ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ENVIRONMENTAL STUDIES
PROCEDURES MANUAL

SUBTASK 7.06
CULTURAL RESOURCES INVESTIGATION

Terrestrial
Environmental
Specialists, Inc.

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Submitted by

Terrestrial Environmental Specialists, Inc.

and

University of Alaska Museum

to

Acres American, Inc.

Environmental Study Manager (TES)

Environmental Study Director (TES)

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PROCEDURES MANUAL/RESEARCH DESIGN

SUBTASK 7.06 CULTURAL RESOURCES INVESTIGATION

FOR THE SUSITNA HYDROPOWER PROJECT

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A. DESCRIPTION OF STUDY

The cultural resources investigation for the Susitna Hydropower Project has two objectives: 1) identification of archeological, historical and paleontological resources in the project area; and 2) testing and evaluation of these resources in order to propose mitigation measures and lessen the impact of ground disturbing preconstruction activities. To meet these objectives the following five step research effort has been developed:

1. Preparation for field studies.
2. Reconnaissance level archeological survey of project area.
3. Intensive testing of archeological and historic sites discovered during Step 2.
4. Analysis and Final Report preparation.
5. Curation of cultural and paleontological materials.

In preparation for field studies it is necessary to develop a research design based on the current data base, literature review, and other pertinent information. For this project the research design integrates the current data base into a cultural chronological framework, and develops a research strategy that is structured to gather data necessary to predict site locations in relation to physical and topographic features in the project area. Ultimately, the research design: 1) will allow the identification of many of the resources located in the project area; 2) will target areas demonstrating high probability of site presence which should be considered areas of high risk for site disturbance; and 3) will provide a basis for the evaluation of site significance based on research potential. In addition to development of the research strategy, other prefield tasks must be performed. These include the acquisition of State and Federal Antiquities Permits, recruitment of personnel, staging of fieldwork, and development of the procedures manual.

The reconnaissance level archeological survey, Step 2, for the project area will consist of on-the-ground survey and sampling. Sampling will allow the reconnaissance survey effort to make predictions concerning site density in each sampling strata. The sampling design to be employed will be a stratified random sampling procedure and is discussed in the Technical Procedures Section. Survey will be conducted in certain areas that will be directly affected by preconstruction activities such as seismic lines and trenches, borrow areas, access roads, drilling sites, and aircraft landing sites as well as the proposed impoundment areas for the Devil's Canyon and Watana Dams. Projected construction areas for the dams and related facilities will also be examined.

Intensive testing, Step 3, will be conducted at sites located during the Step 2 survey. The majority of this testing will occur in the second field season. Metric grids will be superimposed on these sites and metric units selected for excavation. Each unit selected for testing will be systematically excavated. All artifacts and features will be recorded using standard archeological field methods. Site maps and soil profiles will be prepared. Photographs will be taken to document artifacts, features, and site location. Site limits will be delineated and data will be recovered for analysis and evaluation based on the analysis of this material. Intensive testing will provide the data necessary for evaluating the effects of the preconstruction and construction phases of the Susitna Hydropower Project on cultural resources. Each site will be evaluated and mitigating measures recommended and incorporated into the Final Report.

Analysis and Report Preparation, Step 4, entails compilation and analysis of the individual reports for the other phases of the project. The analysis of recovered data will include recommendations for mitigation of adverse effects to sites when appropriate. The specific objective of this step is the presentation of a detailed summary of the results of the cultural resource investigation and recommendations concerning this project. The Final Report will include the location, description, and a mitigation recommendation for each site located. Estimated manpower requirements will be provided for the archeological excavation of specific sites. The overall analysis will be evaluated and discussed.

As presently scheduled, the FERC license application will be prepared prior to the completion of the Cultural Resources Analysis. The cultural resources section of the exhibit will be based on the Phase I Final Report. This report will include recommendations for as many sites as possible and will be based on information which is available at the time the report is prepared (i.e. immediately following the 1981 field season). There are, however, constraints which will make it impossible to provide certain critical information prior to submission of the report. One such constraint is the time required to obtain radiocarbon determinations from samples collected during the 1981 field season. Another is the limited analysis time. Additional data will be provided when available.

Curation of recovered artifactual material and associated contextual data, Step 5, will be an ongoing program throughout the project. All recovered material and supporting documentation will be housed at the University of Alaska Museum and curated in accordance with State and Federal requirements pertinent to the preservation of antiquities.

B. LEGAL BASIS

The Susitna Hydropower Project is a federally licensed project for the State of Alaska. As such, the legal framework and authority for the consideration of cultural resources are spelled out in a number of Federal and State regulations. As early as 1906, the Antiquities Act (P.L. 59-209) directs the preservation of properties "of national, historical or archeological significance and authorizes interagency, intergovernmental, and interdisciplinary efforts for the preservation of such resources." The Reservoir Salvage Act of 1960 (P.L. 86-523) provides for the recovery and preservation of "historic and archeological data" that might be lost or destroyed as a result of the construction of federally funded or licensed dams, reservoirs, and attendant facilities and activities.

The Historic Preservation Act of 1966 (P.L. 89-655) declares it to be a national policy to preserve and protect historic and prehistoric sites, buildings, and objects of national significance. Continuing with this policy the National Environmental Policy Act of 1969 (P.L. 91-180) requires evaluation of the effects of major federal actions on the environment including cultural resources. The Archeological and Historic Preservation Act of 1974 (P.L. 93-391) is an amendment to the Reservoir Salvage Act of 1960. The 1974 Act provides for the protection of historic and archeological sites:

> . . . which might otherwise be irreparably lost or destroyed as a result of (1) flooding, the building of access roads, railroads and highways, and other alterations of terrain, caused by the construction of a dam by any agency and (2) any alteration of the terrain caused as a result of any federal construction project or federally licensed activity or program. (Sec. 1)

Section 7 of this Act authorizes that up to 1% of the total budget of a federally funded or licensed project may be allocated for archeological survey, recovery, analysis, and publication. The Alaska Historic Preservation Act of 1975 specifies that prior to any construction or public improvement by a State agency, or by a private concern under contract with or licensed by the State, cultural resources must be considered. Cultural resource preservation efforts are required by Federal and State law to satisfy licensing requirements for the Susitna Hydropower Project. These tasks are: 1) identification and documentation of cultural resources within project areas; and 2) formulation and explication of recommendations for mitigation for each historic or archeological site identified. However, it is also recognized that the initial studies essential to meet licensing requirements may have direct impact on cultural resources which may pose immediate adverse effects. Examples of such activities are construction of camps to house study personnel, test holes to locate proposed borrow areas, access roads to study locale, etc.

This study will recommend measures which can mitigate potential damage to archeological and historic sites during the course of the engineering and environmental studies. If such mitigation procedures are not incorporated into the proposed action for historic preservation, needless delays and unnecessary additional costs will be inevitable. This has been repeatedly demonstrated in other large construction projects which have required the identification and mitigation of cultural resources for licensing. This research design foresees this need and provides methods by which these delays can be avoided. The proposed cultural resource investigations should be conceptually divided into objectives: 1) the effort necessary to identify and propose mitigation measures for possible adverse effects during the course of the preconstruction and construction activities; and 2) the effort necessary to mitigate damage to all historic and prehistoric sites that will be disturbed either directly or secondarily, by dam construction. This study is concerned with the first of these objectives.

II. TECHNICAL PROCEDURES

A. INTRODUCTION

The research design for the Susitna Hydropower Project consists of analysis and application of the relevant data base in order to define a cultural chronology for the project area, develop a research strategy that will allow areas demonstrating actual or high probability of site presence within the project area to be identified and targeted for mitigation recommendations, and implement a field strategy that will achieve the objectives of the research strategy. The data base relevant to cultural resources in the project area includes the geology, flora, fauna, history, ethnographic information, and archeology. This data base consists of professional literature, unpublished manuscripts, files, fieldnotes, and museum systematic collections. A summary of the data base analysis is presented below, followed by a discussion of data base application and a detailed presentation of the field strategy to be used. The paleontological study of the project is discussed separately in the final section of Technical Procedures.

B. THE DATA BASE

Geology

Detailed studies of the surficial geology do not exist for the project area and data concerning the different types of surface topography land forms, glacial history, and associated dates were not available. Information about the surficial geology can aid the research strategy in several important ways. Limiting dates can be determined for the archeological potential of certain geologic strata, the preservation potential for archeological sites within certain strata can be inferred, and the geology can also contribute to paleoenvironmental interpretations for sites of various ages. A brief study and analysis of the geology was made by the project geologist using air photos. This study is speculative and requires additional field study and verification; however, it has provided the necessary framework within which the archeological field strategy can be developed.

Five flight lines of 60,000' high-resolution false color infrared imagery were examined. They extend from the Chulitna River on the west to the Tyone River on the east, and cover a swath 5-10 miles wide on both sides of the Susitna River. After examination of the photos, units were selected which would best differentiate various types of surface topography and different ages of landforms. Mapping was first done directly on the photos with a grease pencil, and later traced off on a mylar base map.

Because the air photos have built in distortion, it was unavoidably transferred to the mylar base. Distortion is most evident along the tops and bottoms of adjoining flight lines. Time did not permit a transfer directly to the 1:63,360 scale topographic maps. Such transfer can be routinely done with a zoom transfer scope or a map-o-graph. For this phase of the archeological research design, the mylar base may be accurate enough.

Units were mapped at a scale that was suitable to the archeological objectives and size of the study area. Small topographic features such as individual moraine crests were generalized and included within more extensive units, such as morainal topography. Because minor individual features can be easily located on the air photos, they were not mapped.

The surficial geologic units throughout the Susitna River Canyon area consist of two basic end members and all variations between them. One end member is the steep rocky slopes that have been completely unmodified by glacial processes. In contrast the most glacially modified surfaces are the thick accumulations of ice-contact-stratified drift that mantle basal lodgment till and glacially scoured bedrock. Below the highest peaks which extend above the ice limit are steep glacially carved valley walls. Above the clearly defined valley wall, yet below the upper limit of ice, may be narrow or broad "shoulders" of glacially-smoothed (sloping and eroding) rock which still exhibit considerable relief. Near the base of the well defined glacial trough, the sloping surface gradually becomes increasingly mantled with undifferentiated glacial drift, which is generally expressed as undulating ground moraine. Hills of bedrock along the valley floor are also common, and extensive areas of glacial moraine are present in some areas.

Surfaces younger than the period of extensive glaciation are of two widely different types. There are the steep irregular slopes that resulted from recent stream incision, and the recent-modern alluvial gravel which lies at the base of recent stream cuts.

The map units which follow give a two fold designation with upper case and lower-case letter. The upper case letters indicate the <u>relative</u> (not absolute) age of the surface and the lower case indicates the surface morphology or type of deposit. For instance, the unit "G_m" refers to morainal deposit formed during glacial time (undifferentiated) and the unit "R_a" refers to recent alluvium. Although the relative age differences for surfaces have been estimated, the following general succession of ages for common deposits can be inferred because of glacier downwasting:

<u>Glacial Units</u> (Keyed to Figures 3-8)

<u>b</u>. Surfaces mapped as "b" are sloping bedrock surfaces that formed the valley walls of glacial troughs. In most cases slopes are very steep, and usually bedrock is exposed directly underneath the thin recent soil mantle. In some places patchy thin drift may be present within the boundaries of areas mapped with the subscript "b". This unit commonly grades both upward and downward in elevation to rock slopes above the glacial troughs (r) or to drift mantles slopes (d, d/b). Minor windblown sedimentation and solifluction processes have occurred, but in most cases the glacial troughs are relatively unmodified.

<u>r</u>. Surfaces mapped as "r" are extremely common in the Susitna Canyon area. These are rock surfaces that have been smoothed and rounded by glacial erosion. In many cases, the lithology of the bedrock controls the surface topography. In all cases the rock surfaces are rounded and smoothed and the local relief is less than several hundred feet. All of these

surfaces are very well drained, solifluction is absent, and almost no sediment cover exists. In topographic depressions between rock knobs a minor amount of sediment of diverse origin may be present. The characteristic expression of this unit is controlled partly by its topographic height but largely by the rock lithology. Surfaces above glacial trough valley walls "b" are less rounded because glacial erosion is less effective there. The local expression of this unit is controlled largely by rock structure. In areas of varying rock hardness (near Indian River), a ridge and swale (corrugated) topography develops. In upland areas (south of Devil's Canyon Damsite) topography is more gentle, and secondary relief is controlled by rock fractures.

d. Surfaces mapped as "d" include those areas thickly mantled with glacial drift. Relief is generally very low and the unit can have a monotonous gradually sloping undulating expression. Drainage is typically poor, with small ponds forming in a few places. The surface character is controlled largely by the varying thickness and composition of the till mantle. Most of the sediment underlying the surfaces mapped "d" is probably stony, clayey, dense till, which may be overlain by thin gravel cap.

d/b. Surfaces mapped as "d/b" are underlain by thin or patchy drift which overlies bedrock. Both ice-scoured bedrock and a mantle of poorly drained drift can occur locally. The topographic relief is usually lower than "r" surfaces because the drift fills in the original depressions. It is higher than "d" surfaces because the surface irregularities are not completely masked by a drift mantle. Locally, this unit can be well drained (as in the gravelly areas), but usually well drained bedrock areas are randomly interspersed with poorly drained drift areas. Minor areas of subdued morainal topography can be present locally.

m. Surfaces mapped as "m" are underlain by hummocky irregular, commonly gravelly drift which extends to some depth. The surface expression is morainal. Topographic relief is generally less than 100 feet, but numerous chaotic small ridges (morainal) or isolated mounds (kames) typically less than 100' relief may be present. In most areas, the surfaces mapped as "m" are well drained and gravelly. Small lakes are commonly present, and large irregular poorly drained areas may be present as well. Very little morainal topography is present west of the Watana Dam Site. Extensive areas near the Tyone River, although morainal in form (m), are more subdued and poorly drained, possibly because they are partly buried by eolian sediments.

m2. Surfaces mapped as "m2" are similar to "m" surfaces and grade directly into them. They are, however, more irregular in form, with more prominent ridges, and better drained topography. In the vicinity of Tsisi Creek and the Oshetna River, "m2" surfaces include some prominent valley lateral moraines.

o. Surfaces mapped as "o" are outwash terraces with flat uniform surfaces that are usually well drained. Several small terrace scarps in the units mapped "o" were not differentiated. Outwash gravel is present in very small areas in the valley floors of Tsisi Creek and Oshetna River, but these areas were too small to be mapped individually. Outwash is also present in large quantities along the western portion of the map area (unit L_m), but its surface is so highly collapsed that it is included as morainal topography. In addition, some of the units mapped as "d" and "d/b" in Watana Creek Valley may include some outwash.

Non-Glacial Units

g. Surfaces mapped as "g" include all areas of steep, rubbly slopes at higher altitudes than the inferred late Wisconsin glacial limit. The ice appears to have reached about 3,500-4,000 feet altitude over most of the canyon. Angular bedrock ridges, steep slopes, and accumulations of blocky talus were included within this unit. Near the heads of cirques, the graduation from glacial trough (b) and unglaciated mountains (g) is only approximately mapped. Although these surfaces projected above the glacial limit, modern frost shattering and talus accumulation has rendered most of these surfaces essentially modern.

v. Surfaces mapped as "v" include all bedrock surfaces that were formed by recent incision of tributaries and the Susitna River. The surfaces are very steep, commonly gullied, and are still commonly in the process of being eroded. The boundary between "v" surfaces and the next higher surface is usually sharp. "v" surface also includes some colluvium, small talus cones, and a few possible landslides.

a. Surfaces mapped as "a" include all alluvium of modern or relatively recent age. The alluvium is generally well drained and vegetation covered, especially in the Susitna Canyon. Alluvium in the tributaries may contain minor colluvial debris and some fine material, but along the Susitna and Chulitna River "a" is indistinguishable from outwash. The alluvium is derived largely from reworked outwash, hence the similarity. The contact between alluvium (a) and steep gullied slopes (v) is usually abrupt, but difficult to map because of the narrow outcrop pattern.

s. Surfaces mapped as "s" include those mantled by solifluction sediments. These areas are poorly drained, with broad open unbroken slopes. No bedrock knobs or gravel patches are present above the solifluction surface.

l. Surfaces mapped as "l" include all lacustrine deposits. Only two small exposures near Stephan Lake were found. Drainage is very poor, and the sediments appear largely peaty.

f. Surfaces mapped as "f" include several large alluvial fans southeast of Portage Creek. Slopes are fairly shallow, with well drained gravel surfaces.

t. Surfaces mapped as "t" include several exposures of talus rubble above Devil Creek. Drainage is excellent, but slopes are very steep and irregular.

Time Units

No radiocarbon dates or any other age dates are available for the deglacial chronology of the Susitna Canyon area. Review of deglacial and Holocene chronologies elsewhere suggests that nearly all of the Susitna Canyon area was inundated with ice until about 13,000-14,000 years ago, the end of the climatic Wisconsin Stade. At about this time glaciers in many areas experienced rapid retreat. Some regions in Alaska may have been nearly ice free by about 11,000 years B.P., whereas in other regions deglaciation occurred some time prior to about 8,000 years B.P. At about that time minor advances occurred in tributary valleys. In addition, renewed aggradation of major river valleys may have occurred at this time owing to increased rates of frost-shattering.

Based on this inferred deglacial history for the Susitna Canyon area, the time since full glacial conditions can be broken into two major units: the Glacial Interval (13,000-14,000 years B.P. to about 8,000-11,000 years B.P.) and the Holocene Interval (8,000-11,000 years B.P. to 0 years B.P.) The Glacial Interval can be broken into two subunits: the time of full glaciation (13,000-14,000 years B.P. to 10,000-12,000 years B.P.). The Holocene Interval can be subdivided into early Holocene (1,000-3,000 years B.P. to 8,000-11,000 years B.P.) and late Holocene time (1,000-3,000 years B.P. to present). These inferred age boundaries are overlapping because a firm chronological sequence has not been established for the Susitna area.

Based on existing data it cannot be determined exactly when deglaciation of the Susitna Canyon occurred. Ice wastage, which began 13,000-14,000 years B.P. was accompanied by downwasting and terminal retreat up the major tributary valleys. Therefore, higher areas and areas further up large tributary valleys were first exposed. Ice-free conditions in the canyon floor must have occurred some time after the broad bedrock shoulders (r) were first exposed.

Temporal units since the time of full glaciation are divided into the following two major units: "G" (glacial time) and "H" (Holocene time). The glacial time has been subdivided into full-glacial (F) and late-glacial (L) relative ages. The boundary dates are inferred ages only. The Holocene Interval is also represented by two subdivided relative ages: early Holocene (e) and late Holocene (R) time. Boundary dates here are also inferred.

Flora [1]

The geologic data above, especially inferred deglacial history, provide a baseline from which to evaluate probable vegetational resources available to humans and fauna in the prehistoric past. Although floral distributions have probably changed through time, many plant species have been available in varying degrees since the late Pleistocene when most of the region was covered by massive glaciers. Information on past flora can be used to develop a picture of the resource base available for human exploitation of the upper Susitna region. Available flora, as well as faunal distributions, and topographic and climatic factors are presumed to have influenced movements and settlement patterns of prehistoric hunter/gatherers in the area.

