

## 10.16. Breeding Survey of Landbirds and Shorebirds

### 10.16.1. General Description of the Proposed Study

The landbird and shorebird study is planned as a two-year study (2013–2014). Results from the first year of work in 2013 will be used to update existing information and fine-tune the field survey methods and survey areas. The breeding landbird and shorebird surveys will employ two survey techniques: ground-based point-count surveys for breeding birds and a boat-based survey for colonially nesting swallows. The point-count surveys are intended to record all birds seen or heard and to estimate the distance to each bird detected. Point-count surveys, which were designed to count singing male passerines, are now the preferred method for inventory and monitoring efforts for landbirds in remote, roadless terrain in Alaska (Handel and Cady 2004; ALMS 2010). These methods also have been adopted for shorebirds (ASG 2008) and are especially appropriate in forested landscapes, where shorebirds typically occur in low densities and where plot-based methods would yield few observations, even with a relatively large survey effort. The survey of colonially nesting swallows will focus on suitable habitats within the proposed reservoir inundation zone. The boat-based survey will identify swallow nesting colonies and potential nesting habitat.

#### 10.16.1.1. Study Goals and Objectives

The goal of this study is to collect baseline data on the occurrence and habitat use of breeding landbirds and shorebirds in the Project area to enable assessments of the direct, indirect, and cumulative impacts on these birds from construction and operation of the proposed Project. This study will include species of conservation concern, both landbirds and shorebirds, that are known or expected to occur in the Project area (see AEA 2011), as well as numerous other species that are protected under the federal Migratory Bird Treaty Act (see Section 10.3).

The specific objectives of the study are as follows:

- Collect data on the distribution and abundance of landbirds and shorebirds during the summer breeding season;
- Identify habitat associations for landbirds and shorebirds;
- Evaluate changes in distribution, abundance, and habitat use of landbirds and shorebirds through comparison with historical data.

To achieve the study objectives, the following surveys and analyses will be required:

- Conduct ground-based point-count surveys to collect field data on the distribution and abundance of landbirds and shorebirds in the study area during the summer breeding season;
- Conduct boat-based surveys of colonially nesting swallows in riparian habitats within the reservoir inundation zone;
- Collect habitat-use data for landbirds and shorebirds during the point-count surveys to inform the habitat-use evaluation study, which will be the first step in quantifying habitat change (i.e., gain/loss and alteration for landbirds and shorebirds from the proposed Project (see Section 11.5);

- Conduct additional habitat-specific point-count surveys to collect distribution and abundance data on piscivorous species and other species typical of fluvial and riparian habitats, which often are underrepresented in standard point-count surveys;
- Review the literature on the foraging habits and diets of piscivorous landbird species (e.g., Belted Kingfisher, American Dipper), which will be used to inform the mercury assessment study (see Section 5.7, Mercury Assessment and Potential for Bioaccumulation); and
- Review historical (APA Susitna Hydroelectric Project) data on landbirds and shorebirds for comparison with the current data from this study, to evaluate any changes in distribution, abundance, and habitat use over the intervening 30 years. Many species of migratory birds have suffered population declines in recent decades, so these comparisons may provide information on the population status of those species in the Project area.

### **10.16.2. Existing Information and Need for Additional Information**

In 1980 and 1981, breeding landbirds and some shorebirds were surveyed for the APA Susitna Hydroelectric Project using modified territory-mapping methods, which involved repeated visits between May 20 and July 3 to 12 study plots, each 10 hectares (24.7 acres) in size (Kessel et al. 1982, AEA 2011). Each plot was placed in an area of homogeneous habitat, as defined using Kessel's avian habitat classification (Kessel 1979). At that time, territory mapping was the standard method for surveying landbirds. Because each plot was surveyed repeatedly, substantial information on bird occurrence and habitat use was obtained for the limited area encompassed by those 12 plots. However, because only 12 plots were sampled in homogeneous habitats, the data did not adequately address spatial variability in bird occurrence and habitat use across the broader study area. Some additional information on shorebird occurrence was obtained during ground-based surveys of lakes, ponds, and wetlands for waterbirds (Kessel et al. 1982), but focused surveys for breeding shorebirds were not conducted. No studies of landbirds or shorebirds have been conducted more recently in the Project area (AEA 2011).

During the surveys by Kessel et al. (1982), four species of swallows were observed in the Project area: Tree Swallow, Bank Swallow, Cliff Swallow, and Violet-green Swallow. Violet-green and Tree swallows were considered fairly common, whereas Bank and Cliff swallows were considered uncommon, and all four species were either confirmed or suspected to nest in the study area. A nesting colony of 25 pairs of Bank Swallows was recorded along upper Watana Creek and three colonies of Cliff Swallows were observed at Watana and Clarence lakes. The distribution of avian survey plots and incomplete representation of habitat types suitable for swallows likely led to an underestimate of swallow abundance and distribution in the Project area by Kessel et al. (1982). No studies of swallows have been conducted more recently in the study area.

Because of the limitations in extrapolating results from intensive surveys of territory-mapping plots to the larger Project area, it will be necessary to study these species groups again using currently accepted protocols (point-count surveys), which allow large landscapes to be sampled adequately and which provide more data on variability in habitat use. Because the most recent surveys for landbirds and shorebirds were conducted over 30 years ago, and because populations of these birds and their habitats have likely changed during that period, new studies are recommended. Current data on the distribution, abundance, and habitat use of landbirds and

shorebirds is necessary to be able to adequately assess the impacts from the proposed Project on these species.

Point-count surveys for landbirds and shorebirds are ineffective in riparian habitats where auditory capacity is reduced due to flowing water and are suboptimal for species with highly clumped distributions (Swanson and Nigro 2003). In addition, much of the swallow nesting habitat in the study area is difficult to access or observe on foot. Hence, a separate survey with specific methodology is proposed to assess the distribution and abundance of colonially nesting swallows in riparian habitats.

### **10.16.3. Study Area**

The study area for the breeding landbird and shorebird point-count survey includes a 2-mile buffer zone on each side of the proposed reservoir impoundment zone, infrastructure for the dam, powerhouse, and supporting facilities, access route and transmission-line corridor alternatives, and material sites. All direct and indirect effects of the proposed Project on landbirds and shorebirds and their habitats in the upper Susitna basin are expected to be encompassed by this 2-mile buffer.

The survey area for colonially nesting swallows includes riparian habitats along the Susitna River and its tributaries within the reservoir inundation zone. The Susitna River in the inundation zone is an alluvial river located in a shallow canyon and is moderately braided with a low gradient. Tributaries to the Susitna River (e.g., Deadman, Tsusena, Watana, Jay, and Kosina creeks) are lower volume, steeper gradient, clearwater streams with deeply incised canyons along their lower reaches. Habitat features to be examined during the survey will include all river banks and cliffs adjacent to these rivers and streams.

### **10.16.4. Study Methods**

#### *10.16.4.1. Point-count Surveys*

##### *10.16.4.1.1. Study Design*

The proposed methods for the breeding landbird and shorebird study are ground-based point-count surveys, in which all birds seen or heard are recorded, along with an estimate of the horizontal distance to each bird observed. Point-count surveys, which were designed to count singing male passerine birds, are now the preferred method for inventory and monitoring efforts for landbirds in remote, roadless landscapes in Alaska (Handel and Cady 2004; ALMS 2010). These methods have been adopted for shorebirds (ASG 2008) and are especially appropriate in forested landscapes, where shorebirds typically occur in low densities and where plot-based methods would yield few observations, even with a relatively large survey effort.

Point-count surveys are appropriate for large development projects that affect a large area and include many different types of habitats. The sample points can be distributed across the landscape and allocated among habitat types to ensure that all prominent habitat types are sampled. In 2013, point-count sampling locations will be distributed using a pseudostratified random plot allocation procedure based on aerial photosignatures as the sampling strata (because a current, complete habitat map will not be available by spring 2013). The plot allocation methods may change in 2014 after a current, complete habitat map is available. This procedure

will result in adequate sampling of habitats, over two years of surveys, so that habitat-use evaluations for landbirds and shorebirds will be supported by Project area-specific data. These habitat-use evaluations (see Section 10.19) are a critical link in conducting quantitative assessments of habitat loss and alteration for breeding landbirds and shorebirds.

Several species of landbirds and shorebirds are not commonly recorded in standard point-count surveys allocated randomly across available habitats, but are known to be closely associated with riparian and lacustrine habitats (e.g., Belted Kingfisher, American Dipper, Semipalmated Plover, Solitary Sandpiper, Spotted Sandpiper, Wandering Tattler). Therefore, an additional set of point-count surveys will be conducted specifically in riparian and lacustrine habitats that are expected to be affected by Project development. These additional surveys were recommended by the USFWS.

Point-count survey data are subject to errors resulting from high variability in detection of individual birds due to species-specific traits, observer bias, surrounding environment, and distance. Consequently, to improve estimates of abundance and density, the point-count study will incorporate removal sampling and distance-sampling techniques (Farnsworth et al. 2002), as recommended by the USFWS (see Section 10.4). Observations will be stratified temporally and spatially to estimate detectability for all species, to account for the probability of birds present but not detected (Buckland et al. 2001, Rosenstock et al. 2002). Incorporating distance and removal analyses to estimate detection probability will allow improved estimates of abundance and density. Existing detection functions, derived from other point-count studies in Alaska, will be used, when necessary, to improve detectability estimates of uncommon species in the study area.

The landbird and shorebird study will be coordinated with the other wildlife studies being conducted for the Project, especially the raptor and waterbird studies, so that sightings of bird species that apply to other studies can inform the qualitative results and reporting efforts among studies.

#### *10.16.4.1.2. Field Surveys*

Point-count field surveys will follow standard protocols for point-counts in Alaska (Handel and Cady 2004, ALMS 2010). These protocols are based on the variable circular-plot point-count methods and temporally stratified observation periods (Ralph et al. 1995, Buckland et al. 2001, Farnsworth et al. 2002). Surveys will be conducted during early morning hours to maximize the detection of breeding species, especially singing male passerines. Standard 10-minute observation periods will be used and, to facilitate the collection of habitat-use data, the specific habitat being used by each bird observed will be recorded whenever possible.

As noted above, the point-count plot locations in 2013 will be selected using a pseudostratified random plot allocation procedure based on aerial photosignatures as the sampling strata, because it is unlikely a current and complete habitat map will be available by spring 2013. In 2014, point-count locations will be selected again using a pseudostratified random plot allocation procedure, but mapped wildlife habitat types are expected to be available for use as the sampling strata (to the extent the wildlife habitat mapping is complete by spring 2014). In both years, the plot allocation will be constrained so that an adequate number of plots are placed in each mapped habitat or photosignature type. Without this constraint, an excessive number of plots would be located in the most common habitat types and far fewer would occur in uncommon types,

resulting in undersampling of uncommon habitat types. In all cases, sample points will be located in a random and spatially unbiased fashion (using GIS) within each mapped habitat or photosignature type, subject to the restriction of maintaining a minimum distance of 500 meters (1,640 feet) between sample points in open habitats and 250 meters (820 feet) in closed habitats. This sampling scheme will result in a selection of point-count locations that is unbiased with respect to the distribution of breeding birds on the landscape. The goal in plot allocation is to derive a set of sample points that are spread broadly across the study area and are replicated within each photosignature/habitat type to capture spatial variability in habitat use by breeding birds. Replicate sampling also is important to locate the often patchy occurrences of the less common species of conservation concern.

One extended field survey is planned in each summer season in 2013 and 2014. The survey will begin in mid-May, focusing on breeding shorebirds and early nesting landbirds such as the Rusty Blackbird, a species of conservation concern in Alaska (USFWS 2008). It is likely that data on early nesting resident birds also will be collected in the early portion of the survey period because nesting starts later at the higher elevations typical of the Project area. The point-count survey period will extend into early June to focus on neotropical migrant landbirds. Late-arriving flycatchers (e.g., Alder Flycatcher) will be present by early June. It is expected that some data on nesting resident birds and shorebirds will be collected during early June as well.

For the early portion of the survey period in May, point-count plots will be allocated preferentially in open habitats that are used by breeding shorebirds. These habitats include open wetlands in forested areas as well as open, dwarf scrub-dominated habitats in upland and alpine terrain. Woodland bog and tall scrub habitats in poorly drained lowlands also will be sampled because they are used by breeding shorebirds and Rusty Blackbirds. Also in May, an additional set of point-count plots will be allocated specifically in riparian and lacustrine habitats that are expected to be affected by Project development. These surveys will target species that are known to use riparian and lacustrine habitats, which are not often recorded on point counts allocated randomly across all available habitats. In addition to the point-count surveys, researchers will walk along stream courses and lake/pond shorelines sampled as they move between point-count locations, and all birds observed in transit will be recorded. An additional goal of these surveys will be to collect data on the distribution and abundance of piscivorous species (e.g., Belted Kingfisher, American Dipper, Spotted Sandpiper) in the inundation zone and immediately below the location of the proposed dam. By later in the survey period (late May and early June), point-count plots will be allocated across all available habitats in the study area. As noted above, this survey will focus on neotropical migrant landbirds.

#### *10.16.4.2. Survey of Colonially Nesting Swallows*

The focal species for this survey effort include Bank Swallow, Cliff Swallow, and Violet-green Swallow. These three species are gregarious, colonial nesters that prefer riparian cutbanks and cliffs near lacustrine or fluvial waters (Kessel et al. 1982, Brown et al. 1992, Brown and Brown 2002, Garrison 2002). Bank and Violet-green swallows nest in burrows in relatively soft, sandy substrates and may form mixed-species colonies (Brown et al. 1992, Garrison 2002); data on Belted Kingfishers also are likely to be obtained incidentally because they nest in burrows in the same type of bank habitat. Cliff Swallows build nest cavities of mud and clay on rocky cliffs, bridges, and other human-made structures (Brown and Brown 2002). All three species feed on

flying insects and often forage over or near waterbodies (Brown et al. 1992, Brown and Brown 2002, Garrison 2002).

The swallow survey will use a boat for access to the Susitna River and tributary streams in the reservoir inundation zone, searching suitable nesting habitat and recording nesting colonies. Two observers, plus the boat operator, will conduct the survey. In portions of tributary streams not accessible by boat, the survey will be conducted on foot. One observer will record the geographic locations of nesting habitat and colonies on a topographic map or aerial imagery, as well as in a handheld GPS receiver. The other observer will photograph the habitat and colonies to aid in accurate nest counts and quantify the total area of potential nesting habitat. Both observers will assist in species identification and estimate abundance and activity. Researchers will stop and observe active colonies for a minimum of 15 minutes (Garrison et al. 1989) to allow accurate species identification and obtain estimates of abundance and activity.

Accessible colonies will be inspected closely to estimate the proportion of active burrows. Researchers will check a random and spatially balanced sample of burrows within accessible colonies using a flashlight and an angled mirror attached to an extendable rod. Burrows containing eggs, young, or adults will be considered occupied. The number of eggs or young in nests will be recorded (Garrison et al. 1989). These data, combined with other relevant information, will be used to estimate the total number of active burrows in the study, thereby allowing estimation of total population size.

The survey will be conducted in late June or early July. All three focal species normally arrive in interior Alaska by mid- to late May and nesting occurs in June and July (Kessel et al. 1982, Brown et al. 1992, Brown and Brown 2002, Garrison 2002). Bank Swallows may reuse old burrows or create new burrows during courtship (Hickman 1979). Therefore, surveys will be timed to occur after mating and nest establishment to reduce variability in burrow numbers (Jones 1987). Vacant, but suitable, nesting habitat will be recorded to quantify the total area of potential nesting habitat present in the study area and to inform subsequent survey efforts in 2014, which will focus on revisiting colonies located in 2013.

All accessible navigable portions of the study area will be surveyed once in 2013 and again in 2014. Changes in numbers of individuals, colonies, and nests between the two years will provide information on the dynamics of swallow populations and will improve abundance estimates. In addition to swallows, researchers will record incidental observations of other birds during this survey to support this and the other avian studies.

#### *10.16.4.3. Integration of Existing Information with Current Study*

The landbird and shorebird data collected in the APA Susitna Hydroelectric Project area in the 1980s (Kessel et al. 1982, AEA 2011) will be reviewed and incorporated into analyses of habitat use by these species presented in the Initial Study and Updated Study reports (see below). The primary focus will be to compare habitat-use patterns in the historical data with the results of current data analyses. The abundance and distribution information for landbirds and shorebirds from Kessel et al. (1982) will be reviewed to evaluate changes in abundance and distribution over the intervening 30 years. These historical comparisons will provide information on the recent trends for these species in the Project area, which will be useful for impact predictions and assessments.

#### *10.16.4.4. Mercury Risk Assessment*

Scientific literature on the foraging habits and diets of piscivorous landbirds and shorebirds (primarily Belted Kingfisher, but also American Dipper and Spotted Sandpiper) will be reviewed to inform the mercury risk assessment study (see Section 5.7, Mercury Assessment and Potential for Bioaccumulation) and to complement the field data gathered on the distribution and abundance of these species in the study area. As much as possible, the information gathered will be focused on data from Alaska studies.

#### *10.16.4.5. Impact Assessment*

Landbirds and shorebirds could be affected directly by the loss of breeding habitat from the placement of fill and from the conversion of terrestrial habitats to lacustrine habitats in the proposed reservoir. Additional indirect impacts could occur from alteration of habitats by erosion, fugitive dust accumulation, permafrost degradation, landslides, and off-road vehicle use. Disturbance effects (displacement from breeding habitats) from construction and operations activities represent another possible source of indirect impacts. Direct impacts could occur through injury and mortality in various ways (e.g., if exposed to fuel from accidental spills or from in-flight collisions with infrastructure). Alterations in riparian wildlife habitats downstream from the proposed dam due to changes in instream flow, ice processes, and riverine geomorphology in the Susitna River also are possible, and will be addressed in the Riparian Study (see Section 11.6).

The impact assessment for landbirds and shorebirds will be conducted by first conducting habitat-use evaluations (see Sections 10.19 and 11.5) to assign habitat values for each landbird and shorebird species to each of the wildlife habitats mapped in the vegetation and wildlife habitat mapping study (see Section 11.5). Then the various components of the Project “footprint” will be overlaid on the mapped wildlife habitat types using GIS to quantify the acreages of important breeding habitats for each species that would be lost directly to fill or inundation. The determination of acreages of landbird and shorebird habitats that may be affected indirectly by habitat alteration and behavioral disturbance will be conducted similarly by overlaying habitat alteration and disturbance buffers (surrounding the proposed Project infrastructure). The size and number of habitat alteration and disturbance buffer(s) to be used will be determined based upon the final specifications for Project construction, operations, and maintenance activities, which will be provided in the Project description. Direct impacts on landbirds and shorebirds will be assessed qualitatively by evaluating the likelihood of injury and mortality from various sources during Project construction and operations.

Cumulative effects on landbirds and shorebirds in the region of the proposed Project will be assessed by evaluating the extent of the direct and indirect impacts expected from the Project in conjunction with the existing impacts on landbirds and shorebirds in the region.

#### *10.16.4.6. Reporting and Data Deliverables*

The database and reporting deliverables for this study include the following:

- **Electronic copies of field data.** A geospatially-referenced relational database of historic (APA Project) data and data collected during the 2013 and 2014 field seasons, including representative photographs of breeding bird habitats at point-count plots will be

prepared. Naming conventions of files and data fields, spatial resolution, map projections, and metadata descriptions will meet the data standards to be established for the Project.

- **Initial Study Report and Updated Study Report.** The landbird and shorebird study results will be presented in the Initial and Updated Study reports, according to the schedule indicated below. The reports will include descriptions of the field methods, a map of the point-count locations surveyed, and results of the point-count surveys with tables indicating abundance by species and habitat type.

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

The landbird and shorebird study will employ point-count surveys and analytical methods that conform to currently accepted, standard protocols for the monitoring of landbirds in remote, roadless landscapes of Alaska (Handel and Cady 2004, ALMS 2010). In recent years, these methods also have been adopted for shorebird surveys in Alaska (ASG 2008) and are especially appropriate in forested landscapes, where shorebirds typically occur in low densities and where plot-based methods would yield few observations, even with a relatively large survey effort.

The survey of colonially nesting swallows will employ the best available techniques. There currently is no standard protocol for surveying swallow colonies, but the methods proposed above follow those used elsewhere (Garrison et al. 1989, Watts et al. 1996). These methods are intended to be an improvement on point-count surveys, which are widely regarded to be inadequate for swallows and similar riparian species (Swanson and Nigro 2003).

#### **10.16.6. Schedule**

This is a two-year study. The schedule for the 2013 and 2014 activities is presented below.

##### 2013

- Review of aerial imagery; point-count site selection, field planning, logistics: March–April.
- Point-count field survey: May 12–June 12 (four crews of two persons each).
- Swallow survey: approximately four days between June 20 and July 10.
- Data analysis: August–October.
- Delivery of electronic copies of field data: November.

##### 2014

- Initial Study Report: February.
- Review of habitat mapping, aerial imagery, and point-count site selection: March–April.
- Point-count field survey: May 12 to June 12 (four crews of two persons each); survey timing and duration may be modified based on 2013 studies.
- Swallow survey: approximately four days between June 20 and July 10.
- Data analysis: August–October.
- Delivery of electronic copies of field data: November.

##### 2015

- Updated Study Report: February.

### **10.16.7. Level of Effort and Cost**

The ground-based point-count surveys are planned to be conducted over two years (2013–2014). The point-count field surveys (late spring and early summer) will be conducted each year by a crew of eight observers (four crews of two persons each). Point-count surveys would be conducted for approximately 28 days each year, with the goal of obtaining at least 800 point-count samples each year. Helicopter support will be required for this survey with drop-off and pick-ups each day in the field. The surveys will start at first light in the morning, which in the Project area will be approximately 3:30 A.M. The bulk of the costs associated with this study are for field sampling, data analysis, and reporting.

The survey of colonially nesting swallows will focus on estimating the abundance and distribution of swallows in riparian habitats within the inundation zone. The field survey will be conducted in a short time period (estimated four days each year) and require only two observers (plus a boat operator). However, this survey has specific field equipment and safety requirements, including boating and camping equipment which will require helicopter sling transport.

