Susitna-Watana Hydroelectric Project
(FERC No. 14241)

Population Ecology of Willow Ptarmigan in Game Management Unit 13
Study Plan Section 10.17

Initial Study Report
Part A: 1-6, 8-10

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
ADF&G	Alaska Department of Fish and Game
AEA	Alaska Energy Authority
ATS	Advanced Telemetry Systems
ATV	all-terrain vehicle
FERC	Federal Energy Regulatory Commission
GIS	Geographic Information System
GMU	Game Management Unit
GPS	Global Positioning System
IACUC	Institutional Animal Care and Use Committee
ILP	Integrated Licensing Process
ISR	Initial Study Report
PRM	Project River Mile
Project	Susitna-Watana Hydroelectric Project
RSP	Revised Study Plan
SPD	study plan determination
UAF	University of Alaska Fairbanks

1. INTRODUCTION

On December 14, 2012, Alaska Energy Authority (AEA) filed its Revised Study Plan (RSP), with the Federal Energy Regulatory Commission (FERC) for the Susitna-Watana Hydroelectric Project (FERC Project No. 14241) which included 58 individual study plans (AEA 2012). RSP Section 10.17, Population Ecology of Willow Ptarmigan in Game Management Unit 13, focuses on collecting the necessary data to evaluate the potential effects of the proposed Project on Willow Ptarmigan, the predominant species of upland game bird in the Project area and surrounding areas. RSP Section 10.17 listed the goal, objectives, and proposed methods for Willow Ptarmigan data collection and analysis.

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 10.17 was one of the 13 studies approved with modifications. In its February 1 SPD, FERC recommended the following:

> *Based on experience gained in capturing ptarmigan in the study area in 2012, Alaska DFG recommends that the number of capture sites be increased to between 4 and 6 and that capture of ptarmigan be conducted primarily by the use of Coda net gun and noose carpets. Alaska DFG states that the additional capture locations would provide a more comprehensive understanding on willow ptarmigan movement throughout the proposed hydroelectric site and would not increase costs. Also, based on several overflights of the study area, Alaska DFG is now confident access into areas previously thought to be inaccessible will be feasible. Testing of the Coda net gun, mist nets, and noose carpets found that both the net gun and noose carpets were very effective, efficient, and safe for the birds, more so than mist nets. Therefore, Alaska DFG does not recommend using mist nets for this study. Alaska DFG does not expect project cost will increase with the use of net guns and noose carpets.*
>
> *Alaska DFG's recommended changes would ensure efficient use of resources, and its proposed methods are consistent with generally accepted practices in the scientific community (section 5.9(b)(6)) and should be adequate to collect the information necessary to address project effects (section 5.9(b)(4)). Therefore, we recommend that AEA modify the study plan to include Alaska DFG's recommended modification.*

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." (18 CFR 5.15(c)(1)). This Initial Study Report on Population Ecology of Willow Ptarmigan in Game Management Unit 13 Study has been prepared in accordance with FERC's ILP regulations and details AEA's status in implementing the study, as set forth in the FERC-approved RSP and as modified by FERC's February 1 SPD (collectively referred to herein as the "Study Plan").

2. STUDY OBJECTIVES

The goal of this study is to provide the necessary data to evaluate the potential effects of the proposed Project on Willow Ptarmigan, the predominant species of upland game bird in the Project area and surrounding areas. The area of interest consists of Game Management Unit (GMU) Subunits 13A and 13E.

The study has four objectives, as established in RSP Section 10.17.1:

- Determine the seasonal distribution of Willow Ptarmigan in the Project area.
- Determine the seasonal migratory patterns of Willow Ptarmigan that occur in the Project area.
- Estimate the abundance of Willow Ptarmigan in the Project area during the breeding season and during the fall.
- Estimate seasonal survival of Willow Ptarmigan.

3. STUDY AREA

As established in RSP Section 10.17.3, the study area encompassed a 15-mile buffer around the proposed dam site and reservoir and the access and transmission corridor alternatives. The study area is composed of alpine and subalpine habitats in GMU Subunits 13A and 13E. Six areas within the study area with relatively high breeding densities of Willow Ptarmigan were preselected for capture (Figure 10.17-1). Aerial surveys occurred in appropriate habitats within 50 miles of the original capture locations.

