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SUSITNA-WATANA HYDRO

Susitna–Watana Hydroelectric Project (FERC No. 14241)

Aquatic Furbearer Abundance and Habitat Use Study Plan Section 10.11

2014–2015 Study Implementation Report

Prepared for

Alaska Energy Authority

SUSITNA-WATANA HYDRO

Clean, reliable energy for the next 100 years.

Prepared by

ABR, Inc.—Environmental Research & Services

Fairbanks, Alaska

October 2015

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS, ABBREVIATIONS, AND DEFINITIONS

Abbreviation	Definition
ADF&G	Alaska Department of Fish and Game
AEA	Alaska Energy Authority
APA	Alaska Power Authority
FERC	Federal Energy Regulatory Commission
GIS	Geographic Information System
GPS	Geographic Positioning System
ILP	Integrated Licensing Process
ISR	Initial Study Report
Project	Susitna-Watana Hydroelectric Project
RSP	Revised Study Plan

1. INTRODUCTION

This Aquatic Furbearer Abundance and Habitat Use Study, Section 10.11 of the Revised Study Plan (RSP) approved by the Federal Energy Regulatory Commission (FERC) for the Susitna-Watana Hydroelectric Project, FERC Project No. 14241, focuses on: estimating the number and distribution of active and inactive beaver lodges in the area and assessing their overwinter survival; locating winter tracks of river otter and mink to assess their relative numbers, distribution, and habitat associations during winter; and identifying muskrat pushups to assess muskrat distribution.

A summary of the development of this study, together with the Alaska Energy Authority's (AEA) implementation of it through the 2013 study season, appears in Part A, Section 1 of the Initial Study Report (ISR) filed with FERC in June 2014 (ABR 2014a). As required under FERC's regulations for the Integrated Licensing Process (ILP), the ISR describes AEA's "overall progress in implementing the study plan and schedule and the data collected, including an explanation of any variance from the study plan and schedule" (18 CFR 5.15(c)(1)).

Since filing the ISR in June 2014, AEA has continued to implement the FERC-approved plan for the Aquatic Furbearer Abundance and Habitat Use Study. For example, researchers:

- On October 21, 2014, AEA held an ISR meeting for the Aquatic Furbearer Abundance and Habitat Use Study, along with meetings for each of the other wildlife studies.
- Conducted a second aerial survey for beaver lodges in fall 2014;
- Assessed overwinter survival of beaver lodges with aerial surveys conducted in spring 2014 and 2015;
- Conducted two aerial surveys for river otter and mink tracks in late winter 2014;
- Conducted one aerial survey for river otter and mink tracks in December 2014; and
- Deployed modified snares in late winter 2014 to snag hair samples from river otters for analysis of mercury content.

In furtherance of the next round of ISR meetings and FERC's SPD expected in 2016, this report describes AEA's overall progress in implementing the Aquatic Furbearer Abundance and Habitat Use Study prior to October 2015. Rather than a comprehensive reporting of all field work, data collection, and data analysis since the beginning of AEA's study program, this report is intended to supplement and update the information presented in Part A of ISR 10.11 through September 2015. It describes the methods and results of the study efforts in 2014–2015, and includes a discussion of the results obtained to date.

2. STUDY OBJECTIVES

The goal of the Aquatic Furbearer Abundance and Habitat Use Study (hereafter, 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.

Five specific objectives were established in RSP Section 10.11.1:

1) Delineate the distribution and estimate the current population size of beavers.

2) Describe the distribution and relative abundance of river otters, mink, and muskrats.

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 Study 5.7, Mercury Assessment and Potential for Bioaccumulation.

5) Collect hair samples from river otters and mink to characterize baseline tissue levels of mercury for Study 5.7, Mercury Assessment and Potential for Bioaccumulation.

As described in ISR 10.11, Part C, Section 7.1.2 (ABR 2014b), AEA has removed objectives and methods related to mercury analysis of piscivorous furbearers (river otter and mink; RSP Sections 10.11.1 and 10.11.4.3) and consolidated this work under Study 5.7, Mercury Assessment and Potential for Bioaccumulation, including the literature review of food habits and diets of river otters and mink (Objective 4) and the collection of hair samples for laboratory analysis of mercury levels (Objective 5).

3. STUDY AREA

As established by RSP Section 10.11.3, the study area for aquatic furbearers varies according to the species being surveyed. Beavers were 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. Muskrat surveys are 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 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. Stream surveys extend upstream along tributaries at least 3 miles (Figure 3-1) and north-south transects cover non-riparian areas in this zone to provide comparative data on the extent of use of those drainages and upland areas in comparison with the Susitna mainstem.

As described in the ISR Overview (Section 1.4) filed in June 2014 and subsequently the *Proposal to Eliminate the Chulitna Corridor from Further Study* filed with FERC on September 17, 2014, AEA explained that it had decided to pursue the study of an additional alternative north-south corridor alignment for transmission and access from the dam site to the Denali Highway, referred to as the "Denali East Corridor Option," and to eliminate the Chulitna Corridor from further study. This change to the study area affected the Aquatic Furbearer Study area as follows: beaver surveys were dropped in the Chulitna Corridor and added in the Denali East Corridor after the first year of study, and river otter and mink surveys were similarly changed in December 2014 (affecting a single survey).

4. METHODS AND VARIANCES

The methods implemented for each of the Aquatic Furbearer Study components are described in this section, along with explanations of variances from the Study Plan, where necessary.

4.1. Beaver and Muskrat Surveys

AEA implemented the methods described in the Study Plan (RSP Section 10.11.4.1), with the exception of the variances explained below (Section 4.1.1).

The study team flew aerial surveys to assess the distribution and abundance of beaver colonies in the Middle Susitna River Segment below the proposed dam site and in the Project area (reservoir inundation zone, dam and camp facilities area, and access road and transmission line corridors) and to assess overwinter colony survival. The fall surveys of the beaver study area were conducted in a small piston-engine helicopter (Robinson R-44) in October 2013 and September–October 2014. Surveys were scheduled after deciduous trees had shed leaves but before most water bodies froze. Active beaver colonies were indicated by lodges with fresh food caches nearby, consisting of small-diameter trees and saplings, typically with leaves still attached, that had been cut and stored underwater (Hay 1958, Payne 1981). Inactive colonies were noted as well, as indicated by the lack of fresh caches near lodges or by the proximity of old caches lacking fresh cuttings from the current season. The surveys were conducted in two phases to account for elevational and latitudinal differences in the timing of leaf fall and ice formation. The portions of the study area at higher elevations (Denali West corridor and part of the Chulitna Corridor in 2013; and the Denali East and West corridors, dam/camp facility area, and inundation zone in 2014) were surveyed on October 1–2, 2013 and September 26–27, 2014 and the remainder of the study area was surveyed on October 9–10, 2013 and October 8–9, 2014. The locations of beaver lodges were recorded and mapped using a handheld Global Positioning System (GPS) receiver.

