FEASIBILITY ASSESSMENT FOR MAINTAINING OR INCREASING SUSTAINABLE HARVEST OF MOOSE IN GAME MANAGEMENT UNIT 20A

Prepared by

DIVISION OF WILDLIFE CONSERVATION

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Overall assessment of potential to increase harvest[1]: Moderate

Department recommendation:

At this time, the Department does not recommend implementing an Intensive Management (IM) plan that includes predator control for the following reasons: 1) Moose densities are relatively high at >2 moose/ mi^2 (based on the 2013 population estimate); 2) Improvements in the nutritional condition of the moose population have not yet been detected (i.e., the moose population may still be nutritionally stressed in which case increasing moose numbers/density would not be justified); 3) The department will be capturing and weighing 10-month old calves in March to better assess nutritional condition (i.e., substantiate low twinning rate estimates); 4) We have not had the opportunity to evaluate the effect of several years of conservative and 1 year without cow harvests on moose numbers; 5) The 2013 population estimate is a single data point; and 6) The 2013 estimate may have been biased low due to poor survey conditions (i.e., the surveys were conducted in early December when low light condition persist, negatively affecting sightablity).

Instead, we recommend evaluating the potential for change in the feasibility assessment after collecting additional information on: 1) abundance (Geospatial Population Estimate with Sightability Correction during fall 2015); 2) productivity and survival (fall composition data); 3) nutritional condition of the moose population (weigh 10-month old calves during spring 2015 and continue to collect twinning rate estimates); and 4) public support for IM that includes predator control.

I. FEASIBILITY ASSESSMENT[2]

A. *Definitions*

1. Define the relevant geographic area for assessing abundance of prey and predators (Appendix A, part 1):
   - Unit 20A, including the Tanana Flats and central Alaska Range between the Nenana and Delta Rivers, is an IM area because it is identified in 5 AAC 92.108 as important for providing high levels of harvest for human consumptive use, and population and harvest objectives are established (Figure 1**).**
2. Recommend a time period for evaluation of the proposed program that matches the regional Alaska Board of Game (BOG) cycle: 3 years[3].
3. Note if the feasibility assessment is for intensive management (legal requirements in Appendix A and the *Intensive Management Protocol*) or another purpose: This feasibility assessment is for intensive management.

[1] Component factors are discussed in Section II.

[2] The purpose of the feasibility assessment and process are described in *Intensive Management Protocol*.

[3] Six years is the recommended time period for evaluating progress toward objectives because it fits either a 2-year or 3-year regional BOG cycle and should provide adequate time to assess whether a program is causing improvement in ungulate abundance or harvest in the defined area.

B. *Review Management Objectives and Current Abundance and Harvest*

1. List the population and harvest objectives for prey species and current estimates of each; objectives may be in regulation for IM (Appendix A, part 2) or in survey and inventory reports otherwise: The IM population objective in Unit 20A (Fig. 1) is 12,000-15,000 moose and the IM harvest objective is 900-1,100 moose. The 2013 population estimate for Unit 20A is 10,156 (8678-11,633 @ 90% CI) moose (Fig. 2). The average reported harvest in Unit 20A during 2012-2013 was 590 moose annually. Using a 15% correction factor for unreported harvest (Gasaway et al. 1983:9), the average annual harvest during these years was 679 moose (Fig. 3).

2. Briefly review biological rationale of IM objectives (Appendix A, part 2) or other objectives for prey species: The IM population objective had been exceeded every year until 2013. The reason for not reaching the goal in 2013 is at least 2-fold. First, the department had been striving to reduce the moose population from an estimates 17,000-18,000 moose in 2004 to 10,000-12,000 moose - the IM population objective until 2012. Second, the lower 2013 estimate may have been the result of poor sightability due to the survey being conducted in December when light conditions are generally poor. We used an average Sightability Correction Factor (SCF) of 1.21, but a higher SCF may have been more appropriate considering the poor survey conditions. Harvest objectives have not been achieved even during the population reduction phase (2004-2007) when harvest rates were extremely liberal and unsustainable.

3. List the population and harvest objectives for predator species in survey and inventory reports: The management objective for wolves in Unit 20A is to maintain a fall density of $\geq$ 11 wolves/1000 mi^2 (Young 2012). The management/harvest objective for grizzly bears in the mountains portion of Unit 20A is to manage human-caused grizzly bear mortality to provide a stable population with a 3-year mean annual human-caused mortality $\leq$8% of the bears $\geq$2 years old (an estimated 10-12 grizzly bears), and in the Tanana Flats portion of Unit 20A of a 3-year mean annual human-caused grizzly bear ($\geq$2 yrs. of age) mortality of 3 grizzly bears, with at least 55% males (Young 2011). The management objective for black bears is to maintain a black bear population that sustains a harvest of at least 55% males for the most recent 3 years (Hollis 2011).

