

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

**Aquatic Furbearer Abundance and Habitat Use Study
Study Plan Section 10.11**

Final Study Plan

Alaska Energy Authority



July 2013

10.11. Aquatic Furbearer Abundance 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 10.11 of the RSP described the Aquatic Furbearer Abundance and Habitat Use Study. This study has been designed to assess the distribution of aquatic furbearers among habitats, to estimate population size for beavers, and to assess the relative abundance of other aquatic furbearers. Additional work will be done to provide information on the food habits and diets of piscivorous furbearers (river otter and mink) to inform the Mercury Assessment and Potential for Bioaccumulation Study (Section 5.7). RSP 10.11 provided goals, objectives, and proposed methods for data collection regarding aquatic furbearers.

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 10.11 was one of the 31 studies approved with no modifications. As such, in finalizing and issuing Final Study Plan Section 10.11, AEA has made no modifications to this study from its Revised Study Plan.

10.11.1. General Description of the Proposed Study

The Aquatic Furbearer Study will be conducted in 2013 and 2014. The study has been designed to assess the distribution of aquatic furbearers among habitats, to estimate population size for beavers, and to assess the relative abundance of other aquatic furbearers. Additional work will be done to provide information on the food habits and diets of piscivorous furbearers (river otter and mink) to inform the Mercury Assessment and Potential for Bioaccumulation Study (Section 5.7).

Study Goal and Objectives

The goal of the Aquatic Furbearer Study is to collect baseline data on aquatic furbearers in the study area to enable assessment of potential Project-related impacts. This information will be used to develop appropriate mitigation measures. Four species of aquatic furbearers occur in the Project area. The beaver is the most prominent aquatic furbearer statewide in terms of ecological and economic importance. Other aquatic furbearers in the Project area include river otter, mink, and muskrat (AEA 2011).

Five specific objectives have been identified for this study:

- 1) Delineate the distribution and estimate the current population size of beavers.
- 2) Describe the distribution and relative abundance of river otter, mink, and muskrat.
- 3) Describe habitat associations of aquatic furbearers.
- 4) Review available information on food habits and diets of piscivorous furbearers (river otter and mink) as background for the Mercury Assessment and Potential for Bioaccumulation study (Section 5.7).
- 5) Collect hair samples from river otters and mink to characterize baseline tissue levels of mercury for the Mercury Assessment and Potential for Bioaccumulation Study.

10.11.2. Existing Information and Need for Additional Information

Studies of aquatic furbearers for the original Alaska Power Authority (APA) Susitna Hydroelectric Project proposed in the 1980s focused primarily on beavers and secondarily on muskrats; limited track surveys were conducted for river otters and mink. Beavers, which were selected to predict downstream impacts of the APA Susitna Hydroelectric Project on furbearers, were studied mainly downstream of the proposed dam site (Gipson et al 1982, 1984; Woolington et al. 1984, 1985; Woolington 1986). Aerial surveys were used to locate lodges and caches and to estimate population levels and overwinter survival. Boat surveys in summer were used to detect beaver sign. Surveys were conducted using boats and airplanes between Devils Canyon and Cook Inlet during summer 1980 and 1982; in general, beaver sign increased substantially with distance downriver from Devils Canyon (Gipson et al. 1982, 1984). Side channels and sloughs were the habitat types used most often. Caches, lodges, and dens were found most often in habitats that had silty banks, willows, and poplars nearby. Little or no sign of beaver activity was found in the mainstem Susitna River during summer surveys (Gipson et al. 1984). Away from the Susitna River, beaver sign was found along slow-flowing sections of most tributaries, including Portage Creek, Indian River (especially along a tributary flowing out of Chulitna Pass), streams along the access alternative between Gold Creek and Devils Canyon, and Prairie Creek (Gipson et al. 1984).

