SUSITNA
HYDROELECTRIC PROJECT

FEDERAL ENERGY REGULATORY COMMISSION
PROJECT No. 7114

PHASE II FINAL REPORT

SAMPLE SURVEY AND PREDICTIVE MODEL REFINEMENT FOR CULTURAL RESOURCES LOCATED ALONG THE SUSITNA HYDROELECTRIC PROJECT LINEAR FEATURES

VOLUME I

PREPARED BY

HISTORICAL RESEARCH
ASSOCIATES

UNDER CONTRACT TO

HARZA-EBASCO
SUSITNA JOINT VENTURE

FINAL REPORT

JUNE 1986
DOCUMENT No. 3408

Alaska Power Authority

Document No. 3408
Susitna File No. 4.4.6

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SAMPLE SURVEY AND PREDICTIVE MODEL REFINEMENT FOR CULTURAL RESOURCES LOCATED ALONG THE SUSITNA HYDROELECTRIC PROJECT LINEAR FEATURES VOLUME I

Report by
Historical Research Associates

With Contributions from
Alaska Heritage Research Group, Inc.

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Under Contract to
Harza-Ebasco Susitna Joint Venture

Prepared for
Alaska Power Authority

Final Report
June 1986

NOTICE

ANY QUESTIONS OR COMMENTS CONCERNING
THIS REPORT SHOULD BE DIRECTED TO
THE ALASKA POWER AUTHORITY
SUSITNA PROJECT OFFICE

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ACKNOWLEDGEMENTS

Historical Research Associates acknowledges the support of the Alaska Power Authority through Harza-Ebasco Susitna Joint Venture for funding this project, and recognizes that staffs of both organizations were crucial in its successful completion.

T. Weber Greiser was Project Manager, and Dr. Sally T. Greiser served as Co-Principal Investigator. Pedestrian field crews, each under the direct supervision of an experienced, professional archeologist and under overall supervision of Glenn Bacon, Co-Principal Investigator with Alaska Heritage Research Group (AHRG), conducted field reconnaissance between June 14 and August 8, 1985. The field crew consisted of crew supervisors Robert Betts, James Enloe, James Ketz (AHRG), Richard Taylor, and Joan Dale; crew members Heidi Adkisson, Andrew Bailey, Robert Betts, James Enloe, Noreen Fritz, Kristen Griffin, Robert Johnson, James Leavitt, Rebecca McLain, Rita Miraglia, Randy Peterson, Timothy Sczawinski, Douglas Stienbarger, Beth Turcy, and Steve Winker. Kristen Griffen also served as laboratory/administrative assistant after completion of fieldwork.

Several individuals contributed to this report. Appropriate credits are listed at the beginning of each chapter. Weber Greiser and Sally Greiser edited the entire report, and Gregory Tollefson was responsible for technical editing. William Hay and Mary Ann Burns prepared figure illustrations. Brent Eberhard prepared redrafts of Sample Unit maps from field data. Report production was supervised by Pam Cobb, assisted by Patty Murray and Suzie Grunenfelder.

1.0 INTRODUCTION

T. Weber Greiser, Historical Research Associates

1.1 PROJECT DESCRIPTION

Historical Research Associates (HRA), under contract to Harza-Ebasco Susitna Joint Venture, conducted a two-phase effort to develop, test, and refine a model for the purpose of predicting the occurrence and density of cultural resources that may occur within prescribed corridors for Linear Features associated with the proposed Susitna Hydroelectric Project. The Linear Features in this effort included: (1) the Anchorage-Willow Transmission Line; (2) the Gold Creek-Devil Canyon Railroad; (3) the Gold Creek-Watana Transmission Line; (4) the Watana and Devil Canyon Access Road; and (5) the Healy-Fairbanks Transmission Line (see Fig. 1-1). The results of the research effort are intended for use by the Alaska Power Authority (the Authority) as an aid in design and siting of the Linear Features, and as a planning tool for the identification of additional cultural resource survey requirements and the development of potential mitigation strategies.

Phase I consisted of background research and statistical analysis necessary for the successful development and field testing of the predictive model. Detailed results of Phase I work were provided in the Phase I Report (Background Research and Predictive Model for Cultural Resources Located along the Susitna Hydroelectric Project's Linear Features) (Greiser et al. 1985).

Phase II consisted of field testing the model, comparison of field results with the initial model, and the development of necessary adjustments and refinements in the model. This report briefly describes the methods used, details the results of fieldwork, and presents modifications of the model. A thorough review

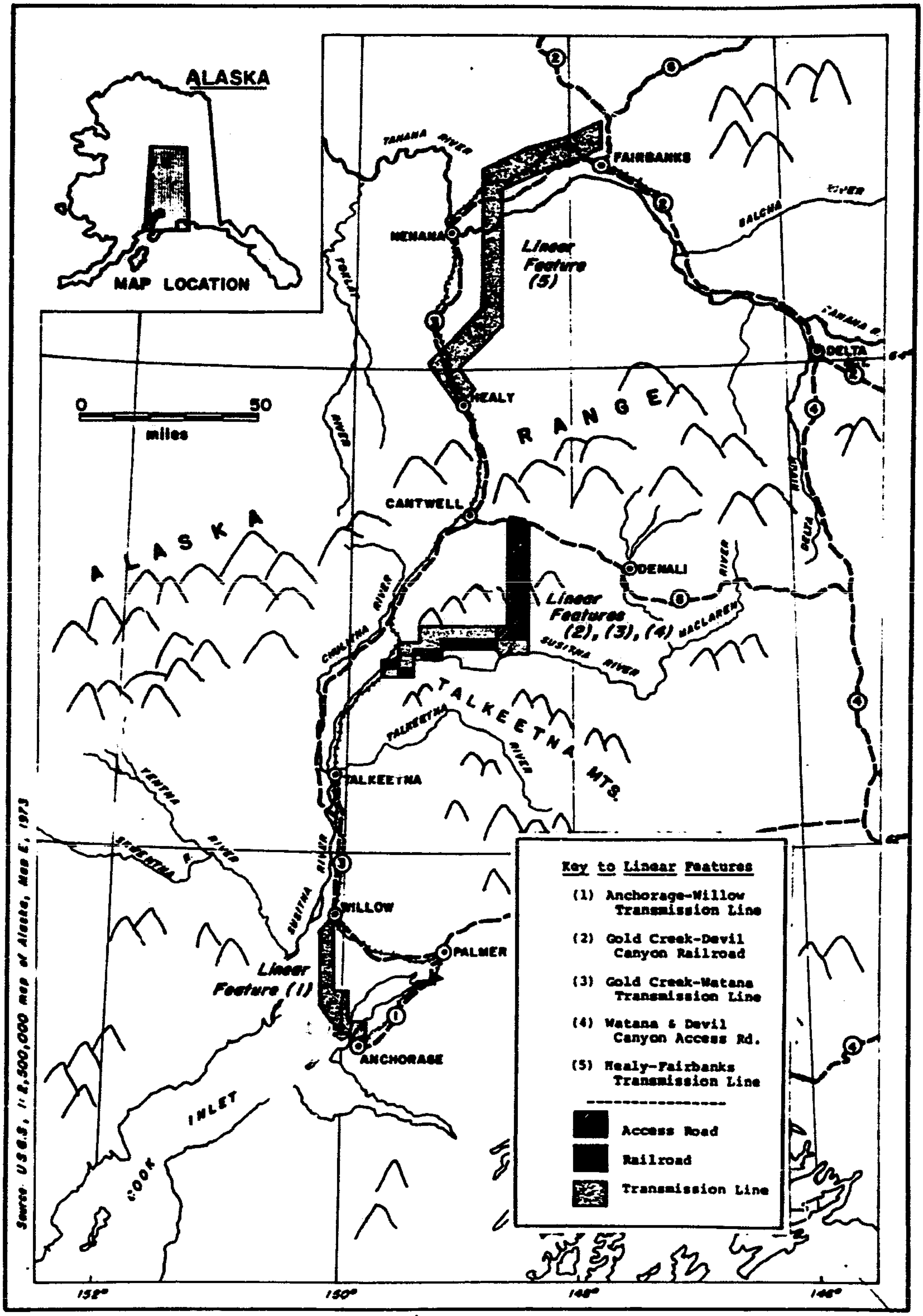

Figure 1-1. Map of the general locations of the Susitna Hydroelectric Project Linear Features.

of existing data and a detailed discussion of model development are presented in the Phase I Report and will be useful to the reader who requires more information. Summary information provided in this chapter is drawn primarily from the Phase I Report.

1.2 ENVIRONMENTAL SETTING

The Susitna Hydroelectric Project is located along the Susitna River, approximately 140 miles northeast of Anchorage, Alaska. The general study area transects four physiographic provinces. These provinces, from south to north, are the Coastal Trough, including the Susitna Basin; the Alaska-Aleutian Province, including the Alaska Range; western Alaska, from the Alaska Range foothills to the Yukon River, including most of the lower Yukon-lower Tanana-Kuskokwim basins; and the periphery of the Northern Plateaus, extending east into Canada from the Yukon-Tanana confluence.

The areas described are affected by both the Transitional climatic zone, located south of the Alaska Range, and the Continental climatic zone to the north. In general, the Transitional zone has a wetter, more temperate climate, while the Continental zone is characterized by extremes in daily and seasonal temperatures and less precipitation.

A preliminary reconstruction of the past climates of interior Alaska and the associated floral and faunal characteristics were presented by Greiser and others (1985:2-1--2-6) and are summarized in Figure 1-2. Pollen studies indicate that the climate of the past 5,000 to 6,000 years generally has remained constant, although localized area of neoglaciation have occurred. Correlating with the relatively stable vegetative regime is the basically stable faunal composition and distribution. It is not until the last 200 years that major modifications to the faunal populations of interior Alaska occur.

	Climatic Characteristics	Flora	Fauna
Modern		Essentially modern	
2,000 B.P.	Essentially modern; Macroclimatic trend of Neoglaciation shows little or no effect on local vegetation		Essentially modern
4,000 B.P.			
6,000 B.P.		Decline in spruce Tree line maximum	Diminution of large mammal species -- most notably bison
8,000 B.P.		Dominance of spruce-birch forests; Wide-spread peat accumulation	
10,000 B.P.		Spruce in lowlands	
12,000 B.P.	Drier, warmer summers; increased precipitation; increased winter snow cover	Abrupt change to mesic shrub tundra	Less diversity in large mammals due to extinctions
14,000 B.P.	Approximate Holocene/ Pleistocene boundary		
16,000 B.P.	Colder, drier, & more continental than present; spring dominant storms	Steppe-tundra	Large mammals more varied than today; fauna generally diverse & abundant

Figure 1-2. Preliminary reconstruction of past climates.

