Susitna-Watana Hydroelectric Project Document
ARLIS Uniform Cover Page

Title: Wolverine distribution, abundance, and habitat occupancy, Study plan Section 10.9 : Initial study report -- Part A: Sections 1-6, 8-9	**SuWa 223**

Author(s) – Personal:

Author(s) – Corporate:
Alaska Department of Fish & Game

AEA-identified category, if specified:
Initial study report

AEA-identified series, if specified:

Series (ARLIS-assigned report number): Susitna-Watana Hydroelectric Project document number 223	Existing numbers on document:

Published by: [Anchorage : Alaska Energy Authority, 2014]	Date published: June 2014

Published for: Alaska Energy Authority	Date or date range of report:

Volume and/or Part numbers:	Final or Draft status, as indicated:

Document type:	Pagination: ii, 7 p.

Related work(s): The following parts of Section 10.9 appear in separate files: Part A ; Part B ; Part C.	Pages added/changed by ARLIS:

Notes:

All reports in the Susitna-Watana Hydroelectric Project Document series include an ARLIS-produced cover page and an ARLIS-assigned number for uniformity and citability. All reports are posted online at http://www.arlis.org/resources/susitna-watana/

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SUSITNA-WATANA HYDRO

Susitna-Watana Hydroelectric Project
(FERC No. 14241)

Wolverine Distribution, Abundance, and Habitat Occupancy
Study Plan Section 10.9

Initial Study Report
Part A: Sections 1-6, 8-9

Prepared for

Alaska Energy Authority

SUSITNA-WATANA HYDRO

Clean, reliable energy for the next 100 years.

Prepared by

Alaska Department of Fish & Game

Palmer, Alaska

June 2014

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF ACRONYMS, ABBREVIATIONS, AND DEFINITIONS

Abbreviation	Definition
AEA	Alaska Energy Authority
AICc	Akaike Information Criteria
APA	Alaska Power Authority
CFR	Code of Federal Regulations
EPA	Environmental Protection Agency
FERC	Federal Energy Regulatory Commission
GMU	Game Management Unit
ILP	Integrated Licensing Process
ISR	Initial Study Report
km	kilometer
OM	Occupancy Modeling
PRM	Project River Mile
Project	Susitna-Watana Hydroelectric Project
RSP	Revised Study Plan
SPD	study plan determination
SUPE	Sample Unit Probability Estimator
WSA	Wolverine Study Area

1. INTRODUCTION

On December 14, 2012, Alaska Energy Authority (AEA) filed with the Federal Energy Regulatory Commission (FERC or Commission) its Revised Study Plan (RSP), which included 58 individual study plans (AEA 2012). Section 10.9 of the RSP described the study of Wolverine Distribution, Abundance, and Habitat Occupancy. This section focuses on evaluation of existing information and field surveys, modeling wolverine occupancy, and estimating population trends during and after construction of the proposed Project. RSP Section 10.9 described the goal, objectives, and proposed methods for data collection regarding wolverines.

On February 1, 2013, FERC staff issued its study determination (February 1 SPD) for 44 of the 58 studies, approving 31 studies as filed and 13 with modifications. RSP Section 10.9 was one of the 31studies approved with no modifications.

Following the first study season, FERC's regulations for the Integrated Licensing Process (ILP) require AEA to "prepare and file with the Commission an initial study report describing its 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" (18CFR 5.15(c)(1)). This Initial Study Report (ISR) on Wolverine Distribution, Abundance, and Habitat Occupancy has been prepared in accordance with FERC's ILP regulations and details AEA's status in implementing the study, as set forth in the RSP and as approved in FERC's February 1 SPD (referred to herein as the "Study Plan").

2. STUDY OBJECTIVES

The overall goal of this study is to collect pre-construction baseline population data on wolverines in the Project area (reservoir impoundment zone; facilities, laydown, and storage areas; access and transmission line routes) to enable assessment of the potential impacts from development of the proposed Project. This information will be used to estimate the number of wolverines that may be affected by the Project and to evaluate impacts on habitats used seasonally by wolverines.

The four study objectives are established in RSP Section 10.9.1:

1) Estimate the current population size of wolverines.
2) Establish a population index for wolverines.
3) Describe the distribution of wolverines in late winter.
4) Describe habitat use by wolverines in late winter.

3. STUDY AREA

The Wolverine Study Area (WSA; Figure 3-1) is substantially larger than the Project area because of the need to consolidate sampling blocks for the proposed population estimation technique while still encompassing the reservoir inundation zone, dam site, access and

transmission line corridors, and other Project infrastructure and adjacent areas. Most of the WSA is within Game Management Unit (GMU) Subunits 13E and 13A. The study team developed a sampling grid delineated for a Sample Unit Probability Estimator (SUPE) survey of wolverines (Becker et al. 2004; Golden et al. 2007) for the WSA as the primary method for assessing population status of wolverines (Figure 3-1). The study team divided the survey area into equal-sized survey units (e.g., 25 square kilometers; Golden et al. 2007) that were stratified on the basis of predicted density of wolverines (high and medium/low density) from *a priori* knowledge, harvest information, and habitat characteristics. The WSA contained 338 survey units, of which the study team randomly selected 216 for the SUPE survey.

4. METHODS AND VARIANCES IN 2013

4.1. Survey Design

The study team implemented the methods as described in the Study Plan with no variances.

The goal of this study is to collect preconstruction baseline population data on wolverine in the Project area (reservoir impoundment zone, facilities, laydown, and storage areas, access and transmission line routes) for future assessment of the potential impacts from development of the proposed Project. The purpose of this study is to use a combination of the SUPE survey technique and Occupancy Modeling (OM) to assess the wolverine population in the WSA. The study team developed survey methods to allow data collected during SUPE surveys to be used in OM without violating the assumptions of either estimator. Because the requirements for conducting a SUPE are more rigorous, the survey design was largely based on the SUPE estimator.

RSP Section 10.9.4 proposed that "a single aerial Sample-Unit Probability Estimator (SUPE) survey will be attempted. If survey conditions are unsuitable for the SUPE in 2013, then an occupancy survey will be flown." Suitable survey conditions did not develop in 2013 to allow the study team to conduct the SUPE as planned, so the study team developed an OM as originally proposed (see Section 4.2 below). The study team used a subset of 25 sampling units from the SUPE grid to model occupancy of the WSA for wolverines. The study team randomly selected the first sample unit, then spaced sample units at approximately 10 km on center, which was the approximate radius of a circular, 300-km^2 home range (approximate mean of adult female and male home range size from the 1980s Alaska Power Authority [APA] Project studies [Whitman and Ballard 1984] and mean adult female home range size in the study by Inman et al. [2012]). The study team selected sampling units from the 216 units selected randomly for the SUPE so that data from the SUPE survey, if conducted, would provide the data for the first OM survey (i.e., the first OM sampling survey would not need to be flown in addition to SUPE surveys).

The study team flew occupancy surveys following SUPE protocols, using a Cessna 185 fixed-wing aircraft rather than a Piper PA-18. Because the study team only needed to detect wolverine presence (either individual animals or tracks) in each of the sample units and not follow tracks, the greater speed of the Cessna reduced the amount of time needed to survey each unit, and the

lower maneuverability did not affect survey results. Surveys of sample units ended when wolverine sign was detected.

Because the SUPE survey was not conducted in 2013, the study team flew two complete occupancy surveys to assess wolverine occupancy in the WSA. The study team flew all sample units for each survey in a single day, with 3 days between the surveys. The study team assigned two aircraft with a consistent pilot/observer team. Each aircraft surveyed half of the sample units during each survey. The study team reversed the sample units assigned to each team for the second occupancy survey to avoid detection bias based on prior knowledge of track locations.

4.1.1. Variances

No variances from the methods described for aerial surveys were necessary in 2013.

4.2. Occupancy Modeling

The study team used OM to estimate the proportion of the WSA occupied by wolverines (MacKenzie et al. 2006) by calculating adjusted occupancy values (Ψ) that account for imperfect detection of wolverines. The study team analyzed 2013 data using "single season, single species" models in program PRESENCE (MacKenzie et al. 2006). The study team included site (i.e., sample unit) covariates for occupancy and sample (i.e., flight) covariates for detection to adjust occupancy estimates. The study team modeled probability of detection (p) as either constant or varying by survey (sample-varying). The study team modeled Ψ with sample covariates taken from SUPE protocols including (1) snow age in days, classified as 1–2, 3–4, 5–6, or 7+; (2) snow cover, classified as complete, some low vegetation showing, or bare ground showing; (3) light type, classified as bright or flat; and (4) light intensity, classified as high, medium, or low. The study team further included observer/pilot pair as an additional sample covariate. Last, the study team used the Multi-Resolution Land Characteristics Consortium's National Land Cover Data (EPA 2001) to estimate the proportion of each sample unit in deciduous forest, conifer forest, and mixed forest and used these cover classes as covariates in OM. The study team compared these values to unadjusted occupancy values (naïve occupancy), where unadjusted occupancy was defined as the number of sample units with wolverine detection, divided by the total number of units sampled. Akaike Information Criteria, corrected for small sample sizes (AICc; Burnham and Anderson 1998) were used to compare models.

4.2.1. Variances

No variances from the methods proposed for occupancy modeling were necessary in 2013.

5. RESULTS

Survey conditions were not suitable for conducting the SUPE survey during the winter of 2012–2013. However, the study team conducted two surveys for OM as originally proposed.

The study team detected wolverine or track sets of wolverine in 23 of 25 sample units (18 of 20 high density; 5 of 5 medium/low density) during surveys of the WSA conducted on April 11 and April 15, 2013. Occupancy of wolverines uncorrected for imperfect detection (naïve occupancy) was 0.920. Detection probability (p) was 0.953 (SE = 0.033) and Ψ corrected for imperfect detection was 0.922 (SE = 0.055) for the 2013 WSA survey.

6.   DISCUSSION

While one of the goals of this Project is to estimate the wolverine population size using the SUPE technique, the study team may need to rely on OM as the primary source of information on wolverine population trends if conditions in the second year of study preclude a SUPE survey. OM provided estimates of wolverine occupancy of the WSA in a more flexible survey regime than did alternative trend estimators currently used in Alaska. Occupancy can also potentially be used to determine minimum population size of wolverines (i.e., the numbers of territory holding adults), although the study team was unable to independently corroborate population estimates because the lack of suitable environmental conditions precluded the SUPE population estimation survey in winter 2013.

In subsequent surveys, the study team intends to follow the same analytical protocol but will use multi-season occupancy models for analyses after more than one year of data is available. This analysis will model both constant and annually varying rates of colonization, extinction (from sample units), and probability of detection. Spatially explicit OM (e.g., Johnson et al. 2013) also may be evaluated in the future as these approaches evolve to include multi-season modeling.

7.   COMPLETING THE STUDY

[Section 7 appears in the Part C section of this ISR.]

8.   LITERATURE CITED

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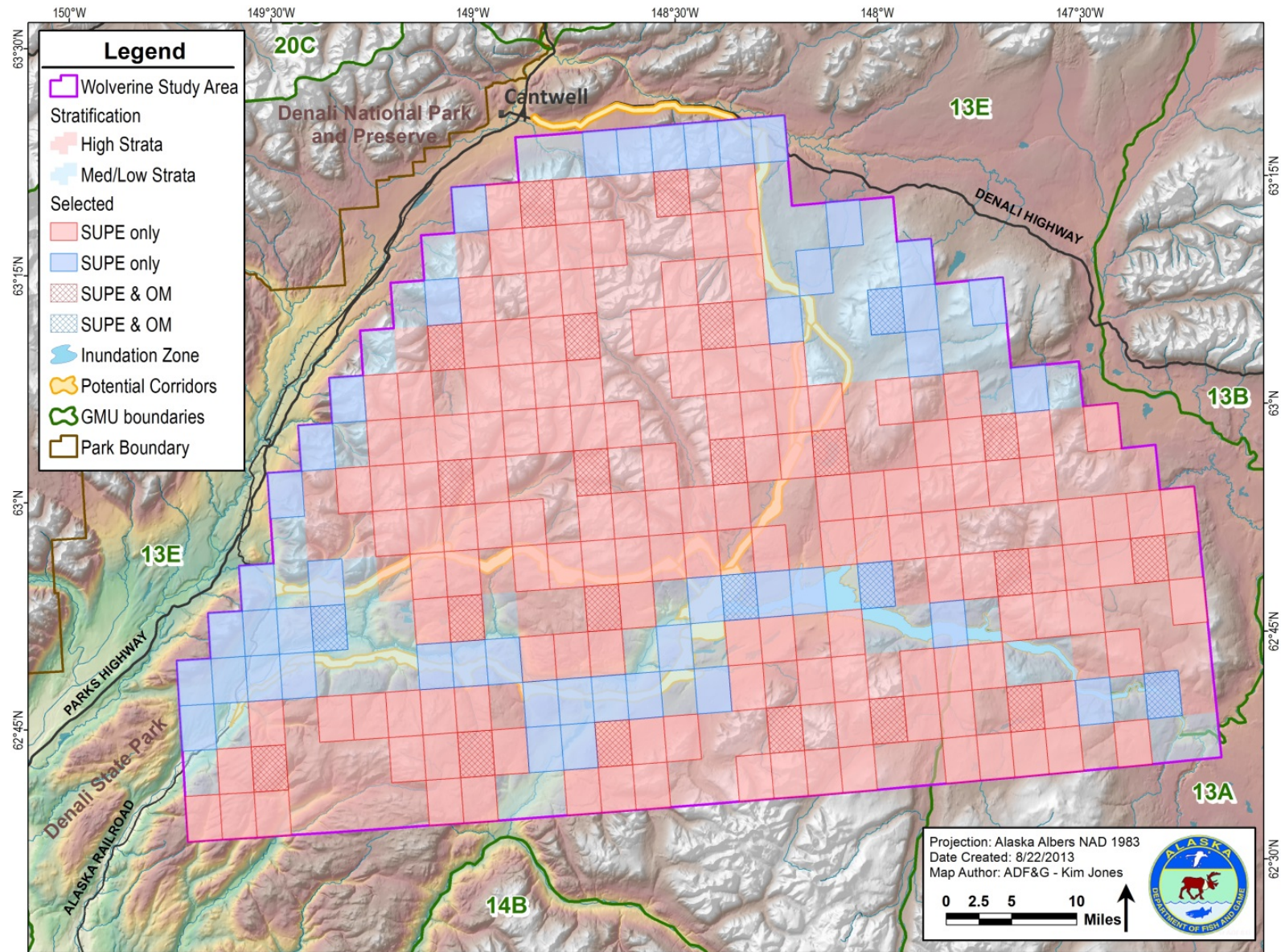
9. FIGURES

Figure 3-1. Wolverine Study Area, 2013.