RC4, Tab 3

OPERATIONAL PLAN FOR INTENSIVE MANAGEMENT OF MOOSE IN GAME MANAGEMENT UNIT 21E DURING REGULATORY YEARS 2017–2022

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ALASKA DEPARTMENT OF FISH AND GAME

DIVISION OF WILDLIFE CONSERVATION

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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 for moose in Game Management Unit (Unit) 21E during regulatory year RY17 (RY17; i.e., RY17 = 1 July 2017–30 June 2018) through RY22. The IM plan for moose in Unit 21E is found in Title 5, Alaska Administrative Code, Section 92, Part 124 (abbreviated as 5 AAC 92.124). Based on the biological and management information for this area (Appendix A), this operational plan describes rationale for evidence of limiting factors; choice of indices for evaluating treatment response; and decision frameworks on implementation, suspension, or termination for predation control, habitat enhancement, and prey harvest strategies. *Intensive Management Protocol* (ADF&G 2011) describes the administrative procedures and the factors and strategies in adaptive management of predator–prey–habitat systems to produce and sustain elevated harvests of caribou, deer, or moose in selected areas of Alaska. The IM plan for moose in Unit 21E has been developed based on the recommendations of the Yukon–Innoko Moose Management Working Group (Working Group) and at the request of the Alaska Board of Game (BOG).

BACKGROUND

Residents of Unit 21E; the Grayling, Anvik, Shageluk, Holy Cross Fish and Game Advisory Committee (GASH AC); and other hunters who use the area expressed concern about a perceived decline in the moose population during the mid-1990s. To address this concern, in January 2005, ADF&G, Division of Wildlife Conservation, established a citizen-based advisory group. The Working Group was given the task of reviewing all available information and developing a comprehensive moose management plan for the area. The final product of the Working Group was the Yukon–Innoko Moose Management Plan with the following mission statement "Maintain healthy and abundant moose populations by proactively managing moose, predation, and habitat, and keeping moose harvest within sustained yield so that subsistence needs for moose are met on an annual basis and there is sufficient moose to provide for personal and family use by Alaska residents and some nonresident hunting opportunity for generations to come." This plan was endorsed by both the Board of Game and the Federal Subsistence Board.

Proactive management was a major tenet of the plan. Therefore, the Working Group felt it was important to recommend an aerial wolf control program to prevent further declines in moose densities and maintain hunting opportunities in Unit 21E. As such, the BOG adopted an Intensive Management Plan (5 AAC 92.124) in March 2010 authorizing wolf control if the moose population declined below 1.0 moose/mi^2 (observable moose). Recent survey data show we are above this objective, and wolf control has not been initiated to date. This plan establishes a Wolf Control Focus Area (WCFA) as well as a Bear Control Focus Area (BCFA).

ADAPTIVE MANAGEMENT FRAMEWORK

Adaptive management is designing programs to maximize what can be learned from field experiments for potential application elsewhere, not simply modifying management in light of experience (National Research Council 1997:122). Managers wishing to use the best available information for management decisions or recommendations often need to generate new information for specific field situations (National Research Council 1997:174). Any section of the following 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:*

Wolf control has not been conducted in Unit 21E to date. If wolf control is initiated, the objective within the WCFA (Figure 1) will be to temporarily reduce wolf numbers to the lowest level possible. The precontrol estimate for all of Unit 21E is 150 wolves with 80 in the WCFA. Alaska residents with a permit from ADF&G will be authorized to use fixed-wing aircraft to shoot either while airborne or after landing. If public permittees are unable to successfully remove at least 60–80% of wolves from the WCFA, the department will consider a removal effort by employees using helicopters to supplement public efforts.

ADF&G will be required to ensure 30 wolves remain in all of Unit 21E. Based on information from previous wolf and moose surveys, the current size of the WCFA ensures 30 wolves will remain in Unit 21E even if all wolves within the WCFA are removed.

In Unit 19A ADF&G was not able to measure a response in moose density with wolf control alone. Therefore, based upon research conducted nearby in Unit 19D East (Keech 2012), we determined that a reduction in bear numbers would also be required. Using this information this plan also establishes a BCFA (Figure 1) in Unit 21E.

If bear control is initiated the objective within the BCFA will be to temporarily reduce black and brown bear numbers to the lowest level possible. The precontrol estimate in the BCFA is 130–160 black and 10–15 brown bears. The relatively small number of bears that would be removed in the BCFA compared to 1,900–2,275 black and 100–200 brown bears in Unit 21E ensures only a minor effect on the Unit 21E-wide bear populations. Bear hunting will continue throughout the area, but we anticipate that harvest will remain low.