1.3 CULTURAL CHRONOLOGY

The study area consists of Northern, Central and Southern subareas (Fig. 1-3). Prehistory of these subareas is not well known, but there is better documentation about the Northern subarea than the others. The Central subarea has recently been the focus of a multi-year cultural resources study carried out as part of the Susitna project (Dixon et al. 1981, 1982, 1983, 1984, 1985). The prehistory of the Southern subarea is least well known.

Various chronologies have been suggested for the region that includes the study area. Despite investigative bias, some agreement has been reached among those offering chronologies. It is generally agreed that the earliest dated evidence of human occupation occurred some 11,000 years ago for interior Alaska north of the Alaska Range and 2,000 years later south of the Range.

The prehistoric archeology of Central Alaska can be viewed within the framework of the environmental characteristics of three post glacial subperiods: (1) Early Tundra; (2) Early Taiga; and (3) Late Taiga. Figure 1-4 provides a chronology based on this framework. A synthesis of the cultural chronology of the Susitna project area has recently been published (Dixon 1985).

The study area encompasses parts of the territories of three Athapaskan-speaking groups [the Tanaina (Dena'ina), the Ahtna, and the Tanana] as they existed at the time of European contact (Fig. 1-5). These three groups have been indentified on the basis of linquistic similarities and geographic distribution. Each of the three groups consisted of a continuum of bands distribtued across a sometimes broad geographical area, who spoke

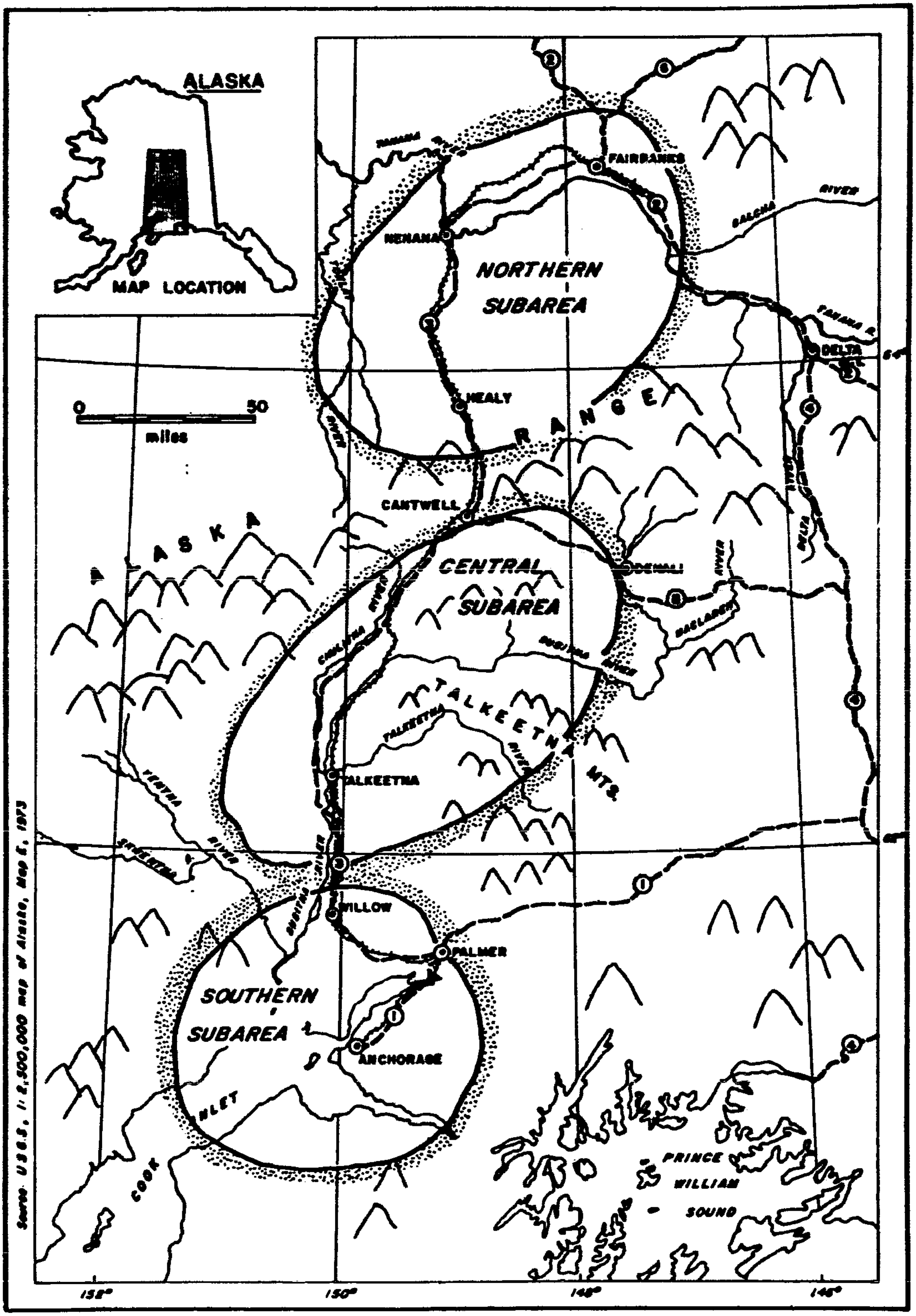

Figure 1-3. Map of the study area illustrating three subareas: northern, central and southern.

	Cultural Chronology	Period		Associated Technology
100 B.P.	Recent Historic	Recent Modern	E x p a n s i o n o f T a i g a F o r e s t s	Copper implements, stemmed stone projectile points, flaked end scrapers, bounder chip tools
1000 B.P.	Athapaskan			
2000 B.P.		Late Taiga		Large bifacially chipped forms, microliths, large lanceolates
6000 B.P.				Side-notched projectile points, stone end scrapers, elongated stone bifaces, boulder chip scrapers, unifacially chipped forms, notched pebbles, stone axes, hammerstones, choppers
		Early Taiga (shrub tundra dominates)		
8000 B.P.				
	American Paleo-Arctic	Early Tundra (grassland tundra dominates)		Stone cores and microblades, burins, bifacial stone knives, stone end scrapers
14,000 B.P.	Early Sites?			

Figure 1-4. Cultural chronology, modified from Bacon et al. 1983:55.

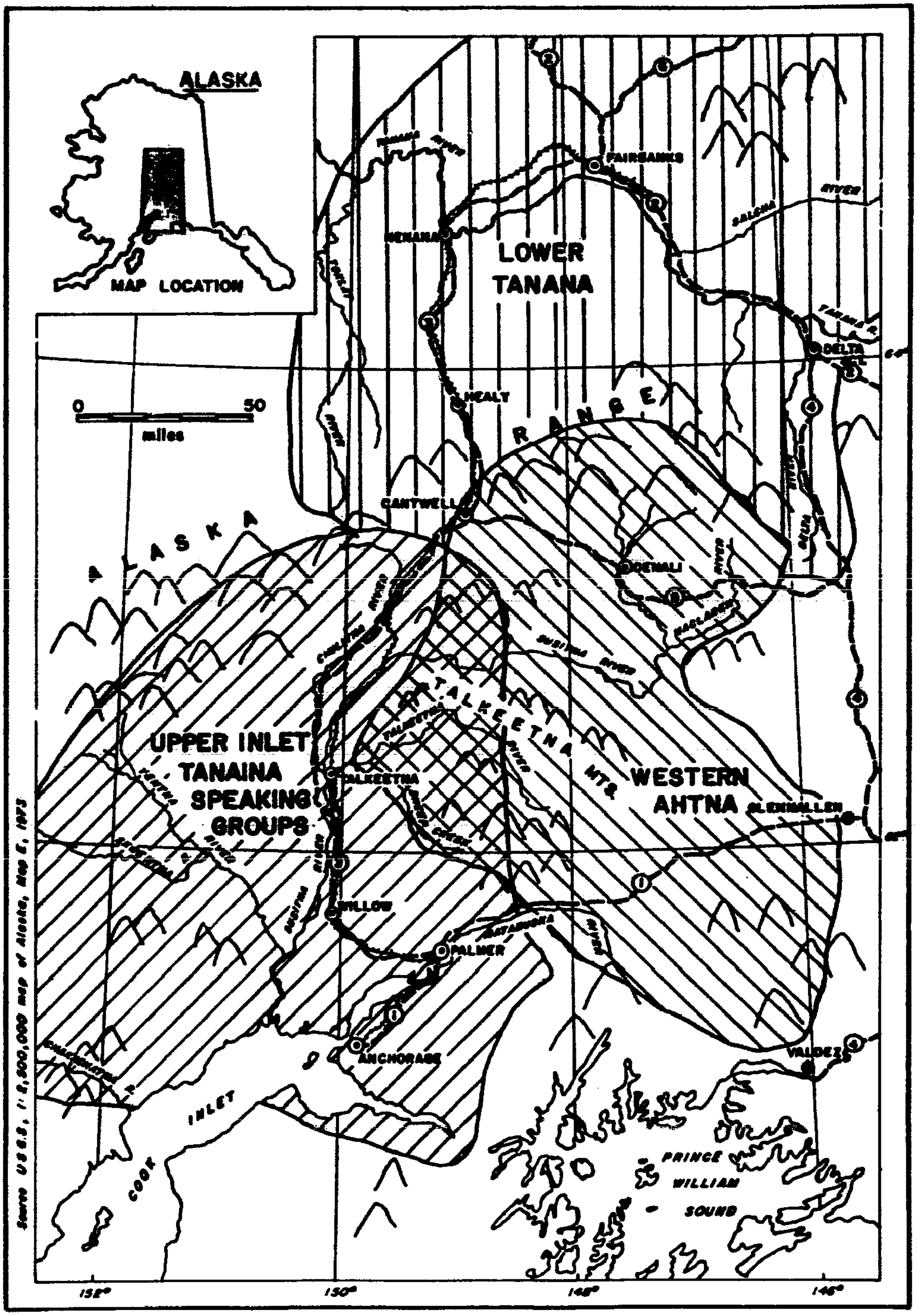

Figure 1-5 Approximate distribution of Tanaina, Ahtna, and Tanana groups over the project area.

similar languages and/or dialects. However, a local band at either end of the continuum may have had more in common with adjacent bands from a different language group than with spatially separate bands from their own group. The concept of a larger socio-political unit above the band, such as a tribe, was lacking at the time of white contact.

