Susitna-Watana Hydroelectric Project
(FERC No. 14241)

Bat Distribution and Habitat Use Study
Study Plan Section 10.13

Final Study Plan

Alaska Energy Authority

SUSITNA-WATANA HYDRO

Clean, reliable energy for the next 100 years.

July 2013

10.13. Bat Distribution and Habitat Use

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 10.13 of the RSP described the Bat Distribution and Habitat Use Study. This study is designed to evaluate the occurrence and abundance of and habitat use by bats in the study area. Biologists will deploy ultrasonic acoustic detectors and will conduct a preliminary search for evidence of roosting sites, maternity colonies, and hibernacula to better understand how bats might be affected by the Project. RSP 10.13 provided goals, objectives, and proposed methods for data collection regarding bats.

On February 1, 2013, FERC staff issued its study plan determination (February 1 SPD) for 44 of the 58 studies, approving 31 studies as filed and 13 with modifications. RSP Section 10.13 was one of the 31 studies approved with no modifications. As such, in finalizing and issuing Final Study Plan Section 10.13, AEA has made no modifications to this study from its Revised Study Plan.

10.13.1. General Description of the Proposed Study

The Bat Study will begin in 2013 to evaluate the occurrence and abundance of and habitat use by bats in the study area. Biologists will deploy ultrasonic acoustic detectors and will conduct a preliminary search for evidence of roosting sites, maternity colonies, and hibernacula to better understand how bats might be affected by the Project. Depending on the results of the first year of study, a second year of study may be conducted in 2014. Bats are small mammals and although this study shares similar objectives with the Small Mammal Study (see Section 10.12), the two studies require substantially different methodologies and separate efforts.

Study Goal and Objectives

The goal of the Bat Study is to collect baseline data on bats in the Susitna-Watana Hydroelectric Project (Project) area to enable the assessment of potential impacts on bats from development of the proposed Project.

The Bat Study has three specific objectives:

- Assess the occurrence of bats and the distribution of habitats used by bats within the reservoir inundation zone and associated infrastructure areas for the Project.
- Review geological and topographical data to assess the potential for roosting, maternity, and hibernacula sites in the study area.
- Examine suitable geological features (caves, crevices) and human-made structures (buildings, mines, bridges) for potential use by bats as roosting sites, maternity colonies, and hibernacula.

10.13.2. Existing Information and Need for Additional Information

Sampling for bat activity was not conducted during the Alaska Power Authority (APA) Susitna Hydroelectric Project in the 1980s, and no bats were captured during the small mammal study for that project. Only one species (the little brown bat) was included in the list of mammal species in

the Project area, on the basis of a single sighting (Kessel et al. 1982). No other documentation of bats in the Project area is known to exist, but this species is distributed throughout Southcentral and Interior Alaska (Parker et al. 1997) and reports have been compiled by ADF&G in the Susitna basin downstream from the Project area (D. Tessler, ADF&G, pers. comm.). No other species have been documented in Southcentral Alaska, but at least five other species have been found in Southeast Alaska (Parker et al. 1997).

Implementation of the proposed study will provide data on bat occurrence (as passes/detector-night) in the study area and contribute to identification of potential roosting and hibernation locations in the Project area.

10.13.3. Study Area

The bat study area (Figure 10.13-1) encompasses the proposed reservoir inundation zone, the proposed dam and powerhouse, and the dam and camp facilities area, but not the access and transmission corridors.

10.13.4. Study Methods

10.13.4.1. Field Surveys and Data Management

Acoustic surveys of bats conducted with echolocation detectors are used to assess bat activity patterns and habitat associations (O'Farrell and Gannon 1999; Hayes 2000; Parsons and Szewczak 2009). Anabat® broadband acoustic detectors (Titley Electronics, Ballina, New South Wales, Australia) are used to detect and produce audible output from the ultrasonic sounds generated by bats to echolocate. These detectors are widely used for passive detection of free-ranging, echolocating bats (O'Farrell et al. 1999). Interpretation of bat acoustic data is subject to several important caveats. The number of recorded "bat passes" is an index of relative activity, but may not correlate to individual numbers of bats (e.g., 10 bat passes may represent a single bat recorded 10 different times or 10 bats each recording a single pass; Hayes 1997). Activity also may not be proportional to abundance because of variability attributable to (1) detectability (loud vs. quiet species); (2) species call rates; (3) migratory vs. foraging call rates; and (4) attraction to or avoidance of the sampling area by bats (Kunz et al. 2007; Hayes et al. 2009). However, interpreted properly, the index of relative activity may provide critical information of bat use by characterizing temporal (hourly, nightly, and seasonal) and spatial (height and location) patterns of bat activity (Parsons and Szewczak 2009).