Fall and spring counts of beaver lodges and food caches were conducted between Devils Canyon and Talkeetna (Gipson et al. 1984; Woolington et al. 1984, 1985; Woolington 1986). Fall counts were conducted annually during 1982–1985 and spring counts were conducted in 1984 and 1985. Between 1982 and 1985, the population in that area was estimated at 70–220 beavers. Aerial surveys for beavers (and muskrats) were conducted in the upstream study area during spring and summer 1980 (Gipson et al. 1982). Beaver colonies in the vicinity of the original APA Susitna Hydroelectric Project impoundment zones occurred mostly in lakes between 610 and 730 meters (2,000 and 2,400 feet) elevation. Colonies also were present in slow-moving sections of most of the larger tributaries, particularly in Deadman Creek. No active beaver lodges or bank dens were found on the Susitna River upstream of Devils Canyon (Gipson et al. 1982), however.

Aerial surveys for muskrat pushups were flown upstream from Gold Creek during spring 1980 (Gipson et al. 1982). Muskrat sign was observed most often in lakes on plateaus above the river valley, at 610–730 meters (2,001–2,395 feet) elevation. Muskrats in the upstream area appeared to depend on fairly small, isolated areas of wetland habitats. Muskrats were also seen along slow-moving sections of creeks and at locations where creeks drained into larger streams, particularly near the Stephan Lake/Prairie Creek and Deadman Lake/Deadman Creek drainages.

Tracks of river otters and mink were recorded in the upper Susitna basin during the APA Susitna Hydroelectric Project studies in the 1980s, but the number of animals present was not estimated. Tracks were widespread but not abundant, although several unusually heavy concentrations of tracks (presumably representing a small number of animals spending an extended period in one area) were noted near river ice in early winter, the time of year when track surveys were conducted.

Data on the distribution, relative abundance, and movements of aquatic furbearers in Game Management Unit (GMU) 13 is limited to that collected for the APA Susitna Hydroelectric Project, and that information is now 25–30 years old. Annual furbearer reports produced by the Alaska Department of Fish and Game (ADF&G) contain general abundance information

obtained from trapper questionnaires (Schumacher 2010), but reports do not include drainage-specific population data. Current data on the abundance and distribution of aquatic furbearers is unavailable for GMU 13.

Current data on the abundance, distribution, and habitat use of aquatic furbearers is needed to enable analysis of Project impacts. A large body of research demonstrates that the beaver is a keystone species that exerts profound ecological effects on hydrology, geomorphology, vegetation, nutrient cycling, the productivity of aquatic and riparian habitats, and the distribution and abundance of fishes and other aquatic organisms (Butler 1995; Collen and Gibson 2001; Müller-Schwarze and Sun 2003; Rosell et al. 2005). As was the case for the APA Susitna Hydroelectric Project, current information on the abundance and distribution of beavers will be required. Additional data will also be needed to assess the current abundance and distribution of river otter and mink, particularly along the mainstem Susitna River and its clearwater tributaries in the reservoir inundation zone. These baseline data will be collected as input for the Mercury Assessment and Potential for Bioaccumulation Study (Section 5.7), which was recommended by the U.S. Fish and Wildlife Service (USFWS) in response to the request for comments and study requests on the Pre-Application Document/FERC Scoping Document 1 for the Project (letter from USFWS to AEA dated May 31, 2012).

10.11.3. Study Area

The study area for aquatic furbearers will vary according to the species being surveyed (Figure 10.11-1). Because of their ecological importance in riparian habitats, beavers will be surveyed in the riparian study area from the reservoir inundation zone downstream to the confluence of the Susitna and Chulitna rivers, as well as in other portions of the Project area. Aerial surveys of muskrats will be restricted to water bodies and wetland areas in the Project area, including the reservoir inundation zone. In addition to covering all portions of the Project area, winter track and transect surveys for river otters and mink will focus on the stream survey area, consisting of the mainstem Susitna River above the dam site and on tributary streams draining into the reservoir inundation zone, as well as on similar river and tributary stretches immediately downstream from the dam site. Surveys will extend upstream along tributaries at least 3 miles (Figure 10.11-1) to provide comparative data on the extent of use of those drainages in comparison with the Susitna mainstem.