4. METHODS AND VARIANCES IN 2013

4.1. Capture and Radio-Tagging of Ptarmigan

The study team implemented the methods as described in the Study Plan with the exception of variances explained below (Section 4.1.1).

During May 2013, the study team captured Willow Ptarmigan at two sites in GMU subunits 13A and 13E (Figure 4.1-1) and fitted the birds with necklace radio transmitters. The study team evaluated capture sites based on several criteria:

- Willow Ptarmigan abundance or habitat quality;
- Proximity to the proposed reservoir and alternative access routes;
- Ease of access using either fixed-wing or helicopter;
- Observed springtime conditions (e.g., snow depth and habitat availability) during the capture time period.

During the breeding season in May, the study team deployed two, two-person teams to various capture locations using highway vehicles, all-terrain vehicles (ATVs), or fixed-wing aircraft. Teams located Willow Ptarmigan visually or by using a playback recording of a territorial male (Peyton 1999; Savage et al. 2011, Merizon 2013). The teams used playback recordings effectively with a Primos™"Alpha Dogg" electronic game call under low wind conditions (≤5 miles per hour) with no precipitation during early morning or late evening hours.

The study team tested and used three capture methods effectively during the May 2013 capture effort. Under the first method, teams constructed noose carpets (Sutherland et al. 2010) from 5×10-cm welded wire poultry fencing with approximately 60 monofilament nooses tied to one side. The teams placed carpets adjacent to a plastic pigeon decoy (Soar-No-More™) painted to resemble a male ptarmigan in spring breeding plumage. When placed in the territory of a displaying male, the territorial male became defensive and when it attempted to make contact with the "intruder" its feet became ensnared in the monofilament nooses. Under the second method, the team used a Coda Enterprises™ net gun with a 3-m^2 net with 5-cm mesh. The net was released with a caliber .308 rifle charge. Under the third method, the teams captured groups of Willow Ptarmigan using an Avinet™ black nylon mist net that was deployed around willow shrubs. Nets were 4.6 m long with 7.5 cm mesh.

At least two people were present for any single capture event to remove birds from the capture device, handle, and release birds as quickly as possible. After capture, the teams restrained Willow Ptarmigan in a cotton bag. The teams weighed each bird to the nearest gram and instrumented each bird with an Advanced Telemetry Systems ™ (ATS) necklace-mounted A3950 VHF radio transmitter with a 25-cm whip antenna (Raymond 1999; Paragi et al. 2012; Figure 4.1-2). The entire radio and necklace package weighed 10.7 g (approximately 1.5–2.0 percent of Willow Ptarmigan body mass). Radio tags transmit in the frequency range of 148–155 Mhz. The transmitter was secured by a rubber-sheathed wire fitted over the bird's neck and crimped on either end to ensure its fit (Figure 4.1-2). The transmitter was adjusted to compensate for expansion of the bird's crop. The team did not collect tissue samples from captured Willow Ptarmigan.

The study team recorded age and sex, based on plumage characteristics (Bergerud et al. 1963; Weeden and Watson 1967; Braun and Rogers 1971; Hudson 1986) for each captured bird. The team used a Global Positioning System (GPS) receiver to record the location of capture. The study team also recorded date, time, and weather conditions.

During August capture efforts, the study team deployed one, two-person team to various capture locations using highway vehicles and fixed-wing aircraft. Teams located untagged Willow Ptarmigan by relocating previously collared Willow Ptarmigan. When previously tagged individuals were located, the study team used a net gun to capture the accompanying mate or juveniles. Once a bird was captured, the study team used the same procedure (outlined above) as during the May captures.

4.1.1. Variances

On March 26, 2013, the Denali Highway site was added as a capture location (Figure 3-1). Investigators thought that this location would offer insight into a future access road proposed as

part of the Project by examining Willow Ptarmigan movement and distribution relative to an existing road corridor. As a result of the late spring in 2013, this location proved to be fortuitous, because most other planned capture locations were inaccessible due to the persistent, deep snow cover.