Differences in resource availability and interactions among small contiguous bands resulted in the establishment of extensive prehistoric trade systems (Plaskett 1977). At the time of European contact, these trade systems provided a network for the adoption of non-native trade goods and the involvement of native Alaskans in the economy of the fur trade.

Generally, the three subgroups conform to the Athapaskan cultural pattern of small, local bands following a scheduled cycle of seasonal transhumance to exploit a wide variety of resources. Similarities in settlement patterns, resource use scheduling, technology and material culture of the Athapaskan groups in the study area are apparent. Individual band adaptations reflect the intimate relationship between hunter-gatherers and the environment. Earlier occupants presumably responded to similar environmental influences.

Russian activities in Alaska, beginning in 1741, and later European and American incursions, were primarily focused on the resources and native populations of the coastal areas. Prior to the discovery of gold at Turnagain Arm in 1895, economic activities were dominated by the fur trade. Mineral exploration following the first discovery brought increasing numbers of non-natives to interior Alaska. This activity peaked in the study area between 1900 and 1920.

Since the original mining activity, the white population has maintained a permanent and slowly growing presence in the interior. The construction of the Alaska Railroad (1915-1923) provided the first reliable transportation assuring continued viability of Fairbanks and other interior settlements.

1.4 MODEL DEVELOPMENT

Environmental and cultural overviews (Greiser et al. 1985) were prepared based on reviews of the literature, existing data and current research. These overviews provided a framework for model development and assessment.

A series of environmental units were defined for the study area, based upon physiographic and vegetative characteristics. A total of 38 Terrain Units, defined as land forms ranging from surface occurrences to those evident at depths up to 25 feet, were identified (ACRES/R&M 1981a, 1981b). Nine Vegetative Units, closely approximating habitat types, were also defined. Abbreviated definitions for each Terrain and Vegetative Unit were placed in a key like that for Table 2-1. These previously identified and mapped units were superimposed on maps for the Linear Features study area.

Data were accumulated and examined for 476 prehistoric, ethnohistoric and historic cases or components at 398 sites. Of these, 269 were recorded during the University of Alaska Museum's five-year survey of the Susitna basin. Information on 18 additional sites came from a survey of the Authority's Anchorage-Fairbanks Intertie (Bacon et al. 1983). Information on the remaining 111 sites was obtained from the Alaska Heritage Resources Survey (AHRS) files. Site type descriptions were developed based upon these data.

Seven variables were then noted for each of the recorded sites. These variables included formal topographic association (Terrain Unit, A-); informal/intuitive topographic setting; general vegetation (Vegetative Unit, C-); site size; distance to water; site type; and period of occupation.

Non-metric factor analysis applied to these data provided bivarite association of site type to Terrain Unit; site type to Vegetative Unit; chronological period to Vegetative Unit; and chronological period to Terrain Unit. The results of this statistical analysis provided the predictive models (Tables 1-1 and 1-2). Only those site types, Terrain Units, or Vegetative Units that were determined to have significant positive or negative associates appear in the model. The remainder are omitted due to insufficient data in the files.

The study area was then divided into 552 160-acre Research Units. The environmental (Terrain and Vegetative) unit totals were calculated for all of the Research Units. The 110 Research Units representing the best proportional distribution of the entire range of Terrain and Vegetative Units were then selected as a 20% sample for field testing the model. Various statistical analyses were subsequently employed to assure that the Sample Units were the most representative.

In order to determine how well the sample represented kinds and quantities of environmental units in the project area, proportions of each environmental unit in the sample and the project area were tabulated. The Spearman rank correlation coefficient and Pearson's coefficient of correlation were the analytical tools selected to determine if the sample was representative. In all tests run, it was determined that the selected sample was representative of the research area.

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Table 1-1
Site Types and Strong Positive or Negative Environmental Unit Associations[a]

Site Type	Association	Terrain Unit	Vegetative Unit
1	Strong Positive	A3, 4, 5, 6, 7, 11, 19	C1, 6
	Strong Negative	A1, 2, 9, 10, 18, 20, 24, 25	C4, 5, 8
3	Strong Positive	A1, 2, 8, 10, 14, 29	C2, 3
	Strong Negative	A5, 18, 25	C1, 5, 6, 7, 8
7	Strong Positive	A3, 8	--
21	Strong Positive	A2, 9, 21, 25	C5, 7, 8
	Strong Negative	A3, 4, 8	C1, 3, 6
23	Strong Positive	A9	C5
	Strong Negative	--	C3, 6
24	Strong Positive	A9, 18, 24	C5, 7
	Strong Negative	--	C3, 6
25	Strong Positive	A20	--
27	Strong Positive	A25	C4, 5
	Strong Negative	--	C6
40	Strong Positive	A16, 19	--
	Strong Negative	A3, 4	--

[a]Strong associations or relationships are statistically significant at the 0.05 level and indicate a non-random distribution.

Key to Site Types:

1 = Chipping station/lithic scatter
3 = Campsite/temporary habitation
7 = Isolated stone tool or flake
21 = Historic building/structure
23 = Railroad bridge
24 = Railroad station
25 = Railroad tunnel
27 = Historic mining camp or operation
40 = Disturbed/unknown

Table 1-2
Chronological Periods and Strong Positive or Negative Environmental Unit Associations

Chronological Period	Associations	Terrain Unit	Vegetative Unit
Historic	Strong Positive	A9, 18, 20, 21, 24, 25	C4, 5, 7, 8
	Strong Negative	A3, 4, 6, 8, 14, 19	C1, 3, 6
Athapaskan	Strong Positive	A2, 8	C3
	Strong Negative	A12, 16, 19, 20, 25	C1, 2, 8
Unknown	Strong Positive	A5, 12, 19, 29	C1, 2, 6
	Strong Negative	A2, 9, 18, 25	C3, 4, 5, 8

1.5 PHASE II DATA COLLECTION

Fieldwork was conducted in 89 of the 110 selected Sample Units (for an actual sample of 16%) between June 14 and August 8, 1985. Methods employed during the field effort generally conformed to those described in the Phase I Report. Modifications to methods presented in the Phase I Report and HRA's field manual are briefly presented in Chapter 2 of this report.

Site types encountered during the field work included: (1) Site Type 1, chipping station/lithic scatter; (2) Site Type 5, cache pit; (3) Site Type 7, isolates; (4) Site Type 21, Historic building or structure; (5) Site Type 27, Historic mining camp and operation; (6) Site Type 31, recent military activity; and (7) Site Type 32, dump/Historic trash scatter. With the exception of Site Type 32, each of these site types is fully described in the Phase I Report. Site Type 32, dump/Historic trash scatter, refers to Historic Euro-American material concentrations or scatters, consisting of cans, bottles, stove parts, domestic items, utilitarian items, etc., which have been discarded or abandoned.

To aid in testing the predictive model, attempts were made to collect the following types of data for each archeological site found during the survey: (1) the presence and depth of subsurface cultural deposits; (2) the vertical and horizontal extent of the site; and (3) the temporal placement and cultural affiliation of site components to the extent possible using site location information and data obtained in the course of establishing site size and limits.

Chapter 3 of the present report summarizes the results of fieldwork within each Sample Unit, a discussion of the cultural resources located, and the results of ethnographic interviews conducted during the field season. Chapter 4 presents refinements to the predictive model, along with a discussion of the changes. Chapter 5 summarizes the results of fieldwork and model refinement and recommendations for further archeological, ethnographic, and historical research are presented.

The report contains four appendices. Appendix A describes the 89 surveyed Sample Units. Appendix B presents detailed information on cultural resources recorded during fieldwork in the form of site narratives, site forms, and isolated finds forms. Appendix C summarizes information gathered from oral interviews and includes interview transcripts. Appendix D presents project background information, including the research design and modification, field manuals, project forms, extracts from the Phase I report, and copies of permits issued to conduct the sample survey.

2.0 METHODS

T. Weber Greiser
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Glenn Bacon
Alaska Heritage Resource Group, Inc.

2.1 INTRODUCTION

The objective of HRA's Phase II sample survey of the Linear Features study was to locate the maximum number of sites possible using a defined methodology. This chapter reviews methods used for selection and modification of sample units for the Phase II Survey; reviews modifications of field methods for Phase II; and describes the methods used to analyze field data. All cultural resource surveys, regardless of transect width, test depth, or test placement, at best only sample the environment for evidence of past activities. It is not possible to locate all activity sites, due to factors such as site size and current depth below surface. For this study, the field strategy for transect spacing and frequency of testing was based on an average site size (400 to 1,000 square meters) obtained during Phase I analysis.

In order to field test the predictive model, it was necessary to establish consistent transect intervals and a systematic pattern of testing within each Sample Unit. With a standard transect interval, site discovery was dependent upon site size, artifact density, and visibility. Survey methods were refined during the first 10 days of fieldwork and were standardized to provide a satisfactory level of survey coverage within the allotted time. Additional, subjective, testing outside of the systematic testing grid was conducted when investigators felt it was warranted. In many cases, subjective tests were placed into small knolls or portions of terraces between transects or between 50 m test points.

2.2 SAMPLE SELECTION METHODS, MODIFICATION, AND RESULTS

Sample units were selected from the 552 160-acre research units identified in Phase I. The Phase I Report provides details on the identification of these units, all of which were within 0.25 mile of the Linear Features' centerlines.

2.2.1 The Initial Sample

As part of Phase I, a sample of 110 160-acre units, or 20% of the total, was selected for the field survey. A review of data gathered during Phase I, particularly case density information, showed that there were insufficient data to allow weighted simple random sampling within each environmental unit. The sample selection process was modified to weight environmental units for selection by their proportionate representation within the population. Identified envionmental units showing a large representation in the overall research area would be similarly represented in the sample. Those environmental units with very small proportions along the Linear Features would reflect that in the sample.

Chapter 6 in the Phase I Report presents environmental data for the Research Units and the Sample Units (Tables 6-1 and 6-2). That chapter also describes the statistical testing of the correlation between the proportions of acreages for each environmental unit in the sample and proportions of acreages in the entire research area. Using the Spearman rank correlation coefficient and Pearson's coefficient of correlation tests on proportions of Terrain Units and Vegetative Units within the sample against those within the research area, it was determined that there was strong agreement between project area proportions and the sample proportions.

2.2.2 The Final Sample

Final selection of the areas included in the sample survey was based upon the ability to acquire the necessary permits and/or permission to enter the land for survey purposes. Land ownership or jurisdiction for the project area included:

(1) private;
(2) State of Alaska;
(3) University of Alaska at Fairbanks (UAF);
(4) U.S. Army;
(5) U.S. Air Force;
(6) USDI BLM;
(7) Native Corporations;
(8) State leased;
(9) municipal; and
(10) borough.

