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SUSITNA-WATANA HYDRO

1.1. Moose Distribution, Abundance, Movements, Productivity, and Survival

1.2. Requester of Proposed Study

AEA anticipates resource agencies will request this study.~~on behalf of Alaska Department of Fish and Game (ADF&G), Division of Wildlife Conservation~~

1.3. Responses to Study Request Criteria (18 CFR 5.9(b))

1.3.1. Describe the goals and objectives of each study proposal and the information to be obtained.

The goal of the study is to obtain sufficient population information on moose, one of the most important wildlife species in the region, to use in evaluating Project-related effects and identifying any ~~approrpriate~~appropriate measures to avoid, minimize, or mitigate for those effects.

The study area will encompass the Project impoundment zone and potential access and transmission-line routes from the west and the north, referred to herein as the greater Project area, most of which is located within Game Management Unit (GMU) subunit 13E and adjacent subunit 13A. The moose study will focus on the middle and upper portions of the basin in which the Project facilities, access road and transmission-line corridors, and reservoir impoundment zone would be located, and will not extend downstream below the Gold Creek/Sherman area.

Five primary objectives have been identified for this study:

1) Document the moose population composition and density in the greater Project area;
2) Assess the relative importance of the greater Project area to moose;
3) Document the productivity and calf survival of moose using the greater Project area;
4) Document the level of late winter use of adults and calves in the proposed inundation area; and
5) Analyze and synthesize data from historical and current studies of moose in the greater Project area as a continuation of the moose task of 2012 study W-S1 (AEA 2012).

Data collected through standard (Very High Frequency – VHF) radio-telemetry, satellite-linked Global Positioning System (GPS) telemetry, and aerial surveys of population composition, density, and calf production will document currently used areas, as well as providing data on the timing and duration of seasonal range use and the proportion of the regional moose population that uses the greater Project area. This information may be used to develop seasonal or access restrictions to protect sensitive habitats. The information developed will be used to inform development of appropriate protection, mitigation, and enhancement measures in support of ADF&G management objectives for moose in GMU 13.

1.3.2. If applicable, explain the relevant resource management goals of the agencies and/or Alaska Native entities with jurisdiction over the resource to be studied. [Please include any regulatory citations and references that will assist in understanding the management goals.]

ADF&G is responsible for the management, protection, maintenance, and improvement of Alaska's fish and game resources in the interest of the economy and general well-being of the state (AS 16.05.020). ADF&G monitors moose populations and manages subsistence and sport

hunting for moose (5 AAC 85.045) through regulations set by the Board of Game (AS 16.05.255). The Federal Subsistence Board, which comprises representatives from the U.S. Fish and Wildlife Service, National Park Service, Bureau of Land Management, Bureau of Indian Affairs, and U.S. Forest Service, oversees the Federal Subsistence Management Program (57 FR 22940; 36 CFR Parts 242.1–28; 50 CFR Parts 100.1–28) with responsibility for managing subsistence resources on Federal public lands, including moose, for rural residents of Alaska.

ADF&G's human use objectives for moose in GMU 13 are to increase the yearly moose harvest of bulls and cows to a combined total of 1,200–2,000 animals; and to provide for a subsistence harvest of 300–600 moose per year (Tobey and Schwanke 2010). ADF&G's moose population objectives for GMU 13 are to increase the unit moose population to 20,000–25,000 moose with a minimum of 25–30 calves: 100 cows, 25 total bulls: 100 cows and 10 yearling bulls: 100 cows in the fall (Tobey and Schwanke 2010).

1.3.3. If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.

Wildlife resources are owned by the State of Alaska, and the Project could potentially affect these public interest resources.

1.3.4. Describe existing information concerning the subject of the study proposal, and the need for additional information.

Moose studies during the early 1980s for the original Susitna Hydroelectric Project proposal were comprehensive, but more recent data are needed to accurately characterize the current moose population size, distribution, and habitat use. New information is also needed to assess current issues pertaining to human use of the population in the greater Project area.

Changes in hunter access due to the proposed Project needs to be adequately evaluated in order to maintain current management objectives. Hunter demand for moose in GMU 13 is very strong and continues to grow. Due to this trend and with implementation of moose population composition objectives in the early 1990s, the GMU 13 moose population composition has been closely monitored in order to maintain a sustainable harvest and high hunter satisfaction rates. Existing annual monitoring efforts for moose in GMU 13A and 13E address abundance, distribution, and recruitment for the purposes of assessing annual moose population trends and related harvest regulatory strategies. These data however, are insufficient to accurately address potential Project-related impacts, or to identify potential mitigation measures for moose in the greater Project area.

1.3.5. Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.

The Project will result in wildlife habitat loss and alteration, blockage of movements of mammals, wildlife disturbance, and changes in human activity due to construction and operation of the Project. In the middle and upper Susitna River basin the Project may result in habitat loss, reduced access, or displacement from seasonally used sensitive habitats such as moose calving and wintering areas caused by increased human activity.

The moose study addresses the following direct, indirect and cumulative effects (AEA 2011):

- W1: Potential direct loss and alteration of wildlife habitats, including key habitat features such as den sites and mineral licks, from Project construction and operation;
- W2: Potential direct physical and behavioral blockage and alteration of movements due to reservoir water and ice conditions; access and transmission corridors; and new patterns of human activities;
- W3: Potential changes in wildlife mortality rates due to Project-related fluctuations in water and ice conditions in the reservoir and downstream river reaches;
- W4: Potential cumulative impact of changes in predator and prey abundance and distribution related to increased human activities and habitat changes resulting from Project development; and
- W5: Potential indirect impacts to wildlife from changes in hunting, vehicular use, noise, and other disturbance due to increased human presence resulting from Project development.

The current level of use of the inundation zone by moose in winter is unknown. As snow accumulates over the winter, moose move to lower elevation areas that typically have shallower snow cover and more abundant forage. Loss of overwinter habitat in the inundation zone was considered to be a major potential impact on moose during the 1980s Susitna Hydroelectric Project studies.

Documentation of currently used seasonal range areas, as well as the timing, duration, and proportion of the regional population that uses those areas, can be used to develop seasonal and access restrictions to protect sensitive habitats. The information developed will be used to inform development of any appropriate avoidance, minimization, and mitigation measures ~~in support of ADF&G management objectives for moose in GMU 13~~. This information also will be useful in reducing inadvertent disturbance from unrelated field studies for the Project.

1.3.6. Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.

The methods employed in this study will be standard capture, handling and monitoring techniques for moose (Schmitt and Dalton 1987). Small piston helicopters (Robinson R44®, Robinson Helicopter Company, Torrance, California) and chemical immobilization techniques will be used for moose captures, and small fixed-wing aircraft (Piper® PA-18 Super Cub, Piper Aircraft, Inc., Vero Beach, Florida) will be used for aerial telemetry (radiotracking) flights. All methods will be fully evaluated and compliant with Alaska Interagency Animal Care and Use Committee certification. Standard permits required by the state of Alaska for animal capture and monitoring are in-hand.

To accomplish project objectives, a variety of methods will be used including, radiotelemetry collars (VHF and satellite), trend count surveys, and intensive population estimation surveys. We will monitor cow and bull moose with telemetry collars. Collected telemetry locations will be used to evaluate spatial distribution and movements of cows and bulls. Location, date, reproduction, and survival status will be documented for each moose located during scheduled

radiotelemetry flights. Additional locations will be gathered for each moose equipped with a satellite collar that records locations at a pre-determined frequency throughout the year.

Moose trend count surveys will be conducted using conventional methods described by Ballard and Whitman (1988) and used throughout Alaska to monitor moose population trends. To maximize precision and consistency between surveys for moose trend count surveys, conventional methods will be utilized pertaining to optimal snow conditions, daylight, flight patterns, etc. (Ballard and Whitman 1988). For intensive population estimates, the GeoSpatial Population Estimator (GSPE) will be used (Ver Hoef 2002, Kellie and Delong 2006) to maximize estimate precision to within 90% confidence. For each population estimate, a stratified random sample of 6 mi^2 units will be surveyed at a high search intensity (>6.5 min/mi^2). Surveys will be flown under optimal conditions when possible. Data analysis and visual representation of data will be accomplished using ArcGIS® (Geographic Information System) software (ESRI, Redlands, California).

Study Activity	Schedule	Objectives
Trend Count Survey – CA7 and CA14	Annually for 3 years: November–December 2012–2014	1, 5
GeoSpatial Population Estimator Survey – intensive population estimate	One estimate above dam site: November 2012 One estimate below dam site: November 2013	1, 5
Winter survey – inundation zone	Two estimates: March 2012 and 2013	4
Telemetry – movements, productivity, survival	Deploy 60 radio and 20 satellite collars: November 2012, March 2013	2, 3, 5
Survey – telemetry relocations, movements, productivity, survival	Monthly monitoring: 2012–2015 Weekly monitoring: 10 May – 15 June 2012–2016; 1–20 September, 2012–2016 Daily monitoring: 15–31 May 2012–2016	2, 3, 4, 5
Telemetry – movements, productivity, survival	Remove satellite collars: November 2014; March 2015	2, 3, 5

1.3.7. Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

Existing annual monitoring efforts for moose in GMU subunits 13A and 13E are insufficient to accurately evaluate potential Project-related impacts, or to identify potential mitigation measures for moose in the greater Project area.

Using telemetry data to monitor moose movements, distribution, and demography has proven to be a very cost effective method to study moose in remote locations and is the principal tool used for moose management in Alaska. In addition, telemetry provides animal-specific movement information not available from aerial surveys or ground-based surveys. Maintaining a large sample of collared moose over multiple years is necessary to capture the large variation in

resource use among years, sexes, and individuals. Limitations of telemetry data will be compensated for by incorporating aerial surveys of the Project area.

Current trend count monitoring by ADF&G, while adequate for managing population and harvest strategies on a subunit basis, does not provide information for specific areas that are not regularly surveyed, such as trend-count areas CA7 and CA14 on either side of the proposed inundation zone. Intensive population surveys have been conducted periodically in GMU 13, but have not been conducted recently in the greater Project area.

Period	Item	Estimated Effort
Fiscal Year 2012 (1 March–30 June 2012	Biologist	1 @ 1 month
	Inundation zone survey	1
Fiscal Year 2013 (1 July 2012–30 June 2013)	Biologist	3 @ 7 months
	Inundation zone survey	1
	Fall capture (60 moose)	9 days
	Monitoring flights	37 flights
	Trend Count Survey (CA 7, CA 14)	1
	GSPE Survey (above dam)	1
	Spring capture (remaining)	days
Fiscal Year 2014 (1 July 2013–30 June 2014)	Biologist	3 @ 1.5 months
	Monitoring flights	37 flights
	Trend Count Survey (CA 7, CA 14)	1
	GSPE Survey (below dam)	1
Fiscal Year 2015 (1 July 2014–30 June 2015)	Biologist	3 @ 1.5 months
	Fall capture (20 moose)	5 days
	Monitoring flights	37 flights
	Trend Count Survey (CA 7, CA 14)	1
Fiscal Year 2016 (1 July 2015–30 June 2016)	Biologist	3 @ 1.5 months
	Monitoring flights	37 flights

1.3.8. Literature Cited

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