Presently known alternatives to predator control for reducing the number of predators are ineffective, impractical, or uneconomical. Hunting and trapping conducted under authority of ordinary hunting and trapping seasons and bag limits are not effective reduction techniques in sparsely populated areas.

B. *Habitat Enhancement:*

Based on available data, habitat does not appear to be limiting population growth of moose in Unit 21E. These data include the most recent two-year average (2014 and 2015) twinning rate of 35% and the 2006 browse utilization survey that indicated moose were removing 21% of the current annual biomass. This is a moderate level along the gradient of removal observed in other Interior moose populations (Paragi et al. 2008). While habitat does not appear to be limiting moose at this time, if low twinning rates indicate nutritional stress, habitat manipulations may be considered.

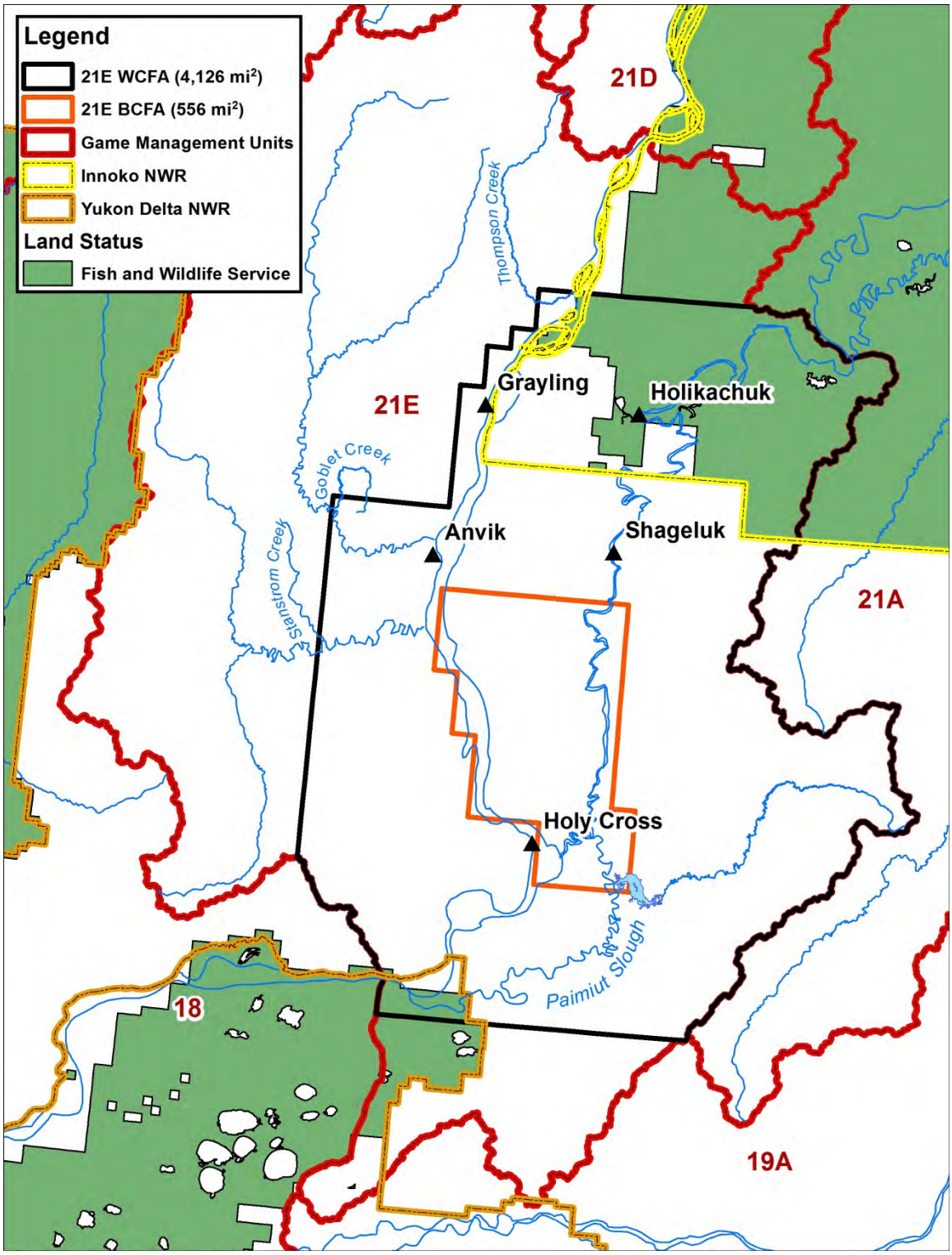

Figure 1. Unit 21E, the Wolf Control Focus Area (WCFA), the Bear Control Focus Area (BCFA) and US Fish and Wildlife Service lands.