Most of the land in the study area is under the jurisdiction of the State of Alaska or BLM. Necessary permits issued to HRA to conduct the Phase II field work included:

(1) State of Alaska Field Archeology Permit #85-1 for survey on State of Alaska lands;

(2) U.S. Department of the Interior (USDI) Bureau of Land Management (BLM) Cultural Resource Use Permit #AA-55590 for survey on BLM managed or administered lands;

(3) U.S. Department of the Air Force License No. DACA85-3-85-31 (acquired by the U.S. Army Corps of Engineers) for survey on Clear Air Force Station lands;

(4) USDI National Park Service (NPS) Archeological Resources Protection Act (ARPA) Permit #ARPA85-AK-015, issued by the Departmental Consulting Archeologist (DCA), Washington, D.C. for survey in Clear Mews Air Force Base; and

(5) Cook Inlet Region, Inc. (CIRI) Land Use Permit #1326.1 for survey in Section 33, Township 15 North, Range 4 West, Seward Meridian.

Permission could not be obtained for a number of Sample Units along the Healy-Fairbanks Transmission Line in the Cold Creek area, and along the Anchorage-Willow Transmission Line. When possible, the units were replaced; when not possible, they were eliminated as part of the sample reduction discussed below.

2.2.2.1 Sample Reduction

Of the 110 Sample Units originally selected, a total of 84 Sample Units were completely surveyed and another 5 Sample Units were partially surveyed. The 89 units sampled (Table 2-1) represented 13,760 acres, or 15.6% of the research area defined in Phase I. The ultimate survey area thus remained larger than the 15% minimum sample size specified in the research design.

The reduction in total Sample Units surveyed resulted from various factors, including: (1) higher than anticipated site density in some units; (2) reduced surveyability due to adverse terrain and vegetation conditions; (3) presence of grizzly bears; and (4) the combined constraints of time limitations and adverse weather conditions at the end of the field study period. All reductions in total sample numbers were approved by Harza-Ebasco representatives.

The data in Table 2-1 present both Terrain and Vegetative Unit acreage projected from Phase I research (see Table 6-1, Phase I report) as well as vegetation acreage calculated during fieldwork. Investigators recorded gross vegetation in all Sample Units, while field checking of Terrain Unit observations was not possible. Observed vegetation appears to be more evenly distributed than anticipated, with some major discrepancies. It should be noted that field observations by non-biologists might include miscategorization of Vegetative Units, such as Deciduous forest

(C4) and Mixed forest (C5), or Coniferous forest (C3) and Dwarf tree shrub/Tall shrub (C7), due to the similarity of these vegetative types. Therefore, the observations from these two sets of Vegetative Units should be compared only in combination.

2.2.2.2 Sample Stratification and Bias

Insofar as possible, proportionate ratios of Terrain and Vegetative Units were maintained as the sampling fraction was reduced from 20% to 15.6%. However, three Terrain Units (A18, A21, and A30) which had limited representation in the research area are slightly (A18 and A21) to heavily (A30) under-represented due to lack of access. The overall effect is negligible, as demonstrated in the test of rank proportions (Chapter 4), and the sample is still adequate for statistical analysis.

Terrain and Vegetative Unit Key

Unit No.	Unit Symbol	Unit Name
		Terrain Units
A1	= O	Organic materials
A2	= Fp	Flood plain deposits
A3	= Gta	Ablation till
A4	= GFk	Kame deposits
A5	= $\frac{\text{Gta}}{\text{Bxu}}$	Ablation till over unweathered bedrock
A6	= Gtb-f	Basal till (frozen)
A7	= $\frac{\text{C}}{\text{Bxu}}$ +Bxu	Colluvium over bedrock and bedrock exposure
A8	= $\frac{\text{L}}{\text{Gtb-f}}$	Lacustrine deposits over basal till
A9	= Fpt	Terrace
A10	= Ffg	Granular alluvial fan
A11	= GFe	Esker deposits
A12	= Bxu	Unweathered, consolidated bedrock
A13	= $\frac{\text{Cs-f}}{\text{Fpt}}$	Solifluction deposits (frozen) over terrace sediments
A14	= $\frac{\text{Gtb-f}}{\text{Bxu}}$	Frozen basal till over bedrock
A15	= $\frac{\text{Ff-c+O}}{\text{Ff}}$	Fan cover deposits and organics over fan river bed deposits
A16	= $\frac{\text{C}}{\text{Scw}}$ +Scw	Colluvium over bedrock and bedrock exposure
A17	= Mt	Marine tidal deposits
A18	= GFo	Outwash deposits
A19	= $\frac{\text{Cs}}{\text{GFo}}$	Solifluction deposits over outwash
A20	= $\frac{\text{C}}{\text{Nsu}}$ +Nsu	Colluvium over bedrock and bedrock exposure
A21	= Gto	Glacial till
A22	= $\frac{\text{Cs}}{\text{Nsw}}$	Solifluction deposits over weathered bedrock
A23	= Cl	Landslide deposits
A24	= Fpa-c	Abandoned flood plain deposits
A25	= Ht	Tailings
A26	= $\frac{\text{C+Elu}}{\text{Nsw}}$	Colluvium and loess over weathered bedrock
A27	= Fss	Silty retransported deposits
A28	= Elu	Eolian loess
A29	= Es	Eolian sand
A30	= C	Colluvial deposits
A31	= Ff-r	Alluvial fan channel sediments
A32	= $\frac{\text{O}}{\text{GFo}}$	Organic deposits over outwash
A33	= $\frac{\text{O}}{\text{Fd}}$	Organics over deltaic deposits
A34	= Fd	Fluvial delta deposit
A35	= $\frac{\text{Cs}}{\text{Scw}}$	Solifluction deposits over bedrock
A36	= $\frac{\text{Cs-f}}{\text{Gtb-f}}$	Solifluction deposits (frozen) over basal till (frozen)
A37	= $\frac{\text{Cs-f}}{\text{Gta}}$	Solifluction deposits (frozen) over ablation till
A38	= $\frac{\text{Cs-f}}{\text{Bxu}}$	Solifluction deposits (frozen) over bedrock
A39	= not used at this time	
A40	= not used at this time	
		Vegetative Units
C1	= Dt	Dry tundra
C2	= Wt/m	Wet tundra/marshland
C3	= Cf	Coniferous forest
C4	= Df	Deciduous forest
C5	= Mf	Mixed forest
C6	= Ls	Low shrub
C7	= Dts/Ts	Dwarf tree shrub/Tall shrub
C8	= Dev; D	Developed; Water/barren
C9	= Rb/La	Recently burned/logged area

Table 2-1
Sample Units

Sample Quadrant	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	A27	A28	A29	A30
	TERRAIN UNITS																													
ANCHORAGE-WILLOW TRANSMISSION LINE (Linear Feature 1)																														
3									143									17												
7									155									3									2			
12										121								24									15			
51			152															3												5
52	80		80																											
56a			160																											
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91																													45	
92		15																											5	
102																														
113																														
120	47								77									36												
126		118																42												
132																														
GOLD CREEK-DEVIL CANYON RAILROAD (Linear Feature 2)																														
*486†	40					40																								
490		1				159																								
498		101				37				22																				
499						160																								
504		144				16																								
GOLD CREEK-WATANA TRANSMISSION LINE (Linear Feature 3)																														
443§								76																						
444§		34	7					55																						
464			41									119																		
*469§														80																
485							4							156																
*519														80																
522							157					3																		
525§			14			63	2			21				60																
536																														
549								160																						
Subtotal	167	413	765	:	:	475	163	289	375	164	:	122	:	376	:	:	:	418	:	:	:	:	:	:	:	:	17	:	50	5

* = partially surveyed units: 80 acres surveyed in Units 486, 469, 519; 40 acres surveyed in Units 397, 408
† = overlaps with Gold Creek-Watana Transmission Line
§ = overlaps with Watana Access Road

Note: Figures presented in table represent acres.

Table 2-1. Sample Units (continued)

Sample Quadrant	TERRAIN UNITS (continued) A31	A32	A33	A34	A35	A36	A37	A38	A39	A40	VEGETATIVE UNITS C1	C2	C3	C4	C5	C6	C7	C8	C9	OBSERVED VEGETATION C1	C2	C3	C4	C5	C6	C7a	C8	C9
ANCHORAGE-WILLOW TRANSMISSION LINE (Linear Feature 1)																												
3																	144	16			96		20			24a	20	
7															72		72	16			11	20	40			20a	69	
12															19	125		16			56		80	8		16a		
51															78		57	25			16		144					
52												80			1		79				16		144					
56a												143			17						80	16	64					
57															160							24	64			32a	40	
60															160						16		112				32	
62															160						3		152	5				
74		160										160									144		8	8				
75		36										160									80	40	40					
91				115											160					40			112			8a		
92			29	111								31			129						80		56			24a		
102			160									160									152	8						
113			160									160									152	8						
120												131			29						112		48					
126													109	49	2						80	32	48					
132			160									160									145	15						
GOLD CREEK-DEVIL CANYON RAILROAD (Linear Feature 2)																												
*486†															80							72			8			
490													19	1	140								96			64a		
498														36	86			40			11		72				77	
499															69		91							80		83a		
504															100			60					140			20		
GOLD CREEK-WATANA TRANSMISSION LINE (Linear Feature 3)																												
443§							86				1					159				112					48			
444§							64				104					56				128					32			
464											5					155				48	48					64a		
*469§											36					2	64			56						24a		
485													113	3			42					100	12		8	40a		
*519											31					8	41			48	8					24		
522																160				128					32			
525§																86	74			16	16				48	80		
536						160					154					6				120					40			
549																160				144		16						
Subtotal	:	196	509	226	:	160	150	:	:	:	329	1185	243	87	1462	917	644	173	:	840	1322	351	1452	101	216	520	238	:

ªIn this column, a = alder thickets
* = partially surveyed units: 80 acres surveyed in Units 486, 469, 519; 40 acres surveyed in Units 397, 408
† = overlaps with Gold Creek-Watana Transmission Line
§ = overlaps with Watana Access Road

Table 2-1. Sample Units (continued)

