Susitna–Watana Hydroelectric Project (FERC No. 14241)

Moose Distribution, Abundance, Movements, Productivity, and Survival Study Plan Section 10.5

2014–2015 Study Implementation Report

Prepared for

Alaska Energy Authority

SUSITNA-WATANA HYDRO

Clean, reliable energy for the next 100 years.

Prepared by

Alaska Department of Fish and Game

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LIST OF ACRONYMS, ABBREVIATIONS, AND DEFINITIONS

Abbreviation	Definition
AEA	Alaska Energy Authority
ADF&G	Alaska Department of Fish and Game
CA	count area
CAG	current annual growth
CIRWG	Cook Inlet Regional Working Group
DFG	Department of Fish and Game
FERC	Federal Energy Regulatory Commission
GMU	Game Management Unit
GPS	Global Positioning System
GSPE	GeoSpatial Population Estimator
ILP	Integrated Licensing Process
ISR	Initial Study Report
LZ	landing zone
PM&E	Protection, Mitigation, and Enhancement
PRM	Project River Mile
Project	Susitna–Watana Hydroelectric Project
RSP	Revised Study Plan
SCF	Sightability Correction Factor
SPD	Study Plan Determination
VHF	Very High Frequency

1. INTRODUCTION

The Moose Distribution, Abundance, Movements, Productivity, and Survival Study (Moose Study), Section 10.5 of the Revised Study Plan (RSP) approved by the Federal Energy Regulatory Commission (FERC) for the Susitna–Watana Hydroelectric Project, FERC Project No. 14241, focuses on characterizing moose distribution, movements, population size, productivity, and habitat use in the study area through a combination of radio telemetry and geospatial analyses.

A summary of the development of this study, together with the Alaska Energy Authority's (AEA) implementation of it through the 2013 study season, appears in Part A of the Initial Study Report (ISR) filed with FERC in June 2014 (ADF&G 2014a). As required under FERC's regulations for the Integrated Licensing Process (ILP), the ISR describes AEA's "overall progress in implementing the study plan and schedule and the data collected, including an explanation of any variance from the study plan and schedule" (18 CFR 5.15(c)(1)).

Since filing the ISR in June 2014, AEA has continued to implement the FERC-approved plan for the Moose Study. For example:

- On October 21, 2014, AEA held an ISR meeting for the Moose Study, along with meetings for each of the other wildlife studies.
- The GPS collars deployed in October 2012 dropped off and were retrieved by the study team in November 2014.
- Additional GPS collars were deployed in the area downstream of the proposed Watana Dam site in April 2015.
- The study team located all VHF-collared moose regularly during monthly telemetry flights. The study team conducted aerial surveys daily during calving and twice a month during fall in 2014 and 2015.
- An additional late-winter population survey of the proposed reservoir inundation zone was conducted in March 2015.

In furtherance of the next round of ISR meetings and FERC's Study Plan Determination (SPD) expected in 2016, this report describes AEA's overall progress in implementing the Moose Study during calendar years 2014 and 2015. Rather than a comprehensive reporting of all field work, data collection, and data analysis since the beginning of AEA's study program, this report is intended to supplement and update the information presented in Part A of the ISR for the Moose Study through the end of calendar year 2014 and thus far in 2015. It describes the methods and results of the 2014–2015 effort and includes a discussion of the results obtained.

2. STUDY OBJECTIVES

The goal of the study is to obtain sufficient population information and use of the study area to evaluate the potential effects of the Project on moose.

The study objectives are established in RSP Section 10.5.1:

- Document the moose population and composition in the study area.
- Assess the relative importance of the habitat in the inundation zone, proposed access/transmission corridors, and the riparian area below the Project.
- Document the productivity and calf survival of moose using the study area.
- Document the level of late winter use of adults and calves in the proposed inundation area.
- Document moose browse utilization in and adjacent to the inundation zone and the riparian area below the Project.
- Document the amount of potentially available habitat for improvement through crushing, prescribed burning, or other habitat enhancement.
- Analyze and synthesize data from historical and current studies of moose as a continuation of the 2012 big-game distribution and movements study (Prichard et al. 2013).

3. STUDY AREA

As established by RSP Section 10.5.3, the study area includes the majority of Game Management Unit (GMU) 13E east of the Parks Highway and the Alaska Railroad and from the Denali Highway south to upper Chunilna Creek (Figure 3-1). The study area also includes a small portion of northwestern GMU 13A, from Kosina Creek east to the Oshetna River drainage. The study area encompasses the proposed reservoir inundation zone, access and transmission corridors, and associated Project infrastructure.

