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Susitna-Watana Hydroelectric Project
(FERC No. 14241)

Cultural Resources Study
Study Plan Section 13.5

Final Study Plan

Alaska Energy Authority

SUSITNA-WATANA HYDRO

Clean, reliable energy for the next 100 years.

July 2013

13. CULTURAL AND PALEONTOLOGICAL RESOURCES

13.5. Cultural Resources Study

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). Included within the RSP was the Cultural Resources Study, Section 13.5. RSP Section 13.5 focuses on systematically inventorying cultural resources within the Area of Potential Effects (APE), evaluate the National Register eligibility of inventoried cultural resources within the APE that may be affected by the Project, and assess Project-related effects on National Register-eligible historic properties within the APE. RSP 13.05 provided goals, objectives, and proposed methods for cultural resources data collection and analysis.

On February 1, 2013, FERC staff issued its study determination (February 1 SPD) for 44 of the 58 studies, approving 31 studies as filed and 13 with modifications. RSP Section 13.5 was one of the 13 approved with modifications. In its February 1 SPD, FERC recommended the following:

We recommend that the study plan be modified to require AEA to consult with CIRI and interview knowledgeable Dena'ina elders, as recommended by CIRI, in order to adequately identify place names, ethnography, history, and culture associated with this culture group. We also recommend that AEA designate specific locations where they would interview knowledgeable Dena'ina elders that are convenient for both AEA and the elders.

We also recommend that AEA evaluate cultural resource sites in the indirect APE for eligibility for the National Register. However, when and how this may be accomplished is best left until the initial study results are available and in consultation with BLM, SHPO, and affected tribal representatives.

In accordance with the February 1 SPD, AEA addressed the recommended modifications in the Final Study Plan for Section 13.5.

13.5.1. General Description of the Proposed Study

The study area proposed herein consists of both a direct and indirect APE. The direct APE includes areas of anticipated direct effects, particularly areas subject to ground disturbance from Project construction. The direct APE encompasses the reservoir impoundment area, construction camp, and three potential access/transmission corridors (Figure 13.5-1). The impoundment area as defined here consists of the proposed normal 23,546-acre maximum reservoir surface area plus an additional 25 vertical feet above that elevation equating to the 2,075 foot elevation upstream from the proposed Watana Dam. The three proposed access/transmission corridors differ in length. The *Chulitna Corridor* is approximately 42.7 miles long; the *Denali Corridor* is approximately 41.4 miles long; and the *Gold Creek Corridor* is approximately 49.2 miles long.

The indirect APE consists of those areas outside of the direct APE that may experience Project-induced human activity, particularly dispersed recreation. These include: the Upper Susitna River corridor from the upper extent of the inundation zone to the Denali Highway Bridge, Fog Lakes, areas around the inundation zone within local drainages that flow into the reservoir, existing trails and camps, and Bureau of Indian Affairs (BIA) ANSCA 14(h)(1) sites (in addition

to those within the direct APE). In consultation with interested parties during summer and fall 2012, the direct and indirect APEs were refined based on: a recalculation of the impoundment area using the 2,075-foot elevation (25 feet above proposed normal maximum pool level to account for potential shoreline changes caused by the reservoir filling and operation), reconsideration of watersheds and topographic features as natural boundaries to new human travel beyond the direct APE, preliminary results of the 2012 archeological field reconnaissance and consequent modeling of likely areas for cultural resources, and identification of known trails where uses may increase as an indirect result of the Project. The APE as updated for this revised study plan combines the current definitions of the direct and indirect APE to design the sampling strategies and priorities for the 2013-2014 field studies. As explained in Section 13.5.3 below, the APE may be further adapted based on results from AEA's ongoing environmental and engineering studies.

A total of 104 known cultural resource sites (90 prehistoric, eight Euroamerican historic, and six Alaska Native historic) are currently identified within the direct APE (Figure 13.5-2 (Hays et al. 2012). The proposed corridors and camp facilities have a combined total of 40 previously-documented sites (all precontact/prehistoric except for two historic). The 2,075-foot impoundment area has a total of 64 known cultural resource sites (62 prehistoric and two historic). Additional sites likely exist within unsurveyed portions of the APE. Known sites will be relocated in 2013 and 2014 and coordinates will be recorded with a survey-grade, hand-held GPS unit. Other standard site data will be recorded and previously described site conditions will be verified.

Phase I (Inventory) surveys will be conducted in areas of the direct and indirect APEs not previously surveyed or in areas within the APE that the 2012 locational model identifies as high potential for containing cultural resources. A combination of low and slow aerial reconnaissance from a helicopter and systematic pedestrian transect survey will be employed during Phase I surveys. Phase II (Evaluation) studies will be conducted for sites within the direct APE only, based on the conclusions of the Phase I surveys, to assess eligibility and analyze effects to eligible historic properties that may be adversely affected by the Project. Both Identification and Evaluation Phase surveys will follow established professional guidelines, including the Alaska Office of History and Archaeology *Historic Preservation Series No. 11* (OHA 2003).

As noted above, the direct APE may include TCPs. As described in National Register Bulletin #38, a TCP is a property, i.e., a place, that is eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community. Determining whether a property qualifies as a TCP requires systematic review and evaluation similar to that devoted to archaeological properties, with additional considerations.

The ethnogeographic portion of the study includes consultation with Ahtna and Dena'ina elders to integrate Alaska Native perspectives on historical land use and cultural values into the cultural resource investigation. Through a partnership with Ahtna, Inc., the regional corporation for the Ahtna people, the ethnogeographic component of the Cultural Resources Study will document Ahtna perspectives and ethnographic context for significance of the cultural resources sites potentially affected by the Project. Included will be traditional Ahtna land use and settlement patterns, seasonal migrations, religious and sacred sites, and traditional foot trail systems. Ahtna language place name records on file (Kari 2008; Kari 2012) will be consulted, and linguistic

analysis of Ahtna place names, including archival taped sources and confirmation interviews with Ahtna Elders, will provide insight into the geographic information (notably hydrology) encoded in the Ahtna terms and narratives for important places.

With regard to the Dena'ina people, the ethnogrographic component of the Cultural Resources Study will build on existing Upper Cook Inlet Dena'ina places names work (Kari and Fall 2003), supplemented by additional interviews with knowledgeable Dena'ina elders, likely from the communities of Chickaloon and Knik. AEA will consult with CIRI and interview knowledgeable Dena'ina elders, as recommended by CIRI, to adequately identify place names, ethnography, history, and culture associated with the Dena'ina people. The location of these interviews will be decided during consultation with CIRI, in an effort to conduct the interviews at locations convenient for both AEA and the elders.

In consultation with Doyon, Limited and other tribal officials, similar interviews may be used to record historic use in the Project area by Doyon region residents, particularly those from Nenana.

Study Goals and Objectives

The goals of the 2013-2014 Cultural Resources Study plan are to systematically inventory cultural resources within the APE (36CFR 800.4(b)), evaluate the National Register eligibility of inventoried cultural resources within the APE that may be affected by the Project (36 CFR § 800.4(c)), and assess Project-related effects on National Register-eligible historic properties within the APE (36 CFR § 800.5).

Specific objectives are to:

- Consult with the SHPO, BLM, and Alaska Native entities during implementation of the 2013-2014 cultural resources survey
- Inventory cultural resources within the APE
- Evaluate National Register eligibility of cultural resources within the APE that may be affected by the Project
- Determine the potential Project-related effects on National Register-eligible historic properties within the APE
- Develop information needed to prepare a HPMP for the Project

The TCP study will be informed through the ethnogeographic study, which has as its goals the identification, inventory, and evaluation of landscape features and resources within the APE that have been and continue to be important to the Ahtna people. The objective is to use ethnographic landscape and place name data to help identify TCPs according to procedures set forth under 36 CFR Part 800, and determine their significance according to National Register criteria (36 CFR § 60.4). Traditional land use patterns of the study area by the Ahtna were based on a migratory cycle that followed fish, game, and plant harvesting opportunities. A complex system of travel and trapping cabins, trails, fish camps, trade routes, portage areas, trap lines, hunting ranges, seasonal camps, and winter villages has been in use for many generations. Some of these use patterns continue today, incorporating modern subsistence harvest technologies and transportation while maintaining traditional use areas by family and clan. Subsistence activity and land use have also been affected in recent times by subsistence regulation, aboriginal land title changes (ANCSA and the Alaska National Interest Lands Conservation Act [ANILCA]), schooling, child protection, and medical care laws and regulations. The ethnogeographic study

addresses the following topics, with emphasis on Ahtna tribal practices, supplemented by information on Dena'ina and Lower Tanana tribal practices as appropriate:

- Land use patterns in the study area, including the seasonal migration patterns of the late 19th and early 20th centuries, and how they relate to the system of trails, trap lines, hunting and fishing sites, winter villages, and religious sites
- Types of wild resources exploited and traditional ecological knowledge about historic animal and fish populations in the area
- Traditional stewardship (i.e., traditional management practices)
- Contemporary values associated with the landscape
- Transcription and translation of language texts that pertain to the Project APE
- Hydrological concepts embedded in place names, directional system, and landscape narratives

13.5.2. Existing Information and Need for Additional Information

Cultural resource investigations conducted within the study area between 1978 and 1985 for prior project designs (referred to as "early 1980s-era") documented almost 300 cultural properties believed to span the last 11, 000 years. Site types in the inventory include historic and precontact archaeological sites, historic buildings and ruins, and other cultural features. About one-third of the sites are in or near the location of the proposed Watana Dam and impoundment. Approximately 90 percent have stone tools and other prehistoric artifacts, about 10 percent are historic sites consisting of building ruins and/or scatters of commercially manufactured items (metal cans, bottles, etc.), and less than 1 percent are fossils of animals or plants. The more recent Native sites are from the Athabascan Indians who inhabited the area historically and hold the majority of the area's Alaska Native place names in their linguistic dialect (Ahtna); the older sites fade into a more generalized adaptation shared by Alaska's ancient interior peoples. Historic sites in the Project area reflect mining, prospecting, hunting, trapping, fishing, and recreational pursuits, as well as simply remote Alaska living.

13.5.2.1. Archaeological Resources

Between 1978 and 1985, archaeologists conducted cultural resources surveys, testing, and site excavations for the then-proposed Alaska Power Authority Susitna Hydroelectric Project and ancillary facilities (construction camps, transmission lines, and access roads). Although the project proposed in the 1980s had a different footprint than the currently proposed Project, there is considerable overlap. For the 1980s project, annual and summary reports from the early 1980s-era described over 270 sites that required some form of analysis and curation of associated artifacts (e.g., Dixon 1985; Dixon et al. 1985; Greiser et al. 1985, 1986). Another 22 previously known sites were revisited and documented. Of the sites found, 111 were discovered through subsurface testing (amounting to approximately 28,000 shovel tests). Of those known sites, 87 percent have prehistoric/ precontact remains, two percent have postcontact/protohistoric remains, 10 percent have historic and modern remains, and one site has paleontological remains. Advances in geoarchaeological techniques and modeling of the region's stratigraphy in the last 30 years, especially those focusing on volcanic ash or tephra deposits, prompts re-examination of the conclusions reached in the 1980s. Revisions are anticipated in the understanding of site locations and distributions through time and space and how they relate to historic Native land

use, the Project area's cultural chronology from a regional perspective, and its place in the greater scheme of North American prehistory.

More than a quarter-century of modern archaeological research has been carried out in Alaska since the original Susitna project work, aided by new methods and technology including GPS and GIS, geoarchaeology, geochronology, stratigraphic analysis, lithic and faunal analysis, and ice-patch research. Research in south-central and Interior Alaska river drainages has demonstrated that the prehistoric cultural chronology and dynamics are far more complex than was previously believed (i.e., Dixon 1985). Modern advances in radiometric dating techniques in particular require re-examination of the radiocarbon dates from the Project area. Accurate dating is essential to determine site significance, which can depend on cultural affiliation, archaeological tradition, and microstratigraphic layers that may represent multiple occupations and/or components spanning hundreds or thousands of years. Sites evaluated for National Register eligibility that have well-preserved organics or multiple components will be radiometrically dated to assist in the eligibility evaluation. Conditions that allow preservation of organic archaeological materials are relatively rare in the study area.

The cultural resources data gap report (Bowers et al. 2012) reviewed and summarized the cultural resource literature for the Project area prepared during the 1978 to 1985 environmental studies. Data gaps identified include inadequacies in the locational information for sites due largely to limitations in field and mapping methods. The cultural chronology within the APE warrants re-examination due to more modern dating techniques (e.g., accelerated mass spectrometry [AMS] radiocarbon [^{14}C], optically stimulated luminescence [OSL]) and newer geoarchaeology (in this case tephra) studies. Investigations of prehistoric land use patterns in Interior Alaska have progressed to the testing of more sophisticated locational models applicable to the Project's cultural resources field studies (VanderHoek 2011). Partial inventories of Alaska Native place names exist that were not available during the early 1980s-era studies, and they, too, can now be incorporated into locational models and field survey strategies.

13.5.2.2. Ethnogeographic Resources

The Project area includes lands important to CIRI and the Dena'ina tribal communities, Ahtna, Inc., and the Ahtna tribal communities, and potentially the Lower Tanana-speaking tribal community in Nenana. Based on linguistic data (Krauss et al. 2011) the Ahtna traditional use area included the Susitna-Watana Project impoundment and lands to the west (Figure 13.5-3) — further west than the Ahtna regional corporation boundary (Figure 13.1-1). Alaska Native regional corporation boundaries drawn by ANCSA in 1971 shifted the CIRI boundary east into the area historically used by the Ahtna. Recognizing the interconnections of corporations and tribes, the ethnogeographic study will concentrate on the Ahtna traditional use area, supplemented by interviews with knowledgeable Dena'ina elders (particularly from Chickaloon and Knik), and as appropriate with Lower Tanana elders from Nenana. Overall, the cultural resource study is intended to broadly address the significance of past land use regardless of ethnicity or antiquity, and will document historic properties and TCPs that may be affected by the project whether resulting from prehistoric or contemporary practices of Ahtna or Dena'ina. As a practical matter, Ahtna tribal practices are less represented in the published scientific literature yet there remain Ahtna language speakers familiar with the study area, and thus the RSP addresses this imbalance while including both Dena'ina and Lower Tanana data sources.

The early 1980s-era studies in the Project area did not recognize TCPs because they did not exist as a formal concept within historic preservation law or regulation. Now, investigation addressing TCPs is required for compliance with Section 106 of the NHPA. There were little data collected about Alaska Native place names in the prior studies (e.g., Dixon et al.1985; Greiser et al. 1985, 1986), and the information that was collected does not meet current professional standards and is not in modern geospatial format (see Bowers et al. 2012; Simeone et al. 2011). However, in the years since the early 1980s-era studies, Ahtna place names data have been collected by James Kari, William Simeone, and others (e.g., Kari 1983, 1999, 2008, 2010, 2011, 2012).

Ethnographic data – in the form of interviews, archival documents, and linguistic data (place names) – can help define the value or cultural significance of a site to the Ahtna, Dena'ina, and Lower Tanana peoples, which in turn will help determine whether TCPs exist in the Project area. The data will also contribute to the locational model for identifying potential archaeological sites. For example, ethnographic data documenting annual or seasonal activity (including the type of resource used, where harvested, method of harvest, and season of harvest) may help in detecting archaeological sites. Ethnographic data also better enable development of historical and cultural context for a site, which is necessary to determine its significance and possible eligibility to the National Register. Ethnographic data aides in the interpretation of sites and artifacts on a variety of levels, addressing such topics as: (1) how a site or artifact was used; (2) how a site fits into Alaska Native and non-Native history; (3) whether a site's content can be applied to the explanation of the area's cultural history; and (4) if a site has religious or other significance not apparent from its physical attributes.

The ethnogeographic study builds on previous research by principal investigators Dr. William Simeone and Dr. James Kari, and will be modeled after the approaches of Simeone and Kari (2002, 2004) and Simeone and Valentine (2007)**.** As with both those studies, the ethnogeographic study for the Project will combine ethnographic, historical, and linguistic research to document traditional Ahtna land use patterns, stewardship practices, and Ahtna traditional knowledge for use by state and federal agencies in making management decisions. The approach to be taken in applying the Susitna data to TCPs parallels aspects of a similar effort addressing Ahtna TCPs sponsored by the BLM as part of the East Alaska Resource Management Plan (Kari and Tuttle 2005).

13.5.3. Study Area

The study area or APE for the Project is composed of an area of direct effect and an area of indirect effect—the geographic region in which the character or use of historic properties may be affected directly or indirectly by construction and operation of the Project. The APE for both direct and indirect effects is identified using several types of information, including Project engineering (transportation corridors and potential visitor infrastructure), known or likely human use patterns, and topographic features that may act as boundaries to visitor travel beyond the project footprint. If licensing studies conducted in 2013 indicate that there may be Project-related effects to cultural resources in areas currently outside the APE, the APE may be further adapted to encompass these areas. Any recommended changes to the APE will be included in AEA's ISR, which will be prepared and distributed in February 2014. Currently, the total area within the study area is approximately 248,707 acres.

13.5.3.1. Area of Potential Direct Effect

Direct effects to cultural resources are those consequences directly attributable to construction and operation of the Project, including inundation. The APE for direct effects encompasses the Watana Reservoir, a buffer around the reservoir footprint up to the 2,075-foot contour, Watana Dam and Camp Facilities area, three potential access and transmission alignments (Chulitna, Denali, and Gold Creek corridors), and facilities associated with construction and operation of the Project. The proposed direct APE, developed in consultation with the SHPO, federal and municipal agencies, Alaska Native entities, and other interested parties, is depicted in Figure 13.5-1.

13.5.3.2. Area of Potential Indirect Effect

Indirect effects to cultural resources are those that occur beyond the direct effects from implementing the Project, such as looting of archaeological sites and damage from off-road vehicle use after the Project has been completed. The proposed indirect APE, developed in consultation with the SHPO, federal and municipal agencies, Alaska Native entities, and other interested parties, is depicted in Figure 13.5-1. As proposed, the Project would inundate the middle Susitna with water upriver of the dam site to the 2,050-foot contour. This would create an approximately 39-mile long lake which will be accessible to the general public. In addition, it is expected that overland use via existing trails by hunters, fisherman, trappers, and recreationists will likely increase as an indirect effect of the proposed Project since access and other developed facilities available for public use will likely be constructed in the immediate Project area. AEA plans to study possible indirect effects that may result from the construction and operation of the proposed Project. The indirect APE is comprised of:

1) Areas likely to be affected by induced dispersed recreational activity extending from existing trails, including all-terrain vehicle (ATV) trails and recent campsites observed during the 2012 field investigations
2) Areas near or related to known sites in the statewide Alaska Heritage Resources Survey (AHRS) inventory, BIA's ANCSA 14(h)(1) site inventory, and recent use-areas like airstrips, bridges, mines, and cabins that are adjacent to APE mapped trails and recreation use areas, based on the premise that these areas may also be locations where future increased human travel may occur
3) Areas adjacent to APE-mapped trails and recreation areas with known high cultural resource potential as determined by the site locational modeling and 2012 aerial and pedestrian reconnaissance, based on the premise that these areas may also be locations where future increased human travel may occur

13.5.4. Study Methods

13.5.4.1. Previous Survey Strategies, Methods, and Definitions

Cultural resource investigations conducted within the study area between 1978 and 1985 documented almost 300 cultural properties spanning the last 11,000 years. Site types in the inventory include historic and protohistoric archaeological sites, historic buildings and ruins, and other cultural features. Many of these sites are within, and would be inundated by, the proposed Watana Reservoir. Subsequent archaeological investigations following the initial surveys have

located and recorded additional cultural resources and expanded knowledge of known sites (cf. Betts 1987; Blong 2011; Dilley 1988; Wygal 2009; VanderHoek et al. 2007).

The information collected in the late 1970s and early to mid-1980s—the "early 1980s-era" data—forms the bulk of the spatial data within the study area and resulted from two separate projects: the first by Dixon et al. (1980, 1985); and the second by Greiser et al. (1985, 1986). Methods used in the 1979 to 1984 fieldwork by Dixon et al. (Figure 13.5-4) included the delineation of "survey locales" by close examination of U.S. Geological Survey (USGS) topographic maps in combination with a survey strategy using additional environmental and artifact variables as analytical units. These variables were defined within a framework of research questions addressing the cultural historical sequence of this region. The survey locales were visited and the terrain within them that was judged higher in site potential was examined by pedestrian survey. In some places, shovel tests were placed in areas deemed of higher site potential. If sites were located either by observation of surface artifacts or by subsurface discovery, concentrated testing then took place. Areas considered of lesser site potential (determined by examination of maps and by on-the-ground judgments) were not surveyed or tested. Concentrated testing meant that the archaeologists set up a grid at a point of site discovery, and then dug shovel tests along transects at specified intervals outward from the discovery point (Figures 13.5-4, 13.5-5). Thus systematic grids of shovel tests (round holes approximately 12 inches [in] in diameter) and at least one square 16-in or 36-in test unit was excavated for each artifact discovery. Locations at which concentrated testing occurred were: variable within a survey locale, mainly within the impoundment, and occurred only at sites; major portions of survey locales were not subjected to concentrated testing and in some cases were not walked because terrain was deemed unsuitable.

Methods used in 1985 in the second of the two projects (Figure 13.5-4) included delineation of survey "units" by a random sampling method that was more explicitly predictive (Greiser et al. 1985). Two major variables, terrain and vegetation—each of which had numerous subgroups—were statistically assessed for associations with known sites across the project area; results were used to stratify areas into lesser or greater degrees of site potential. Then 160-acre survey units were randomly chosen from within a sample of the population of units defined by a grid of the project area. Pedestrian survey across the 160-acre units consisted of linear transects spaced at predetermined intervals that were walked regardless of topography. Though the method was systematic, few sites were located using this approach. Topographic features of higher site potential within the project area but outside a randomly selected survey unit were not surveyed.