Sample Quadrant	TERRAIN UNITS A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	A27	A28	A29	A30
WATANA AND DEVIL CANYON ACCESS ROAD (Linear Feature 4)																														
331																														
341			160																											
346			144											15							1									
355			80				80																							
356							160																							
359			28		92		32																							
364																														
372		5							130																					
382a					75		20					65																		
386			25						4																					
388			26																											
*397					40																									
404	3				157																									
405					160																									
*408			30		10																									
410			160																											
425								160																						
429								160																						
451			149		11																									
461		28	107									23		2																
HEALY-FAIRBANKS TRANSMISSION LINE (Linear Feature 5)																														
136	9															137														
143										100								60												
146																		160												
152										124								36												
163		46							39									75												
169									160																					
174									120									40												
175									120									60												
182										158						2														
183	18									19											123									
188															14	146														
188a																92		10			58									
189															128	13							19							
190															160															
199	20														3															
Subtotal	50	79	909	0	545	:	292	.120	573	401	:	88	:	17	305	390	:	421	:	:	182	:	19	:	:	:	:	:	:	:

* = partially surveyed units: [illegible] acres surveyed in Units 486, 469, 519; 40 acres surveyed in Units 397, 408

Table 2-1. Sample Units (continued)

Sample	TERRAIN UNITS (continued)										VEGETATIVE UNITS									OBSERVED VEGETATION								
Quadrant	A31	A32	A33	A34	A35	A36	A37	A38	A39	A40	C1	C2	C3	C4	C5	C6	C7	C8	C9	C1	C2	C3	C4	C5	C6	C7	C8	C9
WATANA AND DEVIL CANYON ACCESS ROAD (Linear Feature 4)																												
331						160					40					120				136	24							
341																160				80					80			
346																160									160			
355											50					110									160			
356																160				8					128		32	
359						8										160				64					96			
364						160					141					19				144					16			
372						25					138	22								48					80		32	
382a											45	30				70		15		40					101		19	
386								131			34					136									160			
388								134			17					143									160			
*397																40					8				28	4		
404																159		1			48				112			
405																160				24					112	24		
*408																40									40			
410																160								112	40		8	
425															54	106					40				120			
429															15	145					40				120			
451											160														136		24	
461																145	15			24		48	8			80		
HEALY-FAIRBANKS TRANSMISSION LINE (Linear Feature 5)																												
136					14										126	34									17	111	32	
143															3	157					96	32					32	
146															35	125					48		48				64	
152															128	32					48	64	48					
163																77	63	20				48			80		48	
169																	160				112		40				8	
174														40			120				96			56			8	
175														40			120				96			56			8	
182																	160					80	80					
183																	160				32		128					
188														35	125								128			32		
188a													35		95		30				16		144					
189															11		149					40	88	24		8		
190															52		108						16			120	24	
199	137																160				144		16					
Subtotal	137	:	:	:	14	353	:	265	:	:	615	52	35	115	644	2618	1245	36	:	568	848	304	744	248	1930	379	331	:

* = partially surveyed units: 80 acres surveyed in Units 486, 469, 519; 40 acres surveyed in Units 397, 408

Table 2-1. Sample Units (continued)

Sample	TERRAIN UNITS																													
Quadrant	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	A27	A28	A29	A30
HEALY-FAIRBANKS TRANSMISSION LINE (Linear Feature 5)																														
201															76															
209															160															
213															160															
217															160															
225															160															
229															140															
243	36	124																												
254	4																										151	5		
255	1																										159			
270																											148	12		
278																											136	24		
282																											18	162		
291																											9	151		
296																											63	97		
303																											155	5		
304																											156	4		
307																										15		145		
308																											26	134		
313																											118	42		
314																											85	75		
315																											122	38		
Subtotal	41	124	:	:	:	:	:	:	:	:	:	:	:	:	856	:	:	:	:	:	:	:	:	:	:	15	1346	874	:	:

Table 2-1. Sample Units (continued)

Sample	TERRAIN UNITS (continued)										VEGETATIVE UNITS									OBSERVED VEGETATION								
Quadrant	A31	A32	A33	A34	A35	A36	A37	A38	A39	A40	C1	C2	C3	C4	C5	C6	C7	C8	C9	C1	C2	C3	C4	C5	C6	C7[a]	C8	C9
HEALY-FAIRBANKS TRANSMISSION LINE (Linear Feature 5)																												
201	84													15			145						72			88		
209																160					144		16					
213																160					160							
217																32	128				96	64						
225																87	73					32			96	32		
229	20																160				112			48				
245													7				93	60			16			144				
254														1			159				16	144						
255																	160				24	96					40	
270															135	11	14				48	96	16					
278														10		11	131				62	80	5		13			
282															142		18					136					24	
291															45		115				8	136	11				5	
296															33		127					136	24					
303															26		134				80	64	16					
304															35		125					136				24a		
307													10		150							40	104				8	
308													160									136	21				3	
313														102			58					144			16			
314														97			63					30	5			96		
315														43			117				24	112	24					
Subtotal	104	:	:	:	:	:	:	:	:	:	:	:	177	276	566	461	1820	60	:	:	790	1619	314	192	125	240	80	:

[a]In this column, a = alder thickets

TERRAIN UNITS

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20
Subtotal	167	413	765				163	289	375	164		122		376				418		
Subtotal	50	79	909	0	545	475	292	320	573	401		88		17	305	390		421		
Subtotal	41	124													856					
TOTAL	258	616	1674	0	545	475	455	609	948	565		210		393	1161	390		839		
PERCENT	1.88	4.48	12.17	0	8.96	3.45	3.31	4.43	6.89	4.11		1.53		2.87	8.44	2.83		6.10		

TERRAIN UNITS (continued)

	A21	A22	A23	A24	A25	A26	A27	A28	A29	A30	A31	A32	A33	A34	A35	A36	A37	A38	A39	A40
Subtotal							17		50	5		196	509	226		160	150			
Subtotal	182		19			15					137				14	353		265		
Subtotal							1346	874			104									
TOTAL	182		19			15	1363	874	50	5	241	196	509	226	14	513	150	265		
PERCENT	1.32		0.14			0.11	9.91	6.35	0.36	0.04	1.75	1.42	3.70	1.64	0.10	3.73	1.09	1.98		

VEGETATIVE UNITS

	C1	C2	C3	C4	C5	C6	C7	C8	C9
Subtotal	329	1185	243	87	1462	917	644	173	
Subtotal	615	52	35	115	644	2618	1245	36	
Subtotal			177	276	566	461	1820	60	
TOTAL	944	1237	455	478	2672	3996	3709	269	
PERCENT	6.86	8.99	3.31	3.47	19.42	29.04	26.95	1.95	

	C1	C2	C3/C7	C4/C5	C6	C8
COMBINED TOTALS	944	1237	4164	3150	3996	269
PERCENT	6.86	8.99	30.26	22.89	26.95	1.95

OBSERVED VEGETATION

	C1	C2	C3	C4	C5	C6	C7	C8	C9
Subtotal	840	1322	351	1452	101	216	520	238	
Subtotal	568	840	304	744	243	1938	379	331	
Subtotal		790	1619	314	192	125	240	80	
TOTAL	1408	2960	2274	2510	541	2279	1139	649	
PERCENT	10.23	21.51	16.53	18.24	8.93	16.56	8.28	4.72	

	C1	C2	C3/C7	C4/C5	C6	C8
COMBINED TOTALS	1408	2960	3913	3051	2279	649
PERCENT	10.23	21.51	24.80	22.17	16.56	4.72

2.3 PHASE II FIELD METHODS

Prior to field data collection, crews were issued field manuals for recording historic and prehistoric sites (Appendix D). As is normal for a study of this scope, survey methods required some modification to address actual conditions encountered in the field. All modifications were approved and documented prior to implementation. This resulted in slight variability in survey and documentation procedures over the course of the study.

Once the list of Sample Units to be surveyed was established, units within the list were assigned to Crew Supervisors for survey. Assignments were made on the basis of logistical considerations, with units closest to the field crew base camps generally being surveyed first. Whenever possible, Sample Units were assigned to a single crew.

2.3.1 Field Survey

Detection of surface and subsurface cultural resources within each 160-acre Sample Unit was accomplished through pedestrian survey. Shovel tests were placed at regular intervals along parallel transects (systematic testing), while subjective shovel tests were excavated at locations, such as knolls or terraces located between transects, that were considered to have high site potential.

The interval transect survey strategy is an extension of the statistical orientation of the study research design. This technique is theoretically stronger than an inductive approach, because it can be used to indicate where sites do not occur, as well as where they do.

Transects were parallel to one another, generally spaced 30 m apart. They were 800 m long unless interrupted by impassable terrain, and shovel tests were placed every 50 m. Spacing variation between transects was determined by the density of vegetation and by the likelihood of encountering cultural resources. When either condition was judged to be high, spacing between transects could be decreased to 20 m. When both conditions were judged to be low, spacing between transects could be increased to no more than 50 m.

The most direct means to determine the potential for encountering one or more classes of cultural resources was to refer to the predictive model, which calculated high positive statistical correlations between certain site classes and terrain units. However, sample units were tested and surveyed at the highest level of intensity allowed by generally dense vegetation and budgeted field time. Maximum survey intensity for any single sample unit used 32 individual transects (25 m spacing), and minimum survey intensity used 18 transects (44.5 m spacing). The majority of sample units were surveyed using 30 to 35 m transect spacing between crew members or 24 transects per unit.

Recognizing the potential limitations of the interval transect survey, in which transects could fall on either side of a microtopographic feature containing a site, a subjective survey also was incorporated into the research design. This subjective survey method is an inductive approach, in which archeologists use comparisons with ethnographic accounts to focus their survey in paleogeographic settings comparable to those documented ethnographically. Field efforts focused on settings which recorded cultures are known to have utilized, even if they did not occur on transect lines. Shorelines, ancient tributary junctions, and mountain corridors are some examples.

The subjective survey was conducted at the same time as the interval transect survey. Additional shovel tests were placed along and/or off the transect line as crews encountered microenvironmental settings (i.e., knolls, terraces) that had relatively high potential for yielding archeological data.

Shovel tests were an integral part of both the interval transect and the subjective survey strategies. These 30x30-cm tests were to be 30 to 50 cm in depth, if possible located every 20 to 50 m, with approximately each 10 cm of recovered matrix run through 0.25-in. mesh screen.

The systematic testing strategy was revised during the first few days of fieldwork to better address the testing of the model. The systematic strategy of one shovel test every 50 m, if possible, was implemented to gather data relevant to all areas regardless of site probability potential. A practical consideration coincident to this increased testing effort was the difficulty of each crew member carrying a screen while transecting. Therefore, material from transect shovel tests was subjected to troweling and sufficient observation to obtain a recovery rate equivalent to using the screens.

