the drawing permit. Only 1 moose was reported harvested under the general season in 2011.

MANAGEMENT ACTIVITIES: Spring surveys are conducted annually to estimate population size and percent 10-month-old calves in the Unit 26B population.

ISSUES: The moose season was closed in 1996 in response to the dramatic decline in moose numbers and reopened in Unit 26B in 2006 to residents only. In 2010 and 2011, fewer moose were observed in Unit 26B during April surveys compared to 2006 through 2009. There is some concern that the population may be declining again in this unit. ADF&G will continue to monitor the population. The state season in Unit 26C remains closed, but a federal season is open and managed by Arctic National Wildlife Refuge. The Department submitted a proposal to the Board of Game for the March 2012 meeting to open a hunt in southeastern Unit 26C. A proposal to remove the federal closure to non federally qualified users will need to be submitted to the Federal Subsistence Board during their next cycle.

MUSKOXEN

STATUS: During the mid 1990s, approximately 500–600 muskoxen inhabited northeastern Alaska (eastern Unit 26A, Unit 26B, and Unit 26C). In 1999, muskoxen numbers began to decline in Unit 26C. By 2001, we determined that the overall population size in northeast Alaska declined considerably, but the population dynamics were different in each unit. Abundance of calves, yearlings, and adults declined in Unit 26C beginning in 1999. In eastern Unit 26A and Unit 26B, abundance of calves and yearlings was stable during 1999–2006, but numbers of muskoxen declined during 2003–2006. During a census conducted in 2006, we observed 216 muskoxen in Unit 26B and eastern Unit 26A and 1 muskox in Unit 26C. Numbers remained relatively stable during 2007–2011. Groups of muskoxen migrate back and forth across the border between Canada and Unit 26C. Therefore, in some years, 30–40 muskoxen may reside in Unit 26C.

Beginning in regulatory year 2006–2007, permits to hunt muskoxen were not issued in eastern Unit 26A and Unit 26B. All hunts remain in regulation and permits include a Tier II hunt in eastern Unit 26A and Unit 26B west of the Dalton Highway, and a Tier I registration and a drawing hunt in Unit 26B east of the Dalton Highway. Hunting in Unit 26C is managed by the Arctic National Wildlife Refuge.

Beginning in spring 2007, we initiated a research project to look at potential causes of muskoxen mortality, including nutrition, disease, predation, and re-distribution. Results indicated that the primary source of mortality on both adults and calves was brown bear predation.

MANAGEMENT ACTIVITIES: ADF&G works cooperatively with the Arctic National Wildlife Refuge to manage muskoxen in northeastern Alaska. In general, ADF&G directly manages the eastern Unit 26A and Unit 26B subpopulation and the Arctic National Wildlife Refuge manages the Unit 26C subpopulation. Activities include conducting annual composition and population estimate surveys in April, censuses every 3–5 years in April, deploying radio collars, radiotracking, and administering permit hunts when hunts are open. The structure of the permit hunts was developed in the North Slope Muskox Harvest Plan which was approved by the Board of Game in 1999.

During the January 2012 statewide Board of Game meeting, the board authorized a Muskox Recovery program in Unit 26B that authorizes Department personnel to annually remove up to 20 brown bears that are threatening or killing muskoxen in Unit 26B. The Department is authorized to use lethal means and the program will begin in April 2012.

ISSUES: Current issues involve reducing brown bear predation on muskoxen.

SHEEP

STATUS: Population size for the eastern Brooks Range is unknown, but sheep are distributed throughout the mountains. In the mid 1990s, sheep populations in Interior and northern Alaska declined substantially and these declines appeared to be correlated with deep snowfall during winters between 1988 and 1993. In general, sheep were far less abundant in the mid 1990s compared with the 1980s. Since the mid 1990s, survey data from a portion of eastern Unit 24A and western Unit 25A indicate that the population has been relatively stable.

Sheep hunting in the eastern Brooks Range continues to be desirable by consumptive users and the number of hunters and harvest has been increasing over the past decade. Current harvest ranges 220–230 rams taken by 460–525 hunters, annually, during the general season hunt in Units 25A, 26B, 26C, and eastern 24A. A small number of sheep are also taken in a winter registration hunt in Units 25A and 26C. Current sheep harvest in the eastern Brooks Range accounts for about 25% of the total statewide harvest.

MANAGEMENT ACTIVITIES: Beginning in 2002, population surveys were completed in most years in the upper Chandalar drainage in an area that has become popular for resident sheep hunters and guided nonresidents hunters. Survey results suggest that the sheep population and the proportion of legal rams have been stable in recent years. Sheep harvest and hunter effort are monitored based on harvest ticket reports.

In March 2009, we initiated a 3-year study to evaluate factors that may limit sheep population growth in the central Brooks Range and to assess movement patterns that may be affected by development along the Dalton Highway. Objectives of the study are to: 1) investigate seasonal and annual distributions and movement patterns of sheep and 2) estimate survival of lambs to yearling age class and determine the causes of mortality. The study area is in Unit 24A within the area where a population survey is conducted regularly.

ISSUES: The Federal Subsistence Board established the Arctic Village Sheep Management Area in Unit 25A in 1991, and its northern boundary was expanded in 1995. This area was closed to sheep hunting by non-federally qualified hunters and has been the subject of debate in connection with dual management. A portion of this area was re-opened in May 2007 to a full-curl general season hunt to comply with ANILCA. However, this area was again closed by the Federal Subsistence Board in 2012.

The number of hunters and guides in western Unit 25A and eastern Unit 24 has increased in recent years. Some guides and hunters have expressed concerns that the area is overcrowded and would like to see exclusive guide areas re-established. We have expanded population monitoring efforts in this area. Limited survey data suggests that current harvest levels are sustainable.

SMALL GAME

STATUS: The overall status of small game populations in the area are largely unknown. Anecdotal information suggests hare numbers were near their peak in 2008 and 2009 and are currently near the low of the 10-year population size cycle. Spruce and ruffed grouse are widespread south of the Brooks Range but relative abundance in unknown. Observations by Department staff indicate that ptarmigan are abundant in the Brooks Range.

MANAGEMENT/RESEARCH ACTIVITIES: None

ISSUES: None

WOLVES

STATUS: Wolves are widely distributed throughout Units 25A, 25B, and 25D and harvests are low relative to the total population (~4.4–5.3 wolves/1000 km^2). Annual harvest, primarily by trappers, has been relatively stable over the past 15 years and averages 50 wolves.

Wolves are present on the North Slope in Units 26B and 26C in low numbers (2.2–3.2 wolves/1000 km^2). Approximately 5–35 wolves are harvested annually, primarily by trappers, and likely have little effect on the population.

MANAGEMENT ACTIVITIES: Major activities include monitoring harvests, conducting periodic wolf population surveys, and communicating with residents and pilots to obtain anecdotal information on wolf numbers. Wolf surveys in portions of Units 25B and 25D were conducted in spring 2000, 2001, 2006 and 2009.

During 2008–2011, the Department assisted the Yukon Flats National Wildlife Refuge with a wolf predation rate study in western Unit 25D. Final analysis of data and publication is expected in 2012.

Some communities in Unit 25 have requested trapping clinics. ADF&G conducted a wolf snaring clinic in Beaver in 2007 and Venetie in 2009.

ISSUES: Wolf predation on moose is a concern, particularly in Units 25B and 25D. Local residents are currently exploring methods to increase wolf harvest and reduce moose predation by wolves.

GAME MANAGEMENT UNITS 12 AND 20E

TOK AREA OFFICE

Area Biologist: Jeff Gross
Assistant Area Biologist: Torsten Bentzen
Seasonal Wildlife Technician: Bob Gingue
Seasonal Administrative Clerk: Tess Faulise

DESCRIPTION

GAME MANAGEMENT UNIT 12

Game Management Unit 12 is located along the Yukon, Canada border in eastern Interior Alaska. It measures approximately 10,000 mi^2, of which 9,000 mi^2 is wildlife habitat.

LAND OWNERSHIP: Over 80% of the land is managed by the National Park Service (Wrangell–St. Elias National Park and Preserve), the U.S. Fish and Wildlife Service (Tetlin National Wildlife Refuge) or is privately owned by Native corporations or villages. The Tok Management Area (TMA) is the only state special management area in Unit 12 and there are no controlled use areas. Approximately 2,000 people live in 6 communities and villages within the unit.

ACCESS: The Glenn and Alaska Highways, Nabesna Road, and the Tanana, Tok, and Nabesna Rivers are primary access routes into Unit 12. There are few trails suitable for off-road vehicles. Due to the combination of limited access and land owner policies, hunting pressure is low in most of the unit.

HUMAN USE: The Dall sheep population in Unit 12 is the most intensively hunted in the state. Guided nonresident Dall sheep hunting is common, but most moose hunting is by local residents (>70% of the hunters) who take >40% of the harvest. Trapping, primarily for marten and lynx is economically important.

FISH AND GAME ADVISORY COMMITTEES: Upper Tanana–Fortymile and Nabesna Advisory Committees.

SPECIAL MANAGEMENT AREAS:

TOK MANAGEMENT AREA: The TMA was created in 1974 to provide sheep hunters with the opportunity to hunt large-horned Dall sheep under uncrowded conditions. It is one of the top 3 areas in Alaska in terms of Dall sheep horn growth, and hunt objectives were designed to enhance horn growth potential. The TMA is the only sheep hunting area in Alaska specifically established for trophy sheep management. It is very popular among sheep hunters and is one of the most sought-after sheep permits in the state.

GAME MANAGEMENT UNIT 20E

Unit 20E is located north of Unit 12 along the Yukon, Canada border. It encompasses about 11,000 mi^2 of diverse wildlife habitat.

LAND OWNERSHIP: Most of the land in Unit 20E is in state (about 50%) or Native corporation (30%) ownership. State special management areas include the Ladue River and Glacier Mountain Controlled Use Areas. The remaining land is under federal management either within the Yukon–Charley Rivers National Preserve (National Park Service) or the Fortymile National Wild and Scenic River System (Bureau of Land Management.) About 220 people reside in the 3 communities in Unit 20E.

ACCESS: The Taylor Highway, several extensive off-road vehicle trails, and the Yukon, Charley, and Fortymile Rivers are the primary access routes in Unit 20E. Portions of central Unit 20E can be accessed by float plane. Most of western, eastern, and northern Unit 20E are inaccessible, except from a small number of landing areas.

HUMAN USE: Caribou in the Fortymile herd are the most sought-after wildlife species in Unit 20E. Moose hunting participation and harvest increased significantly between 2001 and 2003, exceeding historic records, but has since declined to levels observed during the 1990s. Trapping, primarily for marten and lynx is economically important. Grizzly bear hunting regulations have been liberal since 1981 in an attempt to reduce grizzly bear predation on moose and caribou calves.

FISH AND GAME ADVISORY COMMITTEES: Eagle and the Upper Tanana–Fortymile Advisory Committees.

CONTROLLED USE AREAS:

<u>Glacier Mountain Controlled Use Area (CUA).</u> The Glacier Mountain CUA encompasses about 600 mi^2 and was formed in 1971 to afford greater protection for the Dall sheep population on Glacier Mountain. Methods of access are restricted during August 5–September 20. Access was originally limited to walk-in hunters only. In 1981, the restriction on use of pack animals was eliminated. This CUA continues to provide needed protection for the Dall sheep population as originally intended, and more recently, has provided opportunity for walk-in hunters to hunt Fortymile caribou for a large portion of the fall season.

Ladue River CUA. The Ladue River CUA encompasses about 1,375 mi^2 and was formed in 1994 to afford greater protection to the low density (<0.5 moose/mi^2) moose population. Motorized access is limited to designated trails and airstrips during August 20–September 30. The area is achieving its purpose of protecting this moose in this area from overharvest.

The board reduced the size of the LRCUA to 1,115 mi^2 during their March 2010 meeting. The Upper Tanana–Fortymile and Eagle Fish and Game Advisory Committees continue to support retaining the LRCUA for continued protection of the low density moose population.

During 2006–2011, the moose density in the LRCUA area averaged 0.57 moose/mi^2. Average ratios were 51.6 bulls:100 cows and 18.2 calves:100 cows. If the LRCUA was eliminated, additional trail pioneering is likely to occur and could lead to increased harvest pressure on this low density moose population. If harvest increases, additional season and bag limit restrictions could become necessary to maintain bull:cow ratios above the management objective of 40 bulls:100 cows.

Currently, moose hunting seasons and bag limits are aligned throughout Unit 20E. If season and bag limit changes resulted from elimination of the LRCUA additional hunter confusion is likely to occur.

BLACK BEAR

STATUS: Black bears are present in all suitable habitats in Units 12 and 20E. Based on limited radiotelemetry data collected in Unit 12 and other units with comparable habitats, the estimated black bear density is 1 bear/4–7 mi^2 of black bear habitat. The estimated number of black bears in Units 12 and 20E combined is 2,000–2,500. The black bear population is productive and the reproductive interval is similar to other Interior Alaska black bear populations. Historically, black bear harvest has been low in both units. The primary users in Unit 12 are local residents (>70% of the harvest) and primary users in Unit 20E are Alaska residents (>50% of the harvest). Local residents take black bears primarily during the spring for meat.

MANAGEMENT/RESEARCH ACTIVITIES: Harvest data are obtained through sealing of bears killed in defense of life or property and some hunter-harvested bears. The impact of hunting black bears over bait is monitored through mandatory registration of all bait stations in combination with harvest tickets and harvest reports..

ISSUES: There are no biological or social issues at this time. Units 12 and 20E black bear populations exist at densities considered natural for Interior Alaska black bear populations and harvest and habitat are not limiting.

GRIZZLY BEARS

STATUS: Grizzly bear populations are estimated to be stable at 350–425 (46.6–56.7 bears of all ages/1,000 mi^2) in Unit 20E and 320–394 bears (29.9–36.9 bears of all ages/ 1,000 mi^2) in Unit 12. These estimates are based on the Department's DNA-based mark–recapture surveys and extrapolations from point estimate surveys the Department conducted in Unit 20E and other units with similar type habitats, radiotelemetry data, and harvest statistics. Hunting regulations have been liberal since 1981 to allow hunters to take more grizzly bears in an attempt to reduce grizzly bear predation on moose calves. Strategies used to increase grizzly bear harvest and grizzlies killed in predation control programs include: 1) a public awareness campaign; 2) increased bag limit to 1 bear per regulatory year (1 July through 30 June) in Unit 12 and 2 bears per regulatory year in Unit 20E since regulatory year 2004–2005 (RY04; e.g., RY04 = 1 Jul 2004 through 30 Jun 2005); 3) lengthened seasons; 4) waived resident tag fee in Unit 20E during RY84–RY90 and RY02–RY09 outside the Yukon–Charley Preserve and waived tag the resident fee in all of Region 3 (including Unit 12 and 20E) in RY10 and 5) a grizzly bear predation control program in southern Unit 20E during RY05–RY08 that included baiting as a method for bear control permittees and allowing sale of untanned hides with claws attached and skulls as an incentive for the public to participate in the predation control program. In Unit 12, harvest declined in 1989 and remained stable (avg.=17 bears annually during RY89–RY10). In Unit 20E, grizzly bear take remained low (avg.=15 bears annually) during RY81–RY10 despite liberal harvest regulations and predator control efforts, and the population has not been reduced to levels adequate to increase moose calf survival. Grizzly bear harvest by hunters combined with predation control kills in Units 12 and 20E has been below maximum sustainable levels. Grizzly bears are a significant cause of moose calf mortality in Unit 12 and are an important factor limiting the Unit 20E moose population.

MANAGEMENT ACTIVITIES: Management activities include implementing the Unit 20E grizzly bear predation control program during RY04–RY08, monitoring grizzly bears killed, and evaluating data to track changes in bear numbers. A total of 14 bears were harvested and sealed in the Alaska Department of Fish and Game (ADF&G) office in Tok under this control program during the 5 years it was active. In 2006, ADF&G research staff conducted a grizzly bear population survey in a 2,005-mi^2 area in southern Unit 20E. In February 2009, we analyzed grizzly bear and moose population data in Unit 20E to evaluate the effects of bear densities on moose calf survival. No statistical relationship was found at current bear densities. The grizzly bear portion of the predation control program was suspended on July 1, 2009 because it was ineffective at reducing bear numbers.

ISSUES: The Board of Game designated the Fortymile caribou herd and the moose populations in Units 12 and 20E as important for high levels of human consumptive use under the Intensive Management Law (AS 16.05.255(e)–(g). This designation means that the board must consider intensive management if regulatory action to significantly reduce harvest becomes necessary because the population is depleted or has reduced productivity. Past research has shown that grizzly bear predation is the primary cause of moose calf mortality in Unit 20E and would have to be reduced before the moose population could meet its population goals. Liberal grizzly bear harvest regulations since 1981 and the recent grizzly bear predation control program in Unit 20E have been ineffective at reducing the grizzly bear population enough to allow for increased moose calf survival.

CARIBOU

FORTYMILE CARIBOU HERD

STATUS: Historically, the Fortymile herd was one of the largest herds in Alaska. For over 70 years, it ranged between the White Mountains north of Fairbanks to central Yukon, Canada. Like most other herds in Alaska, it underwent changes in abundance and distribution throughout this period but maintained its use of Yukon, Canada and habitats near the Steese Highway. The Fortymile herd underwent a major decline in size during 1963–1973 to about 6,000 caribou. Following the decline the herd used less than 25% of its traditional range, stopped migrating across the Steese Highway, and rarely traveled into Yukon. Primarily due to favorable weather conditions, the Fortymile herd increased during the late 1970s and 1980s, but much slower than adjacent herds despite similar weather patterns. Range use did not increase during this period. Between 1990 and 1995, herd growth stabilized due to adverse weather conditions and predation, primarily by wolves. The herd increased 119% between 1995 and 2003, primarily due to favorable environmental conditions, wolf trapping, and nonlethal wolf predation control. During 2000–2009, the herd increased the size of its range, using historic range west of the Steese Highway during the fall and historic range in Yukon, Canada during fall and winter. During 2004 and 2005, the herd declined slightly, likely due to increased wolf predation and adverse weather conditions during both years. In 2006, good calf survival to autumn (34 calves:100 cows in October) and mild winter conditions allowed the herd to increase. Following a June 2007 photocensus, the herd was estimated at approximately 38,400 caribou.

Good calf survival to fall (37 and 33 calves:100 cows in October 2007 and 2008) and mild conditions in winter 2007–2008 allowed the herd to continue to grow. Following a July 2009 photocensus, the herd was estimated at approximately 46,500 caribou. Composition data from 2009–2011 indicate the herd likely experienced similar calf survival to fall as observed in 2006–2008. Following the July 2010 photocensus, the herd was estimated at 51,675 caribou.

MANAGEMENT/RESEARCH ACTIVITIES: During 1996–2000, the herd was managed under the Fortymile Caribou Herd Management Plan that was developed through a public planning process. This management plan included reduced harvest, nonlethal wolf control conducted by ADF&G and public wolf trapping. During 2001–2006, harvest was guided by the Harvest Management Plan developed by a coalition of 5 Fish and Game Advisory Committees (Central, Delta Junction, Eagle, Fairbanks and Upper Tanana–Fortymile) and endorsed by the board in spring 2000. The primary goal of this plan was to manage for herd growth and secondarily to provide for increased harvest.

During 2005–2006, these advisory committees developed a revised Harvest Management Plan that the board endorsed in March 2006 to guide harvest from fall 2006 through spring 2013. In spring 2006, the Board of Game added the Fortymile Caribou Herd to the Upper Yukon–Tanana Predator Control Program. In spring of 2009, the Board of Game reauthorized this predation control program for another 5 years.

ISSUES: Since 1995, Fortymile caribou management has been successful because agencies and the public have worked together to develop and implement management and harvests plans to encourage herd growth. Herd growth, predator control and caribou harvest will all be important issues for years to come.

CHISANA CARIBOU HERD

STATUS: The Chisana herd is a small, mostly nonmigratory caribou herd. Its primary range encompasses the Nutzotin and northern Wrangell Mountains between the Nabesna River in Alaska and the Generc River in Yukon, Canada. During the 1980s, the Chisana herd grew from an estimated 1,000 to about 1,900 caribou in 1988. The herd was estimated to have declined from 1,800 in 1989 to 315 by 2002. However in fall 2003, the U.S. Geological Survey (USGS) completed a more intensive census than had been done previously, which resulted in 603 caribou observed and a population estimate of 720 caribou. In addition, the adult bull:cow ratio was estimated to be 37:100 in 2003 versus 25:100 in 2002, indicating that previous surveys may have underestimated these population parameters. The USGS census in 2005 yielded a population estimate of 656–733. In the 2007 USGS census, 719 caribou were observed, with 13 calves:100 cows and 50 bulls:100 cows. A census was not attempted in 2008 and 2009; however, 21 calves:100 cows and 35 bulls:100 cows were observed in the fall 2008 composition survey. The fall 2010 census indicated the population remained stable at an estimated 651–743 caribou based on 622 observed caribou. During 2009–2011 The herd composition has averaged 18 calves:100 cows and 44 bulls:100 cows.

Habitat and harvest do not appear to be limiting herd growth. Based on percent lichen in the diet of these caribou, winter range conditions are adequate in most of the herd's range. Pregnancy rates (>80% per year) and median calving date indicate nutritional status is adequate. During 1950–1993, harvest was limited to bulls, and the annual harvest rate (<2.5%) did not limit the herd's ability to increase. In 1994 harvest of Chisana caribou in Alaska was stopped. Herd management is currently being reviewed by an international working group comprised of members from Government of Yukon, ADF&G, White River First Nation, Kluane First Nation, U. S. National Parks Service (NPS), and the U. S. Fish and Wildlife Service. The working group developed a cooperative management plan which will be complete in 2012.

MANAGEMENT ACTIVITIES: Between 2003 and 2008, the USGS lead cooperative research with the NPS, ADF&G, and Yukon Department of Renewable Resources to evaluate various population parameters to determine why this herd declined by more than 60% since the late 1980s. In 2003–2006, 20–50 adult caribou cows were captured in Yukon by the Yukon Department of Renewable Resources and placed in a pen during late winter through early June to provide protection from predators during and immediately following calving. ADF&G maintained a cooperative technical role in these efforts. ADF&G, in cooperation with the NPS and Yukon Department of Environment, conducted fall composition surveys in 2008, 2009 and 2011 and completed a successful census in 2010. This data has been incorporated in the pending 2012 Chisana Herd management plan. The management plan recommends that the herd could support a 2% bulls only harvest split between Yukon and Canada, as long as the herd maintains ≥15 calves:100 cows and ≥35 bulls:100 cows.

In 2010 the Board of Game passed a proposal to open a joint state/federal bulls only drawing hunt for Chisana caribou following the recommendations of the draft management plan. However, the entire hunt area occurs on federal lands and the Federal Subsistence Board has not yet reached a decision whether to allow a hunt for federal qualified subsistence users only, or to allow a joint state/federal hunt to be opened.

ISSUES: The most critical issue to Chisana caribou herd management is to maintain the ability to monitor the herd as the number of radio collared cows declines. Methods must be developed to maintain accurate counts. The herd management plan recommends the herd can support a limited bulls only harvest. This small caribou herd will need yearly monitoring if state or federal harvest resumes.

FURBEARERS

STATUS: Marten and lynx are the most economically important furbearers in Units 12 and 20E. During population highs, muskrats are also economically and socially important in Unit 12. Little intentional trapping effort is expended on coyote, red fox, mink, otter, beaver, ermine, or wolverine (except in a portion of southern Unit 12) because of low pelt prices or low abundance. Furbearer populations are primarily monitored using trapper questionnaire reports. The snowshoe hare and lynx populations appear to be past a high in their population cycles. During early winter 2009, hares were reported to be declining or absent in many parts of Units 12 and 20E; lynx harvest has declined from 812 in RY08 to 319 in RY10. Marten numbers increased between 2002 and 2005, but declined during 2006–2008 in most of Units 12 and 20E. However, marten appear to be plentiful in portions of the areas burned in Unit 20E during 2004 and 2005. Wolverine numbers appear to be increasing, possibly in response to large numbers of caribou wintering in Units 12 and 20E.

MANAGEMENT ACTIVITIES: Wolverine, lynx, and otter harvest are monitored through mandatory sealing and harvest reporting. A trapper questionnaire is sent to area trappers each year to assess their impression of population trends. This information, along with trapper interviews, field observations and sealing records is used to develop management direction for furbearers in Units 12 and 20E.

ISSUES: No biological concerns currently exist for furbearer populations in Units 12 and 20E.

MOOSE

UNIT 12

STATUS: The moose population in Unit 12 increased slowly from 1982 to 1989, remained relatively stable during 1989–1993, and due primarily to increased calf survival, grew slightly during 1994–1997. The most substantial increase was in northwestern Unit 12 within the area affected by the 1990 Tok wildfire (155 mi^2). This area supported 0.19 moose/mi^2 in 1989, 0.6 moose/mi^2 in 1994, and 0.8–1.0 moose/mi^2 during 1997–2008.

Moose densities currently range from 0.03 moose/mi^2 in the Northway Flats to >2.0 moose/mi^2 along the north side of the Nutzotin Mountains. Between 1997 and 2000, calf and yearling bull recruitment declined and the population remained stable or declined slightly. Based on fall moose surveys in 2003, the Unit 12 population was estimated at 2,900–5,100 moose (0.6–0.7 moose/mi^2 of suitable moose habitat). From 2003 to 2006, we conducted surveys only in northwestern Unit 12 and unitwide estimates were not developed. Surveys in northwestern Unit 12 were conducted in 2004–2006 to monitor the moose population within the Tok River drainage due to concerns about declining bull:cow ratios, and to monitor moose populations north of the Alaska highway within the Upper Yukon–Tanana Predation Control Area. No surveys were conducted in 2007 due to poor snow conditions and budget constraints. The most recent Unit 12 population estimate of 4,300–5,600 moose (0.6–0.7 moose/mi^2 of suitable moose habitat) was developed from fall 2008 surveys.

In November 2011 a 1,602 mi^2 portion on Units 11 and 12 accessible from the Nabesna Road and adjacent trail system, mostly within the Wrangell St Elias Park and Preserve, was surveyed in cooperation with the National Park Service. The population in this area was estimated at 1,009–1,536 moose with a density of 0.8 moose/mi^2.

Past research indicated that predation was the primary factor maintaining the Unit 12 moose population at low density. However, land ownership patterns preclude the use of predator control in most of the unit. Moose numbers are expected to remain stable at low densities (0.3–1.0 moose/mi^2) in most of the unit.

Hunter participation and moose harvest in Unit 12 remained stable during 2002–2010, with an average of 566 hunters (range = 506–616) harvesting an average of 131 (range = 107–159) moose annually.

Most of Unit 12 is difficult to access and harvest has little effect on the bull population. The unitwide bull:cow ratio exceeds the population objective of 40 bulls:100 cows. Most moose are harvested along the Tok, Little Tok and Tanana Rivers in western Unit 12 where access is easiest. In these areas, bull:cow ratios have declined to 20–40 bulls:100 cows. In response, regulations that limit hunters to bulls with spike, fork, or 50-inch antlers, or antlers with 4 brow tines on at least 1 side were enacted in the Little Tok River drainage in 1993 and a portion of the main stem of the Tok River drainage in 2006.

Bull:cow ratios have improved in these areas and hunters support these restrictions. There is little local interest in antler restrictions as a form of harvest management in other areas of Unit 12.

MANAGEMENT ACTIVITIES: In 2005 and 2006, we conducted moose surveys in northwestern Unit 12, primarily to monitor bull:cow ratios within the Upper Tok River drainage and the population status north of the Alaska Highway, within the portion of Unit 12 included in the Upper Yukon–Tanana Predation Control Area. In cooperation with Tetlin National Wildlife Refuge, we conducted a Geospatial Population Estimation survey in 2008 to estimate population size, and sex and age composition of moose in more than 90% of the moose habitat in Unit 12. This information was extrapolated to develop a unitwide population estimate.

Signs are posted along area roads and primary trails to inform hunters about hunting regulations and boundaries. Greater enforcement effort occurs in the Little Tok River area to ensure hunters comply with antler restrictions.

Use and availability of browse is periodically monitored within important wintering areas along the Tok and Tanana Rivers. Habitat enhancement has been conducted in Unit 12 since 1982. Since 1982, over 1,800 acres of decadent willows have been intentionally disturbed to stimulate crown sprouting of new leaders. This has produced more than 2 million pounds of additional browse each year for wintering moose. In 2003, a 40,000-acre wildfire burned in the Black Hills on the Tetlin Refuge National Wildlife Refuge. In 1998, we mechanically crushed 275 acres of decadent willow and aspen within the Tok River Valley. We cooperated with Department of Natural Resources, Division of Forestry to implement a 1,000 acre timber sale in 2008 in the Tok River Valley to enhance moose habitat. Cut areas were planned based on number of marketable trees, historic winter use by moose, and potential to regenerate quality moose browse species. In addition, we are assisting in designing and implementing site-specific scarification techniques that will promote willow and aspen regeneration following logging. Cut areas will be 80–200 acres in size. Wildfire burned an additional 17,000 acres of mature spruce forest within the Tanana river valley in 2010.

In January 2005 the Upper Yukon–Tanana Predation Control Program was implemented in an effort to reduce mortality in the southern Unit 20E moose population by providing conditions to allow the Unit 20E moose population to increase to meet Intensive Management objectives. A small portion of northwestern Unit 12 was included in the wolf portion of the predation control program in 2004–2006. In May 2006, the board modified the Upper Yukon–Tanana Predation Control Program to include all of Unit 12 north of the Alaska Highway in the wolf predation control program. The grizzly bear predation control portion of the program was suspended in July 2009 because it was ineffective at reducing grizzly bear predation on moose calves. The wolf predation control program is still in place.

ISSUES: The primary management challenge for Unit 12 moose is managing this predator-limited, low density moose population that is subject to high harvest near roads and rivers, within sustainable levels.

The Board of Game has identified the moose population within Unit 12 as important for high levels of human consumptive use under the Intensive Management Law (AS 16.05.255(e)–(g)). This designation means that the board must consider intensive management if regulatory action to significantly reduce harvest becomes necessary because the population is depleted or has reduced productivity. The Unit 12 moose population (4,300–5,600 moose) is likely at the lower end of the board's population objective of 4,000–6,000 moose. Population densities remain low near villages and roads, while remote portions of Unit 12 have good moose densities relative to available habitat.

Research we conducted in Unit 12 in the mid 1980s identified wolves as the primary predator on moose. Wolf control in most of the unit is not an option because of land ownership. Prescribed burns are the best option for intensively managing for moose in areas where predation control is not possible, but in northwestern Unit 12 the moose population can be intensively managed with a combination of predation control and habitat enhancement.

Taking moose for funerary or mortuary potlatches is difficult to quantify. Most potlatch harvest occurs near villages roads. Harvest reporting has improved in recent years, but is not always consistent. Therefore it remains difficult to determine the effects of this harvest. We are currently working with local villages to improve reporting.

UNIT 20E

STATUS: Between 1981 and 1988, the moose population in Unit 20E increased 5–9% annually, reaching a density of 0.3–0.5 moose/mi^2. Between 1988 and 2000, the population stabilized at an estimated 0.5–0.6 moose/mi^2. Between 2001 and 2004, the moose population experienced the lowest calf and yearling recruitment in 25–30 years. In 2004, the estimated density of moose in Unit 20E was 0.4–0.5 moose/mi^2. Our analysis of 2004–2008 fall moose survey data from the 4,630-mi^2 moose survey area in southern Unit 20E indicates this moose population increased. The fall 2008 density estimate in southern Unit 20E was 0.6–0.8 moose/mi^2.

ADF&G research has shown that predation by wolves and grizzly bears is the primary factor maintaining the Unit 20E moose population at low densities (0.2–1.0 moose/mi^2) and that hunting and habitat quality are minor limiting factors. Moose densities vary, ranging from approximately 1.0 moose/mi^2 in southcentral and southwestern Unit 20E, associated with several large 30-year-old burns (500,000 acres), to 0.2 moose/mi^2 in northern Unit 20E along the Yukon River. During 2005–2008, fall bull:cow ratios were above management objectives (≥40 bulls:100 cows).

Hunter participation and harvest increased in Unit 20E between 1993 and 2002 and reached a peak of 944 hunters who harvested 170 moose in 2002. Beginning in 2003, hunter numbers and harvest declined through 2006 when 695 hunters harvested 130 moose. Hunters and harvest increased in 2007, when 749 hunters harvested 144 moose, and in 2008 when 770 hunters harvested 179 moose. This increase in hunters and moose harvest continued in 2009, with 787 hunters harvesting 172 moose. However, in 2010, 661 hunters harvested 166 moose. In 2011 the number of hunters and harvest reached a new high in Unit 20E with 823 hunters harvesting 184 moose.

MANAGEMENT ACTIVITIES: We monitor population trends and composition annually. Survey areas are primarily in southern Unit 20E, but occasionally the National Park Service (NPS) conducts surveys in the Yukon–Charley Rivers National Preserve in northern Unit 20E. ADF&G samples browse availability and use every 2–3 years in important wintering areas and prescribed burn sites.

Since 2001, moose hunting in most of Unit 20E has been under a registration permit that requires the hunter to select either moose or caribou. The moose hunting season in most of Unit 20E is separated into a 5-day hunt in August and a 10-day hunt in September.

During 2004 and 2005, over a million acres of moose habitat burned in Unit 20E. This burn varied widely in severity and left significant unburned inclusions. It will provide exceptional improvements in moose habitat for many years.

In 2004, the Upper Yukon–Tanana Predation Control Program was implemented in an effort to reduce moose mortality from predation in southern Unit 20E and thereby stimulate an increase toward meeting Intensive Management population objectives. In May 2006, the Board of Game expanded the control program to include all of Unit 20E, although the NPS does not allow predation control within the Yukon–Charley Rivers National Preserve. The grizzly bear portion of the control program was suspended in July 2009 because it was ineffective at reducing grizzly bear numbers and predation on moose. The wolf control portion of the program is still in place.

ISSUES: The greatest challenge in Unit 20E is to manage for an increase in moose numbers in this predator-limited population that is also subject to high harvest along roads and rivers.

Currently, much of Unit 20E is inaccessible because there are few trails or suitable aircraft landing sites. However, hunters using all-terrain and off-highway-vehicles are increasingly pioneering new trails from the Taylor Highway. We expect this proliferation of trails to new areas to increase as moose numbers increase. This increased hunter access is likely to cause the bull component of the population to decline below 40 bulls:100 cows in portions of the unit; however, we expect the unitwide bull:cow ratio to remain above the minimum management objective of 40 bulls:100 cows. The split hunting season and the requirement that hunters choose either to hunt moose or caribou appears to have stabilized harvest in most areas but this may not be sufficient as hunter numbers and off-road vehicle use increases in key areas.

The Board of Game has identified the moose population within Unit 20E as important for high levels of human consumptive use under the Intensive Management Law (AS 16.05.255(e)–(g)). This designation means that the board must consider intensive management if regulatory action to significantly reduce harvest becomes necessary because the population is depleted or has reduced productivity. The Upper Yukon–Tanana Predation Control Program in Unit 20E began in January 2005 and was reauthorized for 5 years in March of 2009. Moose population data is currently being collected and will be evaluated prior to the March 2012 Board of Game meeting.

DALL SHEEP

STATUS: There are three distinct sheep areas in Units 12 and 20E: 1) northern Wrangell, Mentasta, and Nutzotin Mountains; 2) Tok Management Area (TMA); and 3) Tanana Hills.

The sheep population in Wrangell, Mentasta, and Nutzotin Mountains traditionally exists at relatively high densities in typically rugged, glaciated habitats. This area produces rams with horns below average size, compared with other sheep populations in Alaska. The consumptive use management goal in this area is to provide the greatest opportunity to participate in sheep hunting. This population grew throughout the 1980s, declined during the early 1990s, and appeared to be stable or growing slowly during 1994–1998. Unfavorable winter weather occurred in 1999 and 2000, and lamb recruitment was low. The number of legal rams increased during 2001–2005 due to favorable weather conditions in the mid 1990s, but declined in 2006–2008. This area receives some of the highest harvest in the state; 131–152 rams per year during 2002–2006. Between 2007 and 2010, harvest has been lower with and average of 104 sheep taken each year.

Sheep in the TMA exist at low to moderate densities but produce large-horned rams. This population grew during the 1980s until 1992. The population declined during 1992 and 1993 due to adverse weather. Weather conditions were mild to average from 1994 to 1998, and based on lamb and yearling survival data, the population increased slowly. Winters 1999–2000 and 2000–2001 had greater than average snow depths and lamb survival was low. During 2001–2004, mild winters and moderate snow depth allowed good lamb production and recruitment. The number of legal rams increased between 2001 and 2004 due to favorable weather conditions in the mid 1990s and good survival of rams to 7–8 years of age. During winter 2004–2005, portions of the TMA experienced deep snow with layers of ice from early winter rains, resulting in die-offs in the eastern portions. Mild weather during winters 2005–2006 to 2007–2008 allowed good lamb recruitment. However, severe winter conditions in 2008–2009 may have caused further declines in some areas.

The TMA is designated for trophy sheep management. The primary consumptive use goal is to provide the opportunity to pursue large-horned trophy rams under uncrowded hunting conditions. This goal is attained through a limited number of drawing permits. Maintaining low hunter density has increased the number of large trophy rams and created high quality hunting experiences. All harvest objectives were met in the TMA during 2003–2007. During 2008-2010, the percentage of harvested rams with horns 40-inch or greater fell below the management objective of 7–10% of harvested rams with 40-inch or greater horns. Due to concerns about numbers of trophy quality rams in the TMA, a proposal to reduce the number of permits from 100 to 80 was supported by the board in 2010. In 2010 and 2011 the percent of rams with horns 40 inches or greater increased to 11% and 21% respectively. Harvest increased and exceeded the harvest objective, of 30–45 rams annually, 3 times in the mid to late 1990s, but has remained within the harvest objectives since the number of permits was first reduced to 100 in 2002. The TMA permit is the most sought-after sheep permit in the state, with over 5,000 applicants applying for DS102 (first half of the season) and DS103 (second half of the season) permits in 2011.

The Tanana Hills sheep population occurs at low density and is disjunct due to the physical geography of the Tanana Hills, which is atypical sheep habitat. The Tanana Hills were not glaciated during the most recent glacial advance and underwent little uplift. Overall elevations are low, and the range has a rolling rather than rugged physiography. The sheep population has remained at low densities, but maintains enough legal rams to provide adequate opportunity for hunters who access the area from a few small aircraft landing strips. The management objective is for uncrowded hunting conditions. Most of this area is very difficult to access, and due to sheep distribution, is very difficult to hunt. The portion of the area accessible from the Taylor Highway was designated the Glacier Mountain Controlled Use Area, and the most accessible fly-in area (Mount Harper) is managed by drawing permit. Annual harvest has ranged from 3 to 10 full-curl rams annually during the 2002–2008 seasons, and the management objective is being met.

MANAGEMENT ACTIVITIES: Status of the sheep population and quality of hunting experience in Units 12 and 20E are evaluated by analyses of harvest reports, periodic aerial and mineral lick surveys and interviews with area guides and hunters. During 2008 through 2011,we conducted aerial surveys in portions of the TMA during 2008–2011. We also conducted surveys in portions of the Mentasta and Nutzotin Mountains in 2009, and in central and eastern Unit 12 in 2011. During 2004–2011, the Tok ADF&G office sealed 36–66 rams annually.

ISSUES: There are currently no biological issues with the sheep populations in Units 12 and 20E.

SMALL GAME

STATUS: The status of the small game populations in Units 12 and 20E are not rigorously monitored. Most information is collected from incidental sightings made during surveys for other animals and from discussions with hunters, trappers, hikers, and other outdoors enthusiasts. Overall, it appears that the 3 grouse species (spruce, ruffed and sharp-tailed) and ptarmigan increased during 2003–2006, but declined during 2007–2009. Hares increased between 2003 and 2008, but declined during 2009–2011.

MANAGEMENT ACTIVITIES: We continue to survey area hunters, trappers, hikers and other outdoors enthusiasts concerning numbers and locations of grouse, ptarmigan and hares.

ISSUES: No biological concerns currently exist for small game populations in Units 12 and 20E.

WOLVES

STATUS: The wolf population in Unit 20E numbered at least 227–238 wolves in 1996. The population remained relatively stable between fall 1997 and fall 1998, but declined slightly by fall 1999 due to a combination of nonlethal wolf control and public trapping. The wolf population increased slightly during 2000, except in western and central Unit 20E where effects of nonlethal wolf control continued. By 2004, most of the effects of the nonlethal control program had subsided as the sterilized pairs died and their territories were overtaken by unsterilized wolves. Recovery of sterilized packs, increased numbers of Fortymile caribou throughout most of Unit 20E, and increased numbers of wintering Nelchina caribou in southern Unit 20E resulted in an overall increase in the number of wolves in Unit 20E during 2001–2004. The Unit 20E wolf population was estimated to be 250–310 wolves in August 2004.

Using data inputs from information gathered during predator control activities and wolf surveys conducted in March 2010, models indicate the fall 2011 wolf population estimate in Unit 20E is 179–195 wolves. The Unit 20E population estimate is below 2004 levels, primarily due to ongoing lethal wolf control and an increase in efforts by several trappers in southcentral Unit 20E during 2005–2010.

Historically, the Unit 20E wolf population has been lightly harvested. The fur market primarily affects wolf trapping intensity. Most wolf harvest in northwestern Unit 12 and southern Unit 20E is associated with the predator control program and efforts of 3–4 area trappers, while traditional trapping efforts are the primary source of human harvest in the remainder of these units. Demand for wolf pelts has been moderate to low during the past few years, resulting in light trapper efforts for wolves. Most wolves trapped in these units were taken incidental to other furbearer species and harvest by trappers remains moderate to low.

Unit 12 wolf numbers increased by an estimated 27% between 1988 and 1992 in response to increased food base as the Nelchina caribou herd wintered within the unit. Autumn pack size and number of packs increased, indicating improved recruitment and possibly adult survival. The population appeared to decline in 1993 following an estimated 36% harvest rate and remained stable until 1995 due to moderate harvest rates. Area trappers selected for wolves during this period because wolf pelt prices were high. Fur prices declined during 1995–2008 and wolf trapping declined. During this period, wolf numbers increased by an estimated 33% to 245–260 wolves in fall 2002. No further estimate has been developed, but with light harvest and a similar food base as in 2002, the current population is likely similar to 2002 levels except within the portion of northern Unit 12 included in the Upper Yukon–Tanana Predation Control Program.

The wolf population estimate is currently 250–350 wolves within the 18,750-mi^2 Upper Yukon–Tanana Predation Control Program control area in Unit 20E and northern Unit 12. This estimate will be further refined prior to the March 2012 Board of Game meeting.

MANAGEMENT/RESEARCH ACTIVITIES: Population trends are monitored by aerial surveys and hunter and trapper reports in both Units 12 and 20E, and by predator control permittees in the Upper Yukon–Tanana Predation Control Program. Harvest is monitored from mandatory sealing and harvest reporting in both units and by closely monitoring wolves killed in the predator control program. In addition, ADF&G personnel conducted aerial wolf control from helicopters in March 2009, resulting in 84 wolves killed within the Upper Yukon–Tanana Wolf Predation Control Area, 38 of which were killed in Units 12 and 20E. In March 2010 ADF&G personnel killed an additional 15 wolves in the control area, of which 10 were in Unit 20E.

ISSUES: Lethal wolf control within the Upper Yukon–Tanana Predation Control Area in Unit 20E and a portion of Unit 12 continues to be monitored and evaluated by Tok ADF&G staff. A report on the status of the wolf control program will be provided to the board at this meeting.

FORTYMILE CARIBOU HERD HARVEST PLAN 2012–2018

Photo by Robert Gingue

This plan was developed by the Harvest Management Coalition consisting of members of the Anchorage, Central, Delta, Eagle, Fairbanks, Matanuska Valley, and Upper Tanana/Fortymile advisory committees, and the Eastern Interior Regional Subsistence Advisory Council in cooperation with Yukon Fish and Wildlife Management Board, Yukon Department of Environment, Yukon First Nations, Bureau of Land Management and the Alaska Department of Fish and Game.

This document should be cited as:

HARVEST MANAGEMENT COALITION. 2012. Fortymile caribou herd harvest plan 2012–2018. Alaska Department of Fish and Game, Fairbanks, Alaska.

FORTYMILE CARIBOU HERD
HARVEST PLAN
2012–2018

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ALASKA DEPARTMENT OF FISH AND GAME

DIVISION OF WILDLIFE CONSERVATION

2012

CONTENTS

FIGURES

TABLE

APPENDICES

INTRODUCTION

This *Fortymile Caribou Herd Harvest Plan 2012–2018* ("2012 Harvest Plan") covers regulatory years[1] (RY) 2012–2018. It was developed as a guide for managing harvest of the Fortymile caribou herd (FCH) in Alaska and for allocation of an annual allowable harvest between Alaska and Yukon. To help guide future decisions regarding harvest of the FCH, the plan includes herd history and historic harvest data. Furthermore, it retains many of the provisions of the first two FCH harvest plans that guided harvest of the herd from RY01 to RY11. For Alaska it recommends actions and regulations to guide overall herd harvest levels and harvest management options such as permits, seasons, bag limits, methods and means. The Yukon Fish and Wildlife Management Board, Tr'ondëk Hwëch'in and Yukon Department of Environment have interests in managing the FCH harvest allocation in the Yukon, but that will be dealt with separately. Therefore, unless otherwise stated, this document outlines FCH harvest management in Alaska.

The following are changes in the 2012 Harvest Plan:

- The boundary of Zone 1 is moved farther northwest so that the Steese Highway is no longer a zone boundary.
- A new Zone 4 is added to accommodate the expansion of the FCH into the White Mountains.
- Joint state-federal registration permits are used to hunt both the White Mountains caribou herd and the Fortymile caribou herd; however each herd will be managed separately until radiotracking data show that the two herds are not separate.
- State opening dates for the fall hunts in Zones 1 and 3 are moved to 29 August.
- Bulls-only hunts in the fall are recommended as a means to promote herd growth, and manage harvest.
- The harvest rate will change to 4% when the FCH reaches 70,000 animals.
- Appendix A is added as a recommendation to Alaska Department of Natural Resources regarding land disposal in Zone 3.

The 2012 Harvest Plan was developed by a Harvest Management Coalition (HMC) made up of representatives from Eagle, Central, Fairbanks, Delta, Upper Tanana/Fortymile, Matanuska Valley, and Anchorage state Fish and Game advisory committees; the federal Eastern Interior

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[1] The state regulatory year (RY) begins 1 July and ends 30 June of the following year. For example, RY12 = 1 July 2012–30 June 2013.

Regional Advisory Council; the Yukon Fish and Wildlife Management Board; the Yukon Government; and Tr'ondëk Hwëch'in (First Nation) (Appendix B). The U.S. Bureau of Land Management (BLM) and the National Park Service manage some of the lands within the FCH range. BLM provided technical support, the National Park Service provided support, and the U.S. Fish and Wildlife Service, Office of Subsistence Management provided expertise on federal regulatory issues. The Alaska Department of Fish and Game (ADF&G), Division of Wildlife Conservation provided technical and monetary support in producing the plan.

Where management provisions specific to Alaska are cited in this plan, references to the HMC shall apply solely to the Alaska delegates of the coalition. Yukon delegates abstained from Alaska management decisions.

The HMC requests the Alaska Board of Game (BOG) to approve and the Federal Subsistence Board to endorse only the harvest formulas and, as appropriate, the state or federal regulations pertaining to seasons, methods and means, and hunt management conditions as identified in the 2012 Harvest Plan.

BACKGROUND

FORTYMILE CARIBOU HERD PLANNING

The first *Fortymile Caribou Herd Management Plan 1995* ("1995 Management Plan") was completed in October 1995 by the Fortymile Caribou Herd Planning Team. The 1995 Management Plan provided a guide to managing the FCH from 1995 through 2000. Its primary purpose was to help restore the FCH to its former range and abundance. It addressed many aspects of herd management, included an allocation between Alaska and Yukon, and included provisions to reduce caribou mortality by decreasing harvest and by implementing a nonlethal wolf management program in Alaska.

During RY96–RY00, harvest in Alaska was limited to a quota of 150 bulls per year under a joint state-federal registration permit hunt. That joint registration permit hunt, which began in RY96, was the result of an agreement to simplify state-federal dual management of the herd. All hunters, whether state or federally qualified, were to use the same permit. Federally qualified hunters were allowed to hunt only on federal lands if the federal season was open and the state season was closed.

In 1999, with the herd increasing in size, Fairbanks, Upper Tanana/Fortymile, Delta, Central, and Eagle Fish and Game advisory committees began a cooperative effort to develop a FCH harvest management plan to provide a framework for expanding opportunities to harvest the herd. The *Fortymile Caribou Herd Harvest Plan 2001–2006* ("2001 Harvest Plan") was the result of that effort. While the overall goal of restoring the herd to its former range continued, the plan provided for increasing the harvest quota from 150 bulls per year in Alaska to a herd-wide allowable harvest of 2–3% of the estimated population size. Population size and growth rate were to be estimated by periodic photocensuses and modeling of annual population trends conducted by ADF&G in partnership with BLM. The plan allowed for annual harvest allocation increases if the herd grew by 10% or more in the previous year. At the same meeting Alaskans and Canadians agreed that Alaska would get 65% of the harvest allocation and Canada would get

35%. In March 2000, the BOG endorsed the 2001 Harvest Plan and adopted new FCH hunting regulations. The Federal Subsistence Board endorsed the plan and adopted revised federal regulation proposals later that spring. In 2001 the nonlethal wolf management program ended, and harvest in Alaska was increased as recommended.

In July 2005, representatives of the Delta Junction, Eagle, Fairbanks and Upper Tanana/Fortymile advisory committees (Central advisory committee was unable to attend), the Eastern Interior Advisory Council, the Yukon Fish and Wildlife Management Board, Yukon Department of Environment, and the T'rondëk Hwëchîn all met to revise the 2001 Harvest Plan. That meeting resulted in the *Fortymile Caribou Herd Harvest Plan 2006–2012* ("2006 Harvest Plan"), which retained the same goal of the previous plans to restore the herd to its former range, but included a secondary goal of increasing harvest as the herd grew.

Beginning in November 2010 the group, now called the "Harvest Management Coalition," (HMC or coalition) reconvened to begin drafting a *Fortymile Caribou Herd Harvest Plan 2012–2018* ("2012 Harvest Plan"). Public meetings were held in Fairbanks and Tok in November 2010, February 2011, and November 2011.

Dedicated Canadian and Alaskan hunters, biologists, and concerned citizens have contributed, compromised, and sacrificed to allow the Fortymile caribou herd to grow while still allowing some harvest. Since 1995 when the first plan was put in place, the herd grew from approximately 20,000 caribou with an annual harvest of 150 bulls to over 50,000 with an annual harvest of 1,000 animals. By 2011, minimum state intensive management objectives were reached, and the herd continues to grow. The planning effort for the Fortymile caribou herd is a real success story.

Herd Population Size

Estimates of the size of the FCH in the 1920s were between 260,000 and 568,000 animals, and the herd's range encompassed approximately 101,000 square miles, extending from Whitehorse, Yukon, to the White Mountains north of Fairbanks, Alaska (Murie 1935). The 1920s estimate was not developed with rigorous census methods. It is more likely that the herd was around 250,000–300,000 during the 1920s based on estimates of recent Fortymile caribou densities and assuming the historic range of the herd indeed encompassed nearly 100,000 square miles (Fig. 1). Population estimates from around 1950 ranged from 46,000 to 60,000. By the 1970s the population declined to an estimated low of 5,000 animals.

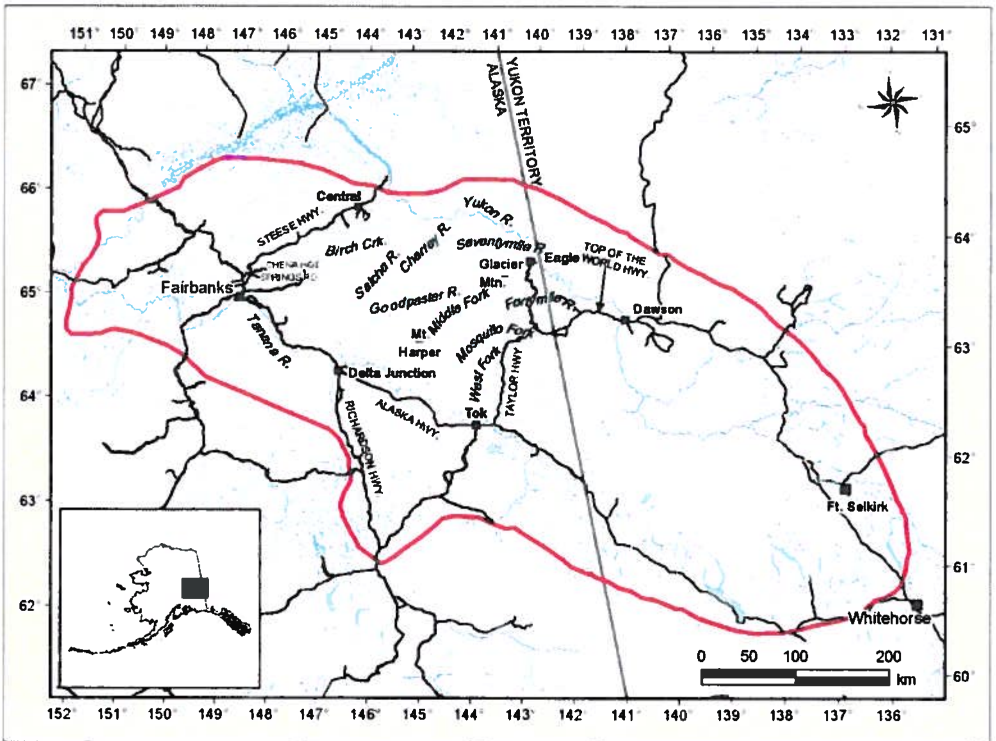

FIGURE 1. Historic range of the Fortymile caribou herd.

From the 1970s through the 1990s the herd occupied only a small portion of its previous range and seldom crossed into Yukon in significant numbers. Between 1974 and 1990 the herd grew slowly to about 23,000 caribou (Fig. 2). It remained at that level until 1995 mainly because of low calf survival. In 1995 the size of the FCH was estimated to be between 22,000 and 23,000 animals.

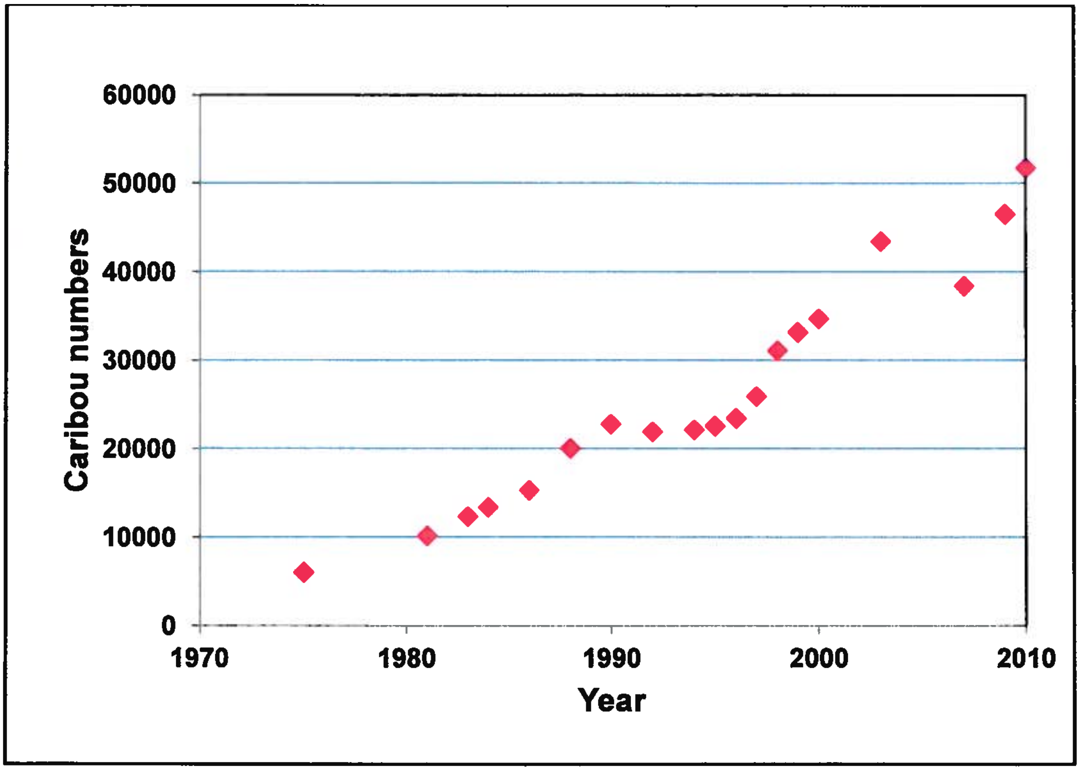

FIGURE 2. Fortymile caribou herd population estimates from census counts 1975–2010.

By 2003, the combination of an intensive private wolf trapping effort and nonlethal predator management in Alaska, together with favorable weather conditions and reduced hunting pressure enabled the population to increase to 43,375. Thereafter, continued private trapping efforts, favorable weather conditions, low hunting pressure, and (starting in 2005) same-day airborne lethal wolf removal conducted by members of the public who had been issued ADF&G permits and by ADF&G staff provided conditions for the herd to continue to increase at approximately 2–3% annually. Following a successful photocensus in summer 2010, the herd's minimum size was 51,675 caribou.

HARVEST HISTORY

The FCH provided much of the food for residents as well as an income from market hunting from the late 1800s to World War I in both Alaska and Yukon. Before the Taylor Highway was constructed in the mid-1950s most hunting was concentrated along the Steese Highway and along the Yukon River above Dawson. During the 1960s, hunting was concentrated along the Steese and Taylor highways in Alaska and the Top of the World Highway in Yukon. From the mid-1970s through the 1980s, FCH hunting regulations in Alaska were designed to benefit local hunters and to prevent harvest from limiting herd growth. Bag limits, harvest quotas, and season openings were used to meet these objectives. Hunting seasons were deliberately scheduled to avoid the period when road crossings were likely. Consequently, concentration of hunters and distribution of harvest shifted from highways to trail systems accessed from the Taylor and Steese highways, and to river systems and small airstrips scattered throughout the herd's range.

In 1980 the Alaska National Interest Lands Conservation Act (ANILCA) became law. ANILCA mandated that rural residents of Alaska would have a preference for harvest of fish, wildlife, and vegetation resources on federal lands in Alaska. Harvest regulations became increasingly complex in 1992 when the Secretaries of Interior and Agriculture assumed responsibility for management of the federal subsistence program and new federal regulations created a dual management system. During this period, many people became frustrated that the herd was not growing and that separate federal and state administration of multiple hunts was often in conflict and ineffective. A group of people that depended on the FCH asked agencies to lead a cohesive management plan to which all interests could agree. As a result a consensus based management planning effort was begun in 1994 (Gronquist et al. 2005). The planning process resulted in, among other actions, the use of a single joint state-federal registration permit with a mandatory hunt reporting requirement for all hunters. The permit allowed federally-qualified subsistence users to hunt on federal land when the federal season remained open but the state season was closed.

Under the 1995 Management Plan for RY96–RY00, the harvest quota was reduced to 150 bulls per year as a compromise to gain support for the nonlethal wolf management program implemented in Alaska during the same period. This reduced harvest was well below sustainable levels and was intended to be temporary while the nonlethal wolf management program was in place.

In both the 2001 and 2006 harvest plans, for RY01–RY11, the planning team recommended an increased harvest quota from 150 bulls per year to a harvest allocation of 2–3% of the herd size. While this was a considerable increase, the allocation was still considered to be conservative and allowed for continued herd growth. That allocation was shared with 65% going to Alaska and 35% to Yukon. During these years, the Yukon Department of Environment opened no seasons in Canada and T'rondëk Hwëchin chose not to hunt so that the Canadian harvest quota could be reallocated to herd growth.

The harvest quota for Alaska was further divided with 75% for the fall hunt and 25% for the winter. The fall and winter quotas were allocated among three hunt zones based on historical harvest and herd migration (Fig. 3). Zone 1 included the Steese Highway-Central area; Zone 2 included the Salcha-Goodpaster rivers roadless area; and Zone 3 included the Tok-Taylor Highway area. Until RY04, each zone had its own registration permit.

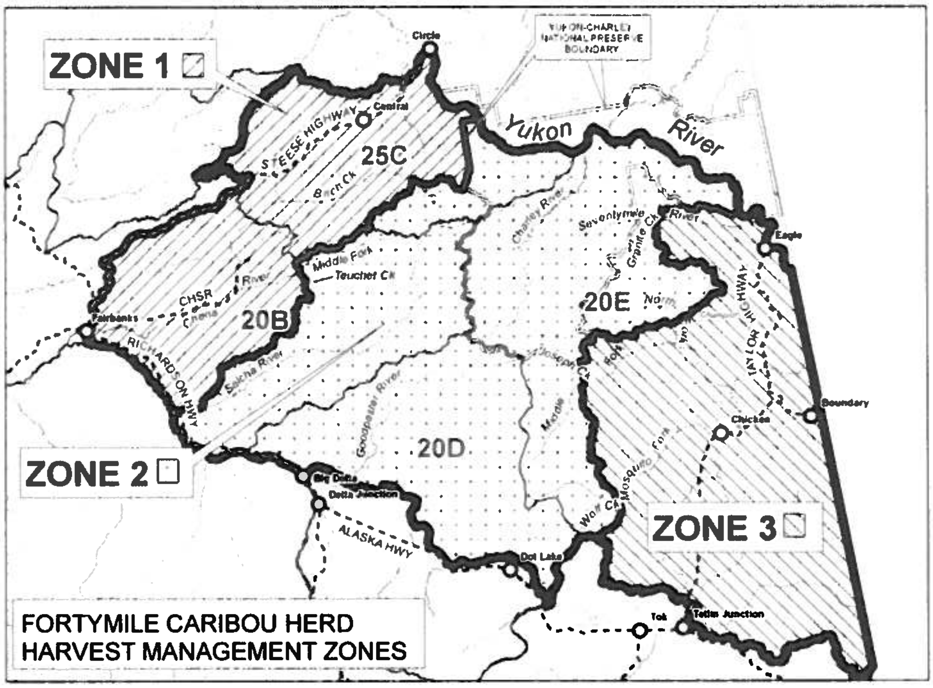

FIGURE 3. Alaska Fortymile caribou herd harvest management zones during regulatory years 2006–2012.

Beginning in RY04, one fall and one winter registration permit was used for all three zones. Harvest quotas for the three zones were retained for both the fall and winter hunts, and both were administered under the joint state-federal registration permit system. A zone could be closed by emergency order if its harvest quota was met. Changing to a single permit for the entire hunt area reduced confusion and eliminated the problem of multiple permits being issued to individual hunters who wanted to hunt Fortymile caribou in more than one zone. (See further discussion of zone quotas for fall and winter in section *Alaska Allocation Among Different Seasons and Harvest Management Zones.*)

Because of high hunting pressure and low moose numbers in Unit 20E, in RY02, state hunting regulations changed. The change allowed possession of either a FCH registration permit or a Unit 20E moose registration permit, but not both at the same time. The intent was to prevent excessive incidental harvest of moose by people hunting FCH.

During RY05–RY09, the FCH became increasingly available along road systems. This resulted in fall harvest quotas being reached or exceeded in 1–10 days during each of these years in portions of the hunt area (Table 1). The extremely short seasons caused some issues to surface. One was whether reasonable opportunity was being provided for subsistence users. Alaska statute 16.05.258(f) states:

> *"For purposes of this section, 'reasonable opportunity' means an opportunity, as determined by the appropriate board, that allows a subsistence user to participate*

in a subsistence hunt or fishery that provided a normally diligent participant with a reasonable expectation of success of taking of fish or game."

TABLE 1. Alaska harvest and quota allocation during regulatory years 2004–2010.

	Regulatory year[a]						
Zone and Hunt no.	2004 Quota/ Harvest (state hunt days)	2005 Quota/ Harvest (state hunt days)	2006 Quota/ Harvest (state hunt days)	2007 Quota/ Harvest (state hunt days)	2008 Quota/ Harvest (state hunt days)	2009 Quota/ Harvest (state hunt days)	2010 Quota/ Harvest (state hunt days)
Fall hunts:							
Zone 1 (Steese/Chena) RC860	230/99 (52)	230/39 (52)	190/42 (52)	190/43 (52)	190/204 (5)	190/276 (3)	190/93 (28)
Zone 2 (Roadless) RC860	90/123 (52)	90/151 (22)	160/135 (52)	160/148 (52)	160/199 (44)	160/163 (40)	160/137 (52)
Zone 3 (Taylor) RC860	320/308 (52)	320/382 (10)	290/305 (8)	290/409 (4)	290/315 (7)	290/601 (3)	290/226 (33)
Total fall quota/harvest	640/530	640/572	640/482	640/600	640/718	640/1040	640/456
Winter hunts:							
Zone 1 (Steese/Chena) RC867	200/178 (91)	151/4 (90)	224/221 (9)	148/274 (2)	85/139 (4)	3 (federal hunt only)	205/209 (74)
Zone 3 (Taylor) RC867	135/141 (3)	227/261 (90)	149/148 (14)	99/135 (1)	56/51 (1)	23 (federal hunt only)	135/56 (117)
Total winter quota/harvest	335/319	378/265	373/369	247/409	141/190	50/26	340/265
Annual quota	850	850	850	850	850	1033	755
Annual harvest	845	737	851	1009	908	1083	719

[a] The state regulatory year (RY) begins 1 July and ends 30 June, e.g., RY04 = 1 July 2004 through 30 June 2005.

Other issues were associated with the crowding of hunters along highways and the adjacent trail systems. There were increasing complaints about "flock-shooting," excessive wounding loss, safety issues, and concerns about the quality of the hunting experience.

Although the 2006 Harvest Plan was not due for revision until 2012, coalition members and managers agreed they needed to "regain control of the hunt" before 2012. In October 2009 Alaska members of the coalition met several times with ADF&G and federal managers to discuss interim solutions to hunt management problems, short seasons, and other hunt issues that had developed over the previous 5 years. Among the recommendations they agreed on for RY10 and RY11 were to delay the opening date of the state season in Zones 1 and 3 from 10 August to 29 August to give the herd a chance to disperse away from the road systems, and to change the fall bag limit to bulls-only for both state and federal seasons. A bulls-only bag limit would force hunters to more carefully identify an animal and its surroundings before shooting. The coalition recognized that accidental cow harvest would likely occur, but probably would have less impact than the wounding loss experienced with "flock shooting." As a result of these meetings, the coalition submitted Proposal 14 to the BOG at its Region III meeting in March 2010 to change the opening date to 29 August and the fall bag limit to bulls-only. The BOG supported ADF&G's use of discretionary authority to implement the interim hunt changes. Furthermore, to ensure consistency and coordination between the state and federal regulatory programs and to assuage concerns that federally qualified hunters[2] would take an excessive proportion of the fall quota during the federal season which opened on 10 August, before the state season opened on 29 August, the coalition supported WP10-105 submitted by the Eastern Interior Advisory Council to the Federal Subsistence Board. The Federal Subsistence Board approved the proposal in 2010. The regulation provided for take by federally qualified hunters "not to exceed 100 caribou" during 10–28 August, and allowed a bulls-only bag limit for federal hunters during the fall season.

RECOMMENDATIONS FOR HARVEST PLAN 2012–2018

Beginning in November 2010, the HMC reconvened to revise the 2006 Harvest Plan. All members agreed to retain the primary goals of the 2001 and 2006 harvest plans. They recognized the previous plans were exemplary models that should largely be continued with modifications as needed.

GOALS

Goal 1: Promote continued growth and restore the herd to its historic range in both Alaska and Yukon to the extent possible without compromising herd health.

Goal 2: Increase the allowable harvest of the FCH as the herd grows and as the herd can sustain harvest within the constraints of Goal 1.

Goal 3: Provide reasonable opportunity for Alaska subsistence uses.

Goal 4: Manage Alaska hunts to allow opportunity for nonsubsistence hunters while staying within the constraints of all other goals and objectives.

[2] In general, a federally qualified user is a person who may take fish or wildlife on federal public lands for subsistence uses only if he is an Alaska resident of a rural area or rural community as recognized by the Federal Subsistence Board.

Objectives

Objective 1: During the life of this plan, promote and support management actions to achieve the following objectives:

- Increase the population by approximately 2–3% annually.
- Increase the harvest to 1,000–4,000 annually.

Objective 2: Over the long term, continue to promote and support management actions to achieve the following objectives:

- Population of 50,000–100,000.
- Harvest of 1,000–15,000.

Objective 3: Manage Alaska harvest to provide at least 14 days of hunting during each of the fall and winter seasons to ensure reasonable opportunity for state and federally-qualified subsistence hunters.

Objective 4: Manage Alaska harvest to provide at least 7 days of hunting during the fall season for nonresident hunters.

Harvest Management

Harvest Rate and Allocation of Harvest Between Alaska and Yukon

Harvest allocation should remain the same with 65% of allowable harvest going to Alaska and 35% going to Yukon. Any caribou not harvested by Yukon hunters will not be reallocated to the Alaska harvest; any caribou not harvested by Alaska hunters will not be reallocated to the Yukon harvest.

- Herd population estimates used for determining annual harvest quotas should be based on the best information available; usually a photocensus.
- Three percent harvest rate (65% Alaska, 35% Yukon) if herd size is less than 70,000.
  - Alaska harvest:
    - Bulls-only in fall;
    - Either sex in winter, but with a maximum of 25% of total annual harvest being cows.
  - Yukon harvest:
    - No licensed harvest permitted, T'rondëk Hwëchîn citizens requested their citizens not to hunt;
    - Continued contribution to herd growth.
- Four percent harvest rate (65% Alaska, 35% Yukon) if herd size is 70,000 or more[3].

[3] The HMC agreed that when the harvest rate rises from 3% to 4%, that the Alaska portion of the 1% difference would go to bulls-only in the fall. That would change the fall hunt quota from 75% to 80% of the total Alaska harvest allocation. The additional allocation of bulls to the fall hunt results in the allowable number of cows decreasing from 25% total annual harvest to 19% of total annual harvest.

- Alaska portion of first 3%:
    - Bulls-only in fall hunt;
    - Either sex in winter, with a maximum of 19% of total annual harvest being cows.
- Alaska portion of remaining 1%:
    - Bulls-only in fall hunt.
- Yukon harvest:
    - Perhaps some harvest, yet to be determined;
    - Continued contribution to herd growth.

Until such time when Yukon begins harvesting the FCH, the intent is to keep the average FCH harvest within the Alaska quota, but to tolerate up to a 15% variation in a single year. If the quota is either not reached or exceeded in one year, harvest allocation normally will not be adjusted the following year to compensate.

(See Appendix C for examples of actual harvestable numbers using the allocation and different rate and herd-size scenarios.)

Alaska Harvest Management Zones

Managers anticipate that the FCH will expand into its historic range in the White Mountains north of the Steese Highway and eventually absorb the White Mountains caribou herd (WCH). Therefore, the HMC recommends the following:

- Rename each of the current RC860 (fall) and RC867 (winter) joint state-federal registration hunts to "*Fortymile-White Mountains Registration Hunts,*" and expand them to encompass the current WCH hunt area.
- Eliminate the present joint state-federal fall general hunt and winter registration permit hunt for the WCH.
- Designate a new Zone 4 (Fig. 4) which will include all the present WCH hunt area, except the portion within the Chatanika drainage north of the Steese Highway. Zone 4 is largely a roadless hunt area, with early closures unlikely.
- Expand the boundary of Zone 1 to include the portion of the Chatanika drainage north of the Steese Highway. This expansion allows the area adjacent to both sides of the Steese Highway to be managed within a single hunt zone, and it simplifies regulations for hunters.

(*See Appendix D for a detailed description of zones.*)

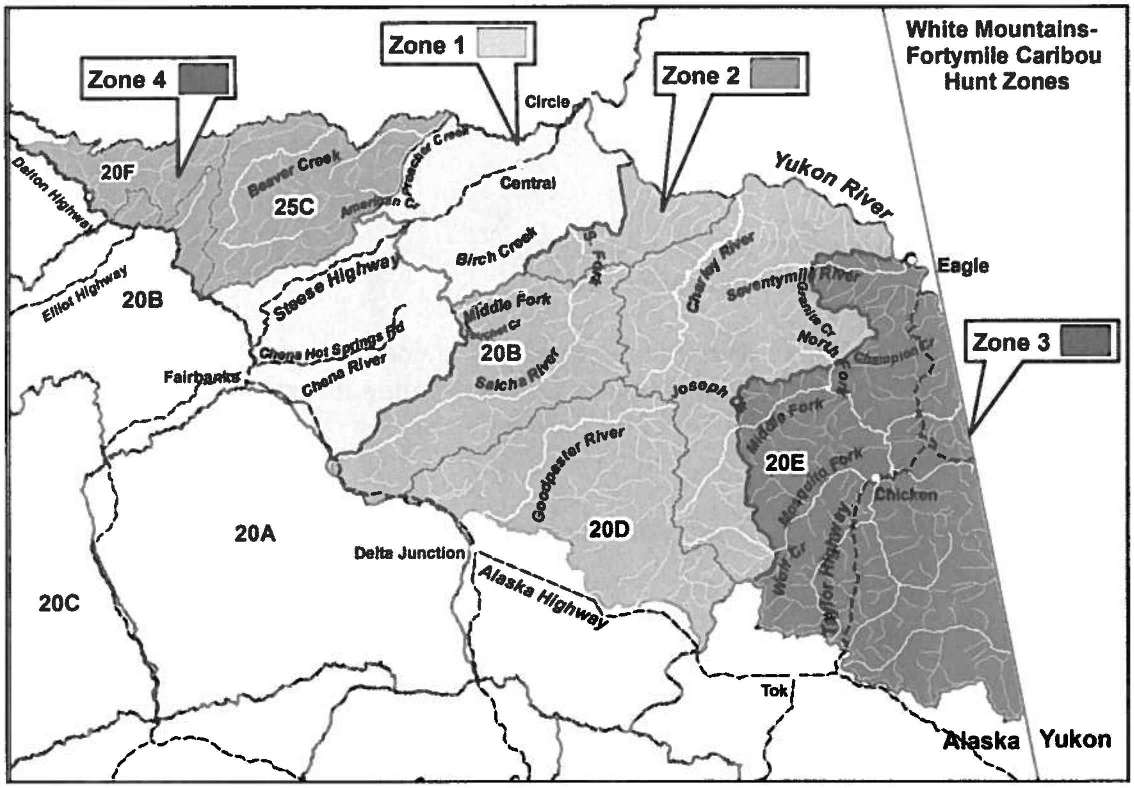

FIGURE 4. White Mountains-Fortymile caribou herd hunt management zones in Alaska for regulatory years 2012–2018.

FCH harvest should be managed so that hunters in different parts of the herd's range all have hunting opportunity. The four hunt zones are intended to help manage and distribute harvest.

Zone 1: The road and trail accessible portion of the herd's range in the vicinity of the Steese Highway and Chena Hot Springs Road.

Zone 2: Generally, the portion of the herd's range that has few roads and trails and access is mostly limited to boats or small aircraft. This zone is bordered by the Richardson Highway but very few, if any, caribou currently occur near the highway where they might be available for harvest.

Zone 3: The road and trail accessible portion of the herd's range in the vicinity of the Taylor Highway.

Zone 4: White Mountains area.

Alaska Allocation Among Different Seasons and Harvest Management Zones

The following Alaska allocations are recommended while the herd remains at less than 70,000:

- Fall hunt: Seventy-five percent of the Alaska annual harvest quota will be allocated to the fall hunt.

  - Fall quota:
    - Zone 1, the Steese Highway-Central and Chena Hot Springs Road area will be assigned 30%. Managers will assign part of the quota for Zone 1 to Zone 4 if the FCH moves into Zone 4.
    - Zone 2, the less accessible areas in the range of the herd, will be assigned a minimum of 25%. Additional harvest, not to exceed the total fall quota, will be permitted from this zone if caribou were not accessible in the other zones.
    - Zone 3, the Tok-Taylor Highway area will be assigned 45%.
    - Zone 4,
      - The White Mountains area quota for FCH will be taken from Zone 1, as specified above.
      - Zone 4 will continue to have a WCH quota.
      - Reported harvest will be assigned to the FCH or the WCH based on geographic distribution of radio collars between the two herds.

- Winter hunt: Twenty-five percent of the annual harvest quota and any surplus from the fall quota.
  - Winter quota:
    - Sixty percent will be allocated to the road accessible zone (either Zone 1 or Zone 3) where the majority of the herd is located immediately prior to the opening of the winter season. The remaining 40% of the quota will be assigned to the remaining road accessible zone. Because large numbers of caribou are not expected to be readily accessible in Zone 2, it does not have a separate winter quota. Instead, Zone 2 winter harvest will be counted against the zone (either Zone 1 or Zone 3) with the highest quota <u>until</u> that zone quota is met. Then additional harvest in Zone 2 will be counted against the zone with the lower quota until it too closes.
    - If the location of the herd clearly shows that the winter harvest quota assigned to one zone cannot be reached by the end of the season, then 75% of the remaining quota may be reassigned to zone(s) where caribou are available for harvest.
    - Managers will assign part of the quota for Zone 1 to Zone 4 if the caribou move into Zone 4.
    - The winter quota formula will allow harvest across the winter range, and prevent the season in one zone from being closed because the <u>entire</u> winter quota is taken in another zone.

Alaska Harvest Management Recommendations

The HMC recommends maintaining a single state-federal registration permit for both the FCH and the WCH because the herds intermingle at times. The harvest quotas for the two herds should remain separate, unless the FCH absorbs the WCH and the WCH can no longer be identified as a separate herd. A registration permit hunt provides important data necessary for timely management of hunts with harvest quotas.

The HMC recommends that ADF&G and federal subsistence program managers continue to cooperatively manage the fall and winter FCH and WCH hunts. Hunt management should include the following:

- Use a single joint state-federal registration permit.
- Use a mandatory short reporting period;
  - For successful hunters, 3 days after harvest;
  - For unsuccessful hunters, 15 days from the close of the season.
- Coordinate state and federal season openings and closures based upon reaching quotas, harvest reports, field observations, and reasonable opportunity for subsistence needs. Monitoring in-season harvest and movements and distribution to minimize heavy roadside harvest and to prevent harvest quotas from being exceeded.
- Exclude proxy hunting for the entire FCH and WMH to maintain consistency throughout the range of both herds;
- Close state seasons in portions of zones when Nelchina caribou are present in a mix of more than 1 Nelchina caribou to 15 Fortymile caribou.

The HMC supports providing reasonable opportunity for subsistence hunters while continuing to ensure herd growth. They stated, "In consideration of the fall and winter hunts being open to all Alaska residents through unlimited registration permits and provisions recommended for ADF&G to use discretionary permit authority to ensure that harvest is controlled and seasons are not cut unreasonably short by emergency orders, the HMC recommends the BOG continues to find that reasonable subsistence opportunity, as required by state law, will be provided by implementing the harvest management guidelines included in the 2012 Harvest Plan. Further, the HMC recommends to the FSB that they continue to find the 2012 Harvest Plan to provide opportunity for subsistence uses by rural residents of Alaska in accordance with public land law (ANILCA Title VIII)."

Seasons and Bag Limits. The hunting season for the FCH should continue to be split between a fall hunt and a winter hunt. Having two distinct seasons facilitates the traditional fall hunt, allows some nonresident opportunity, and also allows some communities to take advantage of the proximity of the caribou during the winter season. Keeping conservation of the herd foremost and continuing to encourage the taking of bulls, the HMC recommends an either sex bag limit during the winter hunt.

The HMC recommends the following seasons and bag limits for the life of this plan or until the herd reaches 70,000, at which time seasons and bag limits should be revisited:

State Fall Season:

- Bag limit: one bull by joint state-federal registration permit.
- Zones 1 and 3: 29 August–30 September for residents and 29 August–20 September for nonresidents.
- Zones 2 and 4: 10 August–30 September for residents and 10 August–20 September for nonresidents.

Federal Fall Season:

- Bag limit: one bull by joint state-federal registration permit.
- All zones: 10 August–30 September *for federally qualified hunters* (Between 10–28 August, up to 100 total animals can be harvested on federal land only.[4]).

State Winter Season:

- Bag limit: any caribou by joint state-federal registration permit, with up to 25% of total annual harvest being cows.
- All zones: 1 December–31 March for Alaska residents only.

Federal Winter Season:

- Bag limit: any caribou by joint state-federal registration permit.
- All zones: 1 November–31 March.

To offer fall hunting opportunity in the Eagle area, this plan recommends that ADF&G have the authority to announce a 1- to 3-day season for resident hunters to harvest caribou on state managed lands in the American Summit area between 20 October and 30 November. Permits will only be available in Eagle. This season will be opened if 1) there has been insufficient local opportunity in September to harvest caribou, and 2) Fortymile caribou are present in the area. This will be a state registration permit hunt, and every effort will be made to maintain the harvest at no more than 30 caribou. The animals harvested will be counted toward caribou harvested under the winter quota for Zone 3. This hunt is intended to accommodate residents of Eagle but would be open to all Alaska residents. If excessive harvest occurs or other problems develop, it should be permanently suspended.

Hunting Methods and Access. Access to the Fortymile herd is important to hunters and nonhunters alike. The herd should be monitored throughout the year, and information provided to the public regarding herd distribution and movements so that conflicts between hunters and nonconsumptive users will be minimized. Furthermore, when large numbers of caribou are crossing major roads, such as the Taylor or Steese Highways, special hunt management provisions are needed to avoid the possibility of exceeding harvest quotas and to minimize public safety concerns.

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[4] All hunters can hunt on state and federal land for RC860 and RC867 when the state season is open.

The HMC recommends the following suite of options for managing situations where large numbers of caribou are congregated near the roads. The options are presented with those most preferred listed first.

- Temporary closures and openings in specific drainages or clearly specified areas. These would include management tools such as establishing sub zones, temporary openings, delayed openings, and patterned openings[5], e.g., Sundays through Wednesdays.

- Limited registration[6] for state winter hunts that could include various permutations of telephone, on-line, checkstation, ADF&G office access to registration permits on a first come, first served basis. Other ideas include multiple permit periods for different hunt dates so that hunters could enter specified areas at specified times. Up to 20% of the remaining winter zone quota could be allocated to this hunt, not to exceed 25 permits per hunt period.

Information and Education

Education and outreach continue to be an integral part of the success of managing the FCH. Brochures on caribou sex identification as well as other hunting information are available. The coalition strongly recommends emphasizing conservation and implementing education programs to encourage hunters to take bull caribou so that harvest of cows will be no more than 25% of the total annual harvest while the herd numbers less than 70,000. Additional educational material should also be provided to help hunters select for bulls when meat quality of bulls is good.

Hunter information specific to FCH harvest should be written on or included with the registration permits. This information includes descriptions of cow and bull caribou, examples of removing viscera from view, signs or markers used to delineate the hunting area or closures, access restrictions, and harvest reporting requirements that monitor harvest quota allocation by area and season.

The HMC identified a need to develop outreach and education materials to foster 1) awareness of the importance of and dependence on Fortymile caribou, especially in communities with limited road access and few or no groceries available; and 2) respect for local residents and the land. The HMC also recognized a need for education materials on subsistence needs of people who live farther from the herd and in more urban areas.

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[5] The authority to manage for patterned openings has not been delegated to BLM by the Federal Subsistence Board. A request for such would require strong justification as to the benefits to subsistence users and the resource.

[6] This limited registration option was agreed upon by a 6 to 2 vote. The minority opinion was that tools are already available to administer the hunt, and an extra hunt complicates the plan.

The *Comeback Trail* newsletter was first published in 1994 to give information to the public about the recovery efforts for the FCH. The Fortymile herd will be periodically issued as needed.

YUKON HARVEST MANAGEMENT

Hunting of the FCH in Yukon was effectively closed upon implementation of the plan in 1995. Licensed hunters were put on a permit hunt with zero permits available; and the Tr'ondëk Hwëch'in requested its citizens not to hunt Fortymile caribou. Yukon has not resumed the hunt, opting instead to put the Yukon harvest allocation into herd growth with the hope that the herd would eventually reoccupy some of its former range in the Yukon. To date, there has been little demand for FCH hunting opportunities by Yukon hunters. However, as the herd grows and expands further east of the international border, public desire for a FCH hunt may grow. While Yukon has chosen not to harvest the FCH in the past, the HMC fully realizes they might begin harvesting in the future. Prior to any resumption of Fortymile caribou harvest in Yukon, a regulation change to reopen a hunt will be pursued through consultation within the established Yukon co-management process.

WOLF AND GRIZZLY BEAR MANAGEMENT

The HMC recognizes that predator management in Alaska has been a vital aspect of increasing the size of the herd and maintaining high levels of harvest by people. Predator management tools in Alaska should remain available, even if they are not used continuously.

In Yukon, predator management actions will be guided by the *Yukon Wolf Conservation and Management Plan* (Yukon Wolf Conservation and Management Plan Review Committee 2012 [*in prep*]) and by hunting and trapping regulations.

Wolf Management

Alaska. Wolf management specifically designed to continue achieving intensive management population and harvest objectives for the FCH is recommended (see 5 AAC 92.125[b]). The HMC recognizes that the minimum population and harvest objectives will have been reached by 2012 with a harvest of at least 1,000 caribou and a herd size of greater than 50,000. Further, the HMC recommends continuing the wolf predation management program authorized by the BOG at its March 2009 meeting. Similar to the other ongoing wolf management programs in Alaska, the program should continue to be conducted primarily by private citizens. ADF&G efforts should be utilized to augment the efforts of private citizens when wolf management objectives have not been met. To identify where it should concentrate its efforts, ADF&G should coordinate with area trappers and program participants. In addition, other lethal and nonlethal management options should continue to be explored to improve the efficiency and likelihood of success of the program.

Yukon. In Yukon, wolf management actions will be guided by the *Yukon Wolf Conservation and Management Plan* (Yukon Wolf Conservation and Management Plan Review Committee. 2012[*In prep*]).

Bear Management

Alaska. Predation by grizzly bears reduces caribou calf survival and herd growth. The Unit 20E Brown Bear Predation Control Program adopted by the BOG in May 2006 as part of the Predation Control Areas Implementation Plans, 5 AAC 92.125(b), was designed primarily to benefit moose but was also intended to benefit the FCH. The BOG suspended the program in 2009 because the methods and means available at that time to conduct the program proved ineffective. Other actions to encourage bear harvest should be considered by the BOG. Additional bear harvest might provide for more herd growth and continued achievement of intensive management harvest and population objectives.

Yukon. In Yukon, bear hunting regulations for FCH range are similar to general Yukon-wide regulations, and no changes are being contemplated at this time.

Herd Health and Habitat Monitoring

The HMC recognizes that the FCH may reach a population greater than the habitat can support. Monitoring caribou herd dynamics is needed to assess the ability of habitat to support the herd. The HMC encourages managers to incorporate new research and management techniques as they develop and to continue to closely monitor herd status by collecting data on weights of 4-month-old caribou, birthrates of 3-year-old caribou, and weather patterns. Data for a single year should not be used to predict herd growth or decline. Instead, data from a multi-year period should be used to signal when nutrition is compromised enough to require increasing harvest and stabilizing herd numbers. If the 5-year running average birthrate of 3-year olds declines below 55% and adverse weather is not a factor, then managers should consider stabilizing the herd to conserve the habitat (Boertje et al. 2012 [*In prep*]).

Emerging concerns for health of the herd and habitat come from the possible disposal of land for residential and commercial settlements by the Alaska Department of Natural Resources as stated in its 2003 *Upper Yukon Area Plan*. Because key habitat and use areas of the FCH overlap some of the proposed settlement sites, and because caribou hunters and their patterns of use also overlap some of the settlement sites, the HMC highly recommends that some of those sites be removed from consideration. See Appendix A for more details. The HMC further recommends that ADF&G and partner federal agencies update the habitat needs assessment for the Fortymile caribou herd (FCHPT 2000) and make it available to landowners and managers to help them conduct and permit land use actions.

In Yukon, extensive habitat assessment efforts have been underway, or completed, to develop a late winter habitat selection model, to conduct a habitat connectivity analysis within the current Yukon range of the FCH, and to map all caribou forage lichen abundance across the current FCH range.

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APPENDIX A. Recommendations to Alaska Department of Natural Resources on the *2003 Upper Yukon Area Plan.*

The Alaska Department of Natural Resources (DNR) in its *2003 Upper Yukon Area Plan* (UYAP) identified 12 specific areas, along the Taylor Highway, as appropriate for settlements and commercial enterprises. The Harvest Management Coalition (HMC) recommends that several of the areas designated for settlement in the UYAP should no longer be considered appropriate because they pose conservation concerns to the Fortymile caribou herd (FCH) and would result in significant conflicts with subsistence use of the herd. Specifically, the areas designated as J-01 near the Jack Wade Junction and portions of W-01 and W-02 between Taylor Mountain and Chicken, are of greatest concern.

In deciding whether areas are appropriate, the UYAP calls for **the protection and management of valuable environmental processes** within areas that are slated to be conveyed into private ownership. Furthermore, pursuant to Alaska statute 38.04.200(b) Traditional Means of Access, authorizations of land sales, DNR must consider the effect on and minimize significant conflicts with traditional and subsistence uses of fish and wildlife resources. More than 15 years, together with countless resources, have been devoted to increasing the size of the FCH and allowing it to expand into its historic range. International cooperative efforts have been devoted to this cause. More hunters can finally again depend on this herd for subsistence needs, and many of those hunters hunt in the area proposed for settlement. Therefore the HMC opposes settlement of the area around the Jack Wade Junction (J-01), near mile post 100 on the Taylor Highway, as well as portions of W-01 and W-02 between Taylor Mountain and Chicken. The HMC's opposition is based on 1) the negative impact to the FCH migratory patterns and disturbance of the herd's critical wintering area, 2) conflicts with hunters who use the same area identified for settlement, and 3) conflicts between settlement and access by hunters using the Taylor Mountain Trail. The Taylor Mountain Trail, which originates at approximately milepost 58 and extends to the top of Taylor Mountain, was converted to an improved road by the military in 2005 and has become a primary access route for Fortymile hunters.

The HMC believes the area should be designated primarily for wildlife and subsistence uses and not for residential development because of the following considerations:

- Extensive trail systems exist on hardened ridge tops in these areas.
- Excellent roadside access to caribou is available, which allows for high harvest rates by hunters as per AS 16.05.255, 5 AAC 92.106, and 5 AAC 92.108. Further, roadside access could be critical if managers decide that the harvest rate for the FCH should be accelerated. Excellent roadside camping opportunities exist for subsistence and sport hunters. In recent years during the fall season there were as many as 50–70 camps in the area around the Jack Wade Junction and 25–30 camps along the Taylor Mountain Trail.
- Fortymile caribou migrate along the ridge system, which acts as a funnel area that passes through the Jack Wade Junction area.
- Fortymile caribou winter extensively in the area around the Jack Wade Junction during some years, including winters 2004–2005 through 2009–2010.

The HMC does acknowledge that disposal of one to three small commercial lots, less than 5 acres each, clustered near the Jack Wade Junction, likely would not cause major herd conservation concerns or major conflicts with subsistence users. However, J-01 was designated as appropriate for commercial development when demand occurs; it was not designated as appropriate for residential settlement. However, once land is conveyed to a private owner, DNR does not have the authority to restrict the use of land to only commercial development. Therefore, the HMC recommends these lands be removed from general offering. Before moving forward with the disposal process, DNR should individually review all future proposals for commercial development in J-01. The review should require a carefully considered, well-vetted plan to minimize the likelihood of future residential development. The HMC recommends that DNR comply with the management intent for the Jack Wade Junction as written in the UYAP.

APPENDIX B. Composition of the Harvest Management Coalition.

Membership of the Harvest Management Coalition (HMC) has evolved over the years. Since the 2001 Harvest Plan, the state advisory committee membership of the HMC has been from the Eagle, Central, Fairbanks, Delta, and Upper Tanana/Fortymile. For the 2006 and 2012 harvest plans the Eastern Interior Regional Advisory Council, and members of the Yukon contingent were added to the HMC.

As a result of growth of the Fortymile herd and expanding harvest opportunities, hunters who live outside of its immediate range want to have a voice in how harvest is managed. The HMC agreed that its Alaska membership should expand. Because both Anchorage and Matanuska Valley advisory committees showed a strong interest in helping with this 2012 Harvest Plan, each asked to have a representative on the coalition. The members agreed that even though the coalition should expand, it must not become so large that meetings would be difficult to manage. Furthermore, they expressed the desire that the five original local advisory committees should always hold a majority, and the Eastern Interior Advisory Council and Yukon contingent should always have representation. Beyond those members there should be two other Alaska seats, not necessarily always Anchorage and Matanuska Valley advisory committees, but people who would represent user groups and appropriate interests.

In the future, if others would like to join the HMC, they should come to the coalition, present their case, and request membership.

Individuals who represented their various groups for the 2012 Harvest Plan were the following:

Darren Taylor: Tr'ondëk Hwëch'in (First Nation)
Art Christiansen: Dawson District Renewable Resources Council
*Carol Foster: Government of the Yukon, Harvest Management Specialist
*Graham Van Tighem: Yukon Fish and Wildlife Management Board, Executive Director
Will Young: Yukon Fish and Wildlife Management Board, Researcher
Mike McDougall: Eagle Fish and Game Advisory Committee
Andy Bassich–Eagle Fish and Game Advisory Committee and Eastern Interior Regional Advisory Council
*Mike Tinker: Fairbanks Fish and Game Advisory Committee
*Will Koehler: Delta Junction Fish and Game Advisory Committee
Don Woodruff: Eastern Interior Regional Advisory Council
*William Glanz: Central Fish and Game Advisory Committee
Terry Brigner: Upper Tanana Fortymile Fish and Game Advisory Committee
Leif Wilson: Upper Tanana Fortymile Fish and Game Advisory Committee
*Mel Grove: Matanuska Valley Fish and Game Advisory Committee
Steve Flory: Anchorage Fish and Game Advisory Committee
Robert Caywood: Anchorage Fish and Game Advisory Committee

* = members who attended all three meetings.

APPENDIX C. Examples of actual harvestable numbers using the allocation and different rate and herd-size scenarios.

Herd size	Percent harvest	Total allowable harvest	Yukon allocation: 35%	Alaska allocation: 65%	Alaska fall: bulls only	Alaska winter
50,000	3	1500	525	975	731	244
55,000	3	1650	578	1073	804	268
60,000	3	1800	630	1170	878	293
65,000	3	1950	683	1268	951	317
70,000	4[a]	2800	980	1820	1479	341
75,000	4	3000	1050	1950	1584	366
80,000	4	3200	1120	2080	1690	390
85,000	4	3400	1190	2210	1796	414
90,000	4	3600	1260	2340	1901	439
100,000	4	4000	1400	2600	2113	488

[a] The Harvest Management Coalition agreed that when the harvest rate rises from 3% to 4%, that the Alaska portion of the 1% difference would go to bulls-only in the fall. That would change the fall hunt quota from 75% to 80% of the total Alaska harvest allocation. The additional allocation of bulls to the fall hunt results in the allowable number of cows decreasing from 25% total annual harvest to 19% of total annual harvest.

APPENDIX D. Hunt zone descriptions.

Note: Federal seasons are managed by game management unit (unit), not zones. Federal lands used for harvest of FCH are in Units 25C and 20E and 20F.

ZONE 1

Unit 20B, that portion within the Chatanika River drainage north and east of the Steese Highway, and that portion south and east of the Steese Highway, except the middle fork of the Chena River drainage upstream from and including the Teuchet Creek drainage and except the Salcha River drainage.

Unit 25C, that portion east of the east bank of the mainstem of Preacher Creek to its confluence with American Creek, then east of the east bank of American Creek, excluding that portion within the drainage of the south fork of Birch Creek and excluding that portion within the Yukon–Charley Rivers National Preserve.

ZONE 2

Unit 20B, that portion south and east of the Steese Highway within the middle fork of the Chena River drainage upstream from and including the Teuchet Creek drainage and the Salcha River drainage.

Unit 20D, that portion north of the south bank of the Tanana River.

Unit 20E, that portion within the Charley River drainage, the Seventymile River drainage upstream from and including the Granite Creek drainage, the North Fork Fortymile River drainage upstream from, but not including the Champion Creek drainage, the Middle Fork Fortymile River drainage upstream from and including the Joseph Creek drainage, the Mosquito Fork of the Fortymile River drainage upstream from and including the Wolf Creek drainage, and the drainages flowing into the Yukon River downstream from the confluence of the Seventymile and Yukon rivers.

Unit 25C, that portion within the drainage of South Fork Birch Creek and that portion within the Yukon–Charley Rivers National Preserve.

ZONE 3

Unit 20E, remainder (the road and trail accessible portion of the herd's range in the vicinity of the Taylor Highway).

ZONE 4

Unit 20B and Unit 20F those portions north and west of the Steese Highway, north and east of the Elliot Highway to its intersection with the Dalton Highway, then east of the Dalton Highway and south of the Yukon River, excluding the Chatanika River drainage.

Unit 25C, that portion west of the east bank of the mainstem of Preacher Creek to its confluence with American Creek, then west of the east bank of American Creek.

UPPER YUKON/TANANA: DEPARTMENT REPORT FOR INTENSIVE MANAGEMENT (IM) WITH PREDATION CONTROL

Alaska Department of Fish and Game, Division of Wildlife Conservation

1) Description of IM Program[1] and Department recommendation for reporting period

A) This report is an interim review _X_ or renewal evaluation ___ for a predation control program authorized by the Alaska Board of Game (Board) under 5 AAC 92.125

B) Date this report was submitted by the Department to the Board:

1 February _X_ (annual report) 1 August ___ (interim annual update[2]) Year 2012

C) Program name (geographic description/GMU and species/herd): Upper Yukon Tanana Wolf predation Control Program (UYTPCP)

D) Existing program has ___ / does not have _X_ an associated *Intensive Management Plan*

E) Game Management Unit(s) fully or partly included in IM program area: Units 12, 20B, 20D, 20E and 25C

F) IM objectives for Fortymile caribou herd (FCH): population size 50,000–100,000 and harvest 1,000–15,000; for moose in Unit 12 north of the Alaska Highway and all of Unit 20E: population size 8,744–11,116 and harvest 547–1,084

G) Month and year the current predation control program was originally authorized November 2004 by the Board. Indicate date(s) if renewed: March 2009

H) Predation control is currently active X or temporarily inactive ____ in this IM area

I) If active, month and year the current predation control program began January 2005 or resumed ____

J) Indicate if an habitat management program funded by the Department or from other sources is currently active in this IM area (Y/N) N

K) Size of IM program area (square miles) and geographic description: 18,750 mi^2 in that portion of Unit 12 north of the Alaska Highway; that portion of Unit 20D within the Goodpaster River drainage upstream from and including the South Fork Goodpaster River drainage, and within the Healy River, and the Billy and Sand creek drainages; that portion of Unit 20B within the Salcha River drainage upstream from and including the Goose Creek drainage, and within the Middle Fork of the Chena River drainage; all of Unit 20E; and that

[1] For purpose and context of this report format, see appendix.

portion of Unit 25C within the Birch Creek drainage upstream from the Steese Highway bridge, and within the area draining into the south and west bank of the Yukon River upstream from the community of Circle (Fig. 1).

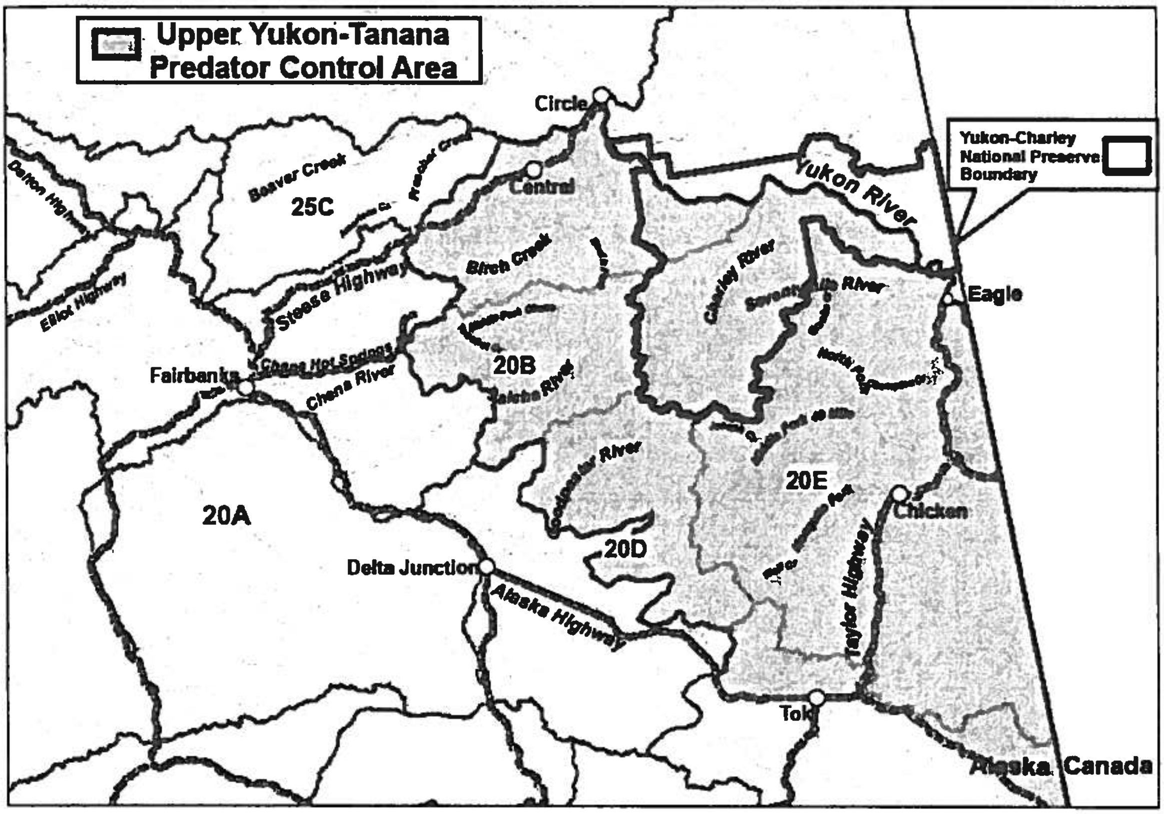

Figure 1. Upper Yukon Tanana Predator Control Program Area (18,750 mi^2)

L) Size and geographic description of area for assessing ungulate abundance: Caribou-21,787 mi^2 FCH hunt area (Fig. 2); Moose-4,630 mi^2 within the Unit 20E West and 20E Central Moose Survey Areas in southern Unit 20E.

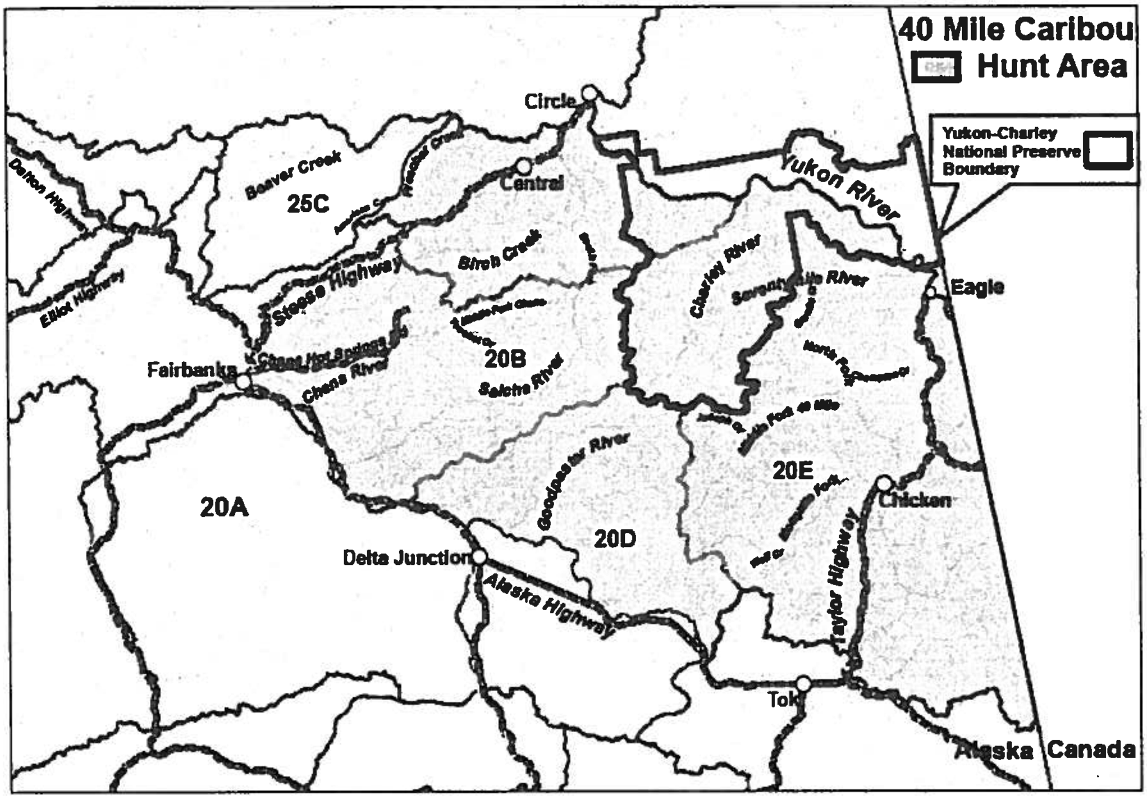

Figure 2. Fortymile Hunt Area (21,787 mi^2)

M) Size and geographic description of area for ungulate harvest reporting: Caribou–FCH hunt area (21,787 mi^2); Moose–Unit 12 north of the Alaska Highway and all of Unit 20E (9,150 mi^2).

N) Size and geographic description of area for assessing predator abundance: Wolf Control Area (WCA)-18,750 mi^2.

O) Size and geographic description of predation control area: WCA-18,750 mi^2.

P) Criteria for evaluating progress toward IM objectives: Caribou and moose abundance and harvest.

Q) Criteria for success with this program: FCH population = 50,000–100,000 and harvest = 1,000–15,000 caribou; moose population in Unit 12 north of the Alaska Highway and in all of Unit 20E population = 8,744–11,116 and harvest = 547–1,084 moose.

R) **Department recommendation for IM program in this reporting period**: continue program (details provided in section 5)

2) Prey data

Date(s) and method of most recent [fall/spring] abundance assessment Caribou–June 2010 photo census; Moose–November 2011 geospatial moose population survey.

Compared to IM area, was a similar trend and magnitude of difference in abundance observed in nearby non-treatment area(s) since program inception Non-Treatment Area Not Established (Y/N) and in the last year Non-Treatment Area Not Established (Y/N)?

Date(s) of most recent age and sex composition survey Caribou – October 2011 composition survey; Moose – November 2011geospacial moose population survey

Compared to IM area, was a similar composition trend and magnitude of difference in composition observed in nearby non-treatment area(s) since program inception Non-Treatment Area Not Established (Y/N) and in the last year Non-Treatment Area Not Established (Y/N)?

Table 1a. Fortymile Caribou Herd (FCH) abundance, age and sex composition in FCH hunt area since the herd was added to the control program in year 3. A regulatory year is 1 July to 30 June (e.g, RY10 is 1 July 2010 to 30 June 2011).

Period	Regulatory Year	Abundance	Composition (number per 100 cows) Calves	Bulls	Total n
Year 1	2004–2005	--	--	--	--
Year 2	2005–2006	--	--	--	--
Year 3	2006–2007	43,837[a]	34	43	4,995
Year 4	2007–2008	44,673[a]	37	36	5,228
Year 5	2008–2009	46,510[b]	33	37	4,119
Year 6	2009–2010	51,675[b]	34	59	4,503
Year 7	2010–2011	--	32	43	7,169
Year 8	2011–2012	--	25	42	3,949

[a]Modeled population estimate
[b]Minimum population estimate from photo census

Describe trend in abundance or composition: 2–4% annual rate of increase during RY06–RY09, based on modeling and photo census results

Table 1b. Moose abundance, age and sex composition in Unit 20E West and 20E Central moose survey areas in southern Unit 20E since program implementation in year 1 to year 8. A regulatory year is 1 July to 30 June (e.g, RY10 is 1 July 2010 to 30 June 2011).

Period	**Regulatory Year**	**Abundance (variation)**	**Composition (number per 100 cows) Calves**	**Bulls**	**Total n**
Year 1	2004–2005	2268 (90% CI±17%)	24	55	516
Year 2	2005–2006	2913 (90% CI±14%)	23	52	887
Year 3	2006–2007	3352 (90% CI±15%)	31	42	1104

Period	Regulatory Year	Abundance (variation)	Composition (number per 100 cows)		
			Calves	Bulls	Total *n*
Year 4	2007–2008	3469 (90% CI±14%)	26	48	935
Year 5	2008–2009	3147 (90% CI±11%)	28	60	865
Year 6	2009–2010	3950 (90% CI±12%)	30	58	1046
Year 7	2010–2011	3894 (90% CI±15%)	28	70	987
Year 8	2011–2012	4148 (90% CI±16%)	14	67	1071

Describe trend in abundance or composition [*statistical or other evidence*]: Moose have increased during RY04–RY11 based upon point estimates with non-overlapping 90% confidence intervals in RY04 and RY11.

Table 2a. Fortymile Caribou harvest in FCH_hunt area since the herd was added to the control program in year 3. A regulatory year is 1 July to 30 June (e.g, RY11 is 1 July 2011 to 30 June 2012). Methods for estimating unreported harvest are described in Survey and Inventory reports.

Period	Regulatory Year	Reported		Estimated			Total harvest
		Male	Female	Unreported	Illegal	Yukon	
Year 1	2004–2005	--	--	--	--	--	--
Year 2	2005–2006	--	--	--	--	--	--
Year 3	2006–2007	601	247	10	10	5	873
Year 4	2007–2008	746	262	10	10	5	1033
Year 5	2008–2009	696	217	10	10	10	913
Year 6	2009–2010	891	192	10	10	20	1083
Year 7	2010–2011	636	89	10	10	5	750
Year 8[a]	2011–2012	918	103	10	10	5	1046

[a]Preliminary data.

Describe trend in harvest: Harvest controlled by fixed annual harvest quota. Annual quota was 850 during RY06–RY09, 795 in RY10, and 1000 in RY11.

Describe any other harvest related trend if appropriate: None.

Table 2b. Moose harvest in Unit 12 north of the Alaska Highway and all of Unit 20E since program implementation in year 1 to year 8. A regulatory year is 1 July to 30 June (e.g, RY11 is 1 July 2011 to 30 June 2012). Methods for estimating unreported harvest are described in Survey and Inventory reports.

Period	RY	Reported		Estimated		Total harvest
		Male	Female	Unreported	Illegal	
Year 1	2004–2005	86	0	0–5	5–10	91–101
Year 2	2005–2006	123	0	0–5	5–10	128–138
Year 3	2006–2007	141	1	0–5	5–10	147–157
Year 4	2007–2008	151	0	0–5	5–10	156–166
Year 5	2008–2009	189	0	0–5	5–10	194–204

Year 6	2009–2010	180	0	0–5	5–10	185–195
Year 7	2010–2011	184	0	0–5	5–10	189–199
[a]Year 8	2011–2012	212	0	0–5	5–10	217–227

[a]Preliminary data.

Describe trend in harvest: Harvest increased during RY04–RY11.

Describe any other harvest related trend if appropriate (e.g., harvest per unit effort): None

3) Predator data

Date(s) and method of most recent spring abundance assessment for wolves: May 2010- combination of aerial reconnaissance survey (March 16–18, 2010), predator control permittee and trapper interviews (winter 2009–2010), anecdotal observations by Department staff (Oct. 2009–May 2010), and trapper/hunter harvest records.

Date(s) and method of most recent fall abundance assessment for wolves: October 2011- ADF&G Pred–Prey model which uses the relationship between spring wolf, moose and caribou population sizes to predict a likely growth rate for the wolf population from spring to fall. Mathematical equations which define model functions were taken from published predator–prey studies.

Other research or evidence of trend or abundance status in wolves: None

Table 3. Wolf abundance and removal in Wolf Control Area (WCA). Removal objective is 60–80% of pre-control fall abundance in year 1 of wolf predation control program, so estimated or confirmed number remaining by 1 May each regulatory year in the WCA must be at least 88. Regulatory year is 1 July to 30 June (e.g, RY11 is 1 July 2011 to 30 June 2012).

Period	Regulatory Year	Fall abundance (range)	Harvest removal		Dept. control removal	Public control removal	Total removal	Spring abundance (range)[a]
			Trap	Hunt				
Year 1	2004–2005	380[bc] (350–410)	52	23	N/A	60	135	245 (215–275)
Year 2	2005–2006	335[c] (300–370)	58	10	N/A	17	85	250 (215–285)
Year 3	2006–2007	362[c] (300–425)	73	7	N/A	23	103	259 (197–322)
Year 4	2007–2008	382[c] (366–398)	57	14	N/A	27	98	284 (268–300)
Year 5	2008–2009	372[d]	82	11	84	49	226	146
Year 6	2009–2010	235[e]	31	4	15	10	60	175
Year 7	2010–2011	274[c] (262–285)	26	11	0	25	62	212 (200–223)
Year 8	2011–2012	329[c] (315-342)	0[f]	3[f]	3[f]	2[f]	8[f]	N/A

[a]Fall estimate minus all know wolf kills.
[b]Pre-control population estimate.
[c]Fall modeled estimate.
[d]Revised fall modeled estimate using results from a March 2009 reconnaissance survey and RY08 removal data. The original fall modeled estimate was 393–431.
[e]Revised fall modeled estimate using results from a March 2010 reconnaissance survey and RY09 removal data. The original fall modeled estimate was 262–299.
[f]Preliminary data.

4) Habitat data and nutritional condition of prey species

Where active habitat enhancement is occurring or was recommended in the *Intensive Management Plan*, describe progress toward objectives: No active habitat enhancement.

Table 5a. Nutritional indicators for Fortymile Caribou in FCH_hunt area since the herd was added to the control program in year 3. A regulatory year is 1 July to 30 June (e.g, RY10 is 1 July 2010 to 30 June 2011).

Period	Regulatory Year	Spring Birthrates (% of cows ≥36 months that gave birth)
Year 1	2004–2005	--
Year 2	2005–2006	--
Year 3	2006–2007	89
Year 4	2007–2008	90

Year 5	2008–2009	70
Year 6	2009–2010	70
Year 7	2010–2011	86

Table 5b. Nutritional indicators for moose in Unit 20E West and 20E Central moose survey areas in southern Unit 20E since program implementation in year 1 to year 7. A regulatory year is 1 July to 30 June (e.g, RY11 is 1 July 2010 to 30 June 2012).

Period	Regulatory Year	Twinning Rates (% of cows observed with calf that had twins)
Year 1	2004–2005	24
Year 2	2005–2006	47
Year 3	2006–2007	27
Year 4	2007–2008	17
Year 5	2008–2009	41
Year 6	2009–2010	22
Year 7	2010–2011	21

5) Department recommendations for annual evaluation (1 February) following Year 7 for UYTPCP

Has progress toward defined criteria been achieved? Yes. The FCH increased at 2–4% annually during RY06–RY09, based on modeling and photo census results. Moose abundance increased within the combined Unit 20E West and 20E Central Moose Survey Areas in southern Unit 20E during RY04–RY11, based point estimates with non-overlapping 90% confidence intervals in RY04 and RY11. Moose harvest increased during RY04–RY11.

Has achievement of success criteria occurred? Caribou – Yes. The caribou population estimate of 51,675 is within the IM population objective of 50,000–100,000. Moose – No.

Recommendation for Predation Control: Continue as currently being conducted.

6) Appendix: Purpose and context of Department Report

This document provides a standard format for area biologists in the Alaska Department of Fish and Game (Department) to periodically report on progress in intensive management (IM) programs with predation control to the public and the Alaska Board of Game (Board). Predation control programs are authorized in Title 5, Chapter 92, Section 125 of the Alaska Administrative Code (5 AAC 92.125). The Department Report is premised on the 10 November 2010 draft *Guidelines for intensive management of big game in Alaska*, which describes the legal background, scientific principles, and management factors of producing and maintaining elevated harvests of ungulates (caribou, deer, or moose) in selected areas of Alaska. For IM programs initiated or renewed after 1 January 2012, the intent is that details of rationale, decision criteria involving public process and other biological and management factors for specific IM programs will be found in the corresponding *Intensive Management Plan.*

IM objectives for deer and moose are determined by the Board for a game management unit (GMU), whereas those for caribou are determined by herd. The IM program area may be described by geography (drainage) or community(s) if it is focused in a smaller area than the one describing the corresponding IM objectives, or if the area is composed of multiple game management units. A predation control area may be smaller, and contained within, the IM program area or the area used for assessing predator abundance in a game management unit. Thus, the number of wolves, black bears, or grizzly/brown bears remaining in the larger abundance assessment area on a specific date incorporates the potential for recolonization of the smaller control area by predators on surrounding lands (where hunting and trapping but not control methods are allowed), in addition to reproduction by predators remaining in the control area.

The Department Report to the Board documents evaluation of progress toward IM population or harvest objectives for ungulate or other objectives determined by public process for existing IM programs. Initially these reports will be only for areas with predation control to meet annual reporting requirements (Alaska Statutes, Title 16, Section 50, Part b), but they may be expanded to IM programs that only include ungulate habitat enhancement, diverse strategies for hunter access and ungulate harvest, and outreach programs (see *Guidelines*). Predator harvest is achieved through hunting and trapping regulations, whereas predation control typically removes predators by additional means such as by public participants (by special Department permit) or by Department personnel (non-lethal methods could also be applied). Report information will be used for Department recommendations and Board decisions on continuing, modifying, suspending, or terminating IM programs. The annual report will be issued on 1 February with an interim report on 1 August. These dates account for lag time in entering reported predator removal and ungulate harvest into an electronic database for archive and analysis. The August interim report will have the ungulate harvest and wolf removal from the previous regulatory year, whereas the February annual report will include most of the ungulate harvest from the prior fall and bear removal from the prior regulatory and calendar years. Report information is for a single program, but it may also be presented in a table showing multiple IM programs in a region or all IM programs statewide.

UNIT 19A: DEPARTMENT REPORT FOR INTENSIVE MANAGEMENT (IM) WITH PREDATION CONTROL

Alaska Department of Fish and Game, Division of Wildlife Conservation

1) Description of IM Program[1] and Department recommendation for reporting period

A) This report is an interim review X or renewal evaluation ___ for a predation control program authorized by the Alaska Board of Game (Board) under 5 AAC 92.125

B) Date this report was submitted by the Department to the Board:

1 February X (annual report) 1 August ___ (interim annual update[2]) Year 2012

C) Program name (geographic description/GMU and species/herd): Unit 19A wolf predation control program (Fig. 1)

D) Existing program has ___ / does not have X an associated *Intensive Management Plan*

E) Game Management Unit(s) fully or partly included in IM program area: Unit 19A

F) IM objectives for moose: population size 7600-9300 harvest 400-550

G) Month and year the current predation control program was originally authorized March 2004 by the Board. Indicate date(s) if renewed: March 2009

H) Predation control is currently active X or temporarily inactive ____ in this IM area

I) If active, month and year the current predation control program began December 2004 or resumed __.

J) Indicate if a habitat management program funded by the Department or from other sources is currently active in this IM area (Y/N) N

K) Size of IM program area (square miles) and geographic description: Unit 19A- 9969 mi^2

L) Size and geographic description of area for assessing ungulate abundance: Central Kuskokwim Villages Moose Management Area (MMA)- 3,853 mi^2

M) Size and geographic description of area for ungulate harvest reporting: MMA- 3,853 mi^2

N) Size and geographic description of area for assessing predator abundance: MMA- 3,853 mi^2

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[1] For purpose and context of this report format, see appendix.

O) Size and geographic description of predation control area: MMA- 3,853 mi^2

P) Criteria for evaluating progress toward IM objectives: moose abundance and harvest

Q) Criteria for success with this program: progress within the MMA that contributes towards achieving the Unit 19A IM moose population objective of 7600-9300 and moose harvest objective of 400-550

R) **Department recommendation for IM program in this reporting period**: continue program (details provided in section 4)

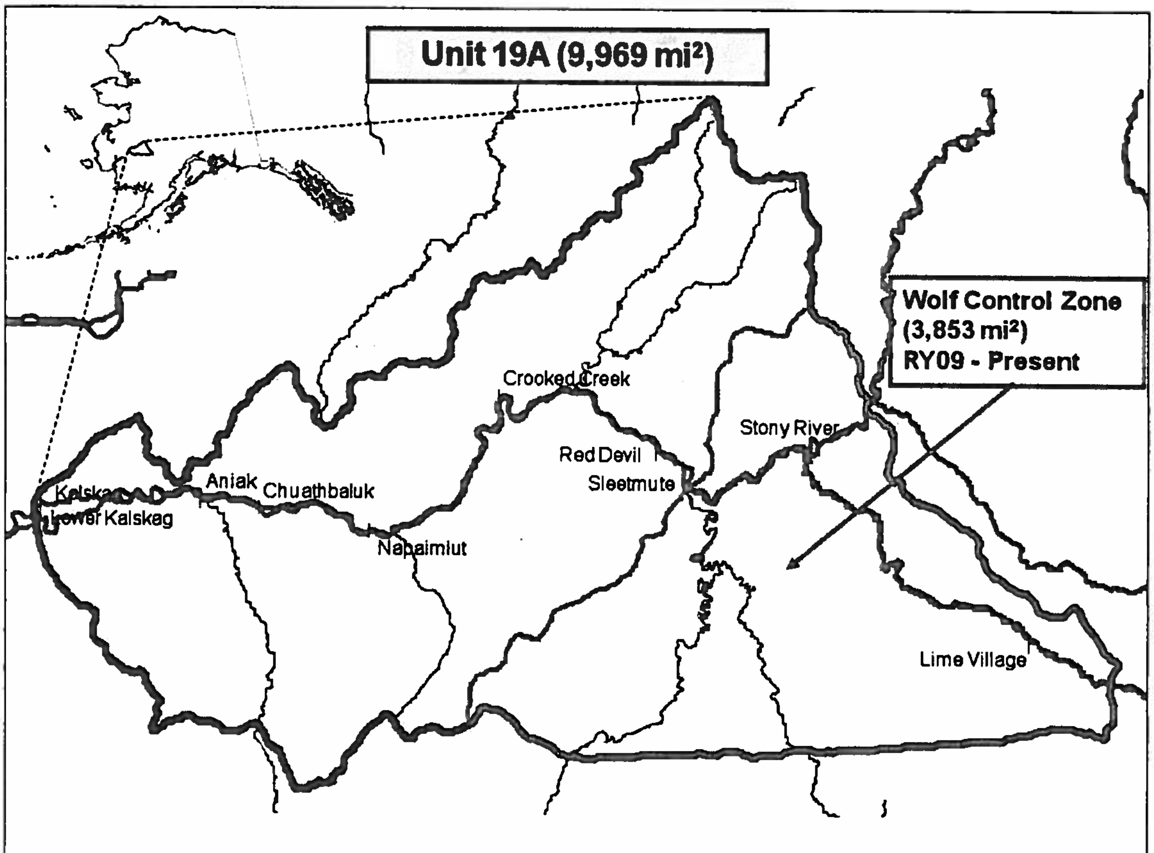

Figure 1. Unit 19A intensive management area and wolf control zone (wolf control zone is the same geographic area as the Central Kuskokwim Villages Moose Management Area (MMA).

2) Prey data

Date(s) and method of most recent abundance assessment for moose: March 2011-Goespatial moose population estimate (GSPE) in MMA

Compared to IM area, was a similar trend and magnitude of difference in abundance observed in nearby non-treatment area(s) since program inception Non-Treatment Area Not Established (Y/N) and in the last year Non-Treatment Area Not Established (Y/N)?

Date(s) of most recent age and sex composition survey: November 2011-east/west line transects in Holitna/Hoholitna Drainages

Compared to IM area, was a similar composition trend and magnitude of difference in composition observed in nearby non-treatment area(s) since program inception Non-Treatment Area Not Established (Y/N) and in the last year Non-Treatment Area Not Established (Y/N)?

Table 1. Moose abundance, age and sex composition in Central Kuskokwim Villages Moose Management Area (MMA) since program implementation in year 1 since program implementation in year 1 to year 8 . Regulatory year is 1 July to 30 June (e.g, RY 2010 is 1 July 2010 to 30 June 2011).

			Composition (number per 100 females)[2]		
Period	RY	Abundance (variation)[1]	Calves	Males	Total *n*
Year 1	2004	1085 moose (± 17%; 90% CI)			
Year 2	2005	--	24	8	307
Year 3	2006	--	--	--	--
Year 4	2007	1703 moose (± 28%; 90% CI)	45	35	200
Year 5	2008	--	27	34	124
Year 6	2009	--	36	51	129
Year 7	2010	962 moose (± 18% at 90% CI) 1666 (± 36% at 90% CI) –w/scf	19	48	212
Year 8	2011	--	31	38	164

[1]February/March GSPE surveys (observed moose, not corrected for sightability unless denoted w/scf).

[2]November line transect surveys; 2005 composition survey conducted in a larger geographic area than other years.

Describe trend in abundance or composition: No detectable trend in moose abundance within the MMA

Table 2. Moose harvest in Central Kuskokwim Villages Moose Management Area (MMA) since program implementation in year 1 to year 7. Regulatory year is 1 July to 30 June (e.g, RY 2010 is 1 July 2010 to 30 June 2011).

Period	RY	Reported		Total harvest	Other mortality[a]	Total
		Male	Female			
Year 1	2004	37	--	37	--	37
Year 2	2005	42	--	42	--	42
Year 3	2006	1[b]	--	1	0	1
Year 4	2007	2[b]	--	2	0	2
Year 5	2008	1[b]	--	1	4	5
Year 6	2009	1[b]	--	1	1	2
Year 7	2010	3[b]	--	3	0	3

[a]Mortuary harvest
[b]Hunting season closed, except within the Lime Village Management Area

Describe trend in harvest: declined due to hunting season closure in most of the MMA

Describe any other harvest related trend if appropriate: None

3) Predator data

Date(s) and method of most recent spring abundance assessment for wolves: February 2011- aerial reconnaissance survey and public control permittee interviews

Date(s) and method of most recent fall abundance assessment for wolves (if statistical variation available, describe method here and list in Table 3): February 2011- calculated by subtracting total removal from following spring abundance estimate

Other research or evidence of trend or abundance status in wolves: Pre-control wolf estimate was modeled at 75 – 100 in MMA

Table 3. Wolf abundance and removal in Central Kuskokwim Villages Moose Management Area (MMA): Removal objective are to reduce wolf numbers as low as possible in the MMA and to maintain 30-36 in all of Unit 19A to ensure wolves persist in the Unit. Regulatory year is 1 July to 30 June (e.g, RY 2010 is 1 July 2010 to 30 June 2011)

Period	RY	Fall abundance[a]	Harvest removal		Dept. control removal	Public control removal	Total removal	Spring abundance
			Trap	Hunt				
Year 1	2004	--	3	0	0	40	43	--
Year 2	2005	44-46	2	0	0	36	38	5-7
Year 3	2006	--	0	0	0	7	7	--
Year 4	2007	27	0	3	0	12	15	12
Year 5	2008	--	1	0	0	19	0	--
Year 6	2009	--	0	0	0	2	2	--
Year 7	2010	30	0	0	0	10	11	19

[a]Calculated by subtracting total removal from following spring abundance in each RY when spring abundance surveys were conducted

4) Department recommendations for annual evaluation (1 February) following Year 7 for Unit 19A wolf predation control program

Has progress toward defined criteria been achieved? No. No detectable change in moose abundance within the MMA.

Has achievement of success criteria occurred ? No

Recommendation for IM program (choose one): Continue with the addition of bear removal in a portion of Unit 19A

5) Appendix: Purpose and context of Department Report

This document provides a standard format for area biologists in the Alaska Department of Fish and Game (Department) to periodically report on progress in intensive management (IM) programs with predation control to the public and the Alaska Board of Game (Board). Predation control programs are authorized in Title 5, Chapter 92, Section 125 of the Alaska Administrative Code (5 AAC 92.125). The Department Report is premised on the 10 November 2010 draft *Guidelines for intensive management of big game in Alaska*, which describes the legal background, scientific principles, and management factors of producing and maintaining elevated harvests of ungulates (caribou, deer, or moose) in selected areas of Alaska. For IM programs initiated or renewed after 1 January 2012, the intent is that details of rationale, decision criteria involving public process and other biological and management factors for specific IM programs will be found in the corresponding *Intensive Management Plan.*

IM objectives for deer and moose are determined by the Board for a game management unit (GMU), whereas those for caribou are determined by herd. The IM program area may be described by geography (drainage) or community(s) if it is focused in a smaller area than the one describing the corresponding IM objectives, or if the area is composed of multiple GMUs. A predation control area may be smaller, and contained within, the IM program area or the area used for assessing predator abundance in a game management unit. Thus, the number of wolves, black bears, or grizzly/brown bears remaining in the larger abundance assessment area on a specific date incorporates the potential for recolonization of the smaller control area by predators on surrounding lands (where hunting and trapping but not control methods are allowed), in addition to reproduction by predators remaining in the control area.

The Department Report to the Board documents evaluation of progress toward IM population or harvest objectives for ungulate or other objectives determined by public process for existing IM programs. Initially these reports will be only for areas with predation control to meet annual reporting requirements (Alaska Statutes, Title 16, Section 50, Part b), but they may be expanded to IM programs that only include ungulate habitat enhancement, diverse strategies for hunter access and ungulate harvest, and outreach programs (see *Guidelines*). Predator harvest is achieved through hunting and trapping regulations, whereas predation control typically removes predators by additional means such as by public participants (by special Department permit) or by Department personnel (non-lethal methods could also be applied). Report information will be used for Department recommendations and Board decisions on continuing, modifying, suspending, or terminating IM programs. The annual report will be issued on 1 February with an interim report on 1 August. These dates account for lag time in entering reported predator removal and ungulate harvest into an electronic database for archive and analysis. The August interim report will have the ungulate harvest and wolf removal from the previous regulatory year, whereas the February annual report will include most of the ungulate harvest from the prior fall and bear removal from the prior regulatory and calendar years. Report information is for a single program, but it may also be presented in a table showing multiple IM programs in a region or all IM programs statewide.

UNIT 19D EAST: DEPARTMENT REPORT FOR INTENSIVE MANAGEMENT (IM) FOR MOOSE WITH WOLF, BLACK BEAR, AND GRIZZLY BEAR PREDATION CONTROL

Alaska Department of Fish and Game, Division of Wildlife Conservation

1) Description of IM Program[1] and Department recommendation for reporting period

A) This report is an interim review X or renewal evaluation ___ for a predation control program authorized by the Alaska Board of Game (Board) under 5 AAC 92.125

B) Date this report was submitted by the Department to the Board:

1 February X (annual report) 1 August ___ (interim annual update[2]) Year 2012

C) Program name (geographic description/GMU and species/herd): Unit 19D East wolf and bear predation control program (Fig. 1)

D) Existing program has __ / does not have X an associated *Intensive Management Plan*

E) Game Management Unit(s) fully or partly included in IM program area: Unit 19D East

F) IM objectives for Moose: population size 6000 – 8000 harvest 400 – 600

G) Month and year the current predation control program was originally authorized: Fall 1995 by the Board. Indicate date(s) if renewed: January 2000, March 2003, January 2006, May 2006, March 2009

H) Predation control is currently active X or temporarily inactive ____ in this IM area

I) If active, month and year the current predation control program began December 2003 or resumed ___.

J) Indicate if a habitat management program funded by the Department or from other sources is currently active in this IM area (Y/N) N

K) Size of IM program area (square miles) and geographic description: Unit 19D East: 8,513

L) Size and geographic description of area for assessing ungulate abundance: Upper Kuskokwim Villages Moose Management Area (MMA)-1,118 mi^2

M) Size and geographic description of area for ungulate harvest reporting: MMA-1,118 mi^2

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[1] For purpose and context of this report format, see appendix.

N) Size and geographic description of area for assessing predator abundance: Wolf Control Focus Area (WCFA)-4,484 mi^2 ;Bear Control Area (BCA)-528 mi^2

O) Size and geographic description of predation control area: WCFA-4,484 mi^2; BCA-528 mi^2;

P) Criteria for evaluating progress toward IM objectives: moose abundance and harvest

Q) Criteria for success with this program: MMA abundance=2500 and MMA harvest=100

R) **Department recommendation for IM program in this reporting period**: continue program (details provided in section 5)

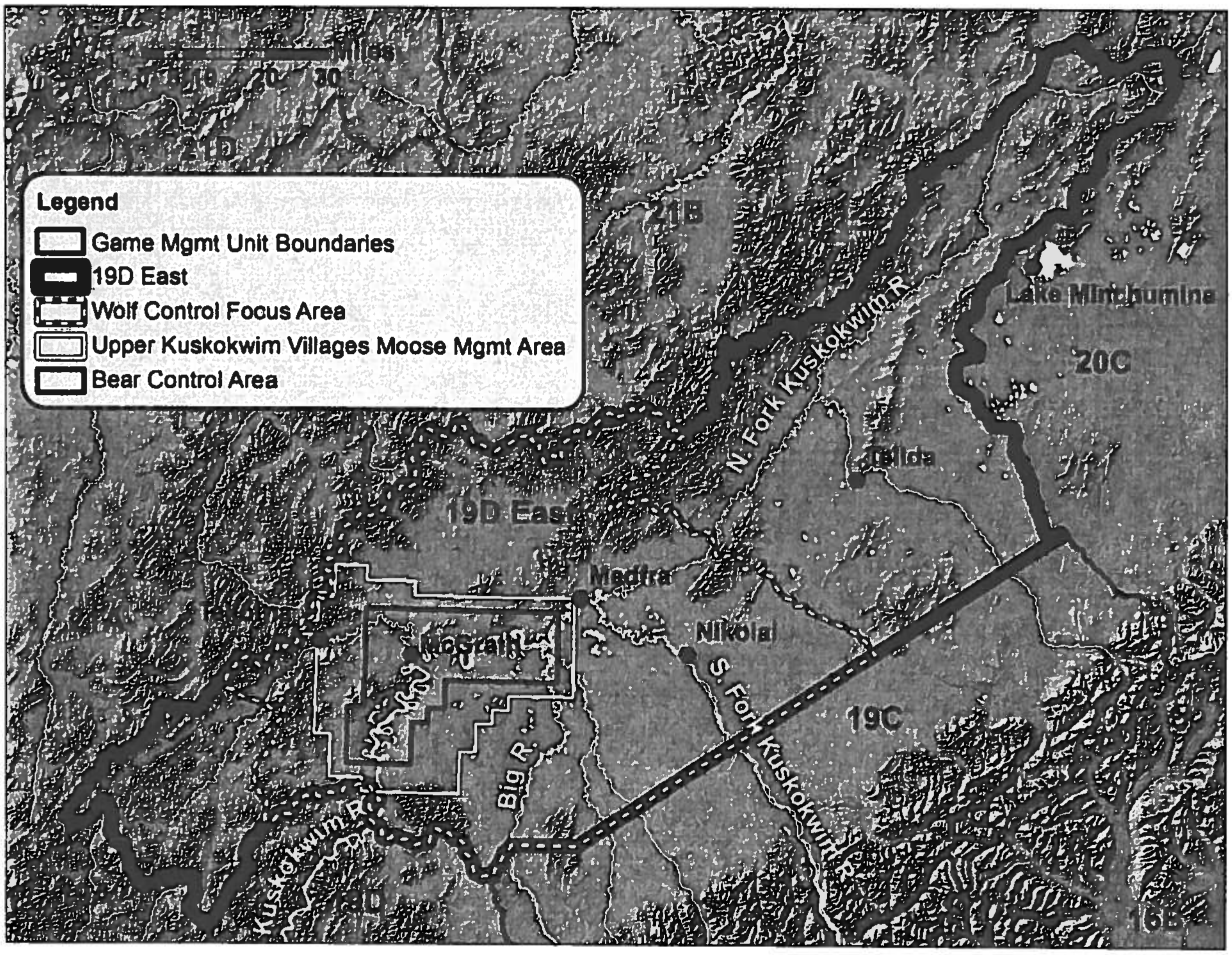

Figure 1. Unit 19D East intensive management area.

2) Prey data

Date(s) and method of most recent fall/spring abundance assessment for moose: Nov 2011-Goespatial moose population estimate (GSPE) in MMA

Compared to IM area, was a similar trend and magnitude of difference in abundance observed in nearby non-treatment area(s) since program inception Non-Treatment Area Not Established (Y/N) and in the last year Non-Treatment Area Not Established (Y/N)?

Date(s) of most recent age and sex composition: Nov 2011-goespatial moose population estimate in MMA

Compared to IM area, was a similar composition trend and magnitude of difference in composition observed in nearby non-treatment area(s) since program inception Non-Treatment Area Not Established (Y/N) and in the last year Non-Treatment Area Not Established (Y/N)?

Table 1. Moose abundance, age and sex composition in Upper Kuskokwim Villages Moose Management Area (MMA) since program implementation in year 1 to year 11. Regulatory year is 1 July to 30 June (e.g, RY 2010 is 1 July 2010 to 30 June 2011).

			Composition (number per 100 Cows)			
Period	RY	Abundance [a] (90% CI)	Calves (90% CI)	Yearling Bulls (90% CI)	Bulls (90% CI)	Total *n*
Year 1	2001	868(±147)	36(±10)	8(±3)	21(±6)	455
Year 2	2002	--	--	--	--	--
Year 3	2003	--	--	--	--	--
Year 4	2004	1192(±228)	66(±18)	8(±4)	18(±6)	578
Year 5	2005	--	--	--	--	--
Year 6	2006	1308(±174)	55(±10)	12(±3)	30(±8)	762
Year 7	2007	1720(±306)	53(±14)	15(±4)	36(±10)	844
Year 8	2008	1718(±352)	44(±12)	14(±5)	40(±11)	678
Year 9	2009	1820 (±323)	38 (±10)	11 (±4)	40 (±11)	711
Year 10	2010	1796(±312)[b]	43[b]	16[b]	49[b]	712
Year 11	2011	1648[b]	42[b]	10[b]	33[b]	639

[a]Estimate with sightability correction applied
[b]Preliminary estimate

Describe trend in abundance or composition: Results of a RY 2001-2009 trend analysis indicate a statistically significant increasing linear trend in abundance within the MMA (115 moose/year, SE=19.2, P=0.004).

Table 2. Moose harvest in Upper Kuskokwim Villages Moose Management Area (MMA) since program implementation in year 1 to year 11. Regulatory year is 1 July to 30 June (e.g, RY 2010 is 1 July 2010 to 30 June 2011).

Period	RY	Reported		Other mortality[a]	Total
		Male	Female		
Year 1	2001	29	0	-[b]	29
Year 2	2002	23	0	-[b]	23
Year 3	2003	32	0	-[b]	32
Year 4	2004	7	0	-[b]	7
Year 5	2005	14	0	-[b]	14
Year 6	2006	12	0	3	15
Year 7	2007	25	0	1	26
Year 8	2008	61	0	1	62
Year 9	2009	56	0	2	58
Year 10	2010	50	0	2	52
Year 11	2011[c]	95-100	0	0	95-100

[a]Mortuary harvest
[b]Records destroyed by fire
[c]Preliminary data

Describe trend in harvest: Increasing as moose have become more abundant and seasons liberalized

Describe any other harvest related trend if appropriate: None

3) Predator data

Wolves

Date(s) and method of most recent spring abundance assessment for wolves: March 2009- aerial reconnaissance survey

Date(s) and method of most recent fall abundance assessment for wolves: March 2009-calculated by subtracting total removal from following spring abundance estimate

Other research or evidence of trend or abundance status in wolves: Keech et al. In Press. Effects of Predator Treatments, Individual Traits, and Environment on Moose Survival in Alaska. Journal of Wildlife Management

Table 3. Wolf abundance and removal in Wolf Control Focus Area (WCFA). Removal objectives are to reduce wolf numbers as low as possible in the WCFA and to maintain a minimum of 40 wolves in all of Unit 19D east to ensure wolves persist in the unit. The WCFA was established in RY 2010. Prior to RY 2010, control was conducted in various different geographic areas. All values listed are for the current WCFA. Regulatory year is 1 July to 30 June (e.g, RY 2010 is 1 July 2010 to 30 June 2011).

Period	RY	Fall abundance[a]	Harvest removal		Dept. control removal	Public control removal[b]	Total removal	Spring abundance[c]
			Trap	Hunt				
Year 1	2001	89	19	3	0	N/A	22	67
Year 2	2002	--	28	5	0	N/A	33	--
Year 3	2003	--	9	1	0	17	27	--
Year 4	2004	--	12	2	0	12	26	--
Year 5	2005	26	9	1	0	3	13	13
Year 6	2006	29	13	1	0	2	16	13
Year 7	2007	--	6	2	0	19	27	--
Year 8	2008	--	4	3	0	19	26	--
Year 9	2009	37	7	4	0	4	15	22
Year 10	2010	--	4	2	0	13	19	--
Year 11	2011[d]	--	1	0	0	2	3	--

[a]Calculated by subtracting total removal from following spring abundance in each RY when spring abundance surveys were conducted
[b]Public control removal began in RY 2003
[c]Calculated by extrapolating density within a 3,210 mi^2 aerial reconnaissance survey area within the WCFA to the entire WCFA
[d]Preliminary data

Black Bears

Date(s) and method of most recent spring abundance assessment for black bears. May 2010-mark/recapture estimator

Date(s) and method of most recent fall abundance assessment for black bears. November 2009-calculated by subtracting total removal from May 2010 abundance estimate.

Other research or evidence of trend or abundance status in black bears: Keech et al. In Press. Effects of Predator Treatments, Individual Traits, and Environment on Moose Survival in Alaska. Journal of Wildlife Management.

Table 4. Black bear abundance and removal in Bear Control Area (BCA). Removal objective is to reduce bear numbers as low as possible within the BCA. Regulatory year is 1 July to 30 June (e.g, RY 2010 is 1 July 2010 to 30 June 2011).

Period	RY	Spring abundance[a] (95% CI)	Harvest removal		Dept. control removal		Public control removal		Total removal	Fall abundance[a,b]
			FA[c]	SPR[d]	FA	SP	FA	SP		
Year 1	2001	--	1	0	0	0	0	0	1	--
Year 2	2002	96(±13)[e]	4	0	0	67[f]	0	0	73	--
Year 3	2003	30(±9)[e]	1	5	0	26[f]	0	0	32	23
Year 4	2004	--	0	1	0	0	0	0	1	Near 0
Year 5	2005	--	1	5	0	0	0	0	6	--
Year 6	2006	70(±14)[g]	0	0	0	0	0	0	0	--
Year 7	2007	--	1	7	0	0	0	0	8	70
Year 8	2008	--	1	5	0	0	0	0	9	--
Year 9	2009	102[g,h]	4	0	0	0	0	6	10	--
Year 10	2010	--	1	2	0	0	4	13	20	92[h]
Year 11	2011[h]	--	1	--	--	--	--	--	--	--

[a]Does not include cubs
[b]Calculated by subtracting total removal from spring abundance estimate in the previous RY
[c]Fall
[d]Spring
[e]Removal estimator
[f]Non-lethal removal
[g]Mark/recapture estimator
[h] Preliminary

Grizzly Bears

Date(s) and method of most recent spring abundance assessment for grizzly bears: May 2002- Estimated by using density extrapolated from other areas of Interior Alaska with comparable habitat

Date(s) and method of most recent fall abundance assessment for grizzly bears: November 2003- calculated by subtracting total removal from May 2002 abundance estimate.

Other research or evidence of trend or abundance status in grizzly bears: Keech et al. In Press. Effects of Predator Treatments, Individual Traits, and Environment on Moose Survival in Alaska. J. of Wildl. Manage.

Table 5. Brown bear abundance and removal in Bear Control Area (BCA). Removal objective is to reduce bear numbers as low as possible within the BCA. Regulatory year is 1 July to 30 June (e.g, RY 2010 is 1 July 2010 to 30 June 2011).

Period	RY	Spring abundance[a]	Harvest removal		Dept. control removal		Public control removal		Total removal	Fall abundance[a,b]
			FA[c]	SP[d]	FA	SP	FA	SP		
Year 1	2001	--	0	0	0	0	0	0	0	--
Year 2	2002	12[e]	0	0	0	6[f]	0	0	6	--
Year 3	2003	--	0	0	0	0	0	0	0	6
Year 4	2004	--	0	0	0	0	0	0	0	--
Year 5	2005	--	0	0	0	0	0	0	0	--
Year 6	2006	--	0	2	0	0	0	0	2	--
Year 7	2007	--	1	2	0	0	0	0	3	--
Year 8	2008	--	0	0	0	0	0	0	0	--
Year 9	2009	--	2	0	0	0	0	0	2	--
Year 10	2010	--	0	0	0	0	0	0	0	--
Year 11	2011[g]	--	0	--	0	--	0	--	0	--

[a]Does not include cubs
[b]Calculated by subtracting total removal from spring abundance estimate in the previous RY
[c]Fall
[d]Spring
[e]Estimated by using density extrapolated from other areas of Interior Alaska with comparable habitat
[f]Non-lethal removal
[g]Preliminary

4) Habitat data and nutritional condition of prey species

Where active habitat enhancement is occurring or was recommended in the *Intensive Management Plan*, describe progress toward objectives: No active habitat enhancement occurring.

Table 5. Nutritional indicators for moose in Upper Kuskokwim Villages Moose Management Area (MMA). Regulatory year is 1 July to 30 June (e.g, RY 2010 is 1 July 2010 to 30 June 2011).

Period	RY	Twinning Rate for Radiocollared cows >2 yrs (*n*)	Twinning Rate uncollared cows (*n*)
Year 1	2001	59% (22)	39% (46)
Year 2	2002	24% (25)	36% (39)
Year 3	2003	32% (31)	39% (31)
Year 4	2004	44% (45)	50% (40)
Year 5	2005	40% (60)	35% (29)
Year 6	2006	52% (56)	50% (30)
Year 7	2007	55% (51)	--
Year 8	2008	33% (43)	26% (87)
Year 9	2009	33% (40)	29% (45)
Year 10	2010	--	37% (38)
Year 11	2011	--	--

5) Department recommendations[3] for annual evaluation (1 February) following Year 10 for Unit 19D East wolf and bear predation control program

Has progress toward defined criteria been achieved? Yes. Results of a 2001-2009 trend analysis indicate a statistically significant increasing linear trend in moose abundance within the MMA (115 moose/year, SE=19.2, P=0.004). MMA moose harvest has increased as abundance has increased and seasons have been liberalized. Increases with the MMA are contributing to achievement of Unit 19D East IM objectives.

Has achievement of success criteria occurred? Yes. The MMA abundance objective of 2500 has not been achieved, but the harvest objective of 100 is within the range of our estimated harvest from the MMA.

Recommendation for Predation Control: Continue as currently being conducted.

6) Appendix: Purpose and context of Department Report

This document provides a standard format for area biologists in the Alaska Department of Fish and Game (Department) to periodically report on progress in intensive management (IM) programs with predation control to the public and the Alaska Board of Game (Board). Predation control programs are authorized in Title 5, Chapter 92, Section 125 of the Alaska Administrative Code (5 AAC 92.125). The Department Report is premised on the 10 November 2010 draft *Guidelines for intensive management of big game in Alaska*, which describes the legal background, scientific principles, and management factors of producing and maintaining elevated harvests of ungulates (caribou, deer, or moose) in selected areas of Alaska. For IM programs initiated or renewed after 1 January 2012, the intent is that details of rationale, decision criteria involving public process and other biological and management factors for specific IM programs will be found in the corresponding *Intensive Management Plan.*

IM objectives for deer and moose are determined by the Board for a game management unit (GMU), whereas those for caribou are determined by herd. The IM program area may be described by geography (drainage) or community(s) if it is focused in a smaller area than the one describing the corresponding IM objectives, or if the area is composed of multiple GMUs. A predation control area may be smaller, and contained within, the IM program area or the area used for assessing predator abundance in a game management unit. Thus, the number of wolves, black bears, or grizzly/brown bears remaining in the larger abundance assessment area on a specific date incorporates the potential for recolonization of the smaller control area by predators on surrounding lands (where hunting and trapping but not control methods are allowed), in addition to reproduction by predators remaining in the control area.

The Department Report to the Board documents evaluation of progress toward IM population or harvest objectives for ungulate or other objectives determined by public process for existing IM programs. Initially these reports will be only for areas with predation control to meet annual reporting requirements (Alaska Statutes, Title 16, Section 50, Part b), but they may be expanded to IM programs that only include ungulate habitat enhancement, diverse strategies for hunter access and ungulate harvest, and outreach programs (see *Guidelines*). Predator harvest is achieved through hunting and trapping regulations, whereas predation control typically removes predators by additional means such as by public participants (by special Department permit) or by Department personnel (non-lethal methods could also be applied). Report information will be used for Department recommendations and Board decisions on continuing, modifying, suspending, or terminating IM programs. The annual report will be issued on 1 February with an interim report on 1 August. These dates account for lag time in entering reported predator removal and ungulate harvest into an electronic database for archive and analysis. The August interim report will have the ungulate harvest and wolf removal from the previous regulatory year, whereas the February annual report will include most of the ungulate harvest from the prior fall and bear removal from the prior regulatory and calendar years. Report information is fora single program, but it may also be presented in a table showing multiple IM programs in a region or all IM programs statewide.

Special Publication No. BOG 2012-02 RC 4, Tab 6

Customary and Traditional Use Worksheet, Brown Bear, Game Management Units 20A, 20B, and 20C

by

Caroline L. Brown

February 2012

Alaska Department of Fish and Game Division of Subsistence

ALASKA DEPARTMENT OF FISH AND GAME

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Division of Subsistence. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Department of Fish and Game	ADF&G
Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	\$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Measures (fisheries)

fork length	FL
mideye-to-fork	MEF
mideye-to-tail-fork	METF
standard length	SL
total length	TL

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	HA
base of natural logarithm	e
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ2,etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	E
greater than	$>$
greater than or equal to	$\geq$
harvest per unit effort	HPUE
less than	$<$
less than or equal to	$\leq$
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	log2, etc.
minute (angular)	'
not significant	NS
null hypothesis	HO
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

SPECIAL PUBLICATION NO. BOG 2012-02

CUSTOMARY AND TRADITIONAL USE WORKSHEET, BROWN BEAR, GAME MANAGEMENT UNITS 20A, 20B, AND 20C

by

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February 2012

The Division of Subsistence Special Publications series was established for the publication of techniques and procedure manuals, informational pamphlets, special subject reports to decision-making bodies, symposia and workshop proceedings, application software documentation, in-house lectures, and other documents that do not fit in another publications series of the Division of Subsistence. Most Special Publications are intended for readers generally interested in fisheries, wildlife, and the social sciences; for natural resource technical professionals and managers; and for readers generally interested the subsistence uses of fish and wildlife resources in Alaska.

Special Publications are available through the Alaska Resources Library and Information Services (ARLIS), the Alaska State Library and on the Internet: http://www.adfg.alaska.gov/sf/publications/. This publication has undergone editorial and professional review.

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TABLE OF CONTENTS

LIST OF TABLES

Table **Page**

LIST OF FIGURES

Figure **Page**

INTRODUCTION

BACKGROUND

The administrative history of customary and traditional use determinations (C&T) for brown bears *Ursus arctos* in game management units (GMU) 20A, 20B, and 20C is unclear. The Alaska Board of Game (BOG) appears to have considered customary and traditional (C&T) use data for brown bears in GMU 20 in 1991; however, it appears that the BOG did not make any determinations at that time for GMUs 20A, 20B, or 20C. Making a C&T determination for brown bears in these 3 subunits was again before the BOG at their 1992 Subsistence Consistency Review meeting, but the proposal was deferred and apparently never taken up again during subsequent meetings.

This revised C&T use summary for brown bears in GMU 20 provides an expanded description of C&T harvest and use practices for brown bears from Alaska Department of Fish and Game (ADF&G) sealing records and from the ethnographic and ethnohistorical literature of this region in eastern Interior Alaska.

THE EIGHT CRITERIA

CRITERION 1: LENGTH AND CONSISTENCY OF USE

A long-term consistent pattern of noncommercial taking, use, and reliance on the fish stock or game population that has been established over a reasonable period of time of not less than one generation, excluding interruption by circumstances beyond the user's control, such as unavailability of the fish or game caused by migratory patterns.

Historically, residents of Interior Alaska harvested brown bears as a source of meat, fat, and fur. Although brown bears were not a major subsistence resource, brown bears were harvested for food and other subsistence uses, for demonstration of hunting skill, and in protection of human life. Members of the Wood River, Nenana–Toklat, and Salcha bands of Athabascans hunted in the GMU 20A area; the Salcha band also hunted in the GMU 20B area; and Nenana–Toklat and Mouth-of-the-Toklat bands hunted in the GMU 20C area. Brown bear use in all 3 subunits appears to follow the pattern documented in the Upper Tanana, where use had declined by 1930 (McKennan 1959).

Additionally, residents of Anderson, Healy, and McKinley Village have harvested brown bears since the communities were established in 1961, 1915, and the 1920s, respectively. The populations of these communities are mixed; some households use wild resources while others do not.

According to the 1992 Subsistence Consistency Review Worksheet for brown bears in GMUs 20A–C, 2 use patterns are represented by brown bear hunters today. Sport hunters primarily concerned with obtaining trophy brown bears often use riverboats and aircraft to access areas of brown bear habitat specifically to hunt brown bears. Among area subsistence hunters, however, a general preference for black bear meat and strong traditional Athabascan beliefs surrounding the hunting and use of bears have limited the use of brown bears as a major food resource. In general, brown bears are more likely to be taken in the protection of human safety. Today, a few local hunters pursue brown bears: between 1992 and 2011, Alaska residents harvested an annual average of 9 brown bears in GMU 20A, 8 in 20B, and 4 in 20C (Table 1). More specifically, of the 9 brown bears harvested in 20A, 2 were taken by 20A residents; of the 8 harvested in 20B, 7 were taken by 20B residents; and of the 4 harvested in 20C, 2 were taken by 20C residents, including residents of Anderson–Clear, Healy, and Nenana. It is important to keep in mind that only a small portion of GMU 20A and a slightly larger portion of GMU 20B lie outside of the Fairbanks Non-Subsistence Use Area, however, the harvest reports are not broken out by those areas.

CRITERION 2: SEASONALITY

A pattern of taking or use recurring in specific seasons of each year.

Brown bears are available year-round, but are harvested primarily during the spring, summer, and fall when residents are engaged in other activities. Harvest by Tanana residents (likely in GMU 20C) was documented for the months of July, August, September, and October. Lake Minchumina area trappers occasionally shot bears in November and December. Minto residents generally harvested brown bears in May, August, and September as part of their annual harvest cycle (Andrews 1988).

Current regulations in GMUs 20A and 20B allow residents and nonresidents to harvest 1 brown bear per regulatory year between September 1 and May 31. In GMU 20C, residents and nonresidents can harvest 1 bear per regulatory year between August 10 and June 30.

CRITERION 3: MEANS AND METHODS OF HARVEST

A pattern of taking or use consisting of methods and means of harvest that are characterized by efficiency and economy of effort and cost.

Accounts of hunting in the upper Kantishna area to the west provide an example of harvest patterns in the region in the early 1800s (Hosley 1966). The winter harvest method involved awakening an animal from its den and spearing it. In spring, after bears emerged from their dens, hunters used ground squirrel nests to attract bears. A squirrel was released near a bear, and the bear would usually capture the squirrel and follow the tracks back to the nest, and then be harvested with lances while preoccupied with the squirrels. Lances were 8 to 10 feet long and tipped with bone. The shaft was tied with rawhide along its length to improve grip. Spears were the primary means of taking bears until firearms came into more common use in the area during the last Russian period (up to 1867). The historical practice of hunting bears from dens with spears was a demonstration of hunting skill and was considered prestigious.

CRITERION 4: GEOGRAPHIC AREAS

The area in which the noncommercial, long-term, and consistent pattern of taking, use, and reliance upon the fish stock and game population has been established.

Historically, Salcha band members hunted brown bears at a location called "Mutton Hill," in the Alaska Range between Dry Creek and Little Delta River (Andrews 1975). The Wood River band exploited a variety of resources from the Tanana River to the Alaska Range, generally east of the Nenana River. The Nenana–Toklat band used the areas near the Nenana River and to the west (Shinkwin and Case 1984).

Contemporary hunting areas by Nenana Valley residents were documented in a more recent 1987 study (ADF&G Community Subsistence Information System [CSIS[1]]). McKinley hunters reported bear hunting activity in the Yanert Valley and the hills immediately to the north (Figure 1). Healy hunters also used the Yanert Valley, as well as lands to the north of the Healy River extending to near Anderson (Figure 2). Anderson–Clear hunters also used the lands between their community and the Healy River (Figure 3). No brown bear hunting areas were mapped for Nenana (Shinkwin and Case 1984). Minchumina residents harvest brown bears in the Kantishna drainage (Bishop 1978).

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1. ADF&G Community Subsistence Information System: http://www.adfg.alaska.gov/sb/CSIS//. Herein after cited as CSIS.

CRITERION 5: MEANS OF HANDLING, PREPARING, PRESERVING, AND STORING

A means of handling, preparing, preserving, and storing fish or game that has been traditionally used by past generations, but not excluding recent technological advances where appropriate.

Division research shows that brown bears were used a variety of purposes. Bear fat was mixed with berries and also used in making fried bread and a variety of bannock. Hides were used as bedding and in the manufacture of waterproof footwear (including bear grease), and the bones were used for tools.

CRITERION 6: INTERGENERATIONAL TRANSMISSION OF KNOWLEDGE, SKILLS, VALUES, AND LORE

A pattern of taking or use that includes the handing down of knowledge of fishing or hunting skills, values, and lore from generation to generation:

Division research shows that extended families with 3 generations are common in Nenana and Minto and knowledge of hunting resources is shared within this family context. For example, knowledge of bear dens is still held today and passed on from generation to generation.

CRITERION 7: DISTRIBUTION AND EXCHANGE

A pattern of taking, use, and reliance where the harvest effort or products of that harvest are distributed or shared, including customary trade, barter, and gift-giving.

In general, wild resources are shared between households, especially between households related by kinship and between neighbors. In 1987, 3.1% of McKinley households reported receiving brown bears, while in Healy 1.2% reported using brown bears. Such sharing was not reported in Anderson (CSIS). Generally, division research shows that bear meat and fat is considered a specialty food and is served at community events, such as funerals or memorial potlatches to elders or special guests.

CRITERION 8: DIVERSITY OF RESOURCES IN AN AREA; ECONOMIC, CULTURAL, SOCIAL, AND NUTRITIONAL ELEMENTS

A pattern that includes taking, use, and reliance for subsistence purposes upon a wide variety of fish and game resources and that provides substantial economic, cultural, social, and nutritional elements of the subsistence way of life.

Eastern Interior communities harvest, use, and rely upon a wide diversity of fish and game resources. Documented harvests in these communities included 1,015 pounds per person in Minto in 1984 and 297 pounds per person in Lake Minchumina in 2002 (CSIS; Holen et al. 2006). Residents engage in an annual harvest cycle that includes the harvest of salmon, whitefishes, moose, waterfowl, and furbearers. The mix of species depends upon species availability. For most Interior Alaska communities, terrestrial mammals, such as moose and black bears, and salmon or other nonsalmon fish, comprise the largest components of the total community harvest. Brown bears are not historically an important contribution to the annual subsistence harvest of these communities, but they are targeted by some hunters and harvested opportunistically by others.

The amount of cash available in most eastern Interior Alaska communities is relatively small, compared to urban parts of Alaska. According to the U.S. Census Bureau (2011),[2] median household income for

2. U.S. Census Bureau, 2011, http://www.census.gov/, accessed on October 22, 2011.

Minto and Nenana for 2010 was approximately $40,313, compared with the Alaska average household income of more than $44,205. At the same time, imported food costs are very high. The people of the eastern Interior Alaska use and rely upon virtually all the edible wild game species available in their region. Many people in these communities cannot afford to buy meat or fish, and wild foods are essential to the quality of their diet. The harvesting of wild foods continues to evolve in many ways as social, economic, and environmental conditions change.

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TABLES AND FIGURES

Table 1. Brown bear harvests in game management units 20A, 20B, and 20C, by unit residency, 1992–2011.

	Brown bear harvests in GMU 20A, by year																				
GMU residency[a]	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
20A	3	0	0	0	0	1	2	1	2	3	1	2	3	1	4	1	2	2	3	2	33
20B	6	5	3	5	4	7	3	3	3	2	1	5	3	6	9	4	6	4	7	1	87
20C	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	3
Other Alaska	6	2	4	0	3	0	2	4	0	3	4	2	2	1	2	9	3	7	2	9	65
Total	**15**	**7**	**7**	**5**	**7**	**9**	**7**	**8**	**5**	**9**	**6**	**9**	**8**	**8**	**15**	**14**	**12**	**13**	**12**	**12**	**188**
	Brown bear harvests in GMU 20B, by year																				
GMU residency[a]	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
20A	1	1	1	0	1	0	0	2	3	0	1	1	0	2	0	0	2	1	0	0	16
20B	8	1	6	3	4	4	8	4	10	4	8	0	14	7	3	5	15	7	9	7	127
Other Alaska	0	0	0	1	2	0	1	1	0	0	0	0	1	3	0	1	2	0	1	4	17
Total	**9**	**2**	**7**	**4**	**7**	**4**	**9**	**7**	**13**	**4**	**9**	**1**	**15**	**12**	**3**	**6**	**19**	**8**	**10**	**11**	**160**
	Brown bear harvests in GMU 20C, by year																				
GMU residency[a]	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
20A	1	0	1	0	4	1	0	2	3	2	0	0	1	0	3	0	2	3	0	0	23
20B	0	0	3	2	2	3	1	1	0	0	0	0	1	0	2	0	0	0	0	0	15
20C	0	0	0	0	0	0	0	1	0	0	0	0	0	0		0	0	0	0	0	1
Other Alaska	0	0	2	0	0	0	1	1	3	1	3	1	1	0	2	1	1	2	4	1	24
Total	**1**	**0**	**6**	**2**	**6**	**4**	**2**	**5**	**6**	**3**	**3**	**1**	**3**	**0**	**7**	**1**	**3**	**5**	**4**	**1**	**63**

Source ADF&G bear sealing records, 1992–2011.

a. Residency includes military bases.

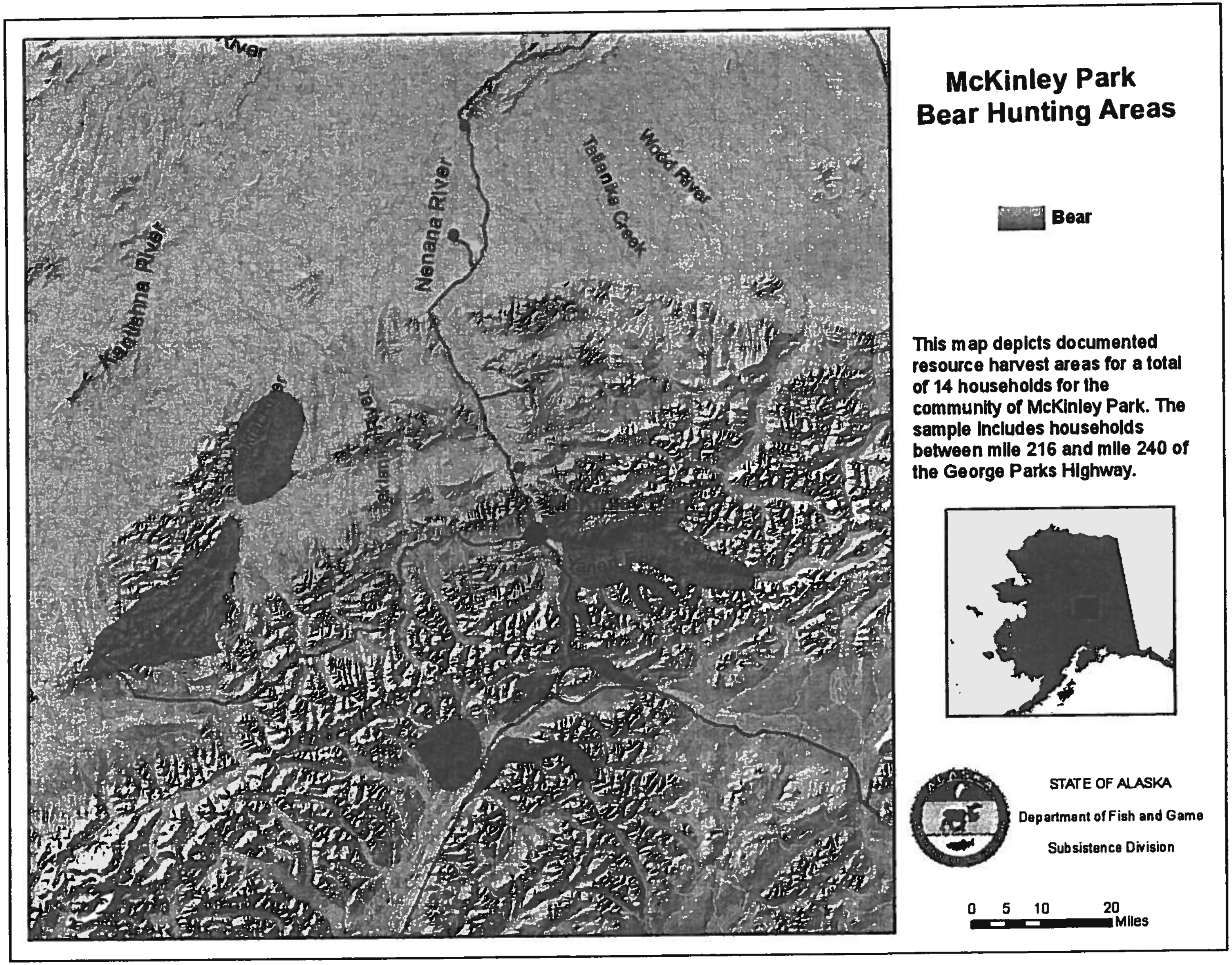


Figure 1.–McKinley Park bear harvesting areas.

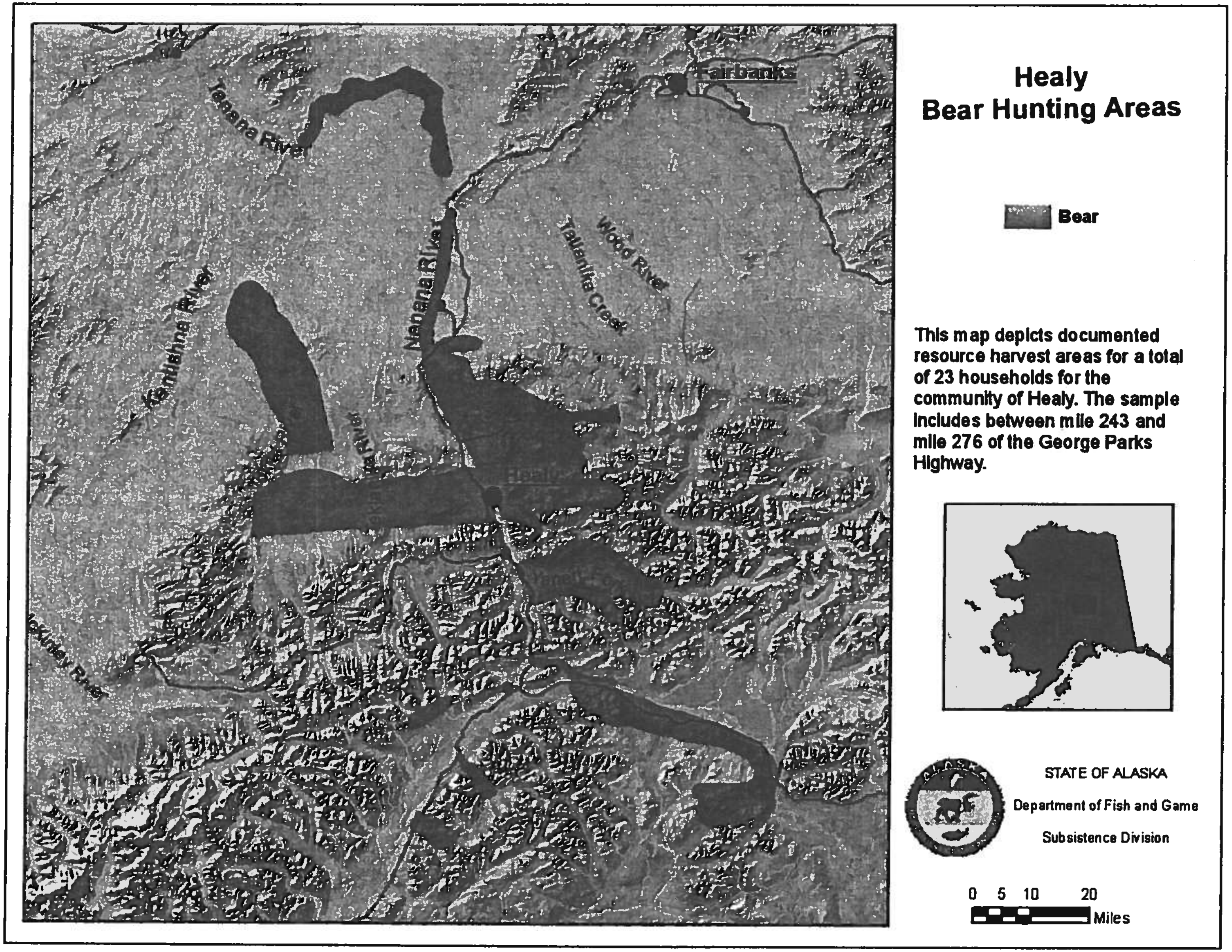


Figure 2.–Healy bear harvesting areas.

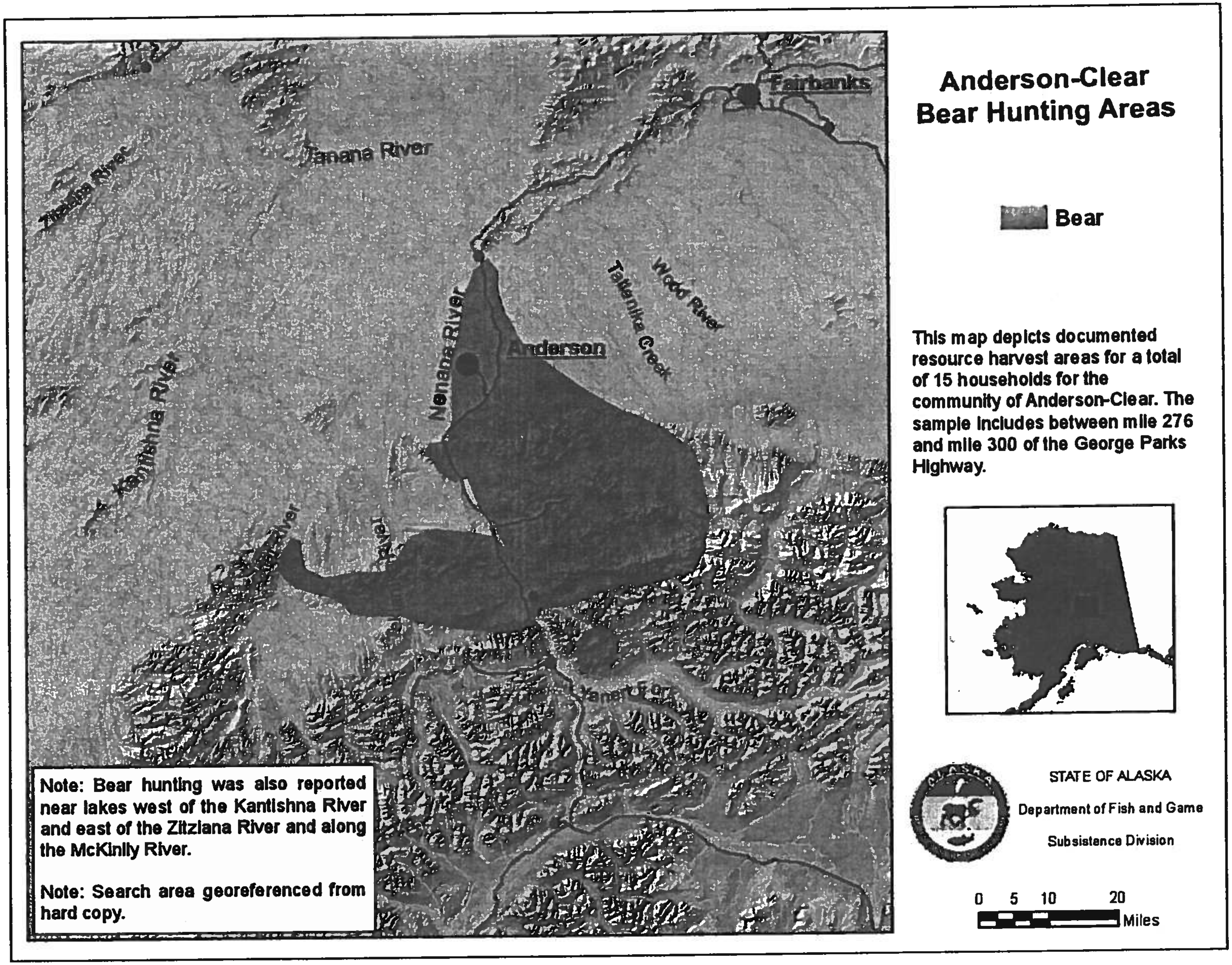
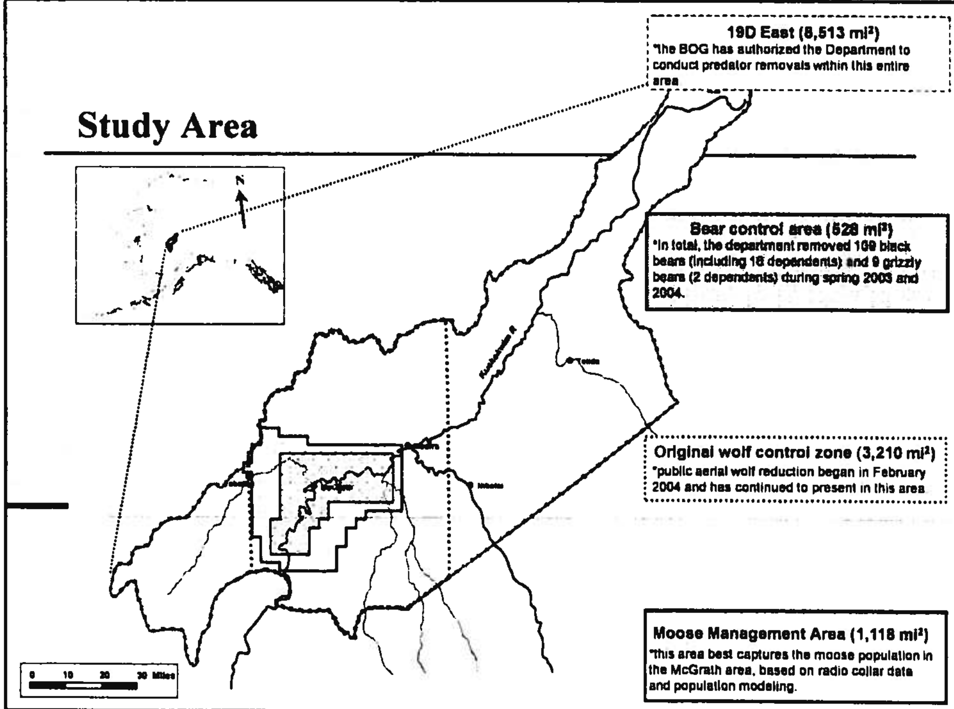


Figure 3.–Anderson–Clear bear harvesting areas.

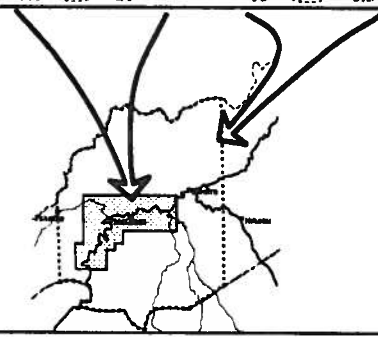
Response of Moose to Bear Removals and Public Wolf Control Near McGrath, Alaska

Study Area



Estimates of black bears and wolves in the McGrath area pre- and post-control

	Black Bears (528mi² bear control area)			Wolves (3,210mi² wolf control area)		
	Population estimate		Density (bears/100mi²)	Population estimate		Density (wolves/100mi²)
Pre-control	96	2003	18	47	2001	1.5
Immediate post-control	4	2004	0.8	11	2005	0.3
Mid-point estimate	70	2007	13	11	2006	0.3
Most recent estimate	111	2010	21	16	2009	0.5



Survival of McGrath area moose calves

Season	2001	2002	2003	2004	2005	2006	2007	2008*	2009*	2010
Summer/Fall	37%	36%	62%	79%	54%	73%	45%	54%	63%	50%

No predator control

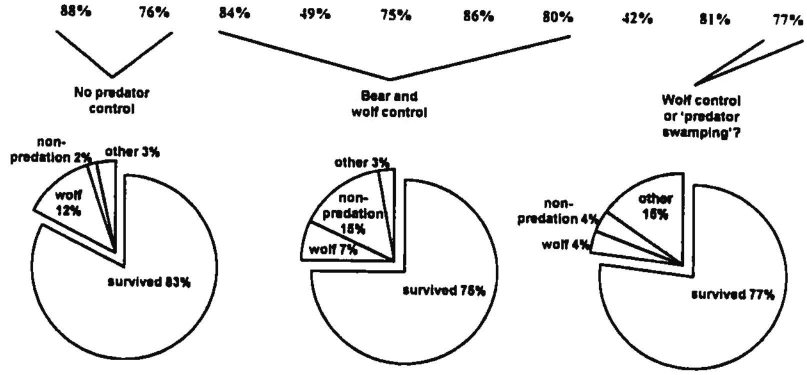
Bear and wolf control

Wolf control or 'predator swamping'?

*2008 and 2009 rates based on observations of collared adult females, not on collared calves

Survival of McGrath area moose calves

Season	2001	2002	2003	2004	2005	2006	2007	2008*	2009*	2010
Winter	88%	76%	84%	49%	75%	86%	80%	42%	81%	77%



*2008 and 2009 rates based on observations of collared adult females, not on collared calves

Survival of McGrath area moose calves

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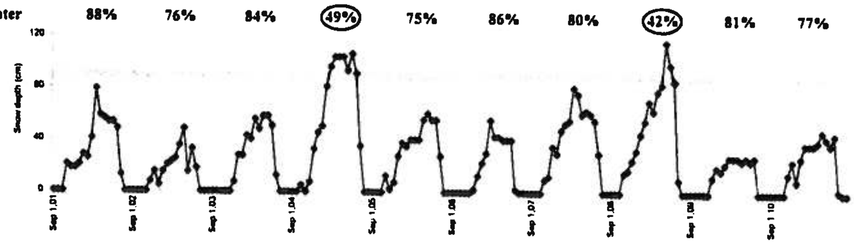


*2008 and 2009 rates based on observations of collared adult females, not on collared calves

Survival of McGrath area moose calves

Season	2001	2002	2003	2004	2005	2006	2007	2008*	2009*	2010
Annual	33%	26%	52%	40%	42%	63%	35%	23%	50%	39%

No predator control (2001–2002): 30%

Bear and wolf control (2003–2010): 43%

Annual survival = summer survival (function of predators) x winter survival (function of weather)

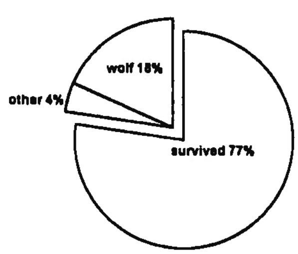
*2008 and 2009 rates based on observations of collared adult females, not on collared calves

Survival of McGrath area yearling moose

Season	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Annual	83%	74%	75%	94%	96%	84%	–	92%	83%	92%

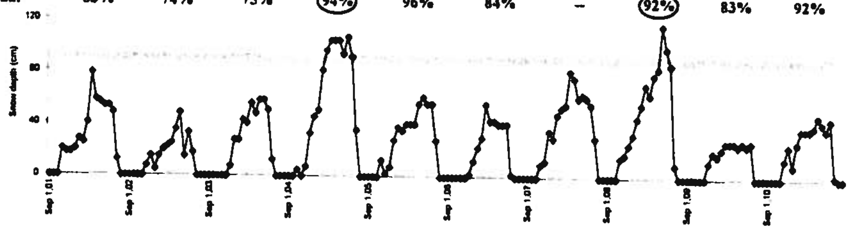
No wolf control (2001–2003)

Wolf control (2004–2010)



Survival of McGrath area yearling moose

Season	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Annual	83%	74%	75%	94%	96%	84%	–	92%	83%	92%

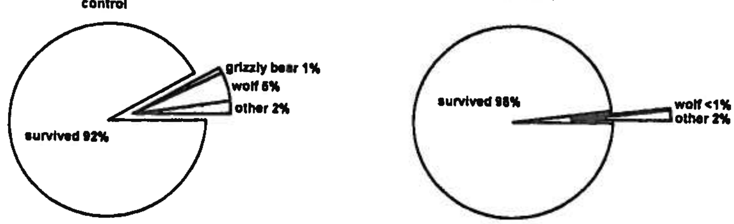


Survival of McGrath area adult moose

2001	2002	2003	2004	2005	2006	2007	2008	2009
90%	91%	95%	100%	98%	98%	98%	96%	98%

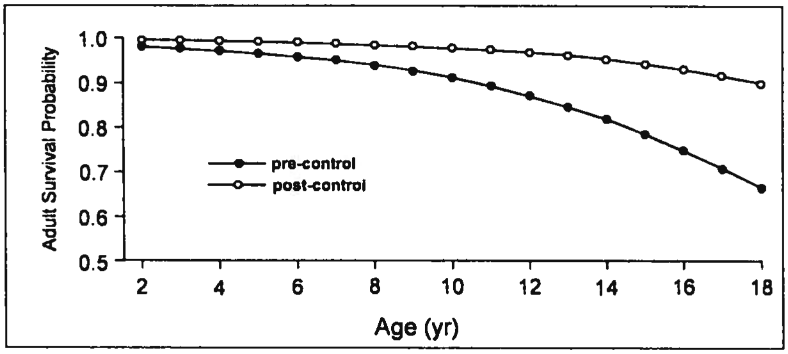
No wolf control

Wolf control

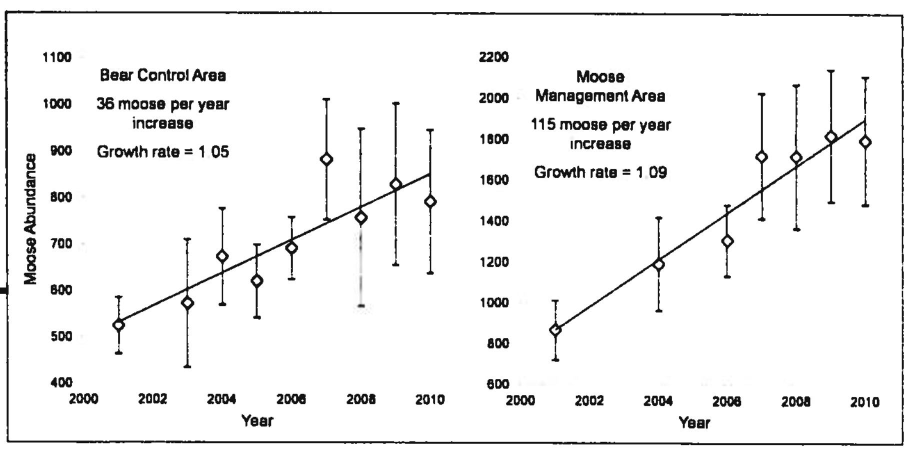


*Adult survival is heavily influenced by age

Survival of McGrath area adult moose



Population trends

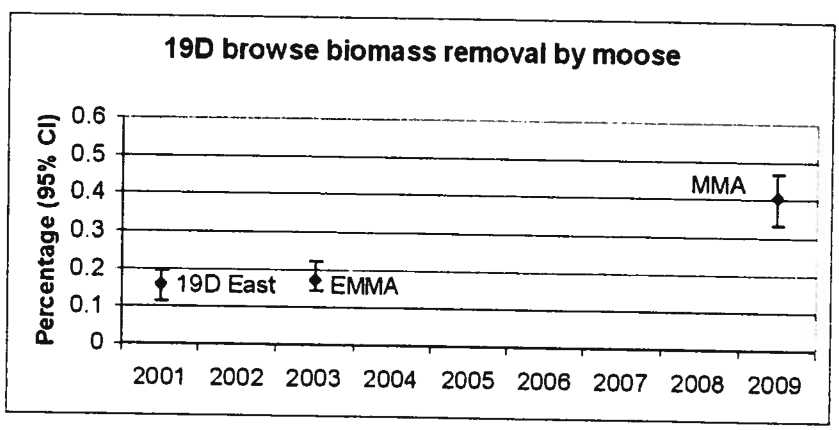


Reproduction and condition indices

Year	Observed rate of parturition for radiocollared cows > 2 yr-of-age (*n*)	Observed rate of twinning for radiocollared cows > 2 yr-of-age (*n*)	Observed rate of twinning for uncollared cows (*n*)	Newborn weights in kg (*n*)*		10-month-old calf weights in kg (*n*)
				Singletons	Twins	
2001	73% (22)	25% (16)	--	19.6 (19)	17.4 (13)	178.1 (15)
2002	88% (25)	59% (22)	39% (46)	18.9 (16)	17.4 (38)	191.4 (15)
2003	84% (31)	24% (25)	36% (39)	19.4 (23)	16.4 (18)	179.2 (15)
2004	80% (40)	32% (31)	39% (31)	20.2 (23)	16.2 (26)	184.5 (15)
2005	92% (51)	44% (45)	50% (40)	18.3 (20)	15.4 (32)	174.8 (15)
2006	97% (62)	40% (60)	35% (29)	17.5 (15)	15.2 (30)	167.9 (15)
2007	95% (59)	52% (56)	50% (30)	18.8 (14)	16.4 (23)	185.3 (15)
2008	88% (58)	55% (51)	--	--	--	--
2009	87% (52)	33% (43)	26% (87)	--	--	160.7 (15)
2010	93% (43)	33% (40)	29% (45)	18.2 (17)	15.6 (14)	171.4 (15)

*Only newborn calves known or estimated to be ≤3 days old were used for these calculations

Browse usage in the McGrath area



Male vs. female bears as predators

DNA sex identification of suspected predator hair samples collected at mortality sites.

	Black bear		Brown bear	
Year	Male	Female	Male	Female
2001	6	3	2	0
2002	7	8	1	4
2003	4	4	1	0
2004	1	0	0	0
2005	4	2	1	1
2006	2	1	1	0
2007	1	3	3	1
2010	5	2	0	1
Total	**30**	**23**	**9**	**7**

Summary

1 – Bear removal increased summer survival of moose calves. To a lesser extent wolf removals also resulted in increased summer survival. Increased summer survival translated into increased annual survival of moose calves given favorable winter weather. Calf survival was negatively affected by deep snow.

2 – Wolf removals led to increased annual survival of yearling and adult moose. Yearling and adult survival was not influenced by snow depth.

3 – Moose population growth was relatively slow (annual growth rate = 1.05-1.09, with a partial hunting closure).

4 – DNA analysis indicated both male and female bears preyed on moose calves.

5 – Numerical recovery of the black bear population in the bear control area was relatively rapid (6 years).

6 – The duration of elevated moose numbers and future yield of moose remains to be determined.

7 – See: KEECH, M. A., M. S. LINDBERG, R. D. BOERTJE, P. VALKENBURG, B. D. TARAS, T. A. BOUDREAU, AND K. B. BECKMEN. 2011. Effects of predator treatments, individual traits, and environment on moose survival in Alaska. *Journal of Wildlife Management 75*: 1361–1380.

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Research Article

Effects of Predator Treatments, Individual Traits, and Environment on Moose Survival in Alaska

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ABSTRACT We studied moose (*Alces alces*) survival, physical condition, and abundance in a 3-predator system in western Interior Alaska, USA, during 2001–2007. Our objective was to quantify the effects of predator treatments on moose population dynamics by investigating changes in survival while evaluating the contribution of potentially confounding covariates. In May 2003 and 2004, we reduced black bear (*Ursus americanus*) and brown bear (*U. arctos*) numbers by translocating bears ≥240 km from the study area. Aircraft-assisted take reduced wolf (*Canis lupus*) numbers markedly in the study area during 2004–2007. We estimated black bears were reduced by approximately 96% by June 2004 and recovered to within 27% of untreated numbers by May 2007. Brown bears were reduced approximately 50% by June 2004. Late-winter wolf numbers were reduced by 75% by 2005 and likely remained at these levels through 2007. In addition to predator treatments, moose hunting closures during 2004–2007 reduced harvests of male moose by 60% in the study area. Predator treatments resulted in increased calf survival rates during summer (primarily from reduced black bear predation) and autumn (primarily from reduced wolf predation). Predator treatments had little influence on survival of moose calves during winter; instead, calf survival was influenced by snow depth and possibly temperature. Increased survival of moose calves during summer and autumn combined with relatively constant winter survival in most years led to a corresponding increase in annual survival of calves following predator treatments. Nonpredation mortalities of calves increased following predator treatments; however, this increase provided little compensation to the decrease in predation mortalities resulting from treatments. Thus, predator-induced calf mortality was primarily additive. Summer survival of moose calves was positively related to calf mass ($\beta > 0.07$, SE $= 0.073$) during treated years and lower ($\beta = -0.82$, SE $= 0.247$) for twins than singletons during all years. Following predator treatments, survival of yearling moose increased 8.7% for females and 21.4% for males during summer and 2.2% for females and 15.6% for males during autumn. Annual survival of adult (≥2 yr old) female moose also increased in treated years and was negatively ($\beta = -0.21$, SE $= 0.078$) related to age. Moose density increased 45%, from 0.38 moose/km^2 in 2001 to 0.55 moose/km^2 in 2007, which resulted from annual increases in overall survival of moose, not increases in reproductive rates. Indices of nutritional status remained constant throughout our study despite increased moose density. This information can be used by wildlife managers and policymakers to better understand the outcomes of predator treatments in Alaska and similar environments.

KEY WORDS additive, *Alces alces*, *Canis lupus*, condition, indices, limitation, predation, survival, *Ursus americanus*, *Ursus arctos*.

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Effective management of moose (*Alces alces*) populations in many northern systems requires that managers understand the effects of predation by wolves (*Canis lupus*), brown bears (*Ursus arctos*), and black bears (*U. americanus*). These 3 predators have been important sources of mortality for moose at both low (Boertje et al. 1988, Larsen et al. 1989, Bowyer et al. 1998, Bertram and Vivion 2002*a*) and high moose densities (Franzmann and Schwartz 1980, Ballard et al. 1981, Gasaway et al. 1983). Moose survival and density have been increased by reductions in predator numbers (Gasaway et al. 1983, Stewart et al. 1985, Ballard and Miller 1990, Boertje et al. 1996, Hayes et al. 2003). However, relevant detailed individual and environmental covariate data have been lacking in manipulative moose predation studies to date.

Identifying the effects of predator treatments requires evaluating the contribution of variables other than predator treatments that can influence survival (White et al. 2010). Condition of individual moose affects their susceptibility to predation (Testa and Adams 1998, Keech et al. 2000, Swenson et al. 2007) and density, age, and weather can influence moose survival independent of predator treatments (Van Ballenberghe and Ballard 1997; Boertje et al. 2007, 2009). By assessing survival in this broader ecological context, we could potentially increase our understanding of additive versus compensatory mortality and proximate versus ultimate factors affecting predator-ungulate dynamics (Linnell et al. 1995, Ballard and Van Ballenberghe 1998, Zager and Beecham 2006).

We had a unique opportunity to investigate the effects of predation, individual traits, and environmental covariates on survival of moose following predator treatments. Our principle objective was to examine the relationship between moose survival and predator treatments. Our study included 2 untreated years (2001 and 2002) and 5 treated years (2003–2007), allowing us to compare survival before and following predator treatment. Treatments consisted of 2 yr of bear translocations (2003 and 2004) and 4 complete years (2004–2007) of aircraft-assisted take of wolves. In addition, we investigated the effects of individual moose characteristics, moose density, and environmental conditions on moose survival to gain better insights on the potential effects of predator treatments. We also estimated and compared cause-specific rates of moose mortality during untreated and treated years, analyzed moose population trends, and quantified the effect of harvest on the moose population.

STUDY AREA

We studied moose in a 1,368-km^2 area (62°58′N, 155°35′W) on the upper Kuskokwim River, near McGrath in western Interior Alaska, USA. The area was comprised primarily of the broad floodplains of the Kuskokwim and Takotna rivers and adjacent rolling hills. Elevations varied between 102–566 m, and moose used all available habitats (Fig. 1).

Two large rivers played a major role in the creation of shallow oxbow lakes and mixed-age successional plant communities. In these areas, early successional willow (*Salix* sp.) and alder (*Alnus* sp.) graded into stands of mature cottonwood (*Populus balsamifera*), white spruce (*Picea glauca*), and paper birch (*Betula papyrifera*) ultimately replaced by climax bogs and older forests of black spruce (*Picea mariana*) and tamarack (*Larix laricina*). In the hills, lower elevations were characterized by stands of white and black spruce, paper birch, and quaking aspen (*Populus tremuloides*), whereas

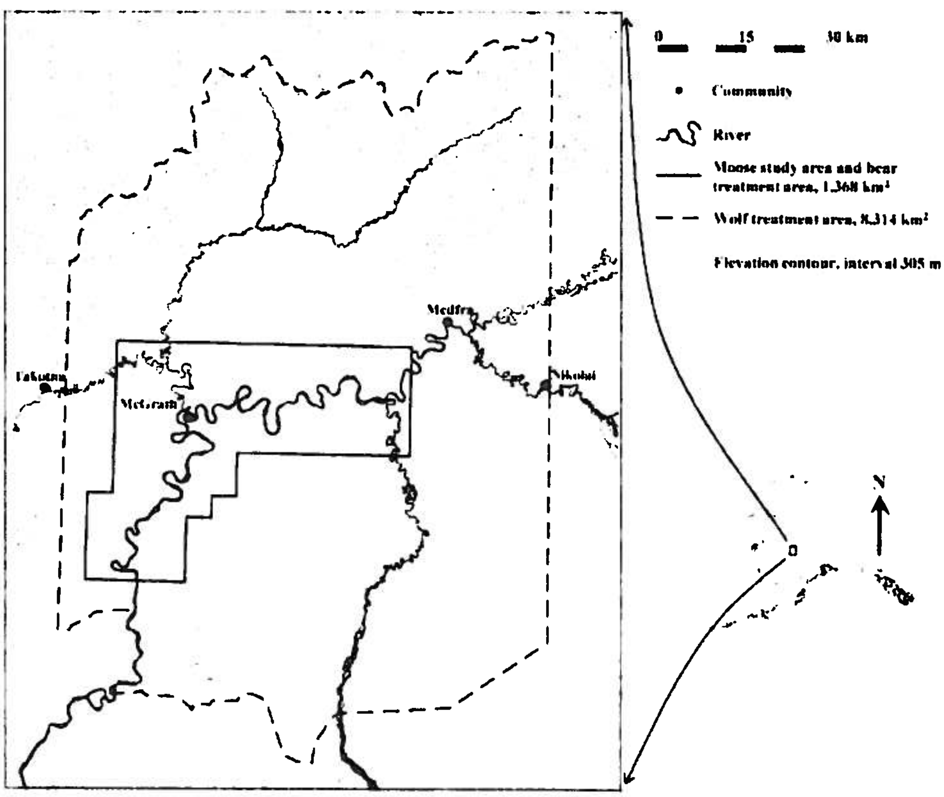

Figure 1. Locations of the 1,368-km^2 moose study area and bear treatment area, and the 8,314-km^2 wolf treatment area, western Interior Alaska, USA, 2001–2007.

shrub communities of willow, dwarf birch (*B. glandulosa* and *B. nana*), and alder predominated at higher elevations. A natural fire regime, including a fire that burned 16.5% of the study area during summer 2002, contributed to a mosaic of shrub, young spruce forest, and older mixed taiga. The 2002 burn occurred in upland spruce forest and radiocollared moose movements were not influenced during our study. Substantial regrowth did not occur until 3–4 yr post-burn.

Temperatures ranged 31° C in summer to −47° C in winter, and early March snow depth ranged 41–104 cm ($\bar{x}$ = 61 cm, SE = 7.7). In general, this region experienced more frequent snowfall and snow accumulation than elsewhere in Interior Alaska. During 2000–2007 average late-winter snow depth (Ballard et al. 1991) was 65 cm (2000), 51 cm (2001), 25 cm (2002), 49 cm (2003), 98 cm (2004), 47 cm (2005), 47 cm (2006), and 65 cm (2007). The period of snow cover usually extended from late October to the beginning of May.

Large predators of moose included wolves, black bears, and brown bears. Caribou (*Rangifer tarandus*) were the only alternate large prey and occurred sporadically in low numbers at the northern edge of the study area.

METHODS

Black and Brown Bear Treatments and Capture

During 2003 and 2004 translocation efforts, we employed 3 methods for catching black and brown bears: 1) aerial search and darting (n = 94 black bears and 5 brown bears) in the entire study area; 2) baited cubbies with Aldrich spring-activated foot snares (Beecham and Rohlman 1994) set along major waterways (n = 15 black bears and 2 brown bears); and 3) breakaway radio-snares (Boertje et al. 1987) set at moose carcasses to enable later aerial darting (n = 2 brown bears). We moved 75 black bears (including 8 dependent young) and 8 brown bears (including 2 dependent young) from within and immediately outside (<3.5 km) the study area during 11–31 May 2003. We moved 34 black bears (including 8 dependent young) and 1 independent brown bear from the study area during 12–22 May 2004. We attempted to minimize study-induced abandonment of young by avoiding capture of female black bears with cubs of the year and some females with yearling cubs; we purposely did not capture 16 adult female black bears associated with 33 dependent cubs in the study area in 2003. In May 2004, we observed no cubs of the year and removed all observed bears.

We immobilized bears using 4.4–8.8 mg/kg Telazol® (Fort Dodge Laboratories, Inc., Fort Dodge, IA), administered intramuscularly via 3–8 cubic centimeter (cc) darts. We marked all bears with an upper lip tattoo and ear tags. With the exception of 14 bears taken to the University of Alaska Fairbanks, we translocated bears by aircraft to sites ≥240 km from our study area. We assumed 240 km would be an adequate distance to minimize return to the study area based on home range movements of Interior Alaska black bears (Bertram and Vivion 2002*b*). We confirmed this assumption based on the relatively few recaptures in years that followed (2 of 37 captures during 2006 and 2007). We kept bears sedated during transport (2–6 hr) with supplemental doses of Telazol, ketamine hydrochloride, and diazepam hydrochloride.

Estimating Black and Brown Bear Abundance

To estimate untreated abundance of black bears and the proportion of bears removed, we used removal estimators (Gould and Pollock 1997) while accounting for female bears with dependent cubs intentionally left in the study area. We estimated the abundance of independent black bears because cubs were unlikely to kill moose calves. To estimate females with dependents remaining in the study area after 2003 treatments, we used the known number of bears remaining, an estimate of family size, and an inflation factor to account for unobserved family groups. We estimated the inflation factor using an average probability of encounter from the removal analysis. Because we could not quantify the uncertainty in this inflation factor, the standard error for the untreated black bear abundance is approximate. We based our estimate of black bear numbers in 2004 solely upon the removal estimator because we removed all bears encountered during 2004.

To determine removal estimates, we ran the closed capture models in Program MARK (version 5.1, updated 15 Nov 2008; White and Burnham 1999) constraining recapture probabilities to zero. The global model (M_{tbh}) accommodated temporal and behavior effects as well as individual heterogeneity (Otis et al. 1978, White et al. 1982, Norris and Pollock 1996, Pledger 2000). We considered models with bears grouped by sex and models with relative effort as a temporal covariate. For 2003 we developed a relative-effort metric based on a qualitative weighting of the 2 capture methods (foot snares and aerial darting) used for black bears. We did not use daily effort as a covariate in 2004 as it was nearly constant. For the removal models as well as the mark–resight and survival analyses that follow, we developed a set of candidate models, selected models using Akaike's Information Criterion for small sample sizes (AIC_c; Sugiura 1978, Hurvich and Tsai 1989) and Akaike weights (Burnham and Anderson 2002), and, where applicable, assessed model fit using the variance inflation factor ($\hat{c}$).

Although treatments were not specifically designed to determine bear abundance we considered our estimates of the proportion of black bears removed reliable. Daily coverage of the study area was sufficient to approximate a similar capture probability for all bears, and although we did not assess closure during the treatments, telemetry data from the mark–resight survey described below support an assumption of limited movement during this time period. Additionally, we determined that uncertainty in the relative-effort covariate values and our estimate of females remaining after the 2003 treatments had little effect on our estimate of initial population size.

During May 2007, we used mark–resight techniques to estimate abundance of independent black bears using the study area (Miller et al. 1987, 1997). We captured and radiocollared (model 500; Telonics, Inc., Mesa, AZ, modified to drop-off as described by Hellgren et al. 1988) bears in 2006 and 2007 (20 bears during 12–15 May 2006 and 17 bears during 2–4 May 2007) to minimize the potential for marking bias based on reproductive status. We used aerial search and darting with drug doses described in the previous section for all captures. For the survey, we partitioned the study area into 5 sections, each approximately 275 km^2, and searched all sections daily 1–8 May, totaling 8 sampling occasions. We searched areas using small aircraft (Piper PA-18, Piper Aircraft Corporation, Lock Haven, PA, or Bellanca 8GCBC, American Champion Aircraft Corporation, Rochester, WI) at approximately 1.2 min/km^2. Additionally, we located all radiocollared bears on each sampling occasion to identify marked bears present within the study area. For all bears located during the survey we recorded the location, the general habitat type, and the number of dependent young present.

We determined the 2007 black bear abundance using an extension of the nonlinear logit-normal mixed effects estimator (LNE; McClintock et al. 2009). This approach modified the LNE to account for immigration and emigration (IELNE) by adding a binomial term to the likelihood, modeling the probability that an animal was in the search area (McClintock and White 2011). The IELNE allowed for the introduction of marks between sampling occasions, produced estimates of the number of animals using the study area during the survey (i.e., the super population) and an average of the number of animals in the study area on each occasion, and enabled us to assess whether density within the study area was constant throughout the survey. The IELNE did not require all animals to have the same sighting probability within occasions, and variability in resighting probabilities was accounted for by including a random effect for individual heterogeneity and temporal and individual covariates.

We did not directly estimate brown bear abundance in our study area. We assumed that the untreated (2003) brown bear density was similar to other areas of Interior Alaska with comparable habitat (i.e., continental climate, forested, and limited salmon [*Oncorhynchus* spp.] resources). Miller et al. (1997) reported brown bear densities of 6.4–11.4 bears $\geq$2 yr old/1,000 km^2 based on mark–resight techniques for similar Interior Alaska study areas. We used the midpoint of this range (9 bears/1,000 km^2) to approximate untreated abundance of brown bears in our study area. We calculated abundance following treatment by subtracting the number of bears removed from the untreated approximation.

Wolf Treatment

To reduce wolf predation on moose during February 2004–April 2008 the Alaska Board of Game established an 8,314-km^2 wolf treatment area (Fig. 1), which encompassed our study area. Private citizens familiar with aircraft-assisted take of wolves received special permits to shoot wolves in winter within the wolf treatment area with no limit. Aircraft-assisted take involved pilots or pilot–passenger teams using aircraft to locate and shoot wolves directly from the air or immediately after landing near wolves.

In addition, liberal conventional hunting and trapping seasons for wolves occurred within the wolf treatment area during the entire study. Hunting season was 10 August–30 April during 2001–2003 and 1 August–31 May during 2004–2007, with a daily limit of 10 wolves during all years. Trapping season was 1 October–30 April with no limit. Any individual who possessed a valid harvest license could hunt and trap wolves.

Estimating Wolf Density

We conducted wolf surveys (Stephenson 1978, Gasaway et al. 1983, Hayes and Harestad 2000) during 21–24 February 2001, 17–19 March 2005, and 14–17 March 2006 to estimate wolf density. Wolves have large territories (500–2,500 km^2; Mech et al. 1998) in Interior Alaska, and our study area was comparatively small (1,368 km^2) and contained only portions of pack territories. Therefore, we used estimates of wolf density for the 8,314-km^2 wolf treatment area (Fig. 1).

We conducted surveys several days following a fresh snowfall (<8 days). We used 3–4 small aircraft flown by pilots experienced at snow-tracking wolves. We searched the entire area, generally using parallel transects, with increased effort along likely wolf travel routes, following tracks until we sighted the wolves or until the tracks were lost. If we did not observe wolves or if they were obscured by cover, we estimated wolf numbers from tracks where individuals traveled separate paths. Survey teams met daily to summarize observations and to resolve potential discrepancies. To estimate population size, we totaled the number of wolves believed to occupy territories primarily within the survey area plus 50% of wolves believed to occupy territories substantially overlapping survey area boundaries.

Capture and Monitoring of Adult and Short-Yearling Moose

We captured 25 adult female moose (>33 months old) during 24–28 March 2001 and 15 during 26–27 March 2002. We also captured 15 short-yearling (10-month-old) female moose annually during late March or early April 2001–2007. We identified short-yearling moose prior to capture by behavior, pelage, and length of the face; we made final determination following capture based on tooth eruption (Peterson et al. 1983, Boertje et al. 2009). We captured and immobilized moose as described by Boertje et al. (2007), and we attempted to capture moose proportionate to the geographic distribution of the March moose population. We considered 1 (2.5%) adult and 5 (4.8%) short-yearling moose to be study-induced mortalities because they died within 3 weeks of capture and moved little beyond capture sites.

We extracted a canine tooth from adult moose to determine age from cementum annuli (Gasaway et al. 1978, Boertje et al. 2009) and weighed short-yearling moose with a 450-kg capacity dynamometer (Dillon, Fairmont, MN) attached below a helicopter or a portable tripod and winch. We deployed very high frequency (VHF) radiocollars (Telonics model 600NH) on all 25 adult moose captured in 2001 and 5 of 15 captured in 2002. We also deployed radiocollars (CB-8 collars with 600NH transmitters) on all 15 short-yearling moose captured each year during 2001–2004, 9 of 15 captured in 2005, and 11 of 15 captured in 2006. Collars were equipped with motion-sensitive mortality sensors.

We monitored radiocollared short-yearling and yearling moose monthly to detect mortalities and movements. We monitored radiocollared adults (≥3 yr of age) daily in May and early June to detect newborn calves and approximately monthly for the remainder of the year. During May and early June radiotracking flights (2002–2007) we also recorded observations of twin and single calves of uncollared females (Boertje et al. 2007) to determine twinning rates (i.e., the percentage of twins among parturient females). We conducted all aspects of our study in accordance with acceptable methods for field studies adopted by the American Society of Mammalogists (Animal Care and Use Committee 1998) and Alaska Department of Fish and Game (Protocols 04–005, 04–007, 08–13).

Capture and Monitoring of Newborn Moose

To locate newborn moose calves for capture from mid-May through early June 2001–2007, we radiotracked adult females and opportunistically searched for calves of uncollared females. We captured newborns as soon as practical, typically within 1 day of observation. We captured 422 calves: 220 from radiocollared females and 202 from uncollared females. We considered 32 (7.6%) calves to be study-induced mortalities or abandonments and removed them from calculations of mortality sources and modeling analysis. We also censored 4 calves from calculations of mortality sources and modeling analysis because of loss of radio signal prior to the end of the first survival interval, and we censored an additional 6 calves from modeling analysis alone because either sex or mass was unknown. We included 21 calves captured <17 km outside the study area during 2001 and 2002 because survival did not differ between those calves and ones captured within the study area and we had no reason to expect survival would vary between areas prior to predator treatments. We also included some newborns (2 in 2003, 2 in 2004, 2 in 2005, and 1 in 2007) of radiocollared females known to live primarily within the study area that we captured <3.5 km outside the study area.

We captured newborns using helicopter techniques described by Ballard et al. (1979), Keech et al. (2000), and Bertram and Vivion (2002*a*). We released calves in <5 min (even if data collection was incomplete) to minimize their separation from the dam. When twins were present, the 2-person crew captured, processed, and released both calves together. During processing we determined sex of calves and weighed calves by placing them in a bag and suspending them with a calibrated 25- or 50-kg Chatillon spring scale (Kew Gardens, NY). To estimate age, we recorded posture, umbilicus condition, and hoof hardness (Haugen and Speake 1958, Adams et al. 1995).

We deployed VHF radiocollars weighing approximately 180 g and constructed from 4 layers of 10-cm wide elastic bandage with a diameter of 14 cm when sewn (Telonics model 335; PEG elastic bandage, Franklin Lakes, NJ). Collars expanded with neck growth and detached after approximately 2 yr (Osborne et al. 1991, Keech et al. 2000). Pulse rate of collars doubled after remaining motionless for 1 hour. We visually located calves within 24 hr post-capture to determine if they rejoined the dam, were separated from the dam, or had died. Thereafter, we monitored radio-signals of calves approximately daily until mid-June and every other day until early July, after which tracking interval increased to every 5 days until mid-August, every other week until November, thereafter to once per month (Keech et al. 2000).

We accessed mortality sites within 24 hr of mortality detection in most instances. We examined carcasses and mortality sites using criteria and techniques described by Ballard et al. (1979) and Adams et al. (1995). We collected hair samples of suspected predators for species-specific DNA analysis (University of Idaho laboratory, Moscow, ID; Farrell et al. 2000, Murphy et al. 2000, Onorato et al. 2006). We included mortalities of all collared moose in analyses even if they occurred outside of the study area.

Estimating Moose Density, Composition, and Harvest

During late October–early December 2001–2007, except 2002, we surveyed moose in the study area to estimate abundance and composition. We divided the study area into 87 sample units (2 min latitude × 5 min longitude; each approximately 15.7 km^2, Kellie and DeLong 2006). Pilot–observer teams in small aircraft searched for moose at approximately 3.1 min/km^2 using techniques described by Gasaway et al. (1986) and Kellie and DeLong (2006). During 2001 and 2004–2007 we surveyed 100% of the 87 sample units. In 2003 we defined high- and low-density strata (using results from previous surveys) and surveyed 45 of the 87 sample units, of which 60% were in the high-density stratum. We recorded total moose numbers, sex, and number of calves and yearling males (Boertje et al. 2009), as well as search effort and survey conditions. We employed analytical methods and followed procedures described in Gasaway et al. (1986), DeLong (2006), and Ver Hoef (2008).

Because some moose in a surveyed unit may not be observed, we estimated a sightability correction factor (SCF) and its variance for each survey based on observations of radiocollared moose (Boertje et al. 2009). Unlike Boertje et al. (2009) we estimated the SCF annually, except in 2004 when we used the average SCF recorded for 2001, 2003, and 2005–2007 and the largest variance recorded flying 100% coverage of the study area. Also, we improved our estimates of SCFs by adding the second term of the delta-method (Seber 1982) derived estimator for the SCF:

$$\mathrm{SCF} \approx \frac{1}{\hat{p}} + \frac{\hat{\mathrm{Var}}[\hat{p}]}{\hat{p}^3}$$

where $\hat{p}$ represents the proportion of moose observed, which corrects for nonlinearity in the expectation of $1/\hat{p}$ (Rice 1995). We multiplied our counts of observable moose by the respective SCFs to estimate total moose abundance and estimated the associated sampling variance (Goodman 1960). We similarly adjusted composition ratios for sightability and used the delta method to estimate the sampling variance of these ratios (Rice 1995).

We analyzed moose population abundance estimates for trend (lambda) and obtained smoothed estimates using a linear mixed effects model (Zhang et al. 1998, McCulloch and Searle 2001, DeLong and Taras 2009). The mixed effects model includes a parameter that accounts for random deviations of estimates from the linear trend and yields smoothed estimates based on information from both combined surveys (trend) and individual surveys. Resulting smoothed estimates of abundance lie closer to the trend line and have tighter confidence intervals.

We estimated lambda for 2002–2007 because that time period best represented population change in the study area. We lacked a 2002 abundance estimate. However, because vital rates indicated moose abundance likely changed little prior to predator treatments, we used the 2001 abundance estimate as a substitute for 2002.

Hunting for moose was legal during 1–20 September 2001–2003 in the entire study area. A partial hunting closure (68% of the accessible study area) existed during 2004–2007; hunting season was 1–25 September in the portion that remained open. During all years hunters were allowed to harvest 1 male moose and were required to report harvested moose within 15 days of the close of season.

Because partial moose hunting closures occurred simultaneous with predator treatments and contributed to population growth via decreased harvest of males, we also calculated lambda assuming no closures. To model a sustained hunt, we first assumed harvest was additive and subtracted a range of hypothetical additional moose that would have been harvested (if partial closures had not occurred) from the 2004–2007 yearly population estimates. We derived this range of hypothetical moose by subtracting the annual reported harvest during 2004–2007 from both the annual minimum and maximum reported harvests during 2001–2003 (pre-closure yr), which provided us with both liberal and conservative approximations of harvest, and thus additional moose. Second, we adjusted the additional moose numbers for cumulative age-specific survival (e.g., additional moose in 2004 were those not harvested in 2004; additional moose in 2005 were those not harvested in 2005 plus those not harvested in 2004 multiplied by annual survival rates for yearlings and adults).

Assessing Characteristics of Calf Mass, Twinning, and Moose Mortality

We used general linear models to estimate the effects of year, twin status, and sex on calf mass and compared these models using AIC_c. We used generalized linear models to assess the effect of year and collar status (i.e., radiocollared or uncollared) on twinning rates of adult moose and compared these models using quasi-AIC_c ($QAIC_c$; Lebreton et al. 1992).

We used chi-square tests, and when any cell count was <5, we used Fisher's exact tests (FET) on 2 × 2 contingency tables (Agresti 2007) to identify differences in cause specific-rates of moose mortality. To test for differences in mortality rates within a treatment period, we followed the method specified by Scott and Seber (1983), which accounts for the covariance associated with sampling a multinomial distribution.

Modeling Moose Survival Probability

Our objective was to estimate the effects of predator treatments on moose by investigating changes in seasonal (calf and yearling) and yearly (adult) survival while evaluating potential covariates that may influence results such as weather and individual moose traits. As a first step in modeling moose survival, we described patterns of calf and yearling moose mortality at 15- and 30-day intervals using the Kaplan–Meier estimator (Pollock et al. 1989). We then created a priori models of survival that included combinations of variables describing predator treatments and covariates that could further influence survival using known-fate models in Program MARK (White and Burnham 1999). We used a logit-link function, selected among competing models using an information-theoretic approach, and obtained maximum likelihood estimates of survival of radiocollared moose calves (n = 380), yearlings (n = 175), and adult females (n = 90) from mid-May 2001 to mid-May 2008.

We modeled survival probability of moose calves and yearlings by dividing the year into 3 intervals; summer (marking date–31 Aug [calves] or 16 May–31 Aug [yearlings]), autumn (1 Sep–15 Nov), and winter (16 Nov–15 May). These intervals represented seasonal changes in the environment, calf development, and forms of predation risk. The start date for summer for calves was variable because we marked calves over about a 2-week period, and we included marking date in some models to examine if interval length influenced calf survival. All years and winters were referenced by the starting year (i.e., yr t not yr t + 1).

We modeled potential effects of predator treatments by examining survival during 3 distinct periods: 1) prior to any treatments (summer 2001–winter 2002), 2) intervals when only bears were treated (summer and autumn 2003), and 3) intervals and years with both bear and wolf treatments (winter 2003–2007). Because bears hibernated during the winter, we modeled bear-treatment effects only during summer and autumn. We included 2005–2007 as treatment years for bears because repopulation of the study area did not occur immediately. We considered the potential effects of wolf treatment for all intervals encompassing winters 2003–2007 because some active form of wolf treatment occurred during this entire period. However, in some models we restricted effects to just winter or summer and winter, reflecting those times when wolf predation may be more important.

Additional covariates potentially affecting calf survival that we included were: calf marking date, number of siblings, sex, depth of snow in the winter prior to birth, and capture age and mass. The number of siblings in our models represented the number of siblings at the time of an individual's death because number of siblings may affect the probability of detection by predators and the female's ability to protect calves from predators. We included mass as the mass unadjusted for capture age because capture age was also included as a covariate. We averaged snow depth from 15 January, 15 February, and 15 March of each winter (Ballard et al. 1991) for our relative measure of snow depth. For winter, we added as covariates the average snow depth during the current winter of each year and the number of days $<-28°$ C (Renecker et al. 1978). We obtained weather records (National Weather Service 2000–2007) from the McGrath airport located in the center of our study area (Fig. 1). We also modeled the potential effects of moose density during the previous or current year on survival. We substituted moose density from 2001 for 2000 and 2002.

In models of yearling survival, we used the same strategy described for calf survival, except we included only sex, moose density, and weather covariates. We modeled the potential effects of sex on yearling survival separately for the 2002 and 2003 autumn intervals because hunting for male moose occurred throughout the study area (no males were marked during 2001).

Our modeling strategy was to first consider single-variable models of calf survival while allowing yearling survival to vary by interval and year (i.e., unconstrained). We then created multiple-variable models with additive and interactive relationships based on a priori reasoning and supported by results from single-variable models. We only considered 2-way interactions because we could not easily explain the biological rationale for 3-way interactions. After completing multiple-variable models of calf survival, we modeled yearling survival by modifying the top ($\Delta AIC_c < 3$) calf survival models. Our hierarchical approach to modeling resulted in 65 models, all of which were constructed based on a priori reasoning to avoid data dredging (Burnham and Anderson 2002).

We modeled survival of adult females annually because few died during any given seasonal interval. We defined the annual interval as 16 May to 15 May. These models examined the potential effects of predation by contrasting 1) years with no treatments of either predator versus years with treatments of both bear and wolves or 2) years with either no treatments or predominately bear-only treatment versus years with treatment of both bears and wolves, to examine the potential differences in the effects of bear versus wolf treatments. For example, we examined only the effects of bear treatment (difference between 2001–2002 survival and 2003–2007 survival) or the combined effects of bear treatment and wolf treatment on survival (difference between 2001–2003 survival and 2004–2007 survival). In addition to predator treatment effects, we considered the potential effects of age, moose density, temperature, and snow depth in the current and previous winter. We removed human-caused mortalities ($n = 4$) from the adult-modeling analysis to separate the effects of predator treatments on survival.

RESULTS

Predator Treatments and Bear Recovery

The untreated population of independent black bears was reduced approximately 96% immediately following the 2004 treatments. Approximately 96 (SE = 6.4) independent black bears used the study area in early May 2003 prior to our treatments, approximately 29 (SE = 6.4) bears immediately following the 2003 treatments, and 4 (SE = 4.5) bears immediately following the 2004 treatments (Table 1). The top removal model for black bears during both years invoked a constant probability of encounter. Models that included individual heterogeneity, those with bears grouped by sex, and those including relative effort as a covariate were not supported by the data. These models had ΔAIC_c of 1.4–1.9 but differed from the top model by one additional parameter, had small ≤ 0.85 differences in deviance, and resulted in nearly identical abundance estimates.

We estimated 70 (SE = 6.9) independent black bears used the study area during our 2007 survey (27% fewer than the 2003 estimate prior to treatment). The top model (AIC_c wt = 0.63) indicated a constant abundance of bears across occasions (days) within the study area, resighting probabilities consistent with an increasing linear trend by group (females with young or others) interaction, and no individual heterogeneity. The top 4 models, which comprised 95% of AIC_c weight, differed only in terms of individual heterogeneity with the latter 3 models supporting heterogeneity for one or both groups. Despite these differences, the top 4 models yielded the same point estimates (to nearest integer) and similar estimates of standard error.

Approximately 12 independent brown bears used the study area prior to treatments, and approximately 6 bears remained immediately following the 2004 treatment. Brown bears may have recovered by 2007, as indicated by elevated take of moose calves by brown bears in 2007 (Fig. 2).

During February 2001, we estimated a density of 5.1 wolves/1,000 km^2 ($n = 42$) in the wolf treatment area,

Table 1. Estimated independent black bear abundance prior to and following treatment efforts to increase moose survival, and number of independent black bears removed, western Interior Alaska, USA, 2003–2007. Abundance estimates for 2003 and 2004 based on removal estimators, and 2007 abundance based on mark–resight estimators.

	Untreated							Treated			
	Removal estimator			Females	Total independents			No.	No. independents		
Year	Abundance	SE	95% CI	not removed	Abundance	SE	95% CI	removed	Abundance	SE	95% CI
2003	77	6.4	64–90	Approx. 19[a]	Approx. 96	6.4[b]	83–109	67	Approx. 29	6.4[b]	26–42
2004	30	4.5	21–39	0	30	4.5	21–39	26	4	4.5	0–13
2007									70	6.9	56–84

[a] Calculated as 16 bears purposely not translocated divided by an estimated average probability of encounter based on the removal estimate (0.87).
[b] This estimate of SE does not include a small increase in uncertainty related to estimating the number of adult females not removed.

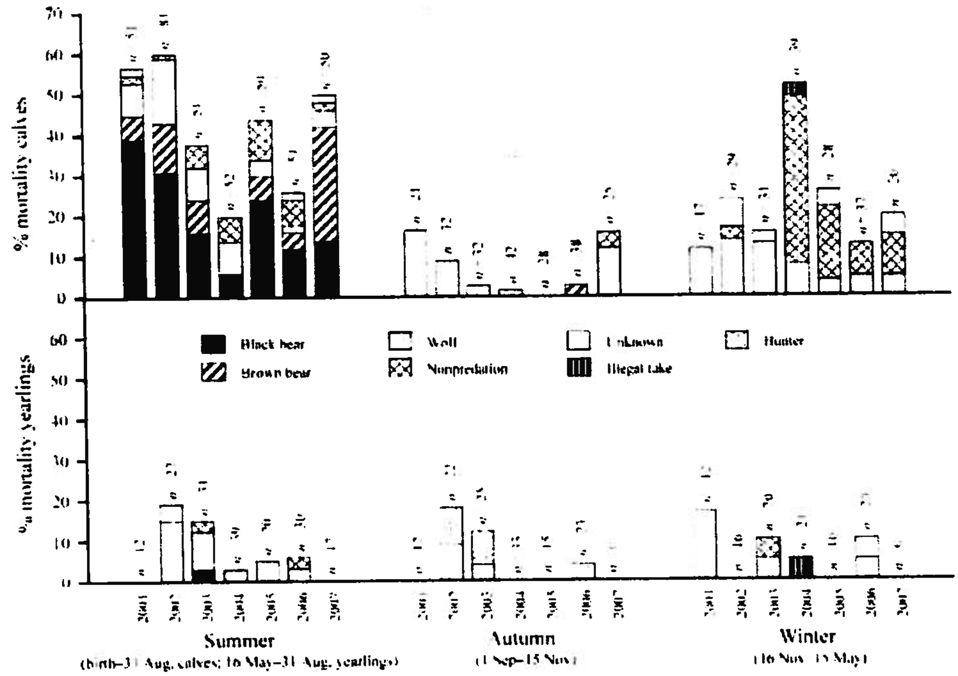

Figure 2. Cause-specific mortality rates for radiocollared moose calves (birth to 12 months of age) and yearlings (12–24 months of age), western Interior Alaska, USA, 2001–2007. Sample sizes represent the number of moose monitored each interval.

whereas in both March 2005 and 2006, we estimated 1.3 wolves/1,000 km^2 (n = 11). Reduced overall take of wolves during winters 2005–2006 and 2006–2007 (Table 2) was supportive evidence that wolf density declined and remained low.

Characteristics of Moose

Calves of radiocollared moose were born between 11 May and 7 July, with a median parturition date for all years of 22 May. We observed 3 (6%) radiocollared 2-year-old female moose with single calves (n = 54), and 81% of 3-year-old female moose produced calves (Table 3). The rate of parturition for radiocollared female moose ≥3 yr of age averaged 89% (Table 3). Annual twinning rates for radiocollared female moose ≥3 yr old ranged 0.24–0.59 and were similar to those for uncollared females (Table 3). The top model (QAIC$_c$ wt = 0.44) indicated an overall twinning rate of 0.42 (95% CI = 0.38–0.47) with no year or collaring effects. Mass of short-yearling female moose averaged 180.2 kg (Table 4) and individuals ranged 129.5–226.8 kg. Annual average mass of short-yearling female moose varied from 167.5 kg in 2006 to 191.4 kg in 2002 (Table 4).

Estimated mean age of newborns at capture (n = 422) was 2.6 days (range: 0.5–11 days). Average capture date for all years was 24 May (range: 14 May–4 Jun), 2 days after the observed median birth date. Mass of sampled calves estimated to be ≤3-days old at capture ranged 7.7–25.9 kg with an average of 17.4 kg (Table 4). The top model (yr, twin status, and sex as main effects; AIC$_c$ wt = 0.64) indicated that on average males were 0.7 kg (SE = 0.28) heavier than females and singletons were 2.8 kg (SE = 0.29) heavier than twins.

Table 2. Number of wolves taken in the 8,314-km^2 wolf treatment area to reduce predation on moose, western Interior Alaska, USA, during 2000–2007 harvest seasons (e.g., harvest season 2000 = Aug 2000–May 2001). Categories include wolves taken by private permittees using aircraft-assisted take and total take by all methods.

	No. wolves taken	
Year	**Aircraft-assisted take**	**Total take all methods**
2000	0	28
2001	0	18
2002	0	33
2003	17	27
2004	14	22
2005	4	11
2006	2	12
2007	17	19

Moose Abundance and Harvest

Early winter moose abundance estimates ranged from 525 (95% CI = 452–598) in November 2001 to 883 (95% CI = 729–1,037) in November 2007 (Table 5). The linear mixed model produced smoothed population estimates of 521 moose (95% CI = 456–586, 0.38 moose/km^2) for November 2002 and 766 moose (95% CI = 690–842, 0.56 moose/km^2) for November 2007 (Table 5). During 2002–2007, lambda was 1.08 (SE = 0.018) corresponding to an annual increase of 49 moose (SE = 11.76, P = 0.014). The calf:100 adult females ratio increased from 34 calves:100 adult females (≥17 months of age) during the 2001 survey to 51–63 calves:100 adult females during 2003–2007 surveys (Table 5).

Hunting closures reduced harvests of male moose by an average of 60% in the study area. Reported harvests of 27 (2001), 45 (2002), and 32 (2003) moose occurred annually

Table 3. Observed parturition and twinning rates for female moose, western Interior Alaska, USA, 2001–2007.

	Observed parturition (collared)						Observed twinning					
	3 yr of age			≥3 yr of age			≥3 yr of age (collared)			Uncollared		
Year	*n*	Rate	SE	*n*	Rate	SE	*n*	Rate	SE	*n*	Rate	SE
2001	3	1.00		22	0.73	0.097	16	0.25	0.112			
2002	1	0.00		25	0.88	0.066	22	0.59	0.107			
2003	9	0.56	0.175	31	0.84	0.067	25	0.24	0.087	46	0.39	0.073
2004	10	0.70	0.153	40	0.80	0.064	31	0.32	0.085	39	0.36	0.078
2005	11	1.00		51	0.92	0.038	45	0.44	0.075	31	0.39	0.089
2006	13	1.00		62	0.97	0.022	60	0.40	0.064	40	0.50	0.080
2007	7	0.71	0.185	59	0.95	0.029	56	0.52	0.067	29	0.35	0.090
All yr	54	0.81	0.054	290	0.89	0.018	255	0.42	0.031	215	0.41	0.034

Table 4. Mean mass (kg) of newborn moose calves and short-yearlings captured, western Interior Alaska, USA, 2001–2007. We included only newborn calves known or estimated to be ≤3 days old.

	Newborn calf mass (kg)											
	Singletons			Twins			All calves			Short-yearling mass (kg)		
Year	*n*	$\bar{x}$	SE	*n*	$\bar{x}$	SE	*n*	$\bar{x}$	SE	*n*	$\bar{x}$	SE
2001	19	19.6	0.68	13	17.4	0.48	32	18.8	0.48	14	178.1	4.67
2002	16	18.9	0.47	38	17.4	0.26	54	17.8	0.25	15	191.4	5.47
2003	23	19.4	0.44	18	16.4	0.70	41	18.1	0.46	15	179.5	4.62
2004	23	20.2	0.51	26	16.2	0.43	49	18.1	0.44	15	184.9	3.75
2005	20	18.3	0.59	32	15.4	0.57	52	16.5	0.46	15	174.8	3.95
2006	15	17.5	0.76	30	15.2	0.48	45	16.0	0.44	15	167.5	3.79
2007	14	18.8	0.71	23	16.4	0.37	37	17.3	0.40	15	185.3	5.39
All yr	130	19.1	0.23	180	16.3	0.19	310	17.4	0.16	104	180.2	1.82

($\bar{x}$ = 35 moose/yr) in the study area prior to hunting closures. Following hunting closures, hunters refocused efforts in those portions that remained open, and reported harvesting 9 (2004), 14 (2005), 16 (2006), and 16 (2007) moose annually ($\bar{x}$ = 14 moose/yr) within the study area. Assuming no hunting closures, we estimated lambda would have been 1.04–1.06 during 2002–2007.

Moose Mortality

Mortality of radiocollared moose calves was lower in treated years than untreated years (Fig. 3). However, combined predation by black bears, brown bears, and wolves accounted for most annual mortality of moose calves during both untreated (94%, *n* = 93, 2001–2002) and treated (65%, *n* = 137, 2003–2007) years (Fig. 2). In all years except 2004, most calf mortality (68–85%) occurred during summer with few calf deaths observed in autumn or winter during either untreated or treated years (Figs. 2 and 3). In 2004, only 32% of calf mortality occurred during summer, presumably because combined predator densities were lowest and non-predation deaths from deep late-winter snow were greatest.

Cause-specific mortality rates varied between untreated and treated years, yet black bears were the dominant source of predation mortality during all years except 2007 (Fig. 2). During summer of untreated years, we attributed the deaths of 34% (*n* = 45) of radiocollared calves to black bear preda-

Table 5. Observable moose numbers, sightability, and estimated total numbers and composition in the 1,368-km^2 study area with untreated (2001) and treated (2003–2007) predators, western Interior Alaska, USA, 2001–2007.

	Survey sightability				Total estimated abundance (SCF applied)		Moose population composition (age or sex class:100 females ≥17 months of age)						Linear mixed effects (smoothed) population estimates	
Year	Moose obs[a]	Collars obs	Collars present	SCF[b]	Estimate	95% CI	Calves	95% CI	Male > calves	95% CI	17-month males	95% CI	Estimate	95% CI
2001	440	32	38	1.19	525	452–598	34	27–41	18	14–22	8	6–10		
2002													521	456–586
2003	424	21	28	1.35	573	413–733	56	33–79	18	9–27	5	2–8	570	520–620
2004	531			1.27	674	550–798	63	47–79	13	9–17	6	4–8	619	578–660
2005	479	38	49	1.30	621	527–715	51	40–62	18	14–22	9	7–11	668	624–712
2006	591	42	49	1.17	692	612–772	58	49–67	25	21–29	14	12–16	717	659–775
2007	662	31	41	1.33	883	729–1037	56	42–70	39	29–49	16	12–20	766	690–842

[a] All years, except 2003, were census counts, therefore SE = 0. In 2003 we estimated number of moose (SE = 39.0).
[b] Sightability correction factor (SCF) for 2004 calculated as the average SCF for 2001 and 2003–2007.

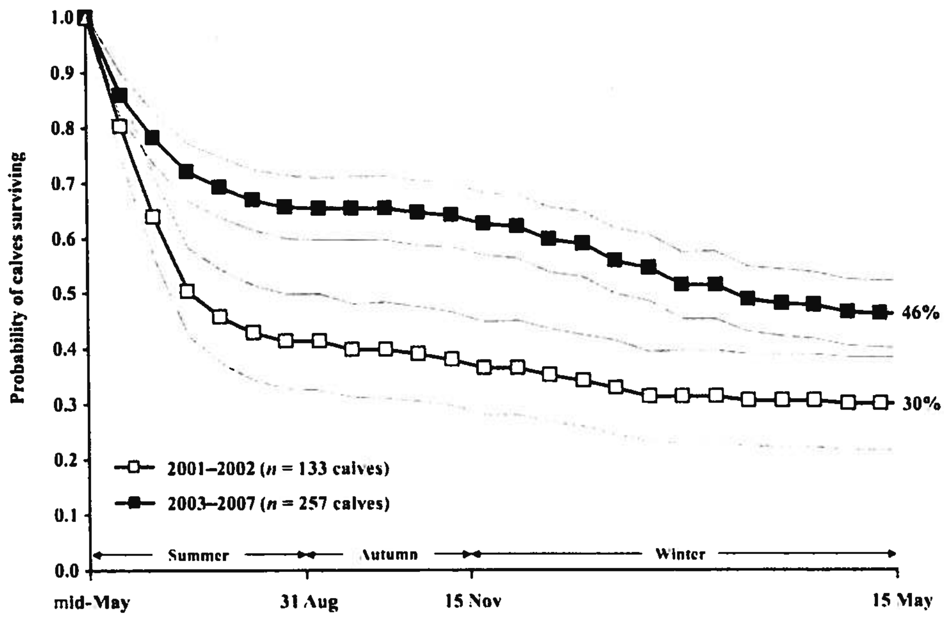

Figure 3. Average annual survival functions and 95% confidence intervals for radiocollared calf moose using Kaplan–Meier analysis (15-day increments), western Interior Alaska, USA, untreated predators (2001–2002) and treated predators (2003–2007).

tion versus 14% ($n = 36$) during treated years, a significant ($\chi_1^2 = 20.78, P < 0.001$) decrease. Wolves and brown bears were largely secondary predators compared to black bears. However, comparing years with untreated wolves (2001–2003) to years with treated wolves (2004–2007), we also observed a significant reduction in wolf-induced calf mortality during summer (12% vs. 4%, $\chi_1^2 = 6.66$, $P = 0.010$). Mortality attributable to brown bear predation varied, accounting for few deaths ($\leq$12%) except in 2007 (28%, Fig. 2).

We observed an increase in the proportion of nonpredation mortality of calves in treated years. During summer, deaths from nonpredation increased from 2% ($n = 2$) of all radiocollared calves during untreated years 2001–2002 to 6% ($n = 15$) during treated years 2003–2007 (FET, $P = 0.064$). However, this elevated nonpredation mortality rate (6%) was still substantially less than the predation-caused mortality rate (28%, $n = 72$) during treated years ($p_{\text{nonpred}} - p_{\text{pred}} = -0.22$; 95% CI = -0.29 to -0.16; $n = 254$). During winter, nonpredation deaths increased from 2% ($n = 1$) of all radiocollared calves during untreated years to 17% ($n = 26$) during treated years (FET, $P = 0.012$) as a result of winter kill in 2004, when snow depths were severe. With 2004 removed, comparable values were 2% versus 9% (FET, $P = 0.182$), respectively. Besides winterkill, nonpredation mortality of calves included drowning, undetermined nontraumatic causes, and a congenital defect. We also observed one illegal take resulting from accidental capture in a snare set for furbearers (Fig. 2). We observed an increase in study-induced mortalities in the latter years of the study. Of 32 study-induced mortalities or abandonments 31 occurred during 2004–2007 (2001 = 1, 2002 = 0, 2003 = 0, 2004 = 4, 2005 = 8, 2006 = 8, and 2007 = 11).

Excluding hunting-caused deaths, mortality of radiocollared yearling moose was lower in years with treated wolves than years with untreated wolves (Fig. 4), with wolves accounting for most yearling mortality during both periods. During years with untreated wolves (2001–2003), wolves were the cause of death for 10% ($n = 7$) of yearlings in summer, 5% ($n = 3$) in autumn, and 6% ($n = 3$) in winter. During years with treated wolves (2004–2007), wolves were the cause of death for 3% ($n = 3$) of yearlings in summer and 2% ($n = 1$) in winter (Fig. 2). Legal harvest was the largest cause of yearling mortality during autumn and we also observed 1 illegal take resulting from accidental capture in a snare set for furbearers (Fig. 2). Other causes accounted for few yearling deaths (Fig. 2).

We observed few adult mortalities. Excluding human causes, wolves accounted for most adult moose mortality ($n = 4$) prior to wolf treatments, 2001–2003 ($n = 100$ adult-yr monitored; Fig. 5). During wolf treatment (2004–2007), we observed no predation mortalities among radiocollared adult moose ($n = 239$ adult-yr monitored; Fig. 5). Nonpredation mortalities ($n = 5$) occurred throughout the study and included 3 undetermined nontraumatic causes, 1 ice-bound, and 1 birthing complication. Mortalities attributed to illegal take were also an important source of adult female deaths ($n = 4$) and include 2 moose accidentally captured in furbearer snares, 1 moose accidentally shot during autumn hunting season, and 1 death of unknown human cause.

Modeling Factors Affecting Moose Survival

For calves ($n = 380$) we focused on interpreting parameter estimates from the top model (AIC_c wt = 0.37), because ΔAIC_c for the top 4 models of survival was <2.4 (ΣAIC_c

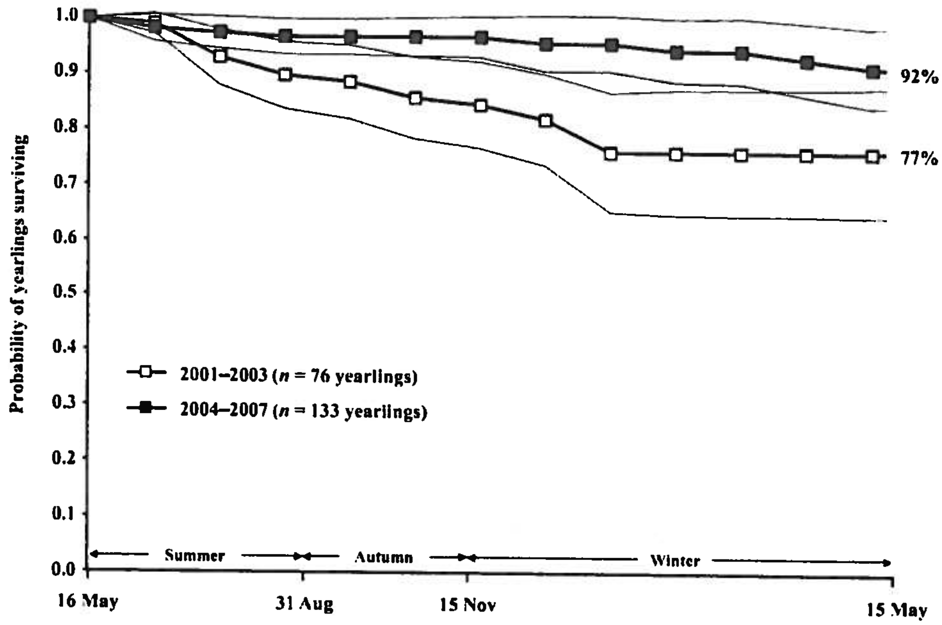

Figure 4. Average annual survival functions and 95% confidence intervals for radiocollared yearling moose using Kaplan–Meier analysis (30-day increments), western Interior Alaska, USA, untreated wolves (2001–2003) and treated wolves (2004–2007). We censored hunter-caused mortality.

wt = 0.93; Table 6). Also, all models up to $\Delta AIC_c = 33$ had the same structure for calf survival as one of these top 4 models. Furthermore, the top 4 models included nearly the same subset of variables (Table 6). In the top model, calf survival was most affected by number of siblings (constant all yr; Figs. 6 and 7), mass (yr-specific; Fig. 7), and capture age (yr-specific) in summer and autumn, and by snow depth (constant all yr) and temperature (constant all yr) during winter (Fig. 8).

When controlling for mass and capture age during summer, survival differed by number of siblings and was year-specific (Tables 6 and 7) in a manner consistent with the prediction that survival would be higher in treated years (2003–2007) than untreated years (2001–2002; Fig. 6a). In autumn, survival was higher during all treatment years, except 2007, for both singletons and twins at the mean values of mass and

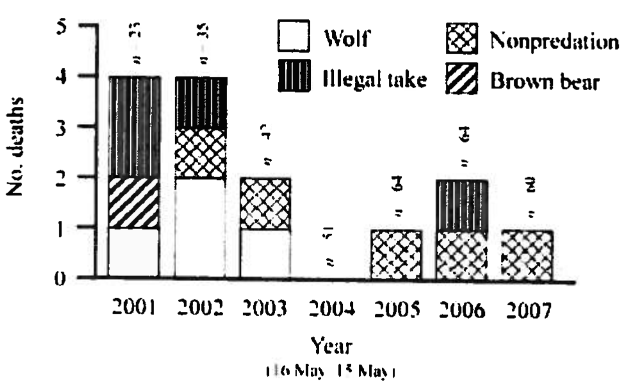

Figure 5. Annual (16 May–15 May) sources of mortality for radiocollared adult (≥24 months of age) moose, western Interior Alaska, USA, 2001–2007. Sample sizes represent the number of moose monitored each year.

capture age (Fig. 6b), although we did not observe a difference in intercepts. Survival during winter was constant across years after controlling for the influence of covariates (i.e., snow depth and temperature).

Across years, summer and autumn survival of calves with siblings was lower ($\beta = -0.82$, SE = 0.247) than calves without siblings, even after controlling for difference in mass and capture age (Fig. 6). However, during summer and autumn, the effects of calf mass varied among years with weak effects ($\beta < 0.06$) in untreated years and stronger effects ($\beta > 0.06$) in treated years (Fig. 7). In contrast, the effects of capture age varied and ranged from −0.49 (SE = 0.242) in 2007 to 0.29 (SE = 0.323) in 2006. In the model without year-specific effects of age (second model), the relationship between capture age and survival was negative ($\beta = -0.18$, SE = 0.089; Table 7).

Calf survival during winter was negatively related ($\beta = -0.05$, SE = 0.017) to snow depth and positively related ($\beta = 0.03$, SE = 0.014) to number of days <−28° C (Fig. 8). Several factors reduced our ability to identify potential effects of predator treatments during winter: 1) the pattern of yearly variation in snow depth and temperature (e.g., no treated yr comparable to winter 2002, an untreated yr with the lowest snowfall and fewest days <−28° C); 2) the lack of replication in weather patterns (i.e., only 2 untreated yr); and 3) the strong effects of both snow depth and temperature on calf survival during winter. However, an exploratory model ($\Delta AIC_c = 1.79$) that had a separate intercept for untreated (2001 and 2002) and treated years (2003–2007) indicated that survival during winter at average yearly snow depth and temperature would have been 0.83 (SE = 0.057) in untreated years and 0.76 (SE = 0.022) in treated years.

Table 6. Top 4 models for survival of calf and yearling moose during summer, autumn, and winter intervals in western Interior Alaska, USA, 2001–2007, based on Akaike's Information Criterion corrected for small sample size (AIC_c).

Rank	Component	Model[a]	AIC_c	ΔAIC_c	AIC_c wt	*K*	Dev
1	Calf	S(yr, mass, age, sibs, mass × yr, age × yr); A(mass, age, sibs, mass × yr, age × yr); W(temp, snow)	960.1	0.0	0.37	33	892.1
	Yearling	S(yr, sex); A(yr, sex); W(sex)					
2	Calf	S(yr, mass, age, sibs, mass × yr); A(mass, age, sibs, mass × yr); W(temp, snow)	960.3	0.2	0.32	27	905.0
	Yearling	S(yr, sex); A(yr, sex); W(sex)					
3	Calf	S(yr, mass, age, sibs, mass × yr, age × yr); A(mass, age, mass × yr, age × yr); W(temp, snow)	962.1	2.0	0.13	34	892.0
	Yearling	S(yr, sex); A(yr, sex); W(yr, sex)					
4	Calf	S(yr, mass, sibs, mass × yr); A(mass, mass × yr); W(temp, snow)	962.4	2.3	0.11	26	909.2
	Yearling	S(yr, sex); A(yr, sex); W(sex)					

S, summer interval; A, autumn interval; W, winter interval; *K*, no. of parameters; dev, deviance.

[a] For calf models, year main effect indicates survival differed for each year. For yearling models, year main effect indicates survival differed for untreated (2001–2003) and treated (2004–2007) years.

For yearlings ($n = 175$), all models up to $\Delta AIC_c = 20$ had a similar structure. These models included interval- and sex-specific survival and most models (except one of the top 9 models with a $\Delta AIC_c = 6.34$) had differences in survival among years related to predator treatments. The top 4 models (Table 6) included effects of predator treatments on yearling survival during summer and autumn (models 1, 2, and 4; models 1 and 2 have identical yearling components) or all 3 intervals (model 3). In the top model and in years when we marked both sexes (we monitored only marked females in 2001), survival of males was lower ($\beta = -0.94$, SE = 0.510; Table 7, Fig. 9). Yearling survival was lower during 2001–2003 than during treated years (2004–2007) in both summer and autumn (Fig. 9). Differences in survival between untreated and treated years were greater for males (summer = 0.17, SE = 0.087; autumn = 0.50, SE = 0.144) than females (summer = 0.08, SE = 0.042; autumn = 0.02, SE = 0.021) in both

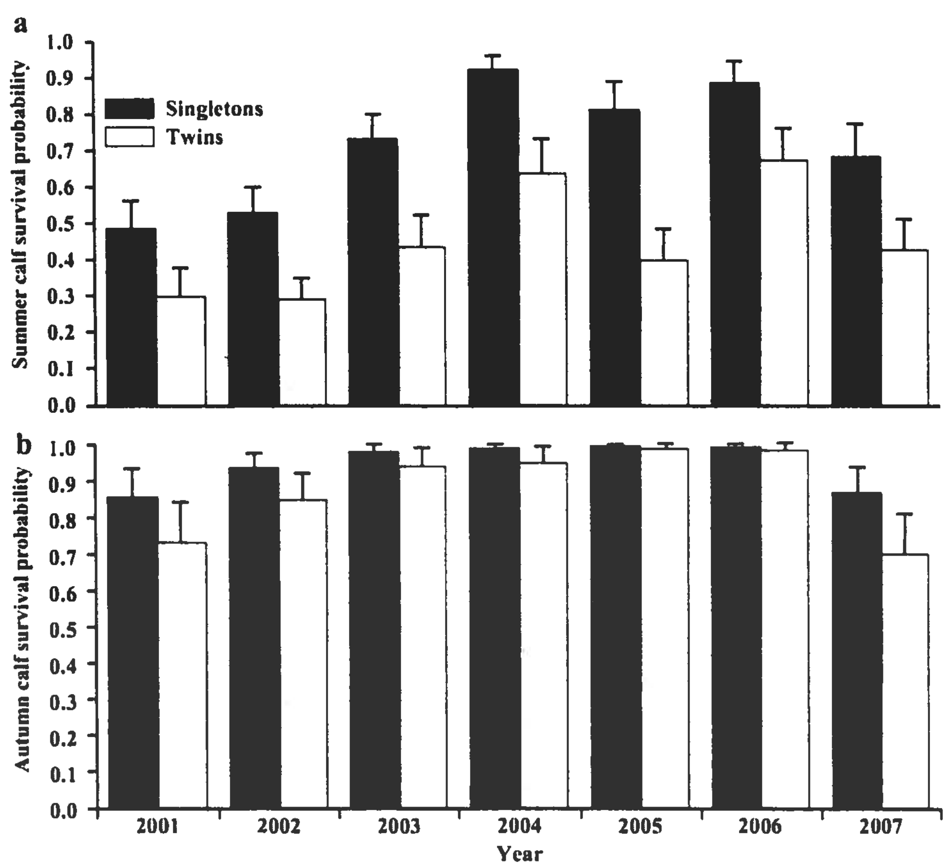

Figure 6. Year-specific estimates of summer (a) and autumn (b) moose calf survival at average mass among years at 3 days of age during years of untreated (2001–2002) and treated (2003–2007) predators, western Interior Alaska, USA.

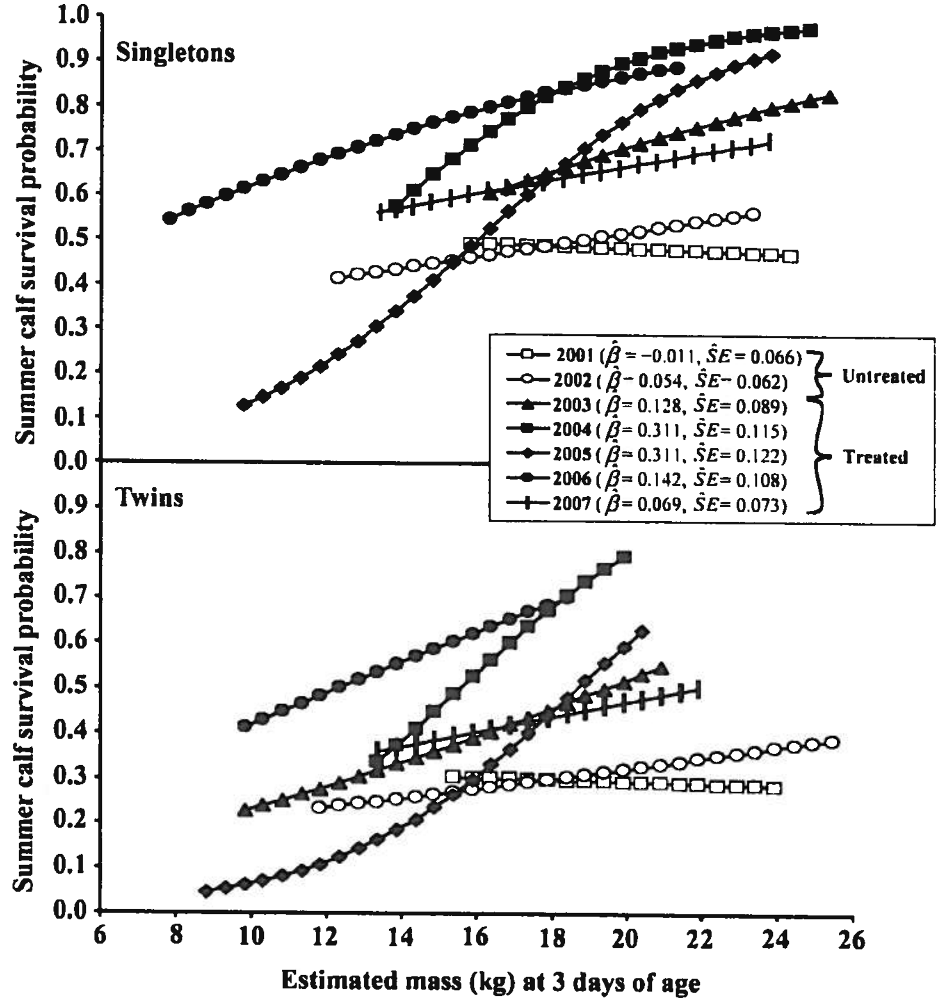

Figure 7. Effects of mass on survival probability of moose calves for mass ranges observed each year, western Interior Alaska, USA, during periods of untreated (2001–2002) and treated (2003–2007) predators. Slopes were the same for both singletons and twins.

intervals, with differences in male survival in autumn mostly the result of male harvest during autumn of 2 of the 3 untreated years (Fig. 9). Lack of support for models that included independent effects of bear treatment (summer and autumn during 2003), as well as cause of mortality data (Fig. 2), indicated wolf treatment was responsible for increases in yearling survival.

For adult females (n = 334), all models with a $\Delta AIC_c < 2$ (the top 4 models) had a similar structure and accounted for most of the AIC_c weight (ΣAIC_c wt = 0.67). All 4 models included the effects of age. Effects of predator treatments were included as a difference in survival between the initial 3 yr of the study versus the remaining 4 yr (top and fourth model, $\Delta AIC_c = 1.82$) and as a difference between the initial 2 yr of the study versus the remaining 5 yr (third model, $\Delta AIC_c = 1.47$). The second model received a similar level of support (AIC_c wt = 0.23) as the top model (AIC_c wt = 0.24). The second model included the effects of the current winter's snow and age effects, indicating that the effects of weather were difficult to separate from the effects of predator treatments because of the pattern of snowfall in untreated and treated years. We summarized estimates from the top 2 models.

In the top adult model (Fig. 10), survival decreased with age ($\beta = -0.21$, SE = 0.078) and was higher in treated (2004 and later) versus untreated years (2001 and 2002) and bear treatment only (2003). In the second model, the effect of age ($\beta = -0.20$, SE = 0.076) on adult survival was similar to that observed in the top model. Adult survival increased ($\beta = 0.12$, SE = 0.061) with snow depth because the effects of predator treatments and snow depth were confounded with deeper snow observed in treated years ($\bar{x}$ monthly depth 2004–2007 = 64.3 cm) than untreated years ($\bar{x}$ monthly depth 2001–2003 = 41.4 cm).

DISCUSSION

The primary effects of reducing predation included increased summer and autumn survival of moose calves and yearlings and increased annual survival of adult female moose. Reduced predation on newborn calves during 2003–2007 resulted largely from the translocation of 70% of the black bears from the study area in May 2003 and 96% by June 2004,

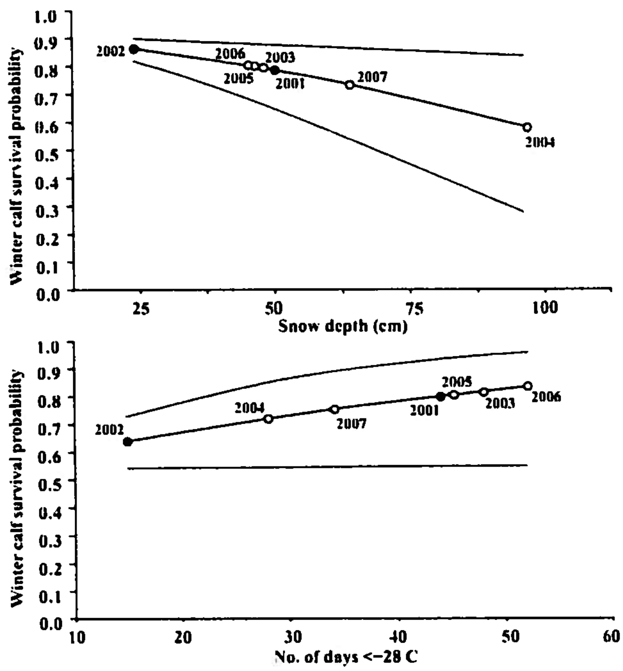

Figure 8. Effects of snow depth at average temperature among years (top) and temperature at average snow depth among years (bottom) on survival of moose calves during winter (16 Nov yr t–15 May yr t + 1), western Interior Alaska, USA, 2001–2007. We show estimated survival (bold line) and 95% confidence intervals. Predators were untreated during 2001–2002 (solid markers) and treated during 2003–2007 (open markers).

as well as prolonged reduction of black bear numbers through 2007. Likewise, increased survival of yearling and adult moose and fewer wolf-induced mortalities of moose calves during summer and autumn resulted from a 75% reduction in wolf numbers.

We concluded summer predation on moose calves was mostly additive. Given the presence of 3 effective predators and the high nutritional status of our moose population (as measured by reproductive and condition indices), we expected this result (Ballard 1992, Gasaway et al. 1992, Van Ballenberghe and Ballard 1994). However, we confirmed predation mortality was partly compensatory because nonpredation mortalities increased during treated years (Fig. 2), which we also expected because mortality will likely never be totally additive or compensatory (Bartmann et al. 1992, Ballard and Van Ballenberghe 1997). Although the proportion of nonpredation mortalities increased both during treated summers and on an annual basis, the actual number of calves dying from nonpredation causes remained low. Thus, increased nonpredation deaths provided little offset to the decline in the predation-caused rate. A major component of the large increase in annual nonpredation mortality (Fig. 2) was the deep snow winter of 2004, during which 16 of 39 calves died from nonpredation causes. We had no winter with comparable conditions during untreated years.

Although summer and autumn yearling survival clearly increased during treated years, winter survival of yearlings did not change with predator treatments. Our ability to detect differences in winter survival pre- and post-treatment may have been confounded by conventional wolf hunting and trapping harvest during untreated years (Table 2). We also speculated that high nutritional status in our study area contributed to high winter survival of yearlings. However, in a substantially less-nourished moose population with a high moose/wolf ratio and low snow depths, winter survival of yearlings was similar (0.92 for females and 0.88 for males; Boertje et al. 2007, 2009). This comparison indicates a combination of factors, not solely nutrition, can be important determinants of yearling survival during winter. Snow depth appeared less important to yearlings than calves because snow depth did not enter any of the top models of yearling survival (Table 6). Even during winter 2004 when 51% of radio-collared calves died, we observed no natural mortality of radiocollared yearling moose (Fig. 2). We concluded well-nourished yearlings had a high tolerance for deep snow, as observed by Ballard et al. (1991).

Annual adult survival increased in years with wolf treatment (Fig. 10). However, only 5 adults died from predation during our study; 4 of these died from wolf predation prior to wolf treatments (Fig. 5). As with yearlings, we attributed increased survival to reduced wolf predation rather than reduced bear predation. Gasaway et al. (1983) and Hayes et al. (2003) also reported an increase in survival of radio-collared adult moose following reductions in wolf densities.

Covariates Influencing Survival

In every year of our study, singletons had higher survival than twins from birth to 15 November, even when controlling for calf mass (Fig. 6). This relationship was relatively constant across large changes in calf survival (48–92% [singles] and 29–61% [twins] during summer; Fig. 6), moose densities (0.38–0.55 moose/km^2), and moose/predator ratios (e.g., approx. 525 moose/96 independent black bears in 2001 to 674 moose/4 independent black bears in 2004; Tables 6 and 7). Evidence elsewhere suggests sibling effects may disappear at very high levels of mortality. For example, Testa et al. (2000) and Bertram and Vivion (2002*a*) concluded survival did not differ between singles or twins in environments with very low calf survival (20–22%). In contrast, the lower survival of twins compared to singletons in our study was similar to results of Keech et al. (2000) and Osborne et al. (1991), where total calf mortality was moderate.

Summer calf survival was strongly influenced by capture mass (Fig. 7) and age. In general, survival was positively related to capture mass and negatively related to capture age. The inverse relationship between survival and capture age resulted because survival is relative to age at a given mass (e.g., a 1-day-old calf is healthier than a 5-day-old calf of the same mass). The role of mass in the survival of moose calves changed as survival rate changed. With untreated predators we noted only a weak relationship between summer survival and capture mass ($\beta < 0.06$, SE = 0.062). However, in years of higher calf survival resulting from predator treatments (2003–2007, Fig. 6), we observed strong positive relationships between survival and mass ($\beta > 0.06$,

Table 7. Coefficients for top 4 models of calf and yearling moose survival during summer (S), autumn (A), and winter (W) intervals in western Interior Alaska, USA, 2001–2007. All beta (coeff.) values are on logit scale.

Rank[a]	Component	Yr[b]	Covariate	Coeff.[c]	SE
1	Calf (S)	X	Mass	−0.01 to 0.31	0.06 to 0.12
			Age	−1.18 to 0.29	0.12 to 0.47
			Sibs	−0.82	0.25
	Calf (A)		Mass	−0.01 to 0.31	0.06 to 0.12
			Age	−1.18 to 0.29	0.12 to 0.47
			Sibs	−0.82	0.25
	Calf (W)		Temp	0.03	0.01
			Snow	−0.05	0.02
	Yearling (S)	X	Sex[d]	−0.94	0.51
	Yearling (A)	X	Sex[d]	−3.83	1.16
	Yearling (W)		Sex[d]	−0.94	0.51
2	Calf (S)	X	Mass	0.01 to 0.25	0.05 to 0.09
			Age	−0.18	0.09
			Sibs	−0.77	0.24
	Calf (A)		Mass	0.01 to 0.25	0.05 to 0.09
			Age	−0.18	0.09
			Sibs	−0.77	0.24
	Calf (W)		Temp	0.03	0.01
			Snow	−0.05	0.02
	Yearling (S)	X	Sex[d]	−0.94	0.51
	Yearling (A)	X	Sex[d]	−3.83	1.16
	Yearling (W)		Sex[d]	−0.94	0.51
3	Calf (S)	X	Mass	−0.01 to 0.31	0.06 to 0.12
			Age	−1.18 to 0.29	0.12 to 0.47
			Sibs	−0.82	0.25
	Calf (A)		Mass	−0.01 to 0.31	0.06 to 0.12
			Age	−1.18 to 0.29	0.12 to 0.47
	Calf (W)		Temp	0.03	0.01
			Snow	−0.05	0.02
	Yearling (S)	X	Sex[d]	−0.95	0.51
	Yearling (A)	X	Sex[d]	−3.83	1.16
	Yearling (W)	X	Sex[d]	−0.95	0.51
4	Calf (S)	X	Mass	−0.06 to 0.19	0.04 to 0.09
			Sibs	−0.81	0.24
	Calf (A)		Mass	−0.06 to 0.19	0.04 to 0.09
	Calf (W)		Temp	0.02	0.01
			Snow	−0.05	0.02
	Yearling (S)	X	Sex[d]	−0.95	0.51
	Yearling (A)	X	Sex[d]	−3.83	1.16
	Yearling (W)		Sex[d]	−0.95	0.51

[a] The model with the lowest Akaike's Information Criterion for small sample sizes (AIC_c) score and models within 4 AIC_c scores of the best model; we present only the top models here.
[b] X = year main effect; for calf models survival differed for each year, for yearling models survival differed for untreated (2001–2003) and treated (2004–2007) years.
[c] A range of beta (coeff.) values indicates a variation among year.
[d] Sex effects for yearlings indicate females had higher survival than males, and the effect was stronger in autumns with hunting seasons for males, 2002–2003.

SE = 0.073; Fig. 7). Keech et al. (2000) also reported a positive relationship between birth mass and survival in a moose population with high annual calf survival (53%).

Likewise, research on caribou has shown both positive and no relationships between early survival and birth mass. Where predators were scarce and not limited by available prey biomass, early survival and birth mass were positively related (Whitten et al. 1992). However, in a caribou population limited by neonatal predation, Adams et al. (1995) reported no relationship between early calf survival and birth mass. We acknowledge the interaction between survival and birth mass may change relative to the overall condition of ungulate populations. Indeed, research on elk (*Cervus elaphus*) has demonstrated different relationships between calf survival and birth mass in both low (Barber-Meyer et al. 2008 [no relationship], White et al. 2010 [positive relationship]) and high (Singer et al. 1997 [positive relationship], White et al. 2010 [no relationship]) survival regimes where predation was the major proximate cause of mortality.

We conclude that mortality of moose calves was largely independent of calf condition during periods of high predation (highly competitive environment), presumably because predators had few alternatives. However, during periods of comparatively low predation (less competitive environment), individual calf condition was an important determinant of survival, mediated at least in part through mechanisms such as maternal investment and predators selecting for less fit calves.

Calf survival during winter (15 Nov–15 May) was negatively related to snow depth (Fig. 8) as reported in other

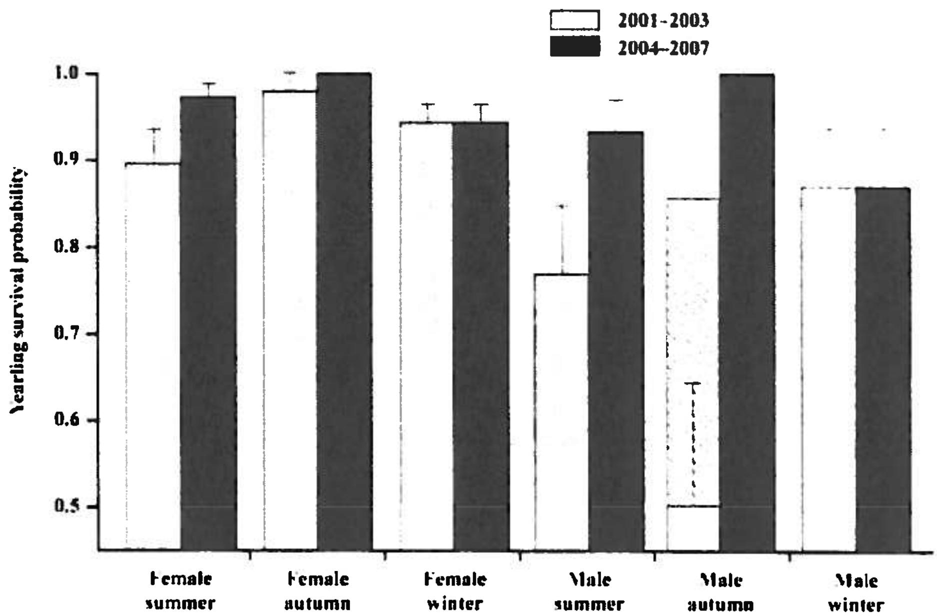

Figure 9. Survival of yearling moose during untreated wolves (2001–2003) and treated wolves (2004–2007), western Interior Alaska, USA, 2001–2007. The hashed bar for males in autumn represents survival in the absence of harvest.

studies (Bishop and Rausch 1974, Coady 1974, Ballard et al. 1991). During 2004 when snow depths exceeded 90 cm for 3 months, 51% ($n = 39$) of calves entering winter died, largely from weather-related causes, not predation (Fig. 2).

We concluded that the positive relationship between survival and number of days $< -28°$ C could be best explained by a post hoc analysis that showed, with the exception of winter 2002, snow depth and number of days $< -28°$ C were highly and inversely correlated ($r = -0.916$ excluding 2002, $r = -0.018$ with 2002). In our study area, snowfall and accumulation were generally associated with moist warm air, whereas the coldest days were often clear, cloudless, and snow free.

Ballard and Van Ballenberghe (1997) reported predation by wolves often had the greatest impact on calf moose during winter. In our top 4 models, survival of calves in winter was constant across years once we controlled for snow depth and temperature (Table 6), indicating minimal influence of predator treatments on winter calf survival relative to the influence of snow and temperature. However, the pattern of

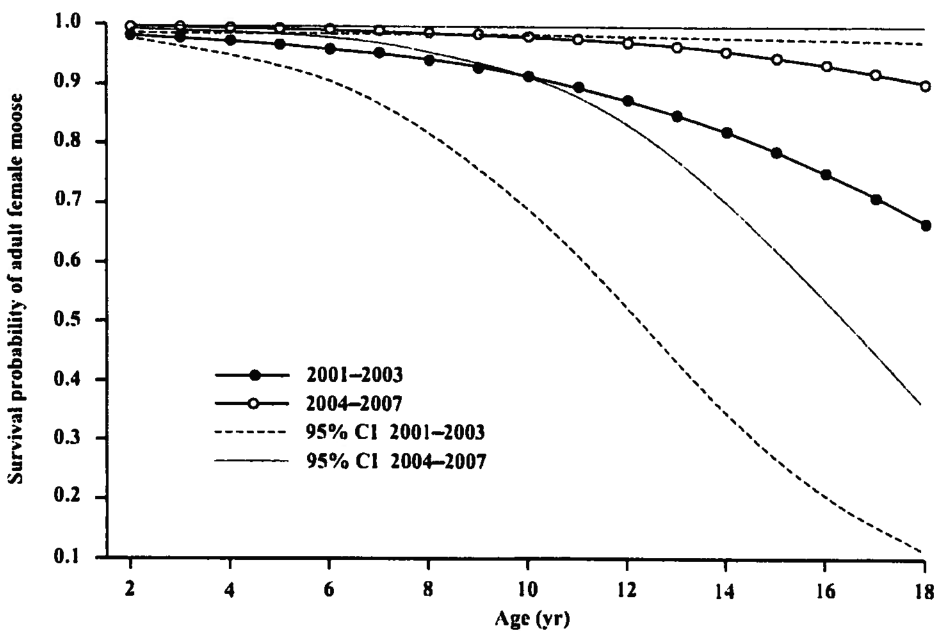

Figure 10. Effects of predator treatment and age on annual survival of adult ($\geq$2 yr old; human-caused mortality censored) female moose for untreated years wolves (2001–2003) and treated wolves (2004–2007), western Interior Alaska, USA, 2001–2007.

yearly variation in snow depth and temperature reduced our ability to identify potential winter effects of predator treatments; in particular we had no untreated deep-snow winters. Another explanation is that wolves were harvested through conventional hunting and trapping before the initiation of wolf treatment in our small study area (Table 2). This level of harvest may have already elevated winter calf survival during 2001–2003, confounding our untreated and treated comparison.

An alternate hypothesis is that winter wolf predation on moose calves was largely compensatory, as evidenced by similar survival rates during untreated and treated years. No comparative data exist for calf moose. However, winter coyote (*Canis latrans*) predation on mule deer (*Odocoileus hemionus*) fawns can have a large compensatory component (Bartmann et al. 1992; Bishop et al. 2005, 2009).

We observed a surprising increase in study-induced neonatal losses during the latter years of the study (31 of 32 study-induced deaths occurred during treated yr 2004–2007), which totaled 11% of captured calves versus 1% prior to treatment. Subjective observations during captures support the hypothesis that females defended calves less vigorously in later years of the study, particularly in 2005 following the severe winter of 2004. Thus, increased study-induced mortalities may have resulted from a nadir in maternal interest, particularly among dams both surviving the severe winter of 2004 and with higher energetic costs associated with treated, high calf survival (Testa and Adams 1998). Lower maternal interest may also explain the increased numbers of nonpredation deaths (Fig. 2) and reduced survival of lightweight calves following predator treatments (Fig. 7). We have no alternate hypothesis for why study-induced losses increased. Methods for capturing calves and classifying mortality sources remained the same throughout the study. Of the 32 study-induced calf losses (all identified within 24 hr of capture), we categorized 15 as abandonments and 17 as immediate deaths. Immediate deaths often exhibited signs of physical trauma inflicted at the capture site consistent with that of an adult moose (e.g., broken bones, bruised organs, and internal injuries with no external punctures or teeth or claw marks).

Female yearlings had higher survival than male yearlings during all 3 untreated intervals and 2 intervals (summer and winter) during treated years (Fig. 9). Higher female survival presumably reflected increased susceptibility of males to mortality through differing movement strategies or more risky behavior compared to females. Male moose often disperse more frequently and have larger home ranges than females (Lynch and Morgantini 1984, Ballard et al. 1991, Cederlund and Sand 1992).

Although adult survival increased in years with wolf treatments, survival was also strongly influenced by age, with survival probability decreasing with age (Fig. 10). This result illustrates that age structure may play an important role in the outcome of predator treatments. For example, young age adults benefit less from predator treatments than older age adults.

We attributed moose population growth to increased survival following treatments, and concluded predation was limiting moose during untreated years in this population. However, we also recognized that reduction of harvest of male moose in the study area improved the harvest-induced skewed male/female ratio and contributed to the population increase (Table 5). Indeed, the hypothetical population growth had no hunting closures occurred (lambda = 1.04–1.06) was approximately 33% less than we observed with hunting closures (lambda = 1.08). This calculation is simplistic but provides important comparative information, given the lack of an alternative method for calculation and short duration of hunting closures. In reality, the positive contribution of hunting closures on male moose in predator limited populations are ultimately of little consequence to the long-term, beyond balancing sex ratios. For example, other moose populations with high birth rates and bear and wolf predation have remained at low densities even without harvest (Gasaway et al. 1992; Boertje et al. 2007, 2009).

Illegal take of radiocollared adult moose ($n = 4$) was similar to take by predators ($n = 5$). Illegally taken moose were primarily (2 of 4 adults, 4 of 6 of all ages) captured accidentally in snares set for furbearers, as previously documented (Boertje et al. 2009, Gardner 2010). We observed some illegal take in each age class of moose and such take occurred throughout the study (2 in 2001, 1 in 2002, 2 in 2004, and 1 in 2006). We conclude illegal take was a chronic source of mortality rather than a source that changed or diminished during the study. These findings underscore the importance of educating trappers on proper usage of snares and the availability of breakaway or diverter mechanisms (Gardner 2010).

Expectations of Predator Treatments

We demonstrate in our 3-predator, 1-large prey system, substantial predator treatments within a small area was an effective way to increase moose survival and population size. Moose nutritional status was moderate to high based on comparative data on age at first reproduction, birth and twinning rates, and mass of short-yearling moose (Boertje et al. 2007) and was likely an important determinant in the outcome of treatments. Survival of prey should be most responsive to reductions in predation at low densities and least responsive as populations near K and mortality has a greater compensatory component (McCullough 1979).

Reducing predation sufficient to allow moose population growth is a key step toward increasing sustainable harvest densities in much of Interior Alaska where moose occur at low densities and are predator-limited (Gasaway et al. 1992, Boertje et al. 2009). The ultimate goal when reducing predation is to elevate the sustained yield of moose. Our results reflect a short-term response (5 yr) to reducing predators and the duration of elevated moose numbers and future yield of moose remains to be determined. Therefore, whether our treatments will ultimately prove to be a successful management action is unknown.

Reductions of predators in limited areas around human population centers, similar to our study, may be a potential method of increasing local moose harvests. However, our experimental program was too costly to routinely utilize.

Implementing economical and practical ways to initially reduce predator numbers and, presumably, to keep predators at lowered densities is a challenge. Preferably, reductions would be achieved by private citizens using conventional means, but we acknowledge private hunters and trappers have not been successful to date in remote, forested portions of inland Alaska.

MANAGEMENT IMPLICATIONS

A thorough example is now available where 3 predators were treated to successfully increase moose survival and numbers. Given results of this and previous studies, wildlife managers and policymakers may expect similar results from predator treatment programs elsewhere, but use less costly and less thorough study designs. Managers, especially in multi-predator systems, should recognize that a substantial suite of covariates and confounding effects may complicate program results. Consequently, managers should be prepared to adapt study designs as well as treatment methods to increase the likelihood of program success and understanding. To accomplish this, we recommend managers implement programs that include collecting comparative data on 1) the relative abundance and take of moose and predators, 2) basic information on moose nutritional status and population composition, 3) the frequency of deep snowfall winters, and 4) the relative effects of different predators on moose survival, because the effects vary considerably among study areas (Boertje et al. 2009: Tables 4 and 5).

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Annual Report to the Alaska Board of Game on Intensive Management for Moose with Wolf Predation Control in Unit 13

Prepared by the Division of Wildlife Conservation
February 2012

1) **Description of IM Program[1] and Department recommendation for reporting period**

A) This report is an interim review X or renewal evaluation ___ for a predation control program authorized by the Alaska Board of Game (Board) under 5 AAC 92.125

B) Date this report was submitted by the Department to the Board:

1 February X (annual report) 1 August ___ (interim annual update[2]) Year_2012

C) Program name(geographic description/GMU and species/herd):
GMU 13 Wolf Predation Control Area/GMU 13/moose

D) Existing program includes an *Intensive Management Plan* in regulation (5AAC 92.125).

E) Game Management Unit(s) fully or partly included in IM program area:
Units 13(A), 13(B), 13(C), and Unit 13(E)

F) IM objectives for moose:
Population objective for Unit 13 is 17,600 – 21,900 (including Unit 13(D)) and harvest objective for Unit 13 is 1,050 – 2,180 (including Unit 13(D)).

For those Units covered by the Unit 13 wolf predation control area, population objectives for Units 13(A), 13(B), 13(C), and 13(E) are 3,500 – 4,200, 5,300 – 6,300, 2,600 – 3,500, and 5,000 – 6,000 moose respectively and harvest objectives for Units 13(A), 13(B), 13(C), and 13(E) are 210 – 420, 310 – 620, 155 – 350, and 300 – 600 moose respectively.

G) Month and year the current predation control program was originally authorized:
March 2000 by the Board (minimal area covered in Units 13(A), 13(B), and 13(E); Same-day-airborne take first allowed January 2004); plan renewed March 2005 (IM area increased to include Unit 13(C)), plan renewed again October 2010 (current area open to predation control has been stable since 2006; current plan active through 31 October 2016)

H) Predation control is currently active X or temporarily inactive ____ in this IM area

I) If active, month and year the current predation control program began in March 2000.

J) Indicate if an habitat management program funded by the Department or from other sources is currently active in this IM area: (Y/N) Yes
The Alphabet Hills Prescribed Burn plan is active and will be implemented given prescription conditions

K) Size of IM program area (square miles) and geographic description:

[1] For purpose and context of this report format, see appendix.
[2] The interim annual update may be limited only to sections that changed substantially since prior annual report [*e.g., only Tables 3 and 6 in areas with a fall ungulate survey and only wolf control*]

- 15,413 square miles
- All lands within Units 13(A), 13(B), 13(C), and that portion of Unit 13(E) east of the Alaska Railroad, except National Park Service and other federal lands where same-day-airborne take of wildlife is not allowed

L) Size and geographic description of area for assessing ungulate abundance within IM area:
Continuous count areas (CA) 3, 5, 6, 10, 13, 14, and 16 across Unit 13 encompassing a total of 3,219 square miles

M) Size and geographic description of area for ungulate harvest reporting (specify if different areas or multiple species):
Unit 13 covering 23,367 square miles

N) Size and geographic description of area for assessing predator abundance (specify if different areas or multiple species):
Unit 13 covering 23,367 square miles

O) Size and geographic description of predation control area (specify if different areas or multiple species):
Total IM area: 15,413 square miles (14,550 square miles open to predation control in regulatory year 2011; closures include populated areas and federal lands where same-day-airborne take of wildlife is not allowed)

P) Criteria for evaluating progress toward IM objectives:
- population abundance
- calf:cow ratios
- bull:cow ratios
- harvest

Q) Criteria for success with this program:
Achieve population and harvest objectives (listed above) with the following composition benchmarks: a minimum of 25 bulls:100 cows for Unit 13, 25 calves:100 cows for Unit 13(A) and 30 calves:100 cows for Units 13(B), 13(C), and 13(E)

R) **Department recommendation for IM program in this reporting period:**
The Department recommends continuation of the program (details provided in sections 6)

2) Prey data

Date(s) and method of most recent abundance assessment for moose (if statistical variation available, describe method here and show result in Table 1):
Fall trend count surveys are conducted annually November – December to determine sex and age composition of moose. The most recent surveys were conducted in November 2011. Trend count data, corrected for estimated sightability were extrapolated to estimate unit-wide population abundance.

Compared to IM area, was a similar trend and magnitude of difference in abundance observed in nearby non-treatment area(s) since program inception (Y/N)? **No** and in the last year (Y/N)? **No.**

Describe comparison if necessary:

Moose abundance in CAs receiving treatment has more than doubled since program inception, whereas abundance in CA 15 in Unit 13(D) which is adjacent to the current IM area has been relatively stable. The moose abundance in CAs receiving treatment increased substantially between 2010 and 2011, while abundance in CA 15 declined substantially.

Date(s) of most recent age and sex composition survey (if statistical variation available, describe method here and show results in Table 1):

Fall trend count surveys provide age and sex composition data; most recent surveys November 2011.

Compared to IM area, was a similar composition trend and magnitude of difference in composition observed in nearby non-treatment area(s) since program inception (Y/N) **No** and in the last year (Y/N)? **No**

Describe comparison if necessary:

Same as above

Table 1. Moose abundance, age and sex composition in assessment area (L) since program reauthorization in Year 6 (2006) to reauthorization review in Year 11 (RY 2011) in continuous CAs in the Unit 13 Wolf Predation Control Area. Regulatory year is 1 July to 30 June (e.g, RY 2011 is 1 July 2011 to 30 June 2012).

			Composition (number per 100 females)			
Period	RY	Moose observed (Estimated Abundance)	Calves	Yearling bulls	Males	Total *n*
Year 6	2006	3845 (12,050)	23.7	8.3	28.9	3845
Year 7	2007	4334	22.1	10.6	30.5	4334
Year 8	2008	4310 (13,680)	19.4	11.6	33.4	4310
Year 9	2009	4875 (14,710)	22.9	9.3	32.8	4875
Year 10	2010	5112 (15,900)	21.4	9.7	28.2	5112
Year 11	2011	5432 (16,960)	23.3	9.6	31.7	5432

Description of trend in abundance or composition:

Moose across the Unit 13 control area have increased since IM program inception. Cows continue to increase annually across the control area. Based on extrapolation of fall count area densities, corrected for estimated sightability, moose population estimates were calculated in 2006 by subunit: 2,450 moose in Unit 13(A), 3,950 moose in Unit 13(B), 1,230 moose in Unit 13(C), and 4,420 moose in Unit 13(E). Moose population estimates in 2011 by subunit were: 3,890 moose in Unit 13(A), 5,340 moose in Unit 13(B), 1,950 moose in Unit 13(C), and 5,780 moose in Unit 13(E).

Table 2. Moose harvest in Unit 13 (assessment area M). Methods for estimating unreported harvest are described in Survey and Inventory reports.

Period	RY	Reported		Estimated		Other mortality	Total
		Male	Female/Unknown	Unreported	Illegal	Vehicle	
Year 6	2006	688	4	25	25	75	817
Year 7	2007	644	4	25	25	75	773
Year 8	2008	730	5	25	25	75	860
Year 9	2009	857	3	25	25	75	958
Year 10	2010	929	1	25	25	75	1055

Describe trend in harvest:

The general trend in harvest has been consistently positive across the treatment portion of Unit 13 and relatively stable in Unit 13(D) which is adjacent to the treatment area. Easily accessible road-side areas continue to receive the most hunting pressure. Harvest has increased in recent years in remote portions of the unit due to the steady increase in moose abundance as well as the any-bull drawing permits for those areas (2009-current).

The reported harvest in Year 6 by subunit was 225, 172, 57, 68, and 156 in 13(A), 13(B), 13(C), 13(D), and 13(E) respectively. An additional 14 moose were reported in Unit 13(Z).

The reported harvest in Year 11 (2011 preliminary) by subunit is 270, 272, 108, 79, and 166 in 13(A), 13(B), 13(C), 13(D), and 13(E) respectively. An additional 4 moose were reported in Unit 13(Z).

3) Predator data

Date(s) winter 2010-11 and method of most recent spring abundance assessment for wolves (if statistical variation available, describe method here and list in Table 3):

The most recent spring abundance estimate for Unit 13 of 152 (spring 2011) was derived over the course of the 2010-2011 winter and is based on wolf and track sightings gathered from staff biologists, hunters, trappers, and pilots, adjusted for documented harvest.

Date(s) fall 2010 and method of most recent fall abundance assessment for wolves (if statistical variation available, describe method here and list in Table 3):

The most recent fall abundance assessment of 303 wolves (fall 2010) was derived using the same methods. The preliminary fall 2011 abundance estimate is 238 – 291.

The wolf population in Unit 13 has been relatively stable since RY 2006. The annual take by all methods has reflected this trend, although take is more sensitive to changes in annual weather conditions than are population trends.

Table 3. Wolf abundance objectives and removal in wolf assessment area (N) of the Unit 13 Wolf Predation Control Area. The annual removal objective in Unit 13 depends on the fall abundance in relation to the spring objective of 135 – 165 wolves. No less than 135 wolves will remain by 30 April each RY in all of Unit 13. The annual removal since Year 6 (2006) has averaged 39% (range = 30 – 47%). No lethal or non-lethal predation control methods were used by Department personnel.

Period	RY	Fall abundance (variation)	Harvest removal		Dept. control removal	Public control removal	Total removal[a]	Spring abundance (variation)
			Trap	Hunt				
Year 6	2006	280	47	25	0	33	106	160
Year 7	2007	254	48	9	0	33	90	153
Year 8	2008	273	38	26	0	55	121	144
Year 9	2009	272	40	18	0	23	81	180
Year 10	2010	303	31	8	0	103	142	152

[a]Additional removal may be unknown method, Defense of Life and Property, vehicle kill, etc.

4) Habitat data and nutritional condition of prey species

Where active habitat enhancement is occurring or was recommended in the *Intensive Management Plan*, describe progress toward objectives:

Objective(s): N/A

Area treated and method: N/A

Observation on treatment response (specify which and use table if ongoing program): N/A

Evidence of progress toward objective(s) (choose one: Apparent Statistical)

Similar trend in nearby non-treatment areas (Y/N)? N/A

Describe any substantial changes in habitat not caused by active program (e.g., new wildland fires, flooding, insect mortality of vegetation, etc.): N/A

The only habitat improvement project currently planned in Unit 13 is the Alphabet Hills Prescribed Burn on the border of Units 13(A) and 13(B). This burn is contingent upon meeting burn prescriptions; no burn was conducted during this reporting period.

Winters have been mild and conducive to population growth across Unit 13 in recent years. The last severely deep snow winter across the majority of Unit 13 was 2004-2005.

Table 4. Nutritional indicators for moose in assessment area (L) of the Unit 13 Wolf Predation Control Area.

Period	RY	13A West Twinning Rate (radio-collared cows)	13(B)/13(C)/13(E) Twinning rates (random cows)
Year 6	2006	14%	
Year 7	2007	26%	53%
Year 8	2008	27%	50%
Year 9	2009	30%	
Year 10	2010	33%	

Where objectives on nutritional condition were listed in the Intensive Management Plan, Describe trend in condition indices since inception of (a) habitat enhancement or (b) enhanced harvest (clarify which: N/A)(choose Positive, No change, Negative)

Evidence of trend (choose one: Apparent Statistical)

Similar trends in nearby non-treatment areas (Y/N)? N/A

5) Costs specific to implementing Intensive Management

Table 5. Cost ($1000 = 1.0) of agency salary based on estimate of proportional time of field level staff and cost of operations for intensive management activities (e.g., predator control or habitat enhancement beyond normal Survey and Inventory work) performed by personnel in the Department or work by other state agencies (e.g., Division of Forestry) or contractors in the Unit 13 Wolf Predation Control Area. Fiscal year (FY) is also 1 July to 30 June but the year is one greater than the comparable RY (e.g, FY 2011 is 1 July 2010 to 30 June 2011).

			Operations and contracting			Total cost
Period	FY	Salary[a]	Federal Aid[b]	Public Funds[c]	Other[d]	
Year 6	2007	15.0				15.0
Year 7	2008	15.0				15.0
Year 8	2009	15.0				15.0
Year 9	2010	30.0				30.0
Year 10	2011	25.0				25.0

[a]State Fish and Game fund matched 1:3 with Federal Aid (see footnote b) except for activities directly involving predator control (state funding only).
[b]Federal Aid in Wildlife Restoration (excise tax on firearms and ammunition)
[c]Capital Improvement Project or General Fund revenue from Alaska Legislature
[d]Grants, donations from private organizations, etc.

6) Department recommendations[3] for annual evaluation (1 February) following Year 10 (RY 2010) for the Unit 13 Wolf Predation Control Area—skip in final year and go to section 7

Has progress toward defined criteria been achieved? Yes

Has achievement of success criteria occurred?

Population objectives are being met in 3 of 4 treated subunits. Population estimates for Units 13(A) and 13(E) fall in the middle of their respective objective ranges. The population in 13(B) is just above the low end of the population objective range. The population in Unit 13(C) is slowly increasing, but remains well below the objective range.

Calf-to-cow ratios in general remain below objectives in all subunits (small areas within Unit 13(A) and 13(E) are meeting objectives); ratios appear stable. Bull-to-cow ratios are being met in Unit 13(A), 13(C), 13(E) and in remote portions of 13(B). Bull-to-cow ratios are just above the minimum objectives in road-accessible portions of 13(A) and 13(C), with higher ratios in more remote portions of both subunits. Bull-to-cow ratios remain just below the minimum objective in road-accessible portions of 13(B).

Harvest data for the current hunting season (RY 2011) has not yet been finalized. As of the RY 2010 hunting season, harvest objectives were being met in 1 of 4 treated subunits, with the Unit 13(A) harvest falling in the middle of the objective range. The harvest for Unit 13(B) is very close to the low end of the objective range, but remains below objectives. The harvests for Unit 13(C) and 13(E) are slowly increasing, but both remain well below their respective objective ranges.

Recommendation for IM practice(s) (specify practices and choose one action for each):
Continue Modify Suspend Terminate

Predation control **Continue**
Habitat enhancement **Continue**
Harvest strategy **Modify** - the harvest strategy may need to be altered to improve in the number of bulls. Antlerless moose (cow) harvests may become necessary to maintain harvest and keep the population and bull:cow ratio within objectives. The IM program should be suspended in individual subunits if harvest is unable to keep the population within the management objectives.

7) Evaluation (1 February) for program renewal (following final Year 15 [RY 2015]) and Department recommendations for the Unit 13 Wolf Predation Control Area

Has progress toward defined criteria been achieved (describe)? ____________

[3] Prior sections include primarily objective information from field surveys; Sections 6 and 7 involve professional judgment by area biologists to interpret the context of prior information for the species in the management area.

Has achievement of success criteria occurred (describe)? ___________

Recommendation for IM program (choose one): Continue Modify Suspend Terminate

Rationale for recommendation on overall program: ___________________________

Other recommendations (if continuation is recommended, specific actions on individual practices): ____

Annual Report to the Alaska Board of Game on Intensive Management for Moose with Wolf and Bear Predation Control in Game Management Unit 16

Prepared by the Division of Wildlife Conservation
February 2012

1) Description of IM Program[1] and Department recommendation for reporting period

A) This report is an interim review X or renewal evaluation ___ for a predation control program authorized by the Alaska Board of Game (Board) under 5 AAC 92.125

B) Date this report was submitted by the Department to the Board:

1 February X (annual report) 1 August ___ (interim annual update[2]) Year 2012

C) Program name (geographic description/UNIT and species/herd):
Unit 16 Predation Control Area/ Unit 16 / moose

D) Existing program incorporates an *Intensive Management Plan* in regulation *5AAC 92.125*

E) Game Management Unit(s) fully or partly included in IM program area:
Subunit 16A and 16B

F) IM objectives for moose: population size 6,500 – 7,500 harvest 310 - 600

G) Month and year the current predation control program was originally authorized March 2004 by the Board. Indicate date(s) if renewed: May 2006, March 2011

H) Predation control is currently active X or temporarily inactive ____ in this IM area

I) If active, month and year the current predation control program began or resumed (if more than one predator species, list dates separately)

- Program originally authorized in March 2004 (wolf predation control)
- Program was reauthorized in May 2006 (wolf predation control)
- Program was modified to include black bear predation control in March 2007
- Program was reauthorized for 6 years and modified to include brown bear predation control in March 2011

J) Indicate if an habitat management program funded by the Department or from other sources is currently active in this IM area (Y/N) N

K) Size of IM program area (square miles) and geographic description:
All non-federal lands in Subunit 16B and the western half of Unit 16A (11,105 mi^2 total)

L) Size and geographic description of area for assessing ungulate abundance:
All available moose habitat in Subunit 16B below 3500 ft. elevation including park and preserve land. (7018 $miles^2$ total)

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[1] For purpose and context of this report format, see appendix.
[2] The interim annual update may be limited only to sections that changed substantially since prior annual report [*e.g., only Tables 3 and 6 in areas with a fall ungulate survey and only wolf control*]

M) Size and geographic description of area for ungulate harvest reporting:

All available moose habitat in Subunit 16B below 3500 ft. elevation including park and preserve land. (7018 miles^2 total)

N) Size and geographic description of area for assessing predator abundance:

All available moose habitat in Subunit 16B below 3500 ft. elevation including park and preserve land. (7018 miles^2 total)

O) Size and geographic description of predation control area:

The predation control area includes all non-federal lands in Subunit16B and the western portion of Subunit 16A. Area available for control is 7862 mi^2 for black bears and 7777 mi^2 for wolves. Wolf control areas include buffers around local airstrips. Area available for brown bear predator control is 946 mi^2 in southern subunit 16B.

P) Criteria for evaluating progress toward IM objectives:

- Moose population in Subunit 16B between 6500 and 7500 animals
- Harvest between 310 and 600 moose.

Q) Criteria for success with this program:

The program will be considered successful when the moose population reaches population objectives of 6500 to 7500 animals and harvest reaches 310 to 600 moose.

R) **Department recommendation for IM program in this reporting period**:

Continue current IM program (details provided in section 7)

2) Prey data

Date(s) and method of most recent fall abundance assessment for moose (if statistical variation available, describe method here and show result in Table 1): 26 November 2011. Population estimation surveys were conducted using the Geo-Spatial Population Estimator, which is a quadrat-based survey methodology that extrapolates or interpolates numbers of moose detected in quadrats surveyed to quadrats not surveyed to produce a minimum population estimate for the entire GMU.

Compared to IM area, was a similar trend and magnitude of difference in abundance observed in nearby non-treatment area(s) since program inception (Y/N) N/A and in the last year (Y/N)? N/A Describe comparison if necessary: No comparison exists for the wolf control portion of the program. No control was available for GMU 16B bear treatments. However, bear harvest rates varied annually among UCUs within the GMU. Annual harvest rate of black bear has ranged from 2 – 16% of the estimated 2007 population among UCUs, and calf survival was not related to harvest rate of bears ($P > 0.186$) except in 2008, when UCUs with a low black bear harvest had higher calf survival. This is the opposite of what would be predicted if the bear harvest is expected to improve calf survival.

Date(s) of most recent age and sex composition survey (if statistical variation available, describe method here and show result in Table 1):

Subunit 16B South, 13-18 November 2010; 16B Middle, 20-26 November 2011; 16B North 29-31 October 2008

Compared to IM area, was a similar composition trend and magnitude of difference in composition observed in nearby non-treatment area(s) since program inception (Y/N) N/A and in the last year (Y/N)? N/A Describe comparison if necessary: No comparison exists for the wolf control portion of the program. No control was available for GMU 16B bear treatments. However, bear harvest rates varied annually among UCUs within the GMU. Annual harvest rate of brown bears has ranged from 1– 17% of the estimated 2007 population among UCUs, and calf survival was not related to harvest rate of brown bears ($P > 0.238$) in any year, 2005-2011.

Table 1. Moose abundance, age and sex composition in assessment area (L) since program implementation in Year 1 (2005) to reauthorization review in year 7 (2011) in Subunit 16B. Regulatory year is 1 July to 30 June (e.g, RY 2010 is 1 July 2010 to 30 June 2011). Note: This table is subdivided into areas corresponding with Subunit 16B survey areas

16B North			Composition (number per 100 females)			
Period	RY	Abundance (variation)	Young	Yearlings	Males	Sample size
Year 0	2003	898 ± 162.5	17	14	35	326
Year 1	2005					
Year 2	2006	Not surveyed				
Year 3	2007	Not surveyed				
Year 4	2008	1042 ± 235	11	32	60	340
Year 5	2009	Not surveyed				
Year 6	2010	Not surveyed				
Year 7	2011	Not surveyed				

16B Middle			Composition (number per 100 cows)			
Period	RY	Abundance (variation)	Calves	Yearlings	Bulls	Sample size
Year 1	2005	1714 ± 218	14	8	29	628
Year 2	2006					
Year 3	2007	Not surveyed				
Year 4	2008	1905 ± 327	21	22	54	678
Year 5	2009	Composition Survey	19	Na	39	359
Year 6	2010	Not surveyed				
Year 7	2011	2843 ± 398	24	18	46	825

16B South			Composition (number per 100 cows)			
Period	RY	Abundance (variation)	Calves	Yearlings	Bulls	Sample size
Year 1	2005					
Year 2	2006					
Year 3	2007					
Year 4	2008		18	25	78	247
Year 5	2009					
Year 6	2010	1928 ± 421	18	30	52	703
Year 7	2011	Not surveyed				

Describe trend in abundance or composition:
The 2011 population estimate in 16B Middle was statistically greater ($P = 0.008$) than the 2005 estimate, and suggested an increase of approximately 8% per year. Much of this increase was in the bull segment of the population, as indicated by both bull numbers and bull:cow ratios. The increase in the bull:cow ratio was likely primarily due to restricted harvests that began in RY 2006. The cow segment of the population increased at < 5% per year, but the increase was not attributable to predator treatments because neither calf:cow ratio ($r = 0.40$; $P = 0.370$), calf survival ($r = 0.45$; $P = 0.491$), nor adult cow survival ($r = -0.18$; $P = 0.737$) changed during the RY 2005 through RY 2011 period.

Table 2. Moose harvest in assessment area (M). Methods for estimating unreported harvest are described in Survey and Inventory reports.

Period	RY	Reported		Estimated		Total harvest	Other mortality[a]	Total
		Male	Female	Unreported	Illegal			
Year 1	2005							
Year 2	2006	106	0	7	25	138	0	138
Year 3	2007	103	0	7	25	135	0	142
Year 4	2008	117	1	8	25	150	0	150
Year 5	2009	181	0	13	25	219	0	219
Year 6	2010	199	1	14	25	239	0	239

[a]Clarify other additional removal (Defense of Life and Property, etc.).

Describe trend in harvest:
Harvests of bull moose are generally increasing ($r = 0.92$; $P = 0.026$). This is likely due to both a liberalization of the harvest regulations that began in RY 2009 and an increase in the bull segment of the population that primarily resulted from the closure of the Tier 1 resident season from RY 2006 through RY 2008.

3) Predator data

Wolves

Date(s) May 2010 and method of most recent spring abundance assessment (if statistical variation available, describe method here and list in Table 3):
The population assessment is based on reports from control pilots, and trapper sealing records.

Date(s) September 2010 and method of most recent fall abundance assessment for wolves (if statistical variation available, describe method here and list in Table 3):
Fall abundance is based on spring estimate plus 4 pups per pack for packs greater than 2 individuals.

Other research or evidence of trend or abundance status in wolves: N/A

Table 3. Wolf abundance objectives and removal in wolf assessment area (N) of the Unit 16 Predation Control Area. Removal objective is 73-80 % of pre-control fall abundance in year 1 of wolf predation control program, so minimum number remaining by 30 April each RY in the IM area (N) must be at least 22. If non-lethal predation control methods used by Department personnel, clarify with footnote in control removal tally.

Period	RY	Fall abundance (variation)	Harvest removal		Dept. control removal	Public control removal	Total removal[a]	Spring abundance (variation)
			Trap	Hunt				
Year 0	2004	175 ± 25	11	26	0	91	128	47 ± 25
Year 1	2005	107 ± 16	25	12	0	24	61	46 ± 16
Year 2[b]	2006	121 ± 23	8	9	0	32	49	72 ± 23
Year 3	2007	117 ± 13	5	6	0	21	32	85 ± 13
Year 4	2008	92 ± 10	15	8	0	24	47	45 ± 10
Year 5	2009	84 ± 13	1	5	0	3	9	75 ± 13
Year 6	2010	82 ± 22	4	4	0	11	19	65 ± 13

[a] Additional removal may be Defense of Life and Property, vehicle kill, etc.
[b] In spring of 2006 the BOG increased the area for predator control to include the western portion of 16A. The wolf population goal for 16A was 8 to 15 wolves thus the population objective for Unit 16 is 30 to 60 wolves. The fall abundance and harvest estimates in Table 3 reflect these changes.

Bears

Date(s) May 2007 and method of most recent spring abundance assessment for black bears (if statistical variation available, describe method here and list in Table 4 Black bear densities were estimated for 16B unit wide by a line-transect sampling method (E. Becker, AKDFG, unpublished data) and the density estimates obtained (187.3 black bears/1000 km^2) were extrapolated to all bear habitat in 16B.

Date(s) N/A and method of most recent spring abundance assessment for brown bears (if statistical variation available, describe method here and list in Table 5) Brown bear densities were estimated for portions of 16B Middle and 16B North identically to black bear except that estimated brown bear density (40.6 brown bears/1000 km^2) was extrapolated to GMU 16B bear habitat and brown bear density estimates also integrated a density continuum from Units 9 and 13.

Other research or evidence of trend or abundance status in black or brown bears: N/A

Table 4. Black bear abundance objectives and removal in black bear assessment area (N) of the Unit 16 Predation Control Area. Removal objective is 80 % of pre-control spring abundance in year 1 of bear predation control program, so minimum number remaining by 31 October each RY in the IM area defined in (N) must be at least 600. If non-lethal predation control methods used by Department personnel, clarify with footnote in control removal tally.

Period	RY	Spring abundance (variation)	Harvest removal		Dept. control removal		Public control removal		Total removal[a]	Fall abundance (variation)
			FA	SP	FA	SP	FA	SP		
Year 1	2005		52	112	---	---	---	---	164	
Year 2	2006		75	251	---	---	---	---	326	
Year 3[b]	2007	3500± 300	73	210	0	0	1	106	390	
Year 4	2008		69	201	0	0	32	95	397	
Year 5	2009		43	105	0	0	58	131	337	
Year 6	2010		83	102	1	---	135	107	428	

[a]Additional removal may be Defense of Life and Property, vehicle kill, etc.
[b] Year 3 (RY 2007) was the first year of the black bear control program

While no surveys to estimate black bear abundance have been conducted in recent year, the population is above the minimum population objective based an analysis of harvests and incidental observations by biologists. Black bear harvests in Unit 16B show a strong increasing trend from an average of 130 during RY 2000 – RY 2004 to 340 during RY 2005 – RY 2010. Based on extrapolated densities from the 2007 population estimate, proportion of the black bear population harvested has ranged from 2–16% in relevant UCUs, well below levels necessary to achieve an 80% population reduction.

Table 5. Brown bear abundance objectives and removal in black bear assessment area (N) of the Unit 16 Predation Control Area. Removal objective is 60 % of pre-control spring abundance in year 1 of bear predation control program, so minimum number remaining by 31 October each RY in the IM area defined in (E) must be at least 250. If non-lethal predation control methods used by Department personnel, clarify with footnote in control removal tally.

Period	RY	Spring abundance (variation)	Harvest removal		Dept. control removal		Public control removal		Total removal[a]	Fall abundance (variation)
			FA	SP	FA	SP	FA	SP		
Year 1	2005		63	51	---	---	---	---	114	
Year 2	2006		56	41	---	---	---	---	97	
Year 3	2007	937 ± 313	64	36	---	---	---	---	100	
Year 4	2008		84	28	3	---	---	---	115	
Year 5	2009		34	35	---	---	---	---	69	
Year 6	2010		96	25	---	2	---	27	150	

[a] Additional removal may be Defense of Life and Property, vehicle kill, etc.

While no surveys to estimate brown bear abundance have been measured in recent year, the population is above the minimum population objective based incidental observations by biologists. Harvest of brown bears in Unit 16 has increased from RY 2000 - RY2004 (average = 83) to RY 2005 - RY 2010 (average = 108). Based on extrapolated densities from the 2007 population estimate, proportion of the brown bear population harvested has ranged from 1–17% annually in relevant UCUs and was above 9% in 6 of 7 years since 2004.

4) Habitat data and nutritional condition of prey species

Where active habitat enhancement is occurring or was recommended in the *Intensive Management Plan*, describe progress toward objectives:

Objective(s): N/A

Area treated and method: N/A

Observation on treatment response (specify which, and use table if ongoing program): N/A

Evidence of progress toward objective(s) (choose one: Apparent Statistical) N/A

Similar trend in nearby non-treatment areas (Y/N)? N/A

Describe any substantial change in habitat not caused by active program (e.g., new wildland fires, flooding, insect mortality of vegetation, etc.): N/A

Table 6. Nutritional indicators for Moose in assessment area (L) of the Unit 16 Predation

Control Area.

Period	RY	Pregnancy Rate of radio collared cows[a]	Twinning Rate of radio collared cows[b]	Average Rump Fat on Lactating Females in the Fall (cm)[c]
Year 1	2005	71.4	51%	--
Year 2	2006	83.3	45%	3.7
Year 3	2007	79.8	50%	2.4
Year 4	2008	70.8	48%	1.8
Year 5	2009	79.0	59%	--
Year 6	2010	83.7	47%	--
Year 7	2011	72.2	54%	--

[a] Apparent pregnancy rate based on field observations of calves born to radio collared cows. The reported values likely underestimate calf production in cases where calves were born, but lost before they could be observed by biologists.
[b] Apparent twinning rate is based on field observations of the number of calves born to individual radio collared cows. The reported values likely underestimate twinning in cases where twins were born, but one or both were lost before they could be observed by biologists.
[c]Rump Fat measurements are collected using an ultrasonograph during the fall capture of adult cow moose.

Where objectives on nutritional condition were listed in the *Intensive Management Plan*, describe trend in condition indices since inception of (a) habitat enhancement or (b) enhanced harvest (clarify which: ___________) (choose one: Positive, No change, Negative) N/A

Evidence of trend (choose one: Apparent Statistical)

Similar trend in nearby non-treatment areas (Y/N)? N/A

5) Costs specific to implementing Intensive Management

Table 7. Cost ($1000 = 1.0) of agency salary based on estimate of proportional time of field level staff and cost of operations for intensive management activities (e.g., predator control or habitat enhancement beyond normal Survey and Inventory work) performed by personnel in the Department or work by other state agencies (e.g., Division of Forestry) or contractors in the Unit 16 Predation Control Area. Fiscal year (FY) is also 1 July to 30 June but the year is one greater than the comparable RY (e.g, FY 2010 is 1 July 2009 to 30 June 2010).

			Operations and contracting			Total cost
Period	FY	Salary[a]	Federal Aid[b]	Public Funds[c]	Other[d]	
Year 1	2006	15.0				15.0
Year 2	2007	15.0				15.0
Year 3	2008	15.0				15.0
Year 4	2009	30.0		31.6		61.6
Year 5	2010	40.0		48.6		88.6
Year 6	2011	30.0		27.6		57.6

[a]State Fish and Game fund matched 1:3 with Federal Aid (see footnote b) except for activities directly involving predator control (state funding only).
[b]Federal Aid in Wildlife Restoration (excise tax on firearms and ammunition)
[c]Capital Improvement Project or General Fund revenue from Alaska Legislature
[d]Grants, donations from private organizations, etc.

6) Department recommendations[3] for annual evaluation (1 February) following Year 6 (RY 2010) for Subunit 16B —skip in final year and go to section 7

Has progress toward defined criteria been achieved (describe)?

There has been an increase in moose (primarily bull) abundance since 2005. However, moose calf survival during the first 6 months of life and calf recruitment have not been significantly improved, nor has cow survival

Has achievement of success criteria occurred (describe)?

No. Harvest and population objectives have not been met. It is also unlikely that the harvest objective will be achieved even if the population size objective is reached based on the low calf survival and recruitment

Recommendation for IM program (choose one): **Continue** Modify Suspend Terminate

The department recommends continuing the program to evaluate the brown bear control program, which began in the spring of 2011 (RY 2010). To date, the bear removal has not approached levels necessary to reach the reduction goals (remove 60% of the brown bear population and 80% of the black bear population) and has had no effect on calf

[3] Prior sections include primarily objective information from field surveys; Sections 6 and 7 involve professional judgment by area biologists to interpret the context of prior information for the species in the management area.

<u>survival. Harvest of brown bears on the Brown Bear Control Area increased from 13 in 2009 to 48 in 2010. If increased harvest can be maintained in the Brown Bear Control Area, the cumulative impact may lessen brown bear predation. Additional monitoring of the brown bear harvest and calf survival may clarify whether high brown bear harvest can be maintained and whether the cumulative effect of this harvest can benefit calf recruitment. The department will continue to evaluate the predator control program during the next year and request additional guidance from the Board during the 2013 Region IV meeting in Wasilla.</u>

7) Evaluation (1 February) for program renewal (following final Year 12 [RY 2016]) and Department recommendations for Unit 16

Has progress toward defined criteria been achieved (describe)?

Has achievement of success criteria occurred (describe)?

Recommendation for IM program (choose one): Continue Modify Suspend Terminate

Rationale for recommendation on overall program:

Other recommendations (if continuation is recommended, specific actions on individual practices):

Annual Report to the Alaska Board of Game on Intensive Management for Caribou with Wolf Predation Control in the Southern Alaska Peninsula Caribou Herd, Subunit 9D

Prepared by the Division of Wildlife Conservation
February 2012

1) **Description of IM Program[1] and Department recommendation for reporting period**

A) This report is an interim review X or renewal evaluation ___ for a predation control program authorized by the Alaska Board of Game (Board) under 5 AAC 92.125

B) Date this report was submitted by the Department to the Board:

1 February X (annual report) 1 August ___ (interim annual update[2]) Year 2012

C) Program name (geographic description/GMU and species/herd):
Alaska Peninsula / Subunit 9D / caribou / Southern Alaska Peninsula (SAP) caribou herd

D) Existing program has an Intensive Management Plan in regulation (5AAC 92.125)

E) Game Management Unit(s) fully or partly included in IM program area:
Subunit 9D

F) IM objectives for caribou: population size 1,500 – 4,000 harvest 150 – 200 annually

G) Month and year the current predation control program was originally authorized March 2008 by the Board. Indicate date(s) if renewed: Renewed November 2011

H) Predation control is currently active ___ or temporarily inactive X in this IM area

I) If active, month and year the current predation control program began ______ or resumed ____ (if more than one predator species, list dates separately)

J) Indicate if a habitat management program funded by the Department or from other sources is currently active in this IM area (Y/N)
No

K) Size of IM program area (square miles) and geographic description:
- 9,549 square miles
- includes all the mainland portion of Subunit 9D

L) Size and geographic description of area for assessing ungulate abundance:
- 9,549 square miles
- includes all the mainland portion of Subunit 9D

M) Size and geographic description of area for ungulate harvest reporting:
- 9,549 square miles
- includes all the mainland portion of Subunit 9D

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[1] For purpose and context of this report format, see appendix.
[2] The interim annual update may be limited only to sections that changed substantially since prior annual report [*e.g., only Tables 3 and 6 in areas with a fall ungulate survey and only wolf control*]

N) Size and geographic description of area for assessing predator abundance:
- 9,549 square miles
- includes all the mainland portion of Subunit 9D

O) Size and geographic description of predation control area:
- Defined annually based on caribou calving distribution
- Up to 3,819 square miles
- Can include any drainage of the Alaska Peninsula west of a line from the southernmost head of Port Moller Bay to the head of American Bay (not applicable to federal lands unless approved by federal land management agencies)

P) Criteria for evaluating progress toward IM objectives:
- monitor trends in bull-to-cow ratio
- monitor trends in fall calf-to-cow ratio
- monitor trends in caribou abundance

Q) Criteria for success with this program:
- fall bull ratio can be sustained within management objectives (35 bulls:100 cows)
- fall calf ratio can be sustained above 30 calves:100 cows
- the population can grow at a sustained rate of 5% annually
- harvest objectives are met

R) **Department recommendation for IM program in this reporting period**:
The Department recommends continuing the suspension of the predation control program during the 2012 calving season while monitoring the herd for progress towards IM objectives (details provided in sections 6).

Refer to one or more scaled maps in the *Intensive Management Plan* for areas described in this section

N/A

2) Prey data

Date(s) and method of most recent abundance assessment for caribou (if statistical variation available, describe method here and show result in Table 1):
- July 6 – 9, 2009
- post-calving population count

Compared to IM area, was a similar trend and magnitude of difference in abundance observed in nearby non-treatment area(s) since program inception: No and in the last year: No

Describe comparison if necessary:

The adjacent Unimak caribou herd (UCH) has declined in abundance since SAP program started and in the last year abundance was estimated (2009), while the SAP showed a steady increase in abundance.

Date(s) of most recent age and sex composition survey (if statistical variation available, describe method here and show result in Table 1):

- October 23, 2011

Compared to IM area, was a similar composition trend and magnitude of difference in composition observed in nearby non-treatment area(s) since program inception (Y/N) N and in the last year (Y/N)? N

Describe comparison if necessary:
The UCH bull ratio has remained low since the predation reduction program began on the calving grounds of the SAP, while the SAP bull ratio has continued to increase. The UCH calf ratio has remained low since program inception, while the SAP calf ratio has increased since the predation reduction program began except in the last year during program suspension.

Table 1. Caribou abundance, age and sex composition in assessment area (L) since program implementation in Year 1 (RY2007) to reauthorization review in Year 5 (RY 2011) in the Southern Alaska Peninsula Predation Management Area, Subunit 9D. Regulatory year is 1 July to 30 June (e.g. RY11 is 1 July 2011 to 30 June 2012).

			Composition (number per 100 females)			
Period	RY	Abundance (variation)	Calves	Yearlings	Males	Total *n*
Year 1[a]	2007	600	0.5		14.7	431
Year 2	2008	700	39.2		9.7	570
Year 3	2009	800	43.4		21.4	679
Year 4[b]	2010	-	46.6		27.9	532
Year 5[b]	2011	-	20.0		40.2	920

[a] Abundance and composition surveys were conducted prior to the start of the wolf control program, which started in May 2008
[b] Scheduled post-calving population counts were not conducted due to poor weather conditions.

Describe trend in abundance or composition:
Caribou abundance, fall bull ratio, and fall calf ratio have all increased since program implementation. Though abundance has not been estimated since RY 2009, sample size for the RY 2011 composition survey indicates that the population has continued to increase. The calf ratio increased dramatically in the first year of wolf removals, remaining high while the program was active. The calf ratio decreased in RY 2011 when the program was temporarily suspended, but remains high relative to pre-control levels. The bull ratio has increased steadily.

Table 2. Caribou harvest in assessment area (M). Methods for estimating unreported harvest are described in Survey and Inventory reports.

Period	RY	Reported		Estimated		Total harvest	Other mortality[a]	Total
		Male	Female	Unreported	Illegal			
Year 1	2007	0	0	0	10		0	10
Year 2	2008	0	0	0	10		0	10
Year 3	2009	0	0	0	10		0	10
Year 4	2010	0	0	0	10		0	10

[a]Clarify other additional removal (Defense of Life and Property, etc.).

Describe trend in harvest:

We estimate illegal harvest to have remained level over the course of the program.

3) Predator data

Date(s) N/A and method of most recent spring abundance assessment for wolves (if statistical variation available, describe method here and list in Table 3):

The objective of the program is to remove wolves from the control area (calving grounds of the SAP) during the period when calves are most vulnerable to predation (first 2 weeks of a calf's life) to improve caribou calf survival and recruitment.

Date(s) N/A and method of most recent fall abundance assessment for wolves (if statistical variation available, describe method here and list in Table 3):

The objective of the program is to remove all wolves from the control area (calving grounds of the SAP)

Other research or evidence of trend or abundance status in wolves:

Biologist observations of wolves and wolf tracks from the air in SUBUNIT 9D indicate wolves have persisted in the area since program implementation. Data from satellite collared wolves indicate dispersal into the area is likely occurring from northern Alaska Peninsula packs.

Table 3. Wolf abundance objectives and removal in the predation control area (O) of the Southern Alaska Peninsula Predation Management Area, Subunit 9D. Removal objective is N/A % of the wolves in the control area, so the estimated or confirmed number remaining post-removal (25 June) each RY in the predation control area (O) must be at least N/A.

The program is designed to remove the fewest number of wolves possible during the period of time in which calves are most vulnerable to predation to increase calf survival and recruitment. The program does not have a removal objective (% of the wolf population) and does not require a reduction in the wolf population.

Period	RY	Fall abundance (variation)	Harvest removal		Dept. control removal	Public control removal	Total removal[a]	Spring abundance (variation)
			Trap	Hunt				
Year 1	2007		1	8	28	0	37	
Year 2	2008		0	3	8	0	11	
Year 3	2009		0	9	2	0	11	
Year 4	2010		0	2	0	0	2	

[a]Additional removal may be Defense of Life and Property, vehicle kill, etc.

4) Habitat data and nutritional condition of prey species

Where active habitat enhancement is occurring or was recommended in the *Intensive Management Plan*, describe progress toward objectives :

Objective(s): N/A

Area treated and method: N/A

Observation on treatment response: N/A

Evidence of progress toward objective(s) (choose one: Apparent Statistical)

Similar trend in nearby non-treatment areas (Y/N)? N/A

Describe any substantial change in habitat not caused by active program (e.g., new wildland fires, flooding, insect mortality of vegetation, etc.): N/A

Table 4. Nutritional indicators for caribou in assessment area (L) of the Southern Alaska Peninsula Predation Management Area, Subunit 9D.

Period	RY	Pregnancy (Females 2+ yrs of age)	Male Calf Weights (kg)	Female Calf Weights (kg)
Year 1	2007	86%	7.6	7.5
Year 2	2008	90%	7.4	6.4
Year 3	2009	91%	7.1	6.1
Year 4	2010	85%	-	-

Where objectives on nutritional condition were listed in the *Intensive Management Plan*, describe trend in condition indices since inception of (a) habitat enhancement or (b) enhanced harvest (clarify which: N/A) (choose one: Positive, No change, Negative)

Evidence of trend (choose one: Apparent Statistical)

Similar trend in nearby non-treatment areas (Y/N)? N/A

5) Costs specific to implementing Intensive Management

Table 5. Cost ($1000 = 1.0) of agency salary based on estimate of proportional time of field level staff and cost of operations for intensive management activities (e.g., predation control or habitat enhancement beyond normal Survey and Inventory work) performed by personnel in the Department or work by other state agencies (e.g., Division of Forestry) or contractors in the Southern Alaska Peninsula Predation Management Area, Subunit 9D. Fiscal year (FY) is also 1 July to 30 June but the year is one greater than the comparable RY (e.g, FY 2010 is 1 July 2009 to 30 June 2010).

			Operations and contracting			Total cost
Period	FY	Salary[a]	Federal Aid[b]	Public Funds[c]	Other[d]	
Year 1	2008	13	-	106	-	119.0
Year 2	2009	16.4	-	99.7	-	116.1
Year 3	2010	10.0	-	95.5	-	105.5
Year 4[e]	2011	1.1	-	4.8	-	5.9

[a]State Fish and Game fund matched 1:3 with Federal Aid (see footnote b) except for activities directly involving predation control (state funding only).
[b]Federal Aid in Wildlife Restoration (excise tax on firearms and ammunition).
[c]Capital Improvement Project or General Fund revenue from Alaska Legislature.
[d]Grants, donations from private organizations, etc.
[e]Program suspended in Year 4 (FY2011) due to the improved status of the population and to allow evaluation of progress toward objectives without benefit of predator reduction.

6) **Department recommendations[3] for annual evaluation (1 February) following Year 4 (RY 2010) for the Southern Alaska Peninsula Predation Management Area, Subunit 9D — skip in final year and go to section 7**

Has progress toward defined criteria been achieved?
Yes. Caribou abundance, fall bull ratio, and fall calf ratio have all increased since the program started.

Has achievement of success criteria occurred?
Success has been achieved for at least one criterion. The fall bull ratio has met management objectives for the first time since 2004. The fall calf ratio increased during the first year of the program and reversed the negative population trend. The calf ratio continued to increase in subsequent years, until the program was suspended this past year. The current calf ratio is below objectives, but remains high relative to levels observed before program implementation.

Recommendation for IM program (choose one): Continue Modify **Suspend** Terminate

Substantial progress has been made toward meeting the objectives defined for program success. Abundance, fall bull ratio, and fall calf ratio have all increased under this program. Fall calf ratios were above objectives following each year of active predator reduction. Although the calf ratio has decreased since suspension of the program, it remains high relative to pre-reduction levels. Because increases in bull ratio and abundance stem from increased recruitment, these parameters should continue to improve as the calves from Years 1 through 3 reach adulthood. We recommend continued suspension of predation control in Year 5. We will continue to monitor progress towards program objectives in the absence of predation control, then reevaluate the need to reinstate the program based on thresholds identified in the predation management program (5AAC 92.125[k]):

- The bull:cow ratio can be sustained within management objectives and the fall calf:cow ratio can be sustained above 30 calves:100 cows without the benefit of wolf control,
- The population can grow at a sustained rate of 5% annually without the benefit of wolf control, or
- Harvest objectives are met

7) **Evaluation (1 February) for program renewal (following final Year 9 [RY 2017]) and Department recommendations for the Southern Alaska Peninsula Predation Management Area, Subunit 9D.**

Has progress toward defined criteria been achieved (describe)? ____________

Has achievement of success criteria occurred (describe)? ___________

Recommendation for IM program (choose one): Continue Modify Suspend Terminate

[3] Prior sections include primarily objective information from field surveys; Sections 6 and 7 involve professional judgment by area biologists to interpret the context of prior information for the species in the management area.

Rationale for recommendation on overall program: ________________________

Other recommendations (if continuation is recommended, specific actions on individual practices): ____

Feasibility Assessment for Intensive Management Program

Game Management Unit 24B (13,523 mi^2)
Proposed Upper Koyukuk Village Management Area (UKVMA)
1,359.5 mi^2 centered on Alatna and Allakaket (10.1% of Unit 24B)
to Increase Sustainable Harvest of Moose

Alaska Department of Fish and Game, Division of Wildlife Conservation

Version 1, Effective Date: 25 February 2011

Executive Summary: Residents in the Upper Koyukuk River Drainage in Unit 24B have experienced a decreasing moose population and an increased difficulty in moose harvest for the last 15 years. The economic impact of increasing hunter effort has been compounded by increasing fuel prices. Baseline biological data were collected in Unit 24B since 1989, and those data corroborate the declining moose population and the concerns of local subsistence hunters. The Department has assessed the moose population decline in Unit 24B, and has developed an Intensive Management (IM) Program to address the unique situation for this area.

In this Feasibility Assessment for Intensive Management, the department proposes to conduct lethal wolf control activities during early winter in a 1,359.5 mi^2 area near the villages of Alatna and Allakaket for up to five years, on an estimated population of 35-40 wolves (3 to 4 packs) within the IM area. Because this area comprises just 10.1% of the total area in Unit 24B, the management action proposed will not have a detectable affect on the wolf population dynamics of the overall wolf population in Unit 24B. Within the IM area, we project an increase in the moose population of up to 300-350 moose within ten years of treatment. However, like the wolf population, a nominal increase of just 300-350 moose will probably not be detectable in the overall moose population of Unit 24B.

This proposed Intensive Management Program, contains several components that are tailored to the unique biological and cultural issues inherent to Unit 24B; 1) black and grizzly bears are likely the primary mortality factor effecting calf survival based on field studies in adjacent GMU's (21D & 24D), but they will not be included in predator control activities, 2) strong cultural taboos in the area concerning bears, makes bear control an untenable option, 3) the scope of the program will be small in terms of area and wildlife populations effected, 4) the treatment area is nested within large tracts of USFWS land but will not occur on those lands, 5) IM treatment response monitoring will be mostly limited to the inventory activities of the current management program, 6) the current population and harvest estimates are below the Unit 24B IM objectives, and the department anticipates that the IM Population Objectives will not be achieved due to the limited scope of this proposed program, and 7) the department will prioritize efficiency and cost effectiveness in implementation of the program.

Finally, because much of the IM area is privately-owned native corporation land, the benefit of this action will mostly accrue to the local residents of Allakaket and Alatna. Additionally, because the scope of the treatment is limited, in terms of its overall impact on the wolf and moose populations, the context of the project is simply a *"reallocation"* of the moose resource from wolves to humans in a confined area, not necessarily creating a larger moose population.

A. **Biological factors** are the basis for evaluating potential to achieve population or harvest objectives. Information will be mostly numeric answers or not applicable depending on species or geography. In most instances, the professional judgment of the area biologist will be required to put numbers in context in the recommended management strategy (section 6) and public process (section 7).

I. Non-predation and non-hunting mortality of prey

a) Markedly reduced survival of young due to winters with snow ≥36 inches deep for moose or ≥20 inches for deer by 1 March (frequency over ≥10 year periods): 45% (9 winters out of 20) > 3 feet, 85% (17 winters out of 20) >2 feet at Bettles. (Figures 1 & 2)
b) Reduced survival of young deer because of prolonged wind chill <0°F in shrub-dominated coastal areas (frequency over ≥10 year periods): N/A
c) Vehicle mortality along road and rail system that reduces harvestable surplus in the population (estimated number killed annually): N/A
d) High prevalence of disease or parasites in the population (Y/N): No. Blood assessment of moose radio-collared in 2007 showed low incidence of exposure to common diseases. No die-offs have been reported.

II. Access for predator reduction and ungulate harvest (see also sections B.I.c and B.I.d)

a) Estimated availability (in miles) of all-season roads: <10 miles inside village
b) Estimated availability (in miles) of ATV trails: <20 miles. The Bettles Ice Road is open from approximately January 1 – March 15 each year. There are no other roads in the Game Management Unit (Unit). There are four primary snowmachine trails that originate from Alatna/Allakaket: 1) Allakaket-Tanana trail, 2) Koyukuk River trail to Hughes, 3) Bettles trail, and 4) Kanuti Flats trail. Additional trails go out to the Alatna River and various traplines. There are numerous lakes and gravel bars on rivers for landing strips, but the Kanuti Controlled Use Area prohibits the use of aircraft for hunting moose.
c) Availability (in miles) of navigable rivers: 100 miles. Small boat travel is extensive on the Koyukuk River, Alatna River, Kanuti River, South Fork Koyukuk River, and Henshaw Creek depending on water levels in late fall hunting seasons.
d) Feasibility of landing fixed-wing aircraft in winter for predator removal (Low, Moderate, High): Moderate
e) Feasibility of landing fixed-wing aircraft in fall for ungulate hunting (Low, Moderate, High): Moderate
f) Feasibility of ocean shoreline access for hunting or predator removal (Low, Moderate, High): N/A
g) Use of helicopters by public (under permit) for trapping or retrieval of carcasses from aerial shooting (Y/N): Yes
h) Controlled Use Areas that prohibit aircraft access for ungulate harvest (Y/N): Yes

III. Potential effectiveness of predator control

a) Are there concentrated calving and/or young rearing areas of ungulates for focused bear or wolf control (Y/N/Unknown)?: No. Based on population surveys and preliminary radio-collared moose locations, the population is broadly distributed at low density with no apparent distinct calving areas. The area of the Kanuti Flats probably holds the most cows in 24B, and the high density Trend Count Areas of the Henshaw Creek and Kanuti Canyon areas are probably the highest calving areas due to the relatively higher concentrations of moose.

b) Are there concentrated winter ranges of ungulates suitable for focused wolf control (Y/N/Unknown)?: Generally, the Henshaw Creek and Kanuti Canyon areas have higher concentrations of moose in winter (Figures 3 & 4). However, both areas are on the periphery of the proposed UKVMA, and most of the Kanuti Canyon area is on the Kanuti NWR.

IV. Potential effectiveness of public participation in predator control (under permit) or predator harvest

a) Number of licensed hunters and trappers within or near proposed management area (size of potential participant group): 0-2 trappers with planes, 4-6 trappers on snowmachine.

b) Estimated wolf harvest rate (percentage of estimated fall population, average of 3 most recent Regulatory Years [RY: 1 July to 30 June]): the harvest during 1998-2008 was 20-30 wolves/year with an estimated population of ~243 (Unit 24B; 16-21 wolves/1000 mi^2) for an annual harvest rate around 10-15% annually (population ≈ 25-35 wolves within the proposed UKVMA). Estimated 16-21 wolves/1000 mi^2 (6-8 wolves/1000 km^2) in northern Unit 24 (Adams et al 2008, Stout 2009).

c) Estimated black bear harvest rate (percentage of estimated spring population, average of 3 most recent Regulatory Years): 20-25 black bears/year by Alatna/Allakaket residents, estimated 5-10 by non-local hunters, for a harvest of ~30 black bears @ ~100 bl. bears/1,000 mi^2 = harvest rate of < 2.5% (Unit 24B; 50-210 bl. bears/1,000 mi^2 ≈ 676 – 2840 black bears).

d) Estimated grizzly/brown bear harvest rate (percentage of estimated spring population, average of 3 most recent Regulatory Years): 10-15 grizzly bears/year at a harvest rate of less than 4%, mostly by non-local hunters (Unit 24B; 33 grizzly bears/1,000 mi^2 ≈ 450 grizzly bears).

V. Ability to confirm treatment response (e.g., predator control, habitat enhancement, selective harvest) in treatment areas with data from nearby and comparable untreated areas through assessment of biological parameters using existing techniques. Low sample size for survey data may limit applicability in low density situations.

a) Fall or late winter survey for abundance (Y/N): Yes

b) Fall composition surveys for young to adult female ratio as e.g., index to survival forbear predation during prior summer where wolf predation on young is comparative low) (Y/N): Yes

c) Fall composition surveys for yearling to adult female ratio as index to survival (e.g., , wolf predation during year since prior fall survey where bear predation on young is comparatively low) (Y/N): Yes

d) Radio telemetry for survival of age cohorts (Y/N): Yes (proposed)
e) Total prey harvest and age-sex composition of harvest among local residents, state residents, and non-residents (where applicable): Yes

B. Societal factors associated with hunting conflicts (e.g., constraints to access, acceptable methods, and harvest expectations) and public tolerance for intensive management practices

I. Public expectation for ungulate harvest may limit options to control growth of ungulate populations, which can affect nutritional condition and lead to public conflicts where increased harvest is biologically sustainable. A critical component of conflict mitigation is identifying potential for additional harvest opportunity that is acceptable to the hunting and non-hunting public. Defining the benefits of increased harvest is complex because hunter motivation may include economic factors (cost of meat replacement) and intangible measures of satisfaction (continuation of hunting culture, time spent in the field with family or friends, etc.).

a) Acceptable quantity and sex/age structure of ungulate harvest: 40-60 bulls:100 cows, 10-15 yearling bulls:100 cows, 30-45 calves:100 cows, in a growing population. Yearling survival key element to population growth. Within the proposed 24B IM area, we estimated 25% of the 297 adult moose are yearlings ≈ 74 yearling moose (based on 14 yearling bulls:100 cows and assuming 50:50 ratio of M:F). An increase in the population to 595 adults will yield at least 146 yearling moose/annually, depending on yearling survival. Yearling survival will increase with reduction in wolves, even though the population will still sustain high levels of mortality on the calf component of the population from bears. Cow and yearling harvest is acceptable.
b) Ability to inform constituents about ecological and biological constraints (nutrition, forage condition) relative to setting upper limits for population densities of managed ungulates (Y/N): N/A
c) Level of hunter density where significant conflicts occur between hunters (Low, Moderate, High): (High at low moose densities, Moderate at high moose densities) and between hunters and non-hunters (Low, Moderate, High): N/A
d) Potential for conflict in rural areas between local subsistence hunters and non-local hunters (Low, Moderate, High): High. Local residents are relatively intolerant of non-local hunters. However, most non-local hunters in 24B hunt well away from villages due to access regulations and rural residency requirements on federal lands. However, due to the KCUA, all non-local hunters are confined to the floatable rivers, which is where local hunters are confined as well (Figure 5). Local residents believe that non-local airplane hunters would over-exploit the moose population, fail to adequately salvage meat, and/or unfairly harvest trophy bulls in the absence of the KCUA. Local resident are concerned that airborne hunters would spot large bulls from the air then land and harvest them.
e) Conflicts or problems associated with access: existing access constraints (Few, Some, Many) Some, and acceptable strategies to spread out hunters and minimize trespass on private lands (Few, Some, Many) Some, and minimize unacceptable levels of trail damage on public lands (Few, Some, Many) Few.
f) Acceptance of restricted methods or means for harvest, particularly near communities (e.g., archery or muzzleloader) (Y/N): N/A

g) Acceptable level of vehicle mortality, which poses a public safety risk (Low, Moderate, High): N/A

h) Anticipation of strongly adverse public reaction to a management tool (e.g., predation control, prescribed fire, selective harvest), geographic area, or other facet of the proposed program (Low, Moderate, High). Moderate. Local public will favor wolf control but will not favor bear control due to cultural beliefs. Non-local public will be divided, and will probably question an IM strategy that does not include bear control when bears are the primary predator on calves.

i) Potential for predator control to have indirect negative effects on alternate prey, such as increase in medium predators that can prey on ungulate young (e.g., increased coyote abundance following extended periods of wolf control to benefit moose or caribou could increase predation on Dall sheep lambs during peak abundance of hares) (Low, Moderate, High): N/A

j) Coordination among hunters and trappers about control methods and allocation among ground based trappers, aerial gunners by permit, and Department use of helicopters (Low, Moderate, High): High

II. Land Ownership may restrict access for predator control or ungulate harvest. Proximity of restrictive status to communities or areas where management treatments would be most effective is the important context—see discussion of management strategy in section 6. If the objective is to increase harvest in a local area as progress toward a larger area objective, a program to reallocate mortality from predation to harvest without a substantial increase in ungulate abundance may be feasible with harvest coordination (but see Section C.I.c in context of State funds).

a) Percentage of National Park or Preserve and National Wildlife Refuge (where predator control may be restricted) in Game Management Unit or subunit or caribou herd range: 125 mi^2 (9.2%) federal land (BLM/USFWS) within UKVMA (Figure 5).

b) Percentage of area in federally designated wilderness where habitat or wildlife management may be subject to more extensive public process: 0%
Percentage of Alaska Native corporation land: 576 mi^2 (42.3%)

c) Access for predator control or ungulate hunting allowed on Alaska Native corporation lands (Y/N): Yes

C. **Economic factors** define estimated costs of management programs and expectations for public participation in predator control programs for comparison to perceived benefits by the Board and public

I. Cost of participation in prey harvest or predation control by public

a) Price (Dollars/gallon) of unleaded gasoline (average among communities): $6.50-$7.50/gal. unleaded.

b) Price (Dollars/gallon) of 100 octane low lead aviation fuel (average among communities): $8.00-8.50/gal.

c) Cost to hunters per prey animal harvested of alternative strategies (e.g., transportation cost to hunt in adjacent areas with harvestable surplus of ungulates relative to cost replacement value of meat): $1,400-$1,500/moose from GMU20A.

d) Value of predator hides or other parts legal to sell: $100-$300 wolves, $100-$200 black bears.

II. Potential for participation in predator control by public

a) Number of public participants (potential permit holders) in close proximity that are experienced pilots or shooters and likely willing to participate in a predator control program (Low, Moderate, High): Low
b) Availability of State funds for Department sponsored control programs (Low, Moderate, High): Low

III. Potential for cost sharing in habitat enhancement (see also sections B.I.f and B.II)

a) Potential to collaborate on prescribed fire where hazardous fuel reduction is the primary goal (Low, Moderate, High): Moderate
b) Potential to collaborate on forest management or mechanical vegetation treatments to produce wood products or reduce hazardous fuels (Low, Moderate, High): Moderate

4) Availability of biological and harvest information on population status of predators and ungulate species for modeling predator removal rates, ungulate population growth rates, and time until increase in harvest of ungulates is feasible (Y/N/unknown/not applicable)

- Ungulate population status:
  - Abundance survey within last 2 years: Yes
  - Abundance surveys on set schedule to estimate trend: Yes
  - Composition survey within last 2 years: Yes
  - Estimate of parturition rate within last 5 years: No, twinning rates only
  - Young survival estimate with mortality causes identified: No

- Harvest of prey:
  - Trends in reported harvest by residents and "local" (GMU) residents among general season, drawing permit, registration permit, and Tier II categories over last 10 years: *RY99-09* – 20 local residents, 42 non-local residents, 20 non-residents (GMU24B). Local hunting effort is under-reported, therefore Subsistence Division Door-to-Door survey data (1997-2002) was utilized to estimate a harvest demand for Alatna and Allakaket of 40 moose.
  - Where unreported harvest occurs, public perception of trend: Decreasing harvest.
  - Estimate of unreported harvest from telemetry, Division of Subsistence, or other sources: Subsistence Division household surveys have estimated the moose harvest from Alatna and Allakaket at 35-43 during RY97-RY02 compared with a reported harvest of 5-9 moose.
  - Department estimate of current sustainable harvest: RY07-RY09 range = 83-109 moose (~3.5% harvest rate of observable moose based on RY09 population estimate).
  - Amount Necessary for Subsistence (specify date of determination or updates, whether specific to proposed IM area or larger area, and number relative to IM objective): Unit 24 – (ANS=170-270 moose; IM=500-925 moose). There are no ANS numbers for Unit 24B independent of the entire GMU, the Unit 24B IM harvest objective =150-250.
  - Harvest by non-residents allowed (Y/N): Yes

- Status and harvest of predators:
  - Survey/census of wolf density within last 5 years: Yes the harvest during 1998-2008 was 20-30 wolves/year with an estimated population of ~243 (Unit 24B; 16-21 wolves/1000 mi^2) for an annual harvest rate around 10-15% annually (population ≈ 25-35 wolves within the proposed UKVMA).
  - Survey/census black bear density within last 5 years: No, Unit 24B; 50-210 bl. bears/1,000 $mi^2 \approx 676 - 2840$ black bears, based on extrapolated densities from similar habitats in Interior Alaska.
  - Survey/census grizzly/brown bear density within last 5 years: No, 10-15 grizzly bears/year at a harvest rate of less than 4%, mostly by non-local hunters (Unit 24B; 33 grizzly bears/1,000 $mi^2 \approx 450$ grizzly bears), based on extrapolated densities from similar habitats in Interior Alaska.
  - Predator-prey ratio estimated: Incomplete, (24B; ~1 wolf:11 moose) (within 24B IM Area; 25-30 wolves:330-462 moose ≈ 1 wolf:13–15 moose)
  - Survey of alternative prey adequate to aid predator recovery: No, Caribou occur in variable numbers during winter and Dall sheep occur nearby, but there are no estimates.
  - Most wolf harvest accounted for by sealing data: No
  - Most black bear harvest accounted for by sealing data: No
  - Department estimate of black bear harvest where sealing does not occur: 20-25 black bears/year by Alatna/Allakaket residents, estimated 5-10 by non-local hunters, for a harvest of ~30 black bears @ ~100 bl. bears/1,000 mi^2 = harvest rate of < 2.5%
  - Most grizzly/brown bear harvest accounted for by sealing data: Yes

- Habitat condition:
  - Interior moose: Proportional removal of browse biomass in previous 5 years with no large population change or widespread disturbance (e.g., fire) since browse survey: Habitat is not limiting based on twinning surveys in 2008-10 and browse assessment in 2007. Browse biomass removal for sampled plants was 5.3% (95% CL: 4.3–6.3%, $n = 231$ shrubs), which along with Unit 24C is the lowest measured to date in the Interior. The removal index extrapolated to the shrub counts and species composition in Unit 24B was 8.8% (6.8–10.8%, $n = 231$ shrubs).
  - Interior moose: Proportion of browse species with broomed growth structure (history of browsing): The brooming index was relatively low at 0.34 (95% CL: 0.28–0.40, $n = 231$ shrubs), and 51% of the plants had no evidence of past browsing by moose (T. Paragi, ADF&G, personal communication to G. Stout, 22 Jun 2007).
  - Moose: Proportion of area burned in last 10 years (potential browse availability): 0.8 mi^2 (0.06%) (Figure 6)
  - Proportion of area in appropriate habitat type based on vegetative classification (define as forage, cover, etc.): No field-validated vegetative classification exists for the entire subunit, however the 1992 Ducks Unlimited classification (83% overall accuracy validation) covers the SE half (52%, Figure 6) of the IM area and has 13% tall shrub with unknown proportion of browse vs. non-browse species. The unvalidated 2009 LANDFIRE classification of the entire IM area has 8% tall shrub. (Figure 7)

- Ungulate nutritional condition (representative of environmental conditions experienced during the most recent population census or estimate): [*options currently being discussed*]

- Percentage of productive 3-yr-old females (caribou; cohorts are radio marked for calf weights and monitored for photocensus coverage): N/A
- Weight of 4-month- or 10-month-old females (caribou or moose; *deer also?*): N/A
- Weight of adult (5-6 yr old) females (caribou; herd specific that requires baseline): N/A
- Yearling female mandible length (*caribou? deer?*): N/A
- Ratio of femur to hind foot length (*deer?*): N/A
- Two estimates of twinning rate in previous 5 years with no large population change (moose): 2008-35%, 2009-60%, 2010-58%
- *Other metrics?*

5) Potential to achieve ungulate population and harvest objectives

i. Population increase in ungulates required to reach population objective (may be represented as comparable density): The 2010 estimated density is 0.30 moose/mi^2 in Unit 24B for an estimate of 405 (90% C.I. ± 24%) observable moose within the UKVMA. An increase to 0.51 moose/mi^2 (690 observable moose) would provide for a harvest of 34 moose for the villages of Allakaket/Alatna (5% yield, all bulls), including an additional 6 moose harvested outside the management area would provide a total of 40 moose harvested annually. The 1993 density estimate on the Kanuti NWR was 0.76 moose/mi^2 with 1.17 SCF (0.65 moose/mi^2 observable), therefore 0.51 moose/mi^2 within the UKVMA seems reasonably achievable.
ii. Increase in average estimated harvest (last 3 RYs) to reach harvest objective: For entire Unit 24B, the current average 3-yr. estimated harvest = 103 moose and the lower IM harvest objective = 150 moose. See previous question for potential increase in harvest from the UKVMA as a contribution toward the IM harvest objective for GMU24B.
iii. Potential to mitigate biological limitations in proposed IM area (Low, Moderate, High): High
iv. Potential to reduce or moderate hunting conflicts (Low, Moderate, High): Moderate, Local residents are relatively intolerant of non-local hunters. However, most non-local hunters in 24B hunt well away from villages due to access restrictions and rural residency requirements on federal lands.
v. Anticipated public participation based on expense and other factors (Low, Moderate, High); Low
vi. Data availability for designing an effective management plan (Low, Moderate, High): Moderate
vii. Potential to measure or demonstrate progress in ungulate population recovery or an increase harvest within a defined time period (Low, Moderate, High): Moderate
viii. Potential to document reasons for success or failure in population recovery or harvest increase (Low, Moderate, High): Moderate

6) Definitions, review of objectives and current status, and recommended management strategy

a) Define the relevant geographic area for assessing abundance of prey and predators by geographic area: (see also: Appendix A, part 1):): <u>Proposed Upper Koyukuk Village Management Area (UKVMA) 1,359.5 mi^2 centered on Alatna and Allakaket (10.1% of Unit 24B) will be used to assess prey response and will define the boundary of wolf control. Wolf abundance will be assessed annually on the basis of GMU 24B.</u>

b) Recommend a time period for evaluation of the proposed program that matches the regional Board cycle: 6 years
c) Note if the feasibility assessment is for IM (legal requirements in Appendix A and the *IM Guidelines*) or another purpose: Yes.
d) List the population and harvest objectives for prey species; they are in regulation for IM (see also: Appendix A, part 2): *24B - Population Objective*: 4,000-4,500 (current est. = 2,362 ± 490), *24B - Harvest Objective*: 150-250 (current est. = 83-109)
e) Provide a brief feasibility review of IM objectives or other objectives for prey species: (Appendix A, part 2): The recommendation by the Area Biologist to subdivide the GMU 24 IM objectives into four subunits was adopted by the Board of Game in January 2006. The Department recommended new IM objectives for the subunits, which were adopted by the BOG at the March 2006 meeting.
f) List the population and harvest objectives for predator species in Survey and Inventory reports: Wolf Management Objective of 13–23 wolves/1000 mi^2 (5–9 wolves/1000 km^2). No population objectives for black bears or grizzly bears. In Unit 24, the average annual grizzly bear harvest by hunters during RY02–RY07 was 14.5 bears. The reported average harvest during RY05–RY07 in the northern (north of Allakaket) and southern (remaining) portions of Unit 24 was 11.0 and 1.3 bears, respectively. The number of bears taken by fishermen or trappers and not reported is unknown, but was likely <6 bears annually. The RY02–RY07 mean annual reported and estimated unreported harvest in the entire unit was 19.7 bears.
g) Briefly describe the proposed management strategy for the ungulate population (actions to be taken on habitat, predation, harvest, access, or other factors): (see also: Appendix A, part 2): Modeling of the current moose population in the proposed IM area (UKVMA) using estimates of predator abundance and information from similar ecosystems in Interior Alaska indicate a continued potential for slow decline (Figure 8). Conducting wolf control to remove 66% of an estimated pre-control abundance of 30 wolves in the UKVMA and maintaining the lower wolf abundance is forecasted to allow a slow increase in moose abundance in the proposed IM area (Figure 9). Encouragement of habitat enhancement (e.g., fuel breaks or willow crushing) near communities to increase browse may serve to attract or retain moose on winter range where bears and wolves are accessible to hunters and trappers and where a limited winter harvest of moose is economical. A conservative bull harvest may be increased slowly during predator control efforts (at the expense of population growth) as moose mortality is reallocated from wolves to humans. Alternatively, present harvest can be maintained until a population increase allows a greater harvest that may eventually include cows or calves.
h) Propose measures of progress toward population or harvest objectives to be evaluated, identifying if additional data collection is necessary: 1) Calf and yearling survival rates utilizing radio-collared animals, 2) calf and yearling survival rates using composition data from fall surveys, 3) Harvest in the communities of Allakaket and Alatna, 4) Moose population estimates from fall surveys, 5) Wolf population estimates.
i) Provide a brief explanation for collecting or evaluating data from untreated areas for comparison to areas treated under the management program as evidence in a scientific study design that the treatment effects are working as intended and not simply an artifact of non-treatment effects (e.g., widespread improvement in calf survival because of mild winter across region, not because of predation control in a specific area): Baseline moose population demographic data on the Kanuti NWR is available from as early as 1989. Baseline wolf population estimates are available since 1995. Moose and wolf monitoring data collection will continue and can be used for evaluating trends immediately adjacent to the proposed IM area.

j) Provide an estimated cost of implementation (operations and field staff salary) for the proposed program over the evaluation time period. Six-year cost of predator control program (w/o personnel costs)

a. Survey and Inventory Activities (within IM area)

• Moose GSPE surveys (Years 1 and 5: 75-100 SU's)		$ 60,000
• Wolf population survey (Years 1 and 5)		$ 20,000
	Sub-total	$ 80,000

b. Research (1st Year pre-treatment + 4 Years treatment)

• Calf/yearling survival rate study (40 moose/yr)		$ 265,000
o Capture helicopter ($10K)		
o Collars ($10K)		
o Fixed-wing ($3K)		
o 18 Relocation flights ($30K)		
• Subsistence Division Harvest Monitoring		$ 115,000
	5-year Sub-total	$ 380,000

c. Intensive Management (predator removal)

• Year 1 (helicopter + 2 fixed wing, 3-days)		$ 24,000
• Years 2-5 (helicopter + 2 fixed wing, 2-days)		$ 64,000
	Sub-total	$ 88,000
	Total	$ 548,000

7) If the Board requests development of an IM Plan, the Department should engage the public to receive input on:

a) measures of progress toward objectives and criteria of program success;
b) acceptable methods for enhancing ungulate population and harvest, including a discussion of expected harvest levels and "hunter carrying capacity"

****

<u>Appendix A</u>. Legal elements and criteria for IM objectives and a feasibility assessment

Area biologists should review and ensure the following 4 elements have been met:

1. Definition of populations:
   - The relevant area for defining an ungulate population under intensive management is that defined as a positive determination in Title 5, Alaska Administrative Code, Chapter 92, Section 108 (5 AAC 92.108)

        - Game Management Unit 24B (13,523 mi^2)
- "Game population" is defined in AS 16.05.940(20) as a "group of game animals of a single species or subgroup manageable as a unit," so clarify the purpose of ungulate or predator management zones proposed to be smaller than areas under 5 AAC 92.108
    - Proposed Upper Koyukuk Village Management Area (UKVMA) 1,359.5 mi^2 centered on Alatna and Allakaket (10.1% of Unit 24B)
- Consider whether a population with a positive determination for IM (5 AAC 92.108) should match or differ from Amounts Necessary for Subsistence (5 AAC 99.025) for the same geographic area

2. The Board has established population and harvest objectives for intensive management of identified ungulate populations for a high level of human harvest:

- Positive determination made for species and herd (caribou) or GMU subunit (moose, deer) per 5 AAC 92.106:
    - *Estimated harvest (reported and estimated unreported)* – RY07-RY09 range = 83-109 moose (~3.5% harvest rate of observable moose based on RY09 population estimate). Subsistence Division household surveys have estimated the moose harvest from Alatna and Allakaket at 35-43 during RY97-RY02 compared with a reported harvest of 5-9 moose.
    - *Accessibility* – The Bettles Ice Road is open from approximately January 1 – March 15 each year. There are no other roads in the Game Management Unit (Unit). There are four primary snowmachine trails that originate from Alatna/Allakaket: 1) Allakaket-Tanana trail, 2) Koyukuk River trail to Hughes, 3) Bettles trail, and 4) Kanuti Flats trail. Additional trails go out to the Alatna River and various trapline trails. There are numerous lakes and gravel bars on rivers for landing strips, but the Kanuti Controlled Use Area prohibits the use of aircraft for hunting moose. Small boat travel is extensive on the Koyukuk River, Alatna River, Kanuti River, South Fork Koyukuk River, and Henshaw Creek depending on water levels in late fall hunting seasons.
    - *Use of harvest primarily for meat* – Moose harvest is primarily for meat, but there is demand for non-local harvest by hunters targeting large trophy-class bulls.
    - *Hunter demand (reported hunting effort - RY09)* – 20 local residents, 42 non-local residents, 20 non-residents. Local hunting effort is under-reported, therefore Subsistence Division Door-to-Door survey data was utilized to estimate a harvest demand for Alatna and Allakaket of 40 moose.

- Population and harvest objectives established per 5 AAC 92.108:
    - *Population Objective*: 4,000-4,500 (current est. = 2,362 ± 490)
    - *Harvest Objective*: 150-250 (current est. = 83-109)
    - *Effects of weather, habitat capability, diseases and parasites*: Habitat is not limiting based on twinning surveys in 2008-10 and browse assessment in 2007. Browse biomass removal for sampled plants was 5.3% (95% CL: 4.3–6.3%, *n* = 231 shrubs), which along with Unit 24C is the lowest measured to date in the Interior. The removal index extrapolated to the shrub counts and species composition in Unit 24B was 8.8% (6.8–10.8%, *n* = 231 shrubs). The brooming index was relatively low at 0.34 (95% CL: 0.28–0.40, *n* = 231 shrubs), and 51% of the plants had no evidence of past browsing by moose (T. Paragi, ADF&G, personal communication to G. Stout, 22 Jun 2007).

Twinning rates of collared moose in 24A/B from 2008-2010 were 35%, 60%, and 58% respectively. Blood assessment of radio-collared moose showed low incidence of exposure to common diseases. No die-offs have been reported.

- *Maintenance of viable predator populations*: Estimated 50-210 black bears/1,000mi^2 (20-80 black bears/1,000km^2). Estimated 33 grizzly bears/1000 mi^2 (13 grizzly bears/1000 km^2) (Reynolds 1976; Reynolds and Hechtel 1984). Estimated 16-21 wolves/1000 mi^2 (6-8 wolves/1000 km^2) in northern Unit 24 (Adams et al 2008, Stout 2009).
- *Maintenance of habitat conditions suitable for other species in the area*: the area is a high frequency fire area and maintains an abundance of early seral vegetation. River bank erosion and accretion provides abundant willow and riparian regrowth.
- *Effects on subsistence users*: Subsistence users depend primarily on moose, salmon, whitefish, black bears, and caribou when present. Small game and some furbearers (muskrat, beaver, lynx) may also provide food resources. Increased numbers of moose would reduce hunter effort and reduce expenditures on fuel for hunting.
- *Cost, feasibility and potential effectiveness of possible management actions*: Moose calf survival until fall is adequate for population growth (27-58 calves per 100 cows since 1999), but survival of yearlings is inferred to be low (4.9-20.1 yearling bulls per 100 cows during same period). Bears are likely responsible for the largest proportion of neonatal mortality (Osborne et al. 1991), whereas wolves are likely the primary predator of moose >12 months of age (Boertje et al. 2009), particularly for yearling bulls. If predator control is undertaken, a Department program with little public contribution is recommended. Administering a complicated permitting program for private individuals with low potential to achieve an adequate harvest of wolves or bears would compromise that effort. The area residents are culturally sensitive to the harvest and handling of bears, bear meat, and bear parts. Control of bears would probably be politically and culturally impractical and unnecessarily complicate a control program. Alternatively, wolf control would be designed to achieve and maintain 20-45% of pre-control abundance (National Research Council 1997) in the UKVMA (Figures 8 & 9). The area is remote, often extremely cold, and dark during most of the best time of the year to hunt wolves. The cost for private individuals to fly to Unit 24B to hunt wolves or bears is probably not economical. The extremely low density of moose (0.3/mi^2) equates to relatively low density of wolves, which will also reduce incentive for private hunters because so few wolves will need to be removed. However, because the area is confined to a small portion of Unit 24B, there are a relatively few packs in the area, and a relatively low harvest would be needed to successfully reduce the number of wolves in the area. There are no local pilots in Allakaket, and Bettles is the closest community with aviation fuel for sale. The efficiency in the program will be realized by maintaining a low administration overhead for the predator control program. A program that endeavors to improve survival of 6 month old to 24 month old moose, through a reduction in wolf predation is likely the only alternative biologically and socially.
- *Land ownership patterns within the range of the population*: The 24B Intensive Management area contains approximately 125 mi^2 (9.2%) of federal land (BLM/USFWS), 576 mi^2 (42.4%) native corporation, and 631 mi^2 (46.4%) of State land (Figure 5).
- *Degree of accessibility to harvest*: Primarily only by boat due to the Kanuti Controlled

Use Area (KCUA) that restricts the use of aircraft for hunting moose and excludes non-federally qualified users on the federal lands within the KCUA. There is currently an antlered bull, Dec. 15-Apr. 15 hunting season and a September 1-25 bulls only season in 24B under State and Federal regulations.

3. Depletion of the ungulate population [abundance or harvest below objectives] or reduction of the "productivity" [recruitment] of the population has occurred and may result in a "significant" reduction in the allowable harvest per Alaska Statute, Title 16, Chapter 5 (AS 16.05.255(e)).

4. Enhancement of abundance or productivity of the big game prey population is feasibly achievable utilizing recognized and prudent management techniques [AS 16.05.255(e)(3)]

5. The Board is not required to adopt regulations to provide for an intensive management program per AS 16.05.255(f)(1) if a proposed IM program is:

- (A) ineffective, based on scientific information
- (B) inappropriate due to land ownership pattern
- (C) against the best interest of subsistence uses

6. The Board may forego a feasibility assessment if per AS 16.05.255(f) (2) it declares that a biological emergency exists and takes immediate action to protect or maintain the big game prey population in conjunction with the scheduling for adoption of those regulations that are necessary to implement section (e).

Literature cited (can be added later)

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21-2, W-22-1, and W-22-2. Study 4.14R. Juneau, Alaska, USA.

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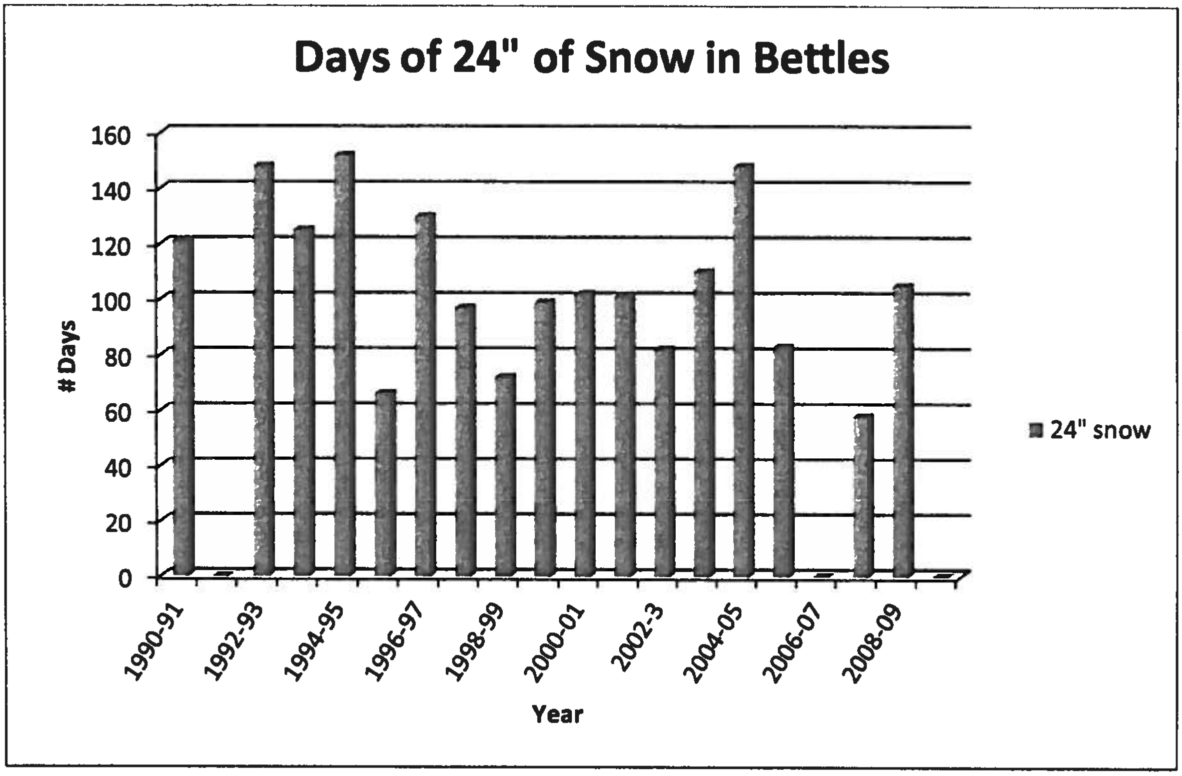

Figure 1. Number of days of 24" of snow accumulation at Bettles, AK, NOAA - 2010.

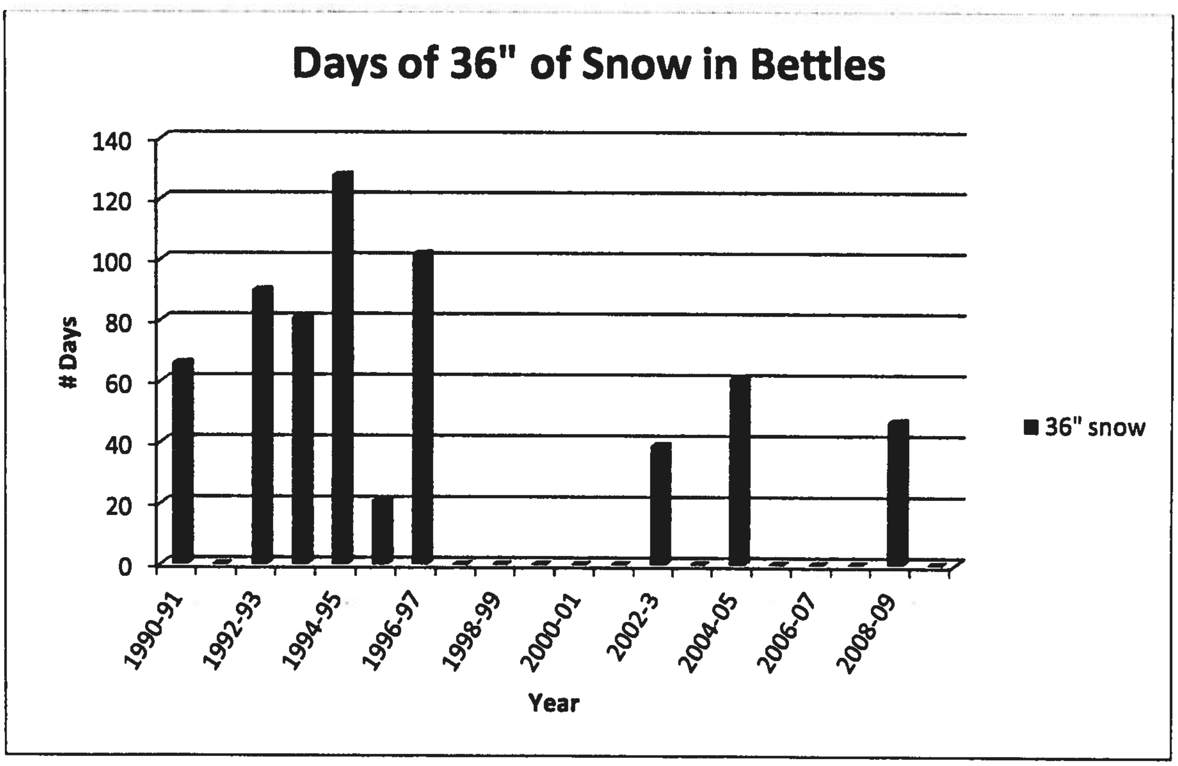

Figure 2. Number of days of 36" of snow accumulation at Bettles, AK, NOAA - 2010.

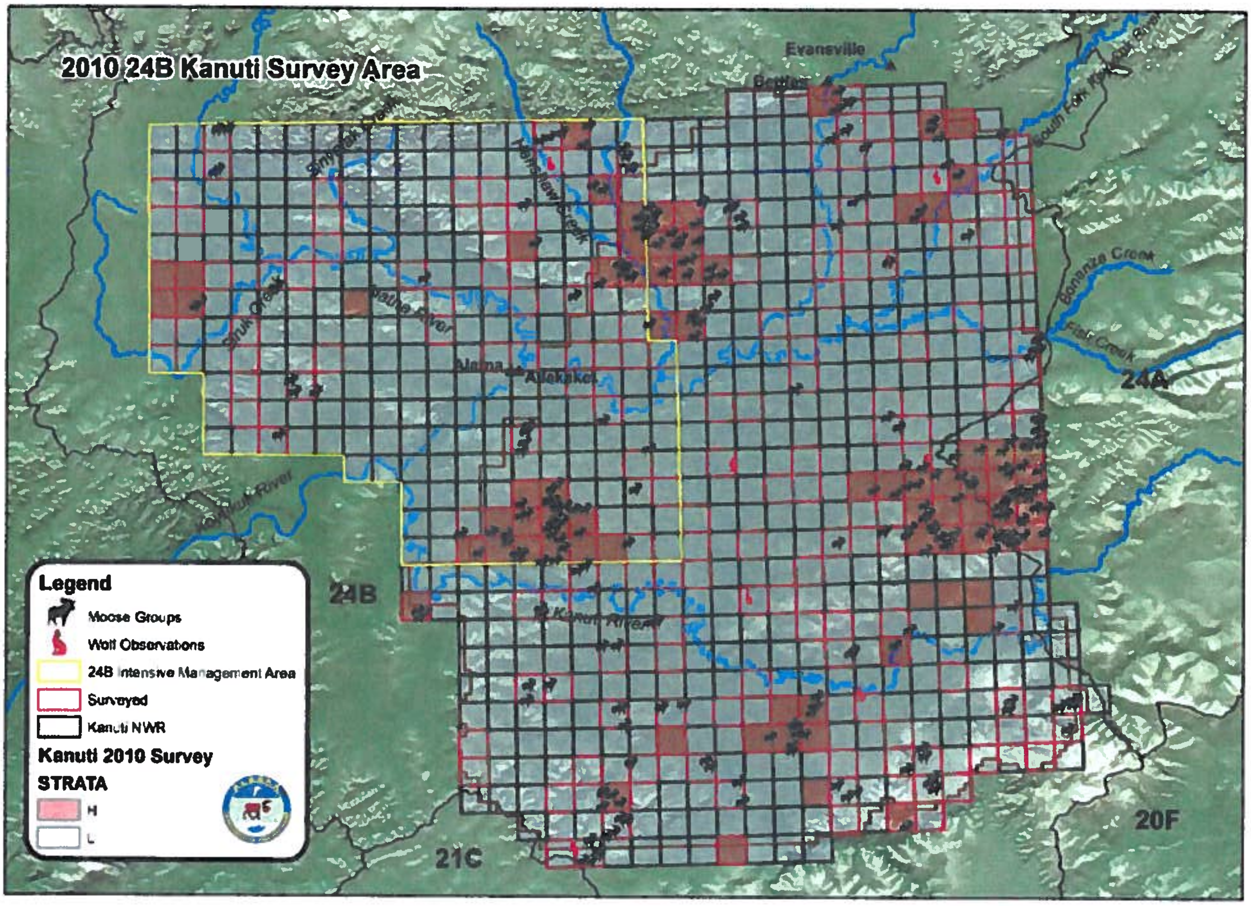

Figure 3. Moose distribution among high and low density sample units from moose observed in GSPE survey conducted in November 2010.

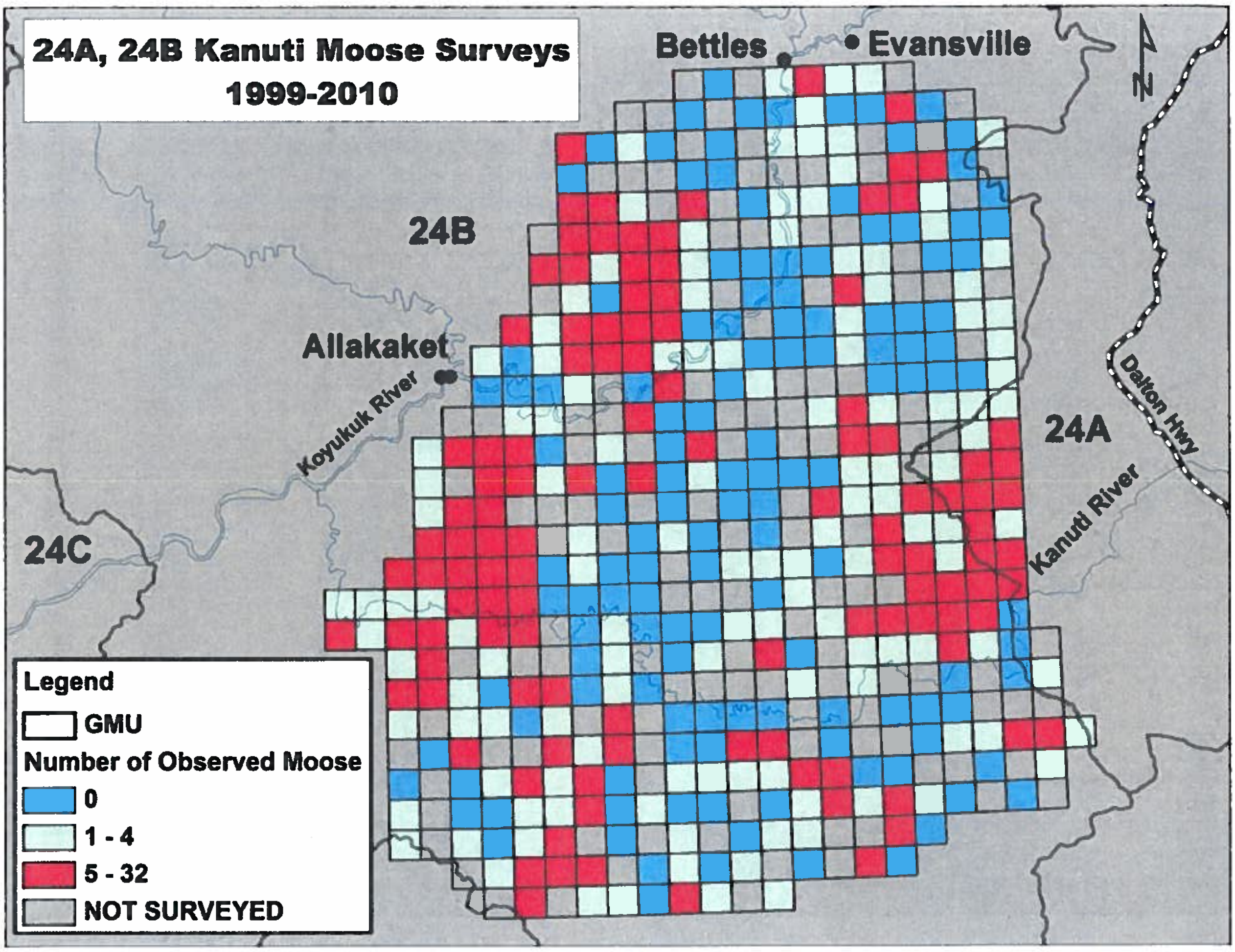

Figure 4. Moose distribution among high and low density sample units from moose observed in GSPE surveys conducted from 1999 to 2010.

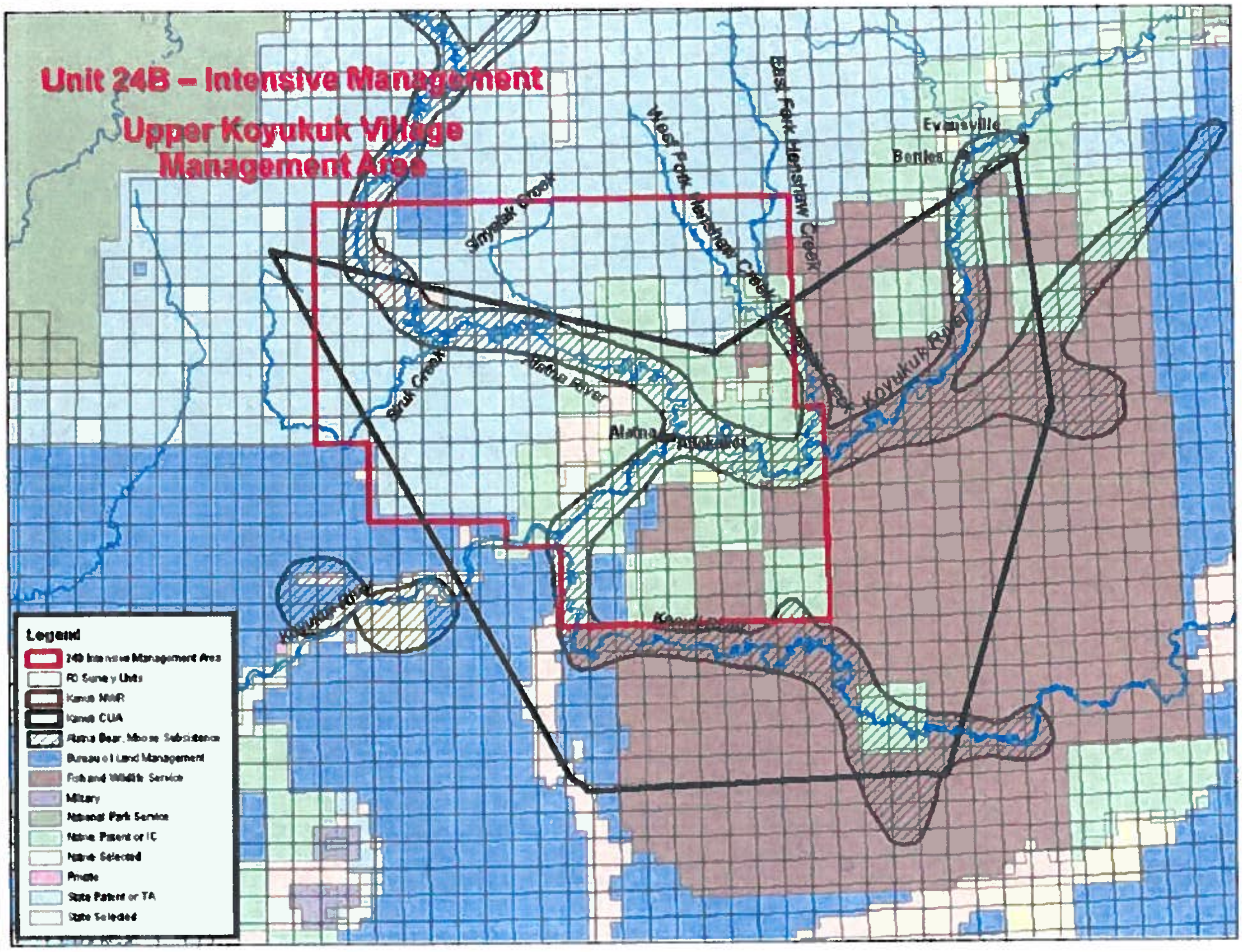

Figure 5. Land ownership and Subsistence resource us patterns within the Upper Koyukuk Village Management Area of Unit 24B.

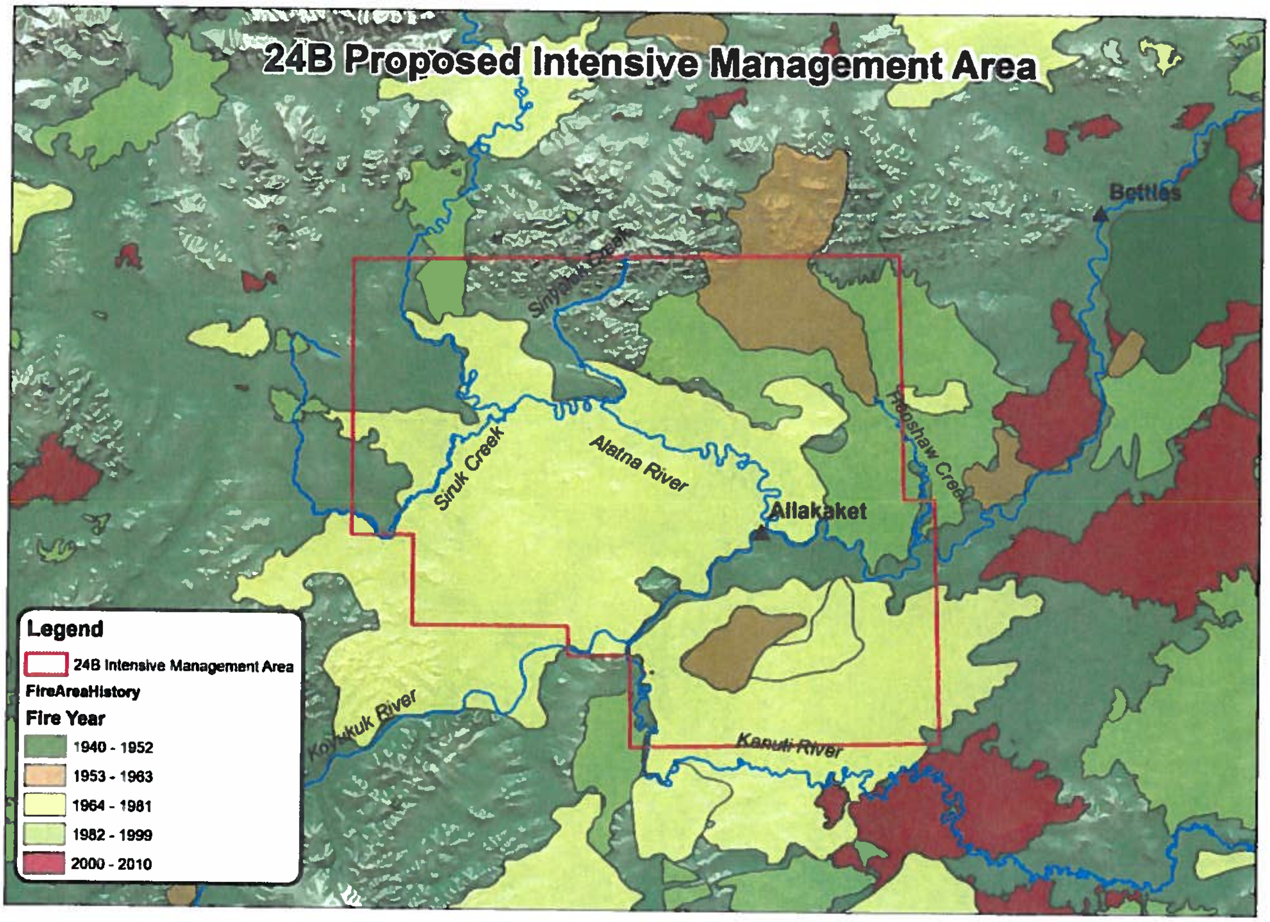

Figure 6. Fire history within the Upper Koyukuk Village Management Area through 2010.

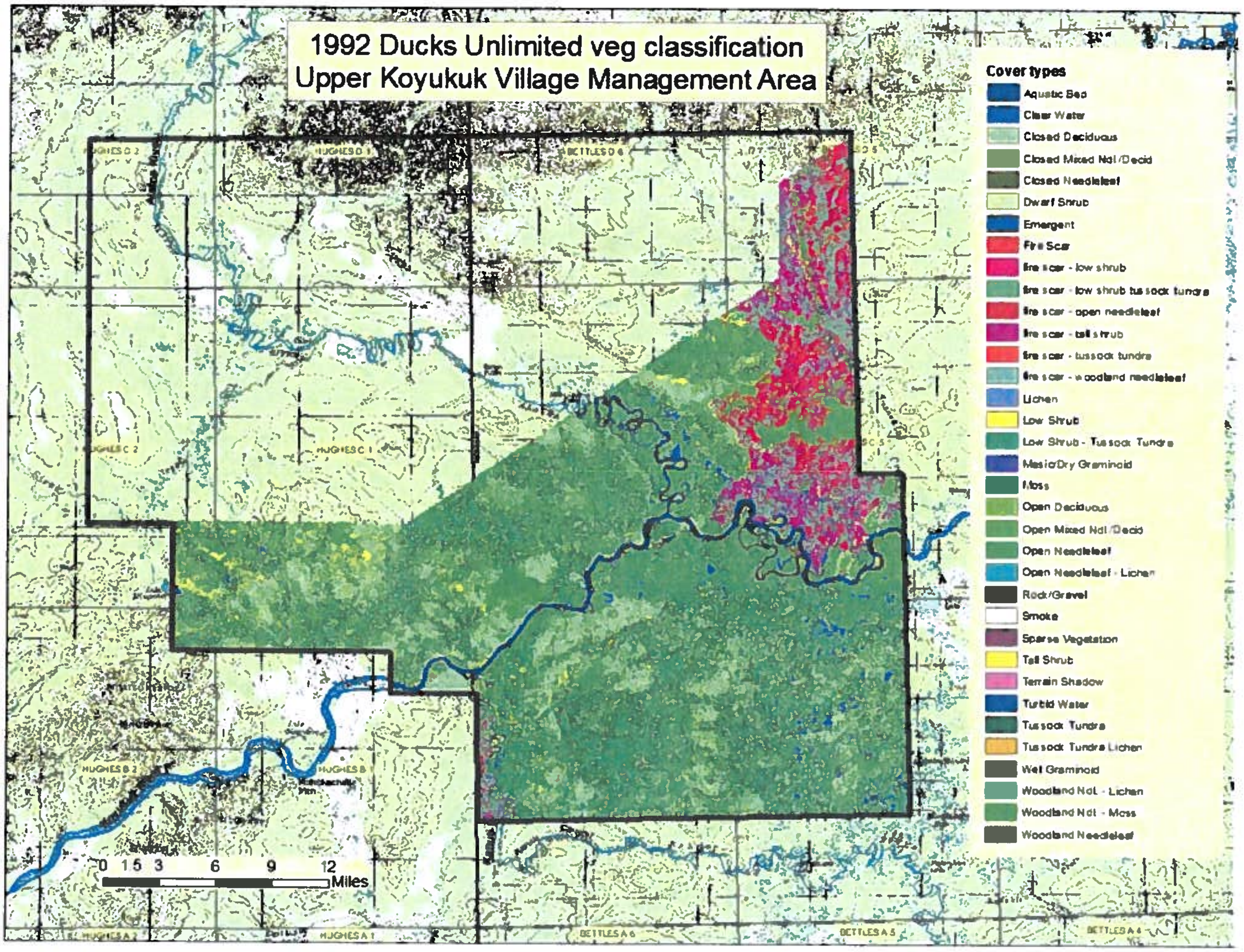

Figure 7. Ducks Unlimited vegetative classification within the Upper Koyukuk Village Management Area.

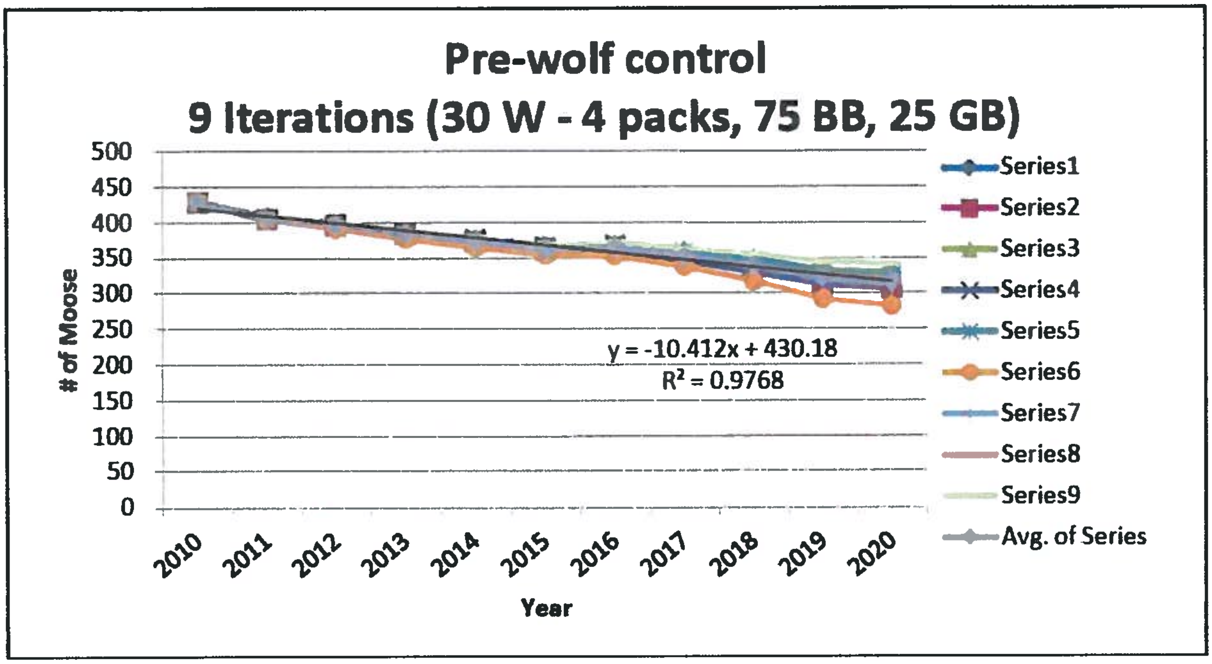

Figure 8. Predprey modeled moose population for the Upper Koyukuk Village Management Area without predator control. This assumes current estimated moose abundance of 429 at start and a moose harvest of 13 and existence of 30 wolves, 75 black bears, and 25 grizzly bears in Area throughout duration of the forecast.

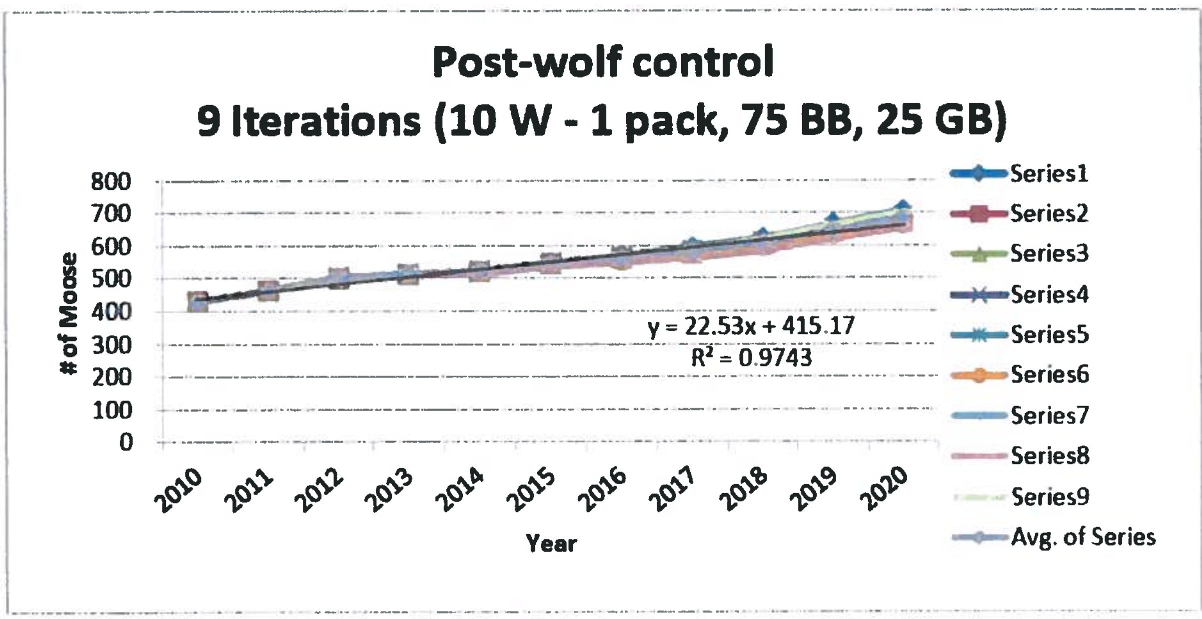

Figure 9. Predprey modeled moose population for the Upper Koyukuk Village Management Area with wolf control. This assumes current estimated moose abundance of 429 at start, removal of 20 wolves (3 packs) at beginning and maintenance of this reduced wolf abundance in Area throughout duration of the forecast, with an annual moose harvest of 13 throughout duration of the forecast.

OPERATIONAL PLAN FOR INTENSIVE MANAGEMENT OF MOOSE IN GAME MANAGEMENT UNIT 24(B) DURING REGULATORY YEARS 2012–2017

Prepared by:

DIVISION OF WILDLIFE CONSERVATION

February 2012

This operational plan has been prepared by the Alaska Department of Fish and Game (ADF&G) to provide supporting information on the Intensive Management (IM) plan (Title 5 Alaska Administrative Code, Section 92, Part 125; abbreviated as 5 AAC 92.125) for moose in Game Management Unit 24(B) during Regulatory Years (RYs) 2012-2017. It describes rationale for evidence of limiting factors; choice of indices for evaluating treatment response; and decision frameworks for predation control, habitat enhancement, and prey harvest strategies. The *Intensive Management Protocol* (ADF&G 2011*a*) contains further description of administrative procedures and the factors and strategies in adaptive management of predator-prey systems to produce and sustain elevated harvests of caribou, deer, or moose in selected areas of Alaska. The IM plan for moose in Unit 24(B) has been developed based on the recommendation of Koyukuk River Fish and Game Advisory Committee and at the request of the Alaska Board of Game (BOG). The IM plan and this operational plan include information and recommendations from a Feasibility Assessment prepared by ADF&G (2011*b*) (summary of supporting information in Appendix A) and recommendations by the BOG following public comment at the March 2011 BOG meeting. **This is an experimental treatment to evaluate whether (a) wolf control in a focused area can allow reallocation of moose mortality from predators to humans and (b) whether moose harvest per unit effort is a feasible response metric at low moose density.**

BACKGROUND

Moose occur at low density in Unit 24(B), and the current population estimate is below the IM population objective established in 2006. Residents in the Upper Koyukuk River Drainage in Unit 24(B) (Fig. 1) have experienced difficult moose hunting for many years, due to the low density of moose in the area. The difficulty in obtaining a moose has been compounded by increasing fuel prices. Baseline biological data were collected in Unit 24(B) since 1989 (Appendix B), and those data corroborate the moose population estimates and the concerns of local subsistence hunters. The Department has assessed the moose population in Unit 24(B), and has developed an IM Plan to address the unique situation for this area.

An Upper Koyukuk Management Area (UKMA) is established within Unit 24(B) by the IM plan, surrounding the villages of Alatna and Allakaket. The UKMA overlaps a portion of the Kanuti National Wildlife Refuge (NWR) (Fig. 2), and moose surveys conducted in the unit were focused on the refuge, but some years those surveys also included lands in the remainder of Unit 24(B) and Gates of the Arctic National Park and Preserve. Population estimation survey density on the Kanuti NWR was 0.67 moose/mi^2 in 1993, but was stable and averaged 0.33 moose/mi^2 during 1999 to 2011 (Fig. 3). Moose density on the refuge and the remainder of Unit 24(B), likely followed trends similar to those observed throughout the Galena Management Area and other regions in Alaska following the repeal of Land and Shoot wolf hunting regulations in 1991 (Regelin et al. 2005). The moose population now appears to be stable at low density with small annual fluctuations. Subsistence Division household surveys in Alatna/Allakaket estimated harvest was nearly 40 moose/year in 1997-2002 (Anderson et al. 2000, Brown et al. 2004), while total estimated harvest among all hunters in Unit 24(B) was 83-109 moose (RY07-RY09; Stout 2010). Based on the 2010 estimated observable population of 2,600 moose and a harvest of 82 moose, the harvest rate was 3.2%, which was below the management objective harvest rate of 5% [24(B) IM objectives; population = 4,000-4,500, harvest = 150-250]. Harvest of wolves, black bears, and grizzly bears is low (20-30 wolves/year, 20-30 black bears/year, 3-8 grizzly bears/year).

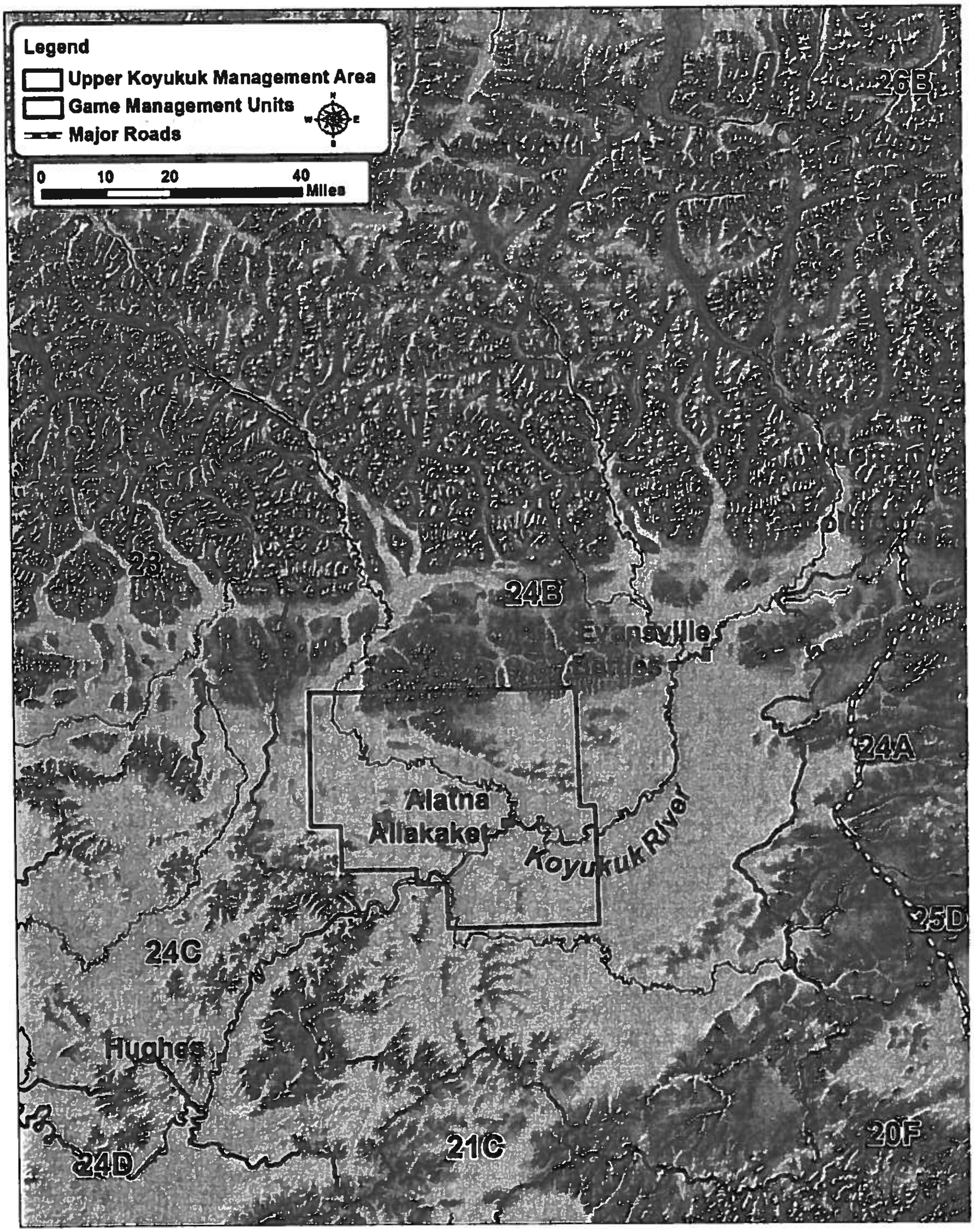

Figure 1. Upper Koyukuk Management Area (1,360 mi^2) in Game Management Unit 24(B) (13,523 mi^2).

Habitat in the UKMA is excellent as demonstrated by the high twinning rates (avg. = 57%; 2008-2011) with low browse utilization in 2007 (browse biomass removal = 5.3%, removal index = 8.8%). High fire frequency in Unit 24(B) has resulted in a high proportion of early seral vegetation communities; however, relatively few fires of significant size have occurred within the UKMA portion of Unit 24(B) in the last 30 years, due to fire suppression activities and other factors. Winters are marked by severe cold weather, but winters with deep snow (>36 in) likely to influence moose habitat selection or cause high energy use occurred in only 9 of the last 20 years.

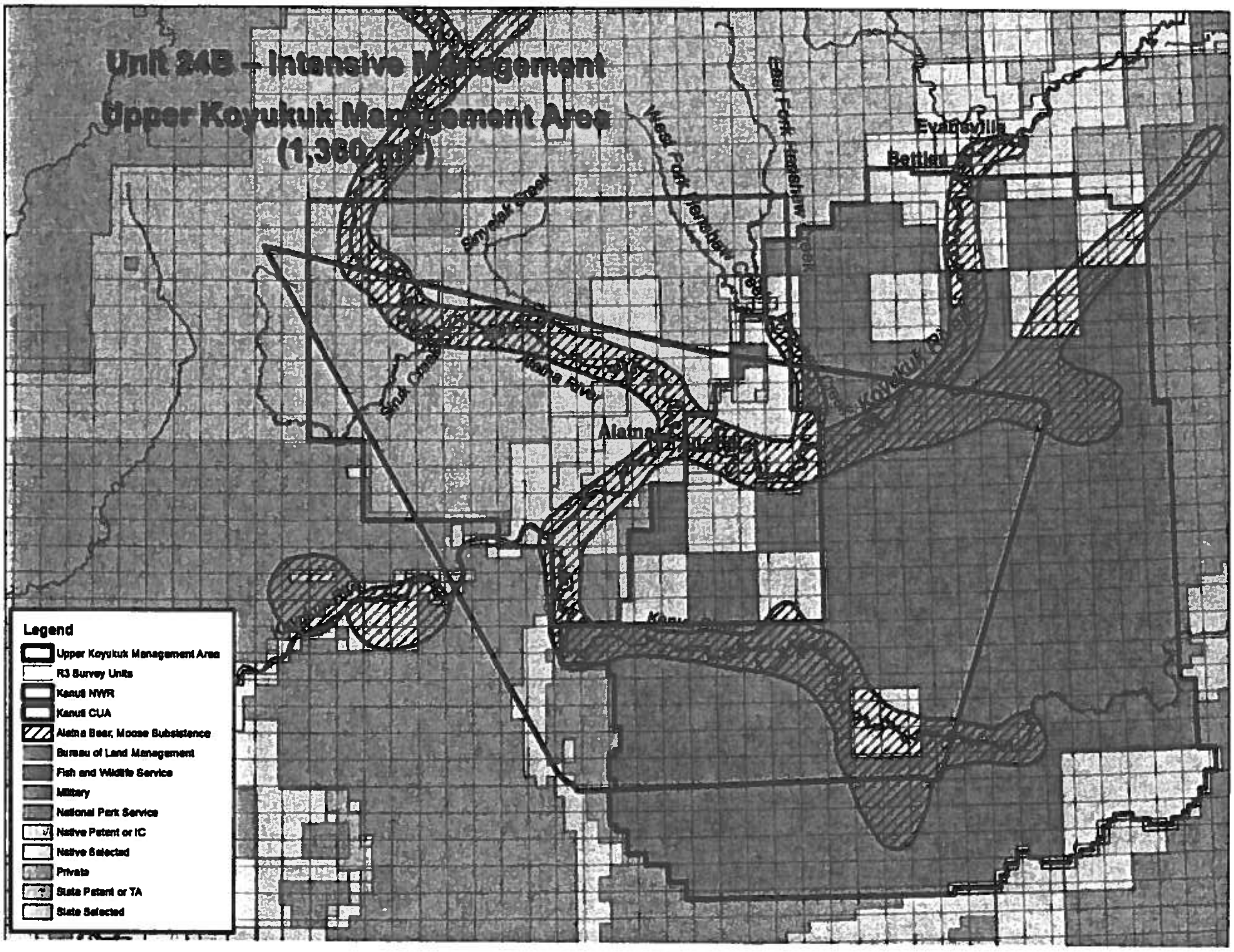

Figure 2. Land ownership and Subsistence resource use patterns within the Upper Koyukuk Management Area of Unit 24(B).

Federal and state hunting regulations in Unit 24(B) are liberal and mostly overlapping, with a small difference in Controlled Use Area boundary. The Kanuti Controlled Use Area prohibits the use of aircraft for moose hunting under state and federal regulations. Federal lands within the federal Kanuti Controlled Use Area boundary are closed to hunters who are not federally qualified. The state and federal fall moose season runs 38 days in August and September, and a winter bull season runs from December 15th to April 15th (122 days).

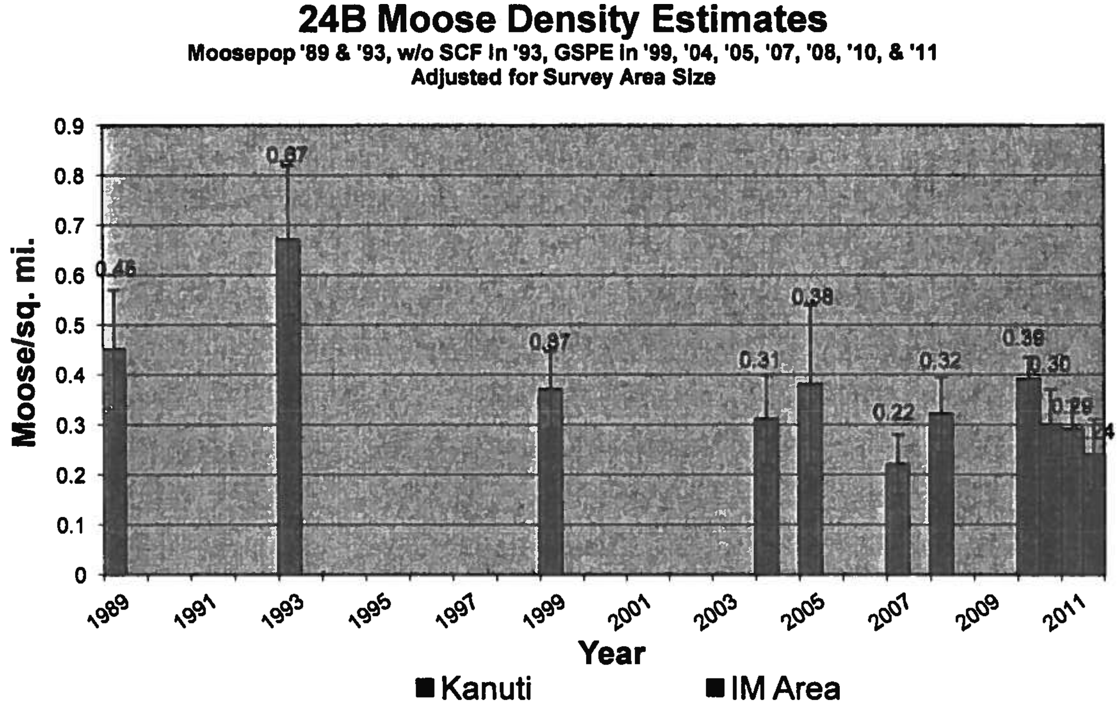

Figure 3. Population estimates on the Kanuti National Wildlife Refuge and Upper Koyukuk Management Area in Unit 24(B), 1989-2010.

This proposed IM plan contains several components that are tailored to the unique biological and cultural issues inherent to Unit 24(B): 1) black and grizzly bears are likely the primary mortality factor effecting calf survival based on composition data and field studies in adjacent Game Management Units (GMU's) (21D & 24D), but they will not be included in predator control activities; 2) local resident cultural taboos make bear control an untenable option; 3) the scope of the program will be small in terms of area and wildlife populations affected; 4) the treatment area is nested within tracts of USFWS land but predation control will not occur on those lands; 5) IM treatment response monitoring will be limited to the inventory activities of the current management program, a calf (> 6 mo. old) and yearling survival rate study, and household subsistence harvest surveys; 6) the current population and harvest estimates are below the Unit 24(B) IM objectives (5 AAC 92.108; Appendix A), and the department anticipates that the IM Population Objectives will not be achieved due to the limited scope of this proposed program; and 7) the department will prioritize efficiency and cost effectiveness in implementation of the program.

This operational plan describes an experimental approach to adaptive management that will test predation control in a relatively small area on a low density moose population. The intent of this IM program will be to increase moose for harvest primarily by residents of Alatna and Allakaket using a cost efficient predation control strategy that could potentially be conducted near other rural communities in Alaska where similar moose harvest concerns exist. Evaluation of subsistence user harvest as a metric for predation control effectiveness will be an important element of this adaptive management program.

The scope of this experimental program is limited in its expected impact on the wolf and moose populations. It is primarily a reallocation of moose from wolves to humans in a confined area and not expected to contribute substantially to a larger moose population or harvest in Unit 24(B). Much of the IM area is privately-owned Alaska Native corporation land, so the benefit of this program will most likely accrue to the local residents of Allakaket and Alatna unless surviving moose move outside the treatment area. However, it may reduce competition for moose hunting on adjacent lands.

ADAPTIVE MANAGEMENT FRAMEWORK

Any section of this framework may be modified as new information comes to light in the study area or the scientific literature. Lack of an anticipated response may require evaluation of additional criteria or a research project to understand which additional factors may be influencing the system and whether they are feasible to manage.

I. TREATMENTS

A. *Predation Control:*

Based on fall moose composition data in 24(B) (Stout 2010) and previous moose mortality studies in the Interior (Osborne et al. 1991, Boertje et al. 2009), we expect that black bears and grizzly bears contribute to the largest proportion of mortality among moose calves < 6 months old, whereas wolves are the primary predator on calves > 6 months old and yearling moose. However, only wolf numbers will be reduced in the UKMA as a component of this predation control program, for the following reasons; 1) lethal bear removal is unacceptable culturally to local publics, 2) non-lethal bear removal is cost-prohibitive and unacceptable culturally to the local public, 3) population modeling suggests an increase of 190-210 moose within the UKMA can may be achieved by 2017 through wolf control alone.

Aerial removal of wolves within the UKMA will utilize fixed-wing aircraft to locate wolves and Department staff in helicopters to lethally shoot wolves. Wolf removal will occur in early winter (October-December) to maximize calf/yearling winter survival. It will be conducted by Department staff as soon as snow cover conditions allow for suitable tracking by fixed-wing aircraft. To economize wolf search expenditures, wolves will be located during regularly scheduled fall moose surveys, as part of annual Survey and Inventory (S&I) management activities. Helicopter control activities will likely last 5-7 days, depending upon weather conditions. Follow-up efforts may be conducted if substantial wolf presence is detected during other management activities during the winter. Wolf control will begin in fall 2012 and will be conducted annually during winter over the course of the six year program. The department will have the discretion to adjust the size and shape of the UKVMA up to 20 percent (approximately 2,700 square miles) of Unit 24(B) if it becomes necessary for effective removal of wolves.

Public harvest of wolves and bears under current regulations will continue to be encouraged. Public aerial shooting permits for removal of wolves may be available to interested parties as authorized in 5 AAC 92.110 beginning fall 2012. Consideration will be given to continue public aerial shooting permits beyond the end of this study, in order to prolong the effect of this program. Harvest incentive programs for hunters and trappers that are initiated and funded by Alaska Native corporations will also be encouraged.

Wolf control within the UKMA will be restricted to state, U.S. Bureau of Land Management (BLM), and Alaska Native corporation lands. No wolves will be removed by aerial shooting on national wildlife refuge lands within the UKMA, or on National Park Service lands unless approved by the federal agencies if the UKVMA is expanded. However, wolves that incidentally travel from Refuge or Park Service lands onto state, BLM, or private lands within the UKMA during control activities will be subject to lethal removal.

B. *Habitat Enhancement:*

There are no habitat enhancement projects proposed in this plan. However, two management needs were identified that have the potential to positively affect moose within the UKMA: 1) work with land owners and managers in the area to liberalize fire management options so that wildfires have the potential to convert the vegetation communities to earlier seral stages, especially the spruce communities in the Alatna River drainage portion of the UKMA, 2) work with land owners to prescribe and conduct mechanical treatment of late seral vegetation communities along the riparian habitats, close to the villages of Alatna and Allakaket. Mechanical treatment near the villages could reduce fuels that carry wildland fire and have the additional benefit of reducing the need for large buffer zones delineated by the fire management options for the area.

C. *Prey Harvest:*

As previously described, moose densities in the area are low and the potential for achieving a detectable increase in moose density is low, due to the relatively small size of the UKMA treatment area within Unit 24(B). Subsequently, the potential for adverse impacts to habitat due to gradual population increases is also expected to be low, and the potential need for additional liberal harvest strategies is unlikely. However, because locals are the primary moose users in the area and because they favor antlerless moose harvest, either sex moose seasons will likely be implemented. As projected by this program strategy, once the first two cohorts of moose that benefited from treatment have been recruited into the population by the 2nd to 3rd year of wolf control, we would expect to be able to provide moose harvest of either sex. Either sex harvest under this experimental program is anticipated to occur early in the program because the concept of reallocation of the moose from wolves to people implies an immediate availability of moose if wolf numbers are reduced, and does not depend on measurable population growth to meet program objectives. Antlerless moose harvest should increase hunter success and would be expected to benefit program effectiveness evaluations. Final determination of the either sex seasons will likely be dependent upon observed improvements in survival rates of radio-collared calves (> 6 mo. old) and yearlings and improvement in calf:cow and yearling bull:cow ratios observed in aerial surveys. Because wolf numbers are expected to rebound quickly following treatment (2-3 year lag), efficacy of either sex moose harvest would be reconsidered within 2-3 years after the end of wolf control efforts.

II. Anticipated Responses to Treatments

By removing approximately 90% of the estimated pre-control wolf abundance in the UKMA and maintaining that level (<6 wolves) for 5 winters (fall 2012-spring 2017), the PredPrey model (McNay and DeLong 1998) forecasted that the number of moose within the UKMA would increase from approximately 405 (±97) moose in 2011 (prior to wolf control) to 600 moose in 5 years (Figs. 4 and 5). Initial model input included moose harvest of 15 bulls and 5 cows and predator populations of 25 grizzly bears and 75 black bears (with objectives of 20 grizzly bears and 60 black bears at stable abundance). Optional prey of 5,000 caribou and 100 sheep with a maximum predation rate of 1% to account for intermittent occurrence within the area or potential prey sources that wolves may utilize near the area. Adult moose biomass was set at 856,488 lb/1,000 mi^2 (150,000 kg/1,000 km^2), and non-predator mortality rates were set at 5%, 2%, 6%, and 10% for adult males, adult females, yearlings and calves respectively. The actual moose population change within the UKMA is expected to be small (absolutely and relatively), thus may be difficult to detect at a relative precision of 25% at the 90% confidence level (Hayes et al. 2003). Nonetheless, it would represent an increase in the number of moose in the UKMA and will progress toward achieving the IM population objective for 24(B).

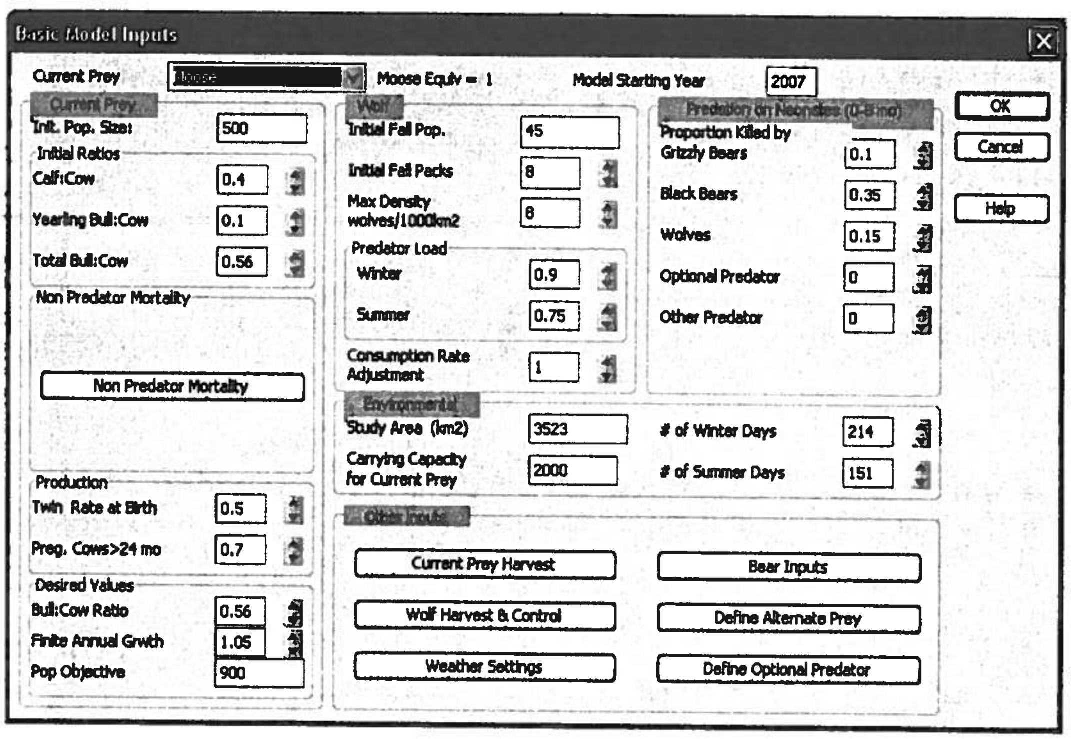

Figure 4. PredPrey Basic Model Input values menu for the Upper Koyukuk Management Area modeled population.

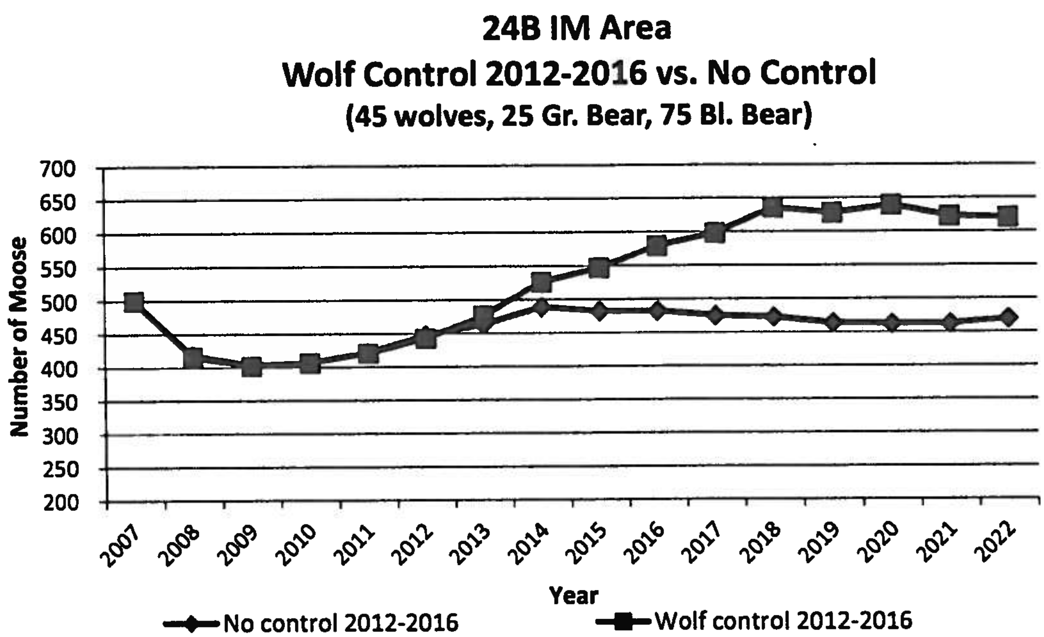

Figure 5. Forecasted moose population scenarios for the Upper Koyukuk Management Area with wolf control during RYs 2012-2016 (5 winters) and no wolf control. Model inputs and change in moose harvest are described in text. Lines are the average of ten iterations of the two modeled population scenarios.

A. *Predator Abundance:*

Within the UKMA (except national wildlife refuge lands), all wolves observed will be lethally removed for 5 winters, but we do not expect to observe every wolf because of conifer forest cover and other factors. Within the UKMA, pre-control wolf abundance was estimated to be 50-60 wolves from a survey conducted in March 2011, so we expect to remove up to 45-55 wolves in the first winter with an objective of maintaining fewer than 6 wolves in subsequent winters. We anticipate wolf recruitment (reproduction and immigration) of 15-25 wolves each following year, requiring lethal removal of at least an additional 10-20 wolves/year. In our 2008 assessment for wolf density in a larger portion of Unit 24(B), we estimated approximately 15-21 wolves/1,000 mi^2 (6-8 wolves/1,000 km^2), which is consistent with literature values for similar habitats and prey abundance (Adams et al. 2008, Stout 2009). That density would have predicted an average about 25 wolves in the UKMA. In the March 2011 survey, several of the wolf packs we observed were located near the perimeter of the UKMA, suggesting a density that was higher than previously estimated. Also, some packs in the March 2011 survey were estimated based on track counts. Modeling of the UKMA fit observed moose population values best when the wolf density input values for the UKMA were at 25-35 wolves. The small area of the UKMA relative to the size of the perimeter and the coincidental juxtaposition of packs in Unit 24(B) during the 2011 survey explain that relatively high estimate of the 2011 survey. Additionally, the influx of Western Arctic Caribou Herd animals during the 2011 survey may have influenced wolf abundance.

Change in the wolf population in Unit 24(B) caused by wolf control within the UKMA will likely not be detectable using standard survey methodology. The UKMA treatment area represents only 10.1% of the land area of Unit 24(B) (Figure 1). An evaluation of effectiveness of wolf control by the Department within the UKMA will be conducted at the end of the 5-year program. If the program is demonstrated to have been effective at increasing moose harvest or harvest per unit effort among local residents, the Department may evaluate using public aerial shooting to extend the benefits of localized predation control within the UKMA.

Elevated moose abundance and an absence of wolf packs defending territories within the UKMA could facilitate wolf immigration. However, numerical and functional responses of predators and prey in multiple prey and multiple predator systems are complex (Gasaway et al. 1992, Boertje et al. 1996, Boertje et al. 2009, Arthur and Prugh, 2010). Therefore, long-term assessment of the response of wolves and moose will provide new insight into population dynamics of a low density moose population.

The management objective for wolves in Unit 24(B) under the current S&I program, was to regulate the population at a 35% annual harvest rate. Based on a fall 2008 estimate of 202-284 wolves (15-21 wolves/1,000 mi^2), this allowed for a harvest of 70-100 wolves and a spring population of 130-180 wolves (9.6-13.3 wolves/1,000 mi^2) (Stout 2009). The management objective for wolf abundance in Unit 24(B) during the predation control program, will be a harvest rate of up to 50% of the fall population, which will allow for a harvest of 100-140 wolves and a spring population objective of 100-140 wolves (7.4-10.4 wolves/1,000 mi^2). Because up to 50-60 wolves could be removed from within the UKMA during predation control activities, this would allow for the harvest of 40-80 wolves in the remainder of Unit 24(B) by hunters and trappers. Harvest in Unit 24(B) is typically 20-30 wolves, therefore it is unlikely that the Unit 24(B) control objective will be achieved, even with wolf removal occurring in the UKMA. A population of 100-140 wolves in Unit 24(B) will assure that wolves persist as part of the natural ecosystem in Unit 24(B) and assure continued wolf hunting, trapping, and viewing opportunities.

B. *Predation Rate:*

Calf (> 6 mo. old) and yearling survival rates will be monitored using 30 radio-collars deployed on calves (> 6 mo. old) in the fall of each year of the program within the UKMA and an additional 30 moose in an area to the east that will serve as an experimental control (non-treatment area; Figure 6). The non-treatment area was selected based upon similar habitat and moose density characteristics and is separated from the UKMA treatment area by an 18.6 mi. (30km) buffer. The buffer between the UKMA and non-treatment areas was determined using observed pack locations and average home range polygons for wolf packs from surveys conducted on the Kanuti NWR and surrounding areas. Collared moose will be observed monthly to determine mortality rates, and mortality causes will be assessed when access is feasible. Moose surveys will also continue to be conducted under the regularly scheduled S&I program, and composition data will provide additional survival assessment data.

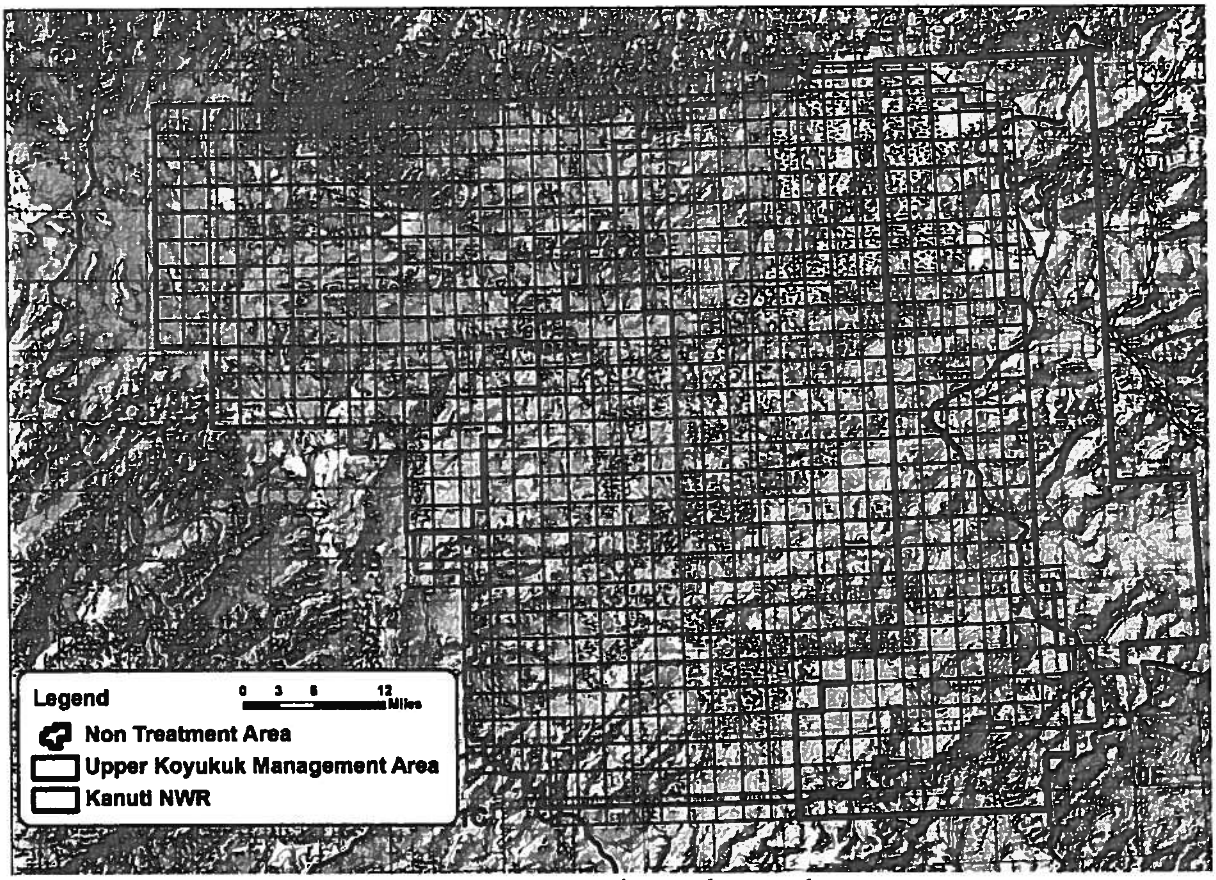

Figure 6. UKMA area and non-treatment experimental control area.

C. *Prey Abundance:*

The UKMA represents only 10.1% of Unit 24(B), and densities of moose and wolves within the game management unit are low. Our ability to detect change in moose abundance within the UKMA will be limited regardless of survey methodology. As mentioned previously, we expect the number of moose within the UKMA to increase from approximately 405 (±97) moose to 590-610 moose in 5 years. The Unit 24(B) population is expected to continue to be stable at intermediate population levels between current lower density (0.25-0.30 moose/mi^2) and historically higher densities (0.65-0.70 moose/mi^2). Additionally, low sample size associated with a low density and the relatively small treatment area may hinder use of composition data from GSPE surveys for detecting a statistically significant changes in calf:cow or yearling bull:cow ratios in the UKMA.

The duration in response of moose numbers within the UKMA will depend on initial response to wolf control and effectiveness of predator harvest by the public, including bears, following Department control efforts that end after winter 2016-17. If improved moose calf (> 6 mo. old) and yearling survival are demonstrated and improved hunter success is realized, implementation or continuation of public aerial shooting of wolves could prolong the response of the initial predation control efforts. In the absence of continued wolf control, the population will likely continue to fluctuate at lower density typical of the last 3-5 years (Fig. 3) unless a proportional higher harvest of wolves occurs.

D. *Prey Recruitment:*

The wolf population survey in March 2011 estimated at up to 50-60 wolves in UKMA area (see section II. A.). Based on modeled wolf predation rates on moose, we expect wolf control to improve winter survival so that up to 65 additional calves (6 mo. old to 12 mo. old) and 30 yearlings (12 mo. old to 24 mo. old) will survive annually. Modeled ratios improved from 30 to 37 calves:100 cows and from 10 to 12 yearling bulls:100 cows.

E. *Prey Productivity or Nutritional Condition:*

Proportional removal of browse biomass from sampled plants in 2007 was 5.3% (95% CL: 4.3–6.3%, n = 231 shrubs) in Unit 24(B), which along with Unit 24C was the lowest measured to date in the Interior (Paragi et al. 2008). The removal index extrapolated to the shrub counts and species composition in Unit 24(B) was 8.8% (6.8–10.8%, n = 231 shrubs). The brooming index was relatively low for the Interior at 0.34 (95% CL: 0.28–0.40, *n* = 231 shrubs), and 51% of the plants had no evidence of past browsing by moose. With low browse use, a small increase in the number of moose unit-wide is not expected to have a measurable effect on habitat, even at moose density objectives of 0.65-0.70 moose/mi^2 within the UKMA.

Using adult radio-collared cow moose from a concurrent study in Units 24A and 24(B) and additional randomly located cows in that area, twinning rate surveys will continue to be conducted in late May or early June of each year. Because the moose population is not expected to change significantly in Game Management Unit 24(B), and because habitat conditions are not expected to be impacted, body condition and twinning rates are not expected to change significantly as a result of predation control.

F. *Harvest:*

Predation control in the UKMA will focus on reallocation of the moose resource from wolf predation to harvest. The reallocation of moose can be achieved with the removal of relatively few wolves (45-55 wolves in the 1st winter, 15-20 wolves in winters 2-5) within the UKMA portion of Unit 24(B). At that level of wolf control, the anticipated increase of 190-210 moose within the UKMA by year 5 is expected to improve hunter success and reduce hunting effort required to achieve that success. The realized increase in moose density is expected to improve moose encounter rates for hunters along the river corridors. However, harvest may not simply increase by the number of moose not killed by wolves because it is uncertain how improved hunter encounter rates with moose are related to moose density. Because moose harvest in the villages of Alatna and Allakaket is modest (35-40 moose/year), we project a harvest rate of 6-8% of the 590-610 moose after 5 years of treatment will be realized by local hunters. However, a portion of that harvest may include harvest from lands adjacent to the UKMA, therefore the precise estimate of harvest rate is uncertain. Moose harvest will likely be a result of increased moose abundance as well as reallocation of moose from wolves to people.

Encounter rates and hunter success are dependent on a variety of factors each year (e.g. hunter effort, water level restrictions on boat travel, distribution of moose, etc.); therefore, an increase in moose density does not ensure a proportional increase in harvest. The projected increase in moose numbers would be similar to historical densities of 0.60 to 0.65 moose/mi^2, which corresponded to historical periods of higher harvest levels (Marcotte and Haynes 1985, Anderson et al. 2000, Brown et al. 2004, Stout 2010). Thus, we expect the projected increase in moose will provide for comparable levels of harvest demand in the villages of Alatna and Allakaket.

Subsistence Division conducted a household survey in the villages of Alatna and Allakaket in October 2011, prior to the initiation of program treatments to establish pre-treatment harvest levels. These surveys will occur each year following predation control efforts. Harvest and catch-per-unit-effort parameters will be monitored to assess treatment effect on harvest success. Although anticipated increases in harvest will not achieve Intensive Management Harvest Objectives for Unit 24(B) identified in 5 AAC 92.108, the improved harvest levels will represent progress toward achieving those objectives.

G. *Use of Nontreatment Comparisons:*

As previously described, an experimental control non-treatment area will be established in the eastern portion of Unit 24(B) with habitat and wildlife population characteristics comparable to the UKMA (Fig. 6). Moose population estimation surveys will continue to be conducted in the adjacent area of the Kanuti NWR.

H. *Other Mortality Factors:* None determined (see Feasibility Assessment). Blood assessment of moose radio-collared in 2007 showed low incidence of exposure to common diseases. Frequency of severe weather events is low. No die-offs have been reported.

III. Evaluation Criteria and Study Design to Document Treatment Response

Adaptive management with the intent to increase harvestable surplus of prey requires evaluating the biological response and achievable harvest after treatments are implemented

(Walters 1986). Evaluation will be reported to BOG in February each year with an interim update of selected criteria in August each year.

A. *Predator Abundance and Potential for Recovery:*

An aerial wolf census (Gasaway et al. 1983) will be conducted in February-March of the 1st and 5th year of the program to assess wolf abundance within the UKMA and adjacent Kanuti NWR. A census was conducted in Unit 24(B) over previously surveyed portions of the UKMA and the Kanuti NWR, in March of 2011 as part of the regular S&I program, and wolf surveys conducted for the IM program will follow similar protocols (see Section II. A above). Wolf abundance will be monitored during the 2nd through 4th years of the study in the UKMA during control activities (Oct./Nov. and Feb./Mar.). The Unit 24(B) wolf population will be monitored during normal S&I activities (moose surveys, radio-tracking flights), conducted for the duration of the program. Bear abundance will not be monitored.

The objective of the wolf control program is to remove as many as practical within the UKMA during 5 consecutive winters. Visual concealment by vegetative cover, wolf travel patterns along the periphery of the control area, and other variables limit removal effectiveness, so we expect some wolves will still inhabit the area following control efforts. Increase in wolf abundance in the UKMA following a control program will depend in part on public harvest. Based on existing hunting and trapping patterns and historical re-population of wolves following the cessation of aerial hunting in the early 1990's in Unit 24 (Stout 2010) and other case histories (National Research Council 1997), wolves within the UKMA will likely return to pre-control abundance levels within 3-4 years even with harvest.

All wolves removed will be delivered to contracted skinners (see Section V. C below). Biological data will be collected from each wolf to include: 1) location of harvest and pack size, 2) sex, 3) body mass before skinning, 4) reproductive tract of females, 5) tooth for age estimation, and 6) blood sample (DNA archive and disease assessment).

B. *Habitat:*

No forage assessment studies are proposed for this program. If significant declines in twinning rates are detected, forage assessment studies will be considered.

C. *Prey Abundance, Herd Composition, and Nutritional Condition:*

Survival of moose during their first and second winters will be monitored using 30 radio-collars deployed in the fall of each year of the program on calves (5-6 mo. old) within the UKMA and 30 radio-collars within the non-treatment area. In the first year of the program, 15-20 collars will be deployed in March 2012 on ~9 mo. old calves in both areas to evaluate the yearling cohort in the first year of predation control. If possible, moose calves will be captured using net-guns from helicopters in October and November, to reduce costs of immobilization drugs. Immobilization drugs delivered via projectile darts (more expensive) will be used if conditions do not allow for net-gun captures.

Collared moose will be relocated by fixed-wing aircraft 1 time each month during November to April to estimate mortality rates. Cause of mortality will be assessed from the air if possible and on the ground, when landing on skis is feasible. Collared moose will be relocated 2 times per month during May to October to improve potential for assessing mortality factors during months when carcass degradation is more rapid, but ground visits will likely be impractical. Radio transmitters will be placed on expandable collars and are expected to be retained on the moose for 1.5 to 2 years. Survival rates of calves (4-12 months old) and yearlings (13-24 months old) will be monitored for the duration of the study. Transmitters shed by animals or retrieved as mortalities will be retrieved and refurbished for future deployment to reduce program costs.

Fall GSPE surveys with correction for moose sightability will be conducted in the UKMA following the 5th year of the program, but statistically discernable population changes may not be detectable. A baseline GSPE survey was conducted in 2010 and 2011 within the UKMA and adjacent Kanuti NWR, with correction for moose sightability conducted in the 2010 survey. GSPE surveys (without sightability correction) have been conducted on the Kanuti NWR in 7 of the last 13 years. Twinning surveys will continue to be flown during the spring in Kanuti NWR as an index of nutritional condition, but twinning assessment will not be possible in the UKMA because of low density and lack of radio-collared females.

D. *Prey Harvest:*

Prey harvest will be monitored through the annual Subsistence Division household surveys and the statewide permit reporting system. Household surveys will assess moose harvest in coordination with regional and sub-regional Native entities, but will also assess total biomass utilization of other wild game species. In addition to harvest levels, hunting effort (e.g. days spent hunting, distance traveled, number of successful hunters in boat, number of hunting trips, etc.) and economic determinations will be assessed (e.g. cost of fuel, gallons of fuel used, etc.) as practical. Wolf and bear harvest will be monitored through sealing reports submitted through the annual S&I program.

If sufficient data exist, changes in harvest and catch per unit of effort (CPUE) parameters will be evaluated with respect to the treatment affects of wolf removal. It is central to this program that not only will the absolute number of harvested moose increase within the UKMA, but that subsistence hunters will experience a reduction in the hunting effort expended to satisfy their moose harvest needs. It is fundamental to this assessment that the study design distinguishes any changes in hunting parameters caused by moose or wolf population changes, as opposed to changes in management strategies, regulations, or community circumstances affecting annual moose hunting effort. Any proposed changes in management strategy must continue to be biologically sustainable for moose and wolf populations.

IV. Decision Framework to Implement or Suspend a Treatment

A. *Predation Control:*

1. Prey Population Abundance.

Because of the experimental nature of the UKMA program, threshold values are not applicable. Wolf control by the Department will be implemented for five years and terminated after five years regardless of detected population changes. However, population increases will represent progress toward achieving the Intensive Management Population Objective for 24(B) identified in 5 AAC 92.108.

2. Harvest Catch Per Unit Effort.

Because of the experimental nature of the UKMA program, threshold values are not applicable. Improved CPUE values are a positive outcome and do not have a negative population component that would require an early suspension of treatments.

B. *Habitat Enhancement:*

Nutritional indices such as twinning rate will not be practical to monitor in the UKMA because of low sample size (relatively few moose). A browse survey could be done, but the projected change in moose abundance is relatively low and unlikely to detect changes in proportional biomass removal.

C. *Prey Harvest Strategy:*

1. Population Abundance.

Harvest rates within Unit 24(B) were established in the Koyukuk River Moose Management Plan, and have been incorporated into the management objectives in Unit 24 (Stout 2010). The harvest rate management objective for moose in Unit 24(B) is 5% of the observable moose estimated from GSPE aerial surveys; however, actual harvest is estimated to be 3.0-3.5% of the observable moose. Hunting seasons are liberal and the bag limit allows for only bulls to be harvested. High bull:cow ratios (50-60 bulls:100 cows) have been maintained under the current management program (management objective = >30 bulls:100 cows).

Seasons and bag limits will not be restricted during the control program because recent harvest was below sustainable harvest rate objectives. Beginning in year two of the program, following two years of predation control treatments, antlerless (cow) moose harvest will be considered if calf and yearling survival rates from radio-collared moose studies indicate substantially improved survival rates of radio-collared moose in the treatment area compared to the non-treatment area. Antlerless moose harvest may continue after 5 years of wolf control depending on public post-treatment harvest of wolves and on calf:cow (≥60 calves:100 cows), yearling bull:cow (≥20 yearling bulls:100 cows), and/or density (≥0.65 moose/mi^2) estimates from GSPE surveys conducted during regular S&I program surveys. If additional harvest is warranted, a review of current regulations that restrict access by non-local hunters may be considered.

2. Nutrition Index.

Twinning surveys will continue to be conducted on Kanuti NWR during the predation control program and at the end of the program depending on S&I program funding. If the three year average twinning rate falls below 20% (environmental effects evaluated), the moose population densities have increased, and/or habitat indicators suggest overutilization of vegetation then additional liberalized harvest of antlerless moose (cows) or calves may be considered.

V. Public Involvement

A. *Continued Outreach by Department:*

The ability to detect changes in harvest and hunting effort with respect to the proposed treatment are the primary metrics for evaluating the success of this program, therefore, residents in the villages of Alatna and Allakaket will be vital participants in several aspects of this program. Harvest monitoring, including report of unsuccessful hunting activities, through the household surveys and permit reporting will be the most important participating activity required of community members. Department management and education staff will work with those tribal councils and regional corporations to develop a strategy for community participation. Participation and support by tribal leaders and elders will translate to broader public support of the program, and will benefit the department's ability to assess the scientific applicability of this type of program in other communities.

The Department will provide annual public newsletters to residents of Unit 24(B) regarding the management activities, regulatory actions, and public involvement. The Department will also provide information and receive input from state Fish and Game Advisory Committees, state Board of Game, federal Advisory Councils, tribal councils, and sub-regional/regional Alaska Native corporations.

B. *Continued Engagement to Confirm Criteria Chosen for Evaluating Success:*

Several parameters will be monitored to evaluate response of hunting success by local villages to the wolf control treatment of this experimental program. The combined annual harvest of up to 40 moose for the villages Alatana/Allakaket will be the primary objective, based on previous harvest levels documented in Subsistence Division household surveys in 1997-2002 (Anderson et al. 2000, Brown et al. 2004). However, hunting effort parameters such as days hunted, distance traveled, and fuel expended will also be evaluated. Qualitative assessments of harvest such as hunter satisfaction, moose observed, and hunt conditions will also be considered.

C. *Participation in Prey and Predator Harvest or Predator Control:*

We will contact the Regional Native Corporation (Tanana Chiefs Conference - TCC) to explore the possibility of them providing funding for wolf skinning. The sub-regional Alaska Native corporation (K'oyitl'ots'ina Ltd.) through the village tribal councils of Alatna and Allakaket will also be contacted to explore the possibility of them hiring and organizing local wolf skinners. Local skinners hired in the communities of Alatna and Allakaket, would mitigate income that may potentially be lost due to reduced wolf harvest opportunity by local trappers. Tribal organizations would then be responsible for organizing skinners, and managing fund disbursement. Local skinners would handle carcass disposal according to traditional cultural practices.

Local hunters and trappers will also be encouraged to continue harvest of wolves to regulate the population post-treatment to prolong the effectiveness of the predation control effort. Public harvest of wolves and bears in the established seasons will continue to be encouraged. Harvest incentive programs initiated and funded by Alaska Native corporations will also be encouraged. Incentive programs that extend to non-local wolf and bear hunters should be considered by tribal organizations (e.g. land access, supplemental funding for permitted aerial wolf hunters, etc.).

E. *Monitoring and Mitigation of Hunting Conflict:*

Harvest reporting cooperation by village hunters will be an essential component of this program. Regional and sub-regional Alaska Native entity involvement and support of the harvest monitoring will be needed to evaluate treatment effectiveness. Registration and submission of required harvest permits by all hunters will provide the Department with critical information on resource demand and harvest success. Additionally, village support of the comprehensive Subsistence Division household surveys will foster a positive working relationship with the Department, and will ensure a meaningful assessment of the relationship between moose harvest and predation control treatment.

Access to native corporation lands will be obtained for Department staff conducting moose captures, radio-transmitter recovery, and wolf control efforts. Access will be requested for Department permitted public participants in the aerial wolf control program for the purpose of wolf removal.

VI. OTHER CONSIDERATIONS None determined (see Feasibility Assessment).

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APPENDIX A. Summary of supporting information from feasibility assessment.

Geographic area and land status	
Management area(s)	Prey abundance assessment (1,360 mi^2), prey harvest assessment (13,523 mi^2), predator abundance assessment (1,360 mi^2), predator control (1,360 mi^2) – see Figure 1
Land status	125 mi^2 (9.2%) federal land (BLM/USFWS), 576 mi^2 (42.3%) Alaska Native corporation land, 659 mi^2 (48.4%) State of Alaska – see Figure 2
Biological and management situation	
Prey population	24(B) - IM objectives: 4,000-4,500 moose 24(B) - Estimate in 2010 (precision): 2,600 (±800) moose
Prey harvest (human use)	24(B) - IM objectives (rate): 150-250 moose Estimated in RY07-RY09 (SY rate): 83-109 moose (3.5% harvest rate of observable moose based on RY09 population estimate Amount Necessary for Subsistence: Unit 24 ANS=170-270 (there is no subunit ANS, RY01)
Feasibility of access for harvest	Existing travel routes: >100 river miles, <10 miles road inside village, <20 miles ATV trails, extensive snow machine access, corporation lands are closed to non-corporation members, most non-local hunters in 24(B) hunt well away from villages due to access regulations and rural residency requirements on federal lands, unleaded gasoline (average among communities): $6.50-$7.50/gal. unleaded, 100 octane low lead aviation fuel (average among communities): $8.00-8.50/gal., hunting season dates allow for boat and snow machine hunting opportunity.
Nutritional condition	Habitat is not limiting based on twinning surveys and 2007 browse assessment. Four estimates of twinning rate in previous 4 years with no significant population change (moose): 2008-36%, 2009-82%, 2010-56%, 2011-52%. In 2007, browse biomass removal for sampled plants was 5.3% (95% CL: 4.3–6.3%, n = 231 shrubs), which along with Unit 24C is the lowest measured to date in the Interior. The removal index extrapolated to the shrub counts and species composition in Unit 24(B) was 8.8% (6.8–10.8%, n = 231 shrubs. The brooming index was relatively low at 0.34 (95% CL: 0.28–0.40, *n* = 231 shrubs), and 51% of the plants had no evidence of past browsing by moose. The 2010 GSPE survey in the IM area results were; 52 bulls:100 cows, 7.6 yrlg. bulls:100 cows, 34.3 calves:100 cows.

Habitat status and enhancement potential	Proportion of IM area burned in last 10 years (potential browse availability): 0.8 mi^2 (0.06%). Proportion of area in appropriate habitat type based on vegetative classification (define as forage, cover, etc.): No field-validated vegetative classification exists for the entire subunit, however the 1992 Ducks Unlimited classification (83% overall accuracy validation) covers the SE half (52%) of the IM area and has 13% tall shrub with unknown proportion of browse vs. non-browse species. The unvalidated 2009 LANDFIRE classification of the entire IM area has 8% tall shrub.
Predator(s) abundance	Estimate in 2011 (precision): Within IM area; wolves = 50-60, black bears = 75, grizzly bears = 25
Predator(s) harvest	Reported in 2009 (SY rate): Within Unit 24(B); wolves = 20-30 (25-30%), black bears = 20-30 (6-12%), grizzly bears = 3-8 (5-6%)
Evidence of predation effects	During annual SI surveys, twinning rates $\bar{x}$ = 57%, calf:cow ratios $\bar{x}$ = 44 calves:100 cows, yearling bull ratios average 11 yearling bulls:100 cows. At predicted calving rates of 80%, spring calf ratios would yield 118 calves:100 cows, therefore, 118 calves – 44 calves = ~74 calves:100 cows are lost from approximately June 1st to November 1st (primarily bear predation). Between successive November surveys for a given cohort, of the remaining 44 calves – 22 yearlings (2x yearling bulls) = 22 yearlings:100 cows are lost per year (primarily wolf predation). Bears are likely responsible for the largest proportion of neonatal mortality (Osborne et al. 1991), whereas wolves are likely the primary predator of moose >12 months of age (Boertje et al. 2009). Based on radio-collared adults in 24A/B (2008-09), approximately 8-10% annual adult mortality.
Feasibility of predation control	Modeling of the current moose population in the proposed IM area (UKMA) using estimates of predator abundance and information, indicate the moose population will respond to wolf control to remove pre-control abundance of 45-55 wolves in the UKMA and maintaining the lower wolf abundance is forecasted to allow a gradual increase in moose abundance in the proposed IM area.
Other mortality	From 1990-2009, 45% of winters had snow > 3 feet and 85% had snow >2 feet at Bettles weather station. Blood assessment of moose radio-collared in 2007 showed low incidence of exposure to common diseases. No die-offs have been reported.

APPENDIX B. Baseline information on moose population in Unit 24(B).

I. GMU 24 – Henshaw/Peavy Creek Trend Count Area aerial moose composition counts.

Regulatory year	Survey Area (mi^2)	Bulls:100 Cows	Yrlg. Bulls: 100 Cows	Calves: 100 Cows	Twins:100 cows w/calves	Percent Calves (%)	Moose counted	Moose/mi^2
1991-1992	67	80		30		14	42	0.62
1992-1993	75.2	58	11	5		3	64	0.85
2000-2001	106	129	18	24	67	9	43	0.41
2001-2002	106	106	0	31	0	13	38	0.36
2002-2003	106	72	6	28	0	14	36	0.34
2003-2004	106	68	15	29	22	15	67	0.63
2004-2005	105.8	75.76	15.15	33.33	22.22	15.94	69	0.65

GMU 24 – Kanuti Canyon Trend Count Area aerial moose composition counts.

Regulatory year	Survey Area (mi^2)	Bulls:100 Cows	Yrlg. Bulls: 100 Cows	Calves: 100 Cows	Twins:100 cows w/calves	Percent Calves (%)	Moose counted	Moose/mi^2
1988-1989	96	118		41		16	101	1.05
1992-1993	79	77	8	27		1	106	1.34
2000-2001	86	38	7	7	0	5	87	1.01
2001-2002	86	40	9	23	0	14	57	0.66
2002-2003	86	16	4	13	0	10	72	0.84
2003-2004	86	29	11	9	0	6	62	0.72
2004-2005	85.82	40.91	0	18.18	0	11.43	35	0.41

GMU 24 – Middle Fork Trend Count Area aerial moose composition counts.

Regulatory year	Survey Area (mi^2)	Bulls:100 Cows	Yrlg. Bulls: 100 Cows	Calves: 100 Cows	Twins:100 cows w/calves	Percent Calves (%)	Moose counted	Moose/mi^2
1987-1988	78.1	49	5	21	0	13	104	1.33
2000-2001	77	13	0	43	10	27	62	0.81

2001-2002	77	36	9	18	0	12	34	0.44
2002-2003	77	0	0	33	0	25	24	0.31
2003-2004	113	23	9	24	0	16	104	0.92
2004-2005	113	37.68	5.80	21.74	0	13.64	110	0.97
2005-2006	113	33	5	14	0	11	86	0.76
2007-2008	113	41	4.92	24.6	15.4	14.9	101	0.89
2008-2009	113	40	13	18	0	11.1	99	0.87
2011-2012	113	21	4.9	29.5	5.9	19.6	92	0.81

GMU 24 – Wild River Trend Count Area aerial moose composition counts.

Regulatory year	Survey Area (mi^2)	Bulls:100 Cows	Yrlg. Bulls: 100 Cows	Calves: 100 Cows	Twins:100 cows w/calves	Percent Calves (%)	Moose counted	Moose/mi^2
2000-2001	78	22	22	44	11	27	15	0.19
2001-2002	78	33	17	33	0	20	10	0.13

GMU 24 – Upper Koyukuk River Drainage population estimation surveys.

Regulatory year	Survey area (mi^2)	Bulls: 100 cows	Yearling bulls:100 cows	Calves:100 cows	Twins/100 cows with calves	Percent calves	Moose (90% C.I.)	Moose/mi^2
1989–1990[a] Kanuti NWR	2615	64	4.1	16.5	n/a	9.2	1171±24.7%	0.45
1993–1994[a] Kanuti NWR	2644	61	8.0	33.0	n/a	17.0	1759±18.4%	0.67
1999–2000 Kanuti NWR	2714	59	4.4	30.2	5.4	16.0	1003±20.7%	0.37
2004–2005 Kanuti NWR	2710	62	8.6	46.4	n/a	20.7	842±28.6%	0.31
2005–2006	2710	70	20.1	42.9	30.1	19.7	1026±43.3%	0.38

Kanuti NWR								
2007–2008 Kanuti NWR	2715	60	12.8	52.6	22.3	24.7	588±21.4%	0.22
2008–2009 Kanuti NWR	2715	46	14.1	57.7	9.0	28.5	872±23.2%	0.32
2010–2011 Kanuti NWR	2715	51	7.5	32.9	6.8	17.5	1068±11.5%	0.39
2011–2012 Kanuti NWR	2715	69	9.5	40.9	18.5	19.9	797±19.3%	0.29
2004-2005 Bettles block	6388	65	10.0	43.1	n/a	21.4	1596±32.9%	0.25
2004-2005 GAAR block	5106	71	7.8	23.4	n/a	13.3	1072±23.9%	0.21
2010–2011 Allakaket Area	1340	52	7.6	34.3	10.7	18.3	405±23.7%	0.30
2011–2012 Allakaket Area	1340	103	7.9	49.4	6.4	18.8	324±29.0%	0.24
1999-2000 Total block	8390	65	4.9	27.3	5.5	14.7	2662±24.4%	0.32
2004-2005 Total block	11494	65	8.6	34.8	n/a	17.8	2810±22.4%	0.24
2010–2011 Total Block	3736	53	7.5	33.3	7.2	17.7	1331±12.5%	0.35
2011–2012 Total Block	3736	78	9.8	42.9	15.7	19.5	1022±18.9%	0.27

[a] Martin and Zirkle 1996.

Unit 24A/B moose aerial twinning surveys in the Kanuti/Alatna/M. Fork Koyukuk Rivers, regulatory years 2006-07 to 2010-11.

Regulatory year	Cows w/o calves	Cows w/1 calf	Cows w/twins	Twinning %[a]	Yearlings	Dates in May
2006–2007	4	3	1	n/a	0	30,31
2007–2008[b]	n/a	32	17	35	n/a	27–31
2008–2009[b]	n/a	19	28	60	n/a	29–31
2009–2010[bc]	n/a	15	21	58	n/a	28–30
2010–2011[bd]	n/a	34	20	37	n/a	31, 6/1-2

[a] Percent of cows with calves that had twins.
[b] Radio-collared cows in sample.
[c] Early leaf-out.
[d] Including 1 cow w/3 calves.

Proposed Codified Language for the Unit 24B Predation Control Plan

5 AAC 92.125 Intensive Management Plans.
(a) Intensive management plans are established under this section in the areas described in this section.

. . .

() **Unit 24(B) Predation Control Area.** For the management of moose in the Upper Koyukuk Village Moose Management Area in Unit 24(B),
(1) The purpose of this plan is to allow for the removal of wolves by the department, near the villages of Alatna and Allakaket so that the moose population can support historical harvest levels,
(2) Notwithstanding any other provisions in this chapter, the department shall
(i) establish a 1,360 square miles Upper Koyukuk Village Moose Management Area (MMA) in Unit 24(B) in the vicinity of the communities of Alatna and Allakaket;
(ii) determine the appropriate level of wolf removal in the MMA;
(iii) estimate the nutritional condition of moose in the MMA;
(iv) estimate the appropriate level of moose harvest in MMA;
(v) develop a strategy that details the activities that will accomplish the purpose of this plan;
(vi) submit an annual report to the Board of Game detailing progress and activities.

This document provides the final, ADF&G recommendations on Board of Game proposals for the 2012 Interior Region meeting. The recommendations for proposals:* 148, 150, 178, 204, 205, 206, 218, 222, 226, and 229 *have been modified from the preliminary recommendations. The recommendations for all other proposals remain the same.

FINAL RECOMMENDATIONS

BOARD OF GAME PROPOSALS

March 2012-Region III

Alaska Department of Fish & Game

Division of Wildlife Conservation and Division of Subsistence

The department's recommendations are based on analysis of the proposals with available information. These recommendations may change after further analysis based on public comment or additional information.

PROPOSAL 131

EFFECT OF THE PROPOSAL: Add bear population reduction to the Unit 19A predation control program.

DEPARTMENT RECOMMENDATION: **Amend and Adopt**

RATIONALE: This is a Department proposal originally submitted to the Board as a placeholder for the January 2012 statewide meeting. The Board deferred it to the March 2012 meeting. The Department recommends adopting this proposal with the following amendments that update information in the existing predation control plan, add lethal, aerial removal of any sex and age of bear by Department personnel, and delete snaring of bears by the department or the public.

5 AAC 92.125. Intensive Management Plans.

(a) Intensive management plans are established under this section in the areas described in this section.

…

(e) **Unit 19(A) Predation Control Area:** the Unit 19(A) Predation Control Area is established and consists of those portions of the Kuskokwim River drainage within Unit 19(A), encompassing approximately 9,969 square miles; this predator control program does not apply within National Park Service or National Wildlife Refuge lands unless approved by the federal agencies; notwithstanding any other provision in this title, and based on the following information, the commissioner or the commissioner's designee may conduct a wolf **and a black bear and brown bear** population reduction or wolf **and black bear and brown bear** population regulation program in the Unit 19(A) Predation Control Area:

(1) **the following Predation Control Focus Areas are established in Unit 19(A):**

(A) **a Unit 19(A) Wolf Predation Control Focus Area (WCFA) is established and consists of approximately 3,913 square miles generally within the Holitna, Hoholitna, and Stony River drainages; the purpose is to focus wolf control in an relatively small area where moose are accessible to hunters, rather than spread this effort over the entire game management unit; wolf control will be conducted only within the WCFA; the department will have the discretion to adjust its size and shape up to 40 percent (approximately 4,000 square miles) of Unit 19(A);**

(B) **a Unit 19(A) Black Bear and Brown Bear Predation Control Focus Area (BCFA) is established and consists of those portions of the Kuskokwim River drainage within the area starting at Sleetmute at 61° 42.00' N. lat., 157° 10.00' W. long., then east to 61° 42.00' N. lat., 157° 00.00' W. long., then north to 61° 44.00' N. lat., 157° 00.00' W. long., then east to 61° 44.00' N. lat. 156° 55.00' W. long., then north to 61° 46.00' N. lat., 156° 55.00' W. long., then east to 61° 46.00' N. lat. 156° 50.00' W. long., then north to 61° 48.00' N. lat., 156° 50.00' W. long., then east to 61° 48.00' N. lat., 156°**

45.00' W. long., then north to 61° 50.00' N. lat., 156° 45.00' W. long., then east to 61° 50.00' N. lat., 156° 30.00' W. long., then south to 61° 40.00' N. lat., 156° 30.00' W. long., then west to 61° 40.00' N. lat., 156° 45.00' W. long., then south to 61° 18.00' N. lat., 156° 45.00' W. long., then west to 61° 18.00' N. lat., 157° 15.00' W. long., then north to 61° 24.00' N. lat., 157° 15.00' W. long., then east to 61° 24.00' N. lat., 157° 10.00' W. long., then north to 61° 42.00' N. lat., 157° 10.00' W. long., encompassing approximately 540 square miles; the purpose is to focus bear control in an area where moose are accessible to hunters, rather than spread this effort over the entire game management unit; bear control will be conducted only within the BCFA; the department will have the discretion to adjust its size and shape by 40 percent (approximately 325 – 750 square miles); the BCFA is generally within the WCFA;

(2) [(1)] the discussion of wildlife population and human use information is as follows:

(A) prey population information is as follows:

(i) a Central Kuskokwim [VILLAGES] moose management area (MMA) is established within **the same area as the WCFA and includes the BCFA;** [UNIT 19(A) PREDATION CONTROL AREA, ENCOMPASSING APPROXIMATELY 3,913 SQUARE MILES GENERALLY WITHIN THE HOLITNA, HOHOLITNA, AND STONY RIVER DRAINAGES] the purpose of the MMA is to **designate an area where moose numbers are closely monitored and objectives for number of moose and moose harvest can be applied; the department may adjust the size and shape of the MMA;** [FOCUS INTENSIVE MANAGEMENT ACTIVITIES, INCLUDING PREDATOR CONTROL AND HABITAT MANAGEMENT, IN A RELATIVELY SMALL AREA WHERE MOOSE ARE ACCESSIBLE TO HUNTERS, RATHER THAN SPREAD THIS EFFORT OVER THE ENTIRE GAME MANAGEMENT UNIT; WOLF CONTROL WILL BE CONDUCTED ONLY WITHIN THE MMA, AND THE DEPARTMENT WILL HAVE THE DISCRETION TO ADJUST ITS SIZE AND SHAPE UP TO 40 PERCENT (APPROXIMATELY 4,000 SQUARE MILES) OF UNIT 19(A);]

(ii) the moose population size for Unit 19(A) was estimated in March 2004, based upon earlier estimates of density in portions of the unit; in March 1998, 1.25 moose per square mile (plus or minus 14 percent at an 80 percent confidence interval) was estimated in a portion of the Holitna-Hoholitna drainage; in March 2001, 0.7 moose per square mile (plus or minus 21 percent at a 90 percent confidence interval) was estimated in a portion of the Aniak River drainage; extrapolation of data from both estimates to all of Unit 19(A) resulted in an estimated total population size of 4,300 - 6,900 moose; the population size for Unit 19(A) was updated in February 2005, based upon an estimate of 0.27 moose per square mile (plus or minus 16 percent at a 90 percent confidence interval) obtained from a survey in the portion of the unit south of the Kuskokwim River; extrapolation of **these** [THIS] data to all of Unit 19(A) resulted in an estimated total population size of 3,000 - 4,000 moose (0.3 - 0.4 moose per square mile), which was corrected for sightability of moose and was lower than the 2004 estimate indicating moose numbers had declined; the population size estimate was updated in March 2006, based on an estimate of 0.39 moose per square mile (plus or minus 15 percent at a 90 percent confidence interval) obtained from a survey conducted south of the Kuskokwim River, from Kalskag to the mouth of Crooked Creek (3,440 square miles); extrapolation of these data to all of Unit 19(A) resulted in a estimated total population size of 2,700 - 4,250 moose (0.27 - 0.42 moose per square mile), which was also corrected for sightability; the population size was updated again in March 2008, based on an estimate of 0.55 moose per square mile (plus or minus 28 percent at the 90 percent confidence interval) obtained within a 3,874 square mile moose survey area located south of the Kuskokwim River, within the Holitna, Hoholitna, and Stony River drainages; extrapolation of these data to all of Unit 19(A) resulted in an estimated total population size of 3,200 - 5,275 moose (0.32 - 0.53 moose per square mile), which was corrected for sightability; **the population size was updated in March 2011, based on an estimate of 0.43 moose per square mile (plus or minus 36 percent at the 90 percent confidence interval) obtained within a 3,874 square mile moose survey area located south of the Kuskokwim River, within the Holitna, Hoholitna, and Stony River drainages; extrapolation of these data to all of Unit 19(A) resulted in an estimated total population size of 2,791 - 5,782 moose (0.28 - 0.58 moose per square mile), which was corrected for sightability;**

(iii) in November 2001, a survey on the Holitna-Hoholitna Rivers in Unit 19(A) was conducted; a total of 196 moose were classified with an observed bull-to-cow ratio of 6:100 and an observed calf-to-cow ratio of 8:100; the low numbers observed could have been influenced by an atypical moose distribution caused by shallow snow and relatively temperate late-fall weather;

(iv) in November 2004, a survey was conducted to estimate composition in the Holitna-Hoholitna, Oskawalik, and Stony River portion of Unit 19(A) (4,828 square miles); a total of 226 moose were classified and the bull-to-cow ratio (19:100, plus or minus 76 percent at a 90 percent confidence interval) and calf-to-cow ratio (32:100, plus or minus 38 percent at a 90 percent confidence interval) estimates were higher than observed in the November 2001 trend count survey; some improvement in the ratios is indicated; however, results of the two surveys cannot be directly compared because the 2004 survey covered a much larger geographic area and was done using different methods than the 2001 survey; the estimated percent moose calves in the total population during the November 2004 composition survey was 22 percent (plus or minus 38 percent with a 90 percent confidence interval);

(v) in November 2005, composition surveys were conducted in the Holitna-Hoholitna drainage in Units 19(A) and 19(B) and in the Aniak River drainage including the Kuskokwim River from Lower Kalskag to Napaimiut in Unit 19(A); a different technique was implemented than what was used for previous composition surveys because of the concern about possible atypical moose distribution when confining the survey area to the river corridor and the concern about wide confidence intervals in the

November 2004 survey; a total of 307 moose were observed and the observed bull-to-cow ratio was 8:100 with most (12 of 19) bulls classified as yearlings; the observed calf-to-cow ratio was 24:100 and the percent of calves was 18 percent; the low bull-to-cow ratios observed during the past three composition surveys indicate that hunting pressure has been high in the Holitna-Hoholitna drainage; in the western portion of Unit 19(A), the Aniak River drainage and the Kuskokwim River from Lower Kalskag to Napaimiut was also surveyed; composition data had not been collected previously in this portion of Unit 19(A); a total of 410 moose were counted with an observed bull-to-cow ratio of 20:100 and an observed calf-to-cow ratio of 23:100;

(vi) in November 2007, composition surveys were conducted in the Holitna-Hoholitna drainage in Unit 19(A) and in the Aniak River drainage downriver from the Buckstock River including the Kuskokwim River from Lower Kalskag to Aniak in Unit 19(A); in the Holitna-Hoholitna drainage a total of 200 moose were observed, the bull-to-cow ratio was 35:100, the calf-to-cow ratio was 45:100, and the percent of calves was 25 percent; in the Aniak River drainage a total of 122 moose were observed, the bull-to-cow ratio was 28:100, the calf-to-cow ratio was 51:100, and the percent of calves was 29 percent; in November 2008, composition surveys were again conducted in the same area; in the Holitna-Hoholitna drainage a total of 117 moose were observed, the bull-to-cow ratio was 34:100, and the calf-to-cow ratio was 27:100, and the percent of calves was 18 percent; in the Aniak River drainage a total of 51 moose were observed, the observed bull-to-cow ratio was 42:100, and the observed calf-to-cow ratio was 23:100, and the percent of calves was 14 percent;

(vii) in November 2009, composition surveys were conducted in the Holitna-Hoholitna drainage; a total of 129 moose were observed, the bull-to-cow ratio was 51:100, the calf-to-cow ratio was 36:100, and the percent of calves was 19; in November 2010, composition surveys were conducted in the Holitna-Hoholitna drainage a total of 212 moose were observed, the bull-to-cow ratio was 48:100, the calf-to-cow ratio was 19:100, and the percent of calves was 11; in November 2011, composition surveys were conducted in the Holitna-Hoholitna drainage; a total of 164 moose were observed, the bull-to-cow ratio was 38:100, the calf-to-cow ratio was 31:100, and the percent of calves was 18;

(viii) [(VII)] birth rate among radiocollared cows in Unit 19(A) is high; in 2005, of nine radiocollared cows in the lower Holitna River, three had twins, four had a single calf, and two had no calf (78 percent birth rate); of eight radiocollared cows in the Aniak River drainage, two had twins and six had single calves (100 percent birth rate); overall, the 2005 birth rate among radiocollared cows in Unit 19(A) was 88 percent; **combined data from twinning surveys in the Holitna during 2007, 2008, and 2010, indicate 12 of 19 cows with calves had twins (63% twinning rate);**

(ix) [(VIII)] a late winter survey to estimate calf survival, conducted in April 2003 in Unit 19(A), resulted in an estimate of 7.6 percent calves in the moose population in Holitna-Hoholitna drainage (sample size 107 adults and 9 short-yearlings) and 8.9 percent in the moose population in the Aniak River drainage (sample size 61 adults and six short-yearlings); spring population surveys conducted south of the Kuskokwim River drainage and west of the Holitna-Hoholitna drainage (3,440 square miles) in 2006, resulted in 17 percent calves and 9 percent calves respectively (plus or minus 30 percent at a 90 percent confidence interval); the calf-to-cow ratios in fall and the percent of calves found in spring surveys support the conclusion that calf survival in the moose population is very low, and a decline in moose numbers is probably occurring;

(x) [(IX)] based on current estimates of recruitment, population density and bull-to-cow ratios, there is no harvestable surplus in eastern Unit 19(A) (upstream from and excluding the George River), excluding the Lime Village Management Area; in western Unit 19(A) (downstream from and including the George River), the harvestable surplus is 60 bulls, using a conservative harvest rate for bulls that is based on three percent of the total estimated population;

(xi) [(X)] the intensive management moose population objective established by the board for Units 19(A) and 19(B) is 13,500 - 16,500 moose; based on the relative sizes of the two units, the proportional population objective for Unit 19(A) alone is 7,600 - 9,300 moose; the intensive management moose harvest objective for Units 19(A) and 19(B) is 750 - 950 moose; the proportional harvest objective for Unit 19(A) alone is 400 - 550 moose; achieving the population and harvest objectives for Unit 19(A) will contribute to achieving the intensive management population and harvest objectives established for Units 19(A) and 19(B);

(xii) [(XI)] based on data available, habitat is probably not a factor limiting population growth in moose in the central Kuskokwim region; a browse survey in Unit 19(D) (in the upper Kuskokwim River) during spring 2001, found that moose were removing about 16 percent of current annual growth; these removal rates are near the midpoint of the range observed in areas of low to high moose browse use (9 - 42 percent); a browse survey in fall 2002 below Lower Kalskag on the Kuskokwim River (Unit 18) found that 78 percent of shrubs were unbrowsed and none were heavily browsed by moose; there is some indication that cows are in average or good body condition because twinning rates of 32 percent were observed in spring 2000 on the Holitna and Hoholitna Rivers, although sample sizes were small (less than 10); of 15 radiocollared cows in Unit 19(A) that had calves in 2005, five produced twins for a 33 percent twinning rate; **in 2007, 2008, and 2010 a combined twinning rate of 63% was observed;** if observations of browsing upriver and downriver from Unit 19(A), and limited observations of twinning are indicative of the situation in Unit 19(A), habitat enhancement alone is unlikely to cause a significant population increase in moose in the foreseeable future; the highest quality moose habitat in the unit is found in the lower Holitna River floodplain; high quality habitat is present in riparian areas along the Kuskokwim River and adjacent drainages; other portions of Unit 19(A) have lower quality habitat;

(xiii) [(XII)] total estimated mortality is likely high relative to the size of the moose population; information gained from studies on moose mortality in Unit 19(D)-East and other similar areas of Alaska, and observations by local residents indicate that wolves are currently a major limiting factor for moose in Unit 19(A); research from Unit

19(D)-East also indicates that black and brown bear predation is likely a factor that contributes to limiting the moose population in Unit 19(A); of 38 adult moose radiocollared in October 2003, seven had died by November 2005; moose mortality from harvest by humans is also high, relative to the population size, and regulatory proposals have been submitted to severely restrict harvest;

(xiv) [(XIII)] the number of animals that can be removed from the Unit 19(A) moose population on an annual basis without preventing growth of the population or altering the composition of the population in a biologically unacceptable manner is less than the harvest objective established for the population in 5 AAC 92.108; the moose population in Units 19(A) and 19(B) is well below the intensive management objective set by the board; the moose population in Unit 19(A) is also well below the objective calculated by the department for the unit;

(xv) [(xiv)] without an effective wolf **and black bear and brown bear** predation control program, moose in Unit 19(A) are likely to persist in a low density dynamic equilibrium state with little expectation of increase; data from moose mortality studies, and predator and prey studies, conducted throughout Alaska and similar areas in Canada suggest that reducing the number of wolves **and bears** in Unit 19(A) can reasonably be expected to increase the survival of calves as well as older moose, particularly yearlings; reducing wolf **and bear** predation on moose, in combination with reducing harvest, particularly of cows, can reasonably be expected to initiate an increase of the moose population towards the population objective;

(B) the human use information for prey population is as follows:

(i) the division of subsistence conducted household surveys on the subsistence use of big game in communities in Unit 19(A) between April 2003 and March 2004; moose was the most widely used and hunted animal in all eight communities surveyed; overall, 76 percent of all households in the central Kuskokwim area used moose, 57 percent of all households attempted to harvest moose, and 22 percent of all households successfully harvested one or more moose; of the estimated 107 moose harvested by the eight survey communities, 64, or 60 percent, were taken in Unit 19(A), 14 or 13 percent, were taken in Unit 18, and the remainder 27 percent were taken in other subunits of Unit 19 or in unreported locations; an estimated 426 individuals, or 28 percent of the area population, spent a total of 4,591 hunter days in pursuit of moose; to put this number in perspective, it is equivalent to a period of nearly 12.6 years, a clear testament to the importance of moose as a subsistence resource in the central Kuskokwim region; of the 426 individuals who went hunting, only 96, or 23 percent, were successful in harvesting a moose; the average number of days spent hunting by successful households per moose harvested (14.7) is higher than any previously reported numbers in the state where similar methods of data collection and analysis were employed; households were asked to compare their 2003 - 2004 harvest of moose with their harvest both five years and 10 years before, and the householders overwhelmingly noted harvesting fewer moose in 2003 - 2004;

(ii) between June 1982 and June 1983, the staff of the division of subsistence conducted extensive research on the resource use patterns and community characteristics of Chuathbaluk and Sleetmute; a comparison of that information with the 2004 data indicates a significant decline in household harvest rates; from an average of 0.55 - 0.2 moose harvested per household in Chuathbaluk and from 0.68 - 0.3 moose harvested per household in Sleetmute;

(iii) residents of Unit 19(A) have always had a high demand for moose for subsistence needs; since the 1990s when larger boats became available to residents in the lower Kuskokwim River and income from commercial fishing increased the ability to purchase fuel for long hunting trips, demand for moose in Unit 19(A) has increased; since 2004, there has been a moratorium on moose hunting in the Kuskokwim River drainage in Unit 18 and this has increased the demand for moose for subsistence purposes in Unit 19(A);

(iv) the amount necessary for subsistence established by the board for Unit 19 (including the Lime Village Management Area) is 430 - 730 moose; most of the human population in Unit 19 is residents of communities along the Kuskokwim River in Unit 19(A); the amount necessary for subsistence for Unit 19 is also based on subsistence need by residents of Unit 18; Unit 19(A) includes the most accessible portion of Unit 19 for the main population base in the region; subsistence hunters have depended on Unit 19(A) to provide the majority of subsistence harvest in Unit 19 as a whole; harvest in Unit 19(A) is a critical component of the amount necessary for subsistence for Unit 19 and the ability to meet subsistence needs in the region;

(v) according to harvest ticket reports, the numbers of hunters and moose harvested declined substantially between the mid-1990s and 2002; the total reported moose harvested in Unit 19(A) declined from the 1994 - 1995 season (168 moose) to the 2002 - 2003 season (67 moose); in Unit 19(A), the number of moose reported harvested by local residents and other Alaska residents declined approximately 65 percent, from 138 moose to 48 moose, between 1994 - 1995 and 2002 - 2003; after the RM 640 registration permit hunt for Alaska residents was implemented in fall 2004, harvest reporting greatly improved; in 2004, reports indicate that 107 moose were harvested in Unit 19(A); during the fall of 2005, 176 moose were reported harvested; while it may appear that moose harvest increased significantly after the registration permit hunt was established, the increase is most likely attributable to better reporting rates; during 2006, 2007, and 2008, reported moose harvest was 43, 77, and 75, respectively; **during 2009 and 2010, the reported moose harvest was 58 and 84, respectively;** these lower harvests were influenced by Tier II hunt restrictions and moose hunting closures;

(vi) the average number of nonresident hunters in Unit 19(A) between 1994 - 1995 and 2002 - 2003 was 52 hunters; the peak number of nonresident hunters was 91 in 2000 - 2001; when Unit 19(A) was closed to nonresident hunting in March 2004 several guides protested vigorously that their agreements with clients could not be met and their businesses would suffer; since that time demand for nonresident hunting opportunity has not been met;

(vii) demand for moose harvest in Unit 19(A) is likely to increase in the future; if the moose hunting moratorium in Unit 18 is successful in increasing the moose population in that area it will help relieve some of the demand on Unit 19(A); still, with more than 20,000 residents in Unit 18 there will be high demand for moose throughout the region indefinitely into the future; clearly, demand is not being met now; if the wolf **and black bear and brown bear** control program is successful it will help to meet the need for moose in the region in the future; without a wolf **and black bear and brown bear** predation control program, there is a very low probability that the moose population will increase sufficiently to meet subsistence needs or other harvest demands in the future;

(C) the predator population information is as follows:

(i) the pre-control wolf population in Unit 19(A) was estimated in fall 2004 using an extrapolation technique combined with sealing records and anecdotal observations the population in the entire 9,969 square mile area was estimated at 180 - 240 wolves in 24 - 28 packs or approximately 1.8 - 2.4 wolves per 100 square miles; a revised pre-control estimate of 125 - 150 was calculated in 2006 because wolf survey data collected during early 2006 and moose survey data collected during 2005 and 2006 indicated the initial pre-control wolf population estimate was too high;

(ii) after a complete wolf survey was conducted in Unit 19(A) in January and March 2006, a total of 107 - 115 wolves was estimated in 26 - 27 packs or approximately 1.1 - 1.2 wolves per 100 square miles; a complete wolf survey was conducted again in Unit 19(A) in February 2008, a total of 74 wolves was estimated in 17 packs or approximately 0.74 wolves per 100 square miles; **in February 2011, aerial wolf surveys, pilot interviews, and harvest and control data were used to obtain fall 2010 estimates of 30 wolves in 7 packs in Unit 19(A) upriver of Sleetmute and approximately 80 wolves in all of Unit 19(A);** in areas with limited human developments, habitat is not considered a significant factor in limiting wolf populations and it is presumed that numbers of wolves are limited mainly by prey availability; there is no evidence of disease or any other naturally occurring factors that would cause wolf mortality to be higher than normally expected;

(iii) using the **2011** [2008] moose and wolf population estimates, the moose-to-wolf ratio in Unit 19(A) is between **35-72:1** [43:1 AND 71:1];

(iv) when present, the Mulchatna caribou herd provides an alternative source of prey for wolves in Unit 19(A); because migrations of the herd into portions of 19(A) vary each year, the herd is not consistently available to wolves in the plan area;

(v) studies in Alaska and elsewhere have repeatedly concluded that large reductions are required to affect wolf population levels and to reduce predation by wolves on their prey; research indicates a reduction of about 60 - 80 percent of the pre-control wolf population may be necessary to achieve prey population objectives; once the wolf population has been reduced to the population control objective, annual reductions of less than 60 percent will likely regulate the wolf population at the control objective; the wolf population control objective during winters 2004 - 2005 and 2005 - 2006 was 40 - 53 wolves in order to achieve a reduction of between 60 and 80 percent of the pre-control estimate of 180 - 240; beginning in winter 2006 - 2007, the wolf pollution control objective was changed to 30 - 36 wolves based on the revised pre-control wolf population estimate of 125 - 150; the minimum wolf population control objective will achieve the desired reduction in wolf predation, and also ensure that wolves persist within the plan area;

(vi) without a wolf predation control program, the wolf population is expected to decline somewhat due to further decline in the moose population and reduced availability of prey; the moose and wolf populations in Unit 19(A) are in a low density dynamic equilibrium state where both predator and prey numbers are likely to stay at low levels indefinitely; if wolf predation control efforts continue and the wolf population is reduced according to the wolf population and harvest objectives, the wolf population will be maintained at 30 - 36 wolves for several years, but once the moose population increases and wolf control efforts are discontinued, the wolf population will increase in response to the increased prey base;

(vii) based on extrapolation of densities from other areas, an estimated 2,475 – 2,970 black bears exist in Unit 19(A), including approximately 135 – 160 black bears within the BCFA;

(viii) based on extrapolation of densities from other areas, an estimated 200 brown bears exist in Unit 19(A), including approximately 10 – 15 brown bears within the BCFA;

(D) the human use information for the predator population is as follows:

(i) total reported harvest of wolves in Unit 19(A) by both hunters and trappers between 1998 and 2004 ranged between 21 and 49 wolves; during the winter of 2004 - 2005, a total of 72 wolves were reported taken in Unit 19(A); of those, 43 wolves were taken in the wolf predation control program and 29 wolves were taken by trappers and hunters; during the winter of 2005 - 2006, a total of 80 wolves were reported taken in Unit 19(A); of those, 47 wolves were taken in the wolf predation control program, and 33 wolves were taken by trappers and hunters; during the winter of 2006 - 2007, a year with low snow and poor travel conditions, a total of 10 wolves were reported taken in Unit 19(A); of those, seven wolves were taken in the wolf predation control program and three wolves were taken by trappers and hunters; during the winter of 2007 - 2008, a total of 24 wolves were reported taken in Unit 19(A); of those, 15 wolves were taken in the wolf predation control program and nine wolves were taken by trappers and hunters; **during the winter of 2008 - 2009, a total of 31 wolves were reported taken in Unit 19(A); of those, 20 were taken in the wolf predation control program and 11 were taken by trappers and hunters; during the winter of 2009 - 2010, a year with low snow and poor travel conditions, a total of 12 wolves were reported taken in Unit 19(A); of those, 2 wolves were taken in the wolf predation control program**

and 10 wolves were taken by trappers and hunters; during the winter of 2010 - 2011, a total of 14 wolves were reported taken in Unit 19(A); of those, 10 wolves were taken in the wolf predation control program and 4 wolves were taken by trappers and hunters; it is likely that a few additional wolves (estimated 5 – 10 annually) are harvested in the area, but are used locally and do not get sealed and reported; [IT IS LIKELY THAT A FEW ADDITIONAL WOLVES (ESTIMATED 5 - 10) ARE HARVESTED IN THE AREA, BUT ARE USED LOCALLY AND DO NOT GET SEALED AND REPORTED;]

(ii) the human population in Unit 19(A) is concentrated along the Kuskokwim River corridor; there are large portions of the unit that are remote from communities in the region and access is difficult; the central Kuskokwim region weather is influenced by coastal conditions and often warm spells in the winter will melt snow and make travel and tracking conditions poor; in addition, the low price of wolf pelts and cost of fuel make it difficult for local residents to harvest a high number of wolves throughout the unit;

(iii) in the first year of the Unit 19(A) wolf predation control program reported wolf harvest by hunters and trappers was 27 wolves, within the range of previous years' harvest; without a wolf predation control program in place wolf harvest is expected to remain relatively constant;

(iv) there is no reporting requirement for black bears harvested in Unit 19(A) and hunter harvest is believed to be low; without a black bear predation control program in place black bear harvest is expected to remain relatively constant;

(v) during 2006 – 2010, a total of 77 brown bears were reported harvested by hunters from Unit 19(A), including an average of 3 per year from the Holitna River drainage; without a brown bear predation control program in place brown bear harvest is expected to remain relatively constant;

(2) the predator and prey population levels and population objectives, and the basis for those objectives, is as follows:

(A) the **2011** [2008] estimated moose population in Unit 19(A) is **2,791 - 5,782** [3,200 - 5,275] moose; the moose population objective for Unit 19(A) is 7,600 - 9,300 moose; this objective is based on the intensive management objective for Units 19(A) and 19(B) established by the board and the proportion of the land area in the combined subunits that is within Unit 19(A); intensive management objectives were based on historical information about moose numbers, carrying capacity of the habitat, sustainable harvest levels, and human use;

(B) the revised pre-control estimated wolf population in Unit 19(A) was 125 - 150 wolves during fall 2004; studies in Alaska and elsewhere have repeatedly concluded that large, annual reductions of wolves are required to diminish wolf population levels and predation by wolves on their prey; consistent with scientific studies and department experience, the objective of this plan is to substantially reduce wolf numbers from pre-control levels in order to relieve predation pressure on moose and allow for improved recruitment to the moose population; this plan also has as a goal to maintain wolves as part of the natural ecosystem within the described geographical area; to achieve the desired reduction in wolf predation, but ensure that wolves persist within the plan area, the wolf population in Unit 19(A) will be reduced by no fewer than 30 wolves;

(C) the wolf population control objective for Unit 19(A) is 30 - 36 wolves; a minimum population of 30 wolves is within the 60 - 80 percent recommended reduction from the pre-control minimum estimated wolf population; the minimum wolf population control objective will achieve the desired reduction in wolf predation, and also ensure that wolves persist within the plan area;

(D) the pre-control estimated black bear population in Unit 19(A) was 2,475 – 2970 bears, including 135 – 160 black bears within the BCFA; the objective for the black bear predation control program is to reduce black bear numbers and black bear predation on moose to the lowest level possible within the BCFA; this plan includes a goal to maintain black bears as part of the natural ecosystem within Unit 19(A); because the BCFA is a relatively small geographic area, removing black bears from within it will have only a minor effect on the black bear population in Unit 19(A) overall, but should significantly contribute to moose calf survival in the BCFA;

(E) the pre-control estimated brown bear population in Unit 19(A) was 200 bears, including 10 – 15 brown bears within the BCFA; the objective for the brown bear predation control program is to reduce brown bear numbers and brown bear predation on moose to the lowest level possible within the BCFA; this plan includes a goal to maintain brown bears as part of the natural ecosystem within Unit 19(A); because the BCFA is a relatively small geographic area, removing brown bears from within it will have only a minor effect on the brown bear population in Unit 19(A) overall, but should significantly contribute to moose calf survival in the BCFA;

(3) the justifications for the predator control implementation plan are as follows:

(A) the estimated **2011** [2008] density of the moose population in Unit 19(A) is in the range of **0.28 – 0.58** [0.32 - 0.53] moose per square mile with a population of **2,791 - 5,782** [3,200 - 5,275] moose; based on current estimates of recruitment, density, and bull-to-cow ratios, there is no harvestable surplus in eastern Unit 19(A) upstream from and excluding the George River), excluding the Lime Village Management Area; in western Unit 19(A) (downstream from and including the George River), the harvestable surplus is 60 bulls, using a conservative harvest rate for bulls that is based on three percent of the estimated population; harvestable surplus is not sufficient to provide the amount of moose necessary for subsistence purposes or provide for nonsubsistence uses; the moose population and harvest objectives for Unit 19(A) are not being met because mortality has exceeded recruitment into the population causing a decline in moose numbers; wolf, **black bear and brown bear** predation is an important cause of moose mortality;

(B) kill rates by wolves are affected by availability of moose, snow depth, number of alternate prey, size of wolf packs, and other local factors; in Alaska and Canada where moose are the primary prey of wolves, studies documented kill rates ranging from four to seven moose per wolf per winter;

(C) black bear and brown bear predation is likely a major cause of moose calf mortality; in nearby Unit 19D-East, a 96 percent and 50 percent reduction in black bears and brown bears, respectively, resulted in increased survival rates during summer;

(D) [C] reducing wolf**, black bear and brown bear** numbers through a wolf**, black bear and brown bear** predation control program, combined with reduction in moose harvest is the approach most likely to succeed in a recovery of the moose population; wolf harvest through hunting and trapping efforts **and black bear and brown bear through hunting efforts** has not resulted in lowering the wolf**, black bear and brown bear** population**s** sufficiently to allow the moose population to grow; a regulation change in March 2002 to allow the use of snowmachines to take wolves has not resulted in a measurable increase in wolf harvest; public information and education programs have been implemented in the central Kuskokwim region to improve understanding of the biological effect of killing cow moose and the potential benefits to the moose population of increasing harvest of wolves and bears; education should help in the long-term but is not expected to result in a significant increase in the moose population in the short-term; Unit 19(A) was closed to nonresident hunting and a registration permit system for resident hunters was established in 2004; beginning in fall 2006, moose hunting was closed upstream from and excluding the George River drainage and excluding the Lime Village Management Area; a Tier II permit hunt was implemented downstream from and including the George River drainage; these changes were made in response to new information obtained during 2005 surveys;

(E) [D] presently known alternatives to predator control for reducing the number of predators are ineffective, impractical, or uneconomical in the Unit 19(A) situation; hunting and trapping conducted under authority of ordinary hunting and trapping seasons and bag limits is not an effective reduction technique in sparsely populated areas such as Unit 19(A); the numbers of hunters and trappers are relatively low and educational programs to stimulate interest and improve skills in taking wolves are in the early stages of development, and so far have been unsuccessful in increasing the harvest of wolves; the inherent wariness of wolves, difficult access, and relatively poor pelt prices also explain low harvest rates; application of the most common sterilization techniques, including surgery, implants, or inoculation, are not effective reduction techniques because they require immobilization of individual predators, which is extremely expensive in remote areas, relocation of wolves**, black bears and brown bears** is impractical because it is expensive and it is very difficult to find publicly acceptable places for relocated wolves**, black bears and brown bears**; habitat manipulation is ineffective because it may improve the birth rate of moose in certain circumstances, but it is poor survival, not poor birth rate that keeps moose populations low in rural areas of interior Alaska; supplemental feeding of wolves and bears as an alternative to predator control has improved moose calf survival in two experiments; however, large numbers of moose carcasses are not available for this kind of effort and transporting them to remote areas of Alaska is not practical; stocking of moose is impractical because of capturing and moving expenses; any of the alternatives to a wolf predation control program are not likely to be effective in achieving the desired level of predator harvest;

(F) [E] moose hunting seasons and bag limits have been reduced in Unit 19(A); in 2004 - 2005, the nonresident season in Unit 19(A) was closed and resident hunters in Unit 19(A) were required to have a registration permit; the resident winter moose hunting season in Unit 19(A) was eliminated to reduce overall harvest and eliminate incidental cow harvest to improve the reproductive potential of the population; beginning in fall 2006, moose hunting in the eastern part of Unit 19(A) outside the Lime Village Management Area was closed and the remainder of Unit 19(A) was limited by Tier II permit; while helpful, these measures alone will not likely stop the decline in the moose population and they will not be enough alone to allow the moose population to increase;

(G) [F] without an effective wolf**, black bear and brown bear** predation control program, the wolf**, black bear and brown bear** harvest objective**s** cannot be achieved and moose in Unit 19(A) are likely to persist in a low density dynamic equilibrium state with little expectation of increase; data from moose mortality studies, and predator and prey studies, conducted throughout Alaska and similar areas in Canada suggest that reducing the number of wolves**, black bears and brown bears** in Unit 19(A) can reasonably be expected to increase the survival of calves as well as older moose; reducing wolf**, black bear and brown bear** predation on moose, in combination with reducing harvest, particularly of cows, can reasonably be expected to initiate an increase of the moose population towards the population objective; aerial wolf predation control makes it possible to increase the take of wolves over large expanses of territory in a vast and remote region like the majority of Unit 19(A); **aerial black bear and brown bear control is an effective technique for reducing bear numbers and bear predation on moose;** with a reduction in wolf **and bear**-caused mortality and restrictions in harvest, the moose population is expected to grow;

(4) the permissible methods and means used to take wolves**, black bears and brown bears** are as follows:

(A) hunting and trapping of wolves **and hunting of black bears and brown bears** by the public in Unit 19(A) during the term of the program will occur as provided in the hunting and trapping regulations set out elsewhere in this title, including use of motorized vehicles as provided in 5 AAC 92.080;

(B) notwithstanding any other provisions in this title, the commissioner may issue public aerial shooting permits or public land and shoot permits as a method of wolf removal under AS1605.783;

(C) notwithstanding any other provisions in this title, the commissioner may reduce the black bear population within the BCFA using department employees to conduct aerial, land and shoot, and/or ground based lethal black bear removal of any sex and

age of black bear using state owned, privately owned, or chartered equipment, including helicopters under AS1605.783;

(D) notwithstanding any other provisions in this title, the commissioner may reduce the brown bear population within the BCFA using department employees to conduct aerial, land and shoot, and/or ground based lethal brown bear removal of any sex and age of brown bear using state owned, privately owned, or chartered equipment, including helicopters under AS1605.783;

(5) the anticipated time frame and schedule for update and reevaluation are as follows:

(A) for up to five years beginning on July 1, 2009, the commissioner may reduce the wolf**, black bear and grizzly bear** populations in Unit 19(A);

(B) annually, the department shall to the extent practicable, provide to the board at the board's spring board meeting, a report of program activities conducted during the preceding 12 months, including implementation activities, the status of moose and wolf populations, and recommendations for changes, if necessary, to achieve the objectives of the plan;

(6) other specifications the board considers necessary are as follows:

(A) the commissioner will suspend wolf control activities:

(i) when wolf inventories or accumulated information from permittees indicate the need to avoid reducing wolf numbers below the management objective of 30 wolves specified in this subsection;

(ii) when spring conditions deteriorate to make wolf control operations infeasible; or

(iii) no later than April 30 in any regulatory year;

(B) wolf**, black bear and brown bear** control activities will be terminated

(i) when prey population management objectives are attained; or

(ii) upon expiration of the period during which the commissioner is authorized to reduce predator numbers in the predator control plan area;

(C) [D] the commissioner will annually close wolf hunting and trapping seasons as appropriate to ensure that the minimum wolf population objective is met.

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PROPOSAL 133

EFFECT OF THE PROPOSAL: Start all big game prey species hunting seasons one week earlier for residents in intensive management (IM) areas in Region III.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: We assume this proposal refers to caribou and moose because these are the 2 big game species identified by the Board for IM in Region III.

This is an allocation issue that should be determined by the Board on a case-by-case basis. Allocation should be based upon a variety of factors specific to each IM area that include: species identified as important for providing high levels of human harvest; species benefitting from predation control; harvestable surplus; customary and traditional (C&T) use findings; and historical harvest by residents and nonresidents. If this proposal were adopted, these factors would no longer be considered, resulting in restriction of nonresident hunting opportunity even when such restrictions are not necessary.

Intensive management areas have been adopted for caribou, and moose, as listed in 5 AAC 92.108. In addition, AS16.05.255(d) states that "regulations adopted…. must provide that, consistent with the provisions of AS 16.05.258, the taking of moose, deer, elk, and caribou by residents for personal or family consumption has preference over taking by nonresidents."

Of the 5 caribou herds identified in Region III as important for IM, 1 herd has no nonresident season and 3 have more restrictive nonresident than resident bag limits and season lengths. Only 1 herd, which is harvested under a drawing permit hunt, is not more restrictive for nonresidents than for residents. However, during regulatory years 2007–2008 through 2011–2012, 91% of permit holders were resident hunters, who killed 90% of caribou harvested.

Where moose have been identified as important for IM, the Board has allocated harvest by means of 48 different hunts (like areas were combined, such as multiple drawing hunts in and around the Koyukuk Controlled Use Area), comprising 16 drawing hunt areas, 9 registration hunts, 21 general season hunts and 2 Tier II hunts. Of these, 21 hunts have more restrictions on nonresidents than residents for season dates, bag limits, and/or the number of permits available. An additional 21 hunts (6 drawing, 8 registration, 5 general season, and 2 Tier II) have no nonresident seasons. Only 3 general season and 3 small drawing hunts do not restrict nonresidents more than residents. In predation control areas, the board has restricted or eliminated nonresident seasons for the moose or caribou populations that the control programs were intended to benefit.
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PROPOSAL 134

EFFECT OF THE PROPOSAL: Allocate all Region III drawing hunts for big game between residents and nonresidents such that a minimum of 90% of the permits go to residents.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: This is an allocation issue that should be determined by the Board, therefore, the Department has no recommendation. Board policy (2007-173-BOG) indicates that allocations for specific hunts will be decided individually, based upon historical patterns of nonresident and resident permit use over the past 10 years. This proposal would pertain to brown bear, bison, caribou, moose, and sheep. There are no drawing permit hunts for black bears, wolves, or wolverine in the region.

For brown bears, only Unit 26B has a drawing hunt, in which 6 permits are issued to nonresident hunters. Residents hunt grizzly bears under a general season in this area, as in the remainder of Region III. The Delta caribou herd is the only caribou herd in the region that is hunted by drawing permit. Ninety-one percent of Delta caribou permits are awarded to residents. There is no limit on the allocation to nonresidents.

Bison hunting in Region III is available by drawing permit only. During the past 5 years an average of 138 permits were available annually. Nonresidents received less than 2% of permits. There is no limit on the allocation for nonresidents.

There are 3 drawing permit hunts for sheep in Region III: Tok Management Area, Mount Harper, and Delta Controlled Use Area. Residents and nonresidents have general season access in the remainder of the region. In the Tok Management Area, the board allows no more than 10% of permits to be allocated to nonresidents. There is no limit on the allocation to nonresidents of permits for Mount Harper and Delta Controlled Use Area sheep hunts. About 9% of these permits were issued to nonresidents during 2004–2010.

Of 3,861 moose drawing permits available in Region III, 96 are allocated exclusively to nonresident hunters, 3,016 exclusively to resident hunters, and 749 to either residents or nonresidents (unallocated). Thereby, nonresidents may apply for 22% of the available moose drawing permits. However, most of the permits available to nonresidents are in hunt areas where resident hunters can hunt by general season, registration permit, or both have longer seasons and/or have less restrictive bag limits. Examples include 1) portions of Unit 20B, where 1,116 antlerless moose drawing permits are issued to residents only and no nonresident season exists; 2) the Koyukuk Controlled Use Area, where residents have access to unlimited registration permits and 108 drawing permits for bulls, and nonresidents are restricted to 28 drawing permits for bulls with 50-inch antlers or 4 or more brow tines on at least one side; and 3) Unit 21E where residents can harvest any bull under general season and nonresidents are restricted to 50 drawing permits for bulls with 50-inch antlers or 4 or more brow tines on at least one side.
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PROPOSAL 135

EFFECT OF THE PROPOSAL: Allocate all drawing hunts statewide between residents and nonresidents such that a minimum of 90% of the permits go to residents.

DEPARTMENT RECOMMENDATION: **Take No Action**

RATIONALE: See analysis and recommendation for proposal 134.

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PROPOSAL 136

EFFECT OF THE PROPOSAL: Adopt earlier seasons for residents to hunt Dall sheep in Region III; residents, August 3–September 20 and nonresidents, August 10–September 20.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: This is an allocation issue between resident and nonresident. Providing a longer resident season is used to separate resident and nonresident hunters in some Region III hunts, including general moose seasons in 11 hunt areas, as well as to provide for customary and traditional (C&T) uses pursuant to the state subsistence priority law. There are positive C&T findings for sheep in all or portions of Units 19, 23, 24, 25, and 26. This proposal might alleviate some conflicts between users. This proposal would also provide for more opportunity for Alaska residents than nonresidents in cases where there is a positive C&T use finding and residents and nonresidents presently have the same seasons and bag limits.

The proponent states that the availability of legal rams has been significantly reduced and is in serious decline. Harvest statistics and sheep survey data indicate that some populations are stable to increasing while others may be stable to declining. Harvest data suggest that 60–80% of legal rams are harvested each year throughout Region III.

Adopting this proposal is not likely to adversely affect sheep populations in the short-term, even if general season harvest increases due to the earlier resident season opening. However, in areas that are heavily harvested, providing resident hunters an opportunity to hunt before nonresidents may reduce the number of legal rams available to nonresidents, reduce the ability of nonresidents to select a big ram to harvest, or increase the effort required by nonresidents to harvest a ram, but the extent that this might occur is unknown. In some cases, such as Unit 19 where the Board made a positive C&T use determination for sheep (March 2010), and where resident and nonresidents seasons and bag limits are identical, amendment of this proposal may serve to provide a priority for subsistence uses of sheep by Alaska residents.

The full-curl restriction should prevent over-harvest from affecting sheep populations in most areas, but there still may be a perceived scarcity of legal rams in areas that are heavily hunted. Lower harvests and success rates since the early 1990s compared to when these parameters peaked in the late 1980s suggest that competition among hunters for legal rams has increased. Region-wide, sheep harvest peaked during the late 1980s, declined through late 1990s, and has increased since 2000. This pattern is most evident in the eastern Brooks Range and Unit 20A, which account for much of the total harvest for Region III. Harvest in some areas has either remained stable since the initial population decline (Unit 19C) or continued to decline (Unit 12).

Region III sheep hunters are predominantly residents and residents take a majority of the rams harvested. During 1981–2010, 75% of all (general season and drawing permit) sheep hunters were residents who took 59% of the harvest. The number of nonresident hunters increased slowly throughout 1981–1996. However, the number of resident hunters increased dramatically during the 1980s and declined sharply during the early 1990s. The proportional take by residents declined and stabilized at 54% of the overall harvest (drawing and general season) during 1997–2010 (range = 52–56%), accompanied by a slight decline in the proportion of resident sheep hunters.

These patterns are similar when looking at general season data only. While nonresident hunter numbers changed slightly in response to availability of legal rams, resident hunter numbers appeared to respond more dramatically. The number of resident general season hunters increased 66% from 724 residents in 1981 to 1,202 in 1991, declined 46% to 650 residents by 1997, and rose 43% to 929 residents by 2010. At the same time, the number of nonresident general season hunters increased 56% from 212 nonresidents in 1981 to 394 in 1991, declined 19% to 319 by1997 and increased 4% to 333 nonresidents by 2010.

Fewer residents hunted sheep when harvests declined in the early 1990s, whereas nonresidents changed their behavior very little. During 1981–2010, 73% of general season sheep hunters were residents who took 55% of the harvest. Residents took 60% of all rams harvested during 1981–1996 and 49% during 1997–2010. However, resident harvest may currently be trending higher due to increasing numbers of resident hunters and relatively static nonresident hunter numbers, as residents took 53% of the general season harvest during 2008–2010.

In drawing hunts, competition among hunters is controlled by the number of permits available. During 2004–2010, resident hunters obtained 91% of 1,757 drawing permits issued in Region III and took 87% of the harvest. Seventy-seven percent of resident permittees hunted, killing 526 rams (43% success). Eighty-nine percent of nonresident permittees hunted, killing 82 rams (57% success). In the Tok Management Area, nonresidents are limited to 10% of available permits. In the Delta Controlled Use Area and Mount Harper hunts, about 9% of applicants are nonresidents who receive an average of about 9% of permits available.
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PROPOSAL 137

EFFECT OF THE PROPOSAL: Convert all nonresident general season Dall sheep hunts in Region III to drawing permit, require guide–client agreements and limit harvest to 15–20% of allowable harvest.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: This is an allocation issue that should be decided by the board. Board policy (2007-173-BOG) indicates that allocations will be made on a case by case basis, based upon the historical data of nonresident and resident permit allocation over the past 10 years.

The Department has no biological concerns. This proposal is not likely to affect sheep populations, since the current full curl ram bag limit adequately guards against overharvest, at least in most cases. In heavily harvested areas, limiting nonresidents may increase the number of legal rams available to residents, but the extent to which this might occur is unknown. In areas hunted primarily by residents, this proposal may not provide any benefit to resident sheep hunters.

If the board decides to adopt this proposal, we request that nonresident harvest be limited to a specific number of permits in each unit, or 15–20% of the estimated total harvest in each unit, rather than 15–20% of the allowable harvest. Sheep surveys cannot be conducted in each unit at the intensity and regularity needed to estimate the number of full curl rams available each year. The current full curl ram bag limit should continue to prevent excessive harvest.

Lower success rates compared with the 1980s and higher hunter numbers compared with the late 1990s suggest that competition among hunters for legal rams has increased. Region-wide, sheep harvest peaked during the late 1980s, declined through the late 1990s, and has been increasing since 2000. This pattern is most evident in the eastern Brooks Range and Unit 20A, which account for much of the total harvest for Region III. Harvest in some areas has either remained stable since the initial population decline (Unit 19C) or continued to decline (Unit 12).

During 2001–2010, 70% of general season sheep hunters were residents who took 50% of the harvest (average = 29% success). Nonresident success throughout the region is generally greater than 60%.

General season hunter statistics during fall 2001–2010 sheep hunts in selected units:

	Average annual hunter numbers	Percent resident hunters	Average annual harvest	Percent harvested by residents	Resident success rate	Non-resident success rate
All of Region III	1,153	70%	470	50%	29%	69%
Unit 12	295	75%	122	54%	30%	75%
Unit 19C	124	50%	62	32%	32%	68%
Unit 20A	198	66%	78	37%	22%	73%
Unit 25A	114	55%	63	45%	46%	68%

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PROPOSAL 138

EFFECT OF THE PROPOSAL: Convert all resident and nonresident general season Dall sheep hunts in Region III to drawing permit and limit nonresidents to 10% of permits.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: This is an allocation issue that should be decided by the board, and therefore, the Department has no recommendation. Board policy (2007-173-BOG) indicates that allocations will be made on a case by case basis, based upon the historical data of nonresident and resident permit allocation over the past 10 years. In addition, drawing permits for resident hunters would not provide reasonable opportunity for subsistence uses outside of nonsubsistence areas. There are positive customary and traditional (C&T) use findings for sheep in all or portions of Units 19, 23, 24, 25, and 26.

The Department has no biological concerns. This proposal is not likely to affect sheep populations, since the current bag limit of full curl rams adequately guards against overharvest. In heavily harvested areas, limiting the total number of permits available and limiting nonresidents to 10% of permits may increase the number of legal rams available to residents and/or increase the average age and horn size of harvested rams, but the extent to which this might occur is unknown. In areas hunted primarily by residents and areas with low hunting pressure, this proposal may not provide significant improvement in the resident hunting experience.

During fall 2001–2010 in Region III, residents made up 70% of general season sheep hunters, and harvested 50% of rams taken. Hunting pressure and resident: nonresident ratios varied by area. Resident hunter success was generally greater than 25% but less than 50%, while nonresident hunter success was about 65–75%.

Average age of rams harvested during the general season hunt in Region III varied slightly since full-curl regulations were put in place in the fall of 1994. During fall 2001–2010, average ram age was 9.0 years. During this 10-year period, residents' rams averaged 8.9 years old, while nonresidents' rams averaged 9.0 years old. Average ram age peaked at 9.5 years-of-age in 1997 when hunter numbers were low. As hunter numbers increased, average age declined to 8.7 in 2005 (when horn sealing began to be required), rose to 9.2 by 2007, and declined again to 8.7 by 2010 as hunter numbers continued to rise. Average ram age also varied among game management units.
****

PROPOSAL 139

EFFECT OF THE PROPOSAL: Convert all nonresident general season Dall sheep hunts in Region III to drawing permit and limit to 5%.

DEPARTMENT RECOMMENDATION: **Take No Action**

RATIONALE: See analyses and recommendations for proposals 134, 136, 137, and 138.
****

PROPOSAL 140

EFFECT OF THE PROPOSAL: Reauthorize Region III resident hunter grizzly tag fee exemptions.

DEPARTMENT RECOMMENDATION: **Adopt**

RATIONALE: Department proposal, see issue statement
****

PROPOSAL 141

EFFECT OF THE PROPOSAL: Implement black bear trapping regulations.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: This proposal was amended by the Board and deferred to the March 2012 meeting from the March 2010 meeting. The Department considers this a methods and means allocation among users and as such has no recommendation to the Board. In the units included in this proposal for potentially allowing black bear trapping, the Department does not have any conservation concerns for the populations of black bears. To establish seasons and bag for trapping black bears, the Department has reviewed other regulations that may need to be modified and suggested regulatory changes are included below.

If adopted, the Department recommends establishing black bear trapping seasons for residents only. Including nonresidents under trapping seasons adds a degree of complexity and potential complications due to statutory requirements for guides and tags. Currently, nonresidents must purchase a big game tag for each animal they intend to take. If a nonresident purchases a trapping license, the black bear would not be a big game animal, and tags would not be required. In addition, no guiding requirements would apply. These considerations become even more complicated because of incidental take of brown bears during black bear trapping.

The Department also recommends limiting black bear trapping seasons to Units 19A, 19D, 20C, 20E and a portion of Unit 12. We recommend deleting the proposed trapping season in Unit 25D because communications with the local fish and game advisory committee indicate lack of support. Additionally because black bear trapping is already authorized in Unit 16B under the Unit 16 predator control program, the department recommends deferring the Unit 16B portion of this regulation to the next Region IV Board of Game meeting in 2013. This deferral will allow the board to simultaneously consider black bear trapping in Unit 16B along with a proposal to update the Unit 16 predator control program regulations and does not prevent the public from snaring in black bears in the Unit in the interim.

See proposal issue statement for more information.

Seasons and Bag Limits

5 AAC 84.270. Furbearer trapping. Trapping seasons and bag limits for furbearers are as follows:

Units and Bag Limits	**Open Season**	**Bag limit**
(XX) Black Bear		
RESIDENTS ONLY		

Unit 12, that portion north of the Alaska Highway, and that portion south of the Alaska Highway within the Tanana River drainage up-stream from but not including the Tok River drainage	**Apr. 15–June 30** **July 1–Oct. 15**	**No bag limit, by registration permit only; may be closed by emergency order when XX brown bears incidentally taken.**
RESIDENTS ONLY		
Unit 16(B)	**Apr. 15–June 30** **July 1–Oct. 15**	**No bag limit, by registration permit only; may be closed by emergency order when XX brown bears incidentally taken.**
RESIDENTS ONLY		
Unit 19(A)	**Apr. 15–June 30** **July 1–Oct. 15**	**No bag limit, by registration only; may be closed by emergency order when XX brown bears incidentally taken.**
RESIDENTS ONLY		
Unit 19(D)	**Apr. 15–June 30** **July 1–Oct. 15**	**No bag limit, by registration only; may be closed by emergency order when XX brown bears incidentally taken.**
RESIDENTS ONLY		

Unit 20(C)	**Apr. 15–June 30** **July 1–Oct. 15**	**No bag limit, by registration permit only; may be closed by emergency order when XX brown bears incidentally taken.**
RESIDENTS ONLY		
Unit 20(E)	**Apr. 15–June 30** **July 1–Oct. 15**	**No bag limit, by registration only; may be closed by emergency order when XX brown bears incidentally taken.**

Statewide Regulations

5 AAC 92.0XX Black bear trapping requirements. Establish a new regulation for black bear trapping requirements.

(a) A person may not trap a black bear with the methods in 5 AAC 92.095, without first obtaining a trapping license and registering with the department.

(b) In addition to any condition that the department may require under 5 AAC 92.051 black bear trapping is subject to the following provisions:

(1) a person must be at least 16 years of age to trap black bears;

(2) a person using bait or scent lures shall clearly identify each site with a sign reading "black bear bait and bucket footsnare station" that also displays the person's trapping license number, or mark each bucket footsnare with the trapping license number;

(3) only biodegradable materials may be used as bait; if fish or game is used as bait, only the head, bones, viscera, or skin of legally harvested fish and game may be used;

(4) a person who uses bait or scent lures must remove bait, litter, and equipment from the site when baiting is completed;

(5) except in Units 12, 13, 15, 16, 19, 20, 21, a person may not give or receive remuneration for the use of a black bear bait and bucket footsnare station, including

barter or exchange of goods; however, this paragraph does not apply to a licensed guide-outfitter who personally accompanies a client at the black bear bait and bucket footsnare station site;

(6) a person must report to the nearest department office, within five days, the incidental take of any brown bears taken by bucket footsnare or take of any brown/grizzly bear accompanying a brown bear taken by bucket footsnare;

(7) a person who sets bucket footsnares must check their bucket footsnares a minimum of every two days;

A regulation allowing discretionary conditions to be applied to trapping permits has been in place for years. The division is recommending additional conditions to allow collection of biological samples without requiring sealing in some areas, and require minimum distance requirements in some areas.

5 AAC 92.051. Discretionary trapping permit conditions and procedures.

In areas designated by the board, the department may apply any or all of the following conditions to a registration trapping permit:

(1) a permittee shall demonstrate

(A) the ability to identify the permit area;

(B) a knowledge of trap use and safety;

(2) a permittee shall attend an orientation course;

(3) only a specified number of permittees may trap during the same time period;

(4) a permittee may trap only in a specified subdivision within the permitted area;

(5) a permittee may only use traps or snares of a specified type or size;

(6) a permittee may only set a trap or snare and bait as specified by the department;

(7) before receiving a permit, the permittee shall acknowledge in writing that he or she has read, understands, and will abide by, the conditions specified for the permit area;

(8) a permittee may trap only during the specified time periods;

(9) a permittee must check his or her traps within a specified interval;

(10) a permit applicant must be at least **16** [10] years old;

(11) a permit applicant less than **<u>16</u>** [14] years old must be accompanied by an adult, **<u>16 years of age or older</u>**, with a valid trapping license;

(12) a permittee shall submit, on a form supplied by the department, information requested by the department about the permittee’s trapping activities under the permit; the permittee shall submit this form to the department within the time limit set by the department;

(13) a permittee shall label the permittee's traps and snares as specified by the department.

<u>(14) a permittee who takes an animal under a permit shall deliver specified biological specimens to a check station or to the nearest department office within a time set by the department;</u>

<u>(15) a permittee may not possess or transport an animal unless sufficient portions of the external sex organs remain attached to either the hide or meat to indicate conclusively the sex of the animal, this does not apply to the meat of an animal that has been cut and placed in storage or otherwise prepared for consumption upon arrival at the location where it is to be consumed.</u>

<u>(16) a person may not use bait, scent lures, or set a bucket foot snare within</u>

<u>(A) one-quarter mile of a publicly maintained road, trail, or the Alaska Railroad;</u>

<u>(B) one mile of a house or other permanent dwelling, businesses or schools; or</u>

<u>(C) one mile of a developed campground or developed recreational facility;</u>

Trappers will likely need to use artificial light because they do arrive at sets after dark, particularly in September. This could become a safety issue. Use of lights could be restricted to within a certain distance of the set.

5 AAC 92.080. Unlawful methods of taking game; exceptions. The following methods of taking game are prohibited:

(7) with the aid of a pit, fire, artificial light, laser sight, electronically enhanced night vision scope, radio communication, cellular or satellite telephone, artificial salt lick, explosive, expanding gas arrow, bomb, smoke, chemical (excluding scent lures), or a conventional steel trap with an inside jaw spread over nine inches, except that

(A) a rangefinder may be used;
(B) a killer style trap with a jaw spread of less than 13 inches may be used;
(C) artificial light may be used

(i) for the purpose of taking furbearers under a trapping license during an open season from November 1 – March 31 in Units 7 and 9 – 26; **or black bears under a trapping license during an open trapping season;**

The Department recommends the following modifications to trapping methods to

1) allow same-day-airborne take of black bears during a trapping season, in order to provide flexibility to dispatch other bears in the group that may not be in the snare, and
2) prohibit trapping black bears by any means other than centerfire rifles and foot snares of a specific design.

5 AAC 92.095. Unlawful methods of taking furbearers; exceptions.

(a) The following methods and means of taking furbearers under a trapping license are prohibited, in addition to the prohibitions in 5 AAC 92.080:

…

(8) a person who has been airborne may not use a firearm to take or assist in taking a wolf or wolverine until after 3:00 am on the day following the day in which the flying occurred; or in taking a coyote, arctic fox, red fox, [OR] lynx, **or black bear,** unless that person is over 300 feet from the airplane at the time of taking; this paragraph does not apply to a trapper using a firearm to dispatch an animal caught in a trap or snare;

...

(20) taking black bears by any means other than centerfire firearm or a bucket foot snare

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When the Board originally allowed the sale of bear hides and skulls, the regulations adopted required that all bears intended for sale had to be sealed. This would require sealing of bears taken as a furbearer. This requirement is included for review purposes.

5 AAC 92.165. Sealing of bear skins and skulls. (a) Sealing is required for brown bear taken in any unit in the state and black bear of any color variation taken in Units 1 - 7, 14(A), 14(C), 15 - 17 and 20(B), and a bear skin or skull before the skin or hide is sold

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Currently, meat of a big game animal, including black bear, cannot be sold. This prohibition would not apply to black bear as a furbearer taken under trapping seasons. For consistency, we recommend that no sale of black bear meat be allowed under either hunting or trapping.

5 AAC 92.200 Purchase and sale of game.

(a) In accordance with AS 16.05.920 (a) and 16.05.930(e), the purchase, or sale of game or any part of game is permitted except as provided in this section.

(b) Except as provided in 5 AAC 92.031, a person may not purchase, sell, advertise, or otherwise offer for sale or barter:

…

(8) the meat of big game, **black bear,** and small game,

Require the salvage of either the hide or the meat of a black bear taken by trapping.

5 AAC 92.220. Salvage of game meat, furs, and hides. (a) Subject to additional requirements in 5 AAC 84 - 5 AAC 85, a person taking game shall salvage the following parts for human use:

(3) **except as provided in (6) of this section,** from January 1 through May 31, the hide, skull, and edible meat as defined in 5 AAC 92.990, and from June 1 through December 31, the hide and skull of a black bear taken in a game management unit in which sealing is required; from June 1 - December 31, the skull and either the hide or edible meat of a black bear taken in Unit 20(B),

(4) **except as provided in (6) of this section,** from January 1 through May 31, the edible meat, and from June 1 through December 31, either the hide, or the edible meat as defined in 5 AAC 92.990, of a black bear taken in any game management unit in which sealing is not required; however, from June 1 through December 31, the edible meat of a black bear taken by a resident hunter taking black bear under customary and traditional use activities at a den site from October 15 through April 30 in Unit 19(A), that portion of the Kuskokwim River drainage within Unit 19(D) upstream from the Selatna River drainage and the Black River drainage, and in Units 21(B), 21(C), 21(D), 24, and 25(D) must be salvaged.

…

(6) either the hide, or the edible meat as defined in 5 AAC 92.990, of a black bear taken under a trapping license;

Since trapping methods cannot totally exclude non-target animals, the prohibition on taking sows with cubs, and cubs must be modified to allow trapping of any bear.

5 AAC 92.260. Taking cub bears and female bears with cubs prohibited. A person may not take a cub bear or a female bear accompanied by a cub bear, except that a black bear cub or a female black bear accompanied by a cub bear may be taken by **a black bear trapper during an open trapping season, or** by a resident hunter from October 15 through April 30 under customary and traditional use activities at a den site in Unit 19(A), that portion of the Kuskokwim River drainage within Unit 19(D) upstream from the Selatna River drainage and the Black River drainage, and in Units 21(B), 21(C), 21(D), 24, and 25(D).

Because trapping methods are restricted to the use of bucket footsnares, a definition of a legal bucket footsnare must be adopted.

92.990 Definitions:
() "bucket footsnare" means a cable at least 3/16-inch in diameter with a 7x7 strand, equipped with a locking device and at least one swivel, set in a manner designed to catch a bear by the foot; footsnares may only be set when accompanied by a spring powered device that propels the footsnare closed and may only be used inside a bucket or container into which the bear must reach, triggering the spring device and becoming snared by the foot; all footsnares, spring devices, buckets and/or containers must be elevated at least 48 inches off the ground; footsnares must be anchored to a live tree 6 inches in diameter or larger.

The Board will need to establish a customary and traditional use finding and establish an amount necessary for subsistence for black bear as a furbearer before establishing seasons in units where these determinations have not already been made. Current findings for black bear as a big game animal in the proposed areas are shown for reference.

5 AAC 99.025. Customary and traditional uses of game populations.
The Board of Game has examined whether the game populations in the units set out in the following table, excluding those units or portions of those units within nonsubsistence areas established by the Joint Board of Fisheries and Game (5 AAC 99.015), are customarily and traditionally taken or used for subsistence and make the following findings:

SPECIES & UNIT	FINDING	AMOUNT REASONABLY NECESSARY FOR SUBSISTENCE USES
(2) Black Bear		
…		
Unit 12	positive	40 - 60
…		
Unit 16(B)	positive	15 - 40

…

Unit 19	positive	30 - 50
Unit 20, outside the Fairbanks non-subsistence area	positive	20 - 30

…

Unit 25	positive	150 – 250

(13) **Furbearers and Fur animals.** The Board of Game (board) finds that all resident uses of furbearers and fur animals are customary and traditional uses, and that furbearers and fur animals, in general, tend to be the focus of these uses, rather than users focusing on individual species or populations. Given this finding, the board also finds that effort on any given population varies according to its harvestable surplus.

(A) Beaver all units with a harvestable portion	positive	harvestable portion

…

() Black Bear
all units with a
harvestable portion

…

(b) In order to establish an amount reasonably necessary for subsistence uses under this section and whether a reasonable opportunity for subsistence uses exists, the Board of Game will, as the board determines is appropriate, attempt to integrate opportunities offered under both state and federal regulations.

(c) In this section,

(1) "amount reasonably necessary for subsistence uses" includes the total amount of animals from a population that must be available for subsistence hunting in order to provide a reasonable opportunity for subsistence uses, under state and federal subsistence hunting regulations, where both exist;

(2) "reasonable opportunity" has the meaning given in AS 16.05.258(f).

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PROPOSAL 142

EFFECT OF THE PROPOSAL: Prohibit trapping of black bear in the Interior region.

DEPARTMENT RECOMMENDATION: **Take No Action**

RATIONALE: See proposal 141.
****

PROPOSAL 143

EFFECT OF THE PROPOSAL: Allow the taking of black bear at bait stations the same day you have been airborne in Unit 20.

DEPARTMENT RECOMMENDATION: **Take No Action**

RATIONALE: See analysis and recommendation for proposal 144.
****

PROPOSAL 144

EFFECT OF THE PROPOSAL: Allow for same-day-airborne hunting of black bear over bait in Region III.

DEPARTMENT RECOMMENDATION: **Adopt**

RATIONALE: Allowing same-day-airborne harvest at established bait stations is not likely to increase harvest above sustainable levels. Based on extrapolations from historical black bear research projects, the Department estimated the Region III black bear population in 2006 at 30,000–50,000 bears. Fewer than 400 black bears were sealed in the region in 2006. Although sealing was not required in some areas, harvest was very low in units where sealing was required. A harvest of 400 represents a harvest rate of 0.8–1.3%, well below maximum sustained yield, indicating that additional harvest opportunity is available.

It is currently legal to take black bears over bait on the same day a hunter is airborne in Units 7, 9–11, 13, 14A, 14B, 15–17, and in any predator control area, provided that the hunter is at least 300 feet from the airplane (5 AAC92.044).
****

PROPOSAL 145

EFFECT OF THE PROPOSAL: Develop a Unit specific amount reasonably necessary for subsistence (ANS) finding for wolves in the Interior Region.

DEPARTMENT RECOMMENDATION: **Take No Action**

RATIONALE: The Board reviewed the ANS amounts for furbearers and fur animals on a statewide basis at the January 2012 meeting in Anchorage and determined that an ANS of 90% of the allowable harvest for both furbearers and fur animals statewide was appropriate.
****

PROPOSAL 146

EFFECT OF THE PROPOSAL: Open year-round coyote hunting and trapping seasons in Region III.

DEPARTMENT RECOMMENDATION: **Do Not Adopt**

RATIONALE: This proposal is not likely to significantly increase harvest or affect region-wide coyote or prey densities. The Department recommends not adopting this proposal for coyote trapping because coyote hides are very poor quality during the summer, with no value in the fur industry and little or no value for personal garment use, and because summer trapping for predators, such as coyotes, could create incidental take issues with other predators, scavengers, and pets.

The department recognizes that this issue as it applies to hunting regulations has not undergone vigorous public debate, and that other issues may be raised during the Board process.

The current coyote hunting season in Region III is August 10–May 25 for Interior units and August 10–April 30 for North Slope units. The current coyote trapping seasons vary by unit with the opening date being October 15 or November 1 and closing dates vary from March 31 to April 30. The hide of a coyote must be salvaged after take under either hunting or trapping licenses.

There is no sealing requirement for coyotes, but based on extrapolation from Trapper Questionnaires, coyote harvest in Region III is around 200–400 per year. Estimated coyote density during a research project in the foothills of the Alaska Range (southern Unit 20A) was around 0.1 coyotes per square mile in a study area of approximately 350 square miles. Coyote densities in the region vary widely, but if that density was extrapolated to one quarter of Region III, we would have around 6,000 coyotes. Thus, it is likely that a very small portion of the coyote population is currently being harvested through trapping and hunting. Year-round hunting and trapping seasons are not likely to significantly increase harvest or affect coyote or prey densities. Year-round hunting and/or trapping seasons currently occur for squirrel, marmot, and hare.
****

PROPOSAL 147

EFFECT OF THE PROPOSAL: Allow the use of helicopters for access to trapping in Region III.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: This is an allocation issue that should be determined by the Board. Both trapping and shooting of furbearers is legal under a trapping license. Use of helicopters would expand the areas that trappers could access to set snares or traps, thereby providing for more use of the furbearer resources and might reduce conflicts between trappers in the more commonly accessed areas, such as along road and trail systems. However, conflicts could increase if helicopters are used in heavily trapped areas. Current regulations prohibit using a helicopter to transport furbearers (5 AAC 92.080). Regulation 5 AAC92.095 makes some exceptions to prohibitions in 5 AAC 92.080, but restricts shooting of furbearers under a trapping license if they are caught in a trap or snare while using a helicopter (aircraft) for transportation. These restrictions include 1) a person may not shoot free-ranging wolves and wolverines under a trapping license on the same day the trapper is airborne, 2) a trapper must be 300 feet or more from an aircraft to shoot fox, coyote, and lynx on the same day the trapper is airborne, 3) motorized vehicles may not be used to herd or molest furbearers, and 4) trappers must be out of any motorized vehicle before shooting at furbearers (with some exceptions for non-aircraft).

If the board chooses to adopt this proposal, it should be recognized that wolves and wolverines are both big game and furbearers and the regulation would only apply to these species as furbearers.
****

PROPOSAL 148

EFFECT OF THE PROPOSAL: Close certain nonresident trapping seasons in the Interior Region.

DEPARTMENT RECOMMENDATION: **Take No Action**

RATIONALE: See proposal 14 that was considered by the Board at their January 2012 statewide meeting.
****

PROPOSAL 149

EFFECT OF THE PROPOSAL: Extend the season for fox, marten, mink, and weasel in Units 12, 20, and 25C to March 15.

DEPARTMENT RECOMMENDATION: **Do Not Adopt**

RATIONALE: This proposal uses incidental take during the extended lynx season as justification for extending the season for fox, marten, mink, and weasel. Trappers who incidentally catch other furbearers in lynx sets must forfeit those animals to the state. A survey of area biologists in Units 12, 20, and 25C showed that, of all the species listed in this proposal, trappers turned in an average of fewer than 2 incidentally-harvested animals per year taken during the late lynx season. Compared to the overall harvest of thousands of furbearers in this area, the forfeit of so few incidentally caught furbearers does not justify an open trapping season for fox, marten, mink, and weasel after February.

A 4-month season exists for fox, marten, mink, and weasel in this area, which represents a significant opportunity for harvest. The fox season in Units 12 and 20E is already open until March 15. These long seasons are based on timing of fur quality, alignment with other seasons, and conservation. Harvestable surplus is lowest at the end of the season. Marten are susceptible to overharvest, especially near urban centers. Units 20A, 20B, 20C, 20D, and 25C get the most trapping pressure of any units in Region III due to their proximity to the largest human population centers in the region (Fairbanks, North Pole, Eielson, Fort Wainwright, Delta Junction, and Nenana). Late season fox in these units are often of no value due to rubbing and other fur damage.

The lynx season in Units 12, 20, and 25C was recently changed to end in March (in 2006 for Units 12 and 20E, and in 2010 for all of Units 12, 20, and 25C). Previously, the lynx season ended in February, along with fox, martin, mink, and weasel seasons. An alternative would be to return the lynx season ending date to the end of February in Units 12, 20, and 25C.

Beaver, coyote, lynx, muskrat, otter, squirrel, marmot, wolf, and wolverine seasons in Units 12, 20, and 25C are open through March 15 or later. Beaver, otter, muskrat, wolf, coyote, and some wolverine and lynx have fur quality that lasts beyond February. Ground squirrels and marmots hibernate in winter, so harvest opportunity is provided through open seasons during summer.
****

PROPOSAL 150

EFFECT OF THE PROPOSAL: Close certain nonresident furbearer hunting seasons in the Interior Region.

DEPARTMENT RECOMMENDATION: **Take No Action**

RATIONALE: See proposal 19 that was considered by the Board at their January 2012 statewide meeting
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PROPOSAL 151 - 5 AAC. 92.540. Controlled use areas.

EFFECT OF THE PROPOSAL: Repeal controlled use areas that no longer meet the management intent.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: This is an allocation issue that should be determined by the Board, and therefore, the department has no recommendation. This proposal reviews conditions of controlled use areas (CUAs) in Region III and would repeal those that no longer meet the original intent. The table below lists controlled use areas in Region 3, their current status, and likely consequences of repeal. Repeal of some CUAs may affect reasonable opportunity for subsistence. Area overviews presented during the Board meeting will provide more detailed information about each CUA.

Units & Controlled Use Areas	Restriction	Original Intent	Most Recent BOG review	Meets Objec-tives	Consequences of Repealing the CUA
Unit 19D, **Upper Kuskok-wim**	No aircraft for moose hunting, except between publicly owned airports	reduce competition for moose by hunters using aircraft along major river corridors	2008	Yes	Competition between hunters using boats & and hunters using aircraft
Units 19A, 19B: **Holitna–Hoholitna**	No boats in excess of 40 hp for big game hunting Aug. 1–Nov. 1	Reduce hunting pressure along these rivers	2008	Yes	Increased competition & crowding, complicate reopening the moose season
Unit 20A: **Wood River**	No motorized vehicles for big game hunting Aug. 1–Sep. 30, except aircraft	Address conflicts between ATV and airplane/horse hunters	2010	Yes	User conflicts & fish habitat degradation will increase; hunt quality will decline.
Unit 20A: **Yanert**	No motorized vehicles except aircraft for big game	Address conflicts between ATV users and airplane and horse users	2011	Yes	User conflicts & fish habitat degradation will increase; hunt quality will decline for airplane and horse users.
Units 13, 20A, 20D: **Delta**	No motorized vehicles or pack animals for big game hunting Aug. 5–Aug. 25, except Richardson Hwy & Charlie Boyd airstrip.	Provide uncrowded hunt conditions with reasonable likelihood of selecting a trophy ram, reduce conflicts between walk-in, hunters and hunters using other transport.	Mar 2004	Yes	Loss of walk-in only sheep hunt. Conflicts between walk-in and hunters using other transport for sheep, moose, & caribou.

Units & Controlled Use Areas	Restriction	Original Intent	Most Recent BOG review	Meets Objec-tives	Consequences of Repealing the CUA
Unit 20D: **Macomb Plateau**	No motorized vehicles for big game hunting Aug. 10–Sept. 30, except floatplanes on Fish Lake and vehicles and aircraft on Dry Creek Airstrip	Protect critical caribou habitat on the Macomb Plateau for the Macomb caribou herd and to regulate hunting.	Mar 2004	Yes	Disturbance to core rutting & calving habitat for Macomb caribou herd. Reduce hunt opportunity for this herd.
Unit 20E: **Glacier Mountain**	No motorized vehicles for big game hunting Aug. 5–Sep. 20, except aircraft and vehicles on the Taylor Hwy.	Conserve Dall sheep population on Glacier Mountain. Now also provides opportunity for walk-in Fortymile caribou hunting.	Mar 2004	Yes	Possible sheep draw permits. Lose walk-in opportunity for Fortymile caribou.
Unit 20E: **Ladue River**	No motorized vehicles except aircraft for big game hunting Aug. 24–Sep. 20, except on the Taylor Hwy, 9-mile & liberty creek trails, AK–Canada border, and Boundary road.	Conserve the moose population, especially along 9-mile trail. After bull: cow ratios improved, a late-season draw hunt was added for more opportunity.	2010	Yes	Low bull:cow ratios & moose numbers, and/or restrict moose hunting in portions of the LRCUA.
Units 21 & 24: **Koyukuk** (Also see proposal 162)	No aircraft for hunting moose, except between publicly owned airports; all hunters required to stop at check stations; moose meat of 4 quarters & ribs remain on bone.	Address needs to conserve the moose population in face of inadequate population & harvest data and to address conflicts between local/nonlocal and airplane/boat hunters.	2010	Yes	Conflicts between local/nonlocal and airplane/boat hunters

Units & Controlled Use Areas	Restriction	Original Intent	Most Recent BOG review	Meets Objec-tives	Consequences of Repealing the CUA
Unit 24: **Kanuti** (Also see proposal 164)	No aircraft for hunting moose, except between public airports	Address needs to conserve the moose population in face of inadequate population & harvest data and to address conflicts between local/nonlocal and airplane/boat hunters.	2010	Yes	Little to no effect due to federal closed area over-lapping most of CUA.
Units 21A, 21D, 21E: **Paradise**	No aircraft for hunting moose, except between public airports	Address conflicts between local/ nonlocal and airplane/boat hunters.	2004	Yes	renewed competition between airplane/ boat hunters

****

<u>PROPOSAL 152</u>

EFFECT OF THE PROPOSAL: Open early-season hunts for youth hunters 10–17 years old for all big game species in Region III and require accompanying adult to forfeit their bag limit.

DEPARTMENT RECOMMENDATION: **<u>No Recommendation</u>**

RATIONALE: This is an allocation issue that should be decided by the Board, and therefore, the department has no recommendation. Currently, hunters at least 10 years old can obtain their own harvest tickets and permits. Hunters 17 and younger may also hunt under the direct and immediate supervision of an adult permit or harvest ticket holder who is responsible for ensuring all legal requirements are met.

General season hunting opportunities before school starts are already in place for Dall sheep and caribou throughout Region 3, and black bear seasons are open year-round. Grizzly bear seasons in much of the region begin August 10 or earlier. Additionally, there are no hunter age restrictions for hunting small game, some of which have year-round opportunities.

Where moose populations are high in much of Unit 20, there are numerous opportunities for youth hunting. Unit 20 has numerous early-season moose drawing permit hunts, a long general season, and registration permit hunts. These hunts provide opportunities before school in August, during long weekends, and in some years, during Thanksgiving and winter holidays. Conversely, in areas such as Units 19 and 24, which have lower moose populations, hunting seasons are

short, and generally begin September 1 or later. Opening early-season youth-only hunts for moose in these areas may require shortening of September seasons, or otherwise restricting other hunters. Consideration of youth-only hunts in these areas, and especially in western Unit 19A and western Unit 25D Tier II hunt areas could require determining whether allowing youth to hunt before other Tier II permit holders would affect subsistence hunting opportunity for other Alaskans. There are positive C&T use findings for several species in several units in Region III.
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PROPOSAL 153

EFFECT OF THE PROPOSAL: Make all registration permits available from vendors in the hunt area during the hunt instead of from selected vendors during a time period well before the hunt starts.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: Four game management units are referenced in this proposal. Changes in permit availability for hunts in Units 18 and 23 were considered by the Board during their November 2011 meeting and statewide during the January Board meeting in Anchorage, and were not adopted. The Unit 19D moose hunt, RM650, will be considered by the Board at their March 2012 meeting.

This is an allocation issue in Unit 19D that should be decided by the Board, and therefore, the Department has no recommendation.

The Department has used discretionary authority in 5 AAC 92.052 with direction and approval from the Board to determine the time and place permits are issued for this hunt. The current method of distributing permits in Unit 19D communities during July14– August 20 has allowed the department to issue approximately 300 permittees resulting in the harvest of up to 128 bulls per year, mostly close to communities along river corridors of the Upper Kuskokwim Controlled Use Area (UKCUA). During the 2009–2011 fall hunts, an average of 109 bull moose was taken by an average of 299 hunters. Although this permit can be used throughout Unit 19D, most permit holders hunt within the 1,118 mi^2 Upper Kuskokwim Villages Moose Management Area, which includes McGrath. This resulted in a harvest rate of up to 8% of the moose population.

In addition to the RM650 permit, which applies to all of Unit 19D, a harvest ticket may be used to harvest moose in the 94% of Unit 19D that is outside of the UKCUA. This provides opportunity for boat-based hunters along river corridors outside the UKCUA and for airplane hunters who access gravel bars and small lakes outside the UKCUA. During fall harvest ticket hunts in 2009–2011, an average of 329 hunters took an average of 151 antlered bulls in Unit 19D outside the UKCUA.

Issuing permits only in Unit 19D prior to the start of the hunt has resulted in limited participation, facilitating harvest management and recovery of the moose population. If the Board chooses to adopt this proposal, additional participation is likely to occur and may require additional management actions, such as closure by emergency order or Tier II management.

Also, the Board may wish to evaluate impacts on reasonable opportunity and amounts necessary for subsistence as there is a positive customary and traditional (C&T) use finding for moose in Unit 19.
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PROPOSAL 154

EFFECT OF THE PROPOSAL: Reauthorize antlerless moose hunting seasons in Unit 19D.

DEPARTMENT RECOMMENDATION: **Adopt**

RATIONALE: Department proposal. See issue statement.
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PROPOSAL 155

EFFECT OF THE PROPOSAL: Close resident and nonresident caribou seasons in Units 19, 21A, and 21E.

DEPARTMENT RECOMMENDATION: **Do Not Adopt**

RATIONALE: This proposal would close all resident and nonresident caribou seasons in Units 19, 21A, and 21E; specifically for the small Beaver, Big River–Farewell, and Sunshine herds, but it would also affect the Mulchatna and Tonzona herds that have part of their ranges in the units proposed for closure. There are positive customary and traditional (C&T) use findings for the Beaver Mountains, Big River, and Sunshine Mountains caribou herds.

The 3 small herds proposed for total closure are hunted with conservative bulls-only bag limits and have low annual harvests. During regulatory years 2006–2007 through 2010–2011, harvest was 5–13 caribou from the Big River–Farewell Herd and 0–1 from the Big River and Sunshine herds. Harvestable surplus is 30–60 caribou annually. Therefore, it is unlikely that these small, bulls-only harvests have an appreciable impact on these populations or that a season closure is necessary.

In 2011, during minimum count surveys of the Beaver-Sunshine herds we found 434 caribou. The only information available for the Big River–Farewell herd comes from sightings of caribou recorded during sheep surveys, opportunistic sightings, harvest data, and discussions with the public. In 2004–2005, we estimated the Big River–Farewell herd to include as many as 750–1500 caribou. The number of caribou in this herd is probably now smaller than this estimate and may number about 500–750 caribou.

Unit 19 includes the community of Lime Village. Lime Village residents also provide harvested caribou to residents of Nondalton who are unable to harvest the Mulchatna Herd because of poor abundance. Lime Village is one of the most remote communities in Alaska. In 2007 the per capita harvest of caribou was 159 lb. Caribou was the second largest contributor to the harvest of wild resources in the community. The closure of hunting caribou for Lime Village would be a

major reduction of subsistence opportunity. The Board may wish to evaluate whether the current seasons and bag limits provide reasonable opportunity for continued subsistence uses.
****

PROPOSAL 156

EFFECT OF THE PROPOSAL: Close the nonresident caribou hunts in Units 19C and 19D.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: This is an allocation issue that should be decided by the Board. This proposal would close nonresident caribou seasons in Units 19C and 19D. It specifically mentions the Tonzona herd, but includes portions of the ranges of the Big River–Farewell, Beaver, Sunshine, and Mulchatna herds. There are positive customary and traditional (C&T) use findings for these herds.

The small Tonzona herd is hunted with a conservative bulls-only bag limit and has annual harvests of 1 or 2 caribou in each of the last 5 years. Harvestable surplus is likely 15–30 annually. Therefore, it is unlikely that this small, bulls-only harvest has an appreciable impact on the population. However, the amount necessary for subsistence (ANS) is 20–30. The Board may wish to consider a nonresident closure because the upper limit of harvestable surplus is equal to the upper limit of amount necessary for subsistence.

In 2011, during minimum count surveys of the Beaver–Sunshine herds we found 434 caribou. The only information available for the Alaska Range herds (Big River–Farewell and Tonzona herds) are from sightings of caribou recorded during sheep surveys, other opportunistic sightings, harvest data, and from discussions with hunters and other members of the public. In 2004–2005, we estimated the Big River–Farewell herd to include as many as 750–1500 caribou; and the Tonzona herd was estimated at 750–1000. The number of caribou in these herds is probably now smaller than these estimates, as stated in the proposal, and may number about 500–750 in each herd.

The Board may wish to evaluate whether the current seasons and bag limits provide reasonable opportunity for continued subsistence uses.
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PROPOSAL 157

EFFECT OF THE PROPOSAL: Amend the Mulchatna Caribou Herd Predation Management Plan.

DEPARTMENT RECOMMENDATION: **Adopt**

RATIONALE: Department proposal. See issue statement.
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PROPOSAL 158

EFFECT OF THE PROPOSAL: Implement a predator control plan for the range of the Mulchatna Caribou Herd.

DEPARTMENT RECOMMENDATION: **Take No Action**

RATIONALE: See proposal 157.
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PROPOSAL 159

EFFECT OF THE PROPOSAL: Modify the population objective for Mulchatna caribou

DEPARTMENT RECOMMENDATION: **Do Not Adopt**

RATIONALE: An intensive Management population objective of 100,000 to 150,000 for the Mulchatna Caribou Herd was established in 2001 when the estimated herd size was 160,000 to 180,000 caribou. Herd size has declined dramatically since then. Surveys since 2001 suggest the large size attained by this herd (estimated at 200,000 caribou in 1996) likely contributed to conditions leading to reduced productivity and survival. In 2009, the Board changed the population objective to 30,000 to 80,000. The lower population objectives allow harvesting at high rates when the herd is experiencing rapid growth regardless of population size relative to objectives. Harvest can still be managed to accommodate herd growth if desired. This harvest may otherwise be lost if managers fail to harvest from a growing population and the population declines before the population objectives are reached. This strategy allows managers to slow the growth, optimize harvests, and evaluate nutrition and range status to prevent the herd from overshooting range capacity. Harvest objectives set at desired levels will still trigger Intensive Management programs when the harvest is not being met even when the population is above the lower objective.
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PROPOSAL 160

EFFECT OF THE PROPOSAL: Extend the lynx trapping season in Unit 19 from the current season of 1 November–29 February to 1 November–31 March.

DEPARTMENT RECOMMENDATION: **Adopt**

RATIONALE: A longer season is not likely to generate sufficient interest or additional harvest to threaten lynx populations. Average annual lynx harvest in Unit 19 during regulatory years 2006–2007 through 2010–2011 is 77 (range 33–118) lynx per year. Lynx harvest density is low and varies from 0.2 to 3.2 lynx per 1,000 mi^2. Large areas are inaccessible and untrapped and provide sufficient refuge for lynx. In March, lynx are currently caught incidentally in traps set for other furbearers. These lynx are supposed to be surrendered to the Department, but some are

not. If this proposal were adopted, it would simplify enforcement and these lynx could be retained by the trapper.
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PROPOSAL 161

EFFECT OF THE PROPOSAL: Split the moose drawing permit hunt in Unit 21D (DM817) into two drawing permit hunts.

DEPARTMENT RECOMMENDATION: **Do Not Adopt**

RATIONALE: The proponent is concerned that the September 5–25 season for DM817 is too long, causing a problem with meat spoilage because hunters stay in the field too long. Therefore, the proposal is to split the season into September 5–14 and September 16–25.

The Department has no data concerning wanton waste or meat spoilage among the DM817 permit hunters, and the Alaska Wildlife Troopers have not issued any wanton waste citations to DM817 hunters. The hunt area currently requires the salvage of meat-on-the-bone of the 4 quarters and ribs.

Harvest on the DM817 permit is low, with an average of 6.6 moose harvested annually since its inception (see table), therefore the proponents concern of waste could only potentially occur at relatively low levels. Furthermore, of the 36 moose harvested since 2006 on the DM817 permit, 30 (83%) were harvested during September 16–25. Therefore, this proposal appears to concern few moose (average 1.1 moose/year; 17% of 6.6 moose) that could be potentially wasted. Additional administrative costs and workload will be incurred if another permit is required in this area, for what appears to be a relatively low number of moose harvested under the existing permit. The percent of hunters who "did not hunt" may increase if an additional and less flexible hunt regulation is implemented.

DM817 permit hunt, regulatory years 2004–2005 through 2010–2011

Hunt	Regulatory year	Permits issued	Percent did not hunt	Percent unsuccessful hunters	Percent successful hunters	Total bull harvest
DM817	2006–2007	16	25	25	75	9
	2007–2008	31	36	75	25	5
	2008–2009	31	55	50	50	7
	2009–2010	28	57	58	42	5
	2010–2011	31	58	61	39	7
	2010–2011	31	84	40	60	3

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PROPOSAL 162

EFFECT OF THE PROPOSAL: Allow 10% of the Koyukuk CUA moose drawing permit winners to use aircraft; allow guided drawing permit winners to choose either boat or aircraft.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: This is an allocation issue and the Department has no recommendation.

Because access within the Koyukuk Controlled Use Area (KCUA) is restricted to boats, all moose hunters are concentrated on the same navigable waterways during the hunting season. According to a memo from the Division of Game deputy director (May 27, 1981), the KCUA was established specifically to provide protection to local rural hunters' customary and traditional (C&T) uses from undue competition from other hunters using aircraft. There is a positive C&T finding for moose in Units 21 and 24. The board may wish to consider whether this proposal would negatively impact subsistence opportunity within the KCUA.

Some people believe inaccessible areas away from the river corridors function as a refugia and that moose in these areas are not hunted. However, based on studies of radiocollared moose conducted in 1984–1990 in the KCUA, 83% of radiocollared adults and 58% of cow–calf pairs were migratory (Osborne and Spindler 1993). Observations during more recent November moose surveys also indicate many bulls leave the river corridors following rut. Migratory movements by much of the moose population suggest moose mix freely throughout the KUCA and the surrounding game management unit, and occupy any vacant habitats. This is an important consideration for this proposal.

Changes in hunter success due to a different mode of access could be accommodated by adjusting the number of permits issued. Annual harvest is closely managed within sustainable levels by calculating the number of drawing permits awarded each year using annual moose population estimates, previous harvest levels, and hunter participation and success rates.

Additional considerations include: 1) Nonresident drawing permit holders without a guide and resident registration permit hunters were not considered for fly-in hunting opportunity under this proposal. 2) The logistics of handling the check-in/out procedure will be an important consideration for this proposal. Small planes may be required to land several times at a checkpoint to complete the check-out process, increasing traffic at smaller airports.
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PROPOSAL 163

EFFECT OF THE PROPOSAL: Authorizes a predator control program in a small portion of Unit 24B.

DEPARTMENT RECOMMENDATION: **Amend and Adopt**

RATIONALE: This is a Department proposal originally submitted to the Board as a placeholder. The following amendment establishes a predator control plan in Unit 24B and focuses wolf control activities in a 1,360 square mile Upper Koyukuk Moose Management Area.

Hunters in the Upper Koyukuk River drainage have experienced a decreasing moose population and increased difficulty in moose harvest for the last 15 years. The economic impact of increasing hunter effort required to harvest moose has been compounded by increasing fuel prices. Baseline biological data collected in Unit 24B since 1989 confirm the moose population is declining, corroborating concerns of local subsistence hunters. The Department has assessed the moose population decline in Unit 24B and has developed an Intensive Management Program that includes this wolf predation control plan to address the situation.

(X) **Unit 24B Predation Control Area**: the Unit 24(B) Predation Control Area is established and consists of those portions of the Koyukuk River drainage within Unit 24(B), encompassing approximately 13,523 square miles; this predation control program does not apply to any National Park Service or National Wildlife Refuge lands unless approved by the federal agencies; notwithstanding any other provisions in this title, and based on the following information contained in this section, the commissioner or the commissioner's designee may conduct a wolf population reduction or wolf population regulation program in Unit 24(B):

(1) an Upper Koyukuk Management Area (UKMA) is established within the Unit 24(B) Predation Control Area encompassing approximately 1,360 square miles surrounding the villages of Alatna and Allakaket and bounded to the north at 66° 52' N. Lat., to the east at 152° 10' W. Long., to the south at 66° 10' N. Lat., to the west at 153° 45' W. Long.; the UKMA does not delineate a moose or wolf population and is not intended to distinguish animals within the UKMA from populations in Unit 24(B); the purpose of the UKMA is to focus wolf control in an area where moose are accessible to hunters, rather than spread this effort over the entire game management unit; wolf control will be conducted only within the UKMA, and the department will have the discretion to adjust its size and shape up to 20 percent (approximately 2,700 square miles) of Unit 24(B) if necessary;

(2) this is an experimental program that will have limited impact on the moose and wolf populations in Unit 24(B); it is designed primarily to reallocate moose from wolves to humans in the UKMA and is expected to make only a small contribution to the intensive management (IM) moose harvest objective in Unit 24(B); at the end of the authorized period for removal of wolves, the control program will be terminated.

(3) Moose and wolf objectives are as follows:

(A) the moose intensive management (IM) objectives established by the board for Unit 24(B) are for a population of 4,000–4,500 and an annual harvest of 150–250;

(B) the moose harvest objective for the UKMA is for an annual harvest of 35–40 moose by fall 2017;

(C) the wolf population control objective for Unit 24(B) is 100–140; the pre-control wolf population in Unit 24(B) was estimated in fall 2008 at 202–284; a minimum population of 100 wolves is approximately a 50 percent reduction from the pre-control population and will assure that wolves persist as part of the natural ecosystem in Unit 24(B) and assure continued wolf hunting, trapping and viewing opportunities;

(D) the wolf control objective in the UKMA is to reduce wolf numbers to the lowest level possible; in fall 2010, the estimated maximum number of wolves in the UKMA was 25-60;

(4) Board findings concerning populations and human use are as follows:

(A) the Unit 24(B) moose population and harvest objectives have not been achieved;

(i) in early winter 2010 the observable moose population size in Unit 24(B) was estimated at 1,800–3,400 (0.13–0.25 moose per square mile), based on extrapolation of population estimates from survey areas in the unit, including all or parts of the UKMA, Kanuti National Wildlife Refuge, and Gates of the Arctic National Park and Preserve; during regulatory years 2008–2009 through 2010–2011, estimated annual harvest in Unit 24(B) was 82–109 moose;

(ii) in early winter 2010, the number of observable moose within the UKMA was estimated at 405 (90 percent confidence interval: ±96); estimates of annual harvest from the UKMA are not available; however, Division of Subsistence household surveys from the villages of Alatna and Allakaket within the UKMA indicated moose harvest during 1997–2002 averaged approximately 40 per year; Division of Wildlife Conservation estimated current reported and unreported harvest in Alatna and Allakaket was 15–20 moose annually; based on resident testimonials, cost to obtain a moose has increased due to declining moose densities and increasing fuel costs;

(B) predation by bears and wolves is an important cause of the failure to achieve moose population and harvest objectives;

(i) moose surveys in Unit 24(B) during spring 2008–2011 indicated high twinning rates (average 57 percent), thus good body condition; fall composition surveys in Unit 24(B) indicated high productivity, with calf:cow ratios averaging 44 calves per 100 cows, but cohort survival was low with yearling bulls averaging 11 per 100 cows; these survey data and a predicted calving rate of 80 percent indicate more calves are lost during summer (due primarily to bear predation) than winter (due primarily to wolf predation);

(ii) studies from Interior Alaska have documented bears as the primary source of neonatal moose mortality, whereas wolves are the primary predator of moose >12 months of age; based on radio-collared adults in Units 24(A) and 24(B) (2008–2009), annual adult mortality is approximately 8–10 percent;

(C) a reduction of wolf predation within the UKMA can reasonably be expected to make progress towards achieving the Unit 24(B) intensive management objectives; modeling of the current moose abundance in the UKMA using estimated abundance of 45–55 wolves, 75 black bears, 25 grizzly bears, 405 (±97) moose, and a harvest of 20 moose annually, indicated that moose abundance should slowly increase in response to wolf control that increases calf and yearling moose survival; wolf control alone likely will result in a positive response in moose abundance after 5 winters of control, including reallocation of some surviving moose to harvest;

(D) Reducing predation is likely to be effective and feasible utilizing recognized and prudent active management techniques and based on scientific information; based on survey results indicating wolf predation is an important source of mortality, reducing wolves in a small geographic area will likely result in increased moose survival and additional animals available for hunter harvest; harvest data will be collected using harvest ticket or registration permit reports, household surveys, and other reporting mechanisms such as calendars for recording hunting activities; moose population data collection will include abundance, calf:cow ratio, and yearling bull:cow ratio from population estimation surveys and calf survival and yearling survival from radio-collared moose;

(E) Reducing predation is likely to be effective given land ownership patters; the UKMA was selected based on land ownership status (minimizing federal lands), proximity to traditional moose hunting areas for the villages of Allakaket and Alatna (maximizing inclusion of navigable river corridors), and habitat suitability; within the UKMA, 125 square miles (9.2 percent) is federal land (BLM/USFWS), 576 square miles (42.3 percent) is Alaska Native corporation land, 659 square miles (48.4 percent) is State of Alaska lands;

(5) authorized methods and means are as follows:

(A) hunting and trapping of wolves by the public in Unit 24(B) during the term of this program may occur as provided in the hunting and trapping regulations set out elsewhere in this title, including use of motorized vehicles as provided in 5 AAC 92.080;

(B) notwithstanding any other provisions in this title, the commissioner may allow department employees to conduct aerial, land and shoot, or ground based lethal removal of wolves using state owned, privately owned, or chartered equipment, including helicopters, under AS 16.05.783;

(C) notwithstanding any other provisions in this title, the commissioner may issue public aerial shooting permits or public land and shoot permits using fixed-wing aircraft as a method of wolf removal under AS 16.05.783;

(6) time frame is as follows:

(A) during July 1, 2012–June 30, 2018, the commissioner may authorize removal of wolves in Unit 24(B);

(B) annually, the department shall, to the extent practicable, provide to the board a report of program activities conducted during the preceding 12 months, including implementation activities, the status of the moose and wolf populations, and recommendations for changes, if necessary to achieve the objectives of the plan;

(7) the commissioner will review, modify or suspend program activities when the wolf surveys or accumulated information from department personnel, hunters, trappers, and permittees indicate the need to avoid reducing wolf numbers in Unit 24(B) below the control objective of 100 wolves specified in this subsection;

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PROPOSAL 164

EFFECT OF THE PROPOSAL: Eliminate the restriction on aircraft in the Kanuti Controlled Use Area (KCUA).

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: This is an allocation issue and the Department has no recommendation.

Because access within the Kanuti Controlled Use Area (KCUA) prohibits the use of aircraft by moose hunters, all moose hunters are concentrated on the same navigable waterways during the hunting season.

Harvest is low and there is adequate moose available for some additional harvest. Estimated annual harvest rate in 24B is low (avg. = 83 moose harvested) at 3.5% of the observable moose, and bull:cow ratios are high at 50–60 bulls:100 cows in November surveys. Nonlocal hunter harvest (avg. = 25.6 moose; 1.1% annual harvest rate) constitutes 30–35% of the total annual harvest. The moose population is stable at a low density (24B = 2,362 ± 730 moose/13,523 mi^2 = 0.12–0.23 moose/mi^2; Kanuti NWR portion = 1,068 ± 122 moose/2,715 mi^2 = 0.35–0.44 moose/mi^2). Federal lands within the KCUA have been closed to non-federally qualified users since 1992.

According to a memo from the Division of Game deputy director (May 27, 1981), the KCUA was established specifically to provide protection to local rural hunters (customary and traditional, C&T, uses) from undue competition from other hunters using aircraft. There is a positive C&T finding for moose in Unit 24. The board may wish to consider whether this proposal would negatively impact subsistence opportunity within the KCUA.
****

PROPOSAL 165

EFFECT OF THE PROPOSAL: Close all hunting for the Galena Mountain Caribou Herd in Unit 24.

DEPARTMENT RECOMMENDATION: **Do Not Adopt**

RATIONALE: The Galena Mountain Caribou Herd does not occur in Unit 24. The Galena Mountain Caribou herd occurs mostly in Unit 21D, with some of the herd periodically crossing over into Units 21B and 21C. Those portions of Units 21B, 21C, and 21D (Galena Mountain Caribou Herd range) were closed for conservation concerns by the Board at the recommendation of the Department in March 2004. Closure of any portion of Unit 24 would unnecessarily limit opportunity to harvest caribou from other herds in Unit 24. No harvest of the Galena Mountain Herd has been reported since 2000.
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PROPOSAL 166

EFFECT OF THE PROPOSAL: Extend hunting season for wolves in Unit 21.

DEPARTMENT RECOMMENDATION: **Take No Action**

RATIONALE: See recommendations for Proposal 167.
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PROPOSAL 167

EFFECT OF THE PROPOSAL: Extend wolf hunting season in Units 21, 22, 24 to May 31.

DEPARTMENT RECOMMENDATION: **Amend and Adopt**

RATIONALE: Unit 22 is not on the Board agenda for March 2012. We recommend this proposal be amended to include only Units 21 and 24. This proposal would align wolf hunting seasons with neighboring Units 19 and 20. There are no conservation concerns with extending the wolf hunting seasons from August 10–April 30 to August 10–May 31 in these units. We estimated 386–476 wolves occupied Units 21A and 21E during winter 2008–2009 and 442–771 wolves occupied Units 21B, 21C and 21D during winter 2007–2008, for a total of 828–1,247 wolves in all of Unit 21. We estimated 374–541 wolves in Unit 24 during winter 2007–2008. In regulatory year 2010–2011, reported harvest was 41 wolves in Unit 21 and 22 wolves in Unit 24, making up ≤9% of the estimated population. Even with allowances for unreported harvest, there remains a harvestable surplus of wolves in Units 21 and 24.
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PROPOSAL 168

EFFECT OF THE PROPOSAL: Allow brown bears to be taken over bait in Unit 21D.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: No biological concern exists with respect to this proposal because the brown bear population is likely stable and the annual harvest is below estimated harvestable surplus. Large portions of Unit 21D are forested, making bear hunting more challenging than in units with more open terrain. Access into the unit is primarily by boat, snowmachine, and aircraft.

Current black bear baiting seasons in Unit 21D in spring (April 15-June 30) and fall (August 1-October 25) allow for more effective harvest of this species. Reported harvest of grizzly bears in Unit 21D is low, with harvest averaging 5 bears per year (80% male) for the past 3 regulatory years (RY 2008–2009:3(2 males), RY 2009–20010:5(4 males), RY 2010–2011:7 (6 males).
****

PROPOSAL 169

EFFECT OF THE PROPOSAL: Extend lynx trapping season in Unit 21.

DEPARTMENT RECOMMENDATION: **Amend and Adopt**

RATIONALE: The Department recommends amending this proposal to include Unit 24. Extending the season from November 1–February 28 to November 1–March 31 will increase opportunity without concern of overharvest. Units 21 and 24 have a low human population and subsequently low annual harvest (<150 annually in Unit 21, <100 annually in Unit 24).Proposal 160 seeks to extend lynx season in neighboring Unit 19 to March 31 and adopting both proposals 160 and 169 will maintain season alignment.
****

PROPOSAL 170

EFFECT OF THE PROPOSAL: Shorten the moose hunting season in the Sheenjek and Coleen River drainages from September 5–25 to September 15–25.

DEPARTMENT RECOMMENDATION: **Do Not Adopt**

RATIONALE: Moose harvest data for Unit 25A demonstrates that the number of hunters, number of moose harvested and hunter success rates have been relatively stable over the past decade. Although variable between years, 85–119 hunters harvested 32–49 moose annually with success rates ranging 33–56% during 2001–2010. Harvest data for the Sheenjek and Coleen River drainages of Unit 25A also demonstrate stability in hunting pressure, harvest, and success rates over the past decade. During 2001–2010, 14–39 hunters harvested 5–15 moose annually (23–60% success) in the Sheenjek River drainage and in the Coleen River drainage 23–45 hunters harvested 8–19 moose (31–57% success).

Although there may be more hunters and fewer moose in localized areas along the Sheenjek and Coleen rivers, drainage-wide harvest data show no significant change in the number of hunters or moose harvested.

The Department has no data concerning wanton waste prevalence in Unit 25A and the Alaska Wildlife Troopers do not issue excessive wanton waste citations in Unit 25A compared to other Interior game management units. Department harvest data show that 60% of the harvest occurs after September 14 and 90% occurs after September 7.

The Department does not conduct moose population estimates in Unit 25A. However, moose densities are likely low (< 0.2 moose/mi^2). Stability in the number of hunters and moose harvested combined with relatively high and stable success rates indicate that current harvest rates are likely sustainable.

There are positive customary and traditional (C&T) use findings for moose in portions of Unit 25 outside the Fairbanks nonsubsistence area. If adopted, this proposal would result in a reduction of subsistence opportunity and the Board may wish to identify whether a reasonable opportunity for subsistence uses would still be provided.
****

PROPOSAL 171

EFFECT OF THE PROPOSAL: For moose harvested in Unit 25A, all of the meat of the front quarters, hind quarters, and the ribs must remain naturally attached to the bone until transported from the field or processed for human consumption.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: The Department has no data concerning wanton waste in Unit 25A, and the Alaska Wildlife Troopers do not issue excessive wanton waste citations in Unit 25A compared to other Interior game management units. Leaving the edible meat attached to the bone is commonly practiced by hunters, and some hunters remove the meat from the bone at kill sites or camps to facilitate packing or transporting from the field. Meat can be successfully salvaged for human consumption using either method when proper procedures are followed. However, neither method ensures adequate preservation. Many factors, including weather, cleanliness during field care and while transporting and the use of game bags affect the condition of meat when it arrives at the point of processing.

Moose occur at low density in Unit 25A and hunter access is difficult due to remoteness from roads. During regulatory years 2000–2001 through 2010–2011, 77% of hunters used aircraft to access the unit and 14% used boats. An average of 105 hunters harvested 42 moose per year and over 90% of hunters were nonlocal residents of Alaska (who reside outside of Unit 25A, 25B, or 25D) or nonresidents. Nonlocal hunters who use aircraft may experience transportation difficulties due to weight limitations if the Board adopts this proposal.
****

PROPOSAL 172

EFFECT OF THE PROPOSAL: For moose harvested in Unit 25B, all of the meat of the front quarters, hind quarters, and the ribs must remain naturally attached to the bone until transported from the field or processed for human consumption.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: The Department has no data concerning wanton waste in Unit 25B, and the Alaska Wildlife Troopers do not issue excessive wanton waste citations in Unit 25B compared to other Interior game management units. Leaving the edible meat attached to the bone is commonly practiced by hunters, and some hunters remove the meat from the bone at kill sites or camps to facilitate packing or transporting from the field. Meat can be successfully salvaged for human consumption using either method when proper procedures are followed. However, neither method ensures adequate preservation. Many factors, including weather, cleanliness during field care and while transporting and the use of game bags affect the condition of meat when it arrives at the point of processing.
****

PROPOSAL 173

EFFECT OF THE PROPOSAL: For moose harvested in Unit 25D, all of the meat of the front quarters, hind quarters, and the ribs must remain naturally attached to the bone until transported from the field or processed for human consumption.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: The Department has no data concerning wanton waste in Unit 25D, and the Alaska Wildlife Troopers do not issue excessive wanton waste citations in Unit 25D compared to other Interior game management units. Leaving the edible meat attached to the bone is commonly practiced by hunters. However, some hunters remove the meat from the bone at kill sites or camps to facilitate packing or transporting from the field. Meat can be successfully salvaged for human consumption using either method when proper procedures are followed. However, neither method ensures adequate preservation. Many factors, including weather, cleanliness during field care and while transporting and the use of game bags affect the condition of meat when it arrives at the point of processing.
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PROPOSAL 174

EFFECT OF THE PROPOSAL: Open a registration moose hunt in the Firth and Mancha River drainages in Unit 26C for resident hunters for 1 bull during Sept 1–30 and for nonresidents 1 bull with 50 inch antlers or four or more brow tines during Sept 1–Sept 30.

DEPARTMENT RECOMMENDATION: **Amend and Adopt**

RATIONALE: The Department recommends amending proposal 174 by implementing a drawing hunt for both resident and nonresident hunters and setting a bag limit of 1 bull for residents and 1 bull with 50-inch antlers or 4 or more brow times on at least one side for nonresidents. We also recommend amending the season to September 1–25 for both resident and nonresident hunters. In addition, we recommend amending the proposal to include the Kongakut drainage, upstream of and including Drain Creek. The Department would issue up to 30 drawing permits with a harvest objective of 10 bulls. Additional limited hunt opportunity is warranted in the Firth–Mancha and upper Kongakut drainages of Unit 26C based on recent moose surveys and current harvest levels.

Unit 26C state hunting seasons were closed beginning in 1996 in response to a North Slope-wide (Units 26A, 26B, and 26C) moose decline in the early 1990s. Moose seasons were also closed in Unit 26B and substantially restricted in Unit 26A. Gradually, during the 2000s, the North Slope moose population increased beginning in Unit 26A and subsequently in Unit 26B. In Unit 26A, hunting seasons were liberalized during that time and in 2006, resident-only moose hunting seasons were re-opened in Unit 26B. The Unit 26C moose season remained closed to non-federally qualified subsistence users because moose surveys conducted by Arctic National Wildlife Refuge (ANWR) staff along most drainages of the coastal plain in Unit 26C indicated the moose population had not recovered. During 2003–2009, 5 surveys were conducted, indicating a low and stable moose population ranging from 47 to 61 moose in northern Unit 26C. However, the upper Kongakut and Firth–Mancha drainages of Unit 26C were not surveyed and these areas historically contained the best moose habitat and the greatest number of moose.

Unit 26 has a positive finding for customary and traditional (C&T) use of moose. In 2006, the amount necessary for subsistence (ANS) was revised from 60–80 moose to 21–48, including 15–30 in Unit 26A. This suggests that 6–18 moose are reasonably necessary for subsistence opportunity in Units 26B and 26C.

Currently, a resident hunters-only drawing permit (DM996; up to 30 permits may be issued) and general season moose hunt (Feb. 15–April 15, up to a 14–day season may be announced by emergency order) occur in Unit 26B. Combined harvest from those hunts averaged 6 bulls annually during 2006–2011. A federal hunt occurs in Unit 26B and Unit 26C by residents of Kaktovik for 3 moose, provided no more than 2 antlered bulls may be harvested from Unit 26C, and no cow moose may be harvested from Unit 26C. This results in a harvest quota of 2 antlered bulls for Unit 26C. Three permits are issued annually and, on average, 1 moose is harvested per year in Unit 26C.

The 2011 moose population estimate for Units 26B and 26C combined is 850−1,000 moose (observable moose=854). In Unit 26B, annual moose surveys conducted by the Department in April during 2003–2011 indicated a stable population between 400–600 moose. As mentioned previously, surveys conducted by ANWR during 2003–2009 indicated approximately 55 moose on the coastal plain in Unit 26C. No ratio data are associated with these surveys because they were conducted in the spring. In fall 2011, the Department conducted a moose survey of the Firth–Mancha and upper Kongakut drainages in Unit 26C. In the Firth–Mancha, we observed 212 moose (60 bulls:100 cows, 27 calves:100 cows). In the upper Kongakut, we observed 127 moose (90 bulls:100 cows, 38 calves:100 cows). Prior to 2011, the most recent survey of the Firth–Mancha and upper Kongakut drainages was conducted by ANWR staff in 2002 when a total of 132 moose were observed in the Firth–Mancha and 95 moose were observed in the upper Kongakut. The 2011 survey resulted in an increase in observable moose from 227 moose in 2002 to 339 moose in 2011, indicating that there is a harvestable surplus of moose in Unit 26C above the 2 antlered bull harvest quota provided by the federal system for residents of Kaktovik. A 3% harvest rate of 850−1000 moose results in a harvestable surplus of 26–30 moose for Units 26B and 26C. This harvestable surplus exceeds the upper end of the presumed ANS of 6–18 moose in Units 26B and 26C. As a result, additional but limited nonsubsistence hunting opportunity may be feasible in the Firth–Mancha and upper Kongakut drainages of Unit 26C.

Historical harvest data in Unit 26C (1985–1995) indicated an average of 16 hunters hunted moose and harvested an average of 8.5 moose per year. Residents comprised 67% of hunters. In the Firth–Mancha and Kongakut portion of Unit 26C, an average of 2 hunters hunted per year.

If the Board of Game adopted this proposal as amended by the Department, the moose season would remain closed by federal regulation (except for federally qualified subsistence hunters) and the Department will not issue any drawing permits. The Department intends to request a federal closure review for the Firth–Mancha and upper Kongakut portion of Unit 26C at the next Federal Subsistence Board meeting in 2014. If the federal closure is removed, the Department will issue drawing permits.

Units and Bag Limit	**Resident Open Season (Subsistence and General Hunts)**	**Nonresident Open Season**
(24)		
…		
<u>**Unit 26(C), that portion in the drainages of Firth Creek and Mancha Creek and the upper Kongakut River, upstream from and including Drain Creek**</u>		
<u>**RESIDENT HUNTERS 1 bull by drawing permit only; up to 30 permits may be issued;**</u>	<u>**Sept. 1–25**</u>	
<u>**NONRESIDENT HUNTERS 1 bull with 50-inch antlers or antlers with 4 or more brow tines on at least one side; by drawing permit only; up to 30 permits may be issued;**</u>		<u>**Sept. 1-25**</u>
<u>**Remainder of**</u> Unit 26(C)	No Open Season	No Open Season

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<u>**PROPOSAL 175**</u>

EFFECT OF THE PROPOSAL: Increases the nonresident bag limit from 1 bull to 2 bulls for Porcupine Herd caribou in Units 25B, 25D, 26C, and the eastern portion of 25A.

DEPARTMENT RECOMMENDATION: **Adopt**

RATIONALE: Staff proposal–see issue statement.
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PROPOSAL 176

EFFECT OF THE PROPOSAL: Increases the nonresident bag limit from 1 bull to 2 bulls for Porcupine Herd caribou in Units 25B, 25D, 26C, and the eastern portion of 25A.

DEPARTMENT RECOMMENDATION: **Take No Action**

RATIONALE: See analysis and recommendations for proposal 175.
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PROPOSAL 177

EFFECT OF THE PROPOSAL: Decrease the bag limit for caribou in Unit 26B from 5 caribou to 3 caribou.

DEPARTMENT RECOMMENDATION: **Do Not Adopt**

RATIONALE: In RY10 the board provided additional hunting opportunity in the growing Central Arctic caribou herd (CAH) which was experiencing low harvest rates. The Board increased the resident and nonresident bag limit for caribou in most of Unit 26B from 2 to 5 caribou and extended seasons for both cows and bulls. The CAH had grown substantially from 32,000 caribou in 2002 to 67,000 caribou in 2008 with a reported harvest rate of ≤2%. In July 2010 the population was estimated at 70,000 caribou. Although harvest increased in RY10, the reported harvest rate remained the same at ≤2% of the population.

Concerns by the public have arisen in that more caribou are harvested than what is accounted for in the reported harvest ticket system. The Department has taken these concerns into consideration and generously estimated an additional 800 caribou may have been harvested by a combination of hunters who did not return their harvest ticket and by hunters residing in local communities harvesting the CAH. Including these additional caribou still results in a low harvest rate of 3%.

RY10 harvest data indicate 1,573 hunters reported hunting and 846 harvested 1,188 caribou (54% success rate; 946 males and 216 females). This compares to RY05–RY09, prior to the 5-caribou bag limit, when an average of 1,300 hunters reported hunting and harvested an average of 745 caribou annually (57% success rate). Similar to previous years, a small proportion of hunters in RY10 were nonresidents (23%) who took approximately 23% of the harvest. The change in bag limit in RY10 resulted in 91% of successful hunters harvesting 1–2 caribou and

9% harvesting 3–5 caribou. An additional 107 caribou were harvested as a result of the bag limit being greater than 2 caribou.

Composition surveys in fall 2010 and 2011 resulted in high bull:cow ratios (50 bulls:100 cows in 2010 and 76 bulls:100 cows in 2011), further indicating that harvest did not have a measureable effect on the herd.

The 5-caribou bag limit likely had a small effect in attracting hunters to the CAH. The increased number of hunters in RY10 was at least partly the result of hunters displaced from the Fortymile caribou herd (where the hunt opened later in RY10 compared to previous years) and the Mulchatna Caribou Herd (whose population declined dramatically in recent years).

Wanton waste issues along the Dalton Highway in Unit 26B have been reported by the public in previous years. Although the Department has no database of reported wanton waste, we did not receive more wanton waste complaints from the public in RY10; nor did the Alaska Wildlife Troopers issue more wanton waste citations compared to prior to the increased bag limit.
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PROPOSAL 178

EFFECT OF THE PROPOSAL: Closes the drainages of Red Sheep Creek and Cane Creek to sheep hunting in Unit 25A.

DEPARTMENT RECOMMENDATION: **Take No Action**

RATIONALE: The Department recommends “take no action” on this proposal based on the actions taken on Proposal 262.
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PROPOSAL 179

EFFECT OF THE PROPOSAL: Create a sheep drawing permit hunt (8 permits) for nonresidents in the Dalton Highway Corridor Management Area in Units 24A and 26B.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: This is an allocation issue between residents and nonresidents that should be decided by the Board, and therefore, the department has no recommendation. There are positive customary and traditional (C&T) use findings for sheep in Units 24 and 26.

In regulatory year 2009–2010 (RY09), guided nonresidents harvested 2 sheep within the Dalton Highway Corridor Management Area (DHCMA) in Unit 26B, and in RY10 guided nonresidents harvested 2 sheep within the DHCMA in Unit 24A. Guided nonresident sheep hunters had not reported harvesting sheep within the DHCMA prior to 2009. The proposer is concerned about competition among local residents of Wiseman and Coldfoot (who also qualify as subsistence hunters on federal lands), nonlocal residents, and guided nonresident hunters in this area.

The DHCMA extends 5 miles either side of the Dalton Highway and in state hunting regulations, this is an archery only area. The DHCMA and BLM land overlap; and federally-qualified hunters can use rifles for hunting on federal lands under federal regulations. In addition, bag limits and seasons differ in that the state hunting regulations have a bag limit of one ram, full curl or larger during Aug. 10–Sept. 20 and federal subsistence hunting regulations have a bag limit of one ram, 7/8 curl or larger during Aug. 10—Sept. 20. Also, federally-qualified hunters may also hunt within Gates of the Arctic National Park (GAAR) for 3 sheep during Aug. 1–Apr. 30.

In Unit 26B, during RY06–RY10, the Department estimated that a total of 2 sheep were harvested by Wiseman and Coldfoot residents (federally qualified hunters) using rifles. The number of hunters from these 2 communities was 3–6 annually during RY06–RY08; with no hunters in RY09 and RY10. During the same time period, an additional 14 sheep were harvested (~ 3 sheep annually) by a combination of nonlocal residents and by 2 nonresidents. These 14 sheep were taken by bow and arrow.

In Unit 24A, during RY06–RY10, the Department estimated that a total of 9 sheep (~ 2 sheep annually) were harvested by Wiseman or Coldfoot residents (federally qualified hunters) using a rifle. The number of hunters from these 2 communities was 3–5 annually. During the same time period, an additional 10 sheep were harvested (2 sheep annually) by a combination of nonlocal residents and by 2 nonresidents. These 10 sheep were taken by bow and arrow.

There are other potential issues besides the direct competition for sheep within the DHCMA because many hunters access the area outside the DHCMA by walking through it in order to hunt with a rifle. Issues include hunters pushing sheep outside the DHCMA, thereby making them inaccessible to Wiseman and Coldfoot residents, and harvesting some of the legal rams along the border of the DHCMA. During RY06–RY10, the number of hunters who reported using a highway vehicle to access their hunt areas in Unit 26B ranged from 70 to 91 with harvest of 8–15 sheep. In Units 24A and 25A combined, the number of hunters was 41–50 with harvest of 7–17 sheep. These figures include those hunters hunting within the DHCMA, except for Wiseman and Coldfoot residents.
****

PROPOSAL 180

EFFECT OF THE PROPOSAL: Open the wolf trapping seasons earlier in Units 25A, Unit 25B, and Unit 25C (from November 1–April 30 to October 1–April 30).

DEPARTMENT RECOMMENDATION: **Do Not Adopt**

RATIONALE: Current wolf trapping seasons in Interior and eastern North Slope units open November 1, when fur quality is prime, except in units where the Board has determined that additional harvest of wolves is warranted to promote intensive management objectives. Although changing the opening date of wolf trapping season to October 1 for Units 25A, 25B, and 25C would align them with Unit 25D, inconsistencies in the starting date of wolf trapping season would still exist with neighboring units where the wolf trapping seasons start on November 1 (Units 20B, 20F, 24A, 26B, and 26C).

This proposal does not specify gear restrictions. However, in units where the wolf trapping season opens on October 1 (Units 19D, 21A, and 25D), steel traps and snares smaller than 3/32 inch in diameter are prohibited during the October portion of the season. Gear restrictions for the October portion of the season were adopted by the Board of Game to reduce incidental catch of other furbearers for which the season is closed.

Annual reported harvest from sealing records during 2000–2010 was 33–63 wolves per year and averaged 42 wolves per year for Units 25A, 25B and 25C combined (excludes wolves taken during predator control in the western portion of Unit 25C in the Upper Yukon–Tanana predation control area). Wolf surveys have not been conducted recently in these units. However, wolf densities likely range from 8–12 wolves per 1000 mi^2 based on wolf surveys conducted in adjacent Unit 25D where prey availability is similar to 25AB&C. Harvest rates from the current trapping season are below sustainable levels and additional harvest from an October season would likely be low and sustainable.
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PROPOSAL 181

EFFECT OF THE PROPOSAL: Extend brown bear seasons in Unit 26B by applying the registration hunt to the entire unit for both resident and nonresident hunters.

DEPARTMENT RECOMMENDATION: **Amend and Adopt**

RATIONALE: This is a Department proposal. We proposed liberal, year-round, hunting seasons for both residents and nonresidents to increase brown bear harvest in order to reduce brown bear predation on muskoxen. However, during the statewide Board of Game meeting in January 2012, the Board authorized a predation control program in which Department personnel will select and lethally remove bears identified as killing or threatening muskox, in accordance with a Muskox Recovery Plan. Under this targeted approach, liberal hunting seasons are not necessary to provide predation relief for muskoxen.

Therefore, the Department recommends amending this proposal to: 1) shorten brown bear hunting seasons in Unit 26B to August 25–May 31for both resident and nonresident hunters; 2) expand the registration permit for resident hunters to include all of Unit 26B; 3) establish a nonresident drawing permit in all of Unit 26B; and 4) retain the limit of up to 20 nonresident brown bear drawing permits. We plan to issue 12 nonresident drawing permits the first year. These proposed seasons are directed at providing opportunity to harvest brown bears at a sustainable harvest rate. However, if harvest exceeds sustainability (including bears taken in the predator control program), the Department will adjust seasons the following year via permit hunt discretionary authority.

In an effort to reduce brown bear predation on muskoxen in Unit 26B, brown bear regulations were liberalized in regulatory year (RY) 2010–2011 by emergency order and in RY 2011–2012 via a special Board of Game meeting. The season was opened on August 10 (15 days early) in RY 2010–2011. In RY 2011–2012, a registration hunt for brown bears was created with no closed season for both resident and nonresident hunters. The season in the remainder of Unit 26B opened September 1 and nonresidents were required to obtain a drawing permit. The liberalized seasons in the registration permit area during RY 2010–2011 and RY 2011–2012 resulted in a 2-year average annual harvest of 25 bears with 16 males and 9 females (35% female). Resident hunters harvested an average of 18 bears and nonresidents harvested an average 6 bears annually. When the season opened on August 25 in RY 2008–2009 and RY 2009–2010, the 2-year mean harvest was 20 bears (14 males and 6 females). Resident hunters harvested an average of 16 bears and nonresidents harvested an average 4 bears.

Sustainable harvest rates are estimated to be ≤8% of the population of 265 bears ≥2 years old. This is estimated to be 21 bears, no more than 8 of which can be females. The harvest objective is to maintain a 3-year mean annual human-caused mortality of ≤8% of the bears ≥2 years old and of which no more than 40% can be females. We expect that season dates of August 25–May 31 will achieve maximum brown bear hunting opportunity while remaining within sustainable harvest rates.

Changes to 5AAC 85.025 are:

Units and Bag Limit	**Resident Open Season (Subsistence and General Hunts)**	**Nonresident Open Season**
(24)		
…		
Unit 26(B)[, THAT PORTION INCLUDING THE KADLEROSHILIK RIVER DRAINAGE SOUTH AND EAST OF THE PRUDHOE BAY CLOSED AREA, AND INCLUDING THAT PORTION OF THE ECHOOKA, IVISHAK LUPINE, AND RIBDON RIVER DRAINAGES AND THE ACCOMPLISHMENT CREEK DRAINAGE NORTH OF A LINE BEGINNING AT 69 DEGREES 08.97 MINUTES NORTH LATITUDE, 146 DEGREES 50.36 MINUTES WEST LONGITUDE ON THE DIVIDE BETWEEN THE ECHOOKA AND SHAVIOVIK RIVER DRAINAGES AND ENDING AT 68 DEGREES 35.71 MINUTES NORTH LATITUDE,		

148 DEGREES 29.64 MINUTES WEST LONGITUDE, EXCLUDING THE ACCOMPLISHMENT CREEK DRAINAGE SOUTHWEST OF A LINE FOLLOWING THE WEST BANK OF ACCOMPLISHMENT CREEK FROM 68 DEGREES 35.71 MINUTES NORTH LATITUDE, 148 DEGREES 29.64 MINUTES WEST LONGITUDE TO THE CONFLUENCE OF ACCOMPLISHMENT CREEK AND THE SAGAVANIRKTOK RIVER AT 68 DEGREES 42.19 MINUTES NORTH LATITUDE, 148 DEGREES, 54.47 MINUTES WEST LONGITUDE, AND INCLUDING THAT PORTION OF THE SAGAVANIRKTOK RIVER DRAINAGE SOUTH OF THE PRUDHOE BAY CLOSED AREA AND NORTH OF 68 DEGREES 42.19 MINUTES NORTH LATITUDE (CROSSING THE DALTON HIGHWAY NEAR MILEPOST 300), AND INCLUDING THAT PORTION OF THE KUPARUK AND TOOLIK RIVER DRAINAGES SOUTH OF THE PRUDHOE BAY CLOSED AREA AND NORTH OF A LINE AT 68 DEGREES 42.19 MINUTES, NORTH LATITUDE, EXCLUDING TRIBUTARY DRAINAGES FLOWING INTO THE KUPARUK RIVER NORTH OF THE CONFLUENCE OF THE KUPARUK AND TOOLIK RIVERS AND WEST OF THE WEST BANK OF THE KUPARUK RIVER.]

RESIDENT HUNTERS:		
1 bear per regulatory year by registration permit only	**Aug. 25–May 31** [JULY 1–JUNE 30]	
NONRESIDENT HUNTERS:		
1 bear per regulatory year by **drawing** [REGISTRATION] permit only, **up to 20 permits may be issued**		**Aug. 25–May 31** [JULY 1–JUNE 30]

[REMAINDER OF UNIT 26(B)]

[RESIDENT HUNTERS:]

[1 BEAR EVERY REGULATORY YEAR]	[SEPT. 1 - MAY 31]

[NONRESIDENT HUNTERS:]

[1 BEAR EVERY REGULATORY YEAR BY DRAWING PERMIT ONLY; UP TO 20 PERMITS MAY BE ISSUED]	[SEPT. 1 - MAY 31]

…

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PROPOSAL 182

EFFECT OF THE PROPOSAL: Increases the black bear bag limit in Unit 25D from 3 to 5.

DEPARTMENT RECOMMENDATION: **Adopt**

RATIONALE: Additional opportunity to harvest black bears in Unit 25D through an increased bag limit of 5 is biologically sustainable. Also, based on the history of liberalized opportunity to harvest black bears in Unit 25D, a significant increase in harvest or reduction in bear abundance is not likely to occur.

In 2010, the Department conducted an aerial mark–recapture survey to estimate black bear abundance in a 530 mi^2 area centered on the village of Beaver in western Unit 25D. Preliminary results indicate that black bear density is high, likely >40 black bears not accompanied by cubs/100 mi^2. Final results will be available at the March 2012 Board of Game meeting. Habitat in much of the remainder of Unit 25D is similar to the area surveyed and likely supports similar black bear abundance. Upland habitats on the northern and southern extent of Unit 25D likely support fewer black bears.

Current harvest likely is less than 70 black bears annually, well below sustainable levels. Harvest report and sealing are not required for black bears harvested in Unit 25D. However, a subsistence household survey of communities in 2008 estimated annual harvest to be 26 per year. Additional harvest from nonlocal resident hunters and guided nonresident hunters likely is 20–40 annually.

Current black bear seasons and bag limits in Unit 25D are more liberal than most Interior units, including an any-bear bag limit, a fall baiting season, the use of artificial light at den sites, and a

community subsistence harvest permit hunt (there is a positive customary and traditional use finding for black bears in Unit 25) Providing maximum opportunity to harvest black bears in Unit 25D has been a long-term objective of local residents and the Yukon Flats Advisory Committee and is supported by the Yukon Flats Cooperative Moose Management Plan.
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PROPOSAL 183

EFFECT OF THE PROPOSAL: Create a brown bear community subsistence harvest permit for Unit 25D.

DEPARTMENT RECOMMENDATION: **Amend and Adopt**

RATIONALE: The Department recommends amending this proposal to increase the bag limit to 2 bears per year for resident hunters, instead of adopting a community subsistence harvest permit for brown bear. Additional opportunity to harvest brown bears in Unit 25D through an increased bag limit of 2 bears for resident hunters is biologically sustainable. However, because there is a negative customary and traditional use (C&T) finding for brown bears in Unit 25; the Board cannot establish a subsistence hunt, such as community subsistence harvest, for brown bears in any part of Unit 25. To do that, a proposal must first be submitted during the next Board cycle indicating that new information exists regarding C&T uses in Unit 25D. The Division of Subsistence would then develop a C&T worksheet to present to the Board, who then could make a determination.

In proposal 183, the Eastern Interior Regional Advisory Council (EIRAC) proposed a community subsistence harvest permit system to address traditional hunting patterns whereby a few hunters in a community who do most of the brown bear hunting would not be restricted to a bag limit of 1 per year. A companion to proposal 183 was submitted to the Federal Subsistence Board (FSB). However, during a meeting in October 2011, the EIRAC amended their FSB proposal to maintain the federal subsistence hunt as a general subsistence hunt and increase the bag limit to 2 brown bears per year. If the Board of Game adopts this amendment to proposal 183, state and federal bag limits would remain aligned, as envisioned by the EIRAC.

Few brown bears are taken by nonlocal hunters (1–4 per year during regulatory years 2005–2006 through 2010–2011). Harvest surveys conducted by the Council of Athabascan Tribal Governments indicated that more bears are taken by local hunters (0–5 brown bears annually during regulatory years 1993–1994 through 2002–2003 and regulatory year 2008-2009, 22 in regulatory year 2005–2006 and 37 in regulatory year 2006–2007). In some years hunters may have been motivated to take more brown bears compared to other years.

The population estimate for brown bears in Unit 25D is 387. If this proposal is adopted, the 3-year mean annual human-caused mortality would likely remain ≤8% of the population (31 bears). Although our management objective for brown bears in Unit 25D is to temporarily reduce brown bear numbers and predation on moose, the Department believes it is unlikely that an increased bag limit would result in a substantial increase in the harvest of bears. The current season dates (RESIDENT: 1 Jul–30 Nov and 1 Mar–30 Jun; NONRESIDENT: 1 Sep.–30 Nov. and 1 Mar.–15 June) would remain the same.

We recommend the Board adopt this alternative solution to provide a 2 bear bag limit in Unit 25D for residents to accommodate traditional hunting patterns, as follows:

5AAC 85.020. Hunting seasons and bag limits for brown bear.

Units and Bag Limits	**Resident Open Season (Subsistence and General Hunts)**	**Nonresident Open Season**
…		
(23)		
Unit 25(D)		
RESIDENT HUNTERS: **2 bears every regulatory year**	**July 1–Nov 30** **Mar. 1–June 30**	
NONRESIDENT HUNTERS. **1 bear every regulatory year**		**Sept. 1–Nov. 30** **Mar. 1–June 15**
	[JULY 1–NOV. 30 MAR. 1–JUNE 30	SEPT. 1–NOV. 30 MAR. 1–JUNE 15]
…		

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PROPOSAL 184

EFFECT OF THE PROPOSAL: Allow the use of crossbows in the Dalton Highway Corridor Management Area.

DEPARTMENT RECOMMENDATION: **Take No Action**

RATIONALE: The Board reviewed proposal 54 during the statewide meeting in January 2012, which sought to expand the definition of bow to include crossbows. The Department recommends the decision the Board of Game made on that proposal carry forth for this proposal. This would maintain consistency among archery-only areas.

Currently, a hunter can submit a methods and means exemption application to use a crossbow or draw-lock in an archery-only hunt by explaining how his/her disability limits his/her ability to comply with the methods and means restriction at issue.
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<u>PROPOSAL 185</u>

EFFECT OF THE PROPOSAL: Allow the taking of small game by falconry in the Dalton Highway Corridor Management area.

DEPARTMENT RECOMMENDATION: **<u>Take No Action</u>**

RATIONALE: The Board acted on Proposal 95 in the January 2012 Statewide meeting to allow this.
****

<u>PROPOSAL 186</u>

EFFECT OF THE PROPOSAL: Establish a joint state–federal registration permit and align hunting season dates and bag limits for moose in portions of Units 11 and 12 accessible from the Nabesna Road.

DEPARTMENT RECOMMENDATION: **<u>Amend and Adopt</u>**

RATIONALE: Under current state and federal regulations there are 4 different sets of moose season dates and bag limits in the portions of Units 11 and 12 accessible from the Nabesna Road (NRD). There are positive customary and traditional (C&T) use findings for moose in Units 11 and 12. In addition, federally-qualified subsistence hunters in Unit 11 must have a federal registration permit, but a state harvest ticket is required for federal hunters in the adjacent portion of Unit 12, and state hunters are required to use a state harvest ticket in both units along the Nabesna Road. Under this system, moose hunters must understand which harvest ticket or permit and which of the 4 sets of season dates and bag limits apply to them. This has caused hunter confusion and law enforcement difficulties. Further, harvest data collection is split between 2 ADF&G offices and a federal agency, resulting in delays in compiling harvest summaries.

This proposal would align the area-wide resident and nonresident state seasons accessible from the NRD in Units 11 and 12 to August 24–28 and September 8–17 to match the current resident season in the NRD portion of Unit 12. This would shorten the resident and nonresident season in the NRD portion of Unit 11from a 32-day, Aug 20–September 20 season to a shorter 15–day spilt season and lengthen the nonresident season in the NRD portion of Unit 12 from a 10–day September 8–17 season to the longer 15–day spilt season. The proposal would also align the NRD bag limit to one bull with spike-fork or 50-inch antlers or antlers with at least 4 brow tines on one side for both resident and nonresident hunters. This would result in more restrictive antler requirements for residents in the NRD portion of Unit 12 and for both resident and nonresident hunters in Unit 11, but it would liberalize the bag limit for nonresidents in the NRD portion of Unit 12. Proposals currently before the federal subsistence board are expected to liberalize antler restrictions and increase season length for federal subsistence hunters in the NRD portion of Unit 12.

The moose population in the NRD portions of Units 11 and 12 is likely stable at low density. During 2003–2008, Wrangell St. Elias National Park (WSENP) staff monitored moose in Unit 11 from the Boulder Creek drainage east to Copper Lake. No moose surveys were conducted in the NRD portion of Unit 11. To better understand the moose population accessible to hunters in this area, a cooperative project between the Department and WSENP deployed radio collars on 22 moose in October 2011. An intensive moose survey incorporating radio collar information was conducted in this area in late November. Information from this survey indicates a density of 0.79 moose per square mile, with 34 bulls:100 cows and 27 calves:100 cows.

Although numbers of hunters fluctuated (range 105–160) between 2000–2009, harvest and the distribution of harvest between Alaska residents, nonresidents and federally qualified subsistence users appears to have remained stable in the NRD area over the past 10 years. During 2000–2009 moose harvest averaged 23 moose (range 14–33). Non-federally qualified Alaska residents averaged 9 moose, nonresidents averaged 4 moose, and federally qualified subsistence users averaged 10 moose.

The Nabesna Road–Tok Cutoff and Copper Basin Advisory Committees recently expressed concerns that this proposal is overly conservative. Recent moose survey results also indicate the moose population can likely sustain a more liberal season and bag limit. Therefore, the Department recommends establishing a single joint state-federal registration hunt for residents with a bag limit of one bull with spike-fork or 50-inch antlers or antlers with at least 3 brow tines on one side, and an August 20 – Sept 17 season. The Department also recommends establishing an August 24 – Sept 17 season for nonresidents, with a bag limit of one bull with 50-inch antlers or antlers with at least 4 brow tines on one side. These amendments should alleviate concerns by Unit 11 hunters that season length is being unnecessarily shortened, while conserving the bull:cow ratio. However, since adoption of this amendment may represent a restriction in subsistence opportunity, while simultaneously increasing nonresident opportunity, the Board should consider whether these amendments provide reasonable opportunity for continued subsistence uses pursuant to the subsistence priority law.
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PROPOSAL 187

EFFECT OF THE PROPOSAL: Impose antler restrictions for moose hunting in portions of Unit 12 to align with moose harvest limits in Unit 11.

DEPARTMENT RECOMMENDATION: **Take No Action**

RATIONALE: See analysis and recommendations for proposal 186.
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PROPOSAL 188

EFFECT OF THE PROPOSAL: Allocate a fixed 10 percent of the Tok Management Area Dall sheep permits to nonresidents.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: Also see analysis and recommendation for proposal 189. This is an allocation issue that should be determined by the Board, and therefore, the Department has no recommendation.

Currently, up to 10% of the Tok Management Area (TMA) Dall sheep permits are allocated to nonresident hunters each year. Residents and nonresidents are selected at random from the same applicant pool. Once 10% of available permits are awarded to nonresidents, any remaining permits are issued to residents only.

Prior to 2006, increasing numbers of nonresident applications, and a larger proportion of permits allocated to nonresident hunters resulted from the ability of applicants to apply on the internet. In 2006 the Board passed a proposal limiting nonresidents to a maximum of 10% of permits issued. This insures that resident hunters continue to have a higher probability of receiving these valued permits, and addressed concerns of high harvest of full-curl rams due to the disproportionately high success rates of guided nonresident hunters.

Since 2007, 10% of permits issued have been awarded to nonresidents each year. This proposal would not change the current distribution of permits. As long as nonresident applicants continue to exceed 10% of Alaska resident applicants, no more than 10% of permits will continue to be allocated to nonresident hunters.
****

PROPOSAL 189

EFFECT OF THE PROPOSAL: Restrict Dall sheep hunting in the Tok Management Area and the Delta Controlled Use Area to Alaska residents only.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: This is an allocation issue that should be determined by the Board, and therefore, the Department has no recommendation.

Hunting pressure in the Tok Management Area (TMA) and Delta Controlled Use Area (DCUA) is controlled by drawing permit. Sheep populations in both areas are stable, hunter success rates are above 45% in both areas and trophy rams are harvested by Alaska residents each year under the current management strategy.

Up to 10% of TMA Dall sheep permits are allocated to nonresident hunters each year. The number of sheep permits awarded to nonresidents in the DCUA is not limited; however, the majority of applicants remain Alaska residents.

Large numbers of nonresident applications for the TMA, and a larger proportion of permits allocated to nonresident hunters resulted in the Board passing a proposal in 2006 that limits nonresidents to a maximum of 10% of permits. This insures that resident hunters continue to have a higher probability of receiving these valued permits than nonresidents. It also addresses concerns of high harvest of full-curl rams due to the disproportionately high success rates of guided nonresident hunters.

At current harvest levels, nonresident hunters are not preventing Alaska resident hunters from harvesting trophy rams in the TMA or DCUA. In 2010, the number of TMA sheep permits was reduced from 100 to 80 following 3 years in which ≤7% of harvested rams had horns ≥40 inches in length. Following these changes, harvest of rams with horns ≥40 inches in length increased to 11% in 2010 and 23% in 2011. In 2011, hunters harvested 7 rams (5 by Alaska residents) with horns ≥40 inches in length, The average horn length of harvested rams was 37.5 inches, the longest average horn size since the TMA was established in 1974. The largest ram harvested in 2011 was taken by an unguided Alaska resident and had horns >44 inches. During 2007–2011 TMA sheep hunters have harvested an average of 37 rams (range = 27–44 rams), with resident hunters accounting for 78% (range = 74–85%) of the harvest.

During 2007–2011 the department issued 150 DCUA sheep permits each year, with an average of 9.4% of the permits issued to nonresident hunters (range 7–11%). Hunters harvested an average of 48 rams (range 37–55 rams), with resident hunters accounting for 85% (range 83–88%). An average of 2 rams (range 1–6) with horns >40 inches were harvested each year in the DCUA during this period.

Even with nonresident hunters eliminated, TMA and DCUA permits would remain difficult to obtain. For example, in 2010 there were 5680 TMA applicants, 609 of whom were nonresidents. With nonresidents removed from the TMA applicant pool, the chance of a resident being drawn would have changed from 1.2% to 1.3% for the early season (DS102) and from 1.7% to 1.9% for the late season (DS103). In the DCUA the chance of a resident being drawn in 2010 would have changed from 4.3% to 4.5% for the early season (DS203) and from 3.4% to 3.7% for the late season (DS204).
****

PROPOSAL 190

EFFECT OF THE PROPOSAL: Restrict Dall sheep hunting in the Tok Management Area and the Delta Controlled Use Area to Alaska residents only.

DEPARTMENT RECOMMENDATION: **Take No Action**

RATIONALE: See analysis and recommendation for proposal 189.
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PROPOSAL 191

EFFECT OF THE PROPOSAL: In Unit 20E moose drawing hunts DM794 and DM796, extend the season 10 days and restrict harvest to bulls with 50-inch antlers or 4 or more brow tines on one side.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: The Department has no biological concern regarding this proposal. The hunt areas for DM794 and DM796 are located in remote portions of the Ladue River Controlled Use Area (LRCUA). These hunts were established to allow additional opportunity to hunt moose in portions of the LRCUA that are largely inaccessible to hunters during the fall hunt. However, the proposer states that these hunts were originally intended to be trophy hunts and therefore the bag limits should have an antler restriction. Implementing an antler restriction in this hunt is an allocation issue that should be determined by the board.

In 2011, the bull:cow ratio in this area was estimated at 61 bulls:100 cows (management objective 40 bulls:100 cows), with a density estimate of 0.5/moose mi^2. During the past 5 years, harvest averaged 0.2 bulls annually in DM794 and 1.2 bulls in DM796. This moose population can likely sustain a higher harvest rate that may result from extending this hunting season from 30 days in November to 40 days, ending December 10. The proposed antler restrictions will likely mitigate potential increase in harvest associated with the longer season.
****

PROPOSAL 192

EFFECT OF THE PROPOSAL: Modify hunt boundaries, hunt type, season dates, and harvest limits for the White Mountains and Fortymile Caribou Herds in Units 20B, 20D, 20E, 20F and 25C.

DEPARTMENT RECOMMENDATION: **Adopt**

RATIONALE: This proposal is based on recommendations in the revised 2012–2018 Fortymile Caribou Herd Harvest Plan (harvest plan), which the Fortymile Caribou Herd Harvest Management Coalition will present to the Board at the March 2012 meeting in Fairbanks. See proposal 192 issue statement for details. The changes recommended in proposal 192 are needed to fully implement the revised harvest plan. The department supports the revised harvest plan and these proposed regulatory changes, which will provide the flexibility needed to respond quickly to changing management needs of the Fortymile Caribou Herd as it continues to increase in size and expand its range.

The department provided technical and financial support to the Fortymile Caribou Herd Harvest Management Coalition who worked together to develop the revised harvest plan. The coalition included representatives from the Eagle, Central, Fairbanks, Delta, Upper Tanana–Fortymile, Anchorage, and Matanuska Valley advisory committees, the Eastern Interior Regional Advisory Council (EIRAC), as well as Canadians from Tr’ondëk Hwëchîn, Yukon Fish and Wildlife Management Board, and Yukon Department of Environment.
****

PROPOSAL 193

EFFECT OF THE PROPOSAL: Modify season opening date in a portion of the hunt area and close the fall season within one mile of during the fall season for the Fortymile Caribou Herd in Units 20B, 20E, and 25C.

DEPARTMENT RECOMMENDATION: **Take No Action**

RATIONALE: See analysis and recommendation for proposal 192.
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PROPOSAL 194

EFFECT OF THE PROPOSAL: Establish a youth-only hunt for Fortymile caribou during August 10–15 in Units 20B, 20D, 20E, and 25C.

DEPARTMENT RECOMMENDATION: **Take No Action**

RATIONALE: See analysis and recommendation for proposal 192.
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PROPOSAL 195

EFFECT OF THE PROPOSAL: Prohibit proxy hunting for all Fortymile and White Mountain caribou hunts in Units 20B, 20D, 20E, 20F and 25C.

DEPARTMENT RECOMMENDATION: **Adopt**

RATIONALE: This proposal is based on recommendations in the revised 2012–2018 Fortymile Caribou Herd Harvest Plan (harvest plan), which the Fortymile Caribou Herd Harvest Management Coalition will present to the Board at the March 2012 meeting in Fairbanks. See proposal 195 issue statement for details. The change recommended in proposal 195 is needed to fully implement the revised harvest plan. The department supports the revised harvest plan and this proposed regulatory change.

The department provided technical and financial support to the Fortymile Caribou Herd Harvest Management Coalition who worked together to develop the revised harvest plan. The coalition included representatives from the Eagle, Central, Fairbanks, Delta, Upper Tanana–Fortymile, Anchorage, and Matanuska Valley advisory committees, the Eastern Interior Regional Advisory Council (EIRAC), as well as Canadians from Tr’ondëk Hwëchîn, Yukon Fish and Wildlife Management Board, and Yukon Department of Environment.
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PROPOSAL 196

EFFECT OF THE PROPOSAL: Allow grizzly bear baiting in Units 12 and 20E under general hunting regulations during April 15–June 30.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: The Department has no biological concern regarding this proposal. Grizzly bear baiting was allowed under the Upper Yukon–Tanana (UYT) predation control program in the most accessible portion of southern Unit 20E during spring 2005 through spring 2009. It was suspended because only 5 grizzly bears were taken during the entire program.

Taking bears under general hunting regulations is difficult over most of these units because of thick vegetation and rough topography. The majority of grizzly bears are taken incidental to hunts for other species. During regulatory years 2001–2002 through 2010–2011, average take was 18 grizzly bears in Unit 12 and 14 in Unit 20E, including all hunting and predation control methods. Based on take under the UYT predation control program, we anticipate that few grizzly bears would be harvested over bait under bear baiting hunting seasons.

The current population estimates are 350–425 grizzly bears in Unit 12 and 320–394 in Unit 20E. While densities vary throughout these units, the overall grizzly bear densities are relatively low due to the lack of salmon availability. However, take is consistently below the estimated sustainable level of 5–8%.
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PROPOSAL 197

EFFECT OF THE PROPOSAL: Re-implement brown bear control in a portion of the Upper Yukon Tanana Predator Control Program in southern Unit 20E. Allow foot-snaring with bait, same-day-airborne take of brown and black bears at bait sites, take of any bear, and sale of tanned hides.

DEPARTMENT RECOMMENDATION: **Do Not Adopt**

RATIONALE: The department does not support re-implementing brown bear control as part of the Upper Yukon/Tanana Predation Control Area (UYTPCA) at this time. We agree that another attempt to control brown bears should be made, given the availability of additional control methods. However, due to the demanding logistics involved in such a program, some level of cooperative department support will likely be required for success. In addition, we are concerned that effectiveness of wolf control in the UYTPCA could be jeopardized if too much funding and personnel are reallocated to a bear control program. We expect to collaborate with the proposer before the 2014 Board meeting to explore solutions.

The UYTPCA was established to increase the Fortymile Caribou Herd throughout its range and the moose population in Unit 12 north of the Alaska Highway and in Unit 20(E) to aid in achieving intensive management (IM) objectives. The current program includes only wolf control.

Fortymile herd size has increased to the lower end of the IM population objective, but the IM harvest objective has not been achieved. Significant work remains to be done, and substantial Departmental resources will be required to make additional progress.

While progress has been made toward achieving moose IM objectives, they have not been achieved because wolf control alone has not resulted in a rapid increase in the moose population. Brown bear predation on calves was identified as the single most important limiting factor for moose. This was recognized when the UYTPCA was first established in 2005 and brown bear predation control was part of the program. However, bear control was suspended in 2009 because it was ineffective at reducing brown bear predation on moose calves. The bear control program was conducted by the public under permits issued by the Department. When it was suspended, individual permits allowed: no limit on the number of brown bears taken, but no take of cubs and females accompanied by cubs; use of bait; use of same-day-airborne at bait sites, if the permittee was at least 300 ft. from the aircraft; and sale of untanned hides. At the time of suspension, the Department recommended re-implementing the bear control program if more effective methods became available. The Board has recently approved additional methods for other programs that may improve effectiveness of brown bear control in the UYTPCA. These include: take of any bear, including sows and cubs; snaring with bait; and sale of tanned hides. Efficient ways to implement these methods without jeopardizing continuing success of the UYTPCA program will be explored with the proposer.
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PROPOSAL 198

EFFECT OF THE PROPOSAL: Lengthen fox trapping season in Units 12 and 20E to align with the coyote season, including snare and trap restrictions in October and April.

DEPARTMENT RECOMMENDATION: **Take No Action**

RATIONALE: See analysis and recommendation for proposal 149.
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PROPOSAL 199

EFFECT OF THE PROPOSAL: Extend the end of hunting seasons for lynx and fox in Units 12 and 20E from March 15 to April 30.

DEPARTMENT RECOMMENDATION: **Do Not Adopt**

RATIONALE: Fur quality of most lynx taken after March 15 is generally poor. Fox are also less desirable during March and April because hide quality is greatly diminished. Additionally, snowshoe hare numbers are declining and the low in the lynx–hare cycle is expected to occur in the next 2–3 years. Extending the hunting season to April 30 has potential to slow recovery.

Lengthening hunting seasons through April will remove some fox and lynx which have survived the winter and are preparing to breed. During regulatory years 2006–2007 through 2010–2011 an

average of 6 lynx were harvested annually by hunting in Units 12 and 20E combined. Because there is no sealing requirement for fox in Units 12 or 20E, harvest numbers are poorly documented. Based on information from trapper questionnaires and trapper interviews, we assume that the take of fox by hunters is also low.
****

PROPOSAL 200

EFFECT OF THE PROPOSAL: Amend the amount reasonably necessary for subsistence (ANS) uses for wolves in Unit 12.

DEPARTMENT RECOMMENDATION: **Take No Action**

RATIONALE: The Board reviewed the ANS amounts for furbearers and fur animals statewide at the January meeting in 2012. They found that 90% of the allowable harvest was the ANS amount.
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PROPOSAL 201

EFFECT OF THE PROPOSAL: Reauthorize antlerless moose hunting seasons in Unit 20D.

DEPARTMENT RECOMMENDATION: **Adopt**

RATIONALE: Department proposal; see issue statement.
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PROPOSAL 202

EFFECT OF THE PROPOSAL: Allow the taking of Delta bison the same day airborne.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: The department has no biological concerns regarding this proposal. Few hunters would likely hunt the same day they are airborne. Therefore, it is not likely that average hunter success would increase above the current range of 60–75%. However, if hunter success rates increase and the harvest exceed sustainable levels, we will decrease the number of permits issued.

The proposal cites declining harvest success as a reason to consider same-day airborne hunting assistance for bison hunters. However, there is not a recent decrease in hunter success. It has fluctuated over the past 13 years, but there is not a downward trend during this time period. The average success rate since regulatory year 1998–1999 has been 68%. However, it was higher in the mid 1990s (4-year average from RY 1994-1997 = 90%). The 2010 pre-calving population estimate for the Delta bison herd was 339 animals, slightly below the population objective of 360. The herd has been at or below the population objective since 2009.

The Alaska Wildlife Troopers have indicated that it would be very difficult to know if Delta bison hunters are using air-to-ground communication. Additionally, due to the 6 month length of the Delta bison hunt, it would be difficult to track aircraft use for bison hunting, including use of unimproved airstrips.

If the Board chooses to adopt this proposal, we recommend the following amendment: restricting same-day-airborne hunters to the Delta D66 airstrip. This will allow hunters to conduct reconnaissance flights to and from the main public air field in Delta Junction, and then pursue bison from the ground after returning to Delta D66.

> 92.085. Unlawful methods of taking big game; exceptions.
>
> The following methods and means of taking big game are prohibited in addition to the prohibitions in 5 AAC 92.080:
>
> …
>
> > 8) a person who has been airborne may not take or assist in taking a big game animal until after 3:00 a.m. following the day in which the flying occurred; however, this paragraph does not apply to
> >
> > > ...
> > >
> > > **<u>(G) taking bison in Unit 20(D), for persons departing from and returning to Delta D66 airstrip.</u>**

…

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<u>PROPOSAL 203</u>

EFFECT OF THE PROPOSAL: Restrict all motor vehicle use for big game hunting during August 1–September 30 in the McCumber and Jarvis Creek drainages in southwestern Unit 20D.

DEPARTMENT RECOMMENDATION: **<u>No Recommendation</u>**

RATIONALE: This is an allocation issue between hunters that use different means of transportation, and should be determined by the Board. This proposal seeks to address wildlife habitat degradation and the deterioration of hunt quality in this area.

The area is within the boundaries of the Delta Controlled Use Area (DCUA). The DCUA is closed to any motorized vehicle or pack animal use for big game hunting, including the transportation of the hunters, their gear, and parts of big game during August 5–25. The proposed restriction of motor vehicle use for big game hunting in the McCumber and Jarvis Creek

drainages would add complexity to the hunting regulations in this portion of Unit 20D because the restriction would go into effect earlier and be in effect longer than the surrounding DCUA transportation restrictions, but would not include prohibition on use of pack animals. There would also be a slight decrease in the amount of area accessible to motorized vehicles for sheep, caribou, and moose hunters during August 26–September 30.
****

PROPOSAL 204

EFFECT OF THE PROPOSAL: Increase the Intensive Management population objective for moose in Unit 20A.

DEPARTMENT RECOMMENDATION: **Amend and Adopt**

RATIONALE: The Department recommends the Board adopt the proposed increase in the Unit 20A intensive management objective (IM) for moose from 10,000–12000 to 12,000–15,000. We also recommend amending this proposal to reduce the Unit 20A IM harvest objective from 1,400–1,600 to 900–1,100.

The Unit 20A moose population was reduced from an estimated 17, 766 (15,489–20,044; 90% Confidence Interval [CI]) in 2003 to 12, 536 (11,102–13,969; 90% CI) in 2008. At that lower population level, we detected no improvement in the nutritional status of the population. The Department reduced female harvest rates beginning in 2008 in an attempt to stabilize the population at about 13,000–14,000 moose, while continuing to monitor nutritional status. Estimates in 2009 of 15,676 (13,771–17581; 90% CI), 2010 of 14,497 (12,545–16,448; 90% CI) and in 2011 of 12,724 (11,197–14,250; 90% CI) indicate moose numbers have remained relatively stable, and no further declines in moose productivity have been detected. If nutritional status begins to decline, it may be prudent to further reduce moose numbers until either improvement in nutritional status is observed or the lower end of the proposed population objective (12,000 moose) is reached.

The Department amendment would reduce the IM harvest objective from 1,400–1,600 moose (about 9–13% harvest rate for 12,000–15,000 moose) to 900–1,100 (6–9% harvest rate for 12,000–15,000 moose) because the higher harvest is biologically and socially not sustainable. We observed a population decline during 2004–2008 with reported harvest rates of 6–8% and expect the population will be stable at a reported harvest rate of approximately 5–6%. In terms of absolute numbers of moose, when harvests reached about 1,000 moose (2004–2007), a cadre of social issues surfaced (e.g., trespass, parking and roadside camping, garbage, access, and hunter crowding). These social issues resulted in public resistance to, and loss of public support for, moose management programs, especially controversial antlerless hunts.
****

PROPOSAL 205

EFFECT OF THE PROPOSAL: Change the legal animal in antlerless hunts in Units 20A and 20B

DEPARTMENT RECOMMENDATION: **Do Not Adopt**

RATIONALE: This proposal would allow taking of calves in antlerless moose hunts in Units 20A and 20B. However, taking a cow accompanied by a calf would still be prohibited.

The Department does not support this proposal because it is opposed by most fish and game advisory committees involved in reauthorization of antlerless moose hunts. While calf harvest is biologically sustainable and would aid in achieving intensive management harvest objectives, the department respects advisory committee opposition that is based upon ethics or human values.
****

PROPOSAL 206

EFFECT OF THE PROPOSAL: Reauthorize the antlerless moose hunting season in Unit 20A.

DEPARTMENT RECOMMENDATION: **Amend and Adopt**

RATIONALE: Staff proposal — see issue statement. The amendment will be editing to clarify exactly how many permits may be issued in the unit.

Amended language:

Units and Bag Limit	Resident Open Season (Subsistence and General Hunts)	Nonresident Open Season
…		
(18)		
Unit 20(A), the Ferry Trail Management Area, Wood River Controlled Use Area, and the Yanert Controlled Use Area		
RESIDENT HUNTERS:		
1 bull with spike-fork antlers or 50-inch antlers or antlers with 4 or more brow tines on one side; or	Sept. 1 - Sept. 25 (General hunt only)	

1 antlerless moose by drawing permit only; up to 2,000 permits may be issued in combination with the hunt in the Remainder of Unit 20(A); a person may not take a calf or a cow accompanied by a calf; or	Aug. 15 - Nov. 15 (General hunt only)	
1 antlerless moose by registration permit only; a person may not take a calf or a cow accompanied by a calf; or	Oct. 1 - Feb. 28 (General hunt only)	
1 bull by drawing permit only; up to 1,000 permits may be issued; or	Sept. 1 - Sept. 25 (General hunt only)	
1 bull by drawing permit only; by muzzleloader only; up to 75 permits may be issued in Unit 20(A)	Nov. 1 - Nov. 30 (General hunt only)	
NONRESIDENT HUNTERS:		
1 bull with 50-inch antlers or antlers with 4 or more brow tines on one side; or		Sept. 1 - Sept. 25
1 bull with 50-inch antlers or antlers with 4 or more brow tines on one side by drawing permit only; by muzzleloader only; up to 75 permits may be issued		Nov. 1 - Nov. 30

in Unit 20(A)

Remainder of Unit 20(A)

RESIDENT HUNTERS:	
1 bull with spike-fork antlers or 50-inch antlers or antlers with 3 or more brow tines on one side; or	Sept. 1 - Sept. 25
1 antlerless moose by drawing permit only; up to 2,000 permits may be issued in combination with the hunt in Unit 20(A), the Ferry Trail Management Area, Wood River Controlled Use Area, and the Yanert Controlled Use Area; a person may not take a calf or a cow accompanied by a calf; or	Aug. 15 - Nov. 15 (General hunt only)
1 antlerless moose by registration permit only; a person may not take a calf or a cow accompanied by a calf; or	Aug. 25 - Feb. 28
1 bull by drawing permit only; up to 1,000 permits may be issued in Unit 20(A); or	Sept. 1 - Sept. 25
1 bull by drawing permit only; by muzzleloader only: up to 75 permits may be issued in Unit 20(A)	Nov. 1 - Nov. 30 (General hunt only)
NONRESIDENT HUNTERS:	
1 bull with 50-inch antlers or antlers with 4 or more brow tines on one side;		Sept. 1 - Sept. 25

or

1 bull with 50-inch antlers or antlers with 4 or more brow tines on one side by drawing permit only; by muzzleloader only up; to 75 permits may be issued in Unit 20(A)	Nov. 1 - Nov. 30

…
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PROPOSAL 207

EFFECT OF THE PROPOSAL: Modify the muzzleloader hunt area for moose in Unit 20A (i.e., revert to the original hunt area).

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: The department has no biological concerns. This is an allocation and user conflict issue that should be decided by the Board. This late season muzzleloader hunt (DM766; 1–30 November) was located in the eastern Wood River Controlled Use Area during 1996–1999 and 2005–2010. The hunt was suspended during 2000–2004 because of declining bull:cow ratios.

In 2010, citing conflicts between hunters, trappers (i.e., primarily a single wolf trapper in the area), and local residents as well as disturbance to moose, a public proposal was submitted to the Board to move the hunt from Unit 20A to Unit 20B. Instead, the Board established a new late season muzzleloader hunt in Unit 20B and expanded the Unit 20A muzzleloader hunt to include all portions of Unit 20A outside of the “original” hunt area beginning in fall 2011. The intent was to hold the hunt in a portion of this area, at the discretion of the Department.

The Unit 20A muzzleloader hunt was moved east in 2011 to include upper Dry Creek, the Little Delta River and western portions of Delta Creek. The Department received numerous complaints from drawing permit winners regarding this move. Most complaints cited access issues (i.e., difficulty crossing the Tanana and Wood rivers because they would not be frozen). In October 2011, the Department responded to those complaints and expanded the hunt area to include portions of the Tanana Flats with better access during that time of year.

On average, approximately 15 bull moose are taken each year in this relatively small-scale (40-75 permits), special weapons hunt. Although the proposer suggests that this hunt is a useful management tool to regulate the moose population, any reduction in harvest during the muzzleloader hunt can be reallocated by issuing additional “any bull” permits for that area during fall. Hence, this is clearly an allocation issue that should be decided by the Board.
****

PROPOSAL 208

EFFECT OF THE PROPOSAL: Establish a new muzzleloader drawing permit hunt for any moose in the remainder of Unit 20A, outside the Wood River Controlled Use Area.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: This is an allocation issue that should be determined by the board, and therefore, the Department has no recommendation. A muzzleloader hunt began for bull moose in Unit 20A in 1996 and recently has become very controversial. If this proposal is adopted, the Department requests that the Board specify hunt location, season, and bag limit. The additional harvest generated by adding a new muzzleloader hunt for antlerless moose would be small and is not needed to regulate the Unit 20A moose population.

Currently, there is ample opportunity to hunt antlerless moose with muzzleloader during the winter antlerless registration hunt and the Department does not anticipate significant reductions in opportunity to hunt antlerless moose by any legal means, including muzzleloaders, during late season registration hunts. Portions of the Unit 20A antlerless registration moose hunt (i.e., zones 4B and 5) have been open during 10 January–28 February. Portions of Zone 2 have been open for the month of January and zones 3A and 4A have opened for 2 days at the end of February. At the 2010 Board meeting, the Department was given the authority to open late season antlerless moose hunts as early as 1 October and in 2011 the antlerless registration hunt opened on 15 November.
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PROPOSAL 209

EFFECT OF THE PROPOSAL: Require hunters in “any bull” moose hunts in Unit 20A to attach a locking tag at the kill site and keep the antlers visible during transport from the field.

DEPARTMENT RECOMMENDATION: **Take No Action**

RATIONALE: The Department recommends “take no action” on this proposal based on action taken by the Board on proposal 52 at the January 2012 statewide meeting. The board approved Department discretionary permit authority requiring a permittee to attach a locking tag to an antler at the kill site. However, they did not approve requiring a permittee to keep antlers visible during transport from the field.
****

PROPOSAL 210

EFFECT OF THE PROPOSAL: Move the northern boundary of the Wood River Controlled Use Area.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: This is an allocation and user conflict issue among hunters using different modes of transportation and should therefore be determined by the board.

The Wood River Controlled Use Area (WRCUA) encompasses 972 mi^2 in southcentral Unit 20A. It was established in 1976 to include the Yanert drainage to the south and the Tanana Flats to the north. Its purpose was to reduce conflicts between ATV users and airplane and horse users. Boats and aircraft were the only motorized access allowed for hunting. In 1977 the Tanana Flats portion was removed. In 1983 the Yanert drainage was removed and made into the Yanert Controlled Use Area with year-round restrictions on use of motorized vehicles for big game hunters, except aircraft. The same year, the WRCUA's current boundaries were adopted (with the exceptions that the boundary along the Wood River downstream from Snow Mountain Gulch was clarified in 2000 and the western boundary was changed and changed back again in the early 2000s). Also in 1983, motorized vehicles, except aircraft, were restricted from use for the purpose of hunting big game during Aug. 1-Sept. 30.

Most hunters currently access the area via aircraft and horse. Since its inception, the WRCUA has had substantial use by guides accessing the area by aircraft and horseback for moose, sheep, caribou, and grizzly bear. A portion of the area covered under this proposal was open to motorized access in the early 2000s after the Board passed a proposal by the Middle Nenana Fish and Game Advisory Committee. Within 2 years, that same committee proposed that vehicle restriction be reinstated in that area and the board accommodated their request.

If this proposal is adopted, we would expect to see substantial increases in use of the area and in user conflicts, and modest increases in harvests. Sheep horn restrictions and caribou drawing permits already in place would prevent overharvest of those species.

Regarding moose, antler restrictions already in place would prevent overharvest of bull moose. Opening the area to motorized access in September would likely increase the harvest of antlerless moose and help meet harvest objectives for that area (Zone 4). However, during September, antlerless hunts in this area are by drawing permit only, thus, increases in antlerless harvest would likely be modest.
****

PROPOSAL 211

EFFECT OF THE PROPOSAL: Prohibit all-terrain vehicle use in a portion of Unit 20A.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: This is an allocation issue between hunters that use different modes of transportation, and should therefore be determined by the board. Current regulations are adequate to manage big game harvests in this portion of Unit 20A.

This proposal seeks to prohibit all-terrain vehicle use above 2,500 feet in elevation in that portion of Unit 20A between the west bank of Delta Creek and the east bank of the East fork of the Little

Delta River up to and including the east bank of West Hayes Creek. The aim is to curtail habitat destruction, environmental degradation, deterioration of quality hunting experience, game and hunter harassment, unsportsmanlike conduct and unsightliness of trails. Destruction of habitat and environmental degradation are land management issues under authority of the State of Alaska Department of Natural Resources. Elevation was used to define antlerless hunt boundaries in the Delta Area several years ago and the Alaska Wildlife Troopers found it to be problematic, unreliable and difficult to enforce.
****

PROPOSAL 212

EFFECT OF THE PROPOSAL: Restrict all-terrain vehicle use to one type in a portion of Unit 20A.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: This is an allocation issue between hunters that use different modes of transportation, and should therefore be determined by the board. Current regulations are adequate to manage big game harvests in this portion of Unit 20A.

This proposal seeks to limit all-terrain vehicle use to one type south of the 64th parallel in that portion of Unit 20A that includes the drainages between the east bank of Delta Creek and the west bank of the East Fork of the Little Delta River up to and including the west bank of West Hayes Creek. The aim is to curtail destruction of habitat, environmental degradation, deterioration of quality hunting experience, game and hunter harassment, unsportsmanlike conduct and unsightliness of trails. Destruction of habitat and environmental degradation are land management issues under authority of the State of Alaska Department of Natural Resources. Should this proposal be adopted, the Alaska Wildlife Troopers recommend that the line of latitude be identified by two defined points, one on the east and one on the west.
****

PROPOSAL 213

EFFECT OF THE PROPOSAL: Allow motorized vehicle access in the Yanert Controlled Use Area in Unit 20A during October through July.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: This is an allocation issue between hunters that use different modes of transportation, and should therefore be determined by the board. If the Board adopts this proposal, it could help achieve Intensive Management (IM) population and harvest objectives for moose in Unit 20A. The department is striving to harvest more moose in Unit 20A to regulate the population and to meet IM harvest objectives. In addition, the department's strategy is to spread the harvest spatially and temporally to reduce localized overharvest and social conflicts (e.g., trespass, parking and roadside camping issues, garbage and human waste issues, access issues,

and hunter crowding). Allowing motorized access in the Yanert Controlled Use Area (YCUA) after 1 October would help accomplish this by providing a place for the November muzzleloader hunt (annual harvest of ~15 bull moose) and additional harvest (~10–15 antlerless moose) during the winter registration hunt.
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PROPOSAL 214

EFFECT OF THE PROPOSAL: Create an "any ram" drawing permit hunt in Unit 20A for up to 10 tags; August 17–September 20.

DEPARTMENT RECOMMENDATION: **Do Not Adopt**

RATIONALE: The Unit 20A management objectives for sheep include providing the greatest sustainable annual opportunity to hunt and harvest Dall sheep. The full-curl harvest strategy has been effective in achieving these objectives. The proponent’s intention is to harvest mature rams that have not reached full curl and never will. The department has very little data for this area regarding the proportion of 8-year-old or older rams that do not reach full curl, but that number is probably low and is certainly lower than that of 7-year-old and younger rams. Thus, it is more likely that rams harvested under this permit would be young rams as opposed to less than full curl mature rams. The harvest of younger rams would be primarily additive mortality, which would reduce the availability of full-curl rams in the future and ultimately reduce sustainable opportunity to hunt and harvest full curl rams in the area.
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PROPOSAL 215

EFFECT OF THE PROPOSAL: Establish a community subsistence harvest moose hunt area for the village of Minto in the Unit 20B Minto Flats Management Area.

DEPARTMENT RECOMMENDATION: **Take No Action**

RATIONALE: See analysis and recommendation for proposal 216.
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PROPOSAL 216

EFFECT OF THE PROPOSAL: Open the antler-restricted bull hunt 10 days earlier in the Minto Flats Management Area; convert the winter any-moose registration permit hunt to antlerless; and issue an unlimited number of permits.

DEPARTMENT RECOMMENDATION: **Amend And Adopt**

RATIONALE: The Department recommends amending this proposal to implement a different approach to resident moose harvest in Minto Flats Management Area (MFMA) from what is currently in place. This high density moose population can support a harvest regime different than the current short, antler-restricted bull season and the limited registration permits for any moose (see details in the following table). The limited registration permits that have been issued since 2006 have created dissatisfaction among local and nonlocal hunters because of the limited number of permits and, at times, long waiting periods in outdoor lines under extreme weather conditions.

The MFMA moose population is estimated at over 4000 moose (2010; 4.4 moose/mi^2) and is likely stable or increasing. Sustainable harvest (5%-7%) is estimated at 200-280 moose. Reported harvest during regulatory year 2010 was 195 moose (129 bulls and 66 cows). The board has found that there are positive customary and traditional uses of moose in Unit 20, and has found the amount reasonably necessary for subsistence (ANS) for the Minto Flats Management Area is 20-40.

Proposal 216 would retain the September antler-restricted hunt for bulls; delete the September, any moose, limited registration permit hunt; and modify the winter, any moose, limited registration hunt to an antlerless moose, unlimited registration hunt that starts on November 1. The Department's amendment to proposal 216 would establish a new, any bull season in August; retain the September, antler-restricted season; delete the September, any moose, limited registration permit hunt, and modify the winter, any moose, limited registration hunt to an antlerless moose, unlimited registration hunt that starts on October 15 and would not be limited to 1 per household. This season would be closed by emergency order when the desired number of antlerless moose is taken. All moose hunts would continue to be for resident hunters only.

	Current Regulation	**Proposal 216**	**Department Amendment**
Bag Limit			1 bull
Season			Aug. 21–27
Bag Limit	1bull with spike-fork antlers or 50-inch antlers or antlers with 4 or more brow tines on one side	1bull with spike-fork antlers or 50-inch antlers or antlers with 4 or more brow tines on one side	1bull with spike-fork antlers or 50-inch antlers or antlers with 4 or more brow tines on one side
Season	Sept. 11–Sept. 25	Sept 1–Sept. 25	Sept 8–Sept. 25
Bag Limit	1 moose by registration permit only (limited number of permits, 1 permit per household)		
Season	Sept. 1–Sept. 25		
Bag Limit	1 moose by registration permit only(limited number of permits, 1 permit per household)	1 antlerless moose by registration permit only (unlimited number of permits, 1 permit per household)	1 antlerless moose by registration permit only (unlimited number of permits)
Season	Jan. 1–Feb. 28	Nov. 1–Feb. 28	Oct. 15–Feb. 28

Under the Department's amendment, the August 21–27 any-bull general season and September 8–25 antler-restricted general season would increase the fall general season from 15 to 25 days. It would allow for a liberal bag limit during the early season when hunting conditions are more difficult; however, antler restrictions would be in place when moose start entering the breeding season and become more susceptible to harvest. This general season for bulls would be more restrictive than the current fall registration permit, but every resident could participate without having to stand in line for a permit. This new fall general season would be closed August 28–September 7 in order to limit harvest when Minto Flats has an influx of waterfowl hunters who may incidentally take moose.

The October 15–February 28 antlerless moose registration permit could accomplish several things. First, the registration permits will be unlimited so that people would not need to stand in line to obtain a permit. However, the hunt would be closed by emergency order when the antlerless harvest quota is met. Second, this hunt would continue to provide opportunity for residents to harvest antlerless moose in the MFMA during winter. Third, the harvest quota will likely not be met in an unreasonably short period of time because access will be limited in the area when the hunt starts on October 15. Fourth, access will improve and harvest will increase as the season progresses and snow and ice conditions improve. Finally, this antlerless season would help achieve the Department's goal of harvesting sufficient cow moose to limit growth of this high density moose population. This hunt would be more restrictive than the current winter season because it would be limited to antlerless moose and bulls would still be carrying antlers in October and November.
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PROPOSAL 217

EFFECT OF THE PROPOSAL: Establish a community subsistence harvest hunt area for the Village of Minto in Unit 20.

DEPARTMENT RECOMMENDATION: **Take No Action**

RATIONALE: This proposal was deferred from the spring 2011 meeting. See analysis and recommendation for proposal 216.
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PROPOSAL 218

EFFECT OF THE PROPOSAL: Reauthorize the antlerless moose hunting season in Unit 20B.

DEPARTMENT RECOMMENDATION: **Amend and Adopt**

RATIONALE: This is a staff proposal. The department recommends amending this proposal by changing the bag limit in the Middle Fork of the Chena and upper Salcha rivers muzzleloader hunt (DM782) from any moose to one bull. The Fairbanks Fish and Game Advisory Committee (AC) voted to reauthorize the 20B antlerless hunts with this amendment. After having discussions with the Fairbanks AC, the department agreed that we would support their position

on this proposal. Loss of antlerless harvest in this hunt will not compromise our management goal in Unit 20B and only cause a minor loss in opportunity for hunters. Information on the remainder of the proposal can be found in the proposal issue statement.
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PROPOSAL 219

EFFECT OF THE PROPOSAL: Remove part B of 5AAC 92.530(8), the limitation to airboats and aircraft for moose hunting in the Minto Flats Management Area.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: This is an allocation issue that should be decided by the board, and therefore, the Department has no recommendation. The Minto Flats Management Area (MFMA) was established in 1979 in response to concerns about increasing hunting pressure, competition between users, and declining moose populations. It is an area with a positive customary and traditional use finding currently with a high density of moose and large number of users. It is unclear to what extent the access restrictions were intended to provide reasonable opportunities for subsistence.

Currently, MFMA is open to moose hunting, except that aircraft and airboats may not be used for moose hunting or to transport moose, moose hunters, or moose hunting equipment within the area. Removing the prohibition on airboats and aircraft would not create a biological concern at this time because moose numbers are high (>4000 moose; > 4 moose/mi^2) and the harvest can be regulated by seasons and bag limits (e.g., early seasons, antler restrictions, quotas). The Department anticipates that user conflicts between hunters who use aircraft and airboats and other hunters would arise if this proposal is adopted. Also, allowing the use of aircraft and airboats may shift a significant proportion of the harvest to this more efficient mode of transportation compared to the use of powerboats.

The proposal states that this change would help control the growing, high density moose population in MFMA. Harvest objectives determined by the department are easily attainable with the current regulations.
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PROPOSAL 220

EFFECT OF THE PROPOSAL: Lengthen the muzzleloader drawing permit season for antlerless moose in Unit 20B, Creamer's Refuge, and expand the hunt to all of the Fairbanks Management Area.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: This proposal is an allocation issue that should be decided by the board, and therefore, the Department has no recommendation. Significant social issues that may arise are included below.

The department uses several hunts within the urban Fairbanks Management Area (FMA), which includes Creamer's Refuge, as tools to reduce roadkill, reduce nuisance moose problems, and increase hunting opportunity. Public acceptance of moose hunting in this urban area is critical to the future of the hunts. In addition to a 7-day muzzleloading season on Creamer's Refuge, a drawing archery hunt for antlerless moose and a general season archery hunt for bull moose occur within the FMA. Most of the moose taken in this urban area are taken by archery and roadkill.

Expanding the muzzleloader hunt into the FMA or lengthening the muzzleloading hunt may not be acceptable to surrounding home and business owners or the recreating public. Creamer's Refuge is completely surrounded by Fairbanks residential and business areas and is used by thousands of non-hunting outdoor recreationists every year. Archery has proven to be a publicly acceptable method of moose take within the FMA for the last 20 years, while the local public has frequently requested that large caliber firearms not be used to take large animals around their homes and businesses.

Opportunity for muzzleloading hunters to harvest moose between August 15 and February 28 in the rest of Unit 20 is at an all-time historical high. In addition, muzzleloading rifles can be used during any hunt in which rifles are allowed.

An alternative to this proposal may be to amend the hunt dates to December 1–January 31. This would separate archers from muzzleloaders, provide a much longer season, put muzzleloading hunters in the field during the time of year when Creamer's Refuge has the least number of other users, and focus the harvest during the period of the highest road kill rate.
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PROPOSAL 221

EFFECT OF THE PROPOSAL: Lengthen the muzzleloader season in the Creamer's Field Migratory Waterfowl Refuge in Unit 20B.

DEPARTMENT RECOMMENDATION: **Take No Action**

RATIONALE: See analysis and recommendation for proposal 220.
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PROPOSAL 222

EFFECT OF THE PROPOSAL: Modify the muzzleloader drawing permit hunt area (DM782) to prohibit harvest of antlerless moose in the Salcha River drainage.

DEPARTMENT RECOMMENDATION: **Take No Action**

RATIONALE: See analysis and recommendation for proposal 218.
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PROPOSAL 223

EFFECT OF THE PROPOSAL: Modify the antlerless muzzleloader moose season in Unit 20B by excluding the antlerless component for the Salcha River.

DEPARTMENT RECOMMENDATION: **Take No Action**

RATIONALE: See analysis and recommendation for proposal 218.
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PROPOSAL 224

EFFECT OF THE PROPOSAL: Review the boundary of the Fairbanks Management Area; focus on changing the boundary near Murphy Dome and Ester Dome.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: The Department has no biological concerns with this proposal. The Fairbanks Management Area (FMA) has been in place since the 1970s, when it was called the Fairbanks Closed Area, and was closed to moose hunting. In the 1980s it changed to the Fairbanks Management Area, and an archery moose season was opened. The FMA's main purpose is to facilitate moose management in the densely populated areas in and around Fairbanks. The boundaries have changed numerous times over the years mainly to encompass new housing developments and subdivisions. The current boundaries have been in place for many years and the public is familiar with them. The Department has maintained 37 days of general archery season for bull moose along with a drawing permit hunt for antlerless moose for many years.

We try to maintain a high harvest of moose to reduce moose–motor vehicle accidents in the FMA. The large, relatively undeveloped areas near Murphy and Ester domes referred to in the proposal are small relative to moose home range size and movements. Thus, moose likely move in and out of these areas, making them available for harvest both inside and outside the FMA during the long moose seasons.
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PROPOSAL 225

EFFECT OF THE PROPOSAL: Remove the aircraft restrictions for beaver trapping in the Minto Flats Management Area.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: This is an allocation issue between trappers that use airplanes for access and those who do not. The Department has no concerns about the sustainability of beaver harvested in the Minto Flats Management Area. Although we have not conducted beaver surveys, Minto

Flats is prime beaver habitat and anecdotal information and recent harvest levels documented through household surveys suggest that beaver populations are healthy.

Beaver trapping regulations have been liberalized in recent years across Region III. Seasons were lengthened to start in September and end later in the spring and bag limits were removed. While beaver fur prices have been low for many years, resulting in minimal trapping effort in Interior Alaska, beaver remains a highly significant food source for many Alaskan residents, particularly Alaska Native communities. The Department documented a harvest of 227 beaver by Nenana residents in 1982 and a harvest of 147 beaver by Minto residents in 1984. More recently, we documented a reported harvest of 132 beaver by Minto and Nenana residents combined in 2004–2005.

The Board established a positive customary and tradition (C&T) use finding for beaver in all units with a harvestable surplus in March 2000. At that time, the Board determined that the harvestable portion was the amount reasonably necessary for subsistence (ANS) [5 AAC 99.025 (a)(13)(A)]. That determination was revised in January to 90% of the allowable harvest for all units statewide.

The current regulation prohibiting aircraft for beaver trapping in Minto Flats has been in place for 30 years and was likely put in place because of trapper conflict as a result of high fur prices at the time and the importance of protecting C&T use patterns of beaver use by residents of Minto and Nenana, as recognized in the positive C&T use determination. Although this regulation allows use of aircraft after March 1, the department is not aware of specific conflicts between aircraft and non-aircraft trappers. However, conflicts over trespass on corporation land and between MFMA trappers and other stakeholders continue. A high proportion of the beaver colonies in Minto Flats are on either small ponds, sloughs or one of the many narrow winding rivers that are inaccessible to aircraft.
****

PROPOSAL 226

EFFECT OF THE PROPOSAL: Align the resident and nonresident moose seasons in Unit 20C.

DEPARTMENT RECOMMENDATION: **Amend and Adopt**

RATIONALE: The department recommends amending this proposal to increase both the resident and nonresident moose season in Unit 20C. We will present the Board with an Intensive Management Feasibility Assessment that identifies information collected to address the potential for an Intensive Management (IM) Plan in Unit 20C. In the assessment we recommend increasing the moose season to reach the IM harvest objective of 150–400. The 2011 population estimate in Unit 20C outside of Denali National Park and Preserve is 3,801 moose. The harvestable surplus is 190 bull moose. The bull:cow ratio was 50 bulls:100 cows and the calf:cow ratio was 41 calves:100 cows. The average annual reported harvest during regulatory years 2006–2007 through 2010–2011 was 132 moose, and the average annual nonresident harvest was 13 moose. An average of 35 nonresidents hunted moose annually during this time period.

The board will need to evaluate whether adoption of this proposal would be consistent with the subsistence priority law. Unit 20C is an area with a positive customary and traditional use finding and an amount reasonably necessary for subsistence uses (ANS) of 100–130 for 20C and 20F combined. The harvestable surplus of 190 bulls exceeds the ANS and is well above the average reported harvest.

Unit 20C		
Current Season	**Proposed Change**	**Amended Change**
Residents Sept. 1 –20 Any Bull	Residents Sept. 1–20 Any Bull	Residents Sept. 1–25 Any Bull
Nonresidents Sept. 5–15 Any Bull	Nonresidents Sept 1–20 Any Bull	Nonresidents Sept 1–20 50 inch/4 BT

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PROPOSAL 227

EFFECT OF THE PROPOSAL: Unit 20C will be managed as an intensive management area.

DEPARTMENT RECOMMENDATION: **Take No Action**

RATIONALE: See analysis and recommendation for proposal 229.
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PROPOSAL 228

EFFECT OF THE PROPOSAL: Adopt a wolf control program for Unit 20C.

DEPARTMENT RECOMMENDATION: **Take No Action**

RATIONALE: See analysis and recommendation for proposal 229.
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PROPOSAL 229

EFFECT OF THE PROPOSAL: Adopt an intensive management plan for Unit 20C moose that will identify and quantify the issues restricting moose population growth and plan for actions to enhance that growth.

DEPARTMENT RECOMMENDATION: **Do Not Adopt**

RATIONALE: The Department will present the Board with an intensive management (IM) feasibility assessment recommending that an IM plan not be adopted in Unit 20C. However, we are recommending a more liberal hunting season as explained in the analysis and recommendation for proposal 226.

The department completed a moose population estimate in Unit 20C during November 2011. An estimated 3,801 moose inhabit the unit outside Denali National Park and Preserve with a bull:cow ratio of 49:100 and a calf:cow ratio of 41:100. The current IM population objective is 3,000-4,000 moose. The IM harvest objective is 150-400 and the current harvest is about 126 annually. The harvestable surplus is a 190 bull moose. The current population estimate in Unit 20C falls within the IM population objective. Increasing the season by 5 days will likely increase the current average harvest into the range of the IM harvest objective.
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PROPOSAL 230

EFFECT OF THE PROPOSAL: In Unit 20C, establish a bear population reduction program.

DEPARTMENT RECOMMENDATION: **Take No Action**

RATIONALE: See analysis and recommendation for proposal 229.
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PROPOSAL 231

EFFECT OF THE PROPOSAL: Allow trapping for black bear in Unit 20C in the Teklanika River and Kantishna river drainages.

DEPARTMENT RECOMMENDATION: **Take No Action**

RATIONALE: See analysis and recommendation for proposal 141.
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PROPOSAL 232

EFFECT OF THE PROPOSAL: Allow the harvest of brown bears at black bear bait stations in Unit 20C. The hide and meat must be salvaged.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: The Department has no biological concerns regarding this proposal. Allowing the harvest of brown bears over black bear bait could reallocate some moose in the more accessible areas of Unit 20C from bears to hunters. Currently, an average of 6 brown bears is harvested annually in the unit. It is likely that a higher harvest is sustainable.

The portion of Unit 20C that is accessible for bear hunting is mostly flat, densely wooded habitat where hunting is difficult. The use of bait is the most effective hunting method and most of the current harvest is black bears taken in this way. Access to the area is mainly by boat, ATV, and aircraft, although a large portion of 20C is inaccessible.

The Board has not yet determined whether there are customary and traditional uses (C&T) of brown bears in Unit 20C pursuant to AS 16.05.258. As a result, the Department will provide a C&T worksheet based upon the 8 criteria found in 5 AAC 99.010 for the Board's consideration prior to taking action on this proposal.

If this proposal is adopted, the Department recommends that brown bears be added to 5 AAC 92.044 (Permit for hunting black bear with the use of bait or scent lures) to allow us to use our discretionary permit authority to closely monitor the harvest so the season can be closed by emergency order if necessary.
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PROPOSAL 233

EFFECT OF THE PROPOSAL: Establish the Denali Controlled Use Area to include state land within certain townships and sections in Unit 20C.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: This is an allocation issue that should be decided by the Board. Controlled use areas function primarily to address conflicts between groups that use different modes of transportation for hunting. For example, the purpose of the Wood River CUA in Unit 20A is to reduce conflicts between ATV users and airplane and horse users for big game hunting. This proposal does not identify user conflicts that need to be addressed nor does it make recommendations regarding potential solutions. Also, it is not clear which species (e.g., caribou, moose, black bear, grizzly bear, wolves, wolverine, etc.), if any, are being impacted. Additional information is needed to adequately evaluate this proposal.
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PROPOSAL 234

EFFECT OF THE PROPOSAL: Require meat-on-the-bone salvage of moose in Unit 25C.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: This is not a biological issue, and therefore, needs to be determined by the Board.

The Department is not aware of any meat salvage issues in Unit 25C. We also do not have any quantifiable data concerning wanton waste in Unit 25C and the Alaska Wildlife Troopers do not issue excessive wanton waste citations compared to other Interior units.

Leaving the edible meat attached to the bone is commonly practiced by hunters. However, many hunters remove the meat from the bone at kill sites or camps to facilitate packing or transport. Meat can be successfully salvaged for human consumption when proper procedures are followed during de-boning. Requiring meat to be left on the bone until processed for human consumption does not ensure adequate preservation. Many factors, including weather, cleanliness during field care and transport, and the use of game bags affect the condition of meat when it arrives at the point of processing.

Hunter transportation methods in Unit 25C vary widely, including boats, aircraft, highway vehicles, and ATVs. Since 2000, 48% of successful moose hunters used 3- or 4-wheelers, 24% used boats, 18% used highway vehicles, 4% used aircraft, and 6% used other means, including off road vehicles, or horses.
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PROPOSAL 235

EFFECT OF THE PROPOSAL: Increase the bag limit for black bear in Unit 25C from 3 to 5.

DEPARTMENT RECOMMENDATION: **Adopt**

RATIONALE: The Department recommends adopting this proposal because increasing the bag limit will allow additional hunting opportunity with little or no effect on the black bear population.

Black bear densities and population size are unknown in Unit 25C. However, based on estimated densities in Unit 19D (15–30 black bears/100 mi^2) and Unit 20A (12–18 black bears/100 mi^2), the Unit 25C population estimate is likely 618–1,545 black bears. Therefore, we estimate the harvestable surplus is 61–233 black bears.

Sealing and/or harvest tickets are not required in Unit 25C. However, we estimate an annual take of approximately 15–30 bears, based on extrapolation of reported and estimated harvest from other Interior units. An average of 12 bait stations a year is registered. Harvest is not likely to increase significantly because of the distance from the Fairbanks urban area and relatively few roads. In addition, few hunters will likely take 5 bears annually. In adjacent Unit 20B, annual harvest was133 bears, and an average of 1 hunter per year took the bag limit of 3 bears
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\PROPOSAL 236

EFFECT OF THE PROPOSAL: Allow limited harvest of brown bears at black bear bait stations in Units 20A, 20B and 25C.

DEPARTMENT RECOMMENDATION: **Units 20A and 20B–Do Not Adopt; Unit 25C–No Recommendation**

RATIONALE: The department estimates 120–161 independent (older than 2ond year of life) brown bears in Unit 20A, a sustainable harvest of 10–13 bears (8%), and a mean reported harvest of 23 bears (2008–2010). For Unit 20B, we estimate 57–127 independent brown bears, a maximum sustainable harvest of 4–10 bears (8%), and a mean reported harvest of 14 bears

(2008–2010). Because harvests may have been exceeding estimated sustainable take in Units 20A and 20B and allowing brown bears to be taken over black bear bait stations would likely result in higher harvests, the department does not recommend allowing baiting of brown bears in these Units. The current harvest is being closely monitored and more conservative seasons may be necessary.

We have no recommendation for Unit 25C where additional harvest could likely be sustainable (i.e., the department estimates 66–133 independent brown bears in Unit 25C, a maximum sustainable harvest of 5–10 bears (8%), and a mean reported harvest of 6 bears (2008–2010).

The Joint Boards of Fisheries and Game has adopted a Fairbanks nonsubsistence area (FNSA) that includes portions of the units addressed by this proposal. The Board has previously determined that there are no customary and traditional uses (C&T) of brown bears in Units 25C and 20B outside the FNSA. The Board has not yet made this determination in Unit 20A outside the FNSA pursuant to AS 16.05.258. As a result, the Department will provide a C&T worksheet based upon the 8 criteria found in 5 AAC 99.010 for the Board's consideration prior to taking action on this proposal.

The proponent recommends that the bag limit be restricted to 1 brown bear every four years. However, if this proposal is adopted, the Department recommends a 1 brown bear every regulatory year bag limit (i.e., the same as the general season bag limit in these units). We also recommend that brown bears be added to 5 AAC 92.044(Permit for hunting black bear with the use of bait or scent lures) to allow us to use our discretionary permit authority to closely monitor the harvest so the season can be closed by emergency order if necessary.
****

PROPOSAL 237

EFFECT OF THE PROPOSAL: Align the brown bear season in all of Unit 20 to August 10–June 30.

DEPARTMENT RECOMMENDATION: **Amend and Adopt**

RATIONALE: The grizzly bear seasons in Units 20C, 20D, 20F, and 20E are currently August 10–June 30 and September 1–May 31 in Units 20A and 20B. The Department recommends amending this proposal to change the grizzly bear season in eastern Unit 20B (i.e., the Middle Fork of the Chena River and upper Salcha River drainages in Unit 20B) to August 10–June 30, because this area has poor access and low hunter densities, minimizing the risk of overharvest. However, the Department does not support the longer season proposed for the remainder of Unit 20B and for Unit 20A because these areas have better access and higher hunter densities, increasing the risk of overharvest with a longer season. Reported brown bear harvests during regulatory years 2008–2009 through 2010–2011 in Units 20A (average =23) and 20B (average =14) have been increasing and exceeding estimated sustainable harvest rates of 8% (i.e., 13 of the estimated population of 160 bears in Unit 20A; 9 of the estimated population of 110 bears in Unit 20B). Although harvest rates have been based on dated population estimates and models,

which may no longer be applicable, a conservative strategy should continue to be used in these areas.
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PROPOSAL 238

EFFECT OF THE PROPOSAL: Implement a predation management plan in Unit 9B.

DEPARTMENT RECOMMENDATION: **Do Not Adopt**

RATIONALE: During the March 2011 meeting of the Board of Game in Wasilla, the board adopted a proposal to develop a predator control plan for moose in Unit 9B. The department developed the required regulatory language (5AAC 92.125) and is in the process of conducting a feasibility assessment.

The department recommends the board not adopt Proposal 238 at this time due to the low likelihood of making progress towards objectives given the information collected to date. Significantly more information is required to document the triggers necessary for intensive management, to develop a feasible IM plan, and to determine whether suitable methods for monitoring and evaluating the plan can be implemented.
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PROPOSAL 239

EFFECT OF THE PROPOSAL: Reauthorize the antlerless moose season in Unit 1C, Berners Bay.

DEPARTMENT RECOMMENDATION: **Adopt**

RATIONALE: Staff proposal, See issue statement.

The Juneau-Douglas Advisory Committee voted unanimously in support of reauthorizing the antlerless hunt. However, the department will not be opening the antlerless hunt in this area until such time the herd demonstrates significant growth, and staff believes it is necessary to control the overall number of moose due to habitat limitations. Additionally, no bull permits have been issued for this herd for fall 2012, nor have any been made available since 2006.
An aerial survey conducted in November 2011 recorded 73 moose total (22 bulls; 41 cows; and 10 calves). Using sightability estimates based on radio-marked cow moose, we estimate the Berners Bay moose population to be approximately 108 moose. In 2010 the overall population estimate was 88 moose. At best, we believe the population remained stable, or increased slightly in 2011. Both the bull:cow (54:100) and calf:cow (24:100) ratios increased slightly from 2010 (40:100 and 22:100, respectively). In the coming months, staff will discuss the merits and options for providing a drawing bull moose hunt in Berners Bay in fall 2013. Annual aerial surveys will be conducted annually in Berners Bay to monitor the moose herds' status. Additionally, we will continue to maintain a collared sample of cow moose in this herd to monitor adult survival, calf survival, and fecundity.

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PROPOSAL 240

EFFECT OF THE PROPOSAL: Reauthorize the antlerless moose season in Unit 1C, Gustavus.

DEPARTMENT RECOMMENDATION: **Adopt**

RATIONALE: Staff proposal, See issue statement.

The Gustavus portion of the Icy Straits Advisory Committee voted 4-1 (1 member absent) to support reauthorizing the antlerless hunts; the Juneau-Douglas Advisory Committee voted unanimously in support of the reauthorization. However, the department will not be opening the antlerless hunt at Gustavus until such time the herd demonstrates significant growth, and staff believes it is necessary to control the overall number of moose due to habitat limitations.

An aerial survey conducted in November 2011 recorded 136 total moose (16 bulls, 94 cows, and 26 calves). Using sightability estimates based on radio-marked cow moose, we estimate the Gustavus moose population to be approximately 272 moose. In 2010, the overall population estimate was 252 moose. The Gustavus moose population appears to be stable and within the desired population level for the available habitat and reducing the overall number of moose is not necessary at this time. Annual aerial surveys will be conducted annually in Gustavus to monitor the moose herds' status. Additionally, we will continue to maintain a collared sample of cow moose in this herd to monitor adult survival, calf survival, and fecundity.
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PROPOSAL 241

EFFECT OF THE PROPOSAL: Reauthorize the antlerless moose season in Unit 5A, Nunatak Bench.

DEPARTMENT RECOMMENDATION: **Adopt**

RATIONALE: Staff proposal, see issue statement.

The Yakutat Advisory Committee voted 10-1 to support the antlerless hunt reauthorization. However, the department will not be opening the antlerless hunt at Nunatak Bench until such time the herd demonstrates significant growth, and staff believes it is necessary to control the overall number of moose due to habitat limitations. No permits were issued for fall 2012, nor have any been available since 2004. Aerial surveys of the area were not completed in 2010, and have not yet been completed in 2011.
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PROPOSAL 242

EFFECT OF THE PROPOSAL: Reauthorize the antlerless moose season in Unit 6A.

DEPARTMENT RECOMMENDATION: **Adopt**

RATIONALE: Department proposal; see issue statement.
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PROPOSAL 243

EFFECT OF THE PROPOSAL: Reauthorize the antlerless moose season in Unit 6B.

DEPARTMENT RECOMMENDATION: **Adopt**

RATIONALE: Department proposal; see issue statement.
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PROPOSAL 244

EFFECT OF THE PROPOSAL: Reauthorize the antlerless moose season in Unit 6C.

DEPARTMENT RECOMMENDATION: **Adopt**

RATIONALE: Department proposal; see issue statement.
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PROPOSAL 245

EFFECT OF THE PROPOSAL: Reauthorize the antlerless moose season in Unit 13.

DEPARTMENT RECOMMENDATION: **Adopt**

RATIONALE: Department proposal; see issue statement.
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PROPOSAL 246

EFFECT OF THE PROPOSAL: Antlerless moose hunt reauthorization for GMU 14A

DEPARTMENT RECOMMENDATION: **Amend and Adopt**

RATIONALE: Antlerless moose hunts must be re-authorized annually by the Board. During November 2011, the moose population in Unit 14(A) was surveyed and estimated at 7,467 which was more than the post-hunt objective of 6,000 – 6,500 moose and an increase from the November 2008 survey of 6,613. The bull:cow ratio was 18.6 bulls:100 cows in 2011, which is lower than the ratio of 24.7 bulls:100 cows observed in 2009 and below objectives. The calf:cow ratio observed in 2011 (39.9 calves:100 cows) also declined when compared with the calf ratio observed in 2009 (48.9 calves:100 cows). Snow depth accumulations in the subunit during the last 4 winters were average, and survival of calves and adults was likely good.

Given the increase in the population, models indicate an increase in the cow harvest is needed to prevent further increases in the population. The department is already issuing the maximum number of drawing permits authorized by this regulation (up to 500 permits may be issued currently). At the same time the decrease in the bull to cow ratio indicates that taking additional bulls during the winter antlerless hunt would exacerbate the decline in the bull to cow ratio. As a result, we propose adjusting the season dates for the winter drawing hunt to correspond with a period of time when bulls will still have their antlers. Adjusting the season will result in fewer bulls being taken in this hunt and will help improve the bull:cow ratio.

In March of 2011 the Board authorized a new 'hot spot' permit hunt that allows permitted hunters to take moose that are in conflict with humans during winter months when moose congregate near roads or create other nuisance issues. Because this hunt occurs in the winter when moose are antlerless, the "hot spot" hunt must also be reauthorized annually by the Board. The department would like to retain this hunt along with its current season dates, so it can continue to be used as a tool to address moose problems during the winter.

The department will be submitting an RC with new proposed season dates for the drawing permit hunt, changing the season from Jan. 1 – Feb. 25 to Nov. 1 – Dec. 25, and increasing the number of draw permits that the department can issue from 500 to 1000. The RC will also include regulations for the winter "hot spot" hunt that were not included in the original proposal.
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PROPOSAL 247

EFFECT OF THE PROPOSAL: Reauthorize the antlerless moose season in the Twentymile/Portage/Placer hunt areas in Units 7 and 14(C).

DEPARTMENT RECOMMENDATION: **Adopt**

RATIONALE: Department proposal. See issue statement.
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PROPOSAL 248

EFFECT OF THE PROPOSAL: Reauthorize existing antlerless hunt for Unit 14C, Joint Base Elmendorf-Richardson (JBER).

DEPARTMENT RECOMMENDATION: **Adopt**

RATIONALE: Department proposal. See issue statement.
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PROPOSAL 249

EFFECT OF THE PROPOSAL: Reauthorize the antlerless moose season in the Anchorage Management Area in Unit 14(C).

DEPARTMENT RECOMMENDATION: **Adopt**

RATIONALE: Department proposal. See issue statement
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PROPOSAL 250

EFFECT OF THE PROPOSAL: Reauthorize the antlerless moose season in the Birchwood Management Area and the remainder of Unit 14(C).

DEPARTMENT RECOMMENDATION: **Adopt**

RATIONALE: Department proposal. See issue statement.
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PROPOSAL 251

EFFECT OF THE PROPOSAL: Reauthorize the antlerless portion of the any-moose drawing permit in the upper Ship Creek drainage in Unit 14(C).

DEPARTMENT RECOMMENDATION: **Adopt**

RATIONALE: Department proposal. See issue statement.
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PROPOSAL 252

EFFECT OF THE PROPOSAL: Reauthorize the antlerless moose season in portion of 15A, the Skilak Loop Management Area.

DEPARTMENT RECOMMENDATION: **Adopt**

RATIONALE: Staff proposal.
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PROPOSAL 253

EFFECT OF THE PROPOSAL: Reauthorize the antlerless moose season in a portion of Unit 15C.

DEPARTMENT RECOMMENDATION: **Adopt**

RATIONALE: Staff proposal-see issue statement.

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PROPOSAL 254

EFFECT OF THE PROPOSAL: Reauthorize the antlerless moose season in Unit 16B, Kalgin Island.

DEPARTMENT RECOMMENDATION: **Adopt**

RATIONALE: Staff proposal-see issue statement.
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PROPOSAL 255

EFFECT OF THE PROPOSAL: Reauthorize the brown bear tag fee exemptions in Region IV.

DEPARTMENT RECOMMENDATION: **Adopt**

RATIONALE: Staff proposal-see issue statement.
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PROPOSAL 260

EFFECT OF THE PROPOSAL: Liberalize the brown bear season in Unit 9B.

DEPARTMENT RECOMMENDATION: **No Recommendation**

RATIONALE: This proposal is a companion to Proposal 238. The department submitted this proposal to offer the Board an opportunity to consider changes to the brown bear management in Unit 9(B) when it reviews intensive management options to increase harvest of moose in the same Unit. The proposal is the product of an agenda change request submitted by the department and approved by the Board after the November 2011 Board of Game meeting in Barrow.