10.11.4. Study Methods

10.11.4.1. Beaver and Muskrat Surveys

Aerial surveys of beaver lodges and food caches will be conducted in a small helicopter to assess the distribution and abundance of beavers in the Middle Segment of the Susitna River below the proposed dam site, the reservoir inundation zone in the upper basin, the dam and camp facilities area, and access road and transmission line corridors. A survey will be flown each year in fall, after deciduous trees have shed their leaves but before water bodies freeze, to document the distribution and abundance of active colonies, as indicated by lodges and fresh food caches (Hay 1958; Payne 1981). Aerial surveys of active colonies located on the fall 2013 survey will be flown again in spring 2014 to estimate the overwinter survival of those colonies.

An aerial survey of ponds and lakes will be conducted once each year in a small helicopter in late winter to enumerate muskrat structures (“pushups”) in water bodies and wetlands throughout the Project area that could be affected directly by Project infrastructure and activities.

10.11.4.2. River Otter and Mink Surveys

Because of the low density of these species expected in the Project area based on past field surveys (Gipson et al. 1982, 1984; S. Buskirk, pers. comm.), the use of intensive ground-based fieldwork to obtain hair samples for DNA genotyping and mark–recapture population estimation over the full extent of the Project area is not considered cost-effective for the results that are likely to be produced. Instead, aerial surveys will be flown in a small helicopter at least once each year in early winter (November/December) and two to three times later each winter (February–early April) for snow-tracking of river otters and mink soon (within three days) after fresh snowfalls. The surveys generally will follow the approach described by Reid et al. (1987) and Sulkava and Liukko (2007), albeit using a helicopter rather than ground-based surveys. In portions of the Project area away from the stream survey area depicted in Figure 10.11-1, the helicopter flight lines will parallel each side of the road and transmission alignments to locate tracks that intercept the flight lines.

In the stream survey area (reservoir inundation zone and tributaries), the helicopter will follow the courses of the Susitna River and its tributary streams extending upstream 3 miles (5 kilometers) from the Susitna River (Figure 10.11-1). Streams will be subdivided into sampling segments before the survey. It is expected that trails and tracks of river otters will be detected much more readily during these aerial surveys than will the tracks of mink, but data on both species will be recorded. Wherever encountered, river otter trails will be followed to delineate the length of river and streams traversed by the animals and to evaluate the extent of use of the mainstem river and tributaries. If it is possible to distinguish individual sets of tracks, the trails in each segment will be recorded as belonging to single or multiple animals and the minimum number of animals will be counted or estimated. Flight lines will be recorded using a Global Positioning System (GPS) receiver, as will all sightings of aquatic furbearers for entry into a geospatial database.

The results obtained using this method on the surveys to be conducted in early 2013 will be compared with the results of transect surveys flown in the same helicopter but oriented perpendicularly to the mainstem Susitna River in the stream survey area, rather than lengthwise along the watercourses. These transects will extend up to 3 miles away from the river on each side (excluding high-elevation terrain where river otters and mink are unlikely to occur) and will be spaced at intervals of approximately 3 miles along the length of the stream survey area. The transect surveys will sample terrain away from streams in an attempt to detect animals using lakes or moving between adjacent drainages.

The transect survey and the stream-course survey will be conducted sequentially on the same survey flights. The results from this dual-survey approach in early 2013 will be compared and the survey plan will be revised for the remainder of the study in late 2013 and in 2014, if warranted. Both of these survey methods will provide assessments of the distribution of river otters (and possibly mink) in the stream survey area, as well as an index of their relative abundance and habitat use.

Additional data on river otters and mink may be collected incidentally during the aerial transect surveys and ground-based sampling work conducted for the study of Terrestrial Furbearer Abundance and Habitat Use (Section 10.10). GPS coordinates of sightings and tracks will be requested from the personnel conducting those helicopter surveys, as will information on incidental captures of mink in hair-snag sampling tubes placed to collect marten hair for genotyping. Details of incidental sightings of aquatic furbearers will be requested from other researchers working on other wildlife surveys for the Project, as well as on fish and water resource studies.

10.11.4.3. Information for Mercury Assessment

Hair samples from river otters and mink will be sought for laboratory analysis to characterize preconstruction levels of mercury for the study of Mercury Assessment and Potential for Bioaccumulation (Section 5.7). ADF&G requires that the pelts of river otters be sealed by an authorized ADF&G representative, which will provide an opportunity to obtain hair samples from river otters harvested in the study area. Small amounts of hair will be taken from river otter pelts for which reliable location information is available and will be provided to the mercury study team for mercury analysis. Because mink pelts do not need to be sealed by ADF&G, hair samples from that species are expected to be more difficult to obtain, but carcasses will be sought from any local trappers who are working in the Project area. Another potential source of mink hair samples will be from incidental captures in hair traps set for marten as part of the study of Terrestrial Furbearer Abundance and Habitat Use (Section 10.10). If sufficient samples of river otter and mink hair cannot be obtained using these methods, then hair-snag traps (DePue and Ben-David 2007; Pauli et al. 2008) will be deployed during the helicopter surveys at locations in the stream survey area where river otter and mink sign is recorded. Special attention will be paid to fish-bearing streams having areas of open water.

In addition to hair sampling, the scientific literature will be reviewed to locate and synthesize information on the food habits and diets of river otters and mink in freshwater aquatic systems, to support the pathways analysis being conducted for the Mercury Assessment and Potential for Bioaccumulation study (Section 5.7).

10.11.5. Consistency with Generally Accepted Scientific Practice

Survey methods for beaver colonies, muskrat structures, and winter track surveys follow standard practices for recording aquatic furbearers and their sign (Dozier 1948; Hay 1958; Payne 1981; Proulx and Gilbert 1984; Reid et al. 1987; Sulkava and Liukko 2007). The proposed methods for river otter and mink will focus on assessing distribution, relative abundance, and minimum counts of those species, rather than using the more intensive sample-unit probability estimator techniques (Becker 1991; Becker et al. 2004) required to generate population estimates with accompanying variance estimates. The aquatic furbearer surveys generally will be similar to the surveys conducted for the APA Susitna Hydroelectric Project during the 1980s (Gipson et al. 1982, 1984), except that no boat surveys of beaver are proposed because helicopter surveys will be more efficient. The use of snags to obtain hair samples is a well-established method (DePue and Ben-David 2007; Pauli et al. 2008). Habitat availability and habitat-use analyses allow an ecosystem approach to impact assessment and GIS-based analysis has become a standard method of quantifying the spatial impacts of habitat loss and alteration.

10.11.6. Schedule

As depicted in Table 10.11-1, this study will be conducted primarily in 2013 and 2014, extending into the first quarter of 2015. Several activities will be conducted during February–April 2013: (1) two or three aerial surveys, shortly after fresh snowfalls, to record tracks of river otters and mink; (2) literature review on the food habits and diets of river otters and mink in freshwater aquatic systems; and (3) collection of furbearer hair samples from trapper-harvested animals (in conjunction with ADF&G pelt sealing and direct consultation with local trappers) for mercury analysis. An aerial survey of muskrat pushups in Project area water bodies and wetlands will be conducted in April 2013. Analysis of the first winter’s survey results and the literature review will continue in May. No summer work is proposed, so the next field survey will occur in October 2013, when an aerial survey of beaver lodges and fresh food caches will be flown to locate active colonies. At least one aerial survey to locate tracks of river otters and mink will be flown in November or December 2013, following fresh snowfall. Data analyses will continue through the early winter and the Initial Study Report will be completed by February 2014. The schedule of activities during the first two quarters of 2014 will match the 2013 schedule, with the addition of an aerial survey of beaver colonies in May to assess the overwinter survival of colonies located in fall 2013. An aerial survey of beaver lodges and fresh food caches will be conducted in October 2014 to locate active colonies and an aerial survey of river otter and mink tracks will be flown following fresh snowfall in November 2014. Data analyses will conclude in early winter 2014 and the Updated Study Report will be completed by February 2015. Study progress will be presented at Technical Workgroup meetings, which will be held quarterly during 2013 and 2014.

10.11.7. Relationship with Other Studies

As depicted in Figure 10.11-2, the aquatic furbearer study will use information from, or will contribute information to, eight other studies. The Riparian Vegetation Study Downstream of the Proposed Susitna–Watana Dam (Section 11.6) and the Wetland Mapping Study in the Upper and Middle Susitna Basin (Section 11.7) both will contribute useful information for selection of aerial-survey areas, based on the distribution of suitable habitats for beaver and muskrat. The Study of Fish Distribution and Abundance in the Upper Susitna River (Section 9.5) and the Fish and Aquatics Instream Flow Study (Section 8.5) will help identify fish-bearing streams in the reservoir drainage area to be surveyed for river otter and mink tracks in winter. Incidental observations of aquatic furbearers may be provided by the Terrestrial Furbearer Abundance and Habitat Use study (Section 10.10).

Aerial survey data (GPS coordinates) on the locations of beaver and muskrat colonies and on the abundance and distribution of river otter and mink tracks will be used to evaluate the distribution of aquatic furbearers among habitats, which will be used to inform the Evaluation of Wildlife Habitat Use (Section 10.19). Estimates of population size (beavers), minimum numbers (river otter), and relative abundance (muskrat and mink) from this study will contribute information to the Evaluation of Wildlife Habitat Use (Section 10.19). The aquatic furbearer study will contribute information on beaver numbers and distribution to the Floodplain and Riparian Instream Flow Study (Section 8.6). Lastly, the aquatic furbearer study will contribute hair samples obtained from trapped animals or from hair snags for baseline characterization of mercury concentrations for the Mercury Assessment and Potential for Bioaccumulation study.

Samples of mink hair also may be provided incidentally by the Terrestrial Furbearer Abundance and Habitat Use study (Section 10.10).

The potential impact mechanisms of the proposed Project on aquatic furbearer populations could involve two broad categories:

- Direct and indirect habitat loss and alteration.
- Changes in mortality rates from increased human harvest as a result of improved access.

For aquatic furbearers, direct and indirect habitat loss and alteration will occur in the impoundment area, access and transmission corridors, and other facility footprints as well as possibly downstream of the dam site, where altered flow regimes could alter riparian habitats. Variable winter flows in the Susitna River may result in direct or indirect mortality of beavers. Other potential impacts, including death or injury due to vehicle strikes or exposure to contaminants, may affect relatively small numbers of aquatic furbearers.

During the impact assessment that will be conducted in 2015 for the FERC License Application, data on the distribution, abundance, and habitat use of aquatic furbearers in the study area can be used to assess Project impacts. Location data collected for all four species of aquatic furbearers will identify important habitats in the Project area for each species. For beavers and muskrats, additional quantitative data on the abundance of beaver colonies, muskrat pushups, and river otter groups can be used to obtain estimates of the number of animals potentially affected by Project development. For all four species, direct habitat loss and habitat alteration that would result from the Project can be evaluated by overlaying furbearer location data and the Project features (including the reservoir impoundment, related infrastructure areas, and access road and power transmission corridors) onto the habitat map that will be developed by the Vegetation and Wildlife Habitat Mapping Study in the Upper and Middle Susitna Basin (Section 11.5). Additional indirect habitat loss and alteration also can be estimated by applying various buffer distances from proposed Project features, as determined from the available information on the anticipated effects. In this way, the Geographic Information System (GIS) analysis can incorporate information from the literature to estimate the geographic extent, frequency, duration, and magnitude of Project effects on aquatic furbearers

Results from the Geomorphology Study (Section 6.5), the Floodplain and Riparian Instream Flow Study (Section 8.6), and the Riparian Vegetation Study Downstream of the Proposed Susitna–Watana Dam (Section 11.6) will provide information needed to evaluate potential effects on aquatic furbearer habitats downstream, such as those resulting from reduced spring flows. Any necessary protection, mitigation, and enhancement (PM&E) measures will be developed, as appropriate, by examining the distribution and abundance of species among habitats in relation to the geographic extent and seasonal timing of various Project activities. In addition, historical and current data on harvest of aquatic furbearers in GMU Subunits 13A, 13B, 13E, 14B, 16A, and 20A will be synthesized for the separate Wildlife Harvest Analysis (Section 10.20), beginning in 2012 (AEA 2012) and continuing in 2013 and 2014 as additional data become available. Using those harvest data supplied by ADF&G and USFWS can provide preconstruction information with which to assess the potential effects of increased subsistence and recreational harvest of aquatic furbearers. Documentation of the distribution and relative abundance of piscivorous furbearers (river otter and mink) and characterization of their dietary habits will provide information for the pathways analysis being planned for the Mercury Assessment and Potential for Bioaccumulation Study (Section 5.7).

10.11.8. Level of Effort and Cost

Aerial surveys using a small piston helicopter will be conducted in fall, winter, and spring beginning in 2013 and extending through 2014 to assess the relative abundance of and habitat use by aquatic furbearers in the Project area.

Beaver surveys will require up to a week of survey effort in October each year and 2–3 days in spring. Winter track surveys for river otter and mink, estimated to require approximately 3–5 days each, will be conducted in early winter (November) and two to three times in mid- to late winter (February to April), depending on the occurrence of fresh snowfall suitable for tracking. Surveys of muskrat pushes will be conducted in late winter (April) each year.

Collection of hair samples from river otters will be solicited from trappers working in the Project area and from ADF&G as part of its required pelt-sealing procedure. Collection of hair samples from mink will be more challenging, involving collection of hair samples from marten traps during the terrestrial furbearer survey, or through direct contact with local trappers, or both.

Project costs in 2013 and 2014 are estimated to be approximately \$150,000 annually (not including helicopter charter costs).

10.11.9. Literature Cited

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10.11.10.Tables

Table 10.11-1. Schedule for implementation of the Aquatic Furbearer Study.

Activity	2013				2014				2015
	1 Q	2 Q	3 Q	4 Q	1 Q	2 Q	3 Q	4 Q	1Q
Review of food habits and diets of piscivorous furbearers in freshwater aquatic systems, and collection of furbearer hair samples for mercury analysis	—				—				
Aerial surveys of lodges and fresh food caches to locate active beaver colonies				—				—	
Aerial survey of active beaver colonies to assess overwinter survival						—			
Aerial surveys of muskrat pushups		—				—			
Aerial surveys of river otter and mink tracks (following fresh snowfall)	—			—	—			—	
Initial Study Report					—△				
Updated Study Report								—▲	

Legend:

- Planned Activity
- △ Initial Study Report
- ▲ Updated Study Report

10.11.11.Figures

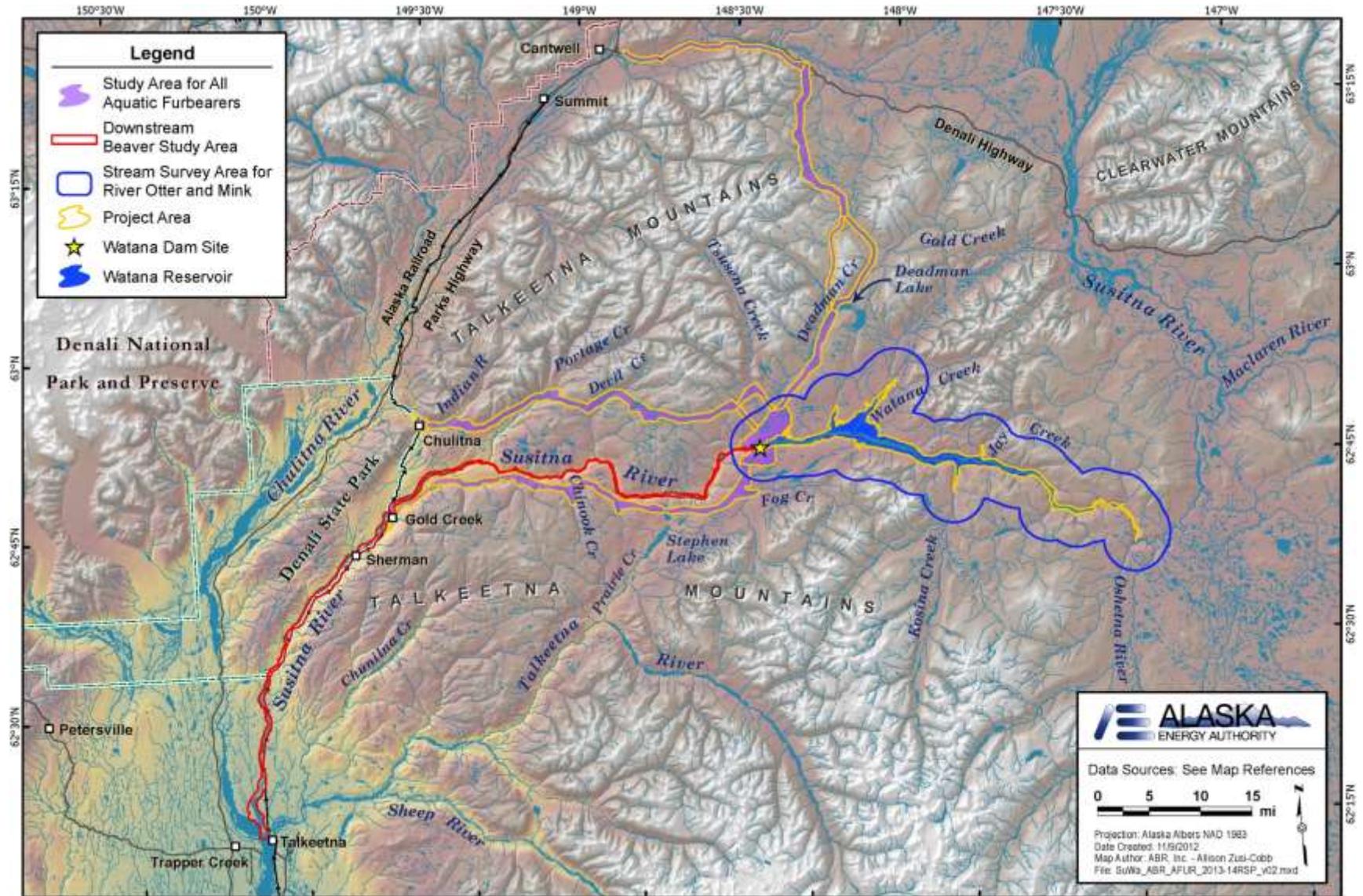


Figure 10.11-1. Aquatic furbearer study areas.

STUDY INTERDEPENDENCIES FOR AQUATIC FURBEARER STUDY

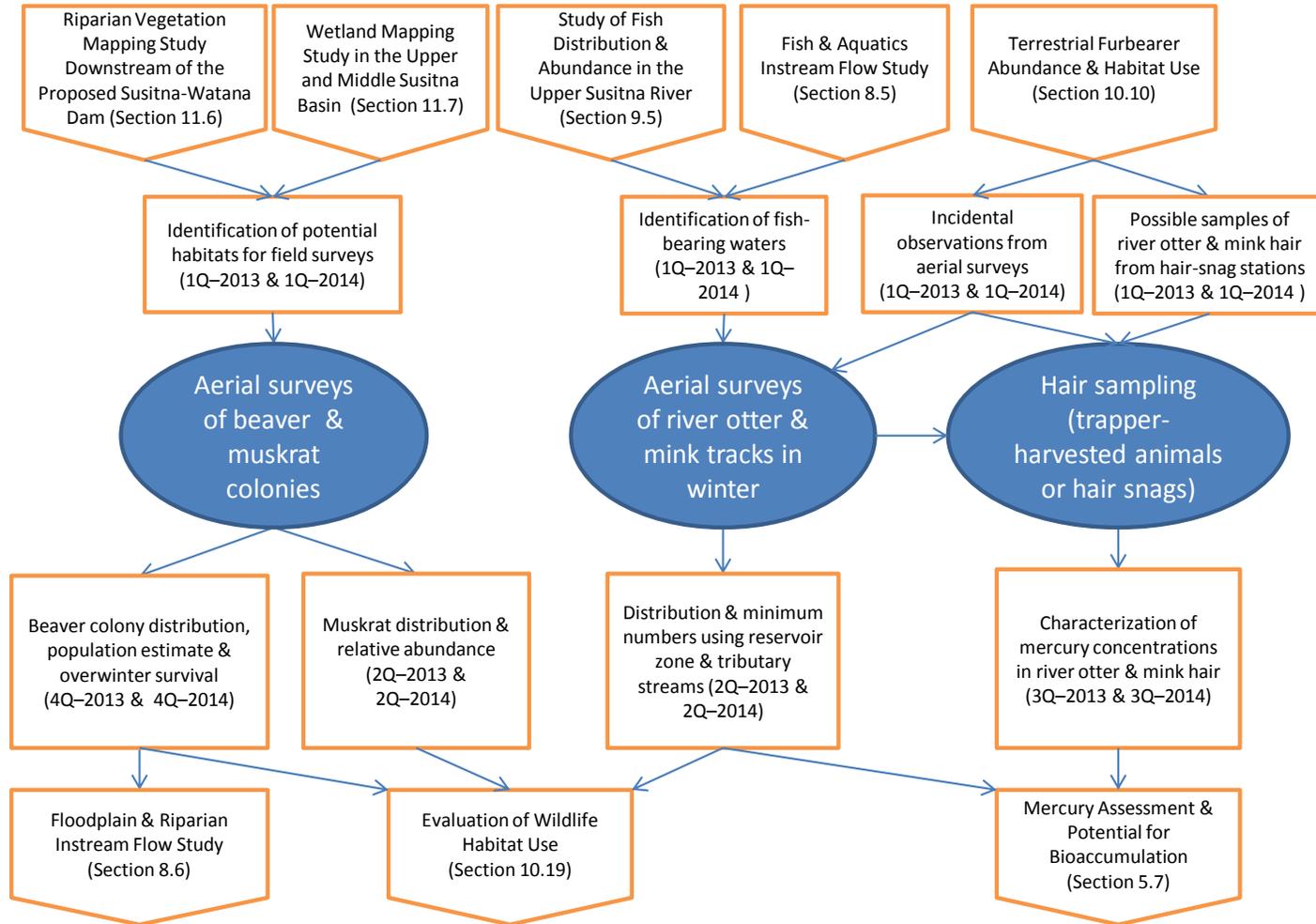


Figure 10.11-2. Study interdependencies for the Aquatic Furbearer Study.