A typical survey unit, up to 24 individual transects or 6 crew transects, would contain 408 potential test locations. Summary data presented for the 89 Sample Units (Chapter 3) surveyed indicate that over 25,000 shovel tests were excavated as part of the interval transect survey. Approximately one-third of the maximum number of tests were not dug due to natural factors, such as surface water or rocks. Less than 59% of these shovel tests were excavated to a depth of 30 cm or less due to natural factors (see Tables 3-1 through 3-5). Those excavated below 30 cm did not exceed 50 cm. For much of the area surveyed, 30 cm proved sufficient to reach underlying gravel, probably representing glacial till and assumed to be sterile of cultural materials.

A second type of test, the controlled shovel test, was conducted within identified prehistoric and certain historic cultural contexts or sites. Ten historic sites with obvious structures, features, or surface material, and one prehistoric site (TLM 275) located outside of a Sample Unit, were not tested.

The generally larger controlled shovel tests differ from shovel tests in that the matrices:

a. were screened through mesh finer than 0.25 in., when judged necessary;
b. were excavated in 10-cm increments or natural/cultural levels;
c. were often excavated by trowel; and
d. were documented with scaled profiles showing observed strata characterized by sediment composition and color according to Munsell Color Charts.

Shovel testing conducted at prehistoric sites radiated in the cardinal compass directions and four points in between from the positive test, surface visible feature or concentration of artifacts. The first series of 30 x 30 cm tests were at 10 m from the positive test. Additional tests were placed at greater or lesser distances until it was determined that site boundaries had been adequately defined. Positive tests were expanded to 50 x 50 cm then excavated and screened or carefully troweled in 10-cm levels or natural/cultural levels if they were definable. All cultural or ecofactual (soil or tephra) samples were bagged by level, with finished tools bagged separately. Prior to back-filling, profiles were drawn for test pits which produced cultural material. They were plotted on site sketch maps, and foil or plastic was placed in the bottom for the reference of future investigators.

2.3.2 Navigation

To successfully test the predictive model, it was necessary to accurately determine the location of Sample Unit boundaries and crew positions within Sample Units. This was accomplished using a variety of techniques. Sample Units 3, 7, and 12, which were reached via surface vehicle, were less difficult to locate and delineate than those accessible only by air.

2.3.2.1 Determining Sample Unit Locations

Sample Unit locations were identified using a set of base maps, including U.S. Geological Survey (USGS) maps (scale 1: 63,360 or 1:25,000), aerial photographs, and Sample Unit legal descriptions. Air photos were cross-indexed to the list of Sample Units which contained their legal descriptions. Legal descriptions were used to finally determine the correct position of each Sample Unit.

The next step in the procedure of locating a Sample Unit was to fly to its general location using topographic maps and previously surveyed units as guides. Under most circumstances, unit boundaries were established within plus or minus 100 m of their true position. Some units had section lines and sometimes quarter-section lines blazed, often with associated survey monuments. Many other units contained identifiable natural or recent cultural (i.e. roads, transmission lines) features which allowed for accurate location. In a few instances, notably units located in the Yukon Flats area, precise unit boundaries could not be determined. The effect of possible mislocation in this area was negligible, since only recent cultural resource materials were recorded in any of the eight units. In addition, no more than 40% of these units was surveyable due to standing water in the form of marshes. Five of the eight units were less than 12% surveyable.

One side of each Sample Unit (800 m) was used as a reference baseline for on-the-ground navigation. This reference baseline was marked with a visible survey string, using a hip-chain calibrated in meters. Placement of the reference baseline depended on whether the survey was to be parallel or perpendicular to the contour of the unit, and whether a previously existing, visible, survey line could be used. A parallel, secondary reference baseline was established at a distance of 800 m from the primary baseline when vegetation density required it. The lines were sometimes flagged at measured intervals (30 or 50 m) to provide additional reference points.

2.3.2.2 Determining and Maintaining Position Within Sample Units

Once baselines were established, survey of the unit proceeded along transects oriented at right angles to this line. Position on each transect was maintained in four ways, including: (1) constantly monitoring compass headings; (2) using voice cues to measure distance between crew members on adjacent transects; (3) using visual cues to measure distance between crew members on adjacent transects; and (4) by monitoring topographic maps. Slight variation to the right and left of each transect centerline was considered beneficial, as it resulted in more of each transect corridor being examined.

2.3.3 Documentation

Individual observations on daily activities, weather, ground cover, natural features, and other pertinent information were entered into field notes maintained by all personnel. When cultural resources were encountered, these were recorded on Isolate, Prehistoric Site, or Historic Site forms, as appropriate. After completion of each Sample Unit, both Shovel Test Summary and Sample Quadrant Record forms also were completed. Photographic documentation augmented written observations. A record of all photographs taken was entered in a photographic log.

The Sample Quadrant Record form was augmented with a Quadrant Shovel Test summary form during fieldwork. The Shovel Test form recorded: (1) the total number of shovel tests placed in the Sample Unit; (2) how many of these were along transects and how many were part of the subjective survey; (3) the number of tests excavated to at least 30 cm; (4) the number of tests which could not be excavated to at least 30 cm and the reasons; and (5) a brief description of nontestable locations.

The form used to record prehistoric and historic sites combined information from a short form used by Alaska Heritage Research Group and a larger form used by the University of Alaska Museum for the Susitna Hydroelectric project. The present form is six pages plus attachments. A site field number was assigned to each discovered site. Site numbers consisted of the Sample Unit number followed by a number representing the consecutive number of finds within the unit. For example, site number 110-3 represents the third recorded find (isolate or site) in Sample Unit 110. Unit numbers were assigned to sample units prior to the field survey.

Some of the archeological finds were located outside of Sample Units. These sites were discovered under a variety of circumstances. Most were located at or near helicopter landing places, and some were located by survey crew members who climbed to vantage points in order to gain terrain perspective during survey. All of these sites were recorded. All finds have been assigned Alaska Heritage Resource Survey (AHRS) file site or resource identification numbers.

2.4 CURATION

The survey resulted in the collection of archeological specimens including isolates, sediment and radiocarbon samples, and artifacts recovered from shovel testing within sites. Each specimen or group of specimens, such as lithic material clusters, was separately bagged. Each specimen bag was coded with information such as collector, date of collection, and provenience, and then cross-indexed to field notebooks and site or isolate recording forms. Specimen bags were grouped by site and placed in larger site bags, marked with a unique field site number, and cross-referenced to Sample Unit. Isolates were packaged either in bags or other suitable containers and marked with unique isolate numbers, cross-referenced to Sample Unit.

Specimens were transported to the laboratory for analysis upon completion of the survey. After analysis, specimens were turned over to the University of Alaska (Fairbanks) Museum for long term curation.

2.5 LABORATORY METHODS

Data were verified by checking all records and map locations completed in the field to assure proper recording. Curation of artifacts included washing, labeling, and cataloging of materials collected in the field. Artifact labels included individual accession numbers according to professional standards established by the University of Alaska (Fairbanks) Museum, the curatorial repository.

2.5.1 Prehistoric Artifact Analyses

Prehistoric artifact analyses included:

(1) Technological Analysis. All lithic specimens were macroscopically inspected and characteristics pertinent to manufacturing techniques recorded.

(2) Use-Wear Analysis. All intentionally modified lithic specimens and a representative sample of unmodified flakes were microscopically examined for edge modifications.

(3) Raw Material Identification. Materials were visually inspected and physical properties described using material types defined by the University of Alaska (Fairbanks) Museum.

(4) Typological Studies. Recovered bifacial implements were compared and contrasted with previously established tool types and styles.

2.5.2 Prehistoric Data Analysis

Analyses of prehistoric site data included defining site types and cultural affiliations through analysis of recorded cultural materials, and elucidating settlement and subsistence patterns through analysis of relationships among cultural and environmental variables. Data resulting from the analysis of cultural materials recovered from the survey and testing activities were incorporated.

2.5.3 Methods for Model Refinement

Due to the extremely low numbers of cultural resource sites recorded, the use of elaborate statistical methods was not appropriate. The new data were added to the existing data base, and the modified sample was subjected to the same correlation tests used on the Phase I data. The tests resulted in some modifications to positive and negative correlations presented in the original predictive model. The Phase II data also provide preliminary information regarding site density for certain site types in the Linear Features project area.

Survey data were added to the Phase I data base, which was then analyzed using the non-metric factor analysis program. This resulted in some refinement of the model for specific site types and certain time periods.

2.5.4 Historic Data Analysis

Research on recorded historic sites identified the historic period of occupation and site function. This research included the sources examined during Phase I, and Federal, State, and local records such as land ownership, plat, and tax records. These were examined in an attempt to identify the individual(s) responsible for site development.

Land ownership records and plat maps maintained by the BLM were reviewed to obtain the original land disposition information for each parcel surrounding a historic site. None of the land around the sites has ever been patented under either the Mineral Entry or Homestead laws. Additional research was conducted in the borough Index to Mining Locations; Mineral Survey Field Notes; USGS Annual Mining Reports, Bulletins and Professional Papers; and local histories and newspapers to gain information about names of locators or developers, existing structures, and general or specific history of the locality.

3.0 RESULTS OF FIELDWORK

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3.1 INTRODUCTION

This chapter summarizes the results of the Phase II field survey. Information is presented according to the particular Linear Feature associated with specific Sample Units. A brief description of the physical environment for each Linear Feature is followed by tables summarizing anticipated and actual ground conditions, and testability and test results. Descriptions and maps for each Sample Unit are presented in Appendix A.

The cultural resource discussion summarizes, through tables and text, the various sites and isolated cultural material occurrences located and recorded during the intensive survey. The type of cultural material and features identified, as well as an evaluation of the potential for each site to produce additional important information, are presented. More detailed site and isolate data are presented in Appendix B.

The final section of this chapter summarizes the goals and results of a series of ethnographic interviews conducted as part of Phase II field research. The ethnographic interviews with older Athapaskan Indians knowledgeable of portions of the study area yielded information on Indian as well as non-Indian sites on or near parts of the Linear Features. Detailed summaries of the interviews, as well as transcripts from three interviews, are presented in Appendix C.