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1. This background information for the cultural resource investigation study area refers to a region larger than the Upper Susitna basin. Thus, in some cases, statements may not be applicable to the study area of the wildlife ecology and plant ecology studies (Subtasks 7.11 and 7.12). Other statements will be superceded by findings of these other subtasks.

Preliminary geologic analysis suggests that regional deglaciation was well underway by 8 to 10 thousand years B.P. However, so little is known of early climatic and vegetational regimes in the regions that reconstructions are largely speculative in nature and constitute extrapolations from other regions which may or may not be applicable. Data from the Tanana Valley north of the Alaska Range suggest that adequate floral and faunal resources for humans could exist in very close proximity to glaciers (Powers and Hamilton 1978). In the middle Tanana Valley a shrub tundra vegetational regime was giving way to spruce-paper birch forest by 9,000 years B.P. (Ager 1975:87-88). Although data are absent for the upper Susitna, shrub tundra may have existed over portions of the region at a similar time with spruce-paper birch forest beginning to enter less elevated parts of the area. The suggestion that vegetation of the Tanana lowland and adjacent upland areas has remained fairly stable for the past 6,500 years (Ager 1975:88) may also apply to the upper Susitna region. Optimally, the modern vegetational patterns could have relevancy for patterns of human exploitation over the past 6,500 years and perhaps as early as 10,000 years B.P. At a minimum the modern flora provide a framework from which to compare prehistoric data and test for similarities and differences.

Five major ecosystems occur within the study area. These are bottomland spruce-poplar forest, lowland spruce-hardwood forest, upland spruce-hardwood forest, moist tundra and alpine tundra. Each of these are briefly characterized below. Bottomland spruce-poplar forest is a tall dense system primarily composed of white spruce (*Picea glauca*), locally mixed with large black cottonwood (*Populus balsamifera* sp. *trichocarpa*), on level to nearly level floodplains, low river terraces, and deeply thawed south slopes. It is generally not found at elevations above 1,000 feet (Arctic Environmental Information and Data Center 1975). Paper birch (*Betula papyrifera*), and quaking aspen (*Populus tremuloides*) are also common to this forest.

Lowland spruce-hardwood forest consists of black and white spruce (*Picea mariana*, *P. glauca*), tamarack (*Larix laricina*), paper birch (*Betula papyrifera*), aspen (*Populus tremuloides*), and poplar (*Populus balsamifera* sp. *balsamifera*). Soils supporting this system are deep, wet, silty, and loamy with thick surface peat layers.

Upland spruce-hardwood forest is a mixed forest composed of white spruce (*Picea glauca*), paper birch (*Betula papyrifera*), quaking aspen (*Populus tremuloides*), black cottonwood (*Populus balsamifera* ssp. *trichocarpa*), and balsam poplar (*Populus balsamifera* ssp. *balsamifera*). It is generally found in the study area at elevations between 1,000 and 3,500 feet. Soils supporting the system are well-drained, shallow to moderate deep gravelly loams, and silt loams. Black spruce (*Picea mariana*) occupies locales with poor drainage, especially north slopes with permafrost. This forest is commonly found in areas of extensive burns. The young trees and associated shrubs provide excellent moose browse for several years following fires.

Lowland spruce-hardwood forest is a dense to open forest of conifers and deciduous trees including white spruce (*Picea glauca*), paper birch (*Betula papyrifera*), aspen (*Populus tremuloides*), and poplar (*Populus balsamifera* sp. *balsamifera*) in drier south facing slopes. Black spruce (*Picea mariana*), occurs on areas of shallow peat, glacial deposits, outwash plains, and north facing slopes with permafrost. Open forest stands with lichens provide excellent winter range for caribou. Willows and other brush species furnish shelter and browse for moose. The upper Susitna Valley contains extensive stands of this forest (Arctic Environmental Information and Data Center 1975).

Moist tundra is a low-growing community which usually forms complete ground cover. Composition varies from almost continuous cotton grass (Eriophorum sp.) with a sparse growth of sedges (Carex sp.) and several dwarf shrubs, to stands where dwarf shrubs dominate. The latter usually contains numerous cottongrass tussocks. Dwarf shrubs include: willow (Salix sp.), dwarf birch (Betula nana), Labrador tea (Ledum palustre), alder (Alnus crispa), blueberry (Vaccinium sp.) and other berries. Underlying soils vary from wet, shallow and loamy with thin peat layers on upper slopes to deep, wet, clayey soils with peat.

Alpine tundra is composed of low plants, both herbaceous and shrubby, including resin birch (Betula glandulosa), dwarf birch (Betula nana), willow (Salix arctica sp.), heather (Phyllodoce sp.). Several low berry shrubs as well as numerous grasses and herbs are present. It is typically found interspersed with rock and rubble on mountains above 2,500 feet and occurs at all elevations over 4,000 feet on the mountains adjacent to the study area (Joint Federal-State Land Use Planning Commission for Alaska 1973). White mountain avens (Dryas sp.) may cover entire ridges and slopes in the Alaska Range. Soils supporting this system are well-drained, shallow, stoney, gravelly loams, and silt loams over coarse rubble and bedrock. Alpine tundra is of prime importance to Dall sheep and mountain goats in the study area.

A vegetational analysis of the study area has shown that the major factors influencing the distribution of plant communities are elevation, soils, drainage, and proximity to existing rivers and streams (Alaska Department of Fish and Game 1975). Bottomland spruce-hardwood forest is present on the Talkeetna River floodplain to the confluence of Prairie Creek and along the Susitna below Devil's Canyon. Lowland spruce-hardwood forest is found in the Tyone River drainage, lower portions of the Oshetna River drainage and along the Susitna between these rivers. Upland spruce-hardwood forests parallel the Susitna and lower portions of its tributary streams below Devil's Canyon to the Oshetna River and the Susitna near the McLaren River. This ecosystem also parallels the Talkeetna River and its tributaries including Prairie Creek and Stephan Lake. Moist tundra is found over large portions of the study area at elevations between 4,000-5,000 feet in the northern foothills of the Talkeetna Mountains south of the Susitna and an area west of Stephan Lake. To the north large areas of 4,000-5,000 feet in elevation are also part of this vegetational regime. Alpine tundra is found in large isolated pockets above 3,500-4,000 feet on exposed ridges and upper portions of the Talkeetna Mountains and mountains north and south of the Watana Dam Site.

Fauna[2]

Previous sections outlining the geological and floral regimes of the upper Susitna area suggest that the steppe-tundra flora, similar to that of the unglaciated Tanana Valley during late Pleistocene, may have largely disappeared by the time the study area was becoming deglaciated approximately 8,000-10,000 years B.P. If so, it seems unlikely that the Pleistocene megafauna associated with a steppe-tundra environment would have expanded into the upper Susitna region as deglaciation progressed. Although it is possible that some remnant populations of Pleistocene megafauna survived in localized marginal habitats (Ager 1975:86), present information suggest that these large mammals were probably not important to early resource patterns in the region.

While distribution and movements of species have probably changed through time, available faunal resources have probably been sufficient to support human populations since the advent of deglaciation, circa 8,000-10,000 years B.P. The possibility that ecosystems in the study area have been relatively stable for the past 6,500 (Ager 1975:88) years may suggest that associated faunal resources were similar to modern fauna, at least during this period. Modern faunal resources provide a baseline for the examination of prehistoric resource utilization, settlement patterns, and strategies of movement.

Fauna in the study area consist of numerous species of mammals, birds, and fish. Large mammals include moose (Alces alces), black bear (Ursus americanus), grizzly bear (Ursus arctos), caribou (Rangifer tarandus), mountain goat (Oreamnos americanus), and Dall sheep (Ovis dalli). The wide variety of ecological zones within the study area provide suitable habitat for a number of small mammals subject to human exploitation as well, including pika (Ochotona collaris), snowshoe hare (Lepus americanus), hoary marmot (Marmota caligata), arctic ground squirrel (Spermophilus parryi), red squirrel (Tamiasciurus hudsonicus), pine marten (Martes americana), porcupine (Erethizon dorsatum), muskrat (Ondatra zibethicus), mink (Mustela vison), wolf (Canis lupus), red fox (Vulpes vulpes), weasel (Mustela erminea), river otter (Lutra canadensis), wolverine (Gulo gulo), and lynx (Felis lynx) (Manville and Young 1965).

Data published by the Alaska Department of Fish and Game in Alaska Wildlife and Habitat (1973) provide information about population distributions and movements of large mammals. Moose concentrate during fall and winter at several locales within the study area. These are the Susitna Valley below Devil's Canyon, the Upper Talkeetna River Valley, the Watana Creek drainage and a large portion of the upper Susitna drainage from Jay Creek to the McLaren River. In spring and summer moose tend to concentrate in an area east of Stephan Lake.

Caribou winter range extends along the entire northern portion of the study area and to the south in the upper drainage of the Talkeetna River. Caribou are found in the vicinity of the Susitna and northeastern slopes of the Talkeetna Mountains in spring and summer. The latter region is also a calving area. During July the caribou migrate between calving grounds south of the Susitna Valley to summer range on the north side of the river. This migration crosses the Susitna a short distance downstream from the Watana Dam site near Deadman Creek.

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2. See note on page 8.

Sheep can be found at higher elevations north of the Susitna in the mountains between drainages of Watana and Jay creeks and to the south around Mt. Watana and throughout the Talkeetna Mountains. Mountain goats are also present in the Talkeetna Mountains in the vicinity of Wells Mountain and on slopes north of Sheep Creek. Grizzly bears occur throughout the study area and concentrate only along Prairie Creek south of Stephan Lake and along Portage Creek north of Devil's Canyon. Denning areas are reported south of the McLaren River on the upper Susitna and in a small area in the mountains west of Stephan Lake. Black bear are present throughout the study area but specific areas of denning or concentration are unknown.

Waterfowl are present throughout the study area in summer but important nesting concentrations are known only for eastern portions of east-west waterfowl migration route and may provide seasonal concentrations of birds during migratory periods. The major fish resources in the area are salmon (Onchorhynchus sp.) and several species are present, especially in the Susitna below Devil's Canyon. Other fish found in the area include northern pike (Esox lucius), and arctic grayling (Thymallus arcticus). Rainbow trout (Salmo gairdneri), lake trout (Salvelinus namaycush), and burbot (Lota lota) are found in lakes.

Archeology

Previous Archeological Research

Scientific archeological investigation of the upper Susitna River Valley began over 27 years ago; however, research during the intervening years has been sporadic. In 1953, Ivar Skarland conducted an aerial reconnaissance of the region in preparation for a survey conducted by William Irving in that same year. This work was done under contract to the National Park Service. Irving's survey was designed to investigate impoundment areas of dams proposed for the Susitna River (Irving 1957:37). His efforts were focused on the proposed Devil's Canyon Dam, and near Lakes Susitna, Louise, and Tyone. The lakes were investigated because the proposed Vee and Denali dams were to be located above the present Watana dam site and expected to inundate these areas (Irving 1957).

Eleven sites were found on the lakes and a twelfth site was discovered approximately three miles above the confluence of Tyone Creek and the Tyone River (Irving 1957). Five of the sites contained remains of semi-subterranean houses which Irving thought resembled houses that Rainey (1939) found along tributaries of the upper Copper River. Both post-contact and early pre-contact sites were reported by Irving. A multicomponent site, site 9, was found north of the outlet of Lake Susitna and was reported to contain late prehistoric Athapaskan, Arctic Small Tool Tradition, Northern Archaic Tradition, and Denali Complex components (Irving 1957).

Frederick Hadleigh-West conducted a brief survey in the study area during the summer of 1971 and located five sites adjacent to Stephan Lake (West 1971). Survey for the proposed Denali State Park was the reason for this survey and consequently the report contains little data on the Stephan Lake sites. The files of the Alaska State Archeologist contain information which indicate that one site (TLM-007) is multicomponent and has been radiocarbon dated to 4,000 B.C.

A recent study, Bacon (1975a), utilized an aerial reconnaissance of the study area to delineate several locales of high archeological potential along the upper Susitna utilizing an ecotone model to predict probable site locations. Most recently, Bacon (1978a; 1978b) conducted surveys near the Devil's Canyon and the Watana Dam sites. No sites were found at the proposed Devil's Canyon Dam site but in the vicinity of the Watana Dam site prehistoric sites were discovered. Site TLM-016 was radiocarbon dated to 3,675 ± 160 B.P.: ca. 1,725 B.C. Bacon (1978a:23) suggests occupation as early as 8,000 to 10,000 years ago at site TLM-015 and a possible Norton influence at site TLM-018. A brief aerial reconnaissance of the entire impoundment area from Devil's Canyon to the Tyone River and Stephan Lake was conducted in the spring of 1980 by E. James Dixon, Jr. and George S. Smith of the University of Alaska Museum. The purpose of the fly-over was to familiarize research personnel with the terrain and character of the study area.

Fifteen historic and prehistoric archeological sites are known from surveys in the study area. It is reasonable to assume that more concentrated effort will discover many more sites. Preliminary geologic analysis of the study area suggests that it has been ice free for approximately the last 13,000-11,000 years. Archeological sites dating from late Pleistocene to historic times are probable within the project area. The earliest C14 dates from the immediate project area document human occupation as early as 4,000 B.C.

Regional Prehistory

Data available from the study area are inadequate to accurately define the cultural historical sequence. Consequently, it is necessary to draw on data from adjacent areas to construct a speculative prehistory for the upper Susitna River. Past studies of this type have proven to be fairly reliable indicators of cultural periods within a given area (Dixon, Smith, and Plaskett 1980). The following regions adjacent to the study area will be considered: the Tanana Valley, Nenana River, the areas near Lakes Susitna, Louise, Tyone, and Tangle Lakes, the upper Copper River Valley, and the upper Cook Inlet region.

It is not necessary to discuss all sites within each area to project a probable cultural chronology for the upper Susitna because many sites within each area represent similar temporal and cultural periods and others lack diagnostic artifacts or have not been subject to absolute or relative dating techniques.

Central Alaska Range

a. Dry Creek

The Dry Creek site is located 10 miles north of Mt. McKinley National Park. It is a multicomponent site representing exploitation of a shrub tundra environment prior to 9,000 B.C. (Powers and Hamilton 1978:72). The latest component dates between 2,400 and 1,400 B.C. and may provide the best known temporal documentation for a notched projectile point horizon in Interior Alaska (Dixon, Smith and Plaskett 1980). The projectile points together with end scrapers forms, and time of occupation are suggestive of the Northern Archaic Tradition. This and other notched point sites in the Interior support Workman's (1978) hypothesis that Northern Archaic groups spread through the Yukon Territory and northward along the Brooks Range to the Onion Portage site by 4,000 B.C. and later spread into southern Interior Alaska. These data suggest that notched points and Northern Archaic Tradition artifact material could be found within the Susitna study area.

An older component at Dry Creek dates to ca. 8,600 B.C. and contains a microblade core and microblade industry which is comparable to the Denali Complex of Interior Alaska (West 1967) and the Akmak level at Onion Portage on the Kobuk River (Anderson 1968a). The similarity of these assemblages with the late Pleistocene Diuktai culture of northeastern Siberia has been noted by Powers and Hamilton (1978:76).

b. Carlo Creek

The Carlo Creek site is just east of Mt. McKinley National Park, and dates to ca. 8,500 years ago (Bowers 1978:14). The oldest of two components produced percussion-flaked elongate bifaces, biface fragments, retouched flakes, several thousand waste flakes and a possible bone awl (Bowers 1978:1). Component II consists of a few rhyolite waste flakes and is older than ca. 3,700 B.C.

Granulometric analysis of Component I sediment "indicates that human occupation occurred on a former sandbar/levee of the Nenana River, during a period of early postglacial downcutting and terrace formation" (Bowers 1978:16). Analysis of Component I faunal remains suggests that this site may have been a fall/winter hunting camp. Component I may contain evidence of heat-treatment of lithic material to improve flaking (Bowers 1978:6).

Although Component I tools are nondiagnostic and the sample size small, Bowers (1978) compared this material with assemblages from other sites. He suggests that Component I at Carlo Creek may have some affinity with Component II at the Dry Creek site (ca. 8,600 B.C.) (Powers and Hamilton 1978:74), and the McKinley Park Teklanika River sites (West 1965) on the basis of similar morphology of bifacial industries (Bowers 1978:14). General similarities were also noted with the "early horizon" at Healy Lake (Cook 1969), various Denali Complex sites (West 1965, 1967) and possibly with the Akmak assemblage from Onion Portage (Anderson 1970; Bowers 1978:14).

c. Teklanika Sites

Sites, Teklanika 1 and 2, were excavated by Frederick Hadleigh-West in Mt. McKinley National Park in 1961, and are located within a half mile of each other. Teklanika 1 occupies a knob overlooking the Teklanika River and is west-northwest of Teklanika 2, which is on a nearby ridge. They produced sufficient cultural material to support the supposition that these were habitation sites (West 1965:5). It appears that they functioned as game lookouts and flaking stations, a point confirmed by Traganza (1964). Teklanika 1 and 2 contain projectile points (mainly tips), leaf-shaped knives, end scrapers, side scrapers, tabular blade cores, microblade cores (similar to Campus cores), microblades (prismatic blades), burins, scrapers or end blade tools, one polished adze blade (Teklanika 2) and a pebble hammer (Teklanika 2).

West interprets this material as coeval with Anangula (ca. 8,500 B.C.) or slightly earlier than the Campus site (West 1971:73). He suggests that they date between 8,000 and 10,000 B.C. In light of recent work and the cultural chronology suggested by this report, it would appear that these dates are not unreasonable, although, the oldest known site in Alaska, Moose Creek, is 9,700 years B.C. (Hoeffecker 1979). The dating of the Moose Creek site is based on a single C14 determination and may be subject to reinterpretation as additional dates become available. Moose Creek appears to lack microblade and blade or microblade core technology and these are associated with both Teklanika sites. These forms indicate affiliation with the Denali Complex which dates as early as 8,600 B.C. at Dry Creek. The Teklanika sites may be closer in age to West's 8,000 B.C. projection than 10,000 B.C. However, microblade sites may extend into the Christian era from 500 A.D. to 1,000 A.D. (Cook 1969; Holmes 1976) and the Teklanika sites could be quite recent in age, as may possibly be suggested by the polished adze blade.

d. Nenana River Gorge Site

The Nenana River Gorge Site is located at the northwest boundary of Mt. McKinley National Park. The prehistoric component at the site represents a seasonal hunting campsite of Athapaskan Indians and has been radiocarbon dated to approximately 1,600 A.D. (Plaskett 1977). It is not certain which Athapaskan subgroup occupied the site. Prehistoric archeological material found includes obsidian and pottery thought to have originated north of the Alaska Range and copper and chalcedony from south of the Alaska Range; suggesting that trade and communication among different Athapaskan groups occurred prehistorically.