C. *Prey Harvest:*

Twinning rates are a sensitive indicator of moose nutritional status (Boertje et al. 2009) and will be carefully monitored. If the 2-year average twinning rate is >20%, we will continue to promote growth. At a rate of 15–20%, moose numbers will be stabilized through harvest. If the 2-year average twinning rate is <15%, the number of moose will be reduced through harvest. Predator control will not be initiated or will be suspended if harvest alone is insufficient to reduce moose numbers.

II. ANTICIPATED RESPONSES TO TREATMENTS

A. *Predator Abundance:*

In March 2009 a partial survey of Unit 21E resulted in an estimate of 150 wolves (19 wolves per 1,000 mi^2) in 20–30 packs and an estimate of 80 wolves in the WCFA. With at least 70 wolves outside the WCFA, we are assured the minimum 30 wolves would remain in Unit 21E even after reducing wolves by at least 60–80% in the WCFA. Based on wolf immigration and reproductive success, we anticipate that wolf numbers would recover to precontrol levels in 3–5 years within the WCFA if wolf control were suspended (National Research Council 1997:52–53).

Based on extrapolation of densities from other areas, an estimated 1,900–2,275 black bears occupy Unit 21E, including approximately 130–160 black bears within the BCFA. Based on the same extrapolations, an estimated 100–200 brown bears are present in Unit 21E, including approximately 10–15 brown bears within the BCFA. Bears surrounding McGrath in Unit 19D East recovered quickly after removal in 2003 and 2004 (Keech 2012), and we anticipate bear numbers in the BCFA will recover to precontrol levels within 5–7 years. In addition, because the BCFA is a relatively small area, removing bears from within it will have only a minor effect on bear densities in Unit 21E overall.

B. *Predation Rate:*

Predation rates on moose in Unit 19D East were substantially reduced after combined bear and wolf control (Keech 2012). We anticipate a similar reduction in the Unit 21E WCFA if predator control is initiated. However, we recommend a calf mortality study be conducted to assess causes of mortality prior to wolf and/or bear removals. Annual spring twinning and fall composition surveys of moose should continue, as well as less frequent density estimates. These data will help to further assess the effectiveness of the IM program.

C. *Prey Abundance:*

Moose surveys have been conducted in Unit 21E since 2000. The most recent survey in 2016, corrected for sightability, estimated a density of 2.0 moose/mi^2 in the WCFA. Based on the case history of bear and wolf control in Unit 19D East (Keech 2012), we expect moose densities to increase in the WCFA, but predominantly within and adjacent to the BCFA if predator control is initiated. The expected increases in density will be utilized and regulated in accordance with principles in part E and F.

D. *Prey Recruitment:*

We expect moose calf survival to increase if bear and wolf densities are significantly reduced. This will in turn lead to increased recruitment of calves into the yearling age class and higher moose numbers.

E. *Prey Productivity or Nutritional Condition:*

Twinning rates are a sensitive indicator of moose nutritional status (Boertje et al. 2009) and will be carefully monitored. If the 2-year average twinning rate is >20%, we will continue to promote growth. At a rate of 15–20%, moose numbers will be stabilized through harvest. If the 2-year average twinning rate is <15%, the number of moose will be reduced through harvest. Predator control will not be initiated or will be suspended if harvest alone is insufficient to reduce moose numbers.

F. *Prey Harvest:*

Bear and wolf reductions should result in an increase in the harvestable surplus of moose. However, if bear and wolf control are initiated, a proposal should be submitted to the Federal Subsistence Board to restrict the winter moose hunt to "bulls only" to allow for population growth.

G. *Use of Nontreatment Comparisons:*

A similar adjacent nontreatment area is not available, and no direct comparisons will be made. However, results of routine surveys will provide useful moose population size, trend, composition and mortality data for comparisons to help evaluate treatment.

H. *Other Mortality Factors:*

Deep snow years were a factor lowering recruitment during some years in Unit 19D East (Keech 2012) and may also be a factor in the Unit 21E WCFA. Additionally, spring flooding can be significant in this area and may affect calf survival in years with flooding.

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. Evaluation will be reported to the BOG in February each year.

A. *Predator Abundance and Potential for Return to Pretreatment Abundance:*

In March 2009 a partial survey of Unit 21E resulted in an estimate of 150 wolves (19 wolves per 1,000 mi^2) in 20–30 packs and an estimate of 80 in the WCFA. With at least 70 wolves outside the WCFA, we are assured the minimum 30 wolves remain in Unit 21E even after reducing wolves by at least 60–80% in the WCFA. Based on wolf immigration and reproductive success, we anticipate that wolf numbers would recover to precontrol levels in 3–5 years in the WCFA if wolf control were suspended (National Research Council 1997:52–53).

Based on extrapolation of densities from other areas, an estimated 1,900–2,275 black bears occupy Unit 21E, including approximately 130–160 black bears within the BCFA. Based on the same extrapolations, an estimated 100–200 brown bears are present in Unit 21E, including approximately 10–15 brown bears within the BCFA. Bears in the area surrounding McGrath in Unit 19D East recovered quickly after removal in 2003 and 2004 (Keech 2012) and we anticipate bear numbers in the BCFA will recover to precontrol levels within 5–7 years. In addition, because the BCFA is a relatively small geographic area, removing bears from within it will have only a minor effect on the bear densities in Unit 21E overall.

B. *Habitat and Forage Condition:*

A baseline browse survey was conducted in March 2006 (Paragi et al. 2008). While no forage assessments are currently scheduled for this program, studies may be conducted if we detect twinning rates below 20%.

C. *Prey Abundance, Age-sex Composition, and Nutritional Condition:*

A density objective of 1.0 moose/mi^2 corrected for sightability (approximately 4,125 moose) is established within the WCFA. Achieving this objective will contribute to achieving the IM population objective of 9,000–11,000 moose in all of Unit 21E.

We will continue to assess moose densities in the BCFA and WCFA as the primary response metric with GeoSpatial Population Estimator (GSPE) surveys (Kellie and DeLong 2006) conducted in late winter. We recognize the challenges of observing moose in late winter surveys (e.g., shadows in dense cover on sunny days) and intend to estimate a sightability correction factor (SCF) with each GSPE using radio-marked moose or other appropriate techniques. We will attempt to survey the BCFA and WCFA every 3 years. However, funding, weather, and other area priorities may prevent this.

We will assess composition of the moose within the BCFA during November. The nutritional condition of moose will be primarily monitored through twinning rates using radiocollared and non-radiocollared females observed during late May surveys. To facilitate these surveys, we will try to maintain 40 radiocollared females.

D. *Prey Harvest:*

The IM harvest objective for Unit 21E is 550–1,100 moose.

Reported harvest in Unit 21E during RY14 was 223 moose. Access is difficult over much of the unit, and it is impractical to conduct predator control over the entire area. Therefore, the IM harvest objective is likely unachievable. However, moose harvest within the BCFA and WCFA will contribute to the overall Unit 21E harvest.

A harvest objective of 165 moose annually is established within the WCFA. Moose harvest will be assessed using hunter reports.

IV. Decision Framework to Implement or Suspend a Treatment

A. *Predation Control:*

1. Prey Population Abundance.

The decision-making framework to initiate or suspend predator control will be based upon estimates of moose density in the WCFA and moose twinning rates in the BCFA.

If a GSPE point estimate in the WCFA is lower than the objective of 1.0 moose/mi^2 corrected for sightability (approximately 4,125 moose), and twinning rates are >20%, wolf control may be initiated. This ensures that the moose density is appropriate for the habitat available. All GSPE surveys will be designed to achieve precision of at least ±20% at the 90% confidence interval, but actual precision will vary with survey conditions and funding.

To remain proactive and ensure the moose density does not fall too low, a 1 to 2-year department-conducted bear control effort may also be accomplished when wolf control is initiated.

2. Prey Harvest Catch Per Unit Effort (CPUE).

CPUE will not be used to trigger management actions because many factors influence the number of days it takes for hunters to harvest a moose. These include, but are not limited to, weather, water levels, fuel cost, and moose numbers and their distribution.

B. *Habitat Enhancement:*

We will not initiate habitat enhancement activities during RY17–RY22.

C. *Prey Harvest Strategy:*

1. Prey Harvest.

The moose harvest objective within the WCFA is 165 moose annually.

2. Prey Nutritional Index.

Twinning rates are an important indicator of nutritional status in moose. We will monitor twinning within the BCFA and use 2-year average twinning rates in our decision-making framework. We will also consider any additional information available on nutrition such as calf weights, age of first reproduction, and age-specific pregnancy rate.

V. Public Involvement

A. *Continued Outreach by Department:*

The department will accomplish outreach through the GASH AC and BOG processes. The GASH AC has been actively involved in moose management in Unit 21E and serves as a good platform for public education.