3.2 SAMPLE UNIT DISCUSSION

The general study area which includes the Linear Features transects four physiographic provinces, as defined by Wahrhaftig (1965). These provinces, from south to north, are the Coastal Trough, which includes the Susitna Basin; the Alaska-Aleutian Province, which includes the Alaska Range; western Alaska, which runs north from the Alaska Range foothills to the Yukon River and includes most of the lower Yukon-lower Tanana-Kuskokwim basins; and the periphery of the Northern Plateaus, which extends east into Canada from near the confluence of the Yukon and Tanana Rivers. The four physiographic provinces are further broken into physiographic divisions by Wahrhaftig (1965). Seven of these divisions are located either within or adjacent to the study area (Fig. 3-1) and, from north to south, are described below in Section 3.2.1 through Section 3.2.6.

3.2.1 Linear Feature 1, Anchorage to Willow Transmission Line

The South Intertie or Anchorage to Willow Transmission Line originates in Anchorage, crosses Cook Inlet, and follows a westerly, then northerly, route across the formerly glaciated, Cook Inlet-Susitna Lowland division. The elevation is less than 500 ft. and features include ground moraines, stagnant ice topography, drumlin fields, eskers, and outwash plains. Near the Alaska Range and Talkeetna Mountains, rolling upland areas in this division rise to 3,000 feet. The Susitna River is the primary drainage in this structural basin. The area has only one glacier to the west and some permafrost in the north. Bedrock geology consists of Tertiary age, coal-bearing rocks covered by glacial moraine and outwash and marine and lake deposits.

A total of 18 sample units were included in the Phase II survey of Linear Feature 1 (Table 3-1). Of these sample units, six were over 80% surveyable; seven were between 50% and 76% surveyable; and five were less than 35% surveyable, with three of

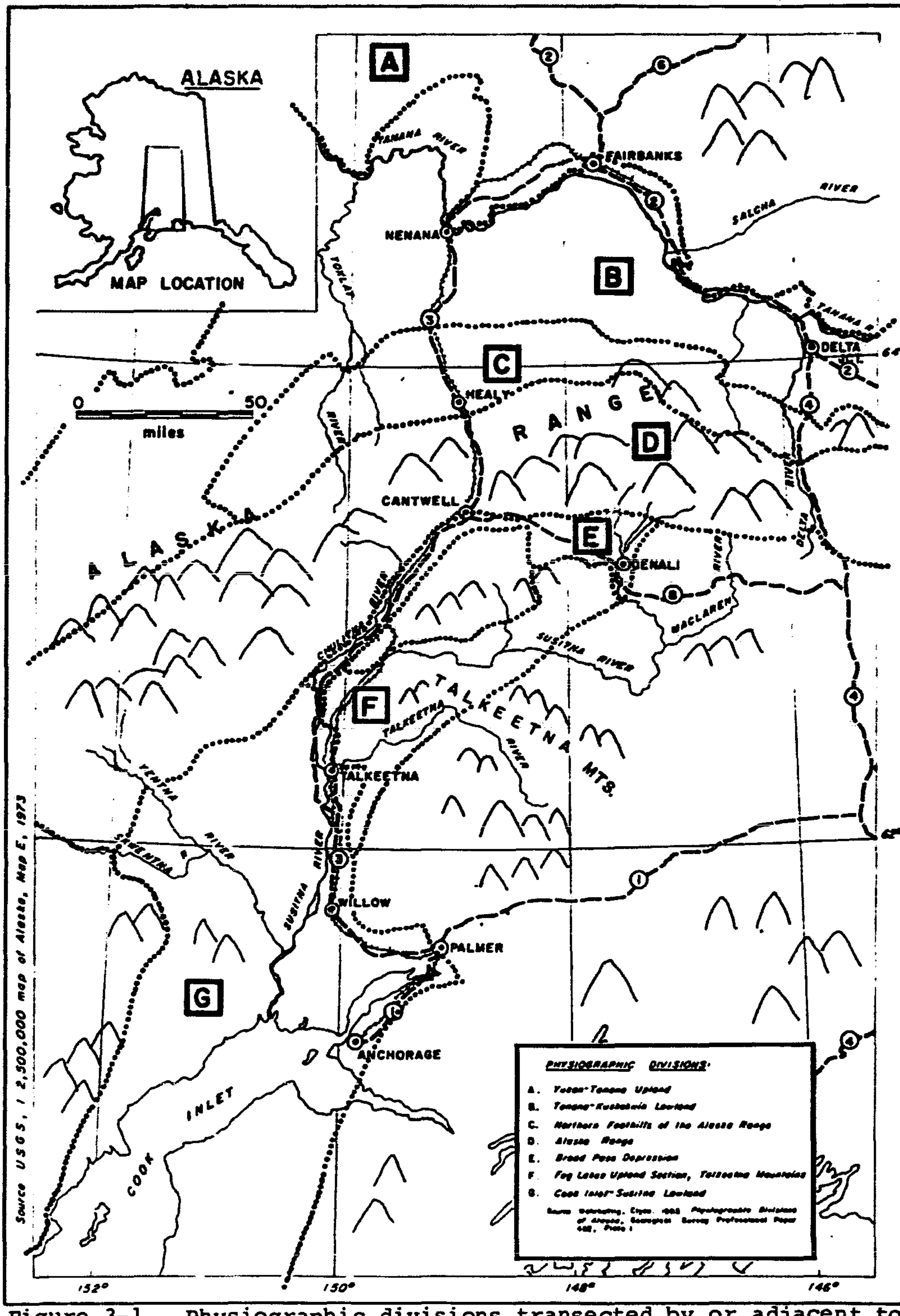


Figure 3-1. Physiographic divisions transected by or adjacent to the Susitna Hydroelectric Project Linear Features.

Table 3-1

Sample Units Along the Anchorage-Willow Transmission Line

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV
							PERCENTAGE OF PITS NOT REACHING 30 cm DEPTH						
SAMPLE UNIT	ANTICIPATED SURVEYABILITY OF UNIT	PERCENT OF UNIT SURVEYED AND TESTED SYSTEMATICALLY	PERCENT OF UNIT NOT TESTED SYSTEMATICALLY AND REASON	TOTAL NO. OF SHOVEL TESTS ATTEMPTED IN TRANSECT GRID	ADDITIONAL TESTS EXCAVATED OUTSIDE TRANSECT GRID	PERCENT OF TESTS REACHING 30 cm DEPTH OR GREATER	SATURATED SOIL/WATER	FROZEN GROUND	ROCKS	DEVELOPMENT/ DISTURBANCE	HEAVY VEGETATION OR ROOTS	STEEP SLOPE	OTHER
ANCHORAGE-WILLOW TRANSMISSION LINE (Linear Feature I)													
3	80%	82%	18% development (construction in progress)	334		49%	6%		36%		11%		
7	80%	69%	31% development (construction in progress)	281		34%	9%		29%	19%	9%		
12	90%	86%	14% development (transmission line)	349		33%	6%		48%		12%		1%
51	60%	58%	20% marsh; 13% heavy vegetation	238	6	65%	25%		2%		7%		1%
52	60%	99%	1% marsh	405		78%	8%		3%		9%		2%
56a	40%	57%	43% marsh	234		57%	36%						7%
57	70%	82%	18% lake	336		57%	39%		1%		3%		
60	70%	75%	25% lake	370		76%	6%		7%		10%		1%
62	98%	72%	28% private land	329		87%			5%		7%		1%
74	10%	13%	87% marsh	51		68%	12%				18%		2%
75	60%	76%	24% marsh	310		65%	25%				8%		2%
91	95%	100%	--	413		59%	39%				2%		
92	70%	74%	26% marsh	300		68%	30%				2%		
102	0%	0%	100% marsh	0		0%							
113	0%	1%	99% marsh	5		100%							
120	30%	34%	66% marsh	139		88%	3%				7%		2%
126	30%	50%	50% marsh	204		70%	28%				2%		
132	10%	2%	98% marsh	7		43%	57%						

those unsurveyable or nearly unsurveyable (1%). A total of 4,496 tests were attempted in the surveyable portions of the sample units.

3.2.2 Linear Features 2, 3, and 4

The Gold Creek-Devil Canyon Railroad (Linear Feature 2), the Gold Creek-Watana Transmission Line (Linear Feature 3), and the lower three-fourths of the Watana-Devil Canyon Access Road (Linear Feature 4), as well as the middle Susitna River, are within the Fog Lakes Upland section of the Talkeetna Mountains division. The Upland section rises to elevations from 3,000 to 4,500 ft. and varies from extensive glacial sculpturing in the southwest to high, flat, unglaciated terraces in the northeast. Portions of the access road also transect foothills of the Chulitna Mountains, which consist of a compact group of glaciated mountain blocks interspersed with low passes.

Glaciers in the division are drained by large, braided tributaries to the Susitna and other rivers. The Susitna cuts through the mountains in a 1,000-ft., steep-walled gorge known as Devil Canyon. Lakes, primarily in the northern part of the division, are located in ice-carved, moraine-dammed basins, and are up to several miles in length. Geologic resources of the primary area of interest in the Talkeetna Mountains are northeast-trending belts of greenstones, graywacke, and argillite of Paleozoic and Mesozoic age.

The northern quarter of the access road from the Denali Highway is located in the eastern portion of the Broad Pass Depression division, which is a broad, glaciated lowland. The rolling morainal topography and central outwash flats at elevations of 1,000 to 2,500 ft. are underlain by permafrost. The area contains the upper Nenana and Susitna Rivers. Since drainages originate in nearby glaciers, the rivers are swift, turbid, and braided. Lakes are common and were formed either by water filling moraine depressions, moraines damming basins, or buried glacial ice thawing into a concavity. The main part of the Broad Pass Depression is underlain by Tertiary coal-bearing rocks in fault contact with slightly metamorphosed Paleozoic and Mesozoic rocks. The lowlands, east of the Tertiary Age graben, are mantled with ground moraine.

3.2.3 Linear Feature 2, Gold Creek-Devil Canyon Railroad

Five sample units included in the Phase II survey are primarily associated with Linear Feature 2, two of which overlap slightly within Linear Feature 3 (Table 3-2). Three of the units were 68% to 79% surveyable, while two were between 38% and 50% surveyable. Sample Unit 486 was only half surveyed due to time constraints, but what was surveyed was 100% surveyable. A total of 1,452 tests were attempted in the surveyable portions of the sample units.

3.2.4 Linear Feature 3, Gold Creek-Watana Transmission Line

Ten sample units were included in the Phase II survey of Linear Feature 3, 6 of which overlap with the Watana Access Road (Table 3-3). Seven of the units were 85% to 100% and three were between 21% and 50% surveyable. However, two of the latter (Units 469 and 579) were only half surveyed due to time constraints. Therefore, surveyability of the portions surveyed would be in the 85% to 100% range. A total of 3,479 tests were attempted in the surveyable portions of the sample units.