The spring of 2013 set records for late snow and persistent cold temperatures throughout much of the state. Many wildlife species and populations statewide exhibited delayed migration, delayed nesting, reduced survival, and overall unusual behavior. This phenomenon resulted in study plan variances on the Willow Ptarmigan study during the spring and summer of 2013. First, the desired radio-tag deployment goal was not reached due to inaccessibility of most of the capture locations. Instead of the four to six capture sites in the FERC-approved Study Plan, due to the late spring and persistent snow in 2013, only one of the proposed sites (Busch Creek) was accessible. The inability to access most of the proposed capture locations will not affect the ability of the study team to accomplish the study objectives. Investigators consider the spring of 2013 to be anomalous and expect to have easier access to road and off-road capture locations in future field seasons.

Second, the late spring caused delayed nesting and subsequent small chick size (~200g) in August, instead of the minimum mass (400 g) needed for tagging. Third, ground travel was extremely difficult through May at the locations visited. All of these difficulties resulted in the study team visiting only two capture locations, rather than the four to six proposed in the Study Plan.

Due to the lack of access to most capture sites in the spring, the study team also attempted to capture and radio-tag Willow Ptarmigan in August 2013. Additional radio tags were deployed in August at the Denali Highway and Busch Creek locations on both adult and juvenile birds.

The study team used mist nets in very rare and specific situations during spring and summer capture efforts. Extended winter weather in 2013 shortened the spring capture period. Methods that depended on territorial defense behaviors of male ptarmigan became less effective as the season progressed. Use of mist nets allowed the study team to capture a few more birds in an attempt to boost the number of tagged subjects. This method did capture willow ptarmigan and may be used in future capture efforts but will not be the primary method of capture.

4.2. Relocation of Radio-tagged Ptarmigan

ADF&G implemented the methods as described in the Study Plan, with the exception of variances explained below (Section 4.2.1).

The study team located radio-tagged Willow Ptarmigan within 24 hours of capture to document capture myopathy or other obvious handling-induced stress. All potential capture and marking methods were fully evaluated and compliant with Alaska Institutional Animal Care and Use Committee (IACUC) certification (No. 441328-1). ADF&G ensured compliance with all IACUC policies.

The study team relocated radio-tagged ptarmigan during fixed-wing flights. These flights (minimum of six as specified in the study plan) took place in July, September, October, and

December. The study team revised the schedule of aerial relocations to better estimate survival during key life history stages: nesting, brood-rearing, juvenile dispersal, early winter, late winter, pre-breeding. This variance was presented at the Technical Workgroup meetings in September 2013 and November 2013. This increase will improve the accuracy and precision of the geospatial model.

While conducting summer capture work, field teams used ATVs to opportunistically locate previously collared birds in hopes of collaring their mate or chicks. The locations for these previously collared birds will be used as a relocation and used in understanding movement patterns. The team used "four-wheeler" ATVs on established trails for this work. The study team recorded location, habitat type, and status (mortality or alive) for all individuals. The study team used an ATS R8000 receiver to locate radio-tagged birds; this receiver was more cost-effective with no diminished capacity compared to the ATS 4520 receiver specified in the study plan. The study team mounted a two-element Yagi antenna to each strut of the aircraft or used a single antenna during ground locations. A handheld GPS receiver was used to record the location for each data record.

4.2.1. Variances

No variances from the telemetry location methods described in the Study Plan occurred in 2013.

4.3. Aerial Transect Surveys

The study team implemented the methods as described in the Study Plan with the exception of variances explained below (Section 4.3.1).

The study team flew aerial transect surveys in January, which were scheduled to occur in September in the Study Plan, to assess the abundance and density of ptarmigan using line-transect or repeat-count techniques (Royle and Dorazio 2008; Thomas et al. 2010). In addition to abundance, these surveys were designed to provide data on the overall distribution of all ptarmigan (not just radio-tagged individuals) in GMU Subunits 13A and13E.

4.3.1. Variances

The March 2013 aerial transect surveys did not occur, as was indicated in the Study Plan. This was an oversight in the Study Plan, as ADF&G had not intended to start the aerial surveys until September 2013. The study team moved the aerial transect surveys planned for September 2013 in the Study Plan to mid-November to mid-December 2013 because snow conditions improve the success of this method (K. S. Christie, University of Alaska Fairbanks, personal communication). Unfortunately, weather conditions precluded safe and effective aerial surveys during the intended November–December transect survey period. The study team was able to complete this survey in January 2014.

