10.13. Bat Distribution and Habitat Use

10.13.1. General Description of the Proposed Study

The bat study will begin in 2013 to evaluate the occurrence, abundance, and habitat use of bats in the Project area. Biologists will deploy ultrasonic acoustic detectors in the study area 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 to the small mammal study (see Section 10.12), the two studies require substantially different methodologies and require separate efforts.

10.13.1.1. Study Goals and Objectives

The goal of the bat study is to collect baseline data on bats in the Susitna-Watana Hydroelectric Project (Project) area to evaluate 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 impoundment zone and infrastructure areas for the Project;
- Review geologic and topographic data to assess the potential for roosting sites and hibernacula in the study area; and
- Examine suitable geological features and human-made structures (bridges and buildings) for potential roosting sites or hibernacula.

This information will be used to assess the potential impacts of the Project.

10.13.2. Existing Information and Need for Additional Information

Sampling for bat activity was not conducted during the 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 encompasses the reservoir inundation zone and around the dam site, including associated infrastructure nearby, but does not include the access and transmission corridors (see Figure 10.13-1).

10.13.4. Study Methods

10.13.4.1. Field Surveys and Data Management

Acoustic surveys of bats using 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 the 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 ≥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.

To the extent possible, 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 allowing 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). To the extent possible, ground searches also will be conducted if suitable substrates exist. 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, bridges) will also be investigated for potential roosting sites. Due to the small number of human-made structures within the Project area, identification and location of potential search areas will be coordinated with the findings of the historic properties surveys (see Section 13.5).

Anticipated work products include characterization of overall bat activity, identification of areas of concentrated bat activity, and possible documentation of locations of maternity roosts or hibernacula if discovered.

Through the successful completion of the proposed study, AEA will document bat use (passes/detector-night) and identify potential roosting and hibernating structures present in the Project area.

ADF&G's review of the study request for the bat study includes recommendations for documenting 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 we share 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 year of work in 2013, as described above. If seasonal concentration areas such as roosting sites, maternity colonies, or hibernacula are located, a second season of field work will be conducted in 2014.

10.13.4.2. Impact Assessment

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 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 plan (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 PM&E measures will be developed by examining the distribution and abundance of bats and their habitats in relation to the geographic extent and seasonal timing of various Project activities.

10.13.5. 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 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

Acoustic monitoring will commence by late May and continue into early October 2013. Evidence of reproductive females (e.g., pregnant or lactating) in Alaska have 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 submitted within 1 year of FERC's Study Plan Determination (i.e., February 2013). If the results of the first year of study warrant a second season of work, then the same seasonal timing of sampling and analytical events would apply in 2014. An Updated Study Report will be completed within 2 years of FERC's Study Plan Determination.

10.13.7. Level of Effort and Cost

Development of a preliminary vegetation map in 2012 (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 4-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.

10.13.8. Literature Cited

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