3.2.5 Linear Feature 4, Watana-Devil Canyon Access Road

Twenty sample units were included in the Phase II survey of Linear Feature 4 (Table 3-4). Seventeen of the units were 85% to 100% surveyable; one was 77% surveyable; and two were 25% surveyable, one due to time constraints and the other due to the presence of sow and cub grizzlies. A total of 7,246 tests were attempted in the surveyable portions of the sample units.

Table 3-2

Sample Units Along the Gold Creek-Devil Canyon Railroad

I SAMPLE UNIT	II ANTICIPATED SURVEYABILITY OF UNIT	III PERCENT OF UNIT SURVEYED AND TESTED SYSTEMATICALLY	IV PERCENT OF UNIT NOT TESTED SYSTEMATICALLY AND REASON	V TOTAL NO. OF SHOVEL TESTS ATTEMPTED IN TRANSECT GRID	VI ADDITIONAL TESTS EXCAVATED OUTSIDE TRANSECT GRID	VII PERCENT OF TESTS REACHING 30 cm DEPTH OR GREATER	VIII PERCENTAGE OF PITS NOT REACHING 30 cm DEPTH: SATURATED SOIL/WATER	IX FROZEN GROUND	X ROCKS	XI DEVELOPMENT/ DISTURBANCE	XII HEAVY VEGETATION OR ROOTS	XIII STEEP SLOPE	XIV OTHER
GOLD CREEK-DEVIL CANYON RAILROAD (Linear Feature 2)													
*486†	95%	50%	50% end of project	277	10	71%	5%		15%	2%	4%	1%	2%
490†	90%	79%	21% inaccessible cliffs	324		62%	11%		15%		12%		
498	70%	38%	25% Susitna R.; 25% private land; 7% steep slope; 5% marsh	157		80%	5%		10%		5%		
499	80%	79%	15% steep slope 6% marsh & dense vegetation	323		69%	6%		15%		7%	2%	1%
504	75%	75%	25% Susitna R.	361		58%	21%	1%	8%		10%	1%	1%

* = partially surveyed units: 80 acres surveyed in Units 486, 469, and 519; 40 acres surveyed in Units 397 and 408

† = overlaps with Gold Creek-Watana Transmission Line

Table 3-3

Sample Units Along the Gold Creek-Watana Transmission Line

I SAMPLE UNIT	II ANTICI-PATED SURVEY-ABILITY OF UNIT	III PERCENT OF UNIT SURVEYED AND TESTED SYSTEMATICALLY	IV PERCENT OF UNIT NOT TESTED SYSTEMATICALLY AND REASON	V TOTAL NO. OF SHOVEL TESTS ATTEMPTED IN TRANSECT GRID	VI ADDITIONAL TESTS EXCAVATED OUTSIDE TRANSECT GRID	VII PERCENT OF TESTS REACHING 30 cm DEPTH OR GREATER	VIII PERCENTAGE OF PITS NOT REACHING 30 cm DEPTH: SATURATED SOIL/WATER	IX FROZEN GROUND	X ROCKS	XI DEVELOPMENT/ DISTURBANCE	XII HEAVY VEGETATION OR ROOTS	XIII STEEP SLOPE	XIV OTHER
GOLD CREEK-WATANA TRANSMISSION LINE (Linear Feature 3)													
443§	100%	100%		405		18%	20%		60%		2%		
444§	100%	99%	1% marsh	404		27%	13%		60%				
464§	100%	100%		466		59%	24%		15%		2%		
*469§	95%	47%	3% marsh; 50% end of project	192		22%	27%		50%		1%		
485§	30%	21%	79% steep slope	87		39%	2%		52%		7%		
*519	100%	50%	50% end of project	204		29%	27%		36%		8%		
522	100%	85%	15% marsh	464		37%	8%		52%		3%		
525§	90%	75%	25% marsh	355	4	37%	10%		52%		1%		
536	100%	100%		408		25%	9%		66%				
549	100%	100%		487		34%	4%		62%				

* = partially surveyed units: 80 acres surveyed in Units 486, 469, and 519; 40 acres surveyed in Units 397 and 403

§ = overlaps with Watana Access Road

Table 3-4

Sample Units Along the Watana and Devil Canyon Access Road

I SAMPLE UNIT	II ANTICI-PATED SURVEY-ABILITY OF UNIT	III PERCENT OF UNIT SURVEYED AND TESTED SYSTEMATICALLY	IV PERCENT OF UNIT NOT TESTED SYSTEMATICALLY AND REASON	V TOTAL NO. OF SHOVEL TESTS ATTEMPTED IN TRANSECT GRID	VI ADDITIONAL TESTS EXCAVATED OUTSIDE TRANSECT GRID	VII PERCENT OF TESTS REACHING 30 cm DEPTH OR GREATER	VIII PERCENTAGE OF PITS NOT REACHING 30 cm DEPTH SATURATED SOIL/WATER	IX FROZEN GROUND	X ROCKS	XI DEVELOPMENT/ DISTURBANCE	XII HEAVY VEGETATION OR ROOTS	XIII STEEP SLOPE	XIV OTHER
WATANA AND DEVIL CANYON ACCESS ROAD (Linear Feature 4)													
331	95%	93%	7% steep slope	379		50%	2%	7%	38%			2%	1%
341	100%	100%		408		19%	31%	3%	46%		1%		
346	99%	96%	4% kettle lakes	295		15%			85%				
355	95%	92%	8% marsh	408		34%	14%		52%				
356	95%	97%	3% scree slope	429		15%	17%		67%		1%		
359	90%	87%	13% marsh	355	89	65%			35%				
364	100%	100%		408	4	26%	9%		65%				
372	99%	98%	2% marsh	400	6	15%	26%		59%				
382a	80%	100%		408		12%	12%		72%			4%	
386	80%	85%	15% marsh	261		28%	10%		62%				
388	80%	86%	9% steep slope 5% marsh	263		34%	19%		45%		2%		
*397	85%	25%	75% grizzly bears	99	14	30%	46%	5%	14%		5%		
404	85%	77%	23% marsh	302	19	45%	12%		41%		2%		
405	95%	93%	7% marsh	381		26%	10%		63%		1%		
*408	90%	25%	75% end of project	68	12	60%	6%		34%				
410	95%	100%		401	128	63%	10%		26%				1%
425	95%	100%		408		21%	27%		48%		4%		
429	95%	100%		472		41%	16%		42%		1%		
431	95%	94%	4% lake; 2% bedrock canyon	386	65	41%	3%		55%			1%	
461	100%	100%		416		27%	12%		57%		3%	1%	

* = partially surveyed units: 80 acres surveyed in Units 486, 469, and 319; 40 acres surveyed in Units 397 and 408

3.2.6 Linear Feature 5, Healy to Fairbanks Transmission Line

A small part of the central section of the Alaska Range division is included along the southern periphery of the Healy-Fairbanks Transmission Line. The Nenana Gorge, just south of Healy, is typical of the superposed drainages which cross-cut the 6,000-9,000-foot glacial ridges and enhance the 9,500 to 20,000-feet, snow-capped mountains. The Alaska Range contains numerous valley glaciers which produce swift, braided drainages. Major faults parallel the range and a complex of synclines has forced rocks of Paleozoic and perhaps Precambrian age to the flanks. Tertiary rocks have easily eroded to form lowlands. A minimum of four periods of glaciation are recognized in the Range, permafrost is extensive and well developed, and solifluction features are present.

From Healy to a point between Browne and Rex, the southern third of the Healy-Fairbanks Transmission Line is in the division known as the Northern Foothills of the Alaska Range. The foothills are broad, east/west, flat-topped ridges 2,000 to 4,500 ft. high, interspersed with broad, rolling lowlands 700 to 1,500 ft. high. Although primarily unglaciated, some valley glaciers from the Alaska Range extended into the foothills. Drainages, flowing mainly north-northwest across the foothills from the mountains, have cut very deep canyons into the ridges and created terraced valleys in the lowlands. Extensive badlands have been incised into the soft substrate of Tertiary age. Lakes and ponds in the division are of thaw or morainal origin. There are extensive permafrost, frost polygons, and solifluction features. Bedrock geology of the ridges is schist and granite intrusives, while the lowlands contain poorly consolidated Tertiary rocks and thick beds of subbituminous coal capped with coarse conglomerate.

The majority of the remainder of the Healy-Fairbanks Transmission Line is located in the Tanana-Kuskokwim Lowland division, which is under 1,000 ft. in elevation. Surface topography includes outwash fans from the Alaska Range; bands of morainal deposits at the upper ends of some fans; broad, deep, terraced valleys associated with rivers originating in the Alaska Range; flood plains of the Tanana and Kuskokwim; and extensive, stabilized dune fields between Nenana and McGrath. Drainages include the major east/west-flowing rivers plus braided glacial streams originating in the Alaska Range. Thaw lakes occur in fine alluvium, while thaw sinks are in loess. The area is unglaciated and contains permafrost and dry permafrost. Coarse to fine outwash fan deposits and alluvial fill several hundred feet thick are the primary geologic features below the transmission line corridor.

The final physiographic division, along the north edge of the study area, is the Yukon-Tanana Upland. The area near Fairbanks consists of flat, alluvium-filled valleys, 1,000 to 1,500 ft. in elevation, generally less than 0.5 mile wide, located between broad, gentle, generally flat-topped divide ridges and spurs between 1,500 and 1,300 ft., which are in turn topped by tight clusters of rugged mountains rising from 4,000 to 5,000 ft. Although considered within the Yukon drainage basin, streams along the south half of the division flow into the Tanana River. There are few thaw lakes in valley floors and low passes. There are no glaciers, although active mass wasting occurs in the mountains, ice wedges are present in frozen valley mucks, and scattered permafrost is present. The portion closest to the study area has thick, windborn silts on slopes, with thick muck over deep gravels in the valleys.

Thirty-six sample units were included in the Phase II survey of Linear Feature 5 (Table 3-5). Fifteen of the units were between 80% and 100% surveyable; seven were between 55% and 78% surveyable; and the fourteen which were less than 48% surveyable included one unsurveyable and four nearly unsurveyable (12%, 10%, 3%, and 1%) units. Changes in recording practices after completion of the survey of the first eight units resulted in a total of 7,317 recorded tests and an estimated additional 1,604 tests

Table 3-5

Sample Units Along the Healy-Fairbanks Transmission Line

I SAMPLE UNIT	II ANTICIPATED SURVEYABILITY OF UNIT	III PERCENT OF UNIT SURVEYED AND TESTED SYