

**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 C: Executive Summary and Section 7**

Prepared for

Alaska Energy Authority



**SUSITNA-WATANA HYDRO**

*Clean, reliable energy for the next 100 years.*

Prepared by

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**EXECUTIVE SUMMARY**

10.17. Population Ecology of Willow Ptarmigan in Game Management Unit (GMU) 13	
Purpose	<p>The goal of this study is to provide the necessary data to evaluate the potential effects of the proposed Project on Willow Ptarmigan.</p> <p>The study has four objectives:</p> <ul style="list-style-type: none"> <li>• Determine the seasonal distribution of Willow Ptarmigan in the Project area.</li> <li>• Determine the seasonal migratory patterns of Willow Ptarmigan that occur in the Project area.</li> <li>• Estimate the abundance of ptarmigan in the Project area during the breeding season and during the fall.</li> <li>• Estimate seasonal survival of Willow Ptarmigan.</li> </ul>
Status	Trapping and radio-tagging was conducted in in May and August 2013; radio-tracking began in June 2013 and will continue through 2014. Aerial transect surveys began in November/December 2013.
Study Components	<ul style="list-style-type: none"> <li>• Annual capture and radio-tagging in each year of the two-year study.</li> <li>• Aerial surveys to relocate tagged ptarmigan throughout the year, at least six times: two in late summer, two in midwinter, and two in early spring.</li> <li>• Aerial transect surveys in November/December and March in each year of the two-year study.</li> </ul>
2013 Variances	Due to the late spring, delayed snow melt, inclement weather, and subsequent transportation difficulties in 2013, fewer radio tags were deployed than planned (RSP Section 10.17.4.1). For these same reasons, the capture locations planned at upper Fog Lakes and Jay Creek (RSP Sections 10.17.3) were not visited, but another capture location was added along the Denali Highway. Aerial transect flights (RSP Section 10.17.4.3) were rescheduled from September to November/December, 2013.
Steps to Complete the Study	As is described in Section 7.1.2 below, Willow Ptarmigan will be captured at four sites in 2014, comprising a combination of two sites originally proposed in RSP Section 10.17.3 and two other sites added in 2013 (ISR Section 4.1.1 and Figure 4.1-1) and will be fitted with radio transmitters. Capture methods will include noose carpets, net gun, and mist nest, depending on the seasonal timing and conditions encountered at each capture site. Radio-tagged ptarmigan will be relocated during aerial surveys conducted from a fixed-wing airplane six times throughout the year to record habitat use, movements, and mortality.
Highlighted Results and Achievements	During spring and summer 2013, the study team captured and radio-tagged 41 Willow Ptarmigan. Radio-tag deployment was limited by weather and late breeding in 2013. By September 18, 2013, 19 percent of adults and 11 percent

	<p>of juveniles were dead. The mortality rate at the road-accessible study site was substantially higher (37 percent) than that at the inaccessible site (7 percent). Most (85 percent) birds made only minimal movements (&lt;1 km) after radio tags were deployed, but one ptarmigan at the inaccessible site moved &gt;1 km (8.8 km) and five ptarmigan at the road-accessible site moved &gt;1 km (8.2 km, 6.6 km, 6.2 km, 4.2 km, 5.4 km). However, this preliminary summary is based on a small sample over a short time-frame and is not appropriate for use in drawing population-level conclusions on movement and distribution.</p>
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## 7. COMPLETING THE STUDY

### 7.1 Proposed Methodologies and Modifications

To complete this study, AEA will implement the methods in the Study Plan except as described in Section 7.1.2. These activities include the following:

- Capture and radio tagging of willow ptarmigan (RSP Section 10.17.4.1);
- Continuation of aerial surveys for collared birds (RSP Section 10.17.4.2);
- Analysis of radio telemetry data (RSP Section 10.17.4.4).

#### 7.1.1 Decision Points from Study Plan

There were no decision points in the FERC-approved Study Plan to be evaluated for this study following the completion of 2013 work.

#### 7.1.2 Modifications to Study Plan

Three capture locations (Upper Busch Creek, Upper Jay Creek, and Upper Fog Creek) were originally planned for the ptarmigan study, along with three possible alternative sites (RSP Figure 10.17-1 and RSP Section 10.17.4.1). The Denali Highway site was added as a capture location in 2013, as described in Section 4.1.1 of Part A of this ISR. In addition to being more accessible in that late spring when persistent deep snow cover precluded capture operations at the other sites (except Busch Creek), this location may provide useful information to the study by examining Willow Ptarmigan movement and distribution relative to an existing road corridor.

Capture operations are planned at four sites in 2014: Upper Busch Creek and Upper Fog Creek (RSP Figure 10.17-1 and RSP Section 10.17.3) as well as the Denali Highway and Upper Butte Creek sites depicted on Figure 4.1-1 and described in Section 4.1.1 of Part A of this ISR.

The study team plans to employ up to three capture methods (RSP Section 10.17.4.1.1), depending on the conditions encountered at the capture sites. The primary methods planned for use in 2014 are expected to be noose carpets or a net gun, as were used in 2013 (see Sections 1 and 4.1 of Part A of this ISR). The study team also may use mist nets in rare, specific situations during spring and summer capture efforts. Methods that depend on territorial defense behaviors of male ptarmigan, such as noose carpets, become less effective as the season progresses. Use of mist nets may allow the study team to capture additional birds to boost the number of tagged subjects, but this technique will not be a primary method of capture.

Aerial transect surveys were planned for this study (RSP Section 10.17.4.3.) to obtain information about the distribution, habitat associations, and occupancy rates of ptarmigan outside of the breeding season. This survey method was developed by Christie et al. (Ptarmigan in a changing Arctic: Characterizing spatio-temporal patterns of ptarmigan distribution in northern Alaska. Arctic: In review.). The survey method uses a small fixed-wing airplane to fly pre-

selected transects at low altitude. The method is based on the assumption that ptarmigan tend to flush in response to low-flying aircraft, making them visible to the survey team.

The first transect survey was conducted on January 21, 2014, when more than 300 km of transect lines were flown during a 6-hr survey period. However, only 6 flushing events were observed by the survey team during that period. The second transect survey was conducted on March 27, 2014, when more than 200 km of transect lines were flown during a 4-hr survey period. Only four flushing events were observed by the team during the second survey period. These low rates of detection were far below the number of observations required to estimate site-occupancy probabilities reliably. Although occupancy models allow for inference about populations when imperfect detection occurs (i.e., when survey efforts fail to detect some animals that are present), a moderate probability of detection (>30 percent in most cases) is required for estimation algorithms to converge and for inferences to be biologically meaningful. Ptarmigan tracks were observed commonly along survey transects, suggesting that many ptarmigan were present but were not detected (i.e., low detection probability). Moreover, data collected during recent radio-telemetry flights indicate that only approximately 10% of radio-tagged ptarmigan in the study area flushed when a fixed-wing airplane passed overhead repeatedly at low altitude. Thus, the low incidence of flushing behavior by ptarmigan in the study area precludes the use of this survey method.

The study team considered two alternative techniques to improve the estimation of occupancy using aerial surveys. The use of a helicopter instead of a fixed-wing airplane was discussed, but this method has never been tested and appears to hold no more promise than using a fixed-wing airplane. The second alternative was to conduct a track count instead of enumerating flush events, but the team concluded that this approach would yield results that would be difficult to interpret.

Although the study team does not think a reasonable alternative to the aerial occupancy survey method exists for gathering broad-scale distributional data, some survey goals can be met by increasing efforts to relocate radio-tagged ptarmigan outside of the breeding season. Specifically, information on habitat, elevation, slope, aspect, proximity to certain landscape features, and use of different portions of the study area by ptarmigan can be obtained from telemetry data. Inferences can then be made about the probable distribution of ptarmigan in the study area during different seasons on the basis of the distribution of those spatial covariates. The study team also plans to estimate the density of breeding willow ptarmigan in the spring at each capture location.

The study team met with resource agencies and other licensing participants on April 9, 2014, to discuss these proposed changes and recommendations for the 2014 and 2015 field seasons (documented at [http://www.susitna-watanahydro.org/wp-content/uploads/2014/05/Wildlife-Technical-Meeting-Notes\\_04092014.pdf](http://www.susitna-watanahydro.org/wp-content/uploads/2014/05/Wildlife-Technical-Meeting-Notes_04092014.pdf)). Recommendations include reallocating the occupancy survey funds to expand the schedule of telemetry flights. Additional flights will increase the amount of telemetry data collected, thereby improving the precision of space-use inferences. Greater precision in space-use inferences will facilitate better predictions about the distribution of ptarmigan across the study area. During the April 9 meeting, those recommendations were approved, so aerial transect surveys were canceled for the remainder of the study and more telemetry flights have been added.

## 7.2 Schedule

In general, the schedule for completing the FERC-approved Study Plan is dependent upon several factors, including Project funding levels authorized by the Alaska State Legislature, availability of required data inputs from one individual study to another, unexpected weather delays, the short duration of the summer field season in Alaska, and other events outside the reasonable control of AEA. For these reasons, the Study Plan implementation schedule is subject to change, although at this time AEA expects to complete the FERC-approved Study Plan through the filing of the Updated Study Report (USR) by February 1, 2016, in accordance with the ILP schedule issued by FERC on January 28, 2014.

With regard to this specific study, AEA plans to complete data collection in the 2014 study season. These efforts will include capture and radio-tagging at four sites (Denali Highway, Upper Busch Creek, Upper Fog Creek, and Upper Butte Creek). Aerial radio-tracking surveys will be flown to relocate tagged ptarmigan at least six times throughout the year: two in late summer, two in midwinter, and two in early spring.

In 2015, AEA plans to complete all analyses for this study, which will be reported in the USR.

## 7.3 Conclusion

Implementation of the Population Ecology of Willow Ptarmigan in Game Management Unit 13 Surveys is planned for 2014. The study team expects that the combination of study results from 2013 (including the variances described in Section 4 of Part A of this ISR), the results from 2014 (including the modifications described in Section 7.1.2 above), and integration with other studies will achieve the approved Study Plan objectives. This study is interrelated with the Evaluation of Wildlife Habitat Use (Study 10.19). AEA expects the approved Study Plan objectives for both this study and Study 10.19 will be achieved with the modifications to this study, as these modifications will increase the amount of telemetry data collected, thereby enhancing the precision of space-use inferences and the ability of the study team to predict the distribution of ptarmigan in the study area. The results of this study will be reported in the USR.