Both of the methods described above have merit, and current survey strategies typically use aspects of both. Advanced GIS tools and the cumulative archaeological experience in field survey methods over the last 30 years contribute to today's methods. GIS-based models provide a more effective means of spatially stratifying the Project area, enabling archaeologists to determine which areas appear to have lower or higher site potential; in 2013 and 2014 both types of areas will be tested to verify the assumptions on which models are based. The 1980s-era work used similar approaches but did not have the benefit of modern GIS or GPS technology.

The early 1980s-era datasets represent a significant amount of field effort and thought, and they are especially useful for refining expectations about site discovery, artifact preservation, and stratigraphic contexts. Site discovery is one of the more straightforward processes in cultural

resource management. In contrast, evaluating a site and determining whether it is eligible for listing in the National Register is often not straightforward, and may require revisiting and reassessing other sites within the APE that may be affected by the Project. Because of major differences in how site locations were recorded and the resulting variations in accuracy (GPS versus a pencil point on a paper map), as well as changes during the nearly 30 years since site discovery, matching site data collected during early 1980s-era work and current field observations can be difficult. The cultural resource investigations for the Project will be accomplished using best practices for modern archaeology. The usefulness of the early 1980s-era data will depend in large part on how accurately the old sites can be matched to current field observations.

13.5.4.2. Locational Model and Survey Strategy

Archaeological survey strategy development typically begins with two things: 1) a review of relevant literature and previous archaeological work in the study area, often performed in an office, museum or archive setting; and 2) a close examination of the topography and other environmental variables, done using observations collected in the field and GIS techniques in the office. These information sources in concert help define expectations about cultural resources within the study area, which in turn helps determine survey strategies (Figure 13.5-5).

This is a holistic pursuit and requires consideration at a regional scale of factors such as climate or ecoregional variability, as well as scrutiny of specific details at the site and artifact level. Details such as elevations at which sites typically occur, or resources closely associated with sites, as evidenced by organic remains (bones, for example), may indicate why people chose to dwell at a particular location. The general goal of a survey strategy is to locate archaeological sites; thus, an understanding of why an area is more desirable than another is important. However, determining those factors that make a location more desirable are complex. Models help to explore this complexity.

Survey strategies today often employ models to assist in defining locations that may have a greater potential for site discovery. The treatment of these cultural resources is governed by federal and state law. Section 106 of the NHPA is the most commonly cited statute, but other directives are also in place to help guide management of cultural resources. The larger goal is to locate cultural resources and determine if they are eligible for inclusion on the National Register.

Survey types consist of either aerial or pedestrian transects. Given the remoteness of the study area, aerial surveys are conducted by helicopter at low airspeed and altitude across large expanses of land. Areas of high potential within these expanses are recorded by GPS and camera and are returned to later for ground survey and testing. Aerial surveys are also necessary in areas where geographic boundaries prohibit access by survey crews. Examples in the study area include steep valleys and river crossings, high elevations, and barrier waterfalls. Ground surveys are conducted in areas having a high potential for cultural resources. Methods used to optimally cover large areas of land (e.g., 40 acres) typically involve a crew of 6 people in a row each spaced 10 to 15 meters (m) apart. The crew walks parallel transects over the land inspecting the ground surface, trees, understory vegetation, and microtopography. Testing can either occur during ground surveys or later during a testing phase. Any resources encountered are recorded in field books, on forms, in GPS units, and photographically.

Survey strategy development is part of most field archaeology, and spatial modeling using GIS techniques provides a flexible means for combining many spatially defined variables onto one surface. The surface illustrates the combined variables with quantitative measures, which can then be used to stratify or characterize a study area in a number of ways. Models are not snapshots of reality, but rather a process which explores one of a number of possible scenarios. Models are one of several techniques from a larger toolbox used to develop survey strategies. Specifically, that toolbox also includes examination of available satellite imagery, USGS maps, and information on known cultural resources, as well as professional archaeological fieldwork.

The 2012 model used to develop a survey strategy for the Project was based upon several digital datasets of varying spatial and chronological scales that are listed in Table 13.5-1. Datasets in many cases provide multiple variables for creating the model surface. For example, Digital Elevation Model data (elevation) are used to derive slope and aspect within the model area, and precipitation and temperature datasets provide monthly averages useful for creating variables of summer and winter extremes. The Source column in Table 13.5-1 lists agencies mainly responsible for collecting data and producing rasters or shapefiles. There is an increasing number of excellent websites specifically tailored for the distribution of downloadable data, such as the Statewide Digital Mapping Initiative (SDMI) based at University of Alaska Fairbanks, the USGS's Alaska Geospatial Data Clearinghouse, and the State of Alaska Department of Natural Resources' own Alaska State Geo-Spatial Data Clearinghouse. Table 13.5-2 lists the variables examined in the modeling process.

In general, the modeling process for a locational model (designed to assist archaeologists in site discovery) can be broken into 10 steps. These steps are described using vocabulary developed for GIS analysis:

> STEP 1. Gather data (downloadable, in most cases) for creating layers of geospatial and other information; these will be independent variables (i.e., vegetation, elevation, wildlife presence, etc.), and dependent variables (i.e., known archaeological site types and locations).
>
> STEP 2. Determine the spatial extent of the model area based on an APE (ideally encompassing as many representative ecosystems as possible) and create a *model polygon*. *Clip* all layers to this area, and *buffer* lines, points or polygons to desired sizes.
>
> STEP 3. Polygons with variables having dichotomous information (presence/absence) should be reclassified as 1 for presence, 0 for absence; values will be numerical. Rasters with continuous variables need to be grouped using Layer Properties>Symbology with Manual grouping. *Merge* the vector datasets with the model area poly to get total coverage of the model area.
>
> STEP 4. Rasterize all layers. Create two rasters of the model polygon (usually 30 m size grids), one with values of 0, and one with values of 1 across the whole grid (these are used later in the process). The idea is to standardize the grid structure for future calculations.
>
> STEP 5. Extract all raster values of the dependent data points (sample of known sites, usually AHRS data) by using Spatial Analyst>Generalize>Extract Values to Points in ArcMap Toolbox. Generate a sample random point dataset of suitable size for statistical purposes and extract all raster values for that dataset as was done for the known dataset.

STEP 6. Copy the extracted values into Excel spreadsheets and code the data; categorize values to reduce numbers (i.e., group elevation values by 100 m intervals and identify with a code number). Place coded data into statistical software such as Statistical Package for the Social Sciences (SPSS) as data tables.

STEP 7. Run frequencies and cross tabulations. It is easiest to split types of sites (historic, prehistoric) into separate tables accompanied by a comparable number of random sites (i.e., prehistoric sites and similar number of random sites in a table, historic sites and random sites in another table, etc.) prior to calculating frequencies and cross tabulations. Examine results of variable association with the dependent data, and compare variable associations with results for random points (this is best done using Pearson chi-square tests).

STEP 8. Weight (reclassify) the rasters using the results of the statistical runs. Make sure "no data" is equal to zero and the area of the model is covered completely when reclassifying rasters (use 16 bit or higher signed raster types). For rasters which do not cover the whole model use *mosaic to new raster*, combining the variable raster with the model raster in Map Algebra>Raster Calculator (either multiply using the model raster with values of 1 or add using the model raster with values of 0). Generally, a reclassification requires recalculation.

STEP 9. Combine the rasters in Raster Calculator to produce a final model surface.

STEP 10. Examine the surface; use the results to assist in survey design or other analysis, in understanding the area in general, and to address research questions.

The purpose of a locational model of this type produced is to use a sample of known site distributions to inform archaeologists about site potential in nearby areas that have not been previously examined for cultural resources. The method is probability-based in that statistically significant relationships between variables form the basis for placing importance on those variables. The experience and judgment of archaeologists involved in the modeling process is an important component since decisions regarding how to spatially define the model area, which variables to include, and how to categorize and apply model results are the responsibility of the modeler. The Project model has been applied to the APE to stratify the modeled surface into higher and lower potential areas for sites. Survey will be focused on areas judged of higher potential for sites, though areas judged of lower potential also will be sampled.

This type of model is most effectively used for locating buried (subsurface) protohistoric or prehistoric cultural resources, because land use shifted after Euro-American contact in many areas of Alaska, and because historic era resources such as collapsed cabins, mining tailings, etc., are often more readily identifiable through aerial survey or historic records.

Problems with locational models are related to the resolution of datasets; fine-grained data are not always available for meaningfully characterizing an area. The Project model has a visualized resolution of 30 m, but some datasets such as temperature and precipitation are based on coarser grids (rasters). In addition, variables based on modern datasets may imperfectly characterize prehistoric environments, especially those with considerable time depth. However, the environmental parameters associated with the known archaeological sites (regardless of the actual chronological age of the site) are defined in modern terms, making locations across a region comparable. Difficulties most likely occur at sites associated with extinct resources

(bison, for example), or at locations desirable for socio-cultural reasons such as spiritual ties or other reasons not associated with quantifiable variables. Ethnogeographic datasets can, however, be incorporated into models when they are available in coded form.

Complementing the model development are the results of the brief 2012 field season, which are also incorporated into the comprehensive 2013-2014 study plan. During three weeks of 2012 a crew of three evaluated how difficult it would be to relocate, map, and record existing cultural resource sites within the direct APE. Inconsistent site location coordinates in the AHRS database limited relocation of known sites to two or three per day. The 2012 effort indicates that coordinates for all AHRS sites in the direct APE must be updated, for which it is estimated six crews of six people will be necessary. To ensure the most consistent and reasoned application of the model, field crews will be briefed on the criteria for defining high and low potential areas as part of their initial project orientation.

13.5.4.3. Culturally Modified Trees

Culturally modified trees (CMTs) are quantifiable data that can only be detected from ground surveys, though ethnogeographic studies can help identify where CMTs might be found and interpret their meaning. In Alaska's interior, traditional Native tree modification typically takes the form of blazing, bark removal, and occasionally weaving or braiding of branches. Sometimes CMTs mark a trail, route direction, or fork, but more often tree bark was harvested for uses such as canoe manufacture, basketry, house construction, and cache pit lining. Typically the location, number of CMTs, modification type (e.g., scar, plank removal, bark removal, burn), dimensions, aspect, sketch, and a description of the CMT are recorded on a field form. Since 2001, in consultation with the SHPO, groves with 25 or more CMTs are recorded in the AHRS inventory.

13.5.4.4. Lake Coring

Lakes and ponds can contain a paleoenvironmental record spanning hundreds and thousands of years. Under stable conditions, their surfaces collect airborne sediments that then sink and ultimately settle on the basin floor. By sampling lacustrine (lake) bottom sediments it is possible to characterize past environmental conditions during the Holocene and very late Pleistocene. Lake sediments typically contain pollen spores, volcanic ash (tephra), wind-blown silt (known as aeolian silt, or loess), and sand. Insect exoskeletons, aquatic microorganisms, vegetation, and other botanical and faunal remains in various states of preservation contribute to basin sediments. Through time, the resulting lacustrine beds preserve a record of the area's sedimentation history and vegetation succession. Accurate information on the study area's paleoenvironment helps place the archaeological record in its proper context, and can contribute temporal depth to analyses of contemporary flora and fauna.

Two important factors bearing on lacustrine coring methods are time of year and water body depth. The best season to core lake beds is spring, when thick ice provides a stable work platform and allows the coring equipment to remain relatively parallel to the water column. Also, by mid-spring, the longer days provide safe and suitable working light. Without adequate ice, a floating platform must be constructed and anchored into place after break-up, creating numerous logistical problems. Water depth is the second most important factor when lake coring, with a water depth of 15'-20' being optimal. Deeper lakes require extensions on the coring device that increase the fieldwork effort, which is why shallow water bodies are preferred sample locations.

Livingstone piston corers are the most common and least expensive devices used to core lakes and ponds.

Three to five lakes at varying elevations in the study area will be cored, preferably shallow water bodies near cultural resources. If bathymetric data is available it will be used to screen-out lakes and ponds unsuitable for coring; if not, then additional reconnaissance effort will be required to map lake bottoms.

Lake coring will be conducted in the spring of 2014, involving a crew of between three and five specialists flown to each of the lakes to be sampled in the study area. A fixed-wing aircraft on skis will be used to transport the crew and cores (due to weight restrictions and core sample lengths -- multiple cores measuring 1 m each -- a helicopter is not advisable). The fieldwork is estimated to take from three to five days. An ice auger will be used to cut a hole for inserting the piston core extensions. Samples of the lacustrine sediments will be taken in one meter increments depending on the sediment depth, with the ideal being an complete column from the uppermost lake sediments down to bedrock. Glacially-derived kettle lakes common in the study area provide favorable coring conditions. Analyses will be conducted by outside laboratories other than AEA. Analyses to be conducted include: 1) radiocarbon dating consisting of 25-30 samples; 2) Carbon-Nitrogen isotope ratio; 3) oxygen isotope ration; 4) pollen identification; and 5) tephra geochemical characterization. The duration of laboratory preparation, analysis, synthesis, and results is expected to extend into 2015. An interim report of radiocarbon results and preliminary tephrochronology will be completed by 2014 and included in the Updated Study Report.

13.5.4.5. Survey Strategy and Phasing of Field Investigations in the Direct APE

The study methods to be implemented in 2013 and 2014 focus on cultural resource identification (inventory) and evaluation (OHA 2003). Described here are the accepted professional practices commonly applied in contemporary archaeological and broader cultural resource investigations. The known properties within the APE to be evaluated include precontact/prehistoric archaeological sites, including isolated finds, TCPs, historic sites, and any other buildings, structures, objects or districts of an architectural nature that may be eligible for listing on the National Register. Discrimination of TCPs requires historic and ethnohistoric interviews, translation, and field investigation. Surveys may also be needed in areas where access was denied to archaeological crews in 1978-1985; and subsurface testing may be required at high-potential areas that were identified but not tested during previous fieldwork.

An aerial survey will be conducted prior to full field crew deployment in 2013 and in 2014. Aerial survey in this case will be used to verify proposed survey segments (Figure 13.5-5), examine helicopter landing zones, examine the direct APE as defined in this document, and provide planning data for the 2013-2014 field seasons.

The field investigations will be executed in two phases. Phase I (identification) surveys in 2013 and 2014 will address the direct APE including the camp, corridors, and impoundment area (Figure 13.5-1). The Alaska OHA and SHPO have defined standards and guidelines for these surveys. The Identification Phase is defined as, “reconnaissance level surveys . . . in the planning stages of a project. They are used to determine if an intensive survey or testing is warranted, but alone cannot normally be used to satisfy complete compliance. These studies entail development of research designs, archival and background research, field survey, analysis, and reporting. All

surveys should include pedestrian (walkover) examinations of the ground surface and might include subsurface testing" (OHA 2003).

Phase I survey in the direct APE will differ in coverage, intensity, and access in comparison to Phase I surveys in the indirect APE (see subsection 13.5.4.5 for indirect APE survey strategy). Survey in the direct APE will consist of pedestrian transects (described below), which record high potential areas; these areas are tested as conditions and logistics allow (e.g., helicopter access, daylight/weather, size of landform, etc.). The majority of effort in 2013 and 2014 will be devoted to the direct APE.

Two types of survey will be conducted on the direct APE: aerial (Type A) and pedestrian (Type B). Aerial surveys are conducted by helicopter at low airspeed and altitude across large expanses of land. Areas of high potential within these vast expanses are recorded by GPS and camera and returned to later for pedestrian survey and testing. Aerial surveys are also necessary in areas where geographic boundaries prohibit access by survey crews. Examples in the study area include steep valleys and river crossings, high elevations, and barrier waterfalls. Pedestrian surveys will be conducted in areas that have high potential for cultural resources, and particularly where there is high potential for deep aeolian sediments (especially during the 2013 field season). Methods used to optimally cover large areas of land (e.g., 40 acres) are to space a crew of six people 10 to 15 m apart in a line. The crew travels in a parallel line across the land inspecting the ground surface, trees, understory vegetation, and micro-topography for cultural resources.

Testing within a designated test area (regardless of whether or not it was identified by helicopter-based survey or pedestrian-based survey) consists of at least six, 50 x 50 centimeter (cm) test pits dug to a maximum of 1 m depth below ground surface. Tests are hand-excavated using a shovel and trowel and screened through 1/4 in or 1/8 in mesh. Tests are spaced five to 10 m apart based on the size of the landform. Tests are aligned in a systematically oriented, recorded, and replicable grid pattern. Grid size, number of tests, grid spacing, and grid orientation are all dictated by the size and shape of the landform being investigated. If cultural resources are encountered during Phase I they will be recorded as AHRS sites; restricted site information will be reported in the summary field report.

Phase II Evaluation surveys will be initiated on sites recommended in the Phase I assessment for further work in 2013 and 2014. If it is determined that a site will not be affected by the Project then no further survey will be recommended. Evaluations will require that one or more crews return to selected sites to collect data for evaluating National Register eligibility of sites potentially affected by the Project. Evaluation of known sites can require, but is not limited to: intensive survey; delineation; establishment and mapping of site boundary; scaled drawings; structural measurements; architectural assessment; dendrochronology; tephrochronology; radiocarbon dating; artifact analysis; and recommendations.

Sites within the impoundment up to the 2,075-foot elevation may be affected, especially the upper 100 feet (ft) where sites may be affected by shoreline erosion, scouring, sedimentation, and seasonal flow variations. OHA (2003) defines the Evaluation Phase as requiring; "evaluation of historic buildings and structures and/or investigation of adequate portions of archaeological sites to evaluate the significance of the property. These studies entail development of research designs, archival and background research, field studies, analysis, and reporting. When there are three or more buildings or structures, it should be determined if the resources constitute an

historic district. Archaeological evaluation projects must include excavation as a major component of field sampling." Sampling theory is composed of a number of contrasting or complimentary methods yielding results from a subset of a greater whole. The goal is to achieve an accurate result from the subset or sample that can be used to extrapolate the same result to the larger whole. "Adaptive sampling" allows modification of the sample design or strategy during the Evaluation Phase based on positive or negative results (Orton 2000:34).

The sample will be selected from all the sites recorded during the Identification Phase. This sample will be fully evaluated to determine eligibility during the Evaluation Phase. Until all sites have been identified, the sample size is unknown. The eligibility of a site to the NRHP may be based on four criteria: A) sites that are associated with events that have made a significant contribution to the broad patterns of our history; or B) sites that are associated with the lives of significant persons in our past; or C) sites that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or D) sites that have yielded or may be likely to yield, information important in history or prehistory (NPS 2012). The sample will also be based on site-specific criteria (e.g., within the direct APE, multicomponent, contain human remains, has organic preservation, intact tephra deposits, etc.). Because the cultural resource investigation is being done within an anthropological framework, and because Anthropology relies on the comparative method, adequate sample sizes of sites and specimens are critical for making the comparisons that will lead to defensible interpretations of the archaeological record with the APEs.

Many sites in areas that may be affected by the Project, such as the proposed inundation zone, will need Phase II surveys. Some affected sites will meet more than one of the criteria listed above, thus reducing the sample size. The greatest amount of effort will be focused on the impoundment area. Phase II survey will be conducted, in the direct APE only, in 2013 and 2014.

Results of the inventory survey will be presented in a Phase I report with recommendations for Evaluation Phase II testing and analysis of affected sites. The Project team will immediately begin processing site evaluation data as they are gathered. Lab analysis and report writing will be conducted concurrently with execution of the field survey. The required Phase II evaluation report will be prepared in 2014 for submittal by AEA to SHPO, BLM, and FERC. The results of this survey will help inform preparation of the HPMP. As is common after the application has been obtained, the HPMP may reserve subsequent seasons for completing evaluations, as necessary, and for developing management measures for historic properties within the APE (see FERC 2002).

13.5.4.6. Survey Strategy and Phasing of Field Investigations in the Indirect APE

The study methods applied to the indirect APE will differ from those described above for the direct APE. The methods will follow accepted professional practices for cultural resource investigations, but will differ in the amount of testing, aerial and ground survey intensity, and site recordation. The indirect APE defined above and shown on Figure 13.5-1 is the portion of the study area that may see increased human access and activity due to Project development.

Phase I survey in the indirect APE will be mainly conducted by aerial survey. Pedestrian survey will also be necessary in the indirect APE where the Project has been determined to have a potential effect on cultural resources. But the amount of ground survey in the indirect APE will

be less than in the direct APE. This discrimination will require supplemental engineering and geotechnical Project data such as proposed locations of ancillary facilities. It is understood that once these types of ancillary facilities are clearly defined then they will be incorporated into the direct APE. Until such facilities are defined then they will be surveyed as part of the indirect APE. Other indirect areas include trails and navigable waters providing access to the direct APE. The indirect APE addresses the impacts of activity in proximity to the impoundment but outside the direct APE.

The two types of survey to be conducted in the indirect APE are termed aerial (Type A) and pedestrian (Type B) (described in more detail above in subsection 13.5.4.4). The majority of the indirect APE will need to be aerially surveyed by helicopter with one crew at low air speed and altitude. Pedestrian survey will be conducted in areas of the indirect APE that have a high potential for containing cultural resources. Pedestrian survey consists of one crew of six or more spread along a line 10 to 15 m apart. Type B surveys will likely constitute a small proportion of survey area compared with Type A survey areas.

Subsurface testing will be conducted in areas that have at least been pedestrian surveyed. Testing consists of digging 50 x 50 cm test pits to a depth of 1 m when possible. Testing will be systematic. Testing intensity will be defined by the high potential landform shape, size, and safe accessibility. Normally, at least six tests will be excavated in any given test area. A grid will be laid out and tests will be performed every five to 10 m. If cultural resources are encountered during testing they will be recorded as AHRS sites and restricted site information will be reported in the summary field report.

Phase II Evaluations will be conducted in the indirect APE in locations where Project-induced recreational activities along existing trails and camp sites leading to the reservoir could adversely affect cultural resources. The level of effort required to conduct a Phase II National Register eligibility evaluation in these areas will be developed in consultation with the SHPO, federal and municipal agencies, Alaska Native entities, and other interested parties, following AEA's completion of the initial work in the indirect APE described in this section.

With regard to other potential Project-related effects to cultural resources in the indirect APE identified at a later time, (e.g., due to changes in Project design, scope, and/or location of Project works and facilities), then those sites will be recommended for evaluation in field studies beyond the 2013-2014 seasons.

13.5.4.7. Mapping-Related Activities

- Map recently identified prehistoric resource locations. Sites will be relocated and mapped with a survey-grade Trimble GeoXT 6000 Series in North American Datum of 1983 (NAD83) with real-time accuracy of 50 cm (scheduled for completion in 2013-2014).
- Add to or adjust locational data on prehistoric settlement patterns and land use (scheduled for completion in 2013-2014).
- Add to or adjust locational data on historic settlement patterns and transportation routes (scheduled for completion in 2013-2014).
- Compile additional relevant environmental datasets from the 2012 field season for use in future locational model (scheduled throughout 2013-2014).

- Map TCPs within the APE, creating a geodatabase with TCP locations and place names. Locations will be depicted based on historical and cultural information. Depending on the nature of some resources, special restrictions may need to be placed on access to information (scheduled throughout 2013-2014).
- Prepare maps using the latest GIS files with Ahtna place names (Kari 2012) and expanding and annotating the current Ahtna/Dena'ina place name inventory into the geodatabase being developed for cultural resource sites (scheduled throughout 2013-2014).

13.5.4.8. Ethnogeography-Related Activities

- Hold a regional elders conference as a venue to inform communities of the upcoming research work, including information on other AEA sponsored research, such as fisheries and wildlife studies, subsistence studies, etc. The conference is planned to be held in the Ahtna region (since most Native contributors are from that region) with invitations to others, and scheduled so as not to interfere with the Alaska Federation of Natives (AFN) annual meeting. A conference in early March of 2013 will avoid traditional Ahtna and Dena'ina subsistence activity windows and the date will be scheduled concurrent with other community meetings or gatherings for maximum efficiency and courtesy.
- Identify, inventory, and compile archival data sources of the Ahtna language, with particular focus on the Jake Tansy recordings on land use and travel, some of which appear in Kari (2010). Recorded stories pertinent to the upper Susitna River from other Ahtna narrators, including Jim Tyone, Jack Tyone, John Shaginoff, Henry Peters, and Fred John will be evaluated, along with the few known Shem Pete recordings and narrative segments that pertain to the Talkeetna Mountains and the upper Susitna River (scheduled throughout 2013-2014).
- Identify and inventory additional data from collections of tapes and transcripts recorded in the English language by the BIA, the Institute for Social and Economic research (ISER), Ahtna, Inc., and other researchers, including Frederica de Laguna and Constance West (scheduled throughout 2013-2014).
- Identify knowledgeable Ahtna individuals to interview for current ethnographic information on potential TCPs in the study area (scheduled throughout 2013-2014).
- Collect Ahtna interview data on contemporary land use and the cultural landscape (scheduled throughout 2013-2014).
- Develop interview protocol with the assistance of knowledgeable Ahtna individuals to guide effective interviewing (scheduled throughout 2013-2014).
- Interview 30 to 50 Ahtna persons of different ages (estimate two hours per interview) (scheduled throughout 2013-2014).
- Document the results of Ahtna interviews, and transcribe tapes (scheduled throughout 2013-2014).
- In consultation with CIRI, identify knowledgeable Dena'ina elders to interview for current ethnographic information on potential TCPs in the study area, to build on existing

Upper Cook Inlet Dena'ina places names work (Kari and Fall 2003) (scheduled for 2014).

- Collect Dena'ina interview data on contemporary land use and the cultural landscape (scheduled for 2014).
- Develop interview protocol with the assistance with Dena'ina elders, and in consultation with CIRI, to guide effective interviewing (scheduled for 2014).
- Interview Dena'ina elders (estimate two hours per interview) (scheduled for 2014).
- Document the results of Dena'ina interviews, and transcribe tapes (scheduled for throughout 2014).
- Develop data on three types of trails: BLM layer, field observation layer, and historic foot trail layer.

13.5.4.9. Synthesis and Analysis Activities

- Develop historic contexts. This task will be largely dependent on the outcome of 2012 planning studies, fieldwork, analysis, and agency consultation. This task will be implemented in 2013.
- Update cultural chronology. This task will be largely dependent on the outcome of 2012 planning studies and 2013-2014 fieldwork and analysis. For this reason, the work will be deferred until after field studies are complete. This will require collecting and analyzing samples at a number of sites for archaeometric analysis, radiocarbon dating, optically stimulated luminescence OSL dating, and tephrochronology (see Bowers et al. 2012).
- Develop archaeological locational model prior to fieldwork. Digital data will be examined statistically to assess strength of associations between known dependent variables (site locations) and independent variables, such as elevation and other environmental variables (15 to 20 or more variables can be assessed). The model output is a map of the study area with negative to positive values depicted in 30 m (98 ft) by 30 m (98 ft) units that grade from dark to light; areas with negative or lower values are least likely to hold sites, and areas with higher, positive values are most likely to hold sites. The information generated is useful for developing survey strategies across the APE and particularly unsurveyed areas, but it is also applicable to surveyed areas that appear to need further exploration.
- Transcribe and translate place name terms and narratives, with initial translation performed by Dr. Kari (scheduled throughout 2013-2014).
- Proofread and correct initial and secondary translations by language specialists or Ahtna elders (scheduled throughout 2013-2014).
- Synthesize data sets to prepare an Interim Study Report by early February 2014 and a final comprehensive report to be submitted as the Updated Study Report by early February 2015. Combine the archaeological results; locational model; historic and contemporary land use patterns; Ahtna and Dena'ina perspectives on the land and

resources; Ahtna- and Dena'ina-language place names; and narratives about important locations. Identify additional studies and reports if needed (scheduled for 2014).

13.5.4.10. Inadvertent Discoveries

Protocols for the inadvertent discovery of human remains, graves, and/or burial items are described in the Plan for Unanticipated Discoveries of Cultural Resources and Human Remains. This document outlines the methods for confirming field discoveries, requirements for communicating discovery information, and contacts for state officials, federal agents, and affected Alaska Native entities.

*13.5.4.11. Archaeological Internshi*p *and Additional Workforce*

AEA's cultural resources study will include an internship program to provide an opportunity for Alaska Native entities to participate in the fieldwork and work alongside registered professional archaeologists for the 2013 and 2014 seasons. Duties, desired experience, and preferred educational background are outlined below.

Primary Responsibilities:

- Assisting in conducting Phase I reconnaissance survey
- Assisting in conducting Phase II site evaluations
- Using standard archaeological field techniques, these include:
    - Walking transects (up to 5 miles per day, possibly more) and working 6-12 hours per day in the boreal forest
    - Taking notes and photographs
    - Digging shovel and trowel test pits
    - Screening sediments
    - Carrying a pack and equipment (weighing up to 35 pounds)

Knowledge and Skill Requirements:

- Course work in history, social sciences, and earth sciences
- Experience/training in specialized areas is preferred (e.g., anthropology, geology, ecology)

AEA also plans to invite Matanuska-Susitna Borough archaeologists, when available, to work with the archaeological crews in the field.

13.5.5. Consistency with Generally Accepted Scientific Practice

The research methods discussed in this proposed Cultural Resources Study (Section 13.5) are consistent with professional practices and FERC's study requirements under the Integrated Licensing Process (ILP). Inventory, evaluation, and determination of effect are well-established steps under NHPA Section 106 and the ACHP's implementing regulations at 36 CFR Part 800. Additionally, the quality of work and qualifications of workers will adhere to the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44716).

This Cultural Resources Study will be undertaken in accordance with the implementing regulations of NHPA Section 106, FERC's ILP regulations, the Secretary of the Interior's

(Secretary) Standards and Guidelines for Archeology and Historic Preservation (48 FR 44716), the Secretary's Professional Qualification Standards (48 FR 22716), and the ACHP's general guidelines for identification and testing procedures as set forth in *Treatment of Archeological Properties, A Handbook*. Unless otherwise specified, field notes, samples, artifacts, and other collected data will be curated with the University of Alaska Museum in Fairbanks in accordance with the requirements set forth in 36 CFR Part 79. Site information, other than the site's AHRS number and National Register eligibility, will be maintained as confidential as provided for under NHPA Section 304, as amended (16 U.S.C. § 470w-3).

In addition, all field crew members will receive approximately two hours of classroom/laboratory instruction on tephra identification and its importance, as well as approximately two hours of classroom/laboratory instruction on soil stratigraphy, as part of the routine pre-field training for archaeological survey crews.

Because FERC's standard practice in hydropower licensing processes is to enter into a (PA) with the SHPO, AEA expects FERC to circulate a draft PA following the completion of the cultural resources study, and likely shortly after its issuance of the draft environmental impact statement.

13.5.6. Schedule

In 2012, a crew of three archaeologists worked within the direct APE to derive estimates for the time and effort needed to relocate, map, and record known cultural resource sites. Two to three known sites were relocated per day, so it is estimated that six six-person crews will be necessary to adequately inventory all known sites in the direct APE. The 2012 field survey determined that the known site coordinates are inaccurate and will need to be updated in the AHRS database as a result of the cultural resource inventory. Results of the 2012 field season have been incorporated into the 2013-14 Revised Study Plan.

Fieldwork performed in 2013-2014 (Table 13.5-3) will include the following components:

- Site Surveys (Inventory Phase). Applying the GIS-based locational model developed early in the study, the 2013-2014 field efforts will begin within the impoundment area. Survey will take place in the proposed Gold Creek, Chulitna, and Denali Corridors. To the extent possible, the study will make use of the 1978-1985 Phase I survey data (e.g., Bowers et al. 2012; Dixon et al. 1985; Greiser et al. 1985, 1986).
- Site Testing (Evaluation Phase). The 2013-2014 field efforts will initiate systematic site testing, with the goal of developing recommendations of eligibility to the National Register for a sample of sites within the direct APE. This will primarily include the Watana impoundment zone, and to a lesser extent the proposed Gold Creek, Chulitna, and Denali Corridors.

Study products to be delivered in 2013-2015 will include:

- **Interim Reporting.** The progress of the cultural resource investigations will be presented to the Technical Workgroup on a quarterly basis during 2013 and 2014.
- **ArcGIS Spatial Products.** Shapefiles of the 1980s and current cultural resources data will be compiled into a geodatabase for the study area. All map and spatial data products will be delivered in the two-dimensional Alaska Albers Conical Equal Area projection, and NAD 83 horizontal datum consistent with ADNR standards. Naming conventions of

files and data fields; spatial resolution; and metadata descriptions must meet the ADNR standards established for the Project.

- **Final Reports.** Reports completed at the beginning of 2014 and 2015 will summarize the results of each field season and will be submitted to resource agency personnel and other licensing participants along with spatial data products. This will include recommendations for additional study in subsequent field seasons and will cover Identification and Evaluation Phases of the Project studies. Reports will follow FERC and SHPO protocols (36 CFR Part 800); will follow professionally-accepted standards; and will include site descriptions, site evaluations (Recommendations of Eligibility), and Determinations of Effect. The reports will be filed with FERC to fulfill the study report requirements of 18 CFR section 5.15(c) and (f) of the ILP regulations.

During the licensing process AEA, in consultation with the SHPO and BLM, will develop an HPMP specifying procedures for the continued identification, evaluation, and protection of historic properties.

13.5.7. Relationship with Other Studies

The cultural resource study's interdependency with other studies is depicted in Figure 13.5-6. Both the Ethnogeography/TCP effort and the archaeological inventory expect to be informed by information resulting from other studies – to be in hand by Q4 2013. A set of three questions has been included in the Traditional Knowledge surveys as part of the Subsistence Study (Section 14), specifically to illicit comments about potential TCPs. The questions are general, derived from the legal definition of a TCP, and designed to draw-out details from the narrator. In turn, the ethnogeography investigation is expected to have developed oral history accounts about caribou migrations and possibly other natural resource patterns by Q2 2014, which is information of value to the Subsistence study group (Figure 13.5-6).

Three study groups will yield information of use to the archaeological inventory, within the cultural resource study. The Recreational Resources study will contribute information on trails and predicted recreation localities within the study area, the Geology and Soils study will contribute information bearing on erosion and mass-wasting processes, and the Geomorphology study will provide information on the age of landforms. The cultural resource investigations will produce data sets on site nature and location, so reports are expected to be of limited distribution and largely not shared with other study groups (Figure 13.5-6).

13.5.8. Level of Effort and Cost

The work described above will take place during the 2013 and 2014 field seasons, with initiation of evaluations of National Register eligibility in 2013-2014. Costs proposed here are in addition to the 2012 reconnaissance effort. For the combined 2013 and 2014 effort, the costs of cultural resource investigations (including field studies, data collection and mapping, analysis, and reporting) have been estimated to cost $7.2-$8.2 million.

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13.5.10. Tables

Table 13.5-1. Datasets used in Project Model 1

Dataset	Source	Access
Archaeological site type and location	Alaska Heritage Resources Survey (AHRS)- Alaska Office of History and Archaeology	Permit
Revised Statute 2477 Historic Trails	Alaska Dept. of Natural Resources	Public
Digital elevation models (DEM)	United States Geological Survey	Public
Surface geology, lode deposits, sediment basins	United States Geological Survey, Alaska Dept. of Natural Resources	Public
Ecoregion	United States Geological Survey	Public
Hydrography	United States Geological Survey, Alaska Dept. of Natural Resources	Public
Vegetation	U of California, Berkeley, Ducks Unlimited	Public
Wetlands	United States Fish and Wildlife Service	Public
Wildlife (fowl, fish, mammals)	Alaska Department of Fish and Game & Alaska Department of Natural Resources	Public
Permafrost	National Snow and Ice Data Center	Public
Temperature and Precipitation	National Snow and Ice Data Center	Public

Table 13.5-2. Classified variables examined in Project locational modeling.

Variables	Classes
Site type	classes 1 through 4 (Random, Prehistoric, Native Historic, Euro-American Historic)
DEM	classes 1 through 23 (100-meter increments)
Slope	classes 1 through 9 (5-degree increments)
Aspect	classes 1 through 9 (45-degree increments)
Surficial geology	16 classes (dataset codes)
Possible tool-stone location	presence/absence (1, 0)
Coal deposits	presence/absence (1, 0)
Metalliferous-lode deposits	presence/absence (1, 0)
Vegetation	classes 0 through 23 (dataset codes)
Distance to lake	classes 1 through 4 (within 100, 500, 1000 meters, & > 1000 meters)
Distance to stream	classes 1 through 4 (within 100, 500, 1000 meters, & > 1000 meters)
Distance to anadromous waters	classes 1 through 4 (within 100, 500, 1000 meters, & > 1000 meters)
Caribou ranges	presence/absence (1, 0 - summer, winter, calving, migration routes)
Moose ranges	presence/absence (1, 0 - summer, winter, calving, rutting)
Dall's sheep ranges	presence/absence (1, 0 - summer, winter)
Dall's sheep licks	presence/absence (1, 0)
Duck & geese ranges	presence/absence (1, 0 - nesting, molting, summer, winter, migration routes)
Swan ranges	presence/absence (1, 0 - nesting, molting, summer, winter, migration routes)
Seabird colonies	presence/absence (1, 0)
Eagle/raptor concentrations	presence/absence (1, 0)
Precipitation	classes 1 through 6, January (20 millimeter increments) & July (30 millimeter increments)
Temperature	classes 1 through 5, January (3-degree C increments) & July (1 degree C increments)
Permafrost	classes 1 through 8 (dataset codes)

Table 13.5-3. Schedule for implementation of the cultural resource study.

Activity	2012				2013				2014				2015
	1 Q	2 Q	3 Q	4 Q	1 Q	2 Q	3 Q	4 Q	1 Q	2 Q	3 Q	4 Q	1 Q
Reconnaissance level field study			—										
Modeling and sample design development from 2012 field reconnaissance				—	—								
Pre-field preparation (logistics, equipment, maps, safety, training and aerial reconnaissance of direct and indirect APEs)					—	—							
Archeological Field studies – Inventory (priority on the impoundment, followed by corridors)						—	—						
Archeological Field studies – Initiation of Evaluation (priority on the impoundment, followed by corridors)							—						
Ethnogeographic Study, planning, coordination with tribes, Elders conference					—	—			—	—			
Ethnogeographic Fieldwork						—	—	—	—	—	—	—	
Draft Ethnogeographic study report, circulated for community review, Elders conference								—					
Initial Study Report								—	Δ				
Additional modeling from 2013 field study results, integrate results from ethnogeographic study, develop sample design for 2014								—	—				
Lake coring										—			
Pre-field preparation (logistics, equipment, maps, safety training)									—	—			
Field studies –Inventory (corridors and trails)										—	—		
Field studies – Evaluation (all project components)										—	—		
Updated Study Report											—	—	▲

Legend:

——— Planned Activity

Δ Initial Study Report (February 2014)

▲ Updated Study Report (February 2015)

13.5.11. Figures

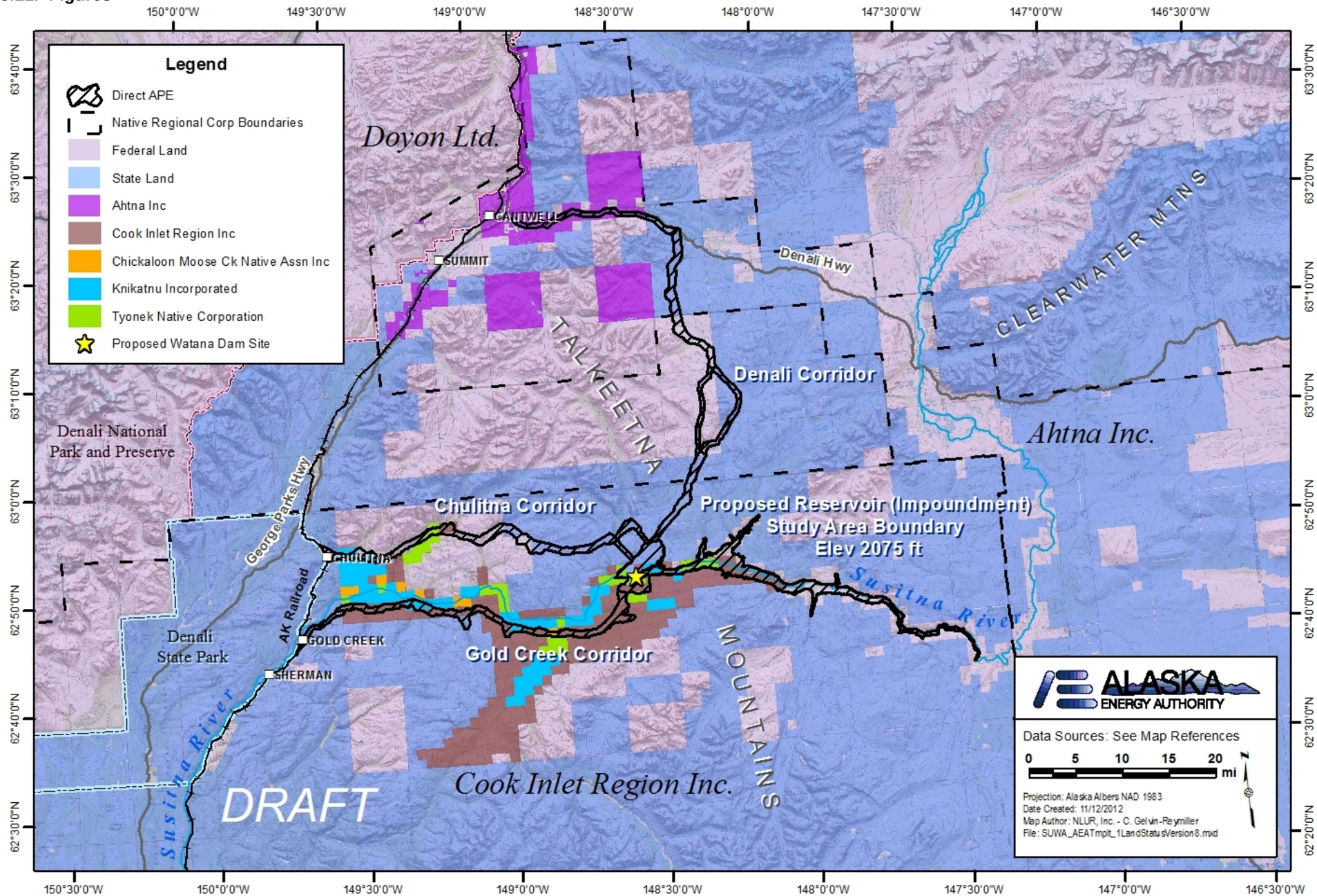

Figure 13.1-1. Property ownership in the vicinity of the study area.