Beaver lodges that were determined to be active during fall surveys were resurveyed during early spring to estimate rates of overwinter survival of beaver colonies. The surveys were conducted in a small piston-engine helicopter (Robinson R-44). Spring beaver surveys were conducted on May 2, 2014 and April 29 and May 17, 2015. We attempted to time the surveys for periods when there was open water around the lodges, but still snow on the ground. The 2015 surveys were conducted on two different days to adjust for widely varying dates of snowmelt between low elevations areas along the Susitna River and Gold Creek Corridor and higher elevation areas along the Denali East and West corridors, dam and camp facility area, and in the reservoir zone. The observer looked for signs of recent beaver activity such as tracks, recently chewed sticks, or recent cuttings on nearby trees and shrubs. Because signs of recent activity are not always apparent, the calculated overwinter survival rates were considered to be minimum rates and the actual rate was expected to be higher.

Although the planned aerial surveys of muskrat "pushups" (feeding structures consisting of small, seasonally temporary domes of vegetation debris and mud pushed up through holes or cracks in the ice cover of water bodies; Erb and Perry 2003) were not conducted in 2013–2015 (see Section 4.1.1 below), the presence of muskrats and muskrat pushups was recorded and mapped by researchers conducting aerial surveys for other Project studies (Study 10.14, Surveys of Eagles

and Other Raptors; Study 10.15, Waterbird Migration, Breeding, and Habitat Use; Study 10.16, Landbird and Shorebird Migration, Breeding, and Habitat Use).

4.1.1. Variances

The downstream beaver survey area in the Middle Susitna River Segment that was sampled in October 2013 and 2014 was somewhat wider in the southern end than was proposed in RSP Section 10.11.3 (as depicted in RSP Figure 10.11-1). The reason for this expansion was that the survey area was aligned with the riverine physiography area, which was delineated for the Riparian Vegetation Study Downstream of the Proposed Susitna-Watana Dam (Study 11.6), after preparation of the Study Plan. As a result of using this refined survey area, more potential beaver habitat was covered than was originally included in the Study Plan, providing a greater volume of data to use in addressing the study objectives. The study area also changed after the first year of beaver studies when the Chulitna Corridor was dropped from the Project and the Denali East Corridor was added.

The unusually late spring, persistent deep snow cover, and delayed melt of snow and ice in 2013 led the study team to postpone and then cancel the aerial survey of muskrat pushups, which had been planned for April (RSP Sections 10.11.4.1 and 10.11.6) for consistency with similar surveys conducted in late winter 1980 for the Alaska Power Authority's Susitna Hydroelectric Project (APA Project) (Gipson et al. 1982). The intent of RSP Section 10.11.4.1 was to conduct the muskrat survey before aerial surveys began for other wildlife studies. The same water bodies that would have been surveyed for this study were covered by researchers conducting aerial surveys for other Project studies (primarily spring migration surveys of waterbirds, but also nest occupancy surveys of raptor nests). Hence, the presence of muskrat pushups in 2013, and again in 2014, was instead recorded during spring surveys of waterbirds and raptors, which were conducted in the appropriate time frame (spring melt) for identifying muskrat pushups. Several incidental sightings of muskrats also were provided by researchers conducting point-count surveys of landbirds and shorebirds. Aerial surveys specifically targeting muskrats were not conducted in spring 2014 or 2015. The incidental sightings in 2013 and 2014 provided useful information on the distribution and relative abundance of muskrats in and near the study area, which, when combined with data to be collected during the next survey, are expected to enable the study team to achieve the study objective for this species.

4.2. River Otter and Mink Surveys

AEA implemented the survey methods proposed in the Study Plan for river otters and mink (RSP Section 10.11.4.2), with the exception of the variances explained below in Section 4.2.1.

Although the planned aerial surveys of river otters and mink were not conducted in 2013, sightings of river otters and the locations of river otter and mink tracks were recorded and mapped during three aerial transect surveys conducted in February, March, and April 2013 and two aerial surveys conducted in February and March 2014 for the study of Terrestrial Furbearer Abundance and Habitat Use (see ISR Study 10.10). In addition, researchers conducting surveys for other Project studies in 2013–2014 (Study 9.5, Fish Distribution and Abundance in the Upper Susitna River; Study 9.6, Fish Distribution and Abundance in the Middle and Lower Susitna River; Study 9.7, Salmon Escapement; Study 10.14, Surveys of Eagles and Other Raptors; 10.15, Waterbird

Migration, Breeding, and Habitat Use; 10.16 Landbird and Shorebird Migration, Breeding, and Habitat Use) also provided data from incidental observations of river otters.

Aerial surveys for river otter and mink tracks were conducted as described in the study plan on March 7–8, April 10–11, and December 6–8, 2014 in a small piston-engine helicopter (Robinson R-44) with a pilot and one observer. The survey crew followed the borders of the Chulitna, Denali East and West, and Gold Creek corridors (the Denali East corridor was added and the Chulitna corridor was dropped for the December 2014 survey), followed the courses of the Susitna River and its tributary streams extending upstream 3 miles (5 kilometers) from the Susitna River, and surveyed straight-line north–south transects spaced 3 miles apart across the survey area within 3 miles of the inundation zone. The surveys were conducted within 3 days of a snowstorm and observed tracks were recorded as new (after the recent snowfall) or old (prior to the recent snowfall). Locations where tracks crossed the survey transects were recorded with a handheld GPS, and in most cases, the helicopter followed the tracks until they could no longer be followed (e.g., entered thick vegetative cover or went under river ice) or they left the survey area. These track segments were recorded with a handheld GPS and brought into a GIS for map production. Some otter groups may have made more than one of these tracks segments, nonetheless, individual track segments were considered to be from individual river otter groups for the purpose of data summaries. The frequency of observing tracks (tracks segments/km) along transects was calculated in different survey areas to determine where river otter tracks were most commonly observed.

4.2.1. Variances

Aerial surveys of river otter and mink tracks were not conducted as planned in late winter 2013 (two or three surveys following fresh snowfall in February–early April; RSP Section 10.11.4.2). The survey planned for early winter (November/December) 2013 was not conducted due to logistical difficulties encountered in trying to match a suitable weather window (within three days of fresh snowfall) with pilot and aircraft availability. Despite the lack of dedicated surveys in 2013, the study team was able to compile incidental observations of river otters, river otter tracks, and mink tracks in and near the study area recorded by researchers conducting surveys for the other Project studies described above (Section 4.2).

Two late winter surveys were conducted in spring 2014 as outlined in the study plan (two or three surveys following fresh snowfall in February–early April; RSP Section 10.11.4.2) and one early winter was conducted in 2014 as outlined in the study plan (at least one per year in November/December; RSP Section 10.11.4.2). The study area also changed after the first two aerial surveys when the Chulitna Corridor was dropped from the project and the Denali East Corridor was added, therefore only one aerial survey of the Denali East Corridor has been completed at this time. However, by using a combination of the December 2014 survey, incidental observations, and additional future surveys, the objectives of this study component will be met.

The combination of incidental data collected in 2013 and the results of surveys conducted in 2014 and the next winter survey will enable the study team to meet the study objectives.

4.3. Information for Mercury Assessment

AEA implemented the study plan modifications proposed in ISR Part C Section 7.1.2 (ABR 2014b). The objectives and methods in this study related to mercury analysis, including the literature review of food habits and diets of river otters and mink and the collection of hair samples, have been consolidated in the Mercury Assessment and Potential for Bioaccumulation Study (Study 5.7) as described in the ISR Part C Section 7.1.2 (ABR 2014b).

As was previously described in the ISR Part A (ABR 2014a), the study team was not successful in obtaining river otter or mink hair samples in 2013. No river otter carcasses were presented to ADF&G for sealing from the study area in 2013, so no hair samples could be collected for that species. Similarly, no trappers were known to have harvested mink in the study area in 2013, so no hair samples could be obtained for that species, either.

Hair-snag snares were deployed during late winter 2014 at sites where river otter tracks were present in an attempt to collect river otter hair samples. Eight nonlethal, breakaway snares modified to snag hairs were set at two main locations on March 8, 2014. Four snares were set at three sites along Kosina Creek and four snares were set at three sites near Deadman Mountain. Snares were checked on March 25 and April 11, 2014. In addition, a new sampling location was established along Kosina Creek on April 11, 2014. All snares were removed on April 23, 2014.

4.3.1. Variances

As described in the ISR Part A (ABR 2014a), there were no variances from the study plan methods for mercury assessment in 2014.

5. RESULTS

Data developed in support of the Aquatic Furbearer Study are available for download in the following files at: http://gis.suhydro.org/SIR/10-Wildlife/10.11-Aquatic_Furbearer/

See Table 5-1 for details.

5.1. Beaver and Muskrat

The results of the fall 2013 beaver lodge survey were also previously described in the ISR Part A, Section 5.1 (ABR 2014a). The study team began the fall 2013 aerial survey of beaver colonies on October 1–2 and completed it on October 9–10, 2013. During the first part of the survey, the study team surveyed the Denali West Corridor between the Denali Highway and the dam and camp facility area, along with the Chulitna Corridor between Portage Creek and the dam and camp facility area. Some shallow water bodies had begun to freeze by the time the survey was conducted. The remainder of the study area at lower elevations was surveyed on the second part of the survey. Colonies that were judged to be active in fall 2013 were resurveyed on May 2, 2014 to look for evidence of activity to assess overwinter survival.

The study team began the fall 2014 aerial survey of beaver colonies on September 26–27 and completed it on October 8–9, 2014. During the first part of the survey, the study team surveyed

the Denali East and West corridors, the dam and camp facility area, and the proposed inundation zone. The remainder of the study area at lower elevations was surveyed on the second part of the survey. Colonies that were judged to be active in fall 2014 were resurveyed on April 29, 2015 or May 17, 2015 to look for evidence of activity to assess overwinter survival.

A total of 184 beaver colonies were recorded and mapped in the 2013 study area during fall 2013 (Table 5.1-1; Figure 5.1-1), 69 (37.5%) of which were judged to be active, based on the proximity of a fresh food cache consisting of fresh-cut stems of forage plants (typically with leaves still attached) stored in water bodies as an overwinter food supply. This resulted in an estimate of 0.14 active colonies/km² although there was large variability in density of active colonies by survey area (Table 5.1-2). A minimum of 33.3% of the colonies that were active in fall 2013 were judged to be active in spring 2014 although poor snow and ice conditions made it difficult to accurately assess overwinter survival (Table 5.1-3).

A total of 250 beaver colonies were recorded and mapped in the 2014 study area during fall 2014 (Table 5.1-4; Figure 5.1-2), of which 82 (32.8%) were judged to be active based on the proximity of a fresh food cache consisting of fresh-cut stems of forage plants (typically with leaves still attached) stored in water bodies as an overwinter food supply. This resulted in an estimate of 0.17 active colonies/km² although there was large variability in density of active colonies by survey area (Table 5.1-2). A minimum of 69.5% of the colonies that were active in fall 2014 were judged to be active in spring 2015 (Table 5.1-3).

Lodges built into banks were common in riverine areas with seasonal or permanently flowing streams, whereas more typical mound-shaped lodges were generally found in "beaver ponds" away from flowing streams. A greater proportion of the lodges located in the downstream survey area (Middle Susitna River Segment) were active than in other parts of the study area (Table 5.1-1; Table 5.1-4); it is possible, however, that the difference is related to lower detectability of inactive bank lodges without caches nearby. Fresh food caches tended to be more visible than were beaver lodges built in river banks, which are more likely to occur in riverine areas.

Beaver lodges were distributed widely throughout the study area during both years and were located on a variety of aquatic habitat types including lakes, small ponds, creeks, sloughs, and as bank lodges along main channels of the Susitna River. Lodges were also found at a wide variety of elevations from the Susitna River to high-elevation areas of the Denali East and West corridors where only shrubs were available for food and lodge construction.

A total of 19 observations of muskrats or muskrat pushups were recorded incidentally during 2013 and 2014. Twelve observations of muskrats or muskrat pushups were recorded incidentally during aerial surveys of water bodies in the study area for waterbirds and raptors in 2013. Six of those water bodies were located in the Fog Lakes area (Figure 5.1-3). Muskrats or muskrat pushups were recorded on four lakes during waterbird surveys in May 2013, with the number of pushups ranging from 3 to 50 per lake, and muskrat pushups were recorded on six water bodies during Bald Eagle surveys in May 2013. All of the incidental sightings from waterbird and raptor surveys in May 2013 were recorded during May 21–24. Two muskrats were observed during landbird/shorebird point-count surveys in late May and early June 2013 and a muskrat was observed in a lake between Indian River and Portage Creek during a waterbird brood survey in July 2013. Observations of muskrats and muskrat pushups also were recorded incidentally during waterbird surveys conducted

in 2014; five observations were recorded in the Fog Lakes area during May and one was recorded near the Denali East Corridor in September.

5.2. River Otter and Mink

5.2.1. Incidental Observations

Incidental observations of river otters or mink prior to 2014 were described previously in ISR 10.11, Part A, Section 5.2 (ABR 2014a). The study team compiled a list of 60 incidental observations of river otters and river otter tracks that were recorded incidentally during surveys for other Project studies in 2012 and 2013, but only one observation of mink tracks was recorded during those surveys. An additional 21 incidental observations of river otters or mink were compiled from 2014 field work (Figure 5.1-3). Twenty sets of river otter tracks and one set of mink tracks were recorded during aerial surveys of winter tracks for Study 10.10, the Terrestrial Furbearer Study (including observations that were not on survey transects): three sets of river otter tracks on February 26, 2013; seven sets of river otter tracks, a river otter, and one set of mink tracks on March 27, 2013; four sets of river otter tracks on April 19, 2013; two sets of river otter tracks on February 17, 2014; and three sets of river otter tracks on March 25, 2014. A total of 45 river otters in 26 groups (presumably including an unknown number of repeated observations of some of the same individuals) were observed during aerial surveys of waterbirds (Study 10.15, Waterbird Migration, Breeding, and Habitat Use) between early June 2013 and mid-October 2014. Two river otters and 23 sets of tracks were recorded in 25 sightings during raptor surveys (Study 10.14, Surveys of Eagles and Other Raptors) in May and October–December 2013. One river otter and four sets of tracks were recorded in five sightings during raptor surveys in July and October–December 2012. One of the river otters seen during a Bald Eagle survey on May 24, 2013, was eating a muskrat at the time of the sighting. Incidental sightings from aerial surveys of radio-tagged fish in December 2013 and January 2014 (S. Crawford, LGL Alaska, pers. comm.) included two groups of four river otters each in the Middle Susitna River Segment, one at the mouth of Portage Creek and the other near Slough 21, plus two sets of otter tracks between Jay Creek and Kosina Creek in the Upper Susitna River Segment and along Portage Creek.

5.2.2. Aerial Surveys

Aerial surveys for river otter and mink tracks were conducted in 2014 on March 7–8, April 10–11, and December 6–8. No mink tracks were identified on any of these surveys. During the March survey, a total of 12 different fresh (since the last snowfall) river otter trails were observed, although some of those may have been made by the same otter groups. During the April survey, a total of 13 different river otter trails were observed (including observations of two animals), although some of the trails may have been made by the same otter groups. During the December survey, a total of 22 different otter trails were observed, although some may have been made by the same otter groups (Figure 5.2-1).

As expected, river otters were detected most commonly in or near riverine habitats in the study area. River otter tracks were most frequently observed along the Susitna River and along tributaries of the Susitna River within the reservoir zone. Tracks were uncommon in the transmission corridors, with the exception of five sets of tracks found in the Denali West Corridor during the March 7–8 survey (Table 5.2-1).

5.3. Information for Mercury Assessment

This task has been consolidated under Study 5.7, Mercury Assessment and Potential for Bioaccumulation , as described in ISR 10.11, Part C, Section 7.1.2. Although no hair samples were snagged by the modified snares deployed in 2014, one sample was collected from the snow adjacent to one of the snares. That sample was sent for laboratory analysis and the results were reported to the study team for Study 5.7.

6. DISCUSSION

6.1. Beaver and Muskrat

The beaver surveys provided current information on the number, distribution, and activity status of beaver lodges in the study area (Project area and downstream survey area). Beavers were distributed throughout most of the Project area and the downstream survey area, but the proportion of active colonies was lower in the access/transmission corridors and dam and camp facility area than in the riverine survey area downstream. Beaver lodges built in riverbanks were more challenging to detect than were lodges in ponds and lakes, and fresh caches had higher detectability; hence, the study team may have located a higher proportion of active colonies in the downstream survey area. APA Project researchers in the 1980s (Gipson et al. 1982, 1984) noted that beavers became more numerous with increasing distance downstream from Devils Canyon in the Middle and Lower Segments of the Susitna River, and that beavers were more abundant on side channels and sloughs with silty banks. In contrast, no signs of beaver activity were found in the active floodplain of the Susitna River between the Tyone River (above the upstream end of the proposed Watana reservoir inundation zone) and Devils Canyon (Gipson et al. 1982, 1984), similar to the 2013–2014 survey results from this study, which found very little beaver sign in the reservoir inundation zone.

Surveys for the APA Project revealed substantial differences in the number of active colonies among years (e.g., twice as many in 1983 as in 1982), possibly related to the detectability of colonies among years but also to differences in survival as a result of high-water events and damage during breakup (Gipson et al. 1984). Many of the inactive lodges in the 2013–2014 surveys were old lodges that were overgrown with vegetation or were collapsing. The proportion of active lodges will be influenced by the number of old lodges that are detected and counted. The total number of active colonies increased between 2013 and 2014, but that was partly a result of an additional year of search effort as well as a change in the survey area.

A survey in late April 1984 found that 23 colonies (85 percent) had survived the winter, out of 27 colonies that had been classified as active in October 1983 (Gipson et al. 1984). The recent surveys for this study found a minimum overwinter survival rate of 33.3% during the winter of 2013–2014 and 69.5% during the winter of 2014–2015. The estimate of overwinter survival rate likely was influenced by survey conditions. The low estimate for 2013–2014 may reflect poor snow and ice conditions for identifying activity in that spring rather than low colony survival.

Furbearer surveys for the APA Project were primarily restricted to areas within 3 mi of the Susitna River, so information on beavers or muskrats in the potential access corridors for that project are

scant. An aerial survey of muskrats and beavers in the upper Susitna basin also was flown in July 1981, but specific results were not reported (Gipson et al. 1982), other than a general statement that most sign of these species was found in water bodies on plateaus above the river at elevations of 2,000–2,400 ft. Sixteen beaver dams were found along the potential road access corridor for the APA Project between Gold Creek and Devils Canyon, and 12 dams and 8 lodges were found along Deadman Creek (Gipson et al. 1984), but it is not possible to compare numbers directly between the APA Project surveys and those for the current study.

The study team compiled 19 incidental observations of muskrats and muskrat pushups in and near the study area in 2013 and 2014, with most pushups being observed in the Fog Lakes area and at Watana and Clarence lakes, at higher elevations south of the proposed reservoir inundation zone. The late spring and delayed breakup in 2013 did not provide good conditions for muskrat surveys, but the incidental observations from surveys conducted for other Project studies generally corroborate the findings of the APA Project studies. Muskrat surveys were flown for the APA Project studies in 1980 on March 10, April 24, and May 9, but the snow cover was too deep to distinguish most pushups until the May survey, when 97 water bodies were surveyed within 3 mi of the Susitna River from the Oshetna River at the upper end of the Watana reservoir zone downstream to Gold Creek (Gipson et al. 1982). Pushups were found on 27 (26 percent) of the 103 lakes surveyed in 1980 (including several lakes from the earlier surveys), ranging from one to 32 pushups per water body. The range observed in this study was three to 50 pushups on individual lakes.

6.2. River Otter and Mink

Incidental observations of river otters and river otter tracks indicated that the species is distributed in low numbers along the Susitna River mainstem, tributary streams, and adjacent lakes and ponds in the study area, as was indicated by the only survey of this species that was conducted for the APA Project in the 1980s (Gipson et al. 1982). Surveys of river otter and mink tracks and sign were conducted once for the APA Project during November 10–12, 1980, using both aerial and ground observations. Fourteen aerial survey transects were flown, extending 3 mi perpendicularly from each side of the Susitna River mainstem from just below Portage Creek upstream to just below the Tyone River mouth. Tracks of each species were recorded on 11 (79 percent) of the 14 transects sampled on that survey (Gipson et al. 1982). Similar aerial surveys of tracks conducted in 2013–2014 for Terrestrial Furbearer Abundance and Habitat Use (Study 10.10) recorded 17 river otter tracks during 5 surveys suggesting that fewer river otters may have been present in 2013–2014 (although direct comparisons are difficult because of the small number of surveys and variations in snow conditions).

During the same survey period in November 1980, ground checks at 37 sampling points (spaced approximately 1–2 mi apart) along the Susitna River from below Portage Creek to Vee Canyon recorded river otter tracks at 17 (46 percent) and mink tracks at 22 (59 percent) of the points sampled (Gipson et al. 1982). River otters were dispersed in low numbers along the length of the river sampled, whereas mink were more numerous in the upper portion of the study area (Gipson et al. 1982). The incidental sightings compiled for the current study in 2013–2014 included only one occurrence of mink tracks, on lower Watana Creek, on an aerial survey of tracks in late March 2013. It is possible that the presence of more mink may have been masked by the similarity

between their tracks and those of marten, which are more numerous than mink in the study area (Gipson et al. 1982).