As described in the ISR Overview (Section 1.4) filed in June 2014 and subsequently the *Proposal to Eliminate the Chulitna Corridor from Further Study* filed with FERC on September 17, 2014, AEA explained that it had decided to pursue the study of an additional alternative north-south corridor alignment for transmission and access from the dam site to the Denali Highway, referred to as the "Denali East Corridor Option," and to eliminate the Chulitna Corridor from further study. This change to the study area did not impact this study because the study area for moose distribution, movements, productivity, and survival already included all current corridor options and late-winter population surveys are only conducted in the proposed reservoir inundation zone and along the Susitna River downstream from the inundation zone.

3.1. Study Area Variances

In 2015, the Study Area was expanded to include capturing and collaring moose along the Susitna River from the proposed dam site downstream to the confluence with Chulitna and Talkeetna rivers, as shown in Figure 3-1.

4. METHODS AND VARIANCES IN 2014–2015

The study team implemented the methods described in the Study Plan with the exception of the variances described in Sections 4.1.1 and 4.3.1 below.

4.1. Moose Distribution, Movements, Productivity, and Survival

To delineate moose movements in the Project area and to evaluate productivity and survival, the study team equipped cow and bull moose with 40 satellite-linked Global Positioning System (GPS) collars and 60 Very High Frequency (VHF) collars in October 2012 and March 2013, respectively, as described in ISR 10.5, Part A, Section 4.1 (ADF&G 2014a). The study team deployed 60 percent of the collars on cows because they represent the reproductive portion of the herd. The GPS collars deployed in October 2012 dropped off (released automatically, as programmed) and were retrieved in November 2014.

As described in Section 4.1.1 below, AEA implemented a variance to the Study Plan in 2015 in response to comments received during the October 2014 ISR meeting. The concern expressed in that meeting was that post-Project changes in river flow levels and ice scour might affect regeneration of woody browse species for moose, such as willows, along the river downstream of the Project. An additional 20 GPS collars were deployed on 13 cows and 7 bulls during April 3–5, 2015, to sample the distribution and movements of both sexes in the riparian area downstream of the proposed Watana Dam site. Habitat-use information from the GPS collars deployed in the downstream area and data from the late-winter downstream population survey will be combined with the Riparian Instream Flow (Study 8.6) modeling of potential changes in flow regimes, ice processes, and sediment and the effects on vegetation. This synthesis will allow the study team to better assess the relative importance of habitats downstream and the potential impacts on moose due to potential future changes in river flow and ice scouring.

The study team conducted aerial radio-tracking (telemetry) surveys in fixed-wing aircraft monthly—except for December, January, February, and April, a Study Plan modification described in ISR 10.5, Part C, Section 7.1.2 (ADF&G 2014b) and below as a variance under Section 4.1.1—to document the distribution of radio-collared moose in the study area. During the spring calving and fall seasons, the study team conducted aerial surveys weekly to document more frequently the distribution of moose in the study area. Additionally, to document productivity and associated calf loss more accurately, the study team conducted twinning surveys daily during calving. The study team used small fixed-wing airplanes (Piper PA-18 "Super Cub") for these radio-tracking flights. The study team documented location, date, reproduction, and survival status for moose located during each flight.

Moose locations are regularly obtained from GPS collars via a satellite data link using the Argos Data Collection System and locations are provided to the study team monthly on a compact disc from Telonics.

Data collection and analysis will continue during the next study season.

4.1.1. Variances

A Study Plan modification described in Study 10.5 ISR Part C, Section 7.1.2 (ADF&G 2014b) and presented at the October 2014 ISR meeting was instituted as a variance in winter 2014–2015: the study team ceased monthly radio-tracking flights of VHF-collared moose in the winter months of December, January, February, and April. Because little movement typically occurs during those months, monitoring was deemed unnecessary to meet the study objectives of

obtaining sufficient information on the moose population and use of the study area to evaluate the potential effects of the Project on moose.

After the ISR was filed in June 2014, the duration of the study (RSP Section 10.5.6) was extended through 2014 and into 2015 to continue collecting telemetry data from active VHF and satellite-linked GPS collars deployed in the study area, thereby maximizing the amount of telemetry data obtained for use in addressing the study objectives.

During the October 2014 ISR meeting, a licensing participant expressed concern about the study team's ability to assess the relative importance of habitats downstream from the proposed Project facilities. The study team addressed this concern by deploying an additional 20 GPS collars on moose in that area in April 2015. These collars were deployed on moose captured along the Susitna River floodplain from the proposed Watana Dam site downstream to the southern end of Denali State Park (Figure 3-1). The location and movement data from these collared moose will be used to assess the relative importance of habitats in the riparian area below the proposed Project facilities, as well as documenting the productivity and calf survival of moose below the proposed dam site. The study team will gain insight into the relative level of use of the riparian areas immediately adjacent to the downstream sections of river below the proposed dam site, which will help to fulfill the fifth objective of the Study Plan.

4.2. Population Monitoring

As described in RSP Section 10.5.4.2, the study team employed three survey techniques to evaluate moose populations, one of which was designed to assess winter use of the proposed reservoir inundation zone. As reported in Section 4.2 of Study 10.5 ISR Part A (ADF&G 2014a), aerial surveys of the moose population using the reservoir inundation zone were completed in March 2012 and March 2013, as described in RSP Section 10.5.4.2, but not in 2014. Although not required as part of the FERC-approved Study Plan, AEA conducted a third survey of the proposed reservoir inundation zone in late March 2015, as described in Section 4.2.1 below. In addition to the inundation zone, the survey conducted in late March 2015 extended downstream of the proposed Watana Dam site to the confluence of the Susitna, Chulitna, and Talkeetna rivers (PRM 102.4), as shown in Figure 3-1 and described in Section 4.2.1 below.

The study team used conventional survey methods pertaining to optimal snow conditions, daylight, flight patterns, and other factors (Ballard and Whitman 1988) for all population surveys to maximize survey precision, maintain consistency among surveys, and facilitate comparisons with existing data sets. Due to the seasonal absence of antlers, it was not possible to distinguish bulls from cows during the late-winter population surveys, but the study team recorded numbers of calves and adults. Population estimates will be corrected for sightability using data from intensive surveys (Gasaway et al. 1986).

4.2.1. Variances

An additional late-winter survey of the proposed reservoir inundation zone was conducted in late March 2015 to supplement the data acquired during the 2012 and 2013 late-winter surveys in that area. Although those two surveys were adequate to fulfill the fourth objective of the Study

Plan, the additional survey in 2015 was added to provide another year of data to better characterize the preconstruction use of the inundation zone by moose and meet the objective.

In addition, during the October 2014 ISR meeting, some licensing participants expressed concern about the study's ability to assess the potential future impacts of altered river flow and ice scouring on moose in the area downstream from the proposed Watana dam. The study team addressed this concern by conducting a late-winter population survey along the Susitna River from the proposed dam site to the confluence of the Susitna, Chulitna, and Talkeetna rivers (PRM 102.4) to document the level of late winter use of adults and calves in this area (Figure 3-1). When combined with predictive models of future river flow and ice scour, this information will assist the study team in assessing potential changes in habitat conditions and allow the development of PM&E measures.

4.3. Moose Browse Survey and Habitat Assessment

No work was performed on this task in 2014 or 2015. The results of work performed on this task in 2013 were reported in Section 4.3 of Study 10.5 ISR Part A (ADF&G 2014a).

4.3.1. Variances

In Section 7 of Study 10.5 ISR Part C (ADF&G 2014b), AEA proposed to conduct the second year of the moose browse survey and habitat assessment in 2015. That effort was later postponed until late winter 2016, however. The same methods used in 2013, the first year of work, as described in Section 4.3 of Study 10.5 ISR Part A (ADF&G 2014a), will be used in the second year of the browse survey.

5. RESULTS

Because animal location data collected during ADF&G population surveys are restricted under Alaska State Statute (AS 16.05.815(d)), the coordinates of moose locations from the ISR (ADF&G 2014a, Section 5.1) or for this report are not included in the data posted on the Project website. Data developed in support of this study are available at: http://gis.suhydro.org/SIR/10-Wildlife/10.5-Moose/. See Table 5-1 for details.

5.1. Moose Distribution, Movements, Productivity, and Survival

Thirty of the GPS collars deployed in October 2012 were retrieved in November 2014 to download the full data stored in the collars. The remaining 10 collars were returned by hunters (7 collars) during the hunting season or were not retrievable (3 collars). In April 2015, the study team deployed 20 GPS collars on 13 cows and 7 bulls in the riparian area of the study area downstream from the proposed Watana Dam site.

The study team located all VHF-collared moose regularly during monthly telemetry flights, except for December, January, February, and April (see Study 10.5 ISR Part C, Section 7.1.2 [ADF&G 2014b]). The study team conducted aerial surveys daily during calving and twice a

month during fall in 2014 and 2015. From October 2014 through October 2015, a total of 2,921 locations of 107 collared moose were obtained.