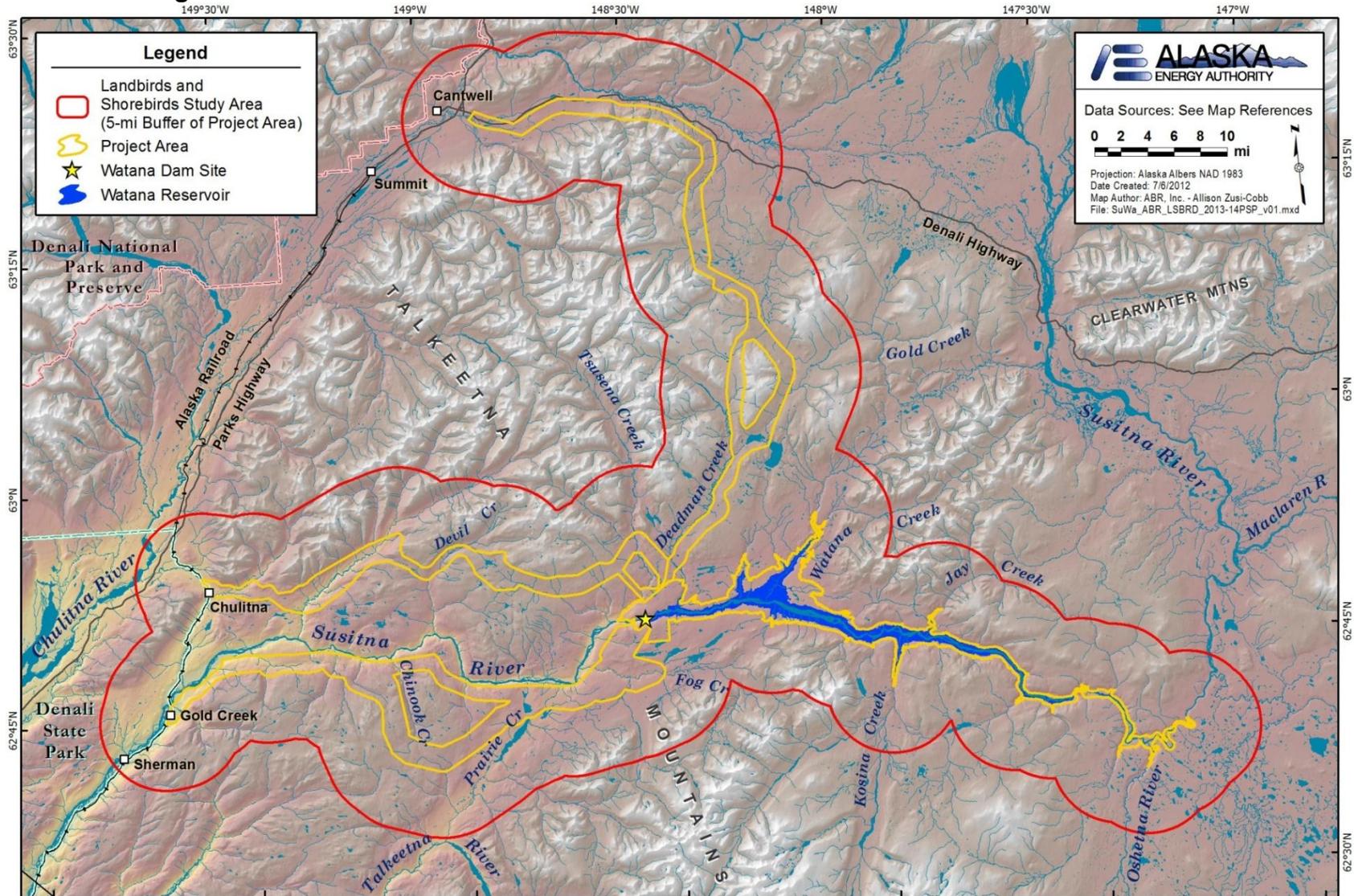
The projected annual cost of this study is in the range of \$425,000–450,000, for an estimated total of \$850,000–900,000 over both years.

### **10.16.8. Literature Cited**

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### 10.16.9. Figures



**Figure 10.16-1. Landbird and shorebird study area. [BUFFER WILL BE REDUCED FROM 5 MILES TO 2 MILES AROUND ALIGNMENTS AND RESERVOIR, AND WILL BE TRUNCATED AT PARKS HIGHWAY AND ALASKA RAILROAD]**