The researchers who conducted the track surveys for the APA Project in November 1980 considered the number of river otter tracks they encountered on Susitna River shelf ice in the two impoundment zones proposed for that project to be unusually high (43 tracks at 17 locations), and speculated that the high incidence of tracks may have resulted either from otters moving upstream or downstream before freeze-up or from otters feeding on grayling that were moving out of tributaries to overwinter in the river mainstem (Gipson et al. 1982). No such concentrations of tracks have been observed or reported thus far in this study.

6.3. Information for Mercury Assessment

This task has been consolidated under Study 5.7, Mercury Assessment and Potential for Bioaccumulation, as described in ISR 10.11, Part C (ABR 2014b).

7. CONCLUSIONS

The surveys of beaver lodges have been completed (RSP Section 10.11.4.1) and three additional aerial surveys for river otter and mink tracks were completed in 2014. To complete this study, AEA will implement the methods in the Study Plan, except as described in Section 7.1 below.

The study team expects that the combination of study results from 2013–2015 (including the variances described in Section 4), additional planned field work, and integration with other studies will achieve the approved Study Plan objectives. This study is interrelated with Study 5.7, Mercury Assessment and Potential for Bioaccumulation; Study 8.6, Riparian Instream Flow; and Study 10.19, Evaluation of Wildlife Habitat Use. AEA expects that the approved Study Plan objectives for both this study and Studies 5.7, 8.6, and 10.19 will be achieved with the modifications to this study, as these modifications will ensure consistency in methods and are expected to result in improved data collection.

7.1. Modifications to Study Plan

As described in Section 7.1.2 of the ISR Part C (ABR 2014b), AEA has added the Denali East Option road and transmission corridor to the study area. With regard to this study, the modified study area showing the Denali East Option is depicted in Figure 3-1.

Aerial surveys of muskrat pushups (as described in RSP Section 10.11.4.1) are planned for the Project area in spring 2016. Instead of conducting a second year of muskrat surveys in the future, however, AEA proposes to substitute the two seasons of incidental observations of muskrats obtained in 2013 and 2014 for one year of surveys, thereby making more data available to meet this study objective.

As described in Section 7.1.2 of ISR 10.11, Part C (ABR 2014b), RSP Sections 10.11.1 and 10.11.4.3 provide objectives and methods for the study team to review available information on food habits and diets of piscivorous furbearers (river otter and mink) as background for Study 5.7,

Mercury Assessment and Potential for Bioaccumulation, and to obtain hair samples from river otter and mink for laboratory analysis of mercury levels, including possible collection of hairs from trapper-harvested animals. After further consideration of all mercury studies for the proposed Project, AEA has removed these objectives and methods related to mercury analysis of river otter and mink (RSP Sections 10.11.1 and 10.11.4.3) and consolidated this work under Study 5.7.

8. LITERATURE CITED

ABR. 2014a. Aquatic Furbearer Abundance and Habitat Use Study Plan Section 10.11; Initial Study Report, Part A: Sections 1–6, 8–10; Susitna-Watana Hydroelectric Project (FERC No. 14241). Report for Alaska Energy Authority, Anchorage, by ABR, Inc.—Environmental Research & Services, Fairbanks, AK. 14 pp.

ABR. 2014b. Aquatic Furbearer Abundance and Habitat Use Study Plan Section 10.11; Initial Study Report, Part C: Executive Summary and Section 7; Susitna-Watana Hydroelectric Project (FERC No. 14241). Report for Alaska Energy Authority, Anchorage, by ABR, Inc.—Environmental Research & Services, Fairbanks, AK. 3 pp.

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Hay, K. G. 1958. Beaver census methods in the Rocky Mountain region. *Journal of Wildlife Management* 22: 395–402.

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9. TABLES

Table 5-1. Server Location and File Names for the Field Data for Aquatic Furbearers Collected in 2013–2015.

Server Pathway or File/Folder Name	Description
/http://gis.suhydro.org/SIR/10-Wildlife/10.11-Aquatic_Furbearer/	Pathway to data files
AFUR_10_11_Data_2013_2015_ABR.gdb	Geodatabase file containing spatial layers of the aquatic furbearer survey areas, beaver lodge locations, miscellaneous aquatic furbearer locations, hair-snag snare locations and river otter track locations and segments.

Table 5.1-1. Number and Percentage of Beaver Colonies, by General Location and Activity Level, October 2013.

General Location	Active Colonies	Inactive Colonies	Total
Chulitna Corridor	16 (41.0%)	23 (59.0%)	39
Dam and Camp Facility Area	2 (18.2%)	9 (81.8%)	11
Denali West Corridor	10 (18.2%)	45 (81.8%)	55
Gold Creek Corridor	6 (35.3%)	11 (64.7%)	17
Middle River	35 (57.4%)	26 (42.6%)	61
Watana Reservoir	0 (0%)	1 (100%)	1
Total	69 (37.5%)	115 (62.5%)	184

Table 5.1-2. Number and Density of Active Beaver Colonies (Colonies/km²), by General Location, October 2013 and 2014.

General Location	Active Colonies 2013	Density 2013	Active Colonies 2014	Density 2014
Chulitna Corridor (79.7 km²)	16	0.20	–	–
Dam and Camp Facility Area (38.8 km²)	2	0.05	2	0.05
Denali East Corridor (118.4 km²)	–	–	12	0.10
Denali West Corridor (105.6 km²)	10	0.09	7	0.07
Gold Creek Corridor (74.9 km²)	6	0.08	2	0.03
Middle River (87.7 km²)	35	0.40	58	0.66
Watana Reservoir (95.3 km²)	0	0	2	0.02
Total (481.9 and 477.5 km²)l	69	0.14	82	0.17

Table 5.1-3. Number and Minimum Overwinter Survival of Active Beaver Colonies, by General Location, 2013.

General Location	Active Colonies Fall 2013 Checked Spring 2014	Minimum Number Active Spring 2014	Active Colonies Fall 2014	Minimum Number Active Spring 2015
Chulitna Corridor	0	–	–	–
Dam and Camp Facility Area	2	2 (100%)	2	1 (50%)
Denali Corridor(s)	10	1 (10%)	18	9 (50%)
Gold Creek Corridor	6	3 (50%)	2	2 (100%)
Middle River	30[a]	10 (33.3)	58	43 (74.1)
Watana Reservoir	0	–	2	2 (100)
Total	48[a]	16 (33.3%)	82	57 (69.5)

a. Five colonies were not relocated.

Table 5.1-4. Number and Percentage of Beaver Colonies, by General Location and Activity Level, October 2014.

General Location	Active Colonies	Inactive Colonies	Activity Status Unknown	Total
Dam and Camp Facility Area	2 (13.3%)	13 (86.7%)	0	15
Denali East Corridor	12 (18.8%)a	52 (81.3%)b	0	64
Denali West Corridor	7 (12.5%)a	49 (87.5%)b	0	54
Gold Creek Corridor	2 (10.5%)	17 (89.5%)	0	19
Middle River	58 (51.8%)	51 (45.5%)	3 (2.7%)	112
Watana Reservoir	2 (50%)	2 (50%)	0	4
Total	82 (32.8%)	165 (66.0%)	3 (1.2%)	250

a. 1 colony in both east and west corridors.
b. 19 colonies in both east and west corridors.

Table 5.2-2. Location and number of river otter tracks observed during three aerial surveys conducted March–December 2014.

	Survey Dates	Reservoir Zone			Chulitna Corridor	Denali Corridors[a]	Gold Creek Corridor
		Susitna River	Susitna River Tributaries	Transects			
Tracks[b]	March 7–8	2	3	0	1	5	1
	April 10–11	7	2	1	0	2	1
	December 6–8	12[c]	8[c]	3	–	0	2
Tracks/km	March 7–8	0.02	0.02	0	0.01	0.05	0.01
	April 10–11	0.08	0.02	0.01	0	0.02	0.01
	December 6–8	0.13	0.06	0.02	–	0	0.03

a. The Denali corridors included the Denali East Corridor during the December survey.
b. Some tracks may have been made by the same river otter groups.
c. Three tracks were located along both the Susitna River and tributaries.

10. FIGURES

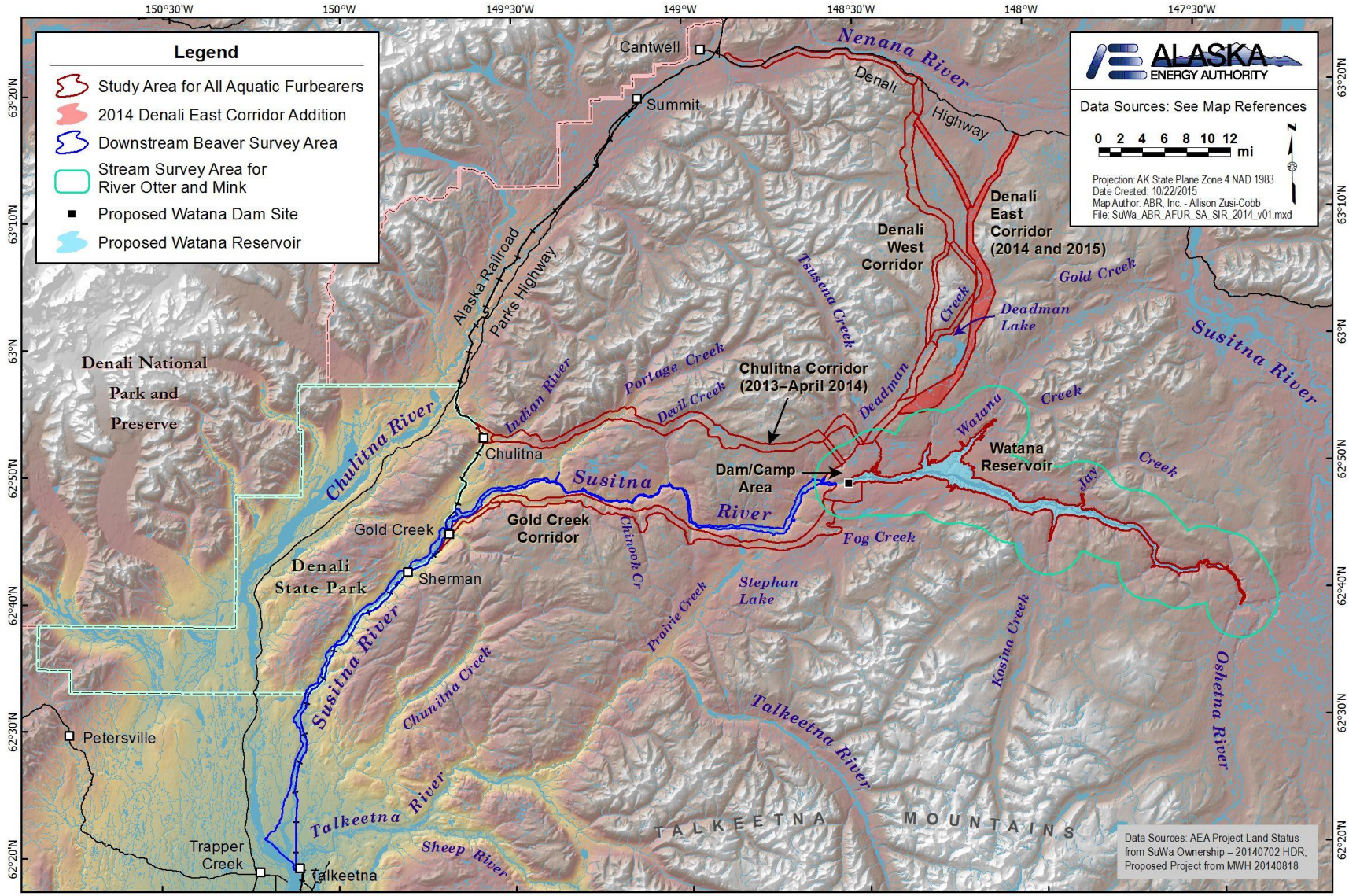

Figure 3-1. Aquatic Furbearer Study Area.

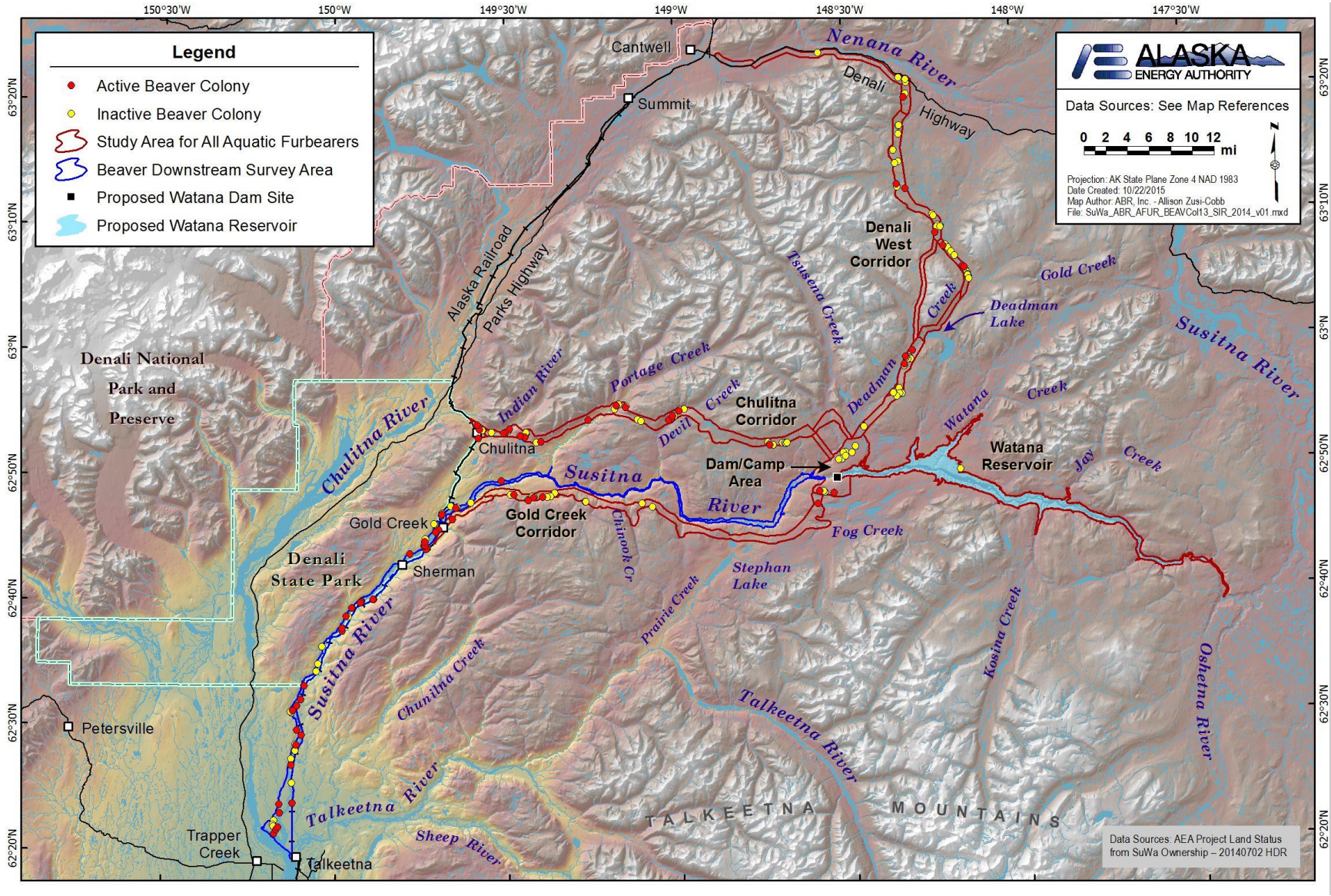

Figure 5.1-1. Beaver Colony Locations, October 2013.

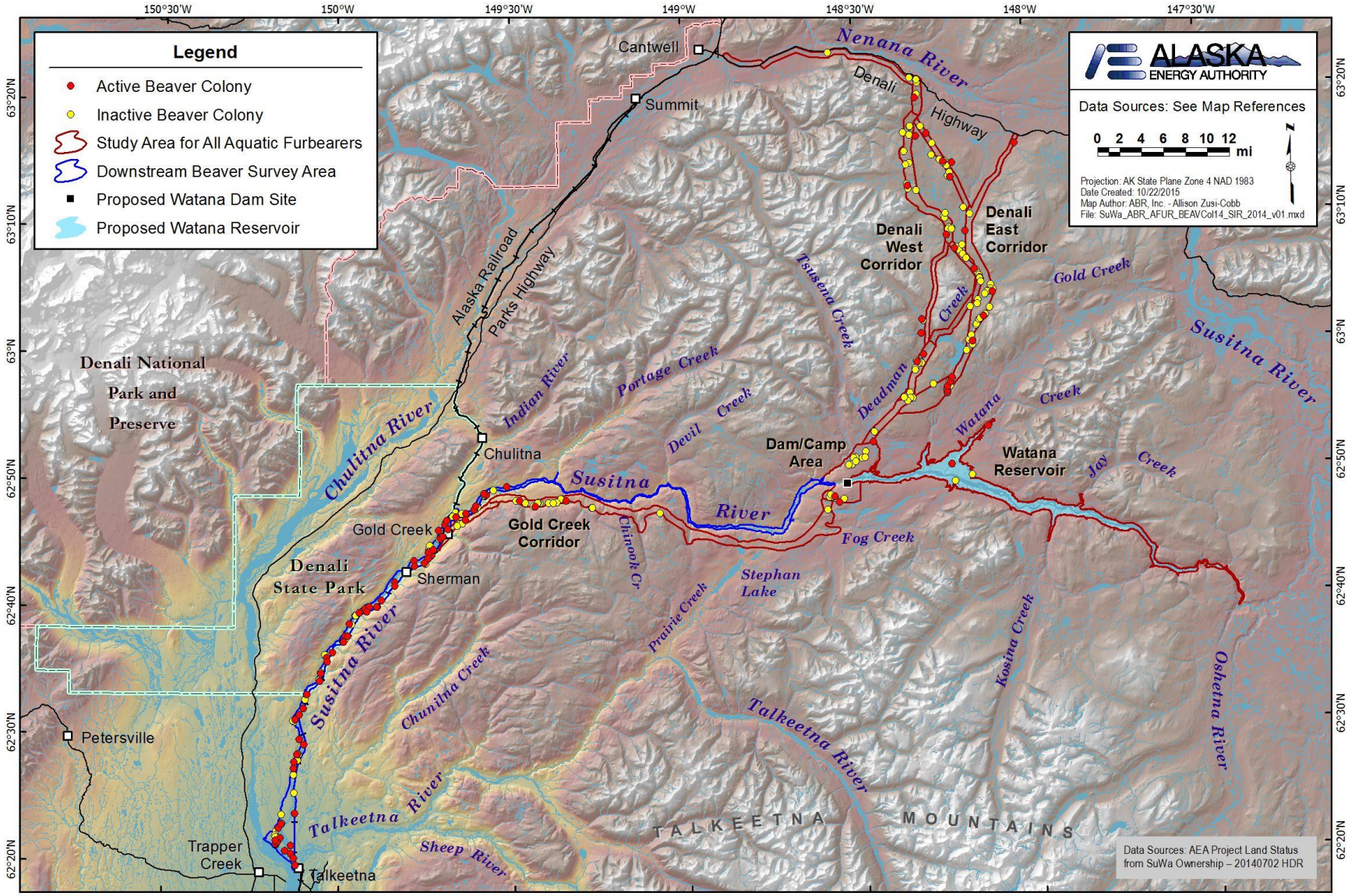

Figure 5.1-2. Beaver Colony Locations, October 2014.