Tanana Valley

a. Lake Minchumina

Several sites on the shores of Lake Minchumina in the western Tanana Valley document human occupation spanning approximately the past 2,500 years (Holmes 1976, Hosley 1967, West 1978). The oldest site known is MMK-004 where a lower level was dated to ca. 500 B.C. and an upper level dated to ca. 1,000 A.D. (Holmes 1976:2). The site is thought to represent a continuous sequence between these dates (Holmes 1976:2). Noteworthy is an apparent late persistence of microblade core and burin technology which dates to between 800 A.D. to 1,000 A.D. Notched points were recovered in addition to microblades in Holmes' level one, but the exact association of these artifacts is not clear and late persistence of microcore technology and affiliations with the earlier Denali Complex of Interior Alaska are unresolved questions. Until further research is conducted it may be prudent to consider that two traditions, i.e., Northern Archaic and Late Denali, may have coexisted during this time.

Holmes (1978) presents some comparative data on the assemblage from MMK-004. Point/knives from the lowest level resemble Choris points, and have been equated with the Norton period (Holmes 1976:5). A relationship between MMK-004 and forest adapted Ipiutak/Norton cultures similar to those from Onion Portage and Hahanudan Lake has also been suggested (Holmes 1976:8; Dumond 1978:14).

The majority of obsidian from MMK-004 is from the Batza Tena source near the Koyukuk River to the north and indicates trade over considerable distance in Interior Alaska. The obsidian is also present at Gulkana in the Copper River Valley and suggests widespread trade in that direction as well. Several other sites, the Birches site with a date of ca. 520 A.D. (West 1978), and MMK-012 dating to ca. 50 A.D. (Holmes 1976:8), demonstrate more recent occupations at Lake Minchumina.

b. Campus Site

The Campus site on the Fairbanks campus of the University of Alaska appears to contain a Denali Complex component of microblades, microblade cores and burins. Also present are notched points and other materials characteristic of the Northern Archaic Tradition. Stratigraphic control at the site is poor and dating has not been established.

c. Healy Lake

The Village site at Healy Lake has yielded evidence for human occupation of Interior Alaska by ca. 9,000 B.C. (Cook 1969). Five components have been identified at the site. The upper level, just below the sod, contained stemmed and notched points, and microblades, a situation similar to the Minchumina site MMK-004 and suggestive of both the Northern Archaic and Denali peoples. Below this level are two components similar to the Denali Complex defined by West (1967). The lowest level named the Chindadn complex was characterized by triangular projectile points, tear-dropped shaped knives, and possibly an absence of microblades.

d. Dixthada

The Dixthada site on Mansfield Lake consists of nine housepits, an associated midden, several storage pits, and 11 tent rings. The site was originally excavated by Rainey (1939:364-371) who interpreted the site as an Athapaskan settlement of the last few hundred years, although, based on presence of a microblade industry, he suggested a relationship with the Campus Site. In 1953 Rainey amended his original evaluation of site age by assigning the microcores and microblades to an earlier component based on comparison with sites of known age (Rainey 1953). Additional excavations by Cook and McKennan in 1971 indicate that a yellow silt horizon located under the middens at Dixthada contained the core and microblade industry (Shinkwin 1975:149-150). These excavations supported the conclusion that the site was multicomponent, as suspected by Rainey.

Shinkwin (1975) studied materials from both components at Dixthada. The upper component, although mixed, contains an array of copper implements, bone and antler artifacts, bifacial knives, scrapers, whetstones, hammerstones, grinding stones, an adze and two axes (Shinkwin 1975:151-152) and represents a late prehistoric/early historic Athapaskan group as suggested by Rainey (Shinkwin 1974:153). Shinkwin notes similarity of the upper level lithic and bone industries to the Klo-kut site in the Yukon Territory. The lower component contains a microcore and microblade industry dating 470 ± 60 B.C.

e. Donnelly Ridge

The Donnelly Ridge site is located over 2,600 feet above sea level in the northern foothills of the Alaska Range. The site is situated on one of the highest points in the area and provides an excellent view of the myriad of lakes and ponds which surround it (West 1967:15). A total of 1,512 stone artifacts were recovered, of which 533 show various degrees of use (West 1967:15). Stone artifacts recovered include bifacial biconvex knives, end scrapers, large blades and blade-like flakes, prepared cores, core tablets, microblades, burins, burin spalls, and worked flakes (West 1967: 17-25)

West interprets the site as a seasonal hunting camp used for a short period of time, possibly only one season (West 1967:27). The age of the site is uncertain although two radiocarbon dates (1,830 ± 200 B.P. (120 A.D. ± 200) (B-649) and 1,790 ± 300 B.P. (160 A.D. ± 300) (B-650) have been recorded. However, West feels that these actually date a later tundra fire and not the cultural material (1967:32). Based on comparison of the Donnelly Ridge material with other Denali Complex sites, West suggests an age of at least 10,000 B.C. The Minchumina site, the Village site at Healy Lake, and Dixthada have produced Denali Complex components with dates much more recent than West's projections.

f. Ft. Wainwright

A 1979 archeological survey of Ft. Wainwright Reservation in the Tanana Valley led to the discovery of 48 prehistoric and four historic sites (Dixon, Smith, and Plaskett 1980). Sampling areas for this project, delineated by the research design, corresponded to most of the major elevations within the military reservation. Site locations included: lake shores (Blair Lakes), outlets of streams draining lakes, knolls near streams and rivers, and high bluffs and buttes. Several of the sites were more than 300 m above the Tanana flats and provided excellent views of the surrounding area.

Three sites on the north shore of Blair Lake South were systematically tested: FAI-044, FAI-045, and FAI-048. Site FAI-044 contained historic, late prehistoric Athapaskan, Northern Archaic and possible Denali components. Site FAI-045 contained the same recent historic component documented at FAI-044, and possible Denali component. Samples of radiometric dating were not recovered but the Denali component was inferred from the recovery of microblades and microcores. Only one of four squares tested produced Denali material and two occupations are suggested. In addition to these sites, 10 Denali, 10 Northern Archaic, and 3 historic period sites were documented on the military reservation (Dixon, Smith, and Plaskett 1980).

Denali Highway Area

a. Tangle Lakes

The Tangle Lakes are 80 km northeast of the study area and accessible from the Susitna via the McLaren River. Over 220 sites spanning the past 12,000 years have been documented in this area (West 1973). The sites represent several periods including late Athapaskan belonging to the last 3,000 years and an early period which West divides into groups. Denali

Complex sites are located on or near old lake shorelines which are about 100 feet above present lake levels (West 1975:79). The Denali occupation at Tangle Lakes may have occurred as early as 10,000 B.C. but radiocarbon dates suggest a more recent date of 8,200 B.C. with the occupation ending about ca. 6,200 B.C. Denali hunters appear to have abandoned the area after that time. There is a hiatus in the Tangle Lakes archeological record until the appearance of the Northern Archaic Tradition (West 1973). The Northern Archaic Tradition was originally defined as a boreal forest adapted culture (Anderson 1968a); however, it may have thrived along the forest edge or even within the tundra forest ecotone (Hickey 1976). Appearance of the Northern Archaic peoples may be associated with a warming trend ca. 5,000 years ago (Anderson 1968b) and raised tree line elevation (Hopkins 1967). The most recent cultural period represented at Tangle Lakes was that of protohistoric Athapaskans (West 1975:20).

b. Ratekin Site

The Ratekin site, near the Denali Highway, is located about 75 miles west of Paxson Lake. Although few artifacts have been recovered in situ, several surface collections have been made. Based on the collections by Skarland and Keim (1958), it is difficult to assess the significance of the site. Notched points suggestive of the Northern Archaic Tradition are present. Based on the type of notching and comparison with the notched point sequence developed by Anderson (1968a), an age of ca. 2,900 to 2,600 B.C. seems a reasonable inference since side notched, stemmed, and lanceolate forms are present.

The site appears to consist of a number of flaking stations and Skarland and Keim (1958:80) suggest that it functioned as a kill site rather than a camp because of the large number of unbroken arrowheads which they think were lost during the hunt. They also suggest that caribou were funnelled through a narrow corridor near the site created by muskeg to the south and steep hills to the north. Photographs on file at the University of Alaska Museum show a low rock wall at or near the site which may have functioned as a hunting blind. Age of this structure and its association with the Ratekin site have not been determined.

Talkeetna Mountains

a. Long Lake

The Long Lake site is in the Southern Talkeetna Mountains and contains a microblade and microcore industry which is similar to that of the Denali Complex. Bacon suggests that the site represents "a displacement of the Denali technology to the southern highlands of southern Interior Alaska", a region which "represented a sort of tundra refugium that was pushed southward (but higher in elevation) by invading Taiga Forests" (1975b:4).

Copper River Valley

Archeological investigations in the Copper River Valley began with Rainey's survey of the region in 1936. Most recently a number of historic and prehistoric sites have been located and several excavated (VanStone

1955; Shinkwin 1974; Workman 1976; Clark 1974; Arndt 1977; and others). Workman (1976:8) has synthesized the available data into a four period sequence for the area: historic (1850-present), protohistoric (1770-1850), late prehistoric (1000 A.D.-1770 A.D.), and early prehistoric (? to 1000 A.D.).

The following sites, some which were previously discussed in this report, can be placed within Workman's (1977:9-30) categories, Historic Period: Taral (VanStone 1955), site on Taral Creek (VanStone 1955:121), Susitna site 3A and 6C (Irving 1957:40), village near Batzulnetas (Rainey 1939:362). Protohistoric Period: Dakah D'nin's Village (Shinkwin 1974), VAL 146 (State of Alaska, Division of Parks), feature 77-3-4 at the BUL 077 site (Workman 1976:26-28), Paxson Lake site (Workman 1976:14), Gakona Airstrip Site (Rainey 1939:350), Alana Site (Rainey 1939:361). Late Prehistoric Period: GUL 077 (Workman 1976), MS 23-0 (Clark 1974, 1976), Gulkana River site (Rainey 1939:360), Susitna 3A (Irving 1957:41), Susitna 3B and 3C (Irving 1957:41), Susitna 3D (Irving 1957:41-42), Susitna 6A (Irving 1957:42), Susitna 6B (Irving 1957:42), caches near Batzulnetas (Rainey 1939:361-362), Tangle Lakes caches (Workman 1976:28), Portage site upper component (Workman 1976:28). Early Prehistoric Period: no sites representing this time period have been positively documented in the Copper River Valley, although the Copper River Basin would have been free of ice dammed lakes and available for human occupation by ca. 9,000 years ago (Workman 1976:31). Workman suggests that, when documented, the prehistory of the Copper River Basin will probably span most of the Holocene times (1976:31). At present, however, there are only traces of occupations predating 1,000 A.D. (Workman 1976:31).

Cook Inlet

a. Beluga Point

Beluga Point is a multicomponent site composed of two localities on the northern shore of Turnagain Arm in upper Cook Inlet. Beluga Point North contains three components. Component I includes a microblade and core industry associated with the Denali Complex. Comparative data from Denali sites in Interior Alaska and the Alaska Peninsula suggest a tentative date between 4,500 and 7,000 years B.C. for this component (Reger 1977). Component II contains stemmed points and points with tapering bases (Reger 1977). An estimated age is 1,000 to 2,000 years B.C. based on typological comparisons (Reger 1977:9). Components IIIa and IIIb from Beluga Point North are similar to the third period of the Kachemak Bay Sequence as evidenced by ground slate points and stone ringed hearths filled with gravel (Reger 1977). A radiocarbon date for IIIa indicates an age of 790 ± 120 B.P. (960 ± 120 A.D.) while IIIb is estimated to be 1,000 years older (Reger 1977).

Beluga Point South, Component I, includes a few nondiagnostic specimens and dates to 4,155 ± 160 B.P. (2,205 ± 160 B.C.). Reger notes similarities between Beluga Point South Component II and Norton collections from the Iyatayet site. Similarities include steeply retouched end-scrapers, end blades, burin-like scrapers and ground slate points (Reger 1977).

b. Kachemak Bay Sequence

Little is known about prehistory of Cook Inlet during the late Pleistocene, ca. 10,000 years ago. The Kachemak Bay Sequence provides an organized data base which can be applied to this study.

The Kachemak Bay tradition first appears in the second millenium B.C. and continues until just before historic contact. Kachemak settlements were usually along rugged coasts with deep water offshore and mountains inland (Reger 1977). Houses were semi-subterranean and made of whalebone, stone, or wood. Economic exploitation concentrated on sea resources, although inland resources were also utilized.

Kachemak I is a poorly defined phase (Workman 1977:35) and absence of reliable dates makes it difficult to place it in a specific time frame. However, relationships with Alaskan Peninsula material and the Takli Beach Phase places it in the second millenium B.C. (Workman 1977:35). Manifestations are known only on Yukon Island and are characterized by a predominance of flaked stone tools, grooved stone weights, and both toggle and dart harpoon heads.

Kachemak II dates from 400 B.C. to as late as 1200 A.D. Typically the assemblage contains large notched stones, grooved stone weights, primarily a flaked stone industry, houses of wood and whalebone and the possible beginnings of grave goods (Workman 1977:35).

A transitional phase called Kachemak Sub III (Workman 1977:35) existed from approximately 400 B.C. to A.D. 0 and flaking was still the primary lithic technology. Stone saws appeared and there was a continuation of elaborate burial practices with the embellishments in later periods. This phase is known from Chugachik Island (SEL-033) and Yukon Island in Kachemak Bay.

Kachemak II began about 800 A.D. (Workman 1977:35). Considering the climax of the tradition, this phase is characterized by an elaborate burial cult indicating dismemberment of the dead, a predominance of ground slate and a florescence of artists' skills. This phase is found at Cottonwood Creek and the Great Midden on Yukon Island.

The Kachemak sequence terminated in a poorly understood Kachemak IV phase during the second millenium A.D. and what is known comes from the upper level of the Great Midden on Yukon Island and the upper component at Cottonwood Creek (Workman 1977:33). Some pottery and native copper has been recovered from Yukon Island, while from Cottonwood Creek (KEN-029) come triangular stemless slate end-blades, an intricate bone knife handle, a barbed bone point and evidence of cannibalism (Workman 1977:33).

The Merrill site, KEN-029, near the Kenai River about 25 miles from the present river channel is on a former meander channel (Reger 1977:37). The lowest level dates to 2,245 ± 115 radiocarbon years or 295 B.C. Reger (1977:50) notes similarities of adze blades, straight based lanceolate points, and stemmed points to the Norton component at the Iyatayet site. Applicable to this study is the fact that the site conforms to locational data from other Norton period sites, i.e., riverine (Reger 1977:51). The riverine adaptation is suggested by evidence for fishing in nearly every Norton period site reported (Reger 1977:51).

Ethnographic Information

Ethnographic data suggest that the study area was inhabited by bands of Northern Athapaskan Indians during late prehistoric, protohistoric and historic times. Several subgroups speaking variant dialects of the Athapaskan language may have been present in the area at various times. The immediate study area falls within known historical geographic limits of the region exploited by Tanaina Athapaskans; however, the present area is near other regions occupied by the Ahtna and Tanana Athapaskan groups (Figure 1). Since the known geographic and linguistic distribution of these groups at the time of historic contact cannot be inferred to extend very far backward in time, ethnographic information relevant to all three groups will be included here.

Of importance in developing the research design is ethnographic information concerning subsistence activities of Athapaskans, and how they affect site location and distribution.

For most non-coastal Athapaskan groups, the annual subsistence cycle largely depended on the availability of resources. Major animal resources available throughout the yearly cycle to the groups considered here were moose, caribou, sheep, fish, and waterfowl (McKennan 1959; Guedon 1975; Andrews 1975). During the summer months, fishing was the most important economic activity. Villages would move to fish camps, generally located on clear water tributaries, to catch and dry salmon, much of which was cached for winter use (VanStone 1974; McKennan 1959; Helm 1975; Guedon 1975). Moose and sheep were also hunted in upland and alpine regions during summer months. Spring activities involved muskrat, beaver, and waterfowl hunting and trapping from camps usually located along lake margins or slow-moving streams (McKennan 1959). Small hunting parties also pursued large game during the winter months (Guedon 1975).

Caribou drives took place mainly in the fall or early winter. During this time, long "caribou fences" were constructed to guide them to enclosures where they were snared and killed. Smaller game such as hares were taken throughout the year (VanStone 1974; Nelson 1973). The annual subsistence cycle kept populations mobile within a given territory or range, while focusing them at specific geographic locales at specific points in time to harvest seasonally abundant animal resources. The seasonal round thus created a variety of settlement locales of varying size, function, and duration.

A number of accounts have described interior Athapaskan material culture (McKennan 1959; Guedon 1975; Nelson 1973; Pitts 1972; Vitt 1973). House construction, as it applies to both permanent and temporary structures, would indicate the location of winter settlements. Several types of houses have been described for the early historic period (McKennan 1959; Pitts 1972; Guedon 1975; Shinkwin 1974). One type of winter house was a dome-shaped structure covered with moose or caribou skins. Another form was a rectangular, semi-subterranean log structure covered with bark and sod. Temporary structures consisted of simple brush shelters or lean-tos. The caches used for storing food were of two types--underground, and elevated with logs. Many of these features should be identifiable archeologically if present in the project area.