5.2. Population Monitoring

The study team conducted all moose surveys under suitable conditions, considering snow cover, wind, daylight, and precipitation. The study team counted 427 moose during late-winter surveys of the proposed reservoir inundation zone (Figure 3-1) in both March 2012 and March 2013, as reported in Sections 4.2 and 5.2 of Study 10.5 ISR Part A (ADF&G 2014a). Of the 40 sample units surveyed, the study team randomly selected 10 each year for intensive surveys, which will be used to develop a sightability correction factor (SCF; Gasaway et al. 1986).

The study team counted 280 moose during a late-winter population survey of the proposed reservoir inundation zone during March 23–25, 2015, and 137 moose during a late-winter survey of the downstream portion of the study area during March 20–23, 2015. The study team randomly selected 10 sample units from each survey area for intensive surveys, which will be used to develop an SCF (Gasaway et al. 1986).

The study team surveyed 205 sample units and counted 1,283 moose in over 100 survey hours during the GSPE survey in November 2013, as reported in Sections 4.2 and 5.2 of Study 10.5 ISR Part A (ADF&G 2014a). The study team conducted the survey using seven pilot/observer teams. Of the 633 sample units in the study area, the study team assigned 319 to the high-density stratum and 314 to the low-density stratum (Figure 3-1). The study team will calculate an SCF for the population estimate using the proportion of collared moose seen by pilot/observer teams.

The study team conducted traditional aerial trend-count surveys in CA 7 and CA 14 (Figure 3-1) in November 2012 and November 2013, as reported in Sections 4.2 and 5.2 of Study 10.5 ISR Part A (ADF&G 2014a).

6. DISCUSSION

Monitoring of the distribution, productivity, and survival of moose in the study area is continuing through tracking of the VHF- and GPS-collared moose currently alive in the study area. Evaluation of the moose population and composition in the study area is also ongoing. The surveys completed thus far include late-winter inundation surveys in March 2012, 2013, and 2015; a late-winter downstream survey in March 2015; a GSPE survey in November 2013; and aerial trend-count surveys in November 2012 and November 2013. Estimation of moose browse utilization in the study area is in progress via browse surveys in the study area, the first of which was conducted March–April 2013, and the second of which is planned for late winter 2016.

Habitat use information from the GPS collars deployed in the downstream area and data from the late-winter downstream survey will be combined with the Riparian Instream Flow (Study 8.6) modeling of potential changes in flow regimes, ice processes, and sediment and the effects on vegetation. This synthesis will allow the study team to better assess the relative importance of habitat downstream and the potential impacts on moose due to potential future changes in river flow and ice scouring.

The study team anticipates that the data collected 2012 through 2015, combined with the data to be collected in the next study season, will be adequate to meet the study objectives outlined in RSP Section 10.5.1.

7. CONCLUSION

Continued implementation of the Moose Distribution, Abundance, Movements, Productivity, and Survival Study is planned for 2015 and 2016, with a late-winter downstream survey and fine-scale browse survey scheduled to occur in March–April 2016. This study is interrelated with Study 10.19, Evaluation of Wildlife Habitat Use. AEA expects the approved Study Plan objectives for both this study and Study 10.19 will be fully achieved with the Study Plan modifications described below in Section 7.1, in combination with the results of the efforts already completed in 2013 and 2014.

7.1. Modifications to Study Plan

RSP Section 10.5.6 indicated that telemetry surveys would continue through the life of the radio collars, (approximately 2016). Radio collars were to be tracked every two weeks during May 10–June 15 in 2013 and 2014, including daily monitoring during calving (May15–31) each year. Radio collars were also to be tracked weekly during September 1–20 in 2013 and 2014. The RSP indicated that any remaining GPS collars would be retrieved in March 2015.

Telemetry surveys and monitoring of GPS-collared moose, including those collared in the downstream portion of the study area in April 2015, are now planned to continue through March 2016 to gather data to use in meeting the Study Plan objectives. As indicated in Section 7.1.2 of Study 10.5 ISR Part C (ADF&G 2014b), the study team will continue to forego monthly radio-tracking flights of VHF-collared moose in the winter months of December, January, February, and April. Because little movement occurs during those months, monitoring then is unnecessary to meet the study objectives of obtaining sufficient information of moose population and use of the study area to evaluate the potential effects of the Project on moose.

Another late-winter population survey will be conducted in the downstream survey area in March 2016 to supplement the data obtained in the March 2015 survey described above under Section 4.2. A fine-scale browse assessment in the proposed reservoir inundation zone (including CIRWG lands), downstream areas, and transmission corridors will be completed in late winter (March–April) 2016, as described above under Section 4.3.1.