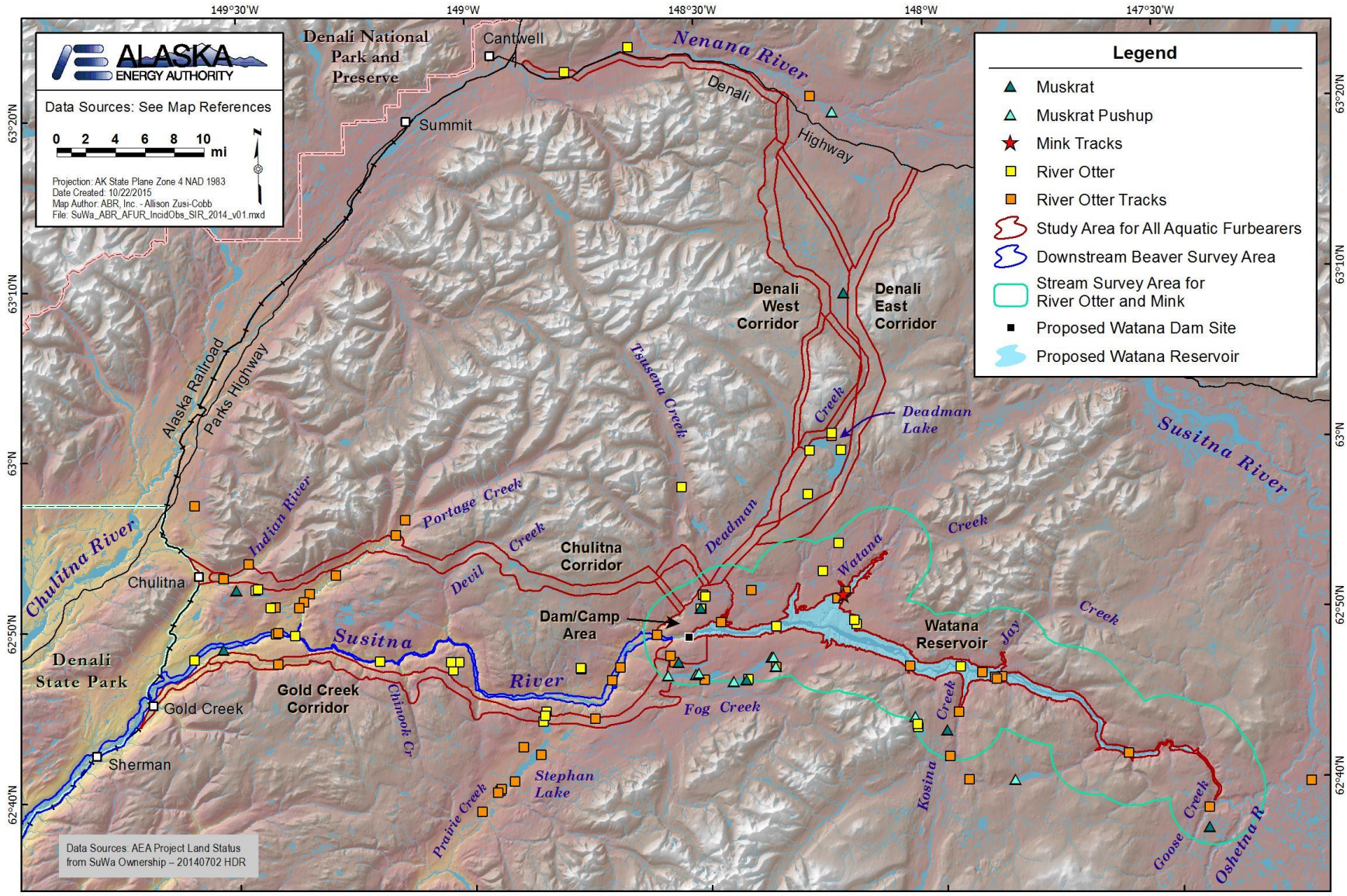

Figure 5.1-3. Locations of Muskrats, River Otters, and Mink Observed Incidentally during Other Project Surveys in 2012–2014.

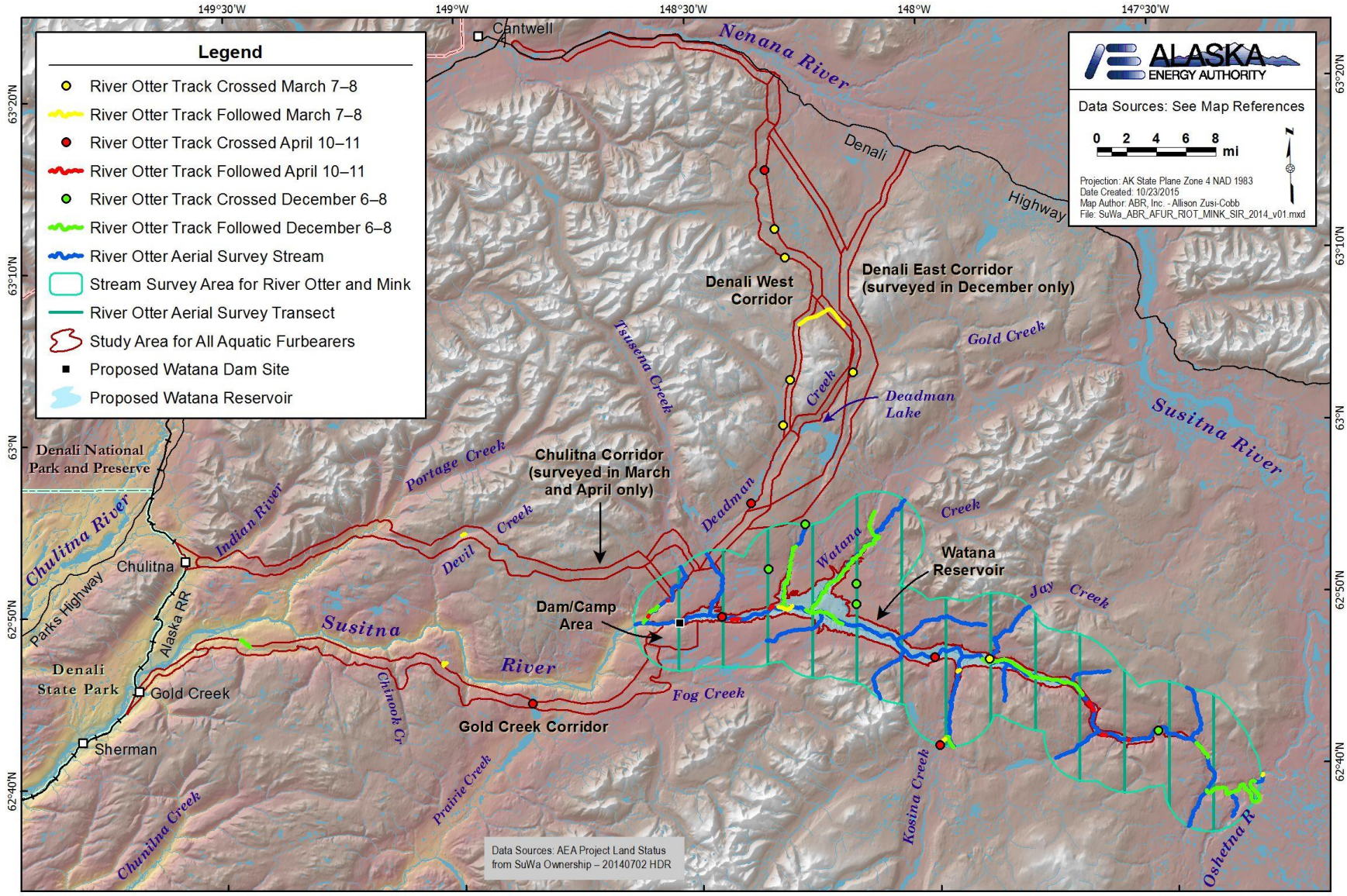

Figure 5.2-1. Results of Three River Otter and Mink Track Surveys Conducted March, April, and December 2014.