

**Susitna-Watana Hydroelectric Project  
(FERC No. 14241)**

**Small Mammal Species Composition and  
Habitat Use Study  
Study Plan Section 10.12**

**Final Study Plan**

Alaska Energy Authority



July 2013

## 10.12. Small Mammal Species Composition 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 10.12 of the RSP described the Small Mammal Species Composition and Habitat Use Study. The study will be an office-based analysis to review and synthesize available information on the occurrence and relative abundance of small mammals in the Project area. The study will describe the species of small mammals known to occur in the Project area and their patterns of habitat use. RSP 10.12 provided goals, objectives, and proposed methods for data collection regarding small mammals.

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 10.12 was one of the 31 studies approved with no modifications. As such, in finalizing and issuing Final Study Plan Section 10.12, AEA has made no modifications to this study from its Revised Study Plan.

### 10.12.1. General Description of the Proposed Study

The Small Mammal Study will be an office-based analysis to review and synthesize available information on the occurrence and relative abundance of small mammals in the Project area. The study will describe the species of small mammals known to occur in the Project area and their patterns of habitat use. Other small mammals, including snowshoe hares (Section 10.10) and bats (Section 10.13), are addressed in other study plans.

#### Study Goal and Objectives

The goal of the Small Mammal Study is to synthesize baseline data on small mammals in the Project area to enable habitat-based assessments of the impacts expected to occur from development of the Project.

The Small Mammal Study has two specific objectives:

- Describe the species composition and relative abundance of small mammals in the Project area.
- Describe the habitat associations of small mammals within the Project area.

### 10.12.2. Existing Information and Need for Additional Information

Small mammal species in the Susitna River basin include porcupine, hoary marmot, arctic ground squirrel, red squirrel, collared pika, and several species each of voles, mice, and shrews (ABR 2011). Species composition, relative abundance, and habitat use by small mammals were studied intensively for the Alaska Power Authority (APA) Susitna Hydroelectric Project in 1980 and 1981 along 49 trapline transects (using both snap-traps and pitfall traps) located in a variety of habitat types in the middle and upper Susitna River basin (Kessel et al. 1982). The APA Susitna Hydroelectric Project study area for small mammals extended from Sherman (near Gold Creek) on the west to the mouth of the Maclaren River on the east and within approximately 16 kilometers (10 miles) on each side of the Susitna River (Kessel et al. 1982).

Since completion of the APA Susitna Hydroelectric Project studies in the 1980s, a new species of small mammal—the Alaska tiny shrew (*Sorex yukonicus*)—was recognized and described by Dokuchaev (1997) on the basis of morphological characteristics. The earliest specimen known was trapped in 1982 near the upper Susitna River during the APA Susitna Hydroelectric Project study. By 2007, the total number collected statewide had increased to 38 specimens from at least 22 widely separated locations (MacDonald and Cook 2009), indicating the species was much more widespread than originally thought, occurring in low densities. Early information indicated that it occurred primarily in riparian habitats, but it was also captured in scrub habitats as trapping efforts expanded. The Alaska Natural Heritage Program classified the Alaska tiny shrew as “unrankable” globally (GU), presumably because little information was available, and as “vulnerable” in the state (S3; AKNHP 2011), presumably due to its restricted range and relatively few populations known in North America. The species was included on the Bureau of Land Management’s (BLM’s) Alaska list of sensitive species (2010). Based on more recent genetic analyses, however, Hope et al. (2010) concluded that *S. yukonicus* is synonymous with the Eurasian least shrew, *S. minutissimus*, and simply constitutes the eastern population of that species, which occurs in Siberia and farther west in Eurasia. Hence, the classification and name are likely to be revised in future taxonomic checklists.

No recent reports on small mammal studies in the middle or upper Susitna basin are available, but additional information is available from other studies in surrounding regions, including species inventories in Denali National Park and Preserve (Cook and MacDonald 2003) and on Fort Richardson near Anchorage (Peirce 2003), and long-term population monitoring (1992–2005) of three species of voles conducted in Denali National Park and Preserve by Rexstad and Debevec (2006).

The APA Susitna Hydroelectric Project studies provided a thorough sampling of the small mammal populations in the Project area. Although 30 years have elapsed since those studies, it is unlikely that species distributions or habitat-use patterns have changed significantly in the interim. Because of the often cyclical population fluctuations of small mammals and the lack of effective mitigation to offset population losses in the impoundment zone, the wildlife data gap analysis report (ABR 2011) questioned whether additional studies were warranted for the Project. Hence, after further consideration of the likely results of the field sampling described earlier in the Proposed Study Plan, and further consultation with the Alaska Department of Fish and Game and the federal Bureau of Land Management, AEA has revised this study to focus on reviewing and synthesizing all available information rather than conducting more field sampling in 2013. In view of the intensive field sampling in the 1980s by the University of Alaska Museum (Kessel et al. 1982) and its suitability for analysis by the Evaluation of Wildlife Habitat Use (Section 10.19), this study will provide useful information for evaluating the direct effects of habitat loss on small mammals as a result of Project development.

### 10.12.3. Study Area

The area of analysis for this study will consist of the entire Project area (Figure 10.12-1). Existing data on the abundance and habitat associations of small mammals from the original study for the APA Susitna Hydroelectric Project (Kessel et al. 1982) will be supplemented with more recent data from other regional studies and will be applied to the wildlife habitat types mapped throughout the reservoir inundation zone, associated facilities areas, and the access road and power transmission corridors.

#### **10.12.4. Study Methods**

This study will review, compile, and synthesize data on the occurrence and relative abundance of the small mammal species captured and analyzed by Kessel et al. (1982). That information will be supplemented with data from other small mammal trapping studies conducted recently in Southcentral and Interior Alaska (including, but not limited to, Cook and MacDonald 2003, Peirce 2003, Rexstad and Debevec 2006, MacDonald and Cook 2009, and specimen records maintained by the University of Alaska Museum of the North in Fairbanks and the Alaska Natural Heritage Program in Anchorage).

This information synthesis will then be applied to the wildlife habitat types mapped by the Vegetation and Wildlife Habitat Mapping Study in the Upper and Middle Susitna Basin (Section 11.5) and will be included in the ranking of habitat values that will be the principal analytical product of the Evaluation of Wildlife Habitat Use (Section 10.19). Kessel et al. (1982) quantified habitat components and conducted detailed analyses of the abundance of small mammals in relation to those habitat components. Standard trapping and survey methods for small mammals (e.g., Jones et al. 1996) were used in that study, providing effective sampling of voles, lemmings, and shrews by using both pitfall traps and snap-traps. Trapping data included the abundance of species captured among different habitats types, which will be incorporated into the Evaluation of Wildlife Habitat Use (Section 10.19) using a Geographical information System (GIS).

Additional information on small mammals will be collected as part of the study of Terrestrial Furbearer Abundance and Habitat Use (described in detail in Section 10.10), which began in August 2012 and will continue in August 2013 and 2014. In that study, the abundance of voles will be estimated by using live-trapping and mark–recapture methods in study plots located in spruce forest and grassy meadow habitats. Captured voles will be weighed, ear-tagged, identified to species and sex, and released. The proportion of tagged individuals to unmarked individuals will be used to calculate an estimate of population abundance. In addition, a population index for snowshoe hares will be estimated using counts of fecal pellets along transects located in selected forest and shrub habitats.

#### **10.12.5. Consistency with Generally Accepted Scientific Practice**

The Small Mammal Study will rely on data that were collected using standard trapping techniques (Jones et al. 1996). Analysis of habitat availability and use allows an ecosystem approach to impact assessment, and GIS-based analysis has become a standard, straightforward method of evaluating the impacts of habitat loss and alteration.

#### **10.12.6. Schedule**

As is depicted in Table 10.12-1, the review and synthesis of small mammal trapping data will be conducted primarily in 2013, with analytical updates occurring in 2014 after further collection of field data on vole and hare abundance and further refinement of the wildlife habitat map for the Project. Initial and Updated Study Reports will be issued in February 2014 and 2015, respectively. Study progress will be presented at Technical Workgroup meetings, which will be held quarterly during 2013 and 2014.

### 10.12.7. Relationship with Other Studies

As depicted in Figure 10.12-2, the Small Mammal Study will use information from the Vegetation and Wildlife Habitat Mapping Study in the Upper and Middle Susitna Basin (Section 11.5) and the study of Terrestrial Furbearer Abundance and Habitat Use (Section 10.10). The habitat types delineated for the wildlife habitat map will be used in the review and synthesis of small mammal data. The terrestrial furbearer study will contribute estimates of vole density and snowshoe hare abundance in selected habitat types. Data on species distribution, habitat associations, and the number of captures will be used to assess the relative abundance of small mammal species among the habitat types mapped in the study area, which will be used in the habitat rankings prepared by the Evaluation of Wildlife Habitat Use (Section 10.19).

Construction and operation of the proposed Project has the potential to result in direct and indirect effects on small mammals, including the following:

- Direct and indirect habitat loss and alteration.
- Potential direct mortality due to vehicle strikes, exposure to contaminants, and attraction to garbage and human activity.
- Potential changes in mortality due to changes in the abundance or distribution of predators.
- Potential physical and/or behavioral blockage of movements due to reservoir water and ice conditions.
- Potential effects on predator species.

For small mammals, the primary impact of direct and indirect habitat loss and alteration could occur in the reservoir inundation zone, associated facilities footprints, and access and transmission corridors.

During the impact assessment that will be conducted in 2015 for the FERC License Application, data on the distribution and relative abundance of and habitat use by small mammals in the study area can be used to assess Project impacts on these populations through geospatial analysis and evaluation of the responses of the study species to other similar projects, as documented in the scientific literature. Small mammal populations could also be affected over a larger region if regional predator abundance is altered by the Project, as will be analyzed in the impact assessment using data from other Project studies (i.e., Distribution, Abundance, and Habitat Use by Large Carnivores [Section 10.8]; Wolverine Distribution, Abundance, and Habitat Occupancy [Section 10.9]; Terrestrial Furbearer Abundance and Habitat Use [Section 10.10]; Aquatic Furbearer Abundance and Habitat Use [Section 10.11]; and Surveys of Eagles and Other Raptors [Section 10.14]). Using GIS software, species presence/absence data or relative abundance data recorded among different habitat types mapped in the Project area can provide spatially explicit impact predictions. The direct and indirect impacts of the Project can be evaluated by overlaying the reservoir, related infrastructure areas, and access road and power transmission corridors onto the habitat map to evaluate direct impacts and indirect impacts on preferred habitats. The GIS analysis can be combined with information from the literature to estimate the potential geographic extent, frequency, duration, and magnitude of Project effects on small mammal populations. Additional information collected for the various studies of predators can be used to evaluate the potential area over which small mammal populations may be affected by changes in

predation rates. The results of these analyses to assess Project impacts can be used to evaluate protection, mitigation, and enhancement (PM&E) measures, as appropriate.

#### 10.12.8. Level of Effort and Cost

Most of the review and synthesis effort will occur in the first year (2013) and will be available for the Initial Study Report, but revisions will be necessary to include additional data collected on vole and hare population indices in 2014 and to incorporate the revisions made for the final wildlife habitat map in 2014 for the Updated Study Report. Total study costs are estimated to be approximately \$50,000 over both years.

#### 10.12.9. Literature Cited

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**10.12.10.Tables**

**Table 10.12-1. Schedule for implementation of the Small Mammal Study.**

Activity	2013				2014				2015
	1 Q	2 Q	3 Q	4 Q	1 Q	2 Q	3 Q	4 Q	1 Q
Review & synthesize results of regional studies of small mammals	—	—							
Apply results of review & synthesis to available wildlife habitat mapping		—				—			
Incorporate results from other studies (snowshoe hare & vole density estimates, wildlife habitat mapping updates)			-----				-----		
Initial Study Report				—	Δ				
Updated Study Report								—	▲

Legend:

- Planned Activity
- Follow-up activity (as needed)
- Δ Initial Study Report
- ▲ Updated Study Report

10.12.11.Figures

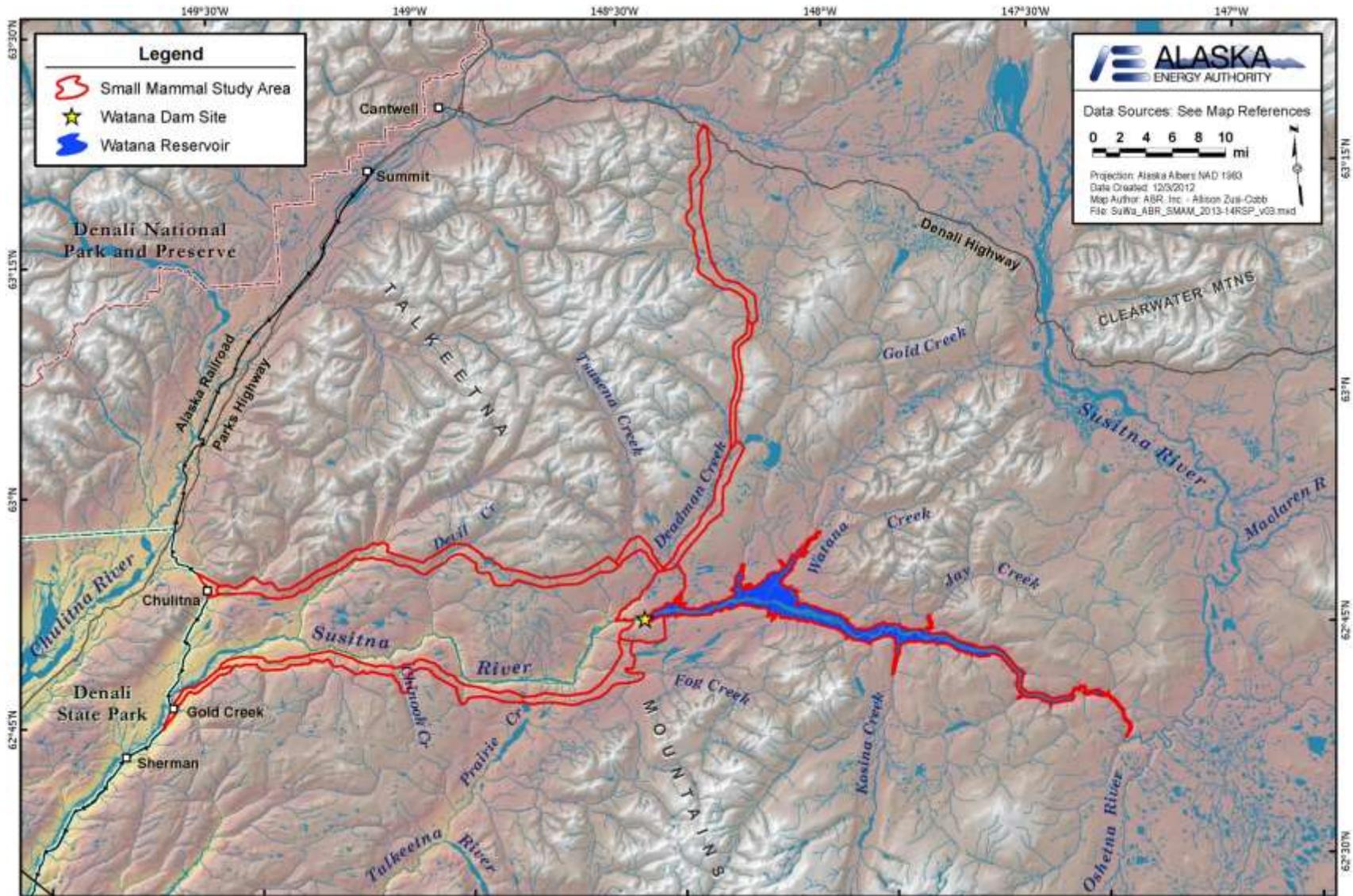


Figure 10.12-1. Study area for the small mammals study.

**STUDY INTERDEPENDENCIES FOR SMALL MAMMAL STUDY**

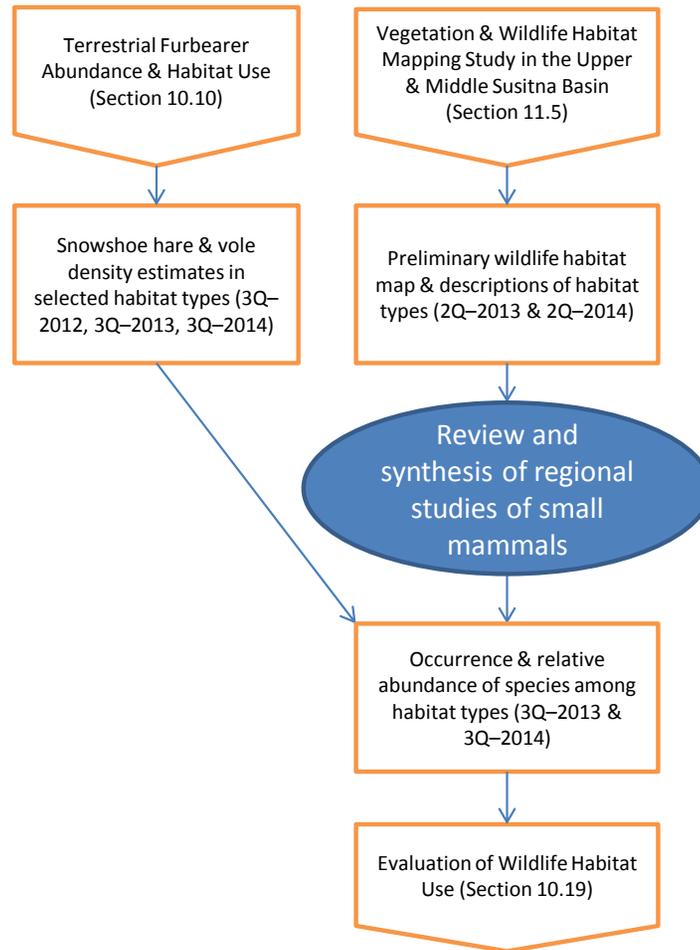


Figure 10.12-2. Study interdependencies for the small mammal study.