8. LITERATURE CITED

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9. TABLES

Table 5-1. Server Location and File Name for the Moose Data.

Server Pathway or File/Folder Name	Description
/http://gis.suhydro.org/SIR/10-Wildlife/10.5-Moose	Pathway to data files
MOOS_10_05_Data_2012_2015_ADFG.gdb	Geodatabase file containing spatial layers of the moose study area, the moose upstream late-winter survey area, the moose downstream survey area, and the continuous moose count areas.

10. FIGURES

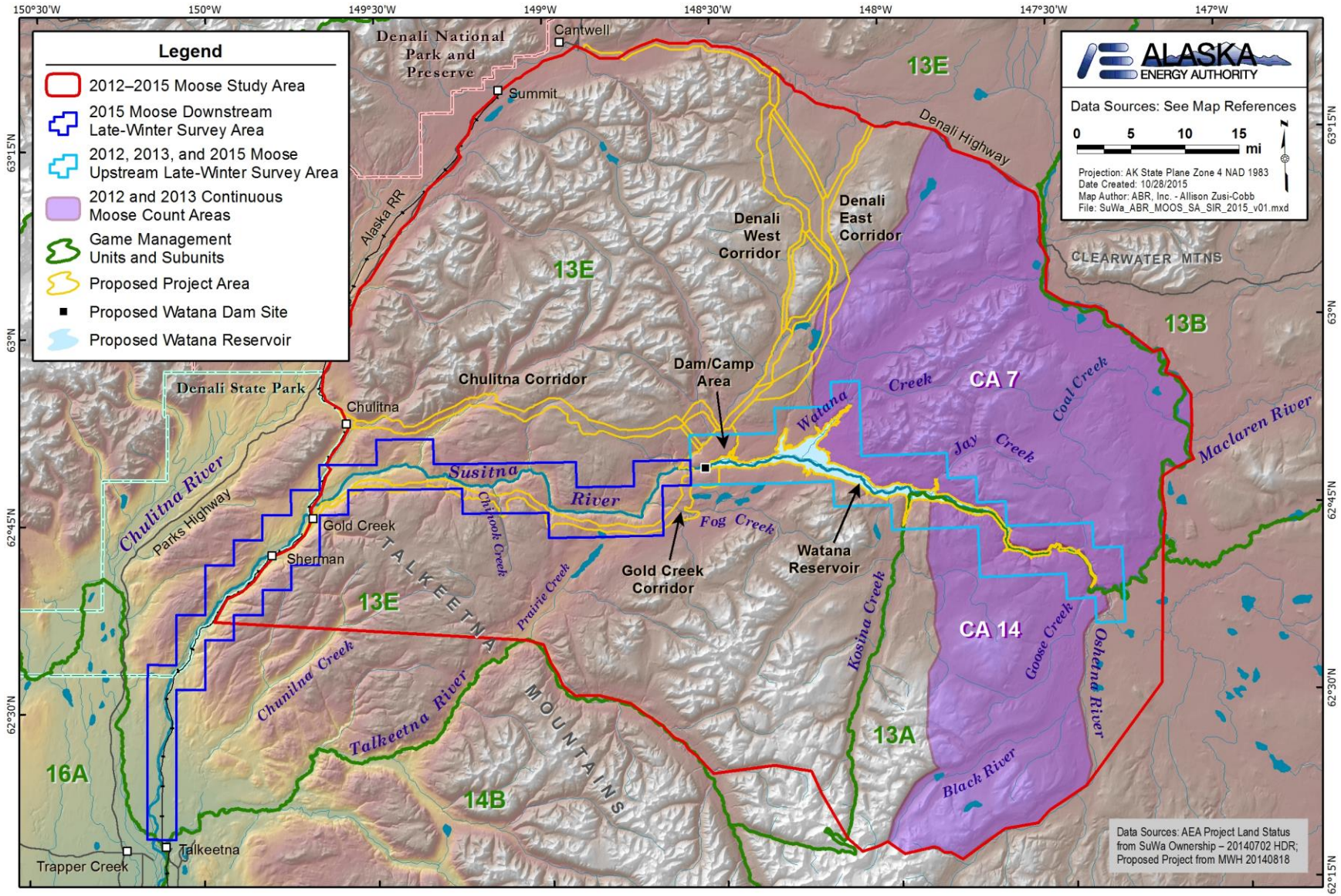

Figure 3-1. Moose Study Area.