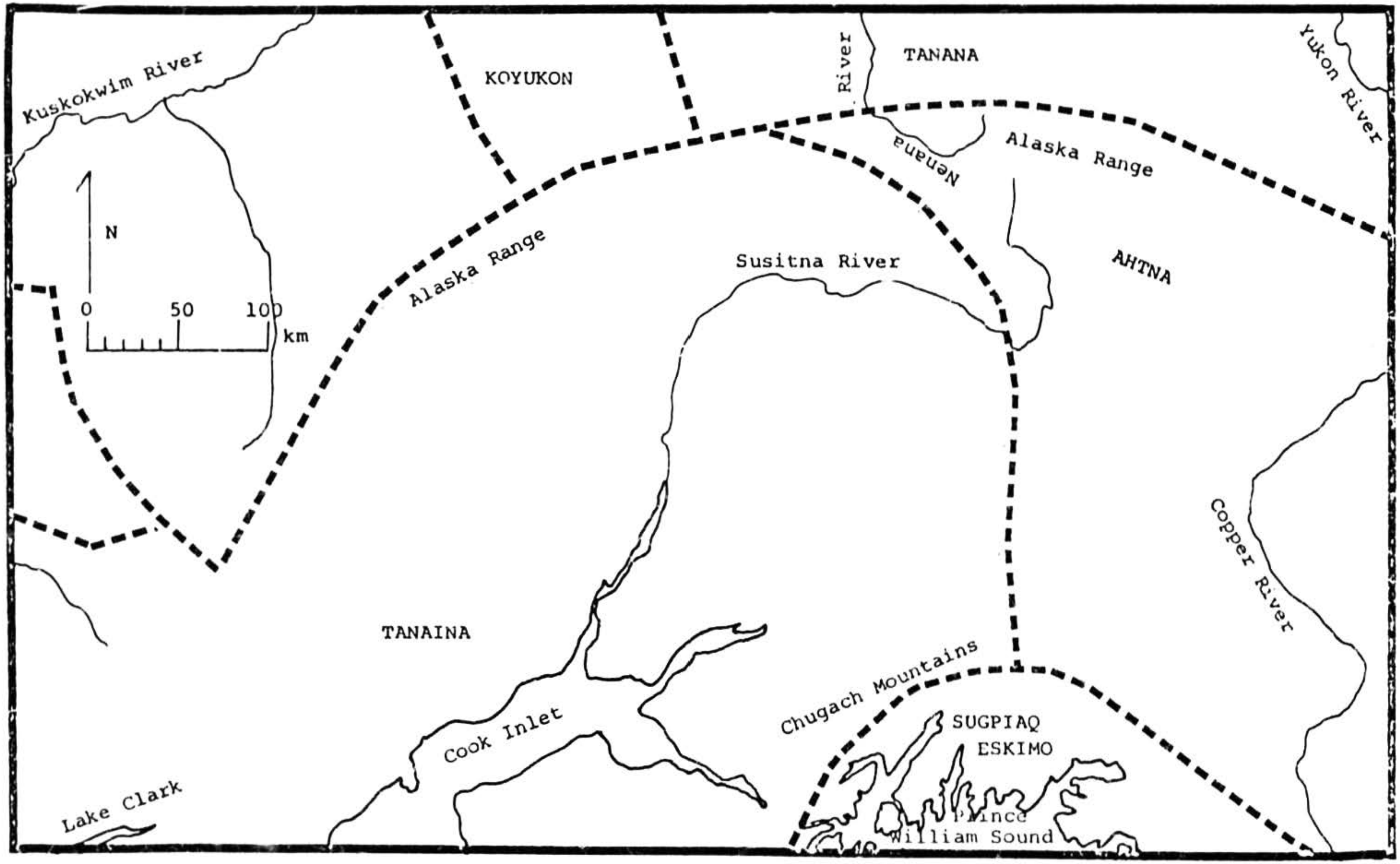

Figure 1. Native Languages and Peoples in and Near the Susitna Study Area.
(From: Alaska Native Center 1974)

The upper Susitna drainage was occupied by Western Ahtna at the time of historic contact. Their subsistence pattern differed in important respects from that of the Ahtna groups whose seasonal round was centered more to the west where fishing on the Copper River and its major tributaries was a primary subsistence activity and winter villages were located at the river (Workman 1976). The absence of the salmon resource base in the upper Susitna drainage resulted in a greater emphasis on hunting of caribou and moose (Irving 1957). Mid-summer through December was primarily devoted to fishing from lakes, their outlets or larger rivers. In late summer and early fall caribou and moose were hunted using fences, snares and surrounds. At mid-winter extensive hunting of moose, bear, and beaver occurred and was possibly accompanied by dispersal into family units from larger multi-family fall villages (Irving 1957). In spring, hunting moved into the hill country south as far as the Talkeetna Mountains where caribou were hunted until mid-summer when fishing resumed. Contacts between the upper Susitna/Lake Louise Ahtna and villages on the Tanana side of the Alaska Range were frequent but the nature of contacts is unknown (Irving 1957). The seasonal round and subsistence strategy of the Western Ahtna appears to have more closely resembled that of interior Tanana Athapaskans than that for most Ahtna centered on the central Copper River.

The Tanaina Athapaskans may have been the first Athapaskan group to come in contact with Europeans and Russians who began to heavily influence their culture by the late eighteenth century (Osgood 1937). Tanaina groups were concentrated on or near the shores of Cook Inlet and in the Iliamna-Lake Clark area as well as inland and are known to have occupied permanent villages containing semi-subterranean houses (Smith and Shields 1977), an atypical settlement pattern for Northern Athapaskans. Richness of salmon runs in the area probably had much to do with the unusual subsistence and settlement pattern (Osgood 1937; VanStone 1974). Uniquely some Tanaina groups were also heavily dependent upon coastal, tidal, and sea mammal resources for their subsistence, a pattern more closely resembling Eskimo rather than other Athapaskan groups (Townsend 1973).

The Tanaina are known to have traveled widely throughout their territory and trade, as well as warfare, resulted in contact with other Interior Alaskan Athapaskan groups (Townsend 1973; Hosley 1966; Plaskett 1977). However, little is known concerning aboriginal Tanaina exploitation of the more interior portions of their territory which included the upper Susitna, Talkeetna Mountains and the Alaska Range. It is probable that at certain times of the year, i.e., fall and spring/early summer, hunting parties moved into these regions to hunt sheep, caribou and bear. Moose would appear to have been rarely present, at least in the mid-nineteenth century (Osgood 1937; VanStone 1973). Camps of hunting parties would probably have consisted of temporary shelters of skins over a wood frame, simple brush shelters or lean-tos.

During the early historic period, it appears that a gradual shift in subsistence activity occurred as a result of increased contact with non-Natives, and led to a general shift in the settlement pattern (VanStone 1970; Townsend 1973). Therefore, site locations which reflect late prehistoric subsistence activities may differ significantly from those activity-related sites of the historic period. Settlements and camps of late prehistoric and protohistoric times often were located near the mouths of clear water streams and rivers, as well as along lake margins and locations strategically suited for resource exploitation (McKennan 1959; Andrews 1975; VanStone 1974; Workman 1976; Irving 1957). Early historic Tanaina settlements were reported at several locations near the study area including Talkeetna (Townsend 1973), Valdez Creek (McKennan 1959), and on the shores of Lakes Susitna and Louise, Tyone, and Grayling (Irving 1957).

History

It is probable that late prehistoric and historic sites in the upper Susitna area date to as early as 1770 and may contain evidence of Western trade materials and influences. Historic, ethnohistoric and archeological data suggest that a widespread network of Native trade routes existed prior to Western contact. Western trade goods doubtless penetrated the upper Susitna region soon after the first exchanges occurred in coastal areas. Following 1900, gold discoveries in the region produced a flurry of exploration and mining activity which probably resulted in historic sites containing associated material in the upper Susitna study area. The chronology of Western man's exploration and penetration into the study area is summarized below.

Shortly after Bering's 1741 voyage, Russian fur traders began exchanging Western goods for pelts. Glass beads and iron were traded for fox and sea otter pelts by Glattov on Kodiak Island as early as 1762 (Bancroft 1886) and although such trade occurred far from the study area, Native trade networks soon dispersed such goods widely to Natives who had no direct contact with Europeans. The first explorer in Cook Inlet, Captain James Cook, observed metal and glass beads among the Tanaina during his visit in 1778 (Cook 1785). By 1786 a Russian trading settlement had been established at St. George (Kasilof) in Tanaina territory and trade contacts soon expanded rapidly with the Tanaina.

Increased dependence upon trade and the wealth provided by Western luxury goods resulted in changes in the aboriginal settlement and hunting patterns (Townsend 1970). The Tanaina began to be drawn more intensively into the Russian fur trade, occasionally as hunters but also as middlemen in the fur trade with peoples in the interior of Alaska. There was increased hunting of certain desirable fur bearers and modification of the subsistence cycle to accomodate such hunting and subsequent travel to trade for Western goods. Thus, it is probable that the location of hunting and trapping sites as well as times of seasonal movements known from the ethnographic present differ from those of slightly older late prehistoric times.

The first explorations of the Susitna River country did not occur until 1834 when Malakoff ascended the river. It is believed that he also explored the Susitna in 1843 but little is known of his work (Bacon 1975a). In any event, it is certain that by 1845 the Russians had better knowledge of the upper Susitna region than could have been obtained via Native informants (Brooks 1973). During the next 50 years very little exploration or other activity by Westerners appears to have occurred in the upper Susitna

River country which was virtually unexplored until nearly 1900 (Cole 1979). During this time one exploration of note occurred to the east of the study area. In 1885, Lt. Henry Allen and his party ascended the Copper River, crossed the Alaska Range and descended the Tanana River to the Yukon. Allen's observations of Native lifeways, villages and their locations provide data regarding Ahtna and Tanana Athapaskans at the time of early direct contact with White men (Allen 1887).

The discovery of gold in Cook Inlet in 1895 precipitated the first extensive and lasting movements of White men into the upper Susitna study area. In the summer of 1896, over 2,000 prospectors swarmed the shores of Cook Inlet and over 100 parties entered the Susitna River but only five continued any distance up the river (Cole 1979). William Dickey and Allen Monks ascended the river as far as Devil's Canyon in 1886 and encountered Natives at a fish camp at the mouth of Portage Creek. W.A. Jack and eight others ascended the Susitna to the "head of boating" on the upper Susitna in 1897 and became the first recorded party to explore nearly the entire river. The Jack party avoided Devil's Canyon by ascending Portage Creek, crossing a divide to Devil Creek, and descending the latter to the Susitna (Cole 1979). Jack guided George Eldridge of the USGS, up the Susitna, over Broad Pass and down the Nenana River in 1898 but their route avoided the upper Susitna area (Eldridge 1900). In 1901, H. Jack Pamo and Al Campbell tried to make an overland trip from the mouth of the Tanana River to Valdez. They descended the Susitna from its "headwaters" and Campbell apparently starved to death at an Indian hunting cabin some 50 miles above Devil's Canyon (Valdez News, 7/20/01). On the south side of the Susitna other overland routes which by-passed Devil's Canyon existed. One route went up the Talkeetna River to Prairie Creek, past Stephan Lake to the Susitna, while another crossed low passes at the headwaters of Kosina Creek and descended the latter to the Susitna (Cole 1979).

The difficult passage around Devil's Canyon greatly reduced gold prospector traffic on the upper Susitna River and it was not until 1903 that a more feasible route from the Copper River drainage was pioneered. In that year, Pete Monahan and four others from Valdez reached the upper Susitna headwaters area. Their route took them over Valdez Glacier, down Klutina River, across Klutina Lake, along St. Anne River and thence up the Susitna. They prospected for gold along several creeks in the upper Susitna drainage and struck pay gravel on a small stream the Indians called "Galina" and later renamed Valdez Creek (Moffit 1912) The next year numerous claims were staked along this creek and its tributaries. These diggings in later years had as many as 150 men (Bacon 1975a) and continued to attract miners until the 1930's. Other, later routes, to these gold fields roughly paralleled the modern Denali Highway from Cantwell in the west and Paxson on the east. Another route followed the West Fork of the Gulkana from the Copper River to the MacLaren and thence up the Susitna (Cole 1979).

Mining equipment and supplies utilized all of these routes to the gold fields on Valdez Creek. It is possible that historic structures and features related to these gold mining activities may be present along any or all of the routes used by miners during prospecting and subsequent mining in the Valdez Creek area. Additionally, Indian hunting cabins were reported at several localities on the upper Susitna drainage by the first gold prospectors and explorers, i.e., Jack, Eldridge, Pamo, and others. It is possible that remains of these log structures may be encountered during cultural resource survey of the study area as well.

C. APPLICATION OF THE DATA BASE

The data base can be used to develop a tentative cultural chronology for cultural resources in the study area, provide data for the delineation of a predictive model for archeological potential of various project areas, and explicate hypotheses that can aid in the evaluation of sites located during survey and testing. Each of these applications is discussed separately below.

Cultural Chronology

A tentative cultural chronology can be constructed utilizing archeological data from known sites in or adjacent to the study area. Archeological sites of several cultural periods spanning the past ca. 10,000 years and several cultural/historical periods are known (Figure 1). This data is incorporated and will be applied to the field strategy.

Archeological sites which may occur in the upper Susitna region are not expected to exceed 9,000 B.C. in age, based on the sequence of deglaciation that occurred in the area. The earliest sites that are expected in the study are those representing the American Paleoarctic Tradition, specifically the Denali Complex for which West (1975) ascribed a date of ca. 10,000 B.C. to 4,500 B.C. This distinctive and long lasting stone tool industry is characterized by wedge-shaped microblade cores, microblades, core tablets, bifacial knives, burins, burin spalls and end scrapers. Incorporation of Denali into the American Paleoarctic Tradition follows Dumond (1977) who has suggested that the Denali Complex is a regional variant of the American Paleoarctic Tradition as defined by Anderson (1968a). The Denali Complex has been dated to between 8,600 and 4,000 B.C. in Interior Alaska. There appears to be a hiatus of Denali sites in the Interior archeological record after 4,000 B.C.; however, several sites in the Tanana Valley which contain elements thought to be distinctive of the Denali Complex date to between 2,400 B.C. and A.D. 1,000. This may suggest a late persistence of this stone industry. Sites representative of the Denali Complex are located in areas adjacent to the study area. The oldest dated Denali Complex site in the Alaska Range area is Component II, at the Dry Creek site which dates to ca. 8,600 B.C. (Powers and Hamilton 1978:76).

Other sites containing the Denali Complex in surrounding regions are Teklanika 1 and 2 near Mt. McKinley, MMK-004 at Lake Minchumina, the Campus site, the Village site at Healy Lake, site FAI-062, the Donnelly Ridge site, several undated Denali sites on the Ft. Wainwright Reservation in the central Tanana Valley, several sites at Tangle Lakes, two sites near Lake Susitna and upper Cook Inlet, the Beluga Point site, and the Long Lake site in the Talkeetna Mountains. These sites suggest that the Denali peoples were extremely widespread and occupied both inland and coastal zones. If a continuum between early and late Denali proves to be real, a time span of over 9,000 years would exist for Denali peoples. The available information suggests that sites representing the Denali period exist within the study area.

The question of the late duration of the Denali Complex is not settled. Several sites in regions adjacent to the study area have yielded materials similar to those of the Denali Complex, i.e., microblades, microblade cores, and burins, which have late dates. These are the Village site at

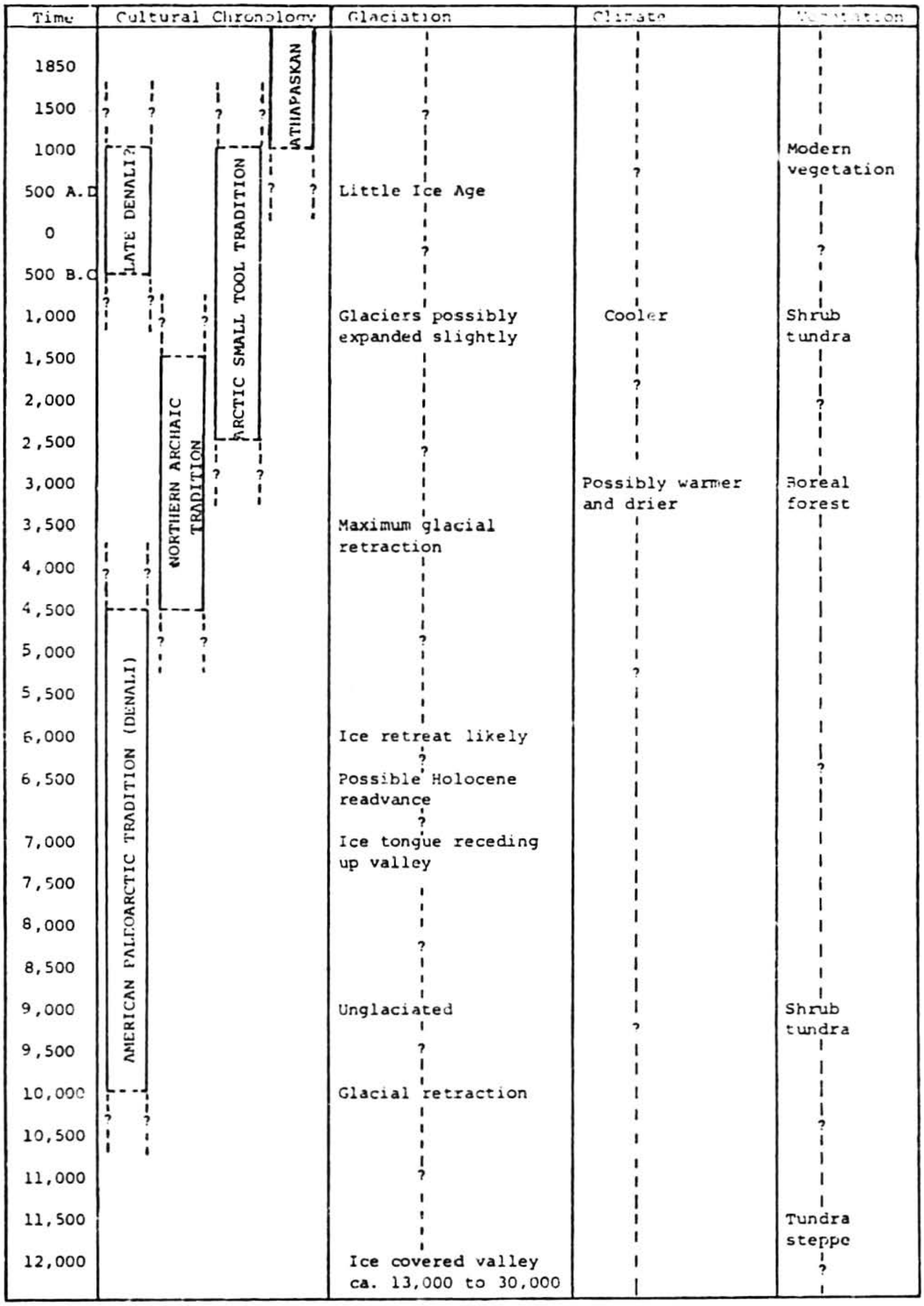

Figure 2. Speculative Cultural Chronology and Inferred Glacial, Climatological and Vegetational Regimes of the Susitna Valley.

Healy Lake with a date of ca. 500 A.D. (Cook 1969), and MMK-004 at Lake Minchumina dated to ca. 800-1000 A.D. (Holmes 1978). At the Dixthada site similar material has been dated to ca. 470 B.C. Several as yet undated sites containing Denali-like material were also located during a 1979 survey in the Tanana Valley (Dixon, Smith, and Plaskett 1980) and could represent late Denali occupation. Sites potentially of late Denali age in areas near the upper Susitna study area suggest that late Denali sites could also exist in the study area.

Areas surrounding the study area have produced sites representative of the Northern Archaic Tradition as defined by Anderson (1968a) and which date from ca. 4,500 B.C. Northern Archaic sites include Lake Minchumina, Dry Creek, the Campus site, the Village site at Healy Lake, several sites found at Ft. Wainwright in 1979, Tangle Lakes, Lake Susitna, Beluga Point, and the Ratekin site. The distribution of these sites is similar to that for the Denali Complex sites. This tradition is characterized by notched projectile points, notched pebbles, a variety of bifaces, end scrapers, and boulder chip scrapers. It is possible that sites representing the Northern Archaic Tradition exist within the study area. A site on Stephan Lake dating to ca. 4000 B.C. may already document the presence of a Northern Archaic Tradition site in the study area.

The Arctic Small Tool Tradition is characterized by assemblages containing microblade cores, microblades, burins, burin spall artifacts, flake knives, and bifacial end blades. This tradition is represented by coastal and non-coastal sites, several of the latter being known from the Alaska Interior. Dumond (1977) suggests that the Arctic Small Tool Tradition can broadly encompass a Denbigh-Choris-Norton continuum, and this is how the tradition is used here. One site in the immediate study area, Lake Susitna Site 9, has been suggested as a possible Arctic Small Tool Tradition Site. A date of 2,200 to 1,800 B.C. has been documented for the Arctic Small Tool occupation at Onion Portage (Anderson 1968a) and may be somewhat later in the southern Interior.

Norton period sites, the late end of the Arctic Small Tool Tradition continuum, first appear on the Bering Sea coast about ca. 500 B.C. Norton does not predate 400 B.C. in the upper portion of the Naknek drainage, and lasts to ca. 1000 A.D. around much of the Bering Sea area (Dumond 1977: 106-108). Shortly after its appearance (ca. 500 B.C.) Norton may be represented in Interior Alaska archeological sites. This is suggested by artifacts from Lake Minchumina, TLM-018 in the upper Susitna Basin, and the Beluga Point site in upper Cook Inlet.

It should also be noted that Norton period sites in the Bristol Bay region tend to occur well up major salmon streams, presumably exploiting this rich resource (Dumond 1977:113). Inland Norton period sites demonstrate the importance of caribou in the Norton subsistence strategy (Dumond 1977:113). The Beluga Point site in upper Cook Inlet may represent the maritime portion of the Norton subsistence cycle. Norton populations employed a subsistence pattern that included the seasonal exploitation of both coastal resources (sea mammals, shell fish, and fish) and interior resources (caribou, moose, salmon, etc.). This shift in subsistence strategy may have been a response to climatic amelioration which occurred after 1,000 B.C. and preceded the "Little Ice Age". This change in resource exploitation may be reflected by the occurrence of Norton period archeological sites in the Susitna study area.

Late prehistoric Athapaskan and historic period sites have also been documented in areas adjacent to the study area. Late prehistoric Athapaskan sites are represented at Lake Minchumina, the upper component at the Healy Lake Village site, the upper component at Dixthada, several sites at Tangle Lakes, other sites on Lakes Susitna, Louise and Tyone, a site on the Tyone River, and another site in the vicinity of upper Cook Inlet. These late prehistoric Athapaskan sites indicate widespread occupation of several regions in Alaska by these groups. Dumond and Mace (1968) have suggested, based on archeological and historical data, that Tanaina Athapaskans may have replaced the Pacific Eskimo in upper Cook Inlet sometime between 1650 A.D. and 1780 A.D. Possibly this replacement occurred somewhat earlier in the study area.

The chronology presented here is speculative and is intended to provide a baseline from which archeological sites of different periods in the project area can be expected. This chronology should be tested and refined by archeological sites located in the present area.

In order to evaluate the significance of archeological sites located during survey and testing, as well as aid in the analysis of archeological materials collected, it is necessary to explicate hypotheses which can be tested and evaluated utilizing the project data.

The most fundamental hypothesis to be examined is the validity of the cultural chronology which has been proposed. To test the cultural chronology each period must be examined separately against archeological data from sites located during survey. To evaluate a site against a proposed period in the chronology it is necessary that the full range of artifactual material from the site, not just selected types, and non-artifactual contexts be compared against the known range of artifactual material from sites of the period and the attempt made to explain the range of variability and the anomalies. This should lead to a fuller understanding of periods involved, or the elimination of invalid periods for the study area and possibly the delineation of others presently unknown. It is anticipated that the proposed cultural chronology will be modified and refined through testing.

Research Strategy

An analysis of the data derived from the literature search focusing on site locales has established that archeological sites occur in a non-random pattern in relation to associated physical, topographic, and ecological features. Based on the analysis of site locational data from regions adjacent to the study area, the features characteristically associated with archeological site occurrence are:

1) Overlooks - locales of higher topographic relief than much of the surrounding terrain. They are characteristically well drained and command a panoramic view of the surrounding region. It is generally inferred that overlooks served as hunting locales and/or possibly short term camp sites. Because these sites occur in elevated areas, soil deposition is generally thin and they are frequently easily discovered through subsurface testing or examination of natural exposures. Examples of sites ascribed to the Denali Complex which occur in this setting are the Campus Site, Donnelly Ridge, Susitna Lake, and the Teklanika sites. Northern Archaic Tradition

sites also known to occur on overlooks are the Campus Site, some sites in the Tangle Lakes area, Susitna Lake, the Ratekin Site, and a site near the Watana Dam project area. Archeological sites ascribed to the Arctic Small Tool Tradition frequently occur on overlooks; however, no positively identified Arctic Small Tool sites situated on overlooks have yet been reported from the study area or regions immediately adjacent to it. The Nenana River Gorge site, some of the Tangle Lakes sites, and Lake Susitna are all Athapaskan period sites which occur on overlooks.

2) Lake Margins - sites ascribed to all defined traditions have been discovered on the margins of major lakes. It is generally inferred that they are frequently more permanent seasonal camps and that fishing, the exploitation of fresh water aquatic resources and large mammal hunting were the primary economic activities associated with these sites. These inferences are primarily based on the location of these sites rather than an analysis of faunal and artifactual material. Sites on lake margins may exhibit greater soil deposition than overlooks because of their lower topographic position. Sites in this setting are frequently discovered through sub-surface testing, the observation of surface features, or through the examination of natural exposures. Athapaskan sites on lake margins include those at Lake Minchumina, Healy Lake, Tangle Lakes, Lake Susitna, Lake Louise, and Lake Tyone. Archeological sites ascribed to the Arctic Small Tool Tradition are reported to occur on lake margins and an example is the Norton component reported at Lake Minchumina. At Lake Minchumina, Healy Lake, Tangle Lakes, Susitna Lake and Stephan Lake sites which may be ascribed to the Northern Archaic Tradition are known to occur on lake margins. Denali Complex sites which have been found near lakes include the Tangle Lakes sites, Lake Minchumina, Healy Lake, Long Lake, and Lake Susitna.

3) Stream and River Margins - numerous sites have been reported along the banks or abandoned channels of streams and rivers. They vary from large semi-permanent seasonal camps to what appear to be brief transient camps. Soil deposition at such locales may be greater than either lake or overlook sites because of the low topographic setting of streams and an active agent (the stream or river) for soil deposition. Sites may be discovered through the examination of natural exposures, subsurface testing, and visual observation of cultural features. Denali Complex sites reported along stream and river margins or abandoned channels include Dry Creek, Carlo Creek, and the Campus site. Northern Archaic Tradition sites found in this type of locale are Dry Creek and the Campus site. The Merrill site, which is ascribed to the Norton period of the Arctic Small Tool Tradition, is a former meander of the Kenai River. Athapaskan sites on stream and river margins include Dixthada, Dakah De'nin's Village and the Nenana River Gorge site.

It can easily be noted in the review of site locational data that many sites have been subject to reoccupation and share more than one of the defined physical, topographic, or ecological features characteristic of archeological site locales. It would appear that there may be a compounding effect in human utilization of a locale, if more than one of these major variables occur, thus possibly increasing the probability of its use and subsequent reuse. It is also recognized that this analysis is limited because it does not address known chronological and settlement pattern gaps in the archeological record. Additionally, sites such as caves, rock shelters, quarry sites, etc., are not reported immediately adjacent to the study area, although they may occur in the Susitna region. By focusing initial survey efforts in these locales as well as natural exposures, it is anticipated that most of the archeological sites which can be easily discovered will be found during intial stages of the project, thus providing maximum time for evaluation and planning to insure their protection.

However, a problem in the delineation of the topographic, physical, and ecological features listed above is that a variety of specific settings are subsumed under these general categories and little precise detail about individual sites is available. One objective of the 1980 research strategy is to attempt to obtain more precise data relevant to prehistoric settlement patterns and the juxtaposition of individual sites in relation to the natural environment. It is anticipated that analysis of this data will increase predictability for locating archeological sites. Additionally, this examination may permit detailed analysis of shifting subsistence patterns during various cultural historical periods which in turn may enable correlation of changing settlement patterns with environmental changes.

Field work will attempt to gather detailed information such as the kind of feature on which a site is located, topographic position and elevation, slope, exposure, view, stratigraphy, as well as details about the surrounding terrain. This specific kind of information should enable an analysis of settlement patterns in relation to lakes, streams, rivers and areas of high topographic relief. Kinds of streams, lakes, and rivers on which sites are found will be recorded as well. A Site Survey Form has been developed which outlines the specific kinds of information that field personnel will record. This form is presented in the Data Procedures section of this report. Similar information will also be recorded at locales where test pits do not yield cultural evidence to facilitate analysis of areas where sites do not occur.

The research strategy is based on a two field season plan designed to provide feedback data throughout the project so that new data can be used to modify, refine and further develop the cultural resources investigations. There are three primary objectives of the 1980 field research program. These are: 1) examination of areas which will be immediately affected by study of the Susitna Hydropower project (proposed air strips, borrow areas, drilling locales, etc.); 2) a thorough survey and testing of the documented archeological site locales explicated above by systematically surveying the eleven surficial geological/morphological units defined during the air photo analysis and interpretation; and 3) an on-the-ground evaluation of all the geologic/morphologic units within the study area will occur simultaneously with the archeological reconnaissance. The criteria used to evaluate these areas are presented in Form 1 in the Procedures Section of this report. This will permit field verification or reinterpretation of uniformity, variability, and nature of these units which will be analyzed and compared in developing sampling strata which will be tested during the 1981 field season.

The efforts of the 1981 field season will focus on: 1) survey of additional areas slated for construction or preconstruction disturbance; 2) rigorous testing of sites discovered during the 1980 field season to determine spatial limits, depth of deposits, stratigraphic placement of cultural materials, possible age and function of sites, etc.; and 3) the implementation of a statistically valid field sampling procedure applied to each of the strata developed from the analysis of the geologic/morphologic units.

Reconnaissance survey data from the 1980 season will be used to develop the sampling strategy employed in the second season, and to initially analyze archeological site distribution and locales within the project area. The second season's sampling and intensive testing will provide a basis for the assessment of individual site significance, and obtain data which will hopefully enable a specific and thorough analysis of settlement patterns through time.

An attempt will be made to evaluate each of the identified surficial geological/morphological units in the impoundment areas, including those isolated within larger units. This first year reconnaissance will have three goals: 1) The geological/morphological units will be evaluated on-the-ground using a series of criteria which are listed on the unit evaluation form presented in the Procedures Section of this report. This evaluation is necessary to obtain information on the uniformity and variability of each unit. Areas within the units can then be compared and analyzed to define the sampling strata to be tested during the second season; 2) The on-the-ground survey will allow the identification of specific locales within each unit for which visual reconnaissance alone may be adequate. Such areas may include natural or human subsurface disturbance, standing water, vertical cliffs, etc.; and 3) During the reconnaissance, an effort will be made to locate as many archeological and historic sites as possible by concentrating on the examination of natural subsurface exposures such as eroding bluff edges and blowouts, visual reconnaissance for surface cultural features, and subsurface testing in locales previously described which are known to contain archeological sites.

During the second field season a sampling design will be used to test for subsurface archeological sites. The sampling design will be developed for the Devil's Canyon and Watana Dam construction sites and impoundment areas, since the actual location of these have been established. The sampling design will follow standard stratified random sampling procedures for the defined sampling strata. The purpose of the 1981 sampling will be to test for archeological site occurrence in a representative number of randomly selected locales for each strata in an attempt to obtain additional data pertinent to prehistoric settlement and land use patterns within different physical and topographic settings through time. In addition to sampling the second season, testing will be conducted at sites located during both seasons. Testing is necessary to evaluate these sites for archeological significance, define the spatial and temporal limits, and propose mitigating measures.

In summary, the first season's field effort should result in the location of as many sites as possible, given current knowledge of site locations, and an evaluation of the surface morphology in the geological/morphological units in the area. This evaluation will provide a basis for developing strata for stratified random sampling. Additionally, an attempt will be made to examine subsurface exposures, conduct subsurface testing at selected locales, and identify areas not amenable for archeological testing or survey using standard archeological field techniques.

1980 Field Survey Units

The project area has been divided into nine surficial geological/morphological units based on air photo analysis and interpretation. The location of these units is shown on Figures 3-8 and the defining criteria for each of the eleven units identified are given in the geology section of this report. These units are not continuous in the project area, but rather occur as isolated segments. For instance, on the maps it can be seen that Rv although defined as one unit occurs discontinuously throughout the project area. Since most units are distributed discontinously, the individual areas of each unit are numbered separately. These numbers are necessary for identification and recording procedures and are also shown on Figures 3-8. A breakdown of the geological/morphological units that have been identified in the two impoundments are shown on Figures 3-8.

Devil's Canyon Impoundment Area

Six surficial geological/morphological units have been identified within the Devil's Canyon impoundment area. These are Gd/b, Gb, Gm, Ra, Rv, and Ma. Each of these units consists of a number of isolated areas on-the-ground, and the areas have been numbered separately within each unit. The location, USGS Quad reference, and approximate size of these units is given below:

Gd/b Unit: A total of two isolated areas of this unit have been identified in the Devil's Canyon impoundment:

Gd/b #1: located on the south side of the Susitna River. Talkeetna Mtns. Quad. D-5. Approximate size 1.5 x .1 miles.

Gd/b #2a: located on the north side of the Susitna River. Talkeetna Mtns. Quad. D-4. Approximate size 1 x .1 miles.

Gb Unit: a total of three isolated areas of this unit have been identified in the Devil's Canyon impoundment:

Gb #1: located on the north side of the Susitna River. Talkeetna Mtns. Quad. D-5. Approximate size .5 x .25 miles.

Gb #2: located on the south side of the Susitna River. Talkeetna Mtns. Quad. D-5 and D-4. Approximate size 5.5 x .25 miles.

Gb #3: located on the north side of the Susitna River. Talkeetna Mtns. Quad. D-4. Approximate size 2.5 x .2 miles.

Gm Unit: only one isolated area of this unit has been identified in the Devil's Canyon impoundment:

Gm #1: located on the north side of the Susitna River. Talkeetna Mtns. Quad. D-4. Approximate size 1 x .1 miles.

Ra Unit: a total of six isolated areas of this unit have been identified in the Devil's Canyon impoundment:

Ra #1: located on the south side of the Susitna River. Talkeetna Mtns. Quad. D-4. Approximate size 1.5 x .4 miles.

Ra #2: located on the north side of the Susitna River. Talkeetna Mtns. Quad. D-4. Approximate size 3.5 x .25 miles.

Ra #3: located on the south side of the Susitna River. Talkeetna Mtns. Quad. D-4. Approximate size 3 x .4 miles.

Ra #4: located on the north side of the Susitna River. Talkeetna Mtns. Quad. D-4. Approximate size 2.5 x .25 miles.

Ra #5: located on the south side of the Susitna River. Talkeetna Mtns. Quad. D-4. Approximate size 3 x .4 miles.

Ra #6: located on the north side of the Susitna River. Talkeetna Mtns. Quad. D-4. Approximate size 5 x .2 miles.

Rv Unit: a total of eight isolated areas of this unit have been identified in the Devil's Canyon impoundment.

Rv #1: located on the north side of the Susitna River. Talkeetna Mtns. Quad. D-5 and D-4. Approximate size 13.5 x .2 miles.

Rv #2. located on the south side of the Susitna River. Talkeetna Mtns. Quad. D-5. Approximate size 10 x .3 miles.

Rv #3a: located on the north side of the Susitna River. Talkeetna Mtns. Quad. D-4. Approximate size 3 x .25 miles.

Rv #3b: located on the north side of the Susitna River. Talkeetna Mtns. Quad. D-4. Approximate size 1.5 x .1 miles.

Rv #4a: located on the south side of the Susitna River. Talkeetna Mtns. Quad. D-4. Approximate size 4 x .1 miles.

Rv #4b: located on the south side of the Susitna River. Talkeetna Mtns. Quad. D-4. Approximate size .25 x .1 miles.

Rv #4c: located on the south side of the Susitna River. Talkeetna Mtns. Quad. D-4. Approximate size 4.5 x .1 miles.

Rv #5: located on the north side of the Susitna River. Talkeetna Mtns. Quad. D-4. Approximate size .5 x .1 miles.

Ma Unit: a total of eight isolated areas, four of which are islands, of this unit have been identified within the Devil's Canyon impoundment.

Ma #1: located on the north side of the Susitna River. Talkeetna Mtns. Quad. D-4. Approximate size .5 x .1 miles.

Ma #2a: located on the north side of the Susitna River. Talkeetna Mtns. Quad. D-4. Approximate size .5 x .1 miles.

Ma #2b: located on the north side of the Susitna River. Talkeetna Mtns. Quad. D-4. Approximate size 1 x .25 miles.

Ma #3: located on the north side of the Susitna River. Talkeetna Mtns. Quad. D-4. Approximate size 2 x .25 miles.

Ma #7: an island located in the Susitna River. Talkeetna Mtns. Quad. D-5 and D-4. Size is very small.

Ma #8: an island located in the Susitna River. Talkeetna Mtns. Quad. D-4. Size is very small.

Ma #9: an island located in the Susitna River. Talkeetna Mtns. Quad. D-4. Size is very small.

Ma #10: an island located in the Susitna River. Talkeetna Mtns. Quad. D-4. Size is very small.

Watana Impoundment Area

Nine surficial geological/morphological units have been identified within the Watana impoundment area, six of which also occur in the Devil's Canyon impoundment. These nine units are Gd/b, Gb, Gd, Gm, Lm, Lm_2, Ra, Rv, and Ma. As was the case for the Devil's Canyon impoundment area, each of these units consists of a number of isolated areas on-the-ground and these areas have been numbered separately within each unit. The location, USGS Quad. reference, and approximate size of these units is presented below.

Gd/b Unit: a total of six isolated areas of this unit have been identified in the Watana impoundment:

Gd/b #2b: located on the north side of the Susitna River. Talkeetna Mtns. Quad. D-4 and D-3. Approximate size 3 x .3 miles.

Gd/b #2c: located on the north side of the Susitna River (lower Deadman Creek). Talkeetna Mtns. Quad. D-3. Approximate size 1 x .1 miles.

Gd/b #3: located on the south side of the Susitna River. Talkeetna Mtns. Quad. D-4 and D-3. Approximate size 10 x .5 miles.

Gd/b #4a: located on the north side of the Susitna River (west side of Watana Creek). Talkeetna Mtns. Quad D-3. Approximate size 8 mile circumference.

Gd/b #4b: located on the north side of the Susitna River (east side of Watana Creek). Talkeetna Mtns. Quad. D-3. Approximate size 14 mile circumference.

Gd/b #5: located on the south side of the Susitna River. Talkeetna Mtns. Quad. D-2. Approximate size 4 x .5 miles.

Gb Unit: a total of three isolated areas of this unit have been identified in the Watana impoundment:

Gb #4: located on the north side of the Susitna River (upper Watana Creek). Talkeetna Mtns. Quad. D-3. Approximate size 10 x .3 miles.

Gb #5: located on the north side of the Susitna River. Talkeetna Mtns. Quad. D-3 and D-2. Approximate size 12 x .4 miles.

Gb #6: located on the south side of the Susitna River. Talkeetna Mtns. Quad D-2 and C-2. Approximate size 10 x .4 miles.

Gd Unit: a total of two isolated areas of this unit have been identified in the Watana impoundment:

Gd #1: located on the north side of the Susitna River (east of Delusion Creek). Talkeetna Mtns. Quad. D-3. Approximate size 1 x .25 miles.

Gd #2: located on the south side of the Susitna River. Talkeetna Mtns. Quad D-3 and D-2. Approximately 10 x .25 miles.

Gm Unit: only one isolated area of this unit has been identified in the Watana impoundment:

Gm #2: located on the north side of the Susitna River. Talkeetna Mtns. Quad. D-3. Approximate size 10 x .4 miles.

Lm Unit: a total of two isolated areas of this unit have been identified in the Watana impoundment.

Lm #1a: located on the south side of the Susitna River (east of Oshetna River). Talkeetna Mtns. Quad. C-1. Approximate size 1 x .1 miles.

Lm #1b: located on the south side of the Susitna River. Talkeetna Mtns. Quad C-1. Approximate size 6.5 x .1 miles.

Lm_2 Unit: only one isolated area of this unit has been identified in the Watana impoundment:

Lm_2 #1: located on the north side of the Susitna River. Talkeetna Mtns. Quad. C-1. Approximate size 1.5 x .1 miles.

Ra Unit: a total of seven isolated areas of this unit have been identified in the Watana impoundment:

Ra #7: located on the north side of the Susitna River. Talkeetna Mtns. Quad. D-3. Approximate size 7 x .4 miles.

Ra #8a: located on the south side of the Susitna River. Talkeetna Mtns. Quad. D-3. Approximate size 3 x .4 miles.

Ra #8b: located on the south side of the Susitna River. Talkeetna Mtns. Quad. D-3. Approximate size 10 x .5 miles.

Ra #9: located on the north side of the Susitna River. Talkeetna Mtns. Quad. D-3 and D-2. Approximate size 2 x .5 miles.

Ra #10: located on the north side of the Susitna River. Talkeetna Mtns. Quad D-2. Approximate size 1.5 x .5 miles.

Ra #11: located on the north side of the Susitna River (confluence of Jay Creek). Talkeetna Mtns. Quad. D-2. Approximate size 3 x .25 miles.

Ra #12: located on the north side of the Susitna River. Talkeetna Mtns. Quad. D-2. Approximate size 2 x .2 miles.

Rv Unit: a total of seven isolated areas of this unit have been identified in the Watana impoundment:

Rv #4d: located on the south side of the Susitna River. Talkeetna Mtns. Quad. D-4 and D-3. Approximate size 3 x .25 miles.

Rv #6: located on the north side of the Susitna River (lower Delusion Creek). Talkeetna Mtns. Quad. D-3. Approximate size 16 x .25 miles.

Rv #7: located on the south side of the Susitna River. Talkeetna Mtns. Quad. D-3. Approximate size 4 x .4 miles.

Rv #8: located on the south side of the Susitna River. Talkeetna Mtns. Quad. D-3. Approximate size 2.5 x .25 miles.

Rv #9: located on the north side of the Susitna River. Talkeetna Mtns. Quad. D-3. Approximate size 7 x .35 miles.

Rv #10: located on the north side of the Susitna River. Talkeetna Mtns. Quad. D-2, C-2, and C-1. Approximate size 35 x .1 to .5 miles.

Rv #11: located on the south side of the Susitna River. Talkeetna Mtns. Quad. D-2, C-2, and C-1. Approximate size 31 x .1 to .5 miles.

Ma Unit: a total of twenty isolated areas of this unit have been identified in the Watana impoundment:

Ma #4: located on the south side of the Susitna River. Talkeetna Mtns. Quad. D-2. Approximate size 1.5 x 2.5 miles.

Ma #5: located on the north side of the Susitna River. Talkeetna Mtns. Quad. D-2. Approximate size .25 x .1 miles.

Ma #6: located on the south side of the Susitna River. Talkeetna Mtns. Quad. D-2. Approximate size .2 x .1 miles.

Ma #11- Ma #27: these areas all consist of islands in the Susitna River. Ma #11-25 are located on the Talkeetna Mtns. Quad. D-3. Ma #26 is located on Talkeetna Mtns. Quad. D-2, and Ma #27 is located on Talkeetna Mtns. Quad. C-2. All islands are small.

D. PALEONTOLOGY

Lower Watana Creek

The primary study area comprises a bank up to one mile wide, on either side of Watana Creek, extending from the mouth of the creek to approximately 10 miles above the mouth. Study procedures involve detailed measurement of selected sections in this band, perhaps 10 in all. Anticipated sampling consists of occasional individual rock units (hand samples) within the measured sections, more intensive sampling of coal seams and plant fossil bearing beds, and random samples elsewhere in the exposure area. Specific collecting sites cannot be determined until initial ground survey of the entire band is completed.

A second small outcrop of similar rocks exposed in an area approximately ½ mile wide and 1 mile long will also be studied and sampled. This is exposed at and above the mouth of the first unnamed creek west of Watana Creek on the north side of the Susitna River. Similar study and sampling techniques will be employed here.

Other Study Areas (Paleozoic and Mesozoic rocks)

Field procedures involve examination of selected outcrops within the area immediately adjacent to the proposed impoundment. Collection of hand samples from specific locales is anticipated, exact locations depending upon on-site findings. Visible fossils will be collected in abundance depending upon the nature and preservation of material and upon on-site assessment of what material and information will be needed in order to fully assess the scientific importance of the occurrence. Specific rock types (shales and cherts) anticipated in the impoundment area will also be examined for their potential microfossil content. Sampling methods in this type of survey involve collection of fossils and blocks of fossils where visible, and of hand samples for microfossils.

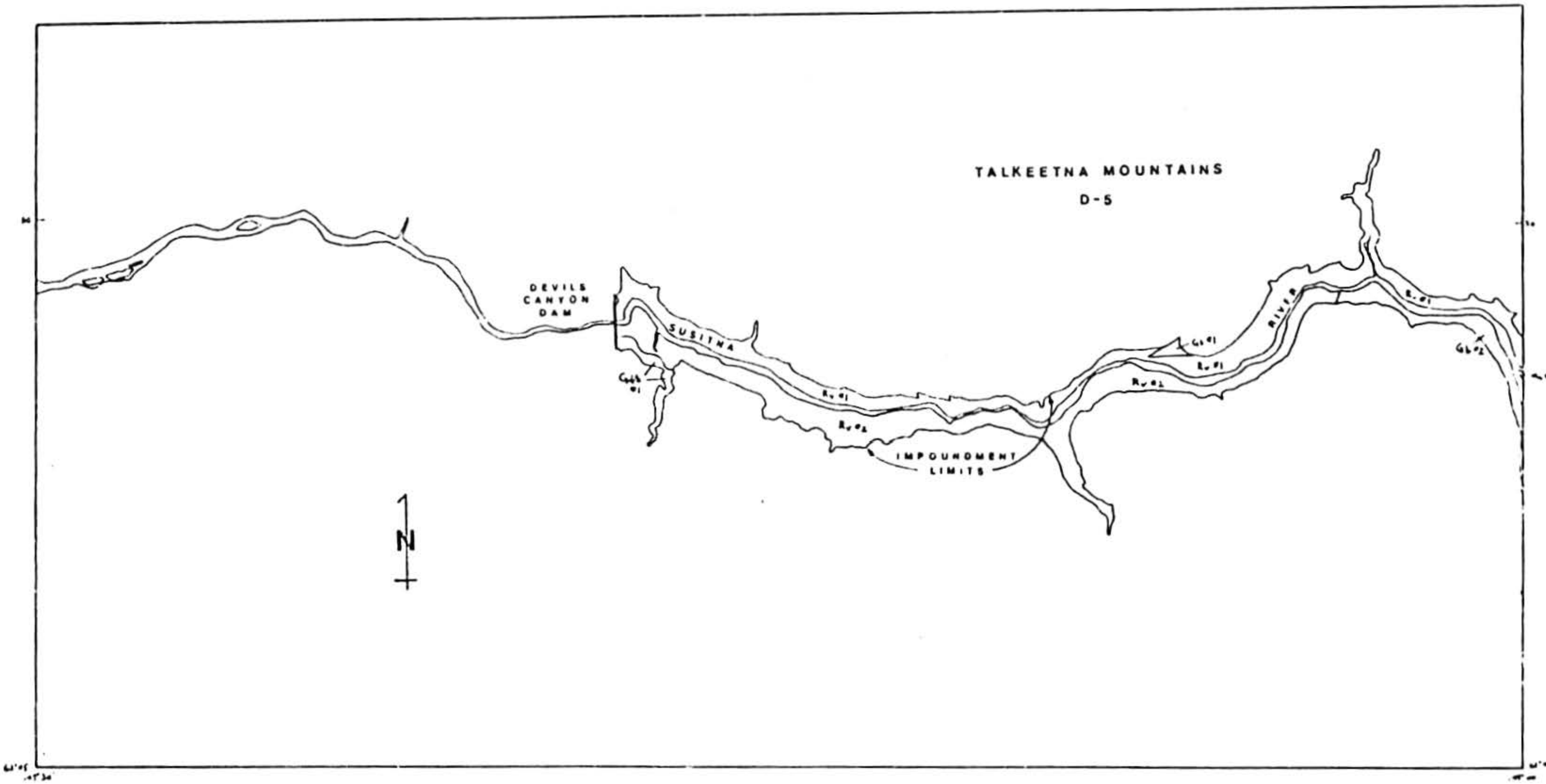

Figure 3. Location of Geological/Morphological Units Within the Impoundment Limits on the Talkeetna Mountains D-5 Quad.

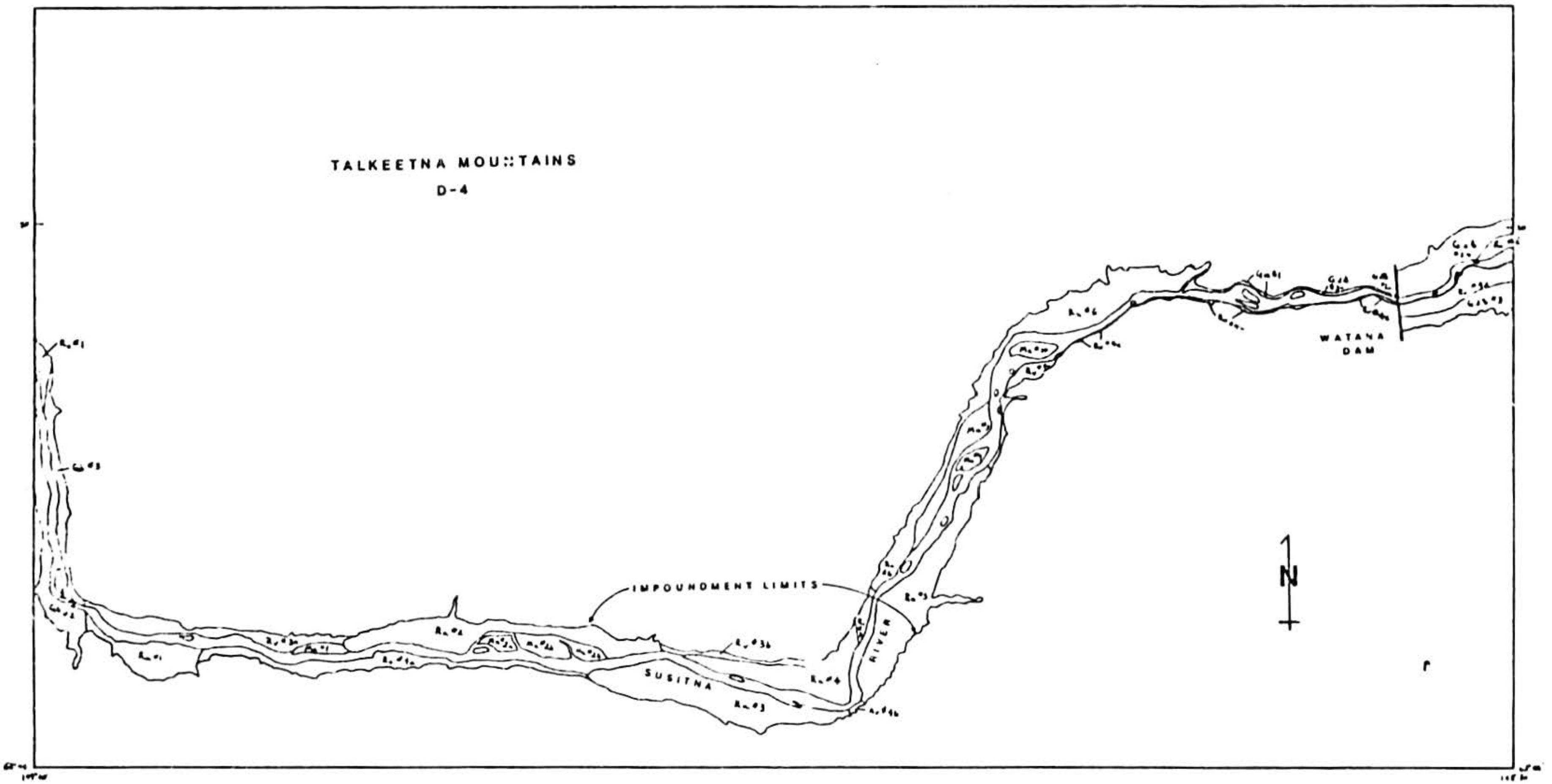

Figure 4. Location of Geological/Morphological Units Within the Impoundment Limits on the Talkeetna Mountains D-4 Quad.

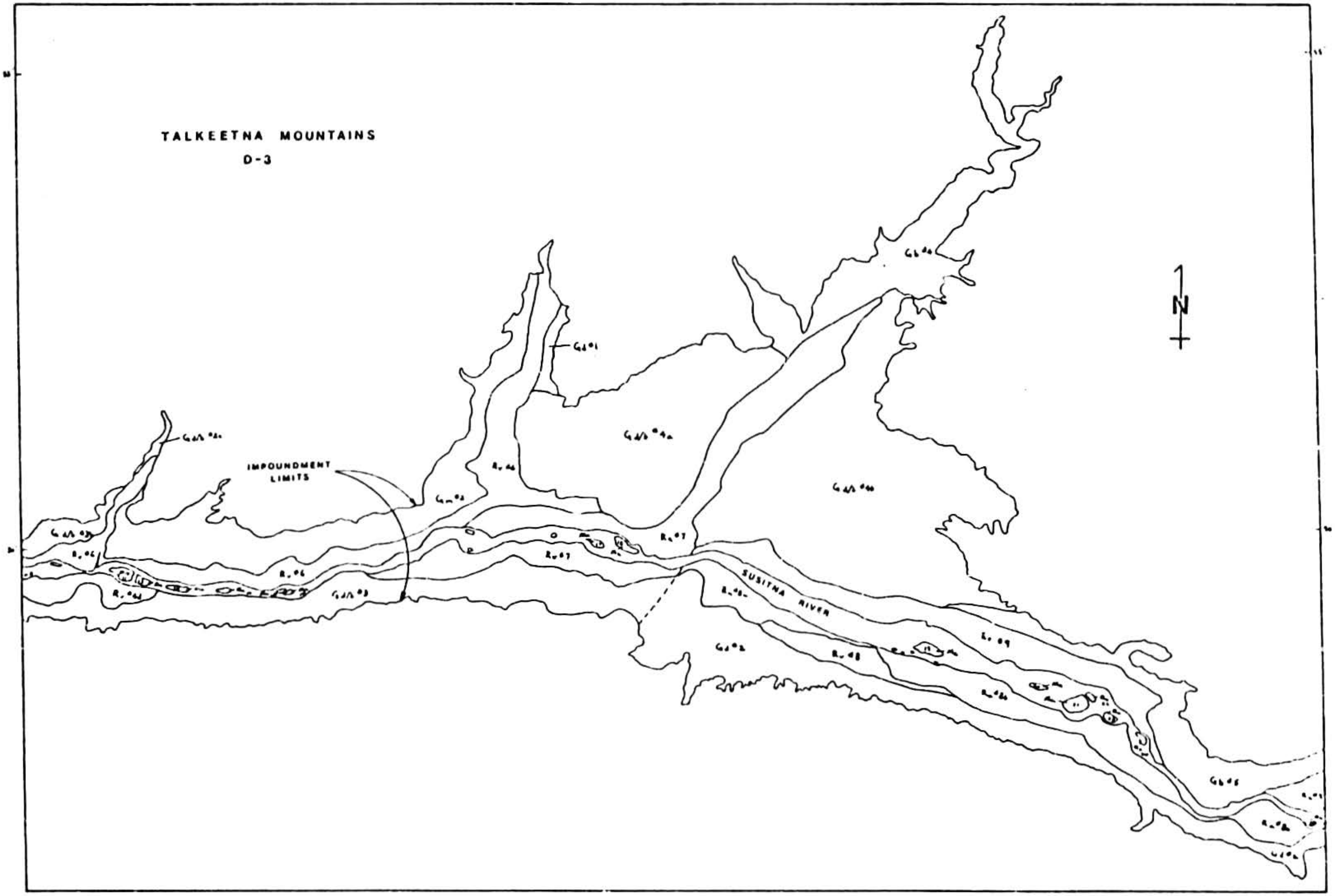

Figure 5. Location of Geological/Morphological Units Within the Impoundment Limits on the Talkeetna Mountains D-3 Quad.

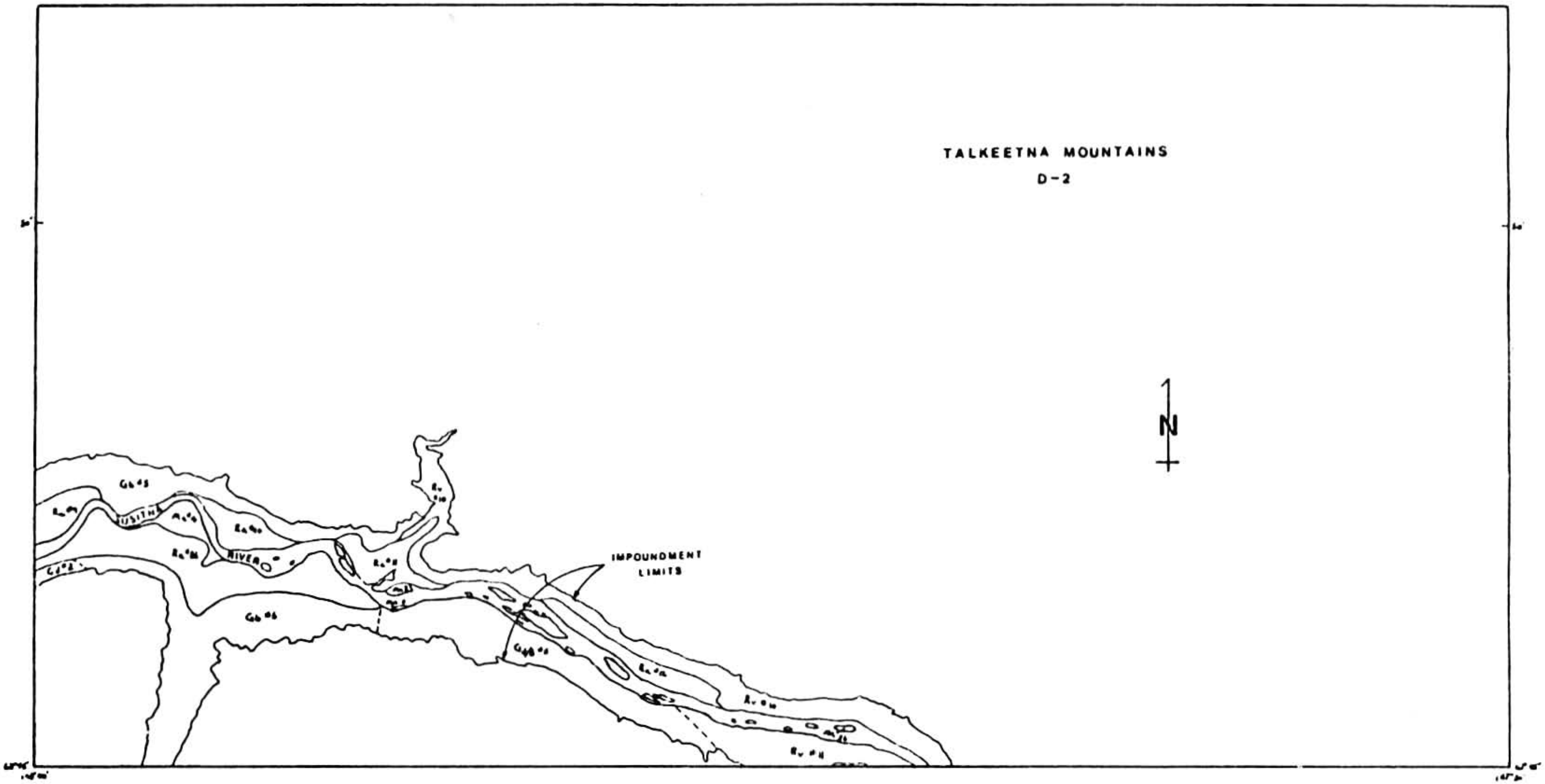

Figure 6 . Location of Geological/Morphological Units Within the Impoundment Limits on the Talkeetna Mountains D-2 Quad.

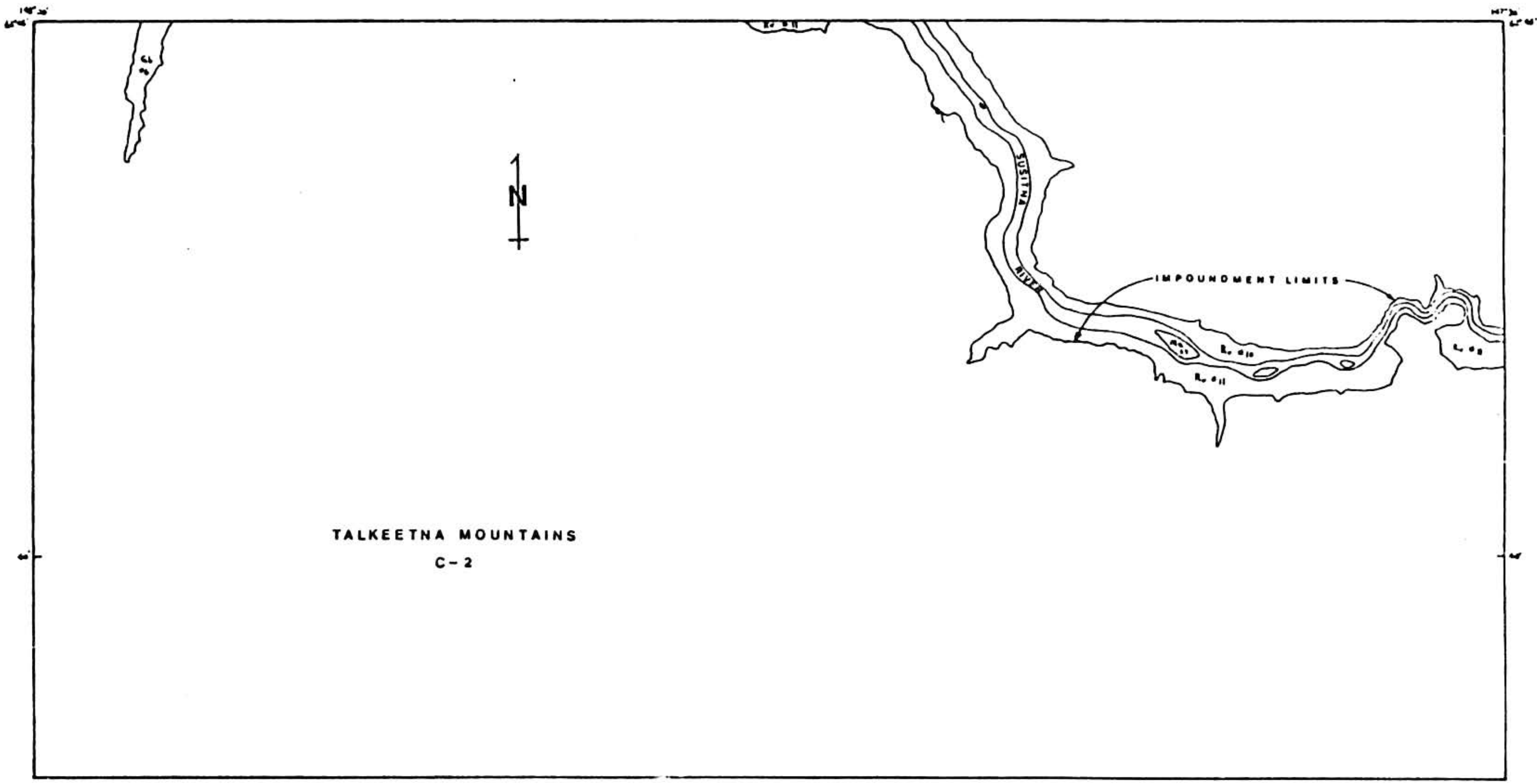

Figure 7. Location of Geological/Morphological Units Within the Impoundment Limits on the Talkeetna Moutains C-2 Quad.

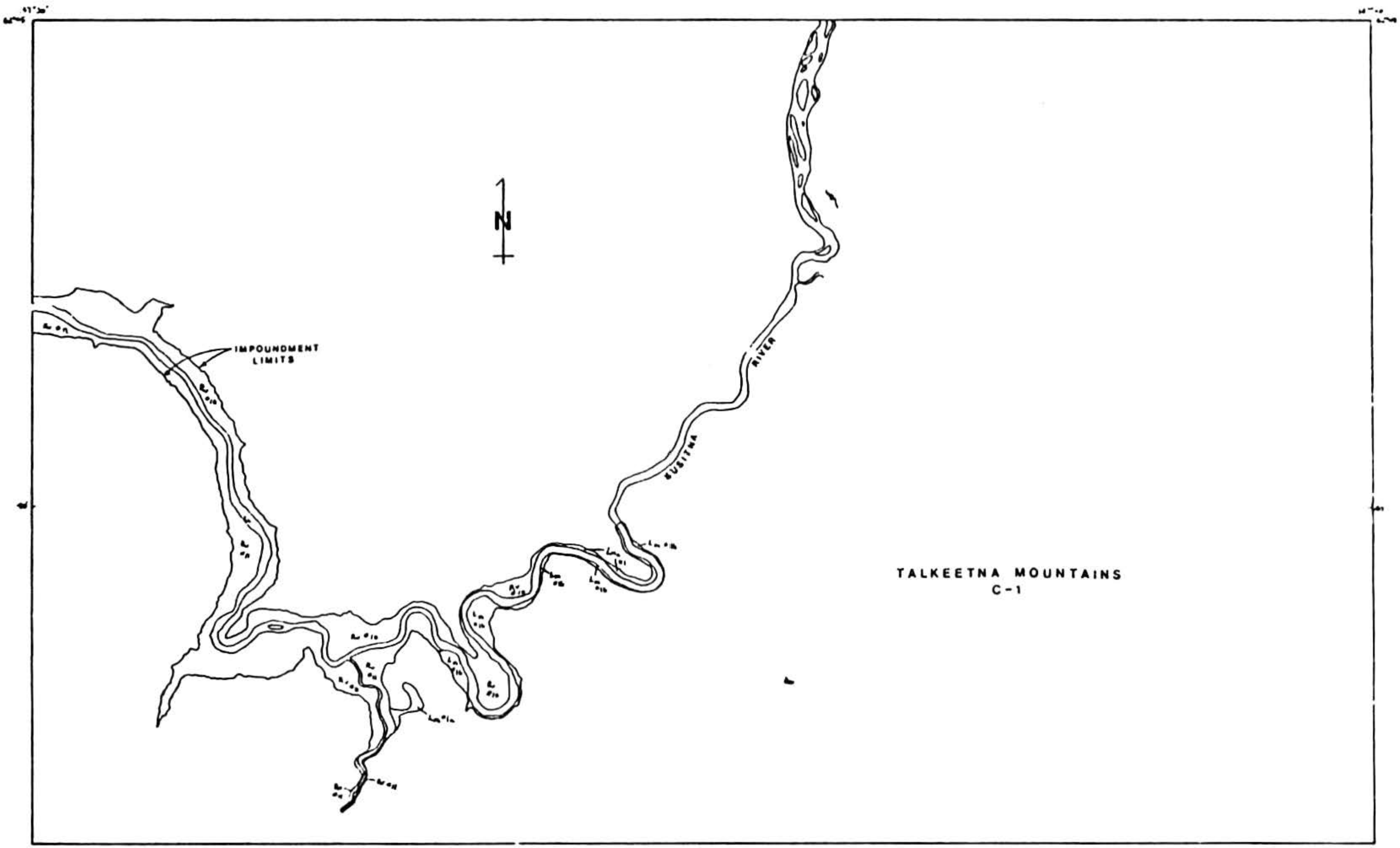

Figure 8. Location of Geological/Morphological Units Within the Impoundment Limits on the Talkeetna Mountains C-1 Quad.

III. DATA PROCEDURES

To insure consistent data collection in the field and provide a systematic format for data retrieval, a Site Survey Form will be used for this project (see Form 1). The form will serve as a basis for recording specific information on each site located during the reconnaissance level survey as well as a basis for further intensive testing or excavation, if necessary.

The form is organized into major categories including: site location, environment, site description and condition, photographic records and additional information such as a site map, and location of test pits. Subcategories within each of these headings provide specific data on these topics. Use of the form is discussed in the Technical Procedures Section as mentioned in the previous section. Although the form will organize a large quantity of data, it is designed to supplement field notebooks, not to replace them.

Daily field notes will be kept by each crew member. Each page will be numbered in the upper right hand corner along with the date or dates included on that page. Each site will be noted by BOLD underlined numbers (i.e., UA-80-23) at the beginning of the notes associated with that site. Field notebooks for survey will record much of the same information found on the Site Survey Forms, such as site location, topography, vegetation, soils, extent of site, and photographs taken. Field notebooks for testing will also record a detailed description of soils, stratification of soils, drawings of significant features or artifacts *in situ*, horizontal and vertical placement of artifacts and features excavated at the site, site maps, methods of excavation, and collection of non-archeological samples (soil, pollen, radiocarbon). A space will be left on each page for additional notes and corrections. Crew leaders will keep a continuous log of all areas surveyed, noting both the location of all test pits and natural exposures and the presence and absence of cultural material.

Once an archeological site is located, additional test pits will be excavated to the north, south, east, and west of the test pit which first documented the site. This testing is designed to assist in determining extent of the site as well as to locate additional cultural material. Due to the possibility of destruction to sites, preliminary testing at each site will be limited. Actual number of tests made at each site will depend on site specific information. All site tests will be numbered, mapped, and backfilled.

The location of all excavated and surface collected artifacts will be recorded. Specimens will be bagged by arbitrary 5 cm levels, unless natural stratification is encountered. Each bag will contain the following information: location (i.e., Devil's Canyon), date, University of Alaska Site Number (i.e., UA-80-23), name of excavator, test number (as recorded on site map, i.e., Test #1), depth, and specimen(s) in bag. Radiometric samples collected will be double wrapped in aluminum foil and placed in ziplock bags with data on each recording location, date, site number, name, test number, depth, specimen. All individual bags from each test will be placed in a large test pit bag with site number, name, date, and location on the outside. All test pit bags will be placed in a site bag with the site number and date on the outside. All site bags will be organized by sampling locale and stored at the Watana Base Camp until transported to the University of Alaska Museum in Fairbanks for cataloging and analysis.

A site specific and regional map will be made for each site. Site maps will include horizontal and vertical datum points, site grid, all test pits made, location of surface artifacts, features (such as hearths, cabin remains, house pits), distance and direction to other sites or major land features, a scale, date, person drawing map, person recording data, and reference to pages in field notebooks on which additional information is recorded. Regional maps will show the site in relation to a larger portion of the study area including nearby rivers, lakes, topographic features, and vegetation communities.

Photographs will be taken of each site located. The first picture at each site will be an identification shot indicating site number, date, and crew. Other photographs will record the environment around the site, features at the site, soil profiles exposed in test pits, and artifacts or features _in situ_ before removal by excavation. Each photograph will be recorded by roll and frame and recorded on the survey form. Direction of view, if applicable, will be noted for each photograph taken along with a short statement of content, and any other data pertinent to the photograph. When practical, a metric scale or other reference object will be included in the photograph. Care will be taken to produce quality photographs.

Detailed soil profiles will be drawn of soil deposits exposed during excavation. These will include a description of color, grain size, consistency, and moisture of each unit. Measurements recording depth and thickness for each unit will also be recorded.

A catalog of all specimens collected in the field during survey or excavation will be prepared during Step V, Curation. Pertinent data will be recorded for each specimen, including its Museum catalog number, description of specimen, excavation or collection unit, level or depth from which it was collected, date of collection, and collector or excavator. Site information collected and recorded during survey and testing will be recorded on Alaska Heritage Resource Site Survey long forms a copy of which is presented as Form 2. These become a permanent public record of the State of Alaska.

The 1980 reconnaissance will be directed toward on-the-ground evaluation of geological/morphological units that have been identified for the project area. The purpose of these evaluations is to provide a basis for the development of sampling strata. Along with these evaluations the attempt will be made in the field to identify areas that potentially may be eliminated from further survey, and the location of as many obvious site locales as possible. Form 3 has been developed to aid these unit evaluations.

FORM 1

ARCHEOLOGICAL SITE SURVEY FORM

ARCHEOLOGY
UNIVERSITY MUSEUM
UNIVERSITY OF ALASKA

FIELD SITE NO.:______________
SITE NAME:______________
AHRS NO:______________

SUSITNA HYDROPOWER PROJECT

I. SITE LOCATION:
   A. USGS QUAD: Talkeetna Mountains_____ Scale: 1:63,360
   B. AIR PHOTO REFERENCE: Roll_____ Frames _____
   C. TWP _______, RNG _______, Seward Meridian
      _______¼ of the ______¼ of the ______¼ of Section ______.
   D. UTM: Zone 6 Easting__________ Northing __________
   E. LATITUDE: ____°____'____" LONGITUDE: ____°____'____"
   F. GEOLOGICAL UNIT: _______ No. _______
   G. REGION: Devil's Canyon ______ Watana_______ Other:______________________

II. ENVIRONMENT:
   A. Site morphology. (See back of form for information required.)

____
____
____
____
____
____
____
____
____
____
____
____
____
____
____

   B. Surrounding terrain morphology. (See back of form for information required.)

____
____
____
____
____
____
____

FIELD SITE NO. 49

C. Ecosystem. (See back of sheet for descriptions.)

1. _____Moist Tundra _____ High Brush _____Other: __________________

_____Lowland spruce-hardwood _____Upland spruce-hardwood

2. Site vegetation and surface description:

3. Vegetation in surrounding area and surface description:

FIELD SITE NO.______________

III. SITE:

A. Description:

1. Characteristics. (lithic scatter, stratified site, cabin, etc.)

2. Number, size and spatial relationship of features, etc.

3. Stratigraphy (if relevant):

B. Artifact inventory.
1. Surface:
a. Artifacts collected:

b. Artifacts observed but not collected:

2. Systematically excavated artifacts:

C. Period: _____Unknown _____Precontact
_____Historic: Native_____ Non-Native_____

D. Size:
1. Observed Size: _____ x _____ meters

Justification for boundaries:

2. Estimated Size: _____ x _____ meters
Justification for boundaries:

E. Site disturbance (current and anticipated).
1. Natural:

2. Human:

FIELD SITE NO.______________

F. What prompted you to survey this location?

G. Draw and attach map(s) of site with location of tests and surface features; soil profile(s); and general location and vegetation map.

IV. PHOTOGRAPHIC RECORD:

Frame #	Direction	Content
		Site ID with date and Crew

V. CREW:

A. Names: ______, ______, ______

______, ______, ______

______, ______, ______

B. Date(s) visited: ______________

VI. Field Recommendation for further testing:

II. A. Site morphology.

1. What terrain feature is the site on: flat plain, sloping plain, continuous ridge, hill, point, shoreline, terrace, valley, etc.
2. What is the topographic context:
   a. no topographic relief relative to surrounding terrain, higher topographic relief than surrounding terrain, lower topographic relief than surrounding terrain.
   b. give elevation: 1) above sea level; 2. Relative to surrounding terrain.
3. Is the terrain feature continuous or discrete?
4. What is the size, shape and direction of this feature?
5. What is the relative position of the site on this feature?
6. Field of view:
   a. direction and range of view;
   b. what is in view?;
   c. would a change in the present vegetation increase or decrease view? How?
7. Describe any special attributes that make this site location unique.
8. Are there other settings similar to that of this site in the unit? Where?

II. B. Surrounding terrain morphology.

Describe surrounding landforms and water features in relation to the site. What is the direction, distance, and difference in elevation of surrounding features? The following characteristics should provide a guide:

1. Streams and rivers:
   a. proximity to site
   b. access from site
   c. are any in view from site?
   d. has downcutting created valley wall constriction in this area?
   e. is stream or river (1) shallow with rapids and sandbars, or (2) deep and smooth in this vicinity, etc.
   f. is water clear or turbid?
   g. what is the general width in this vicinity?
   h. is terracing present?
   i. in this area is the river course:
      1. straight;
      2. bending;
      3. serpentine.
   j. are confluences with other streams or rivers nearby? How far?
   k. what kind of terrain does this stream or river drain? (lakes, hills, marsh)

2. Lakes:
   a. size in hectares using template.
   b. inlet present? outlet present?
   c. single lake or part of lake system?
   d. characterize terrain surrounding lake (low, wet, steep, etc.)
   e. is there any evidence that lake size is changing (vegetation overgrowth, old shorelines, etc.)
   f. characteristics of shoreline. Old shorelines present?

ECOSYSTEMS LIKELY TO BE ENCOUNTERED IN PROJECT AREA

MOIST TUNDRA: Moist tundra ecosystems usually form a complete ground cover and are extremely productive during the growing season. They vary from almost continuous and uniformly developed cottongrass tussocks with sparse growth of other sedges and dwarf shrubs to stands where tussocks are scarce or lacking and dwarf shrubs are dominant. Associated species are arctagrostis, bluejoint, tufted hairgrass, mosses, alpine azalea, wood rush, mountain-avens, bistort, low-growing willows, dwarf birch, Labrador tea, green alder, Lapland rosebay, blueberry and mountain cranberry.

HIGH BRUSH: These are dense to open deciduous brush systems. Floodplain thickets: The subsystem is similar from the rivers of the southern coastal areas to the broad-braided rivers north of the Brooks Range. It develops quickly on newly exposed alluvial deposits that are periodically flooded. The dominant shrubs are willows and alders. Associated shrubs are dogwood, prickly rose, raspberry, buffaloberry and high bush cranberry. Birch-alder-willow thickets: This subsystem is found near timberline in interior Alaska. It consists of resin birch, American green alder, thinleaf alder, and several willow species. Thickets may be extremely dense, or open and interspersed with reindeer lichens, low heath type shrubs, or patches of alpine tundra ecosystems. Other associated species are Sitka alder, bearberry, crowberry, Labrador tea, spirea, blueberry, and mountain cranberry.

UPLAND SPRUCE-HARDWOOD FOREST: This ecosystem is a fairly dense interior forest composed of white spruce, birch, aspen and poplar. Black spruce typically grows on north slopes and poorly drained flat areas. Root depths are shallow. Fire scars are common. White spruce averaging 40 to 80 feet in height and up to 16 inches in diameter occurs in mixed stands on south facing slopes and well drained soils; forms pure stands near streams. Aspen and birch average 50 feet in height. Poplar averaging 80 feet in height and 24 inches in diameter occurs in scattered stands along streams. Undergrowth consists of mosses with grasses on drier sites and with brush on moist slopes. Typical plants are willow, alder, ferns, rose, high and low bush cranberry, raspberry, current and horsetail.

LOWLAND SPRUCE-HARDWOOD FOREST: This ecosystem is a dense to open interior lowland forest of evergreen and deciduous trees, including extensive pure stands of black spruce. Black spruce are slow growing and seldom exceed 8 inches in diameter or 50 feet in height. Cones of this tree are opened by fire and spread abundant seed, enabling black spruce to quickly invade burned areas. The slow-growing stunted tamarack is associated with black spruce in the wet lowlands. It seldom reaches a diameter of more than 6 inches. Rolling basins and knolls in the lowlands have a varied mixture of white spruce, black spruce, paper birch, aspen and poplar. Small bogs and muskegs are found in the depressions. Undergrowth species include willow, dwarf birch, low bush cranberry, blueberry, Labrador tea, crowberry, bearberry, cottongrass, ferns, horsetail, lichens and a thick cover of sphagnum and other mosses. Large areas burned since 1900 are covered by willow brush and very dense black spruce sapling stands.

AFTER: Major Ecosystems of Alaska. Joint Federal-State Land Use Planning Commission for Alaska. July 1973.

FORM 2

ALASKA HERITAGE RESOURCES
SITE SURVEY FORM

ALASKA HERITAGE RESOURCES SITE SURVEY FORM (ARCHAEOLOGY) OH&A 5/76 Page 1
(Attach continuation sheets as needed.)

RECORDER:

1.Name(s)________________________ 2. Date__________

3.Address________________________

4.Project________________________ 5. Permit Number__________

SITE REFERENCE/LOCATION:

1.Field Designation________________________ 2. (AHRS) Designation__________

3.Name(s) of Site________________________

4.Map Name________________________, Map Scale__________

5.Latitude_____Deg._____Min._____Sec./Longitude_____Deg._____Min._____Sec.

6.Legal Description________________________

7.Aerial Photo Reference________________________, Photo Scale__________

8.UTM Grid Reference________________________

9.Bibliographic References (manuscripts, etc.)________________________

____

LAND USE CONDITIONS:

1.Present Land Use________________________

2.Recent Surface Modifications________________________

3.Natural Erosion: Kind________________________Extent__________

4.Vandalism: No____Yes____; Heavy____Medium____Light____

5.Past Surface Modifications________________________

6.Future Surface Modifications________________________

7.Property Owner/Manager________________________

ENVIRONMENTAL DESCRIPTION:

1.Vegetation at Site________________________

2.Surrounding Vegetation________________________

3.Topography at Site________________________

4.Surrounding Topography________________________

5. Geology (surface/bedrock)________________________

6.Nearest Water to Site: Distance________Direction________Type__________

(Attach continuation sheets as needed.)

Site Reference ____________
From Page 1

SOIL MATRIX:

1.Thickness (sod) ____________, (soil) ____________, Description ________________

____

____

3.Samples Taken: No_____ Yes_____; Number/Description ________________________

____

1.Field Book(s) ______________________________ Pages ___________________________

2.Photographs Taken: B&W____ Color Slides____ Color Prints____, Description of

Subject(s) ____

____

ARCHAEOLOGICAL OBSERVATIONS/DATA COLLECTED:

1.Estimated Extent of Site (use sketch map) ______________________________

2.Number of Cultural Components ____

3.Stratigraphy: No____ Yes____ (attach profile)

4.Number of Test Pits Dug____ (indicate their relative positions on sketch map)

5.Organic Preservation: No____ Yes____; Good____ Moderate____ Poor____

6.Faunal: No____ Yes____; Description (ID) _______________________________

7.Human Remains: No____ Yes____; Description ______________________________

8.Charcoal: No___ Yes___ Collected___; Description/Provenience ______________

____

9.Other Features ____

____

10.Artifacts: No____ Yes____ Collected____; Description ____________________

____

____

11.Repository ____

SKETCH MAP ATTACHED:

1.Indicate North, give scale, provide appropriate labels, and include landmarks.

FORM 3

UNIT EVALUATION FORM

Museum Archeology
University of Alaska
Fairbanks, Alaska 99701

Geological Unit:__________
Number:__________

SUSITNA HYDROPOWER PROJECT
UNIT EVALUATION FORM

This form is intended to insure that four kinds of data for each unit are recorded. These data will guide additional survey, the development of strata for 1981 sampling, evaluation of areas that may need no further work, and document areas surveyed and tested on-the-ground. If supplementary information to this form is included in fieldnotes, please note this on the form along with your name(s) and field book page number(s).

I. A field comparison of the geological/morphological unit and its definition (given on the back of this form) is needed. The field description of the unit should include the uniformity and variability of surface morphology. The information which you record will be used to compare this unit with other units to determine similarity and aid in the development of strata for sampling:

a. Describe the surface morphology noting topographic features, drainage, soils, variation in surface slope, etc.

Geological Unit:________
Number:________

b. What, if any, are the discrepancies between the definition of the unit (based on air photo interpretation) and the field observation of the unit? Would you characterize the total area as a single unit based on the homogeneity of surface morphology?

II. Identify areas within the unit that potentially may be eliminated from further archeological survey. Please provide objective criteria in your evaluation such as: 1) areas where testing is not feasible using standard archeological field techniques (areas of standing water, talus rubble); 2) areas where the substrata has been removed by natural erosion (indicate whether these areas have been surface examined for archeological materials); and 3) Overly steep slopes. This would include slopes of greater than 15° to horizontal which you deem unlikely for site occurrence (describe and measure slope angle).

Geological Unit:_________
Number:_________

III. Identify locales within the unit which may have high archeological potential, based on known site locales from other areas and your field experience, including overlooks, river terrace and bluff edges, lake and stream margins, etc. Describe the location, extent, salient features, and tests (if applicable) for these locales, record these locations on USGS maps.

IV. Locate on maps where the survey team actually went on-the-ground, and location, number, size, and depth of test pits excavated and natural exposures examined. Describe the topographic setting, and relation to other physical features, such as lakes, streams, rivers, bluff, edges, nearby hills, elevation, etc., for sterile test pits.

NAMES OF FIELD TEAM:

____________________Date__________ ____________________Date__________

____________________Date__________ ____________________Date__________

____________________Date__________ ____________________Date__________

G = Glacial   L = Late Glacial   R = Recent   M = Modern

b. Surfaces mapped as "b" are sloping bedrock surfaces that formed the valley walls of glacial troughs. In most cases slopes are very steep, and usually bedrock is exposed directly underneath the thin recent soil mantle. In some places patchy thin drift may be present within the boundaries of areas mapped with the subscript "b". This unit commonly grades both upward and downward in elevation to rock slopes above the glacial trough (r) or to drift mantle slopes (d, d/b). Minor windblown sedimentation and solifluction processes have occurred, but in most cases the glacial troughs are relatively unmodified.

d. Surfaces mapped as "d" include those areas thickly mantled with glacial drift. Relief is generally very low and the unit can have a monotonous gradually sloping undulating expression. Drainage is typically poor, with small ponds forming in a few places. The surface character is controlled largely by the varying thickness and composition of the till mantle. Most of the sediment underlying the surfaces mapped "d" is probably stony, clayey, dense till, which may be overlain by a thin gravel cap.

d/b. Surface mapped as "d/b" are underlain by thin or patchy drift which overlies bedrock. Both ice-scoured bedrock and a mantle of poorly drained drift can occur locally. The topographic relief is usually lower than "r" surfaces because the drift fills in the original depressions. It is higher than "d" surfaces because the surface irregularities are not completely masked by a drift mantle. Locally, this unit can be well drained (as in the gravelly areas), but usually well drained bedrock areas are randomly interspersed with poorly drained drift areas. Minor areas of subdued morainal topography can be present locally.

m. Surfaces mapped as "m" are underlain by hummocky irregular, commonly gravelly drift which extends to some depth. The surface expression is morainal. Topographic relief is generally less than 100 feet, but numerous chaotic small ridges (morainal) or isolated mounds (kames) typically less than 100' relief may be present. In most areas, the surfaces mapped as "m" are well drained and gravelly. Small lakes are commonly present, and large irregular poorly drained areas may be present as well. Very little morainal topography is present west of the Watana Dam Site. Extensive areas near the Tyone River, although morainal in form (m), are more subdued and poorly drained, possibly because they are partly buried by eolian sediments.

m2. Surfaces mapped as "m2" are similar to "m" surfaces and grade directly into them. They are, however, more irregular in form, with more prominent ridges, and better drained topography. In the vicinity of Tsisi Creek and the Oshetna River, "m2" surfaces include some prominent valley lateral moraines.

v. Surfaces mapped as "v" include all bedrock surfaces that were formed by recent incision of tributaries and the Susitna River. The surfaces are very steep, commonly gullied, and are still commonly in the process of being eroded. The boundary between "v" surfaces and the next higher surface is usually sharp. "v" surface also includes some colluvium, small talus cones, and a few possible landslides.

a. Surfaces mapped as "a" include all alluvium of modern or relatively recent age. The alluvium is generally well drained and vegetation covered, especially in the Susitna Canyon. Alluvium in the tributaries may contain minor colluvial debris and some fine material, but along the Susitna and Chulitna River "a" is indistinguishable from outwash. The alluvium is derived largely from reworked outwash, hence the similarity. The contact between alluvium (a) and steep gullied slopes (v) is usually abrupt, but difficult to map because of the narrow outcrop pattern.

IV. QUALITY CONTROL

Quality control will be the responsibility of the principal investigator and the project supervisor or their appointed representative. In the field it will be the responsibility of the project supervisor to direct field duties and coordinate with other project personnel.

The inspection of the quality of data recorded in field notebooks, site maps, and soil profiles, Site Survey Forms, as well as adherence to systematic professional standards of testing will be the responsiblity of the project supervisor and the crew leader. Photographs will provide additional documentation of information recorded in the field notes. All forms of documentation will be stored in waterproof boxes while in the field. Artifacts collected will be documented and inventoried in the field and stored at the Watana Base Camp until transported to the University of Alaska Museum in Fairbanks. When specimens are received at the Museum they will be inventoried again. Pertinent information for each specimen will be recorded in Museum catalogs. Maintenance of quality control during laboratory analysis of data will be the responsibility of the project supervisor. All specimens and related documentation will be permanently stored in the University of Alaska Museum.

Areas designated as having low, moderate, or high potential for containing and preserving sites will be tested in the field in order to check the validity and quality of the sampling strata. Testing procedures are discussed in the Technical Procedures section.

Quality control for all phases of the project, including the final report, is ultimately the responsibility of the principal investigator.

V. SCHEDULE

The following schedule is intended to provide a general outline for the five project steps. More specific schedules for individual steps will be developed separately as the project progresses.

Step I: Prefield Season Tasks - January to May 1980

1. Receive notification to proceed.
2. Obtain Federal Antiquities permit and any State documents necessary to proceed.
3. Determination of locations of known archeological and historic sites.
4. Literature search of history, prehistory, ethnography, geology, flora, fauna, and late Pleistocene and Holocene geology.
5. Air photo analysis.
6. Aerial reconnaissance.
7. Analysis of data base.
8. Development of sampling strategy.
9. Development of research design/procedures manual.
10. Personnel recruitment.
11. Staging.

Step II: Archeological Reconnaissance Survey - June to August 1980

1. Identify, locate, document and inventory historic and archeological sites through surface and subsurface testing.

    a. In the impoundment area: in locations as determined by sampling strategy.
    b. At areas affected by preconstruction activity: as determined by sequence of construction events.
    c. Areas of secondary impact.

Step III: Intensive Testing - June to August 1980 as necessary
Sampling and Intensive Testing - June to August 1981

1. Personnel recruitment.
2. Staging.
3. Systematic archeological excavation, including:

    a. Grid site
    b. Sampling scheme for site
    c. Excavation
    d. Mapping
    e. Photographic documentation
    f. Soil profiles

<u>Step IV</u>: Analysis and Report Preparation[3] - July 1980 to March 1982

1. Continuous analysis of data as it is received.
2. Monthly reports - 10th of each month.
3. Semiannual report - August 1980, August 1981
4. Annual Report - February 1981
5. Draft final report - January 1982; includes:

    a. Compilation of individual steps of project.
    b. Synthesis of all data.
    b. Report on vegetation, fauna, geology, history, prehistory and Native populations.
    d. For each site located and tested:

        - location
        - description
        - recommendations for mitigation
        - eligibility for inclusion in National Register of Historic Places

    e. Overall effectiveness of project.

6. Final report - March 1982

<u>Step V</u>: Curation - July 1980 and in perpetuity

1. Receiving material from field.
2. Fumigation.
3. Cleaning.
4. Cataloging.
5. Report to Federal and State agencies on sites located and materials acquired.
6. Storage.

A month-by-month schedule for all personnel known at this time who will be involved in the project is given on the following pages.

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3. Dates refer to report submission by University of Alaska Museum to TES.

PERSONNEL SCHEDULE 1980

J F M A M J J A S O N D

E. James Dixon	(3 months)
George S. Smith	(12 months)
Martha Johnson	(9 months)
Gene West	(2 months)
Charles Utermohle	(3 months)
Alan Ziff	" "
Martha Case	" "
Bob Betts	" "
Les Baxter	" "
Robert Thorson	(6 months)
Clerk Specialist	(3 months)
Research Associate	(5 months)
Steve Hardy	(7months)
Jane Smith	(6 weeks)
Carol Allison	(2 months)
Mikey Payne	(1 month)

PROPOSED PERSONNEL SCHEDULE 1981

	J	F	M	A	M	J	J	A	S	O	N	D	
E. James Dixon	—					—		—			—	—	(3 months)
George S. Smith	—	—	—	—	—	—	—	—	—	—	—	—	(12 months)
Martha Johnson			—	—	—	—	—	—	—	—	—	—	(9 months)
Gene West										—	—	—	(2 months)
Crew Leader						—	—	—	—				(May 28-August 30, 3 months)
Crew Leader						—	—	—	—				" "
Crew Leader						—	—	—	—				" "
Crew Member						—	—	—	—				" "
Crew Member						—	—	—	—				" "
Crew Member						—	—	—	—				" "
Crew Member						—	—	—	—				" "
Crew Member						—	—	—	—				" "
Crew Member						—	—	—	—				" "
Clerk Specialist			—	—						—	—	—	(3 months)
Research Associate			—	—	—	—	—	—	—				(6 months)
Geologist			—	—	—	—	—	—	—				(6 months)
Steve Hardy	—	—	—	—	—								(4 months)

VI. PERSONNEL

A. PRINCIPAL INVESTIGATOR (PI)

The Principal Investigator (PI) bears overall responsibility for the project including research design, obtaining necessary permits, scheduling, crew selection, prefield training, quality assurance, communication with other professionals, data collection and analysis, report preparation and editing, and curation of artifacts. He will have overall responsibility for seeing that the project complied with proposed scheduling, budgeting and all State and Federal regulations that apply to cultural resource management. It is expected that due to administrative responsibilities, the PI will not be available for long periods in the field during this portion of the project. In this case, the PI will delegate responsibilities to the Project Supervisor.

The PI for the project will be Dr. E. James Dixon, Jr. (Ph.D., Brown University, 1979). Dr. Dixon is Curator of Archeology and Assistant Professor at the University of Alaska Museum, Fairbanks, and has over 12 years of archeological experience in Alaska. He is a member in good standing of the Society of Professional Archeologists (SOPA) and meets all the requirements for membership in this organization. Dr. Dixon has published numerous articles on Alaskan archeology and anthropology, has administered several large archeological contracts, and has prepared comprehensive reports for them. Dr. Dixon possesses the necessary archeology background and administrative experience to fulfill the requirements of this project.

B. PROJECT SUPERVISOR (PS)

The Project Supervisor (PS) will have responsibility for directly supervising all phases of the field work and analysis. He will collaborate in designing the research, sampling strategy, and personnel hiring, and will implement programs in the field. Initial preparation of all reports will be the responsibility of the PS. The PS will direct all field crews and act on behalf of the PI in dealing with other project personnel. He will be responsible for all field equipment, food, and supplies and will direct field logistics. He will also be responsible for quality assurance and safety in the field. It will be the responsibility of the PS to see that all data necessary for the completion of the archeological section of the Susitna Hydropower Project Feasibility Studies are collected in a manner which meets professional standards.

The PS for this project will be Mr. George S. Smith (M.A. University of Alaska, 1978). Mr. Smith is a Research Associate in Archeology at the University of Alaska and has over 7 years experience in Alaskan archeology, having been PI and PS on a number of large archeological projects in remote coastal and interior areas of Alaska. He is experienced and competent in research design, sampling strategy, personnel management, supply, field logistics, data collection, analysis, and report preparation. He is also one of the leading experts on zooarcheology in the State.

C. CREW LEADER (CL)

The Crew Leader (CL) will be responsible for directing field operations under the direct supervision of the Principal Investigator and the Project Supervisor. In the absence of either the PI or the PS the Crew Leader will be responsible for continuing field operations. The Crew Leader will have at least two field seasons of archeological survey and/or excavation experience and have knowledge of New World archeology and report writing.

D. CREW MEMBER (CM)

Crew Members for this project will assist the PI, PS, and CL in locating and recording historic and archeological resources located within the Susitna study area. Crew Members will have a basic knowledge of archeological field methods and at least one field season's experience in archeological survey or excavation.

E. GROUP LEADER (GL)

The Group Leader will have responsibility for supervising the cultural resources investigation effort, and for ensuring consistency of this effort with overall project objectives and procedures. The Group Leader will be directly responsible to the Environmental Study Director (ESD). The duties of the Group Leader will be to:

(1) ensure completeness and effectiveness of discipline-specific studies in meeting study objectives,

(2) provide direction of and assistance with the initiation of all field sampling efforts,

(3) maintain active supervision of project staff efforts on a day-to-day basis,

(4) recommend approval/disapproval of adjustments to discipline-specific studies,

(5) approve minor program/sampling procedure adjustments to make the program more compatible with existing conditions,

(6) inform the ESD of program activities on a regular basis,

(7) provide program design recommendations to the ESD, and

(8) assure that subtask reports have a format and contents appropriate for incorporation into the Environmental Study (task) reports.

The Group Leader for this cultural resources investigation will be Mr. Lewis M. Cutler (M.S. State University of New York College of Environmental Science and Forestry, 1975). Mr. Cutler has coordinated and managed archeological efforts on other projects in the continental United States.

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