C. *Recommended Management Strategy*

1. Briefly describe the proposed management strategy for the ungulate population (actions to be taken on habitat, predation, harvest, access, or other factors): Aerial wolf control by permitted pilot/gunner teams would likely have the greatest potential to increase moose survival, facilitate population growth, and increase harvest. Increasing the harvest under present access constraints would likely require increasing the population, although some reallocation of mortality from predators to harvest without population growth may be feasible near areas accessible to hunters. Newly adopted regulations allowing grizzly bear baiting could possibly reallocate some moose from bears to hunters in accessible areas. However, it is unlikely that localized bear harvest or bear control would be as effective as wolf control in

promoting growth of the Unit 20A moose population since bear predation on moose calves is not as significant as wolf mortality in this subunit (Gasaway et al. 1983; Keech 2000).

2. Propose measures of progress toward population or harvest objectives to be evaluated, identifying if additional data collection beyond survey and inventory program is necessary: Progress towards achieving the IM population objective would be evaluated by annual population estimation/composition surveys (i.e., funding and weather dependent). Progress towards achieving the IM harvest objective would be evaluated by hunter harvest reports.

3. 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 nontreatment effects (e.g., widespread improvement in calf survival because of mild winter across region, not because of predation control in a specific area): Unit 20B would serve as the untreated area. It has a similarly high moose density, experienced population growth through the 1980s, 1990s and early 2000s, and was subject to a population reduction through the use of antlerless moose hunts during the last decade. Periodic population estimation surveys would be conducted for comparison of population parameters such as numbers, bull:cow ratios, calf:cow ratios, and yearling:cow ratios.

4. Provide an estimated cost of implementation (operations and field staff salary) for the proposed program over the evaluation time period: A 3 year IM program would cost approximately $200,000 for operations (annual alternating high- and low-intensity surveys in Units 20A and 20B and wolf SUPEs at year 1 and 5 of the project period) and $50,000 for staff salary.

II. Potential to Achieve Ungulate Population and Harvest Objectives[4]

A. Population increase in ungulates required to reach population objective (may be represented as comparable density): Approximate increase of 2000 moose (~20%). The estimated population in Unit 20A in 2013 was 10,156 (90% C.I. = 8,678-11,633) moose, which is below the IM population objective of 12,000-15,000.

B. Increase in average estimated harvest (last three regulatory years [RY]; RY = 1 July–30 June) to reach harvest objective: An increase of 250-400 moose per year is needed to reach the lower end of the IM harvest objective of 900 moose.

C. Potential to mitigate biological limitations in proposed IM area (Appendix B. Section I): High.

D. Potential to reduce or moderate hunting conflicts (Appendix B.II): Moderate.

E. Anticipated public participation based on expense and other factors (Appendix B. Section III): High.

[4] The background data used in evaluating potential are found in Appendices B and C.

F. Data availability for designing an effective management plan [Appendix C]: High

G. Potential to measure or demonstrate progress in ungulate population recovery or an increase harvest within a defined time period (Appendix B, Section I, Subsection E and Appendix C): High.

H. Potential to document reasons for success or failure in population recovery or harvest increase (Appendix B, Section I, Subsection E): High.

APPENDIX A. Legal elements and criteria for intensive management objectives and a feasibility assessment.

Department staff should review and ensure the following four elements have been met:

1. Definition of populations:
   - The relevant area for defining an ungulate population under intensive management (IM) is that defined as a positive determination in Title 5, Alaska Administrative Code, Chapter 92, Section 108 (5 AAC 92.108): Unit 20A (Figure 1).
   - "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." Clarify the purpose of ungulate or predator management zones proposed to be smaller than areas under 5 AAC 92.108: N/A.
   - Consider whether a population with a positive determination for IM (5 AAC 92.108) should match or differ from amounts necessary for subsistence (ANS) (5 AAC 99.025) for the same geographic area: The vast majority (~85% - 90%) of Unit 20A is within the Fairbanks Non-subsistence Area. The ANS for the small portion outside the non-subsistence area is 50-75 moose. The harvest objective for Unit 20A is 900-1,100 moose.

2. The Alaska Board of Game (BOG) has established population and harvest objectives for IM of identified ungulate populations for a high level of harvest by humans:
   - Positive determination made for species and herd (caribou) or unit/subunit (moose, deer) per 5 AAC 92.106(1) by considering the following factors:
     - Historic harvest that meets or exceeds defined levels (caribou: 100, deer: 500, moose: 100); the highest three consecutive years and three most recent years are provided by department: The highest 3-year average harvest was 1215 moose during RY2004-RY2006. The average harvest during RY2011-RY2013 was 719 moose.
     - Accessibility (roads, rivers, trails, landing strips): Accessibility in order of highest to lowest use is ATV/ORV, aircraft, boat, horse and highway vehicle.
     - Use of harvest primarily for meat: Yes.
     - Hunter demand (reported hunting effort, number of applicants for permits): An average of 1153 hunters per year reported hunting during the general hunt and 448 hunters per year in permit hunts in Unit 20A (2011-2013).
   - Population and harvest objectives established in 5 AAC 92.108 based on these criteria in 5 AAC 92.106(2):
     - Effects of weather, habitat capability, diseases, and parasites. Of an estimated 5040 mi^2 of moose habitat in Unit 20A, approximately 1000 mi^2 (~22%) has burned since 2001. The habitat improvement from these burns has yet to be determined, but is anticipated to be substantial in the coming years.
     - Maintenance of viable predator populations (see definition in *Intensive Management Protocol*). Viable predator populations can easily be maintained.

- Maintenance of habitat conditions suitable for other species in the area. Habitat for the Delta caribou herd, a herd identified for Intensive Management, would not be affected by intensive management of moose primarily because of differences in seasonal habitats and diet.
- Effects on subsistence users. There would likely be little effect on subsistence users because most of Unit 20A is within the Fairbanks Non-subsistence Area.
- Cost, feasibility and potential effectiveness of possible management actions. Cost of possible management actions would largely depend on what action was approved by the Board of Game. Wolf control conducted by the public would be relatively inexpensive and effective due to its close proximity to Fairbanks.
- Landownership patterns within the range of the population. The majority (63%) of Unit 20A is state land. However, approximately 35% of Unit 20A is federal land.
- Accessibility to harvest. Access is generally good and highly variable via ATV/OHV trails, horse trails, rivers and creeks, airboat meadows, landing strips, float ponds, and roads.
- Other factors considered relevant by the BOG.

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]). The 2013 population estimate indicates the moose population is likely below the newly adopted population estimate of 12,000-15,000 moose. Harvests of 900-1,110 moose is likely not sustainable with a population of 12,000-15,00 moose (i.e., >6% harvest rate) without reallocation of moose take from predators to people.

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]). Enhancement of abundance or productivity utilizing recognized and prudent management techniques is unknown. Productivity has been low for several decades and no signs of improvement have yet been detected despite reductions in moose density from ~3-4 down to 2-2.5 moose/mi^2during the mid-late 2000s. Habitat improvement in the form of ~ 700,000 acres of burns since 2001 may improve moose nutritional condition, productivity, and survival in the future.

5. The BOG is not required to adopt regulations to provide for an IM program per AS 16.05.255(f)(1) if a proposed IM program is:

- Ineffective based on scientific information. The available data does not suggest that an IM program would be ineffective.
- Inappropriate due to landownership pattern. Not inappropriate because of landowner ship. The primary landowners in Unit 20A are the state (~63%) and the federal government (35%). The large portion of federal land, primarily military managed by BLM, likely would not pose predator control challenges (Appendix D).

- Against the best interest of subsistence uses. We are not aware of any issues regarding subsistence uses.

6. The BOG 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): The Board has not declared a biological emergency.

APPENDIX B. Elements of a feasibility assessment for an area (deer, moose) or herd (caribou).

I. BIOLOGICAL FACTORS

Biological factors are the basis for evaluating potential to achieve population or harvest objectives. Information may be yes/no, numeric, categorical, or not applicable depending on species or area. Brief explanations may be warranted along with local data where available. In most instances professional judgment by department staff will be required to put numbers in context in the recommended management strategy (Section I:Feasibility Assessment, p. 1).

A. *Nonpredation and Nonhunting Mortality of Prey*

1. How frequently is there markedly reduced survival due to annual weather (snow depth, especially associated with complicating factors, such as severe cold; ice on snow events; flooding; drought)? Rare.
2. How extensive is vehicle mortality along road and rail systems that reduce harvestable surplus in the population (estimated number killed annually or as a percentage of total kill by humans that includes harvest and defense of life or property)? Relatively rare, < 20 moose per year.

B. *Productivity of Prey Population and Habitat* (may include prey density effects)

1. Evidence of inherent habitat limitation (e.g., nutrient deficiency) manifested in low reproduction, body weight, or survival? Yes.
2. How strong a negative effect from the local prevalence of diseases or parasites? Moderate.
3. Evidence of longer term weather trend changing forage production or other habitat requirements (e.g., markedly increased area in recent burns or noticeably less frequent flooding) and its consequence for the ungulate in question: Yes. Note trend in habitat capability: Positive from recent large fires.
4. Evidence of high or excessive levels of forage use (excessive means evidence of plant mortality from inability to rejuvenate after persistent grazing or browsing at some proportional level of biomass removal): Yes.
5. Has the combination of natural and human-caused disturbance produced an extent and mixture of vegetative seral stages capable of maintaining the present productivity if the population changes due to management treatment at a moderate level of increase? Unkown. At a substantial level of increase? Probably not.

C. *Potential Effectiveness of Proposed Predator Control* (based on number of predator species and seasonal prey location)

1. Is effect of predation by individual predator species known for the ungulate species of interest in the proposed area? Effect of predation by individual species is inferred from population parameters and research results in Unit 20A (Gasaway et al. 1983, Boertje et al. 1996, Keech 2000).

2. Is predation control being proposed for one or multiple predator species? One (i.e., wolves).
3. Are there concentrated calving and/or young rearing areas of ungulates for focused bear or wolf control? Yes.
4. Are there concentrated winter ranges of ungulates suitable for focused wolf control? To some degree. There are areas with higher moose densities located primarily in the foothills and recent burns.

D. *Potential Effectiveness of Public Participation in Predator Control (under permit) or Predator Harvest* (see also III.A and III.B this appendix)

1. Number of licensed hunters and trappers within or near proposed management area (size of potential participant group) and the proportion of these hunters and trappers actively harvesting predators. During 2006-2010, an average of 26 trappers/hunters per year harvested wolves in Unit 20A. The number of licensed hunters/trappers near the proposed area is in the thousands because of proximity to Fairbanks, North Pole, Delta, Nenana, Anderson, Healy, and McKinley Village.
2. Estimated wolf harvest rate (percentage of estimated fall population, average of three most recent regulatory years). Harvest averaged 45 wolves per year during 2011-2013. Population size based on an estimate of roughly the northern 1/2 of Unit 20A in 2013 and extrapolation to the remainder of the unit is approximately 300 wolves. Estimated harvest rate is ~15%.
3. Estimated black bear harvest rate (percentage of estimated spring population, average of three most recent regulatory years). Harvest was 20 black bears per year during 2011-2013. Estimated population size in Unit 20A is approximately 600 black bears. Harvest rate is likely < 1%.
4. Estimated grizzly/brown bear harvest rate (percentage of estimated spring population, average of three most recent regulatory years). Harvest averaged 23 grizzly bears per year during 2011-2013. Population size based upon estimates conducted in the 1990s is ~ 150 independent bears. Harvest rate is estimated at ~15%.
5. Historical effectiveness of a predator control program in this area (where applicable). Successful 1976-1982 and 1993-1994; Unsuccessful (suspended) in the mid-1990s.
6. Number of competing predator control programs in the region and the anticipated impact of adding an additional program (potential dilution of participation by skilled members of the public). Two wolf control programs are currently active nearby, Upper Yukon\Tanana and Unit 13. Public aerial control permits are being issued for both of these programs. If public aerial wolf control permits are also issued in Unit 20C, some dilution of public participation could occur.

E. *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. Describe whether

the following criteria for evaluating response to treatment are possible or recommended (*Yes/No* answers):

1. Established periodic survey for abundance: Yes.
2. Fall composition surveys for young to adult female ratio as index to survival [*e.g., bear predation during prior summer where wolf predation on young is comparatively low*]: Yes.
3. 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*]: Yes.
4. Radiotelemetry for survival of specific age cohorts: Yes.
5. Total prey harvest and age-sex composition of harvest among local residents, state residents, and nonresidents (where applicable): Yes.
6. Harvest per unit effort, particularly in focused program areas where the initial intent is reallocation of mortality from predators to harvest to first meet local harvest needs: Yes.

II. SOCIETAL FACTORS

Societal factors associated with hunting conflicts (e.g., constraints to access, acceptable methods, and harvest expectations), hunter access, and public tolerance for intensive management practices.

A. *Public expectation for predator control and increased ungulate harvest* must be understood prior to initiating programs to increase ungulate populations. Public conflicts over ungulate harvest methods can reduce options for controlling population growth. Failure to limit growth can reduce the condition of habitat and ungulates to the extent of reduced productivity. Critical components of conflict mitigation are identifying acceptable predation control methods as well as the potential for additional ungulate harvest opportunities that are acceptable to the hunting and nonhunting 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.).

1. Has the public defined an acceptable quantity and sex/age structure of ungulate harvest? Somewhat (Quantity defined - IM harvest objective of 900-1100 moose - through public process, although this is currently set too high. Sex/age structure has not in that female and calf harvests have been extremely controversial).
2. Does the level of unreported or unknown harvest hinder the ability of the department to evaluate response to management treatments? No.
3. Has the department informed constituents about ecological and biological constraints (nutrition, forage condition) relative to setting upper limits for population densities of managed ungulates? Yes.

4. If possible from historic data, characterize hunter density where significant conflicts occur between hunters: High and between hunters and nonhunters: Moderate.
5. If possible from historic data, what is potential for conflict in rural areas between local hunters and nonlocal hunters? Moderate.
6. Conflicts or problems associated with access, such as existing access constraints: Common.
7. Acceptable strategies to spread out hunters and minimize trespass on private lands: Some.
8. Acceptable strategies to minimize unacceptable levels of trail damage on public lands: Some.
9. Acceptance of restricted methods or means for harvest, particularly near communities (e.g., archery or muzzleloader): Moderate.
10. Anticipated increase in vehicle mortality with ungulate population growth (poses a public safety risk): Low.
11. 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: Moderate, primarily selective harvest (i.e., cows and calves) (Appendix E).
12. Potential for predator control to have indirect negative effects on alternate prey, such as increase in medium predators that can prey on ungulate young, particularly in species of high interest to hunters (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, with implications on number of legal rams in future years): Low.
13. Coordination among hunters and trappers about control methods and allocation among ground-based trappers, aerial gunners by permit, and department use of helicopters: Moderate.

B. *Landownership* may influence or 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, Section I:Feasibility Assessment, p. 1). 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 (see Section III.A.3).

1. 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: 30% of Unit 20A is military land and another 5% is federal (non-military, primarily BLM) land.

2. Percentage of area in federally designated wilderness or wilderness study areas where habitat or wildlife management may be subject to more extensive public process: None.
3. Percentage of Alaska Native corporation land: 2%.
4. Access for predator control or ungulate hunting allowed on Alaska Native corporation lands? Public and ADF&G staff access for predator control is unknown at this time, but will be investigated. Public access to corporation land for moose hunting is generally not allowed.

C. *Access for Predator Reduction and Ungulate Harvest* (see also Sections II.A.6 and II.A.7)

1. What is the extent of all-season roads? Limited.
2. What is the extent of ATV trails? Highly variable from none (i.e., CUAs) to common (e.g. Ferry Trail Management Area).
3. What is the extent of navigable rivers? Limited.
4. What is the feasibility of landing fixed-wing aircraft in winter for predator removal? Highly variable from low to high.
5. What is the feasibility of landing fixed-wing aircraft in fall for ungulate hunting? Low to moderate.
6. What is the feasibility of ocean shoreline access for hunting or predator removal? Does not apply.
7. Is use of helicopters by the public (under permit) allowed for trapping or retrieval of carcasses from aerial shooting? Yes, under predator control regulations, but no under general hunting and trapping regulations.
8. Are there controlled use areas that prohibit aircraft access for ungulate harvest? Yes (2; 1556 mi^2; 23%).

III. ECONOMIC FACTORS

Economic factors define estimated costs of management programs and expectations for public participation in predator control programs for comparison to perceived benefits by the BOG and the public.

A. *Cost of Participation* (in prey harvest or predation control by the public)

1. Price (dollars/gallon) of unleaded gasoline (average among communities): $3.50 to $4.50 per gallon of unleaded.
2. Price (dollars/gallon) of 100 octane low lead aviation fuel (average among communities): $5.00 to $6.00 per gallon.
3. Cost to hunters per prey animal harvested from alternative area (e.g., transportation cost to hunt in adjacent areas with harvestable surplus of ungulates): Low.
4. Value of predator hides or other parts legal to sell: $200 to $500 per wolf.

B. *Potential for Participation* (in predator control or harvest by public)

1. Would creating a new predation control program hinder ability to maintain public involvement in existing predation control programs in the region? Somewhat. Unit 20A is easily accessible from Fairbanks. Some of the permitted pilot/gunner teams that participate in the Upper Yukon/Tanana and Unit 13 predator control programs may prefer to participate in the Unit 20A program because of the proximity to Fairbanks, simpler logistics, and reduced cost.
2. Will a predation control program, habitat enhancement project, or ungulate harvest strategy conflict with existing harvest of predators by reducing opportunity for local hunters or trappers? Minimally (On average, 21 trappers took 45 wolves during last 3 years).
3. Potential to conduct department-sponsored control programs if public participation is lower than expected: High.

C. *Potential for Cost Sharing* (in habitat enhancement) (see also Section II.B)

1. Potential to collaborate on prescribed fire where hazardous fuel reduction is the primary goal: Low.
2. Potential to collaborate on forest management or mechanical vegetation treatments to produce wood products or reduce hazardous fuels: Low.

APPENDIX C. Availability of population and harvest information.

Data include status of predators, ungulate species, and habitat for modeling predator removal rates and time until increase in harvest of ungulates is feasible [*Yes/No/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: Yes.
  - Young survival estimate with mortality causes identified: Yes.

- Harvest of prey:
  - Trends in reported harvest by residents and "local" (game management unit) residents among general season, drawing permit, registration permit, and Tier II categories over last 10 years: Yes.
  - Where unreported harvest occurs, public perception of trend: Not applicable.
  - Estimate of unreported harvest from telemetry, Division of Subsistence, or other sources: Yes (Gasaway et al. 1983:9; Boertje et al. 2007).
  - Department estimate of current sustainable harvest: ~500 (5% of ~10,000 moose).
  - Amount reasonably necessary for subsistence uses (ANS) (specify date of determination or updates, whether specific to proposed intensive management (IM) area or larger area, and number relative compared to IM objective). ANS is 50–75 moose for that portion outside the boundaries of the Fairbanks Nonsubsistence Area (~15% of Unit 20A).
  - Historical harvest by nonresidents? Yes.
  - Present harvest by nonresidents? Yes.
- Status and harvest of predators:
  - Survey/census of wolf density within last 5 years: Yes.
  - Survey/census black bear density within last 5 years: Yes.
  - Survey/census grizzly/brown bear density within last 5 years: No.
  - Predator-prey ratio estimated: Yes (Wolves).
  - Survey of alternative prey adequate to aid predator recovery: Infrequent, Delta caribou herd ~2000-3000 animals.
  - Most wolf harvest accounted for by sealing data: Yes.
  - Most black bear harvest accounted for by sealing/harvest ticket data: Yes.
  - Department estimate of black bear harvest where sealing/harvest ticket requirement does not occur. Does not apply.
  - Most grizzly/brown bear harvest accounted for by sealing data: Yes.

- Habitat condition (methods may be specific to region or species):
  - Proportional removal of browse biomass in previous 5 years with no large population change or widespread disturbance (e.g., fire) since browse survey: Yes (High).
  - Proportion of browse species with broomed growth structure (history of browsing): Yes (High).
  - Proportion of area burned in last 10 years (potential browse availability): Yes,~20%–25% of ~5000 mi^2 of moose habitat burned in since 2001.

- Proportion of area in appropriate habitat type based on vegetative classification (define as forage, cover, etc.). No classification has been completed since large burns have occurred. There is potential for browse abundance to increase.
- [*Other metrics? Describe*]: None.

- Ungulate nutritional condition (representative of environmental conditions experienced during the most recent population census or estimate; may be specific to area/region or herd) [*options currently being discussed*]:
  - Percentage of productive 3-year-old female caribou (cohorts are radiomarked for calf weights and monitored for photocensus coverage): Does not apply.
  - Weight of 4- or 10-month-old females (*caribou, deer, moose*): Yes (2009, mean = 330-358 for 3 different study areas); Planned to weigh 60 calves March 2015.
  - Weight of adult (5–6 year old) female caribou (herd specific; requires baseline): Does not apply.
  - Yearling female mandible length: Does not apply.
  - Ratio of femur to hind foot length: Does not apply.
  - Two estimates of moose twinning rate in previous 5 years with no large population change: Yes (10%-20%).
  - [*Other metrics? Describe*]: Yes, Age specific reproduction and productivity (poor); short-yearling mass (low); browse utilization (High).

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Young, D. D. 2012. Units 20A, 20B, 20C, 20F, and 25C wolf. Pages 159–176 *in* P. Harper, editor. Wolf management report of survey and inventory activities 1 July 2008–30 June 2011. Alaska Department of Fish and Game, Species Management Report ADF&G/DWC/SMR-2012-4. Juneau.

Figure 1. Location of Unit 20A.

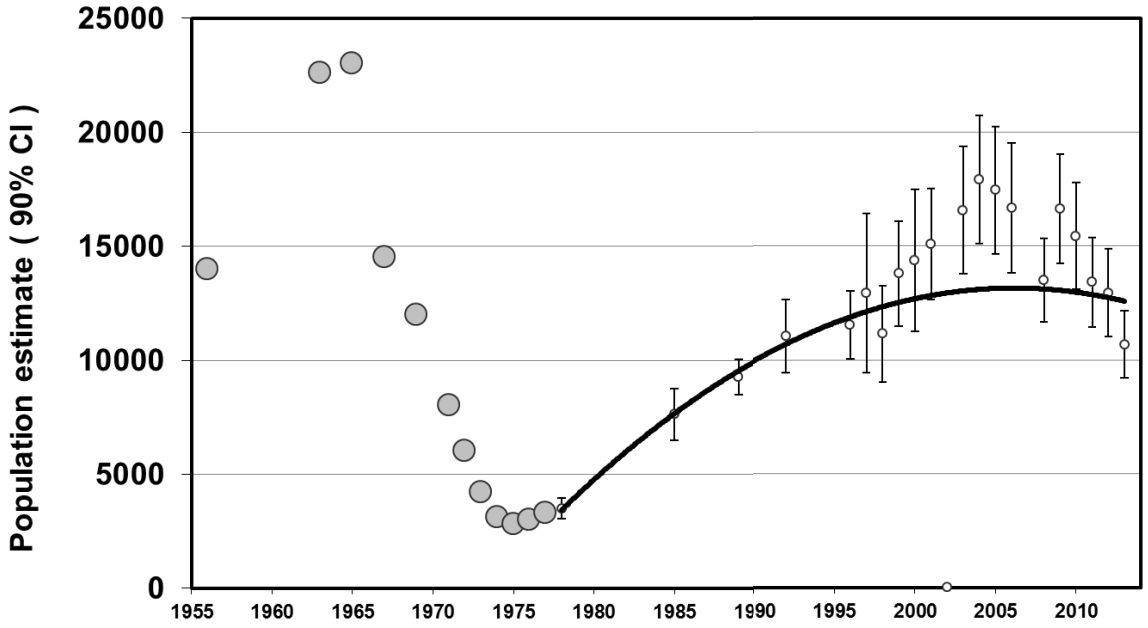

Figure 2. Moose population estimates and smoothed trend, Unit 20A, 1956-2013.

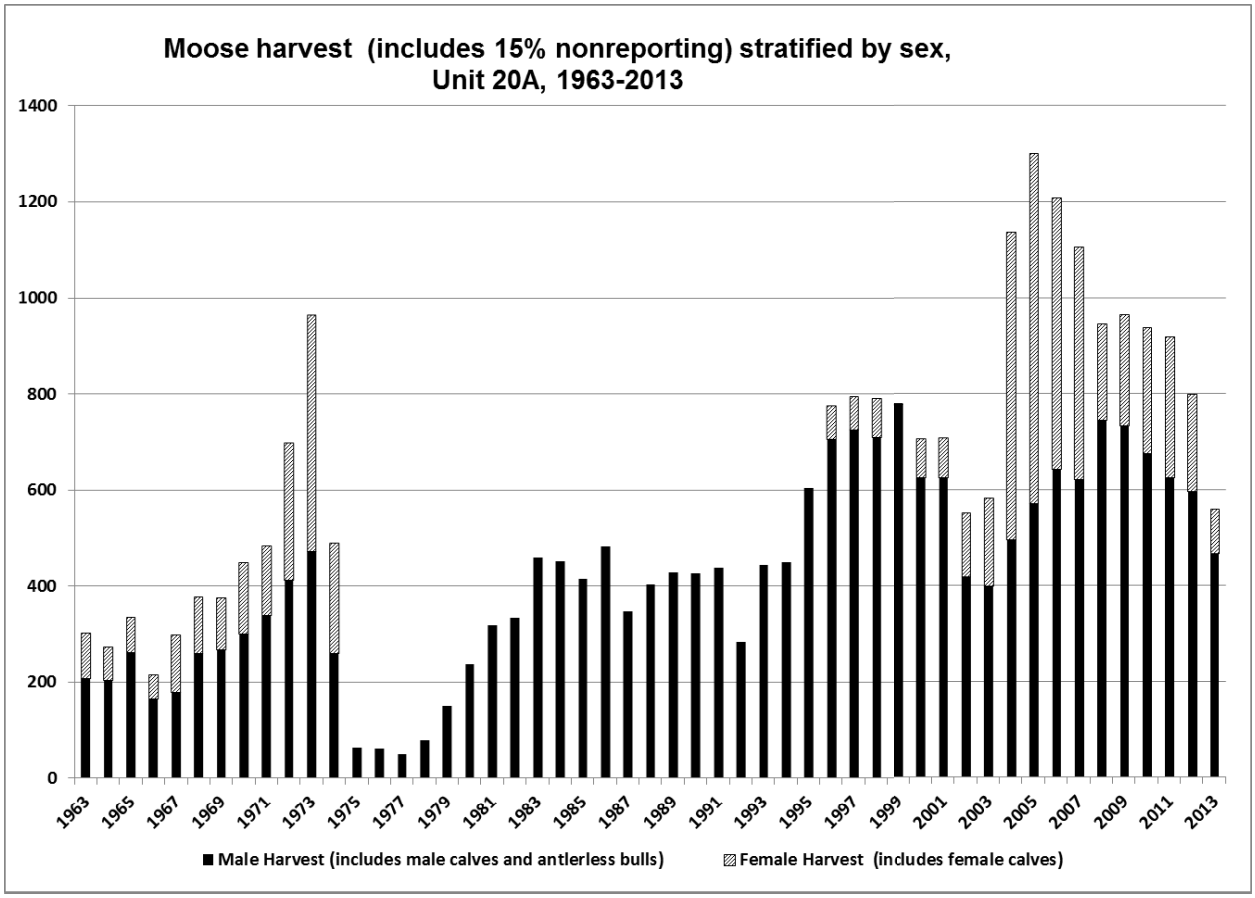

Figure 3. Moose harvest stratified by sex, Unit 20A, 1963-2013.

APPENDIX D. Bureau of Land Management letter

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Alaska State Office
222 West Seventh Avenue, #13
Anchorage, Alaska 99513-7504
http://www.blm.gov/ak

TAKE PRIDE IN AMERICA

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BOARDS

In Reply Refer To:
6800 (AK-93113) H

MAR 24 2008

Mr. Cliff Judkins, Chairman
Alaska Board of Game
Alaska Department of Fish and Game
P.O. Box 115526
Juneau, Alaska 99811-5526

Dear Chairman Judkins:

I am responding to your request for information on the federal laws governing or prohibiting predator control on federal lands in the State of Alaska. As you will recall, your request was made at the Alaska Board of Game meeting during a presentation by Mr. Larry Bell, Assistant Regional Director for External Affairs for the U.S. F.W.S. Region 7 on January 25, 2008.

As shared in general during the meeting and more specifically in a letter of response from Mr. Bell to you dated February 25, 2008, Mr. Bell provided detailed information regarding the agency-specific authorities and policies employed by Department of the Interior (DOI) agencies as they related to predator control on federally administered public land in the State of Alaska. I will not reiterate what Mr. Bell shared regarding the other DOI agencies, but I will share with you the current Bureau of Land Management policy as it relates to predator control on BLM-administered public lands.

The Bureau of Land Management in Alaska (BLM-Alaska) manages its public lands primarily under the Federal Land Policy and Management (FLPMA) Act of 1976 and the Alaska National Interest Lands Conservation Act (ANILCA). BLM-Alaska manages land uses and habitat on the public land it manages, but management of fish and wildlife on BLM-Alaska lands is limited solely to the realm of federal subsistence. The BLM does not have responsibility for predator control, which is an Alaska Board of Game responsibility conducted by the State of Alaska, consistent with the traditional role of the State in managing resident species of fish and wildlife.

Unless predator control activities conflict with on-going or anticipated BLM authorized actions, land use plan decisions for a given area, or threaten public safety, the BLM's position on the State's predator control program is that predator control is a State function. The BLM-Alaska State Office will work with the State's Authorizing Officer and will meet when appropriate to

discuss control methods, objectives and timing, and to share any potential areas of concern or conflict with the program.

If during the review meeting it is determined by the local BLM Field Manager or the affected BLM District Manager that the State's activities may pose a threat to public safety or create a management conflict, a response will be coordinated at the BLM-Alaska State Office level.

Thank you for your interest in public lands. Questions relating to BLM-Alaska policy should be referred to my BLM point of contact, Ms. Ramone McCoy, Ph.D., BLM-Alaska State Wildlife Biologist, (907)-271-3128.

Sincerely,

T. P. Lonnie

Thomas P. Lonnie
State Director

APPENDIX E. Denali Borough Resolution

DENALI BOROUGH, ALASKA
RESOLUTION NO. 12-02

A RESOLUTION REQUESTING THE ALASKA LEGISLATURE REVIEW AND REPEAL INTENSE MANAGEMENT MANDATES DIRECTED AT THE ALASKA DEPARTMENT OF FISH AND GAME AND CENTERED UPON MOOSE IN UNIT 20A

WHEREAS, areas of the Denali Borough in unit 20A, which have traditionally sustained thriving population of moose, are now without herds, and recent wildfires have concentrated many remaining moose populations in smaller, accessible areas; and

WHEREAS, trails in the Denali Borough have received greatly increased pressure from these hunts, resulting in destruction, impassability, and regulation of many of these trails; and

WHEREAS, increased hunter pressure has resulted in a substantial negative environmental impact both from ATV damage to pristine wilderness ecosystems and large amounts of litter and trash; and

WHEREAS, hunts created for and by intense management dictates have created substantial trespass on private property; and

WHEREAS, general moose harvest opportunities have decreased for residents of the Denali Borough, causing the quality of life for residents of the Denali Borough to be adversely affected by the continuation of these practices; and

WHEREAS, overall health and viability of moose populations, and populations of other species which are inextricably tied to moose, are now in question due to hunts created specifically to meet mandates of intense management; and

WHEREAS, questions and concerns of both private individuals and the Middle Nenana Fish and Game Advisory Committee, and resolutions of the Denali Borough Assembly, have gone largely untended by both managing officials of the Alaska Department of Fish and Game and the Alaska Board of Game; and

WHEREAS, these issues have resulted in divisions between the Alaska Department of Fish and Game, the various interior Fish and Game Advisory Committees, bodies of local government, and private citizens groups and individuals, creating a lack of trust and inability to work together; and

WHEREAS, the ultimate origin of each of the above issues is found in the flawed concepts of intense management of moose for food production mandated by the Alaska Legislature, and the solution to these issues lies in the discontinuation of these same practices.

THEREFORE BE IT RESOLVED; that the Denali Borough Assembly requests the Alaska Senate Resources Committee to review the actions of the Alaska Department of Fish and Game concerning mismanagement of wildlife resources within the Denali Borough, most specifically those which deal with the intense management of moose in unit 20A.

BE IT FURTHER RESOLVED; the Denali Borough Assembly requests the Alaska Legislature to repeal AS 16.05.255 (E-G).

BE IT FURTHER RESOLVED; that the Denali Borough Assembly requests the Mayor send copies of this resolution to the Governor of Alaska, The Alaska legislative representatives of the Denali Borough, all members of the Alaska Senate Resources Committee, all members of the Alaska Board of Game, all management authorities of the Alaska Department of Fish and Game concerned with the Denali Borough, all members of the Middle Nenana, Minto-Tanana, Delta, and Fairbanks Fish and Game Advisory Committees, and any other groups or individuals he sees fit.

PASSED and APPROVED by the DENALI BOROUGH ASSEMBLY this 11TH day of JANUARY, 2012.

Mayor David M Talerico

ATTEST:

Gail Pieknik, Borough Clerk

PASSED UNANIMOUSLY
ABSENT: ASBURY