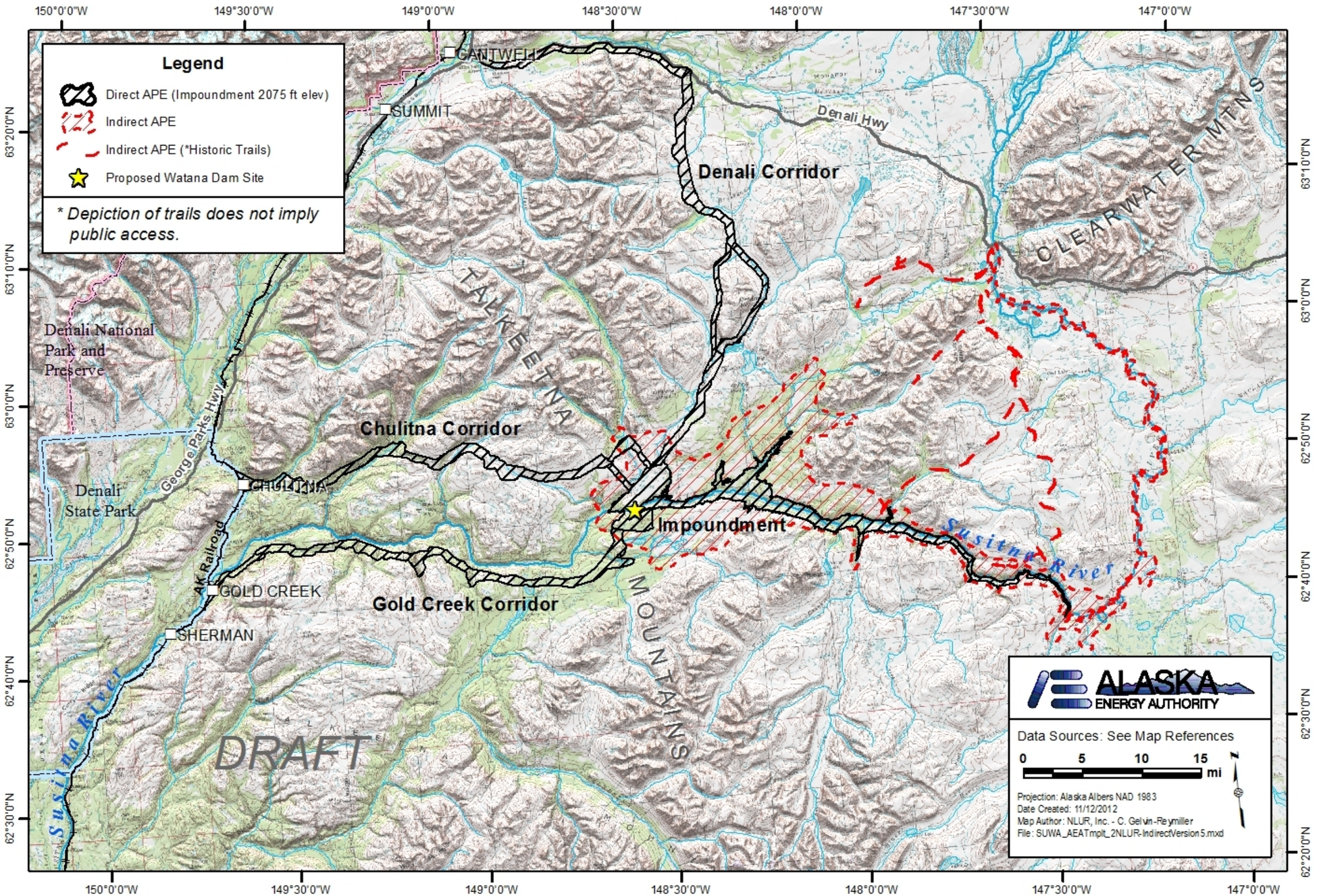

Figure 13.5-1. Direct and indirect APEs for the cultural resource study.

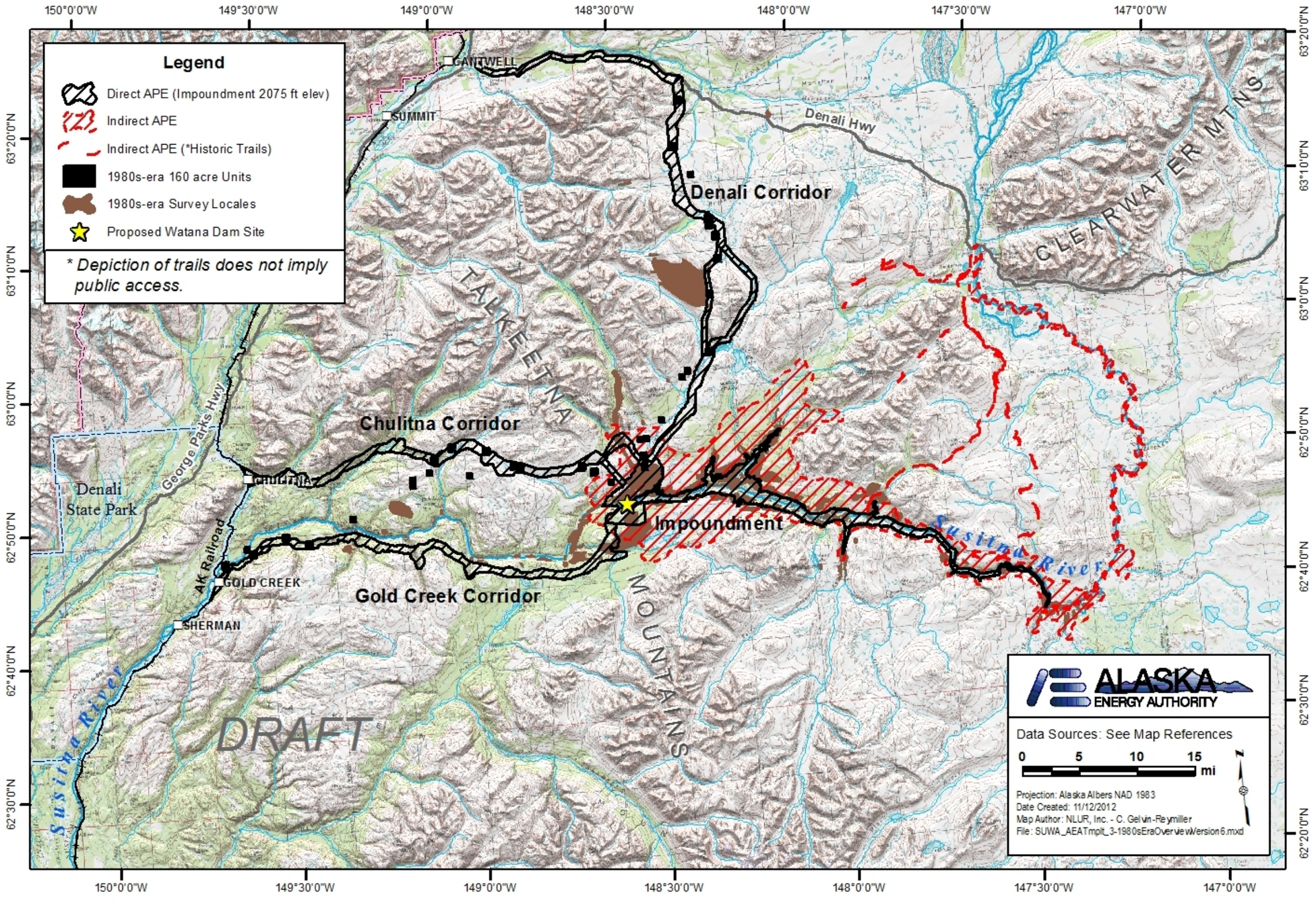

Figure 13.5-2. Survey coverage accomplished in the late 1970s and early 1980s.

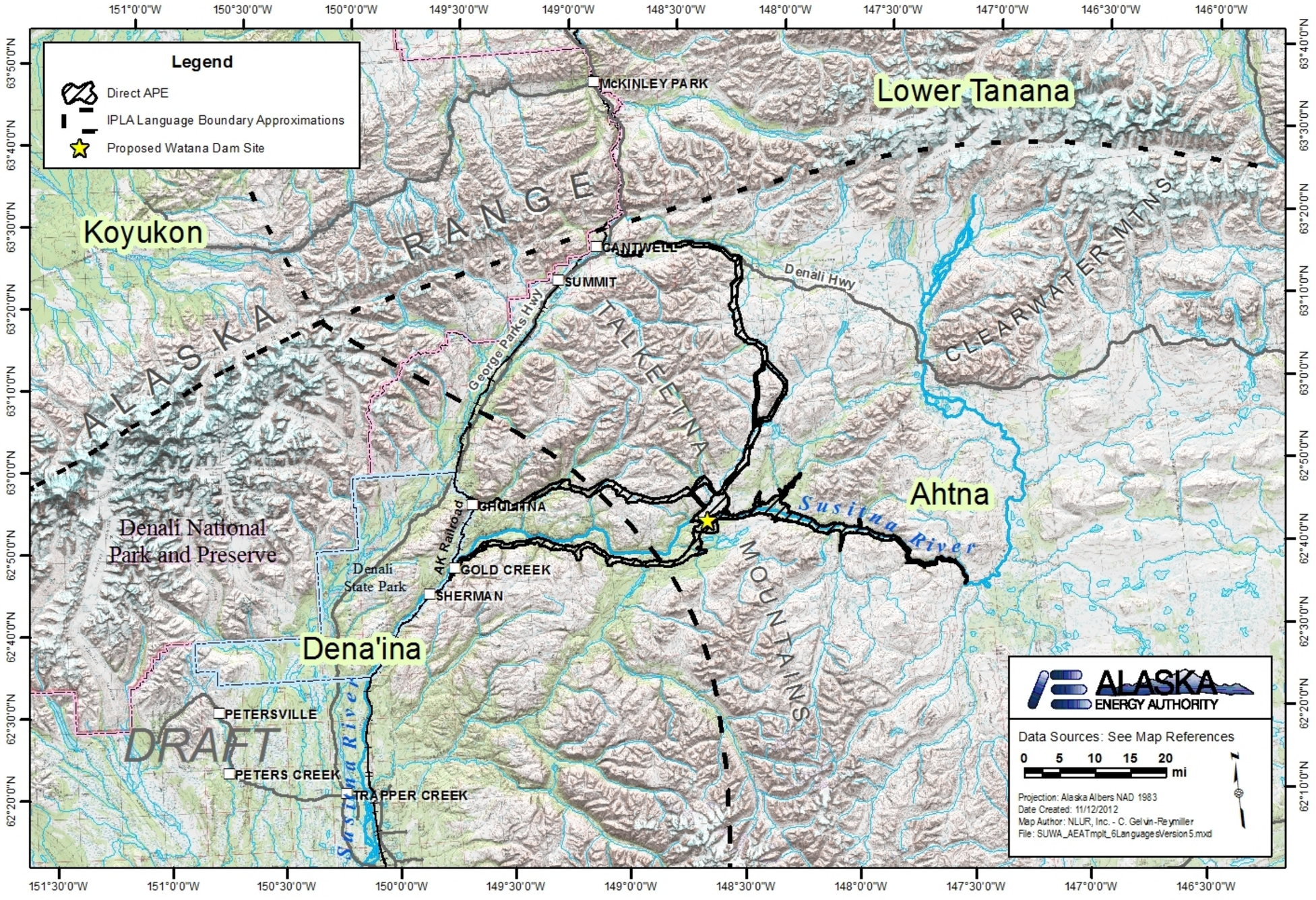

Figure 13.5-3. Traditional Native language areas in the vicinity of the study area.