4.4. Analysis of Radio Telemetry Data

ADF&G implemented the methods as described in the Study Plan, with no variances. After each survey, the study team transferred data to a Microsoft Access database for analysis. The study

team created maps using Geographic Information System (GIS) software (*ArcMAP*) for each aerial survey day, indicating the location of each relocated Willow Ptarmigan. These data were cataloged for use in spatial analyses.

4.4.1. Variances

No variances from the telemetry analysis methods described in the Study Plan occurred in 2013.

5. RESULTS

5.1. Capture and Radio-tagging

As of September18, 2013, a total of 41 Willow Ptarmigan (24 adult males, eight adult females, nine juveniles) had been captured and radio-tagged for this study (Table 5.1-1). A total of 22 ptarmigan were captured at Busch Creek and 19 were captured at the Denali Highway site. Access to most capture locations was very difficult in the spring of 2013, making it impossible for the study team to deploy the planned total of 120 radio-tags.

The capture locations were primarily mixed shrub and subalpine spruce habitats at moderate elevations (850–1,230 m). Busch Creek, upper Fog Creek, and upper Jay and Coal creeks were dominated by exposed, unvegetated rocky slopes and lower elevation riparian areas composed primarily of dwarf arctic birch (*Betula nana*) and willow shrubs (*Salix* spp.). The Denali Highway capture location was at slightly lower elevation (800 m) with less topographic relief, vegetated primarily with white spruce (*Picea glauca*), black spruce (*P. mariana*), resin birch (*B. glandulosa*), and willow shrubs.

5.2. Survival

As of September 18, 2013, eight radio-tagged adults (19 percent) and one juvenile (11 percent) had died. At the Denali Highway site, seven radio-tagged adults (37 percent) had died and at Busch Creek one (7 percent) had died. The juvenile mortality occurred at Busch Creek. Two birds captured at the Denali Highway location were killed by hunters.

5.3. Relocation and Movement Patterns

As of September 18, 2013, the study team had conducted three aerial surveys and three ground surveys to relocate radio-tagged ptarmigan. Most (85 percent) radio-tagged birds moved <1 km from the capture sites, but one bird at Busch Creek moved >1 km (8.8 km) and five birds near the Denali Highway moved >1 km (8.2 km, 6.6 km, 6.2 km, 4.2 km, 5.4 km). The movements of >1 km in the latter area were all in directions away from the main road corridor.

6. DISCUSSION

Despite poor weather, limited access, and deployment of fewer radio tags than planned, the 2013 season was productive. The challenges faced during the work in 2013 are not expected to affect

the overall outcome of the project or the ability to complete the objectives outlined in the study plan. The study team believes that the spring of 2013 was unusual and expects to have easier access to road and non-road capture locations in the next study season. Capture experience and improved locational familiarity gained during pre-project pilot testing will also help ensure sufficient number of tags will be deployed during the coming field seasons. Use of mist nets provided a means of capturing additional ptarmigan after a very abbreviated spring breeding season in 2013 and thus allowed the Study Team to increase the modest sample size. Postponement of the early winter transect flight from fall to winter improved conditions for the survey and shifted the season in which occupancy data were obtained. The variances adopted in 2013 will not adversely affect the ability of the study team to accomplish the objectives of the study. The data obtained on habitat use will be provided for use in the Evaluation of Wildlife Habitat Use (Study 10.19) after the next year of study.

7. COMPLETING THE STUDY

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

8. LITERATURE CITED

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9. TABLES

Table 5.1-1. Demographic Characteristics of Willow Ptarmigan Radio-tagged in 2013.

Capture Period	Location	Male		Female		Unknown		Total
		Juvenile	Adult	Juvenile	Adult	Juvenile	Adult	
May	Denali Highway	2	8	5	2	0	0	17
	Busch Creek	1	11	0	0	0	0	12
August	Denali Highway	0	2	0	0	0	0	2
	Busch Creek	0	4	1	1	4	0	10
	Total	3	25	6	3	4	0	41

10. FIGURES

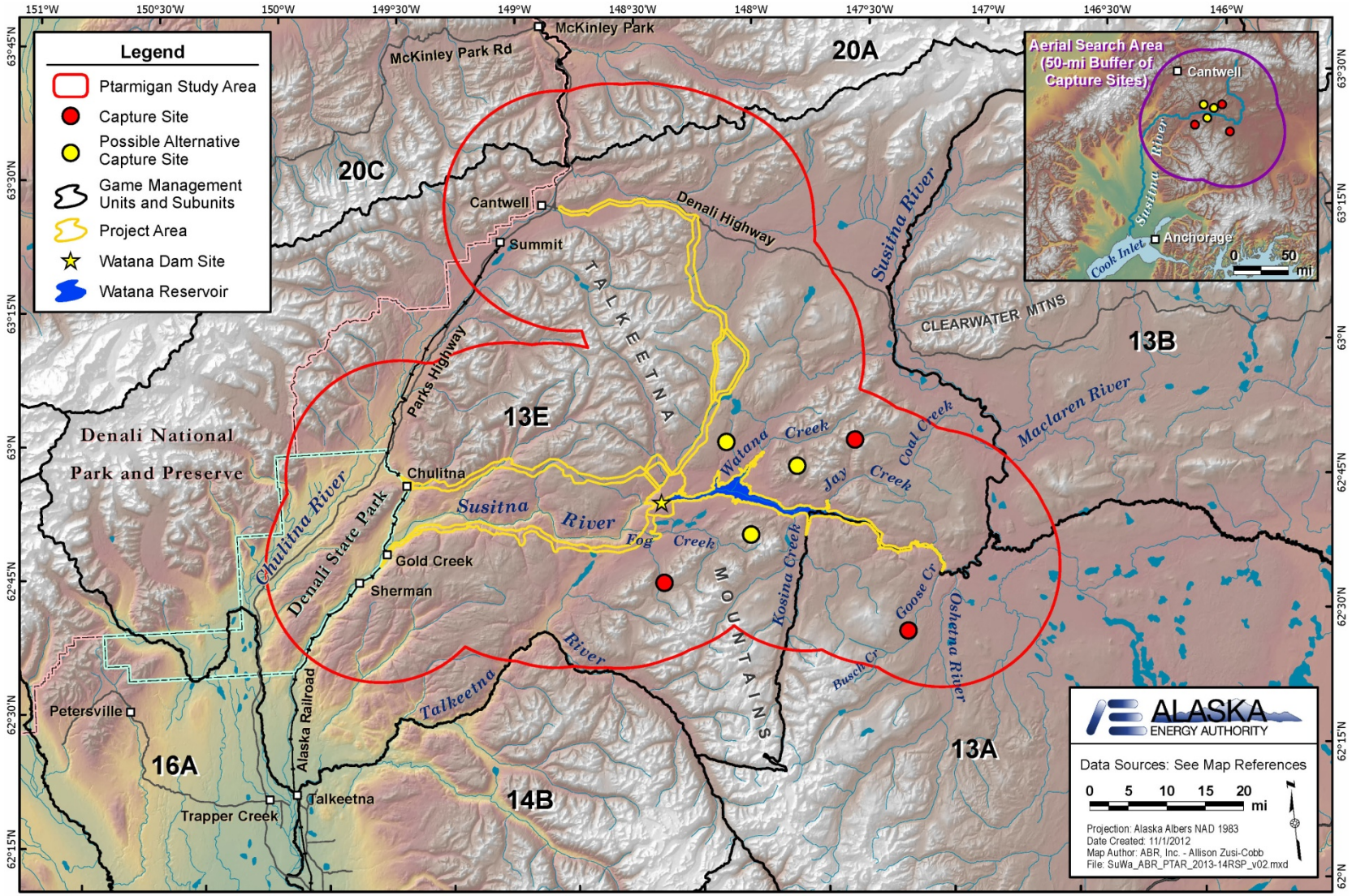

Figure 3-1.Willow Ptarmigan Study Area, 2013.

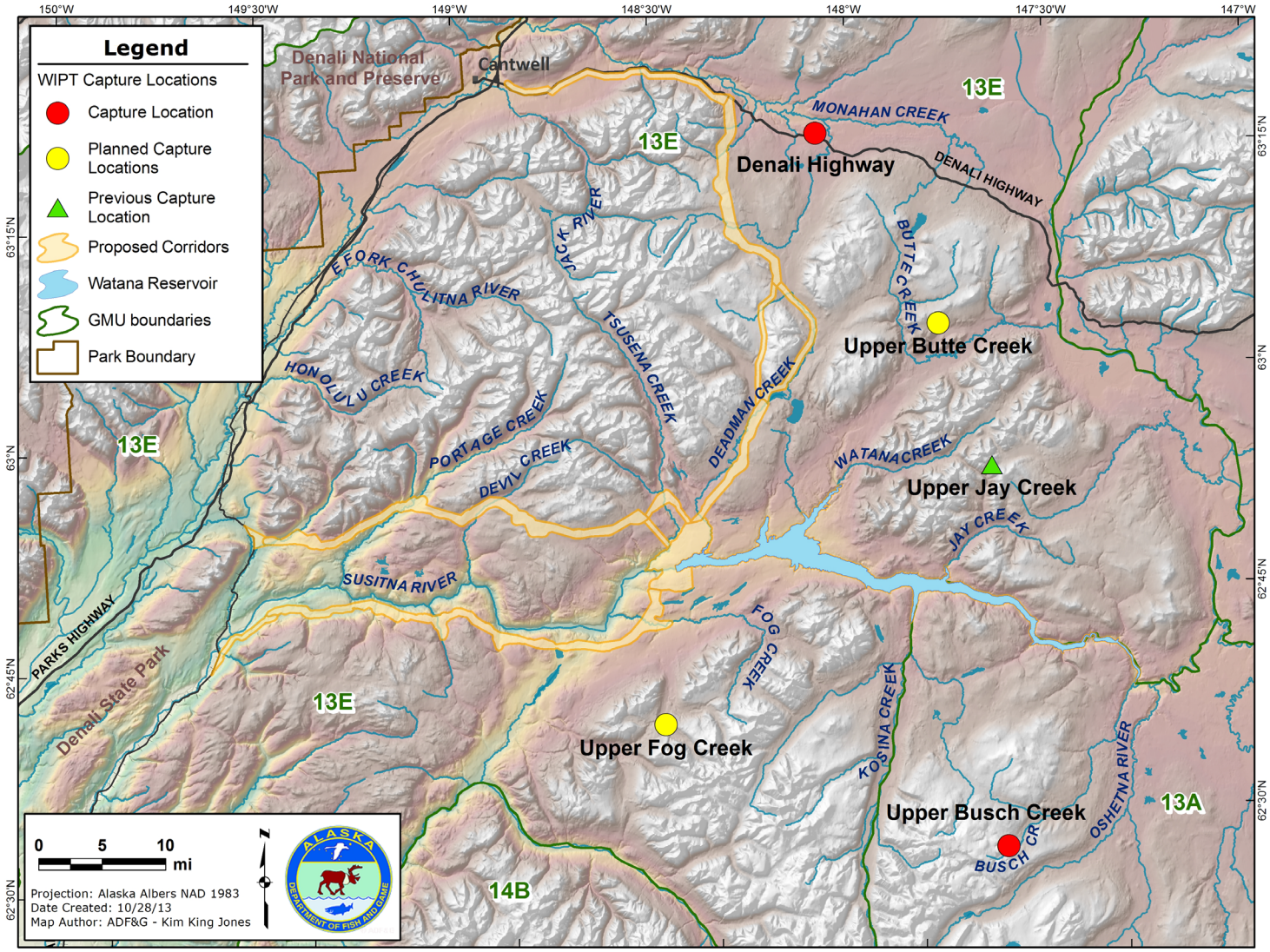

Figure 4.1-1.Willow Ptarmigan Capture Locations in 2013 and Planned Capture Locations for 2014.

Figure 4.1-2.Male Willow Ptarmigan equipped with an ATS 3950 Radio Transmitter. [Photo by Graham Fry, 2013]