B. *Continued Engagement to Confirm Criteria Chosen for Evaluating Success:*

We will continue to engage the GASH AC, BOG and ADF&G staff to evaluate the success of this program.

C. *Participation in Prey and Predator Harvest or Predator Control:*

Public aerial wolf control will be the primary method of wolf reduction in the WCFA. However, due to the remoteness of the area, public participation in this program may not be sufficient to meet removal objectives. If so, the department may need to remove wolves using a helicopter. We do not expect ground-based efforts to be successful in this remote area.

Public bear control was unsuccessful in Unit 19D. Therefore any bear removals within the BCFA will be conducted by the department. Meat and hides will be salvaged from as many bears as possible and distributed to nearby communities. Department-sponsored bear removal is currently considered the only method available to meet bear reduction objectives.

D. *Monitoring and Mitigation of Hunting Conflict:*

Advisory committee and BOG processes will be used to monitor and mitigate user conflict. Communication between committees and other stakeholders will be encouraged.

VI. OTHER CONSIDERATIONS

The perceived decline in moose numbers during the mid-1990s may very well have taken place, however the department has no data to document this. Currently, moose numbers appear to be high again, and the population in Unit 21E is well above the density objective established in this plan. However, the BOG and GASH AC want to remain proactive by having an IM plan in place if a future decline is detected.

In Unit 19A ADF&G was not able to measure a response in moose densities with wolf control alone. Unit 19D research demonstrated a substantial reduction in predation rates following both wolf and bear removals (Keech 2012). Using this case history, it was determined that a reduction in bear numbers would also be required in Unit 19A.

Based on this experience, a BCFA is also established as part of this plan. However, we also recommend that a calf mortality study be initiated to assess the impact of bear predation in Unit 21E before any predator reductions begin. Unit 21E is unique with very high concentrations of moose in the winter, and assessing the influence of various sources of mortality is important. The bear control conducted in Units 19A and 19D required substantial financial and staff resources. For those reasons, conducting a calf mortality study in Unit 21E will be central to focusing predator removal efforts in a cost effective manner.

Wolf control conducted by the public has been successful in Units 19A and 19D. However Unit 21E has several factors which make assurance of success by the public much less certain. First, Unit 21E is more remote than either Unit 19A or 19D with long ferry times required to reach the area. Next, fuel is not locally available for aviation needs. Finally, there are no locally-available pilots to participate as there are in Unit 19A or Unit 19D. Therefore,

public permittees are not as likely to be successful in reducing wolf numbers below control objectives and department-conducted wolf control may be necessary.

An additional consideration prior to conducting control activities will be gaining access to critical private lands. Without this access wolf and bear control would be ineffective and should not be conducted.

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APPENDIX A. Summary of supporting information.

Geographic Area and Land Status	
Management area(s)	Prey density assessment (4,094 mi^2), prey harvest assessment (4,094 mi^2), predator density assessment (4,126 mi^2), predator control focus areas (wolves 4,126 mi^2 and bears 556 mi^2) – see Figure 1
Land status	Federal, State and Private
Biological and Management Situation	
Prey population	Unit 21E IM objectives: 9,000–11,000 moose WCFA estimate in 2016: 8,372 moose
Prey harvest (human use)	Unit 21E IM harvest objectives: 550–1,100 223 moose harvested in Unit 21E in 2014 Unit 21 amount necessary for subsistence 600–800
Feasibility of access for harvest	There are extensive private lands along the major drainages within Unit 21E which are closed to non-shareholders. Unleaded fuel is available in Grayling, Anvik, Shageluk, and Holy Cross but the cost is high. There are very few trails and no roads so access is primarily limited to river travel.
Nutritional condition	2-year average twinning rate (2014 and 2015) for moose in BCFA 35%
Habitat status and enhancement potential	Browse biomass removal was 21% (95% CI: 16–29%) in 2006. Wildfire and floods regularly reset habitat to early successional stages, so no habitat enhancement is anticipated.
Predator(s) abundance	WCFA estimated in 2009: Wolves 80, BCFA estimated in 2005: Black bears 130–160, Grizzly bears 10–15
Predator(s) harvest	Reported in RY14: Grizzly bear 7, Black bear 1 (no harvest ticket or sealing requirements), Wolves 1
Evidence of predation effects	Keech 2012 demonstrated in a 3 predator, 1 large prey system, substantial predator treatments within a small area were an effective way to increase moose survival and densities.
Feasibility of predation control	Keech 2012 demonstrated in a 3 predator, 1 large prey system, substantial predator treatments within a small area were an effective way to increase moose survival and densities.
Other mortality	Deep snow winters.