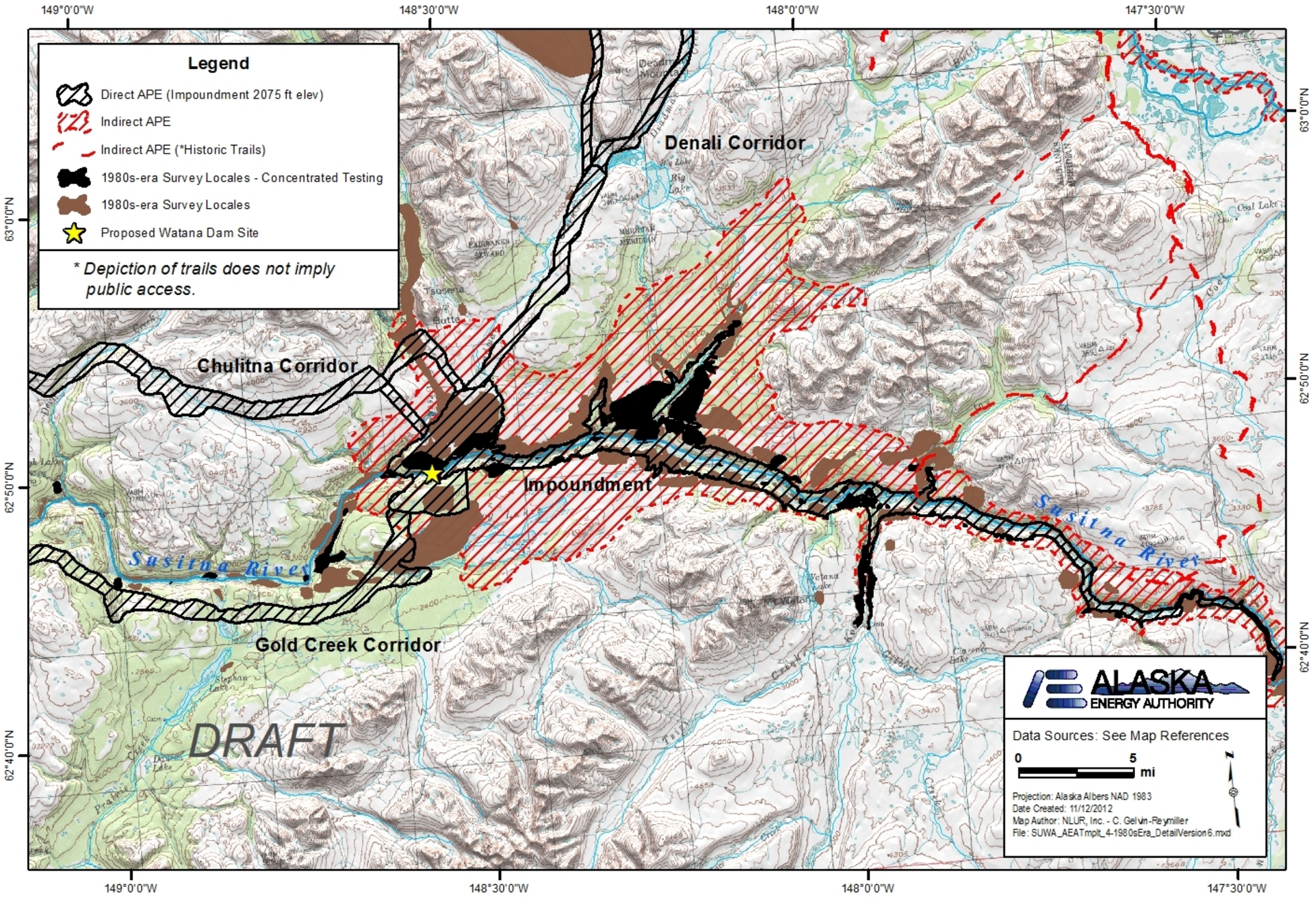

Figure 13.5-4. Detail of testing accomplished in the late 1970s and early 1980s.

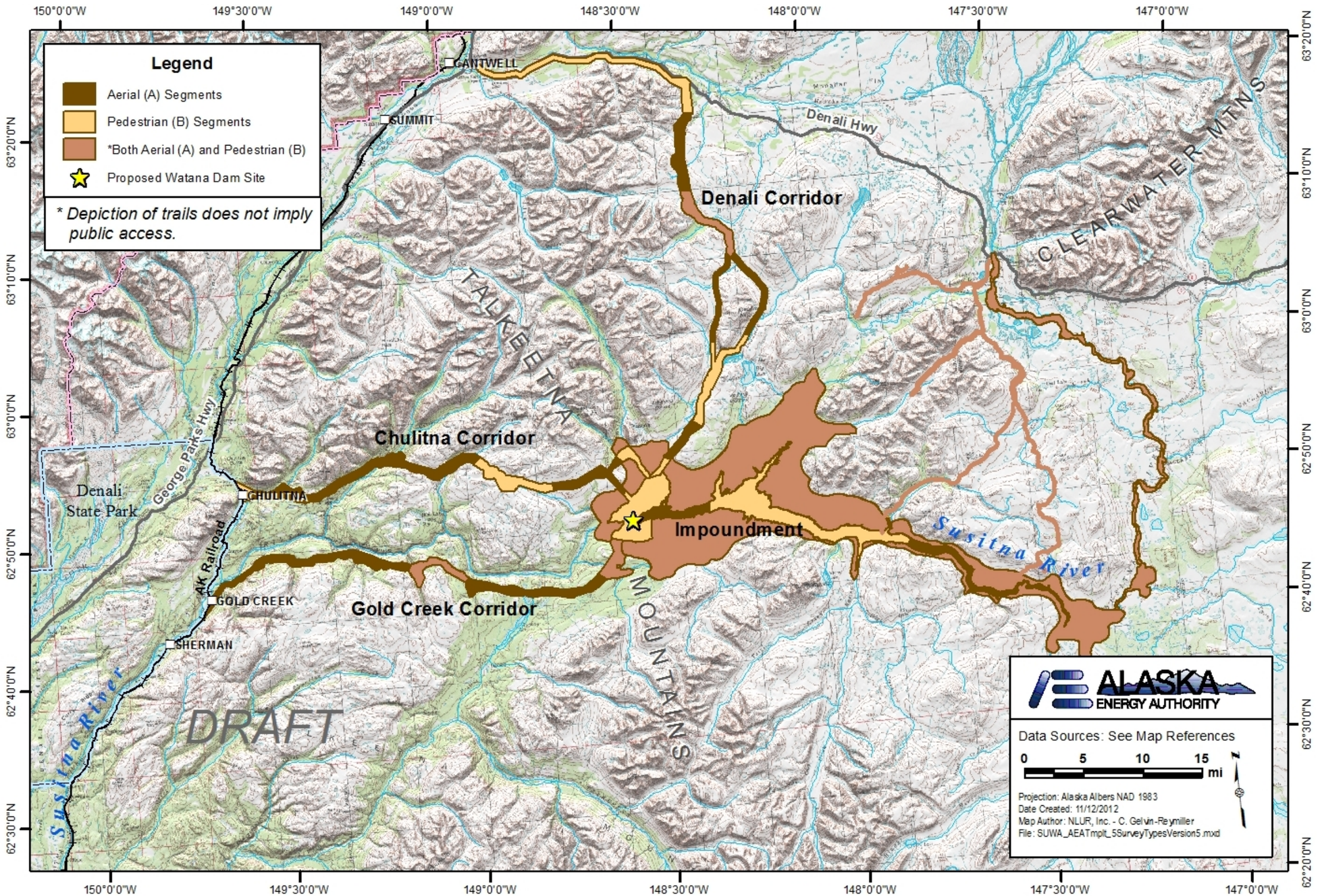

Figure 13.5-5. Proposed survey methods in the direct and indirect APEs.

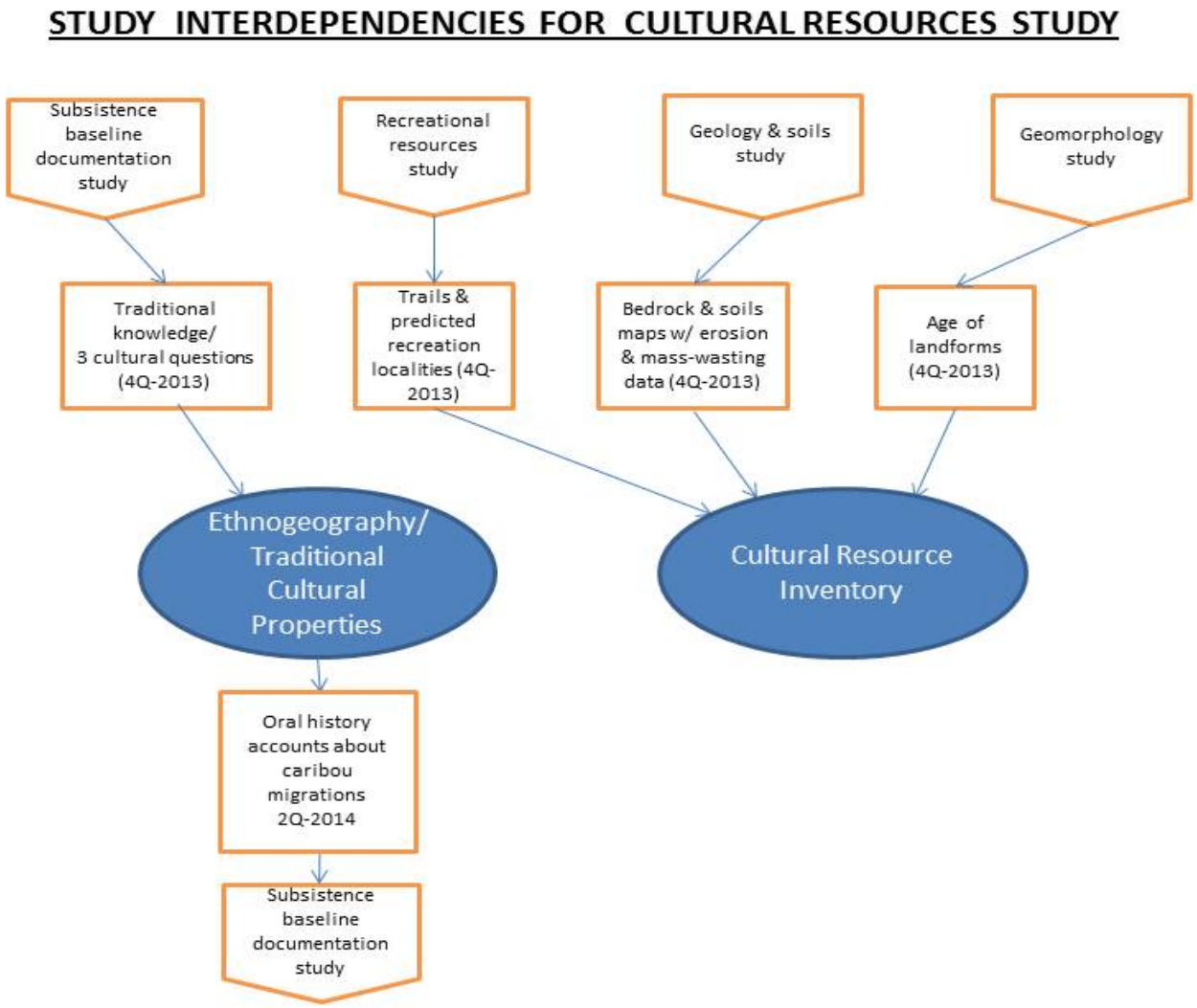

Figure 13.5-6. Study interdependencies for the cultural resources study.