The sampling period will extend from late May to early October 2013. Bat activity will be monitored during crepuscular and nocturnal hours (~1 hour before sunset to ~1 hour after sunrise), when bats are most active (Hayes 1997). The length of crepuscular and nocturnal periods each day fluctuates throughout the summer in Alaska, so the duty cycle of the detectors will be adjusted periodically. Anabat detectors are regularly used in Southeast Alaska and elsewhere where bats are more common than in Interior Alaska. Data will be downloaded and analyzed using Anabat *CFC Read* and *AnalookW* software (Corben 2011) to detect and quantify bat passes. A bat pass will be defined as a search-phase echolocation sequence of $\geq$2 echolocation pulses with a minimum pulse duration of 10 milliseconds (ms) within each sequence, separated by >1 second (Fenton 1970; Thomas 1988; Gannon et al. 2003). Bat activity will be reported as bat passes/detector-night, the standard metric for measuring bat activity

(Kunz et al. 2007). The spatial and habitat relationships among detectors will likely be compared statistically using nonparametric (Kruskal–Wallis) techniques.

To maintain quality assurance and quality control (QA/QC), acoustic monitoring equipment will be checked and data cards downloaded into a database every 1–2 weeks to minimize data loss from equipment failures or other factors. The database will be checked periodically by the study project manager for inconsistencies and errors, and the entire database will be proofed again for errors before data analyses. All data will be stored on a network server with frequent backups to prevent loss of data.

The bat survey results will be examined to evaluate activity levels in different habitat types in the study area. Combined with the wildlife habitat map created for the Project (see Section 11.5), these results will allow an assessment of bat habitat loss.

The potential for roosting sites and winter hibernacula to occur in the Project area will be assessed by reviewing geological literature regarding the occurrence of suitable bedrock (e.g., limestone) in the Project area that would be conducive to the formation of caves, which are favored by little brown bats during hibernation (Parker et al. 1997). Ground searches of suitable substrates will be conducted. Forest inventory information will be gathered from respective landowners if available, to assess presence of large-diameter dead trees for roosting habitat. Human-made structures (buildings, mines, bridges) will be investigated for potential use as roosting sites, maternity colonies, and hibernacula. The number of human-made structures within the study area is expected to be small, but identification and location of potential search areas will draw upon land ownership information available in the Project GIS database and will also be coordinated with the historic property surveys for the Cultural Resources Study (see Section 13.5).

Through the successful completion of the proposed study, AEA will document bat use (passes/detector-night) and will identify potential roosting, maternity, and hibernating sites in the study area. Anticipated work products include characterization of overall bat activity, identification of areas of concentrated bat activity (by habitat type and season), and documentation of the locations and levels of use of all roosts, maternity colonies, or hibernacula discovered.

The Alaska Department of Fish and Game's (ADF&G's) review of the study request for the Bat Study included recommendations to document seasonal variation in bat occurrence and activity, expanded sampling that would provide habitat-specific indices of abundance, and more thorough searching of naturally occurring roosts, maternity colonies, and hibernacula. Because AEA shares ADF&G's opinion that "The Watana development is unlikely to impact large numbers of bats or affect a significant portion of the population either directly or indirectly," it is appropriate to begin the Bat Study with the objective of conducting one season of work to address ADF&G's recommendations in 2013, as described above. If seasonal concentration areas such as roosting sites, maternity colonies, or hibernacula are located, then a second season of fieldwork will be conducted in 2014.

10.13.5. Consistency with Generally Accepted Scientific Practice

The Bat Study will be conducted using standard acoustic monitoring techniques as described in Hayes et al. (2009). The U.S. Fish and Wildlife Service (USFWS) endorses the use of acoustic monitoring to help predict impacts to bats at other industrial developments (i.e., wind energy

sites [USFWS 2012]). Anabat® broadband acoustic detectors are proposed for use in this study because they are used widely for passive detection of free-ranging, echolocating bats (O'Farrell et al. 1999).

10.13.6. Schedule

The schedule for this study is summarized in Table 10.13-1. Acoustic monitoring will commence by late May and continue into early October 2013. Evidence of reproductive female bats (e.g., pregnant or lactating) in Alaska has been documented in mid-June (Parker 1996), and swarming behavior (high concentrations of bat activity) in September and October can be indicative of the presence of hibernacula. The proposed study duration will capture activity patterns during these important life cycle stages.

Data management will be conducted throughout the field season and will be finalized after all sampling has been completed in October. Data analyses will be conducted in October and November. The Initial Study Report will be completed by February 2014, within one year of the February 1 SPD. If the results of the first year of study warrant a second season of work, AEA's Updated Study Report will recommend a second study season for 2014. Should AEA make this recommendation, the same seasonal timing of sampling and analytical events would apply in 2014 and the Updated Study Report would be completed by February 2015.

Updates on the study progress will be provided during Technical Workgroup meetings, which will be held quarterly in 2013 and, if needed, in 2014. In addition, licensing participants will have the opportunity to review and comment on the Initial Study Report and, if needed, the Updated Study Report.

10.13.7. Relationship with Other Studies

As depicted in Figure 10.13-2, the Bat Study will benefit from information provided by several other studies. Information from the Geology and Soils Study (Section 4.5) and the Cultural Resources Study (Section 13.5) will help to identify geological and human structures that are potentially suitable for use by bats as roosting sites, maternity colonies, or hibernacula. Preliminary delineation of forested and wetland habitats by the Vegetation and Wildlife Habitat Mapping and the Wetland Mapping studies (Sections 11.5 and 11.7, respectively) will be used to identify potential foraging sites for deployment of acoustic detectors. The locations of occupied roosting sites, maternity colonies, or hibernacula (if any) and abundance data from sampling of foraging habitats will be central to the evaluation of the distribution of and habitat use by bats in the study area, which will be used in turn in the Evaluation of Wildlife Habitat Use (Section 10.19). Information on the distribution and abundance of bats in the study area will be used to assess potential impacts of the Project and to develop any appropriate PM&E measures for bats, as necessary.

During the impact assessment that will be conducted for the FERC License Application in 2015, data on the distribution of bats and their presence or absence in various habitats in the study area will be used to assess Project impacts through geospatial analysis and evaluation of the responses of the study species to other similar projects, as documented in the scientific literature. Using Geographic Information System (GIS) software, species presence/absence in different habitat types will be combined with the spatially explicit wildlife habitat map of the Project area being developed under the Vegetation and Wildlife Habitat Mapping Study (Section 11.5). Although

the wildlife habitats described and mapped for that study will not include caves or other geological structures suitable for use as roosting sites or hibernacula by bats, all locations of concentrated bat activity will be mapped. The direct and indirect impacts of the Project will be evaluated by overlaying the reservoir impoundment, related infrastructure areas, and access road and power transmission corridors onto the habitat map to calculate direct impacts of habitat loss and alteration and by applying various buffer distances, as determined from the available information on the expected effects, to estimate indirect impacts. The GIS analysis will be combined with information from the literature to estimate the geographic extent, frequency, duration, and magnitude of Project effects on bat populations. Any necessary protection, mitigation, and enhancement measures will be developed, as appropriate, by examining the distribution and abundance of bats and their habitats in relation to the geographic extent and seasonal timing of various Project activities.

10.13.8. Level of Effort and Cost

Development of a preliminary vegetation map in 2012 and early 2013 (see Section 11.5) will enable development of a stratified acoustic monitoring plan based on major habitat types. Up to 20 Anabat detectors will be deployed between late May and early October 2013 to ensure adequate spatial coverage and study design replication in locations judged by experienced biologists to constitute suitable bat foraging or roosting habitats.

After initial deployment in late May, the Anabat detectors will be serviced approximately twice per month during the anticipated four-month field season. Hence, eight helicopter-supported site visits will be conducted. Personnel on other Project field crews may be enlisted to download and inspect the detectors, when possible, thereby reducing study costs. Up to six additional field days will be scheduled for a helicopter-supported survey of sites judged to have potential as roost sites, maternity colonies, or hibernacula.

The cost of this study in 2013 is estimated to be approximately $115,000. If, after reviewing the 2013 results, the study continues in 2014, then the cost is estimated to be similar, or possibly less.

10.13.9. Literature Cited

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10.13.10.Tables

Table 10.13-1. Schedule for implementation of the Bat Study.

Activity	2013				2014				2015
	1 Q	2 Q	3 Q	4 Q	1 Q	2 Q	3 Q	4 Q	1Q
Acoustic monitoring & roost searches		——	——	——					
Data analysis				——					
Initial Study Report				——	Δ				
If 2013 results warrant a second season of work, then the same seasonal timing of sampling and analysis would apply in 2014						——	——	——	
Updated Study Report								——	▲

Legend:

—— Planned Activity
Δ Initial Study Report
▲ Updated Study Report

10.13.11.Figures

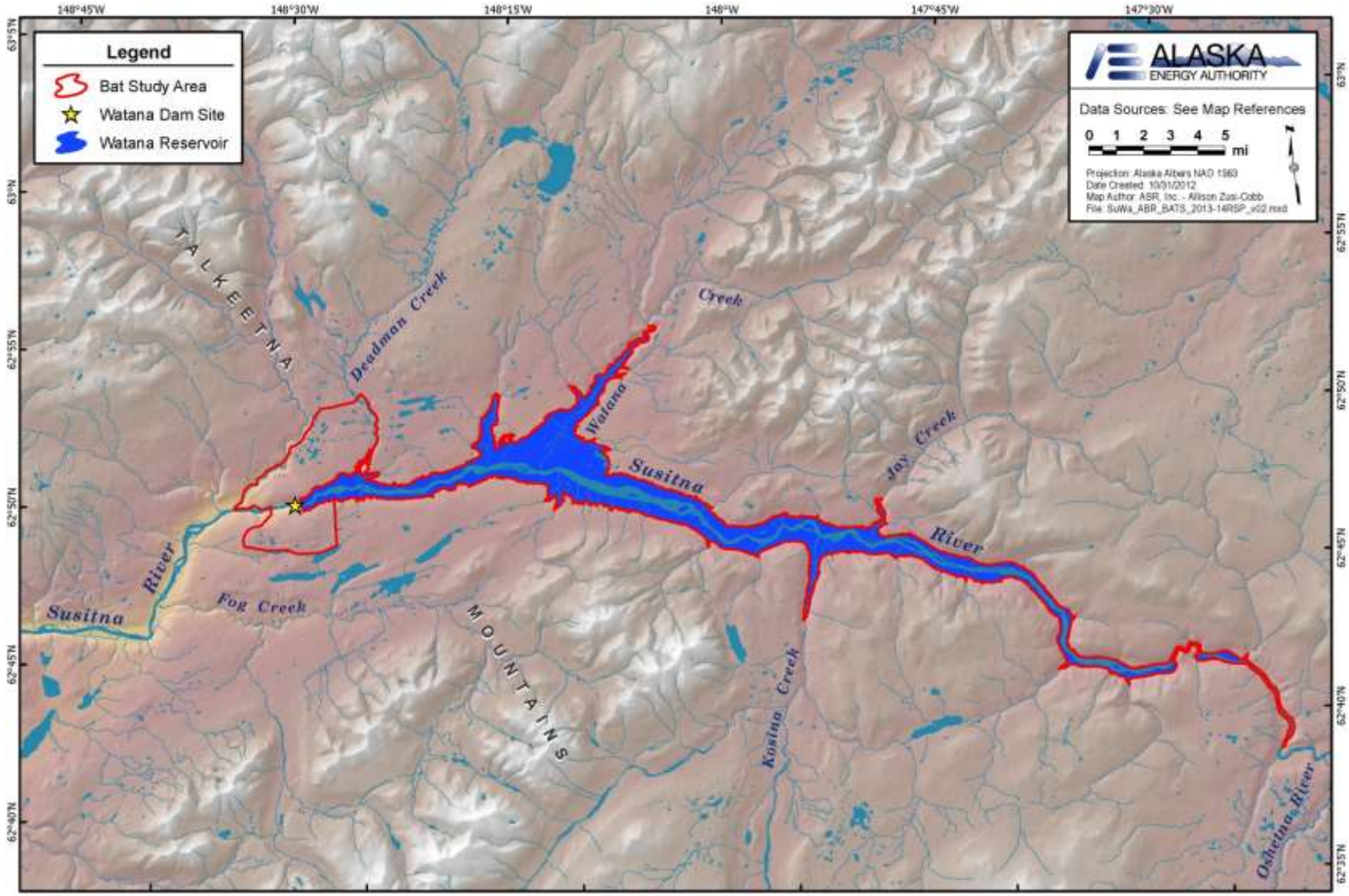

Figure 10.13-1. Bat study area.

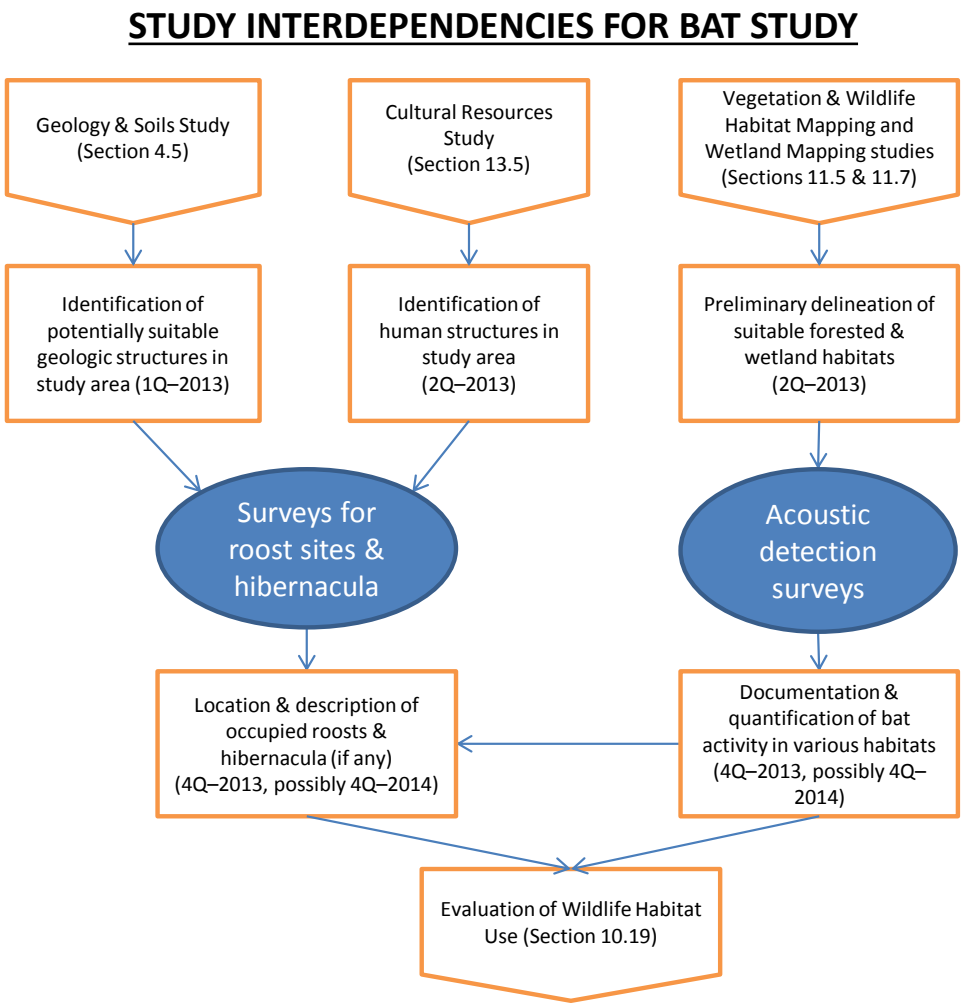

Figure 10.13-2. Study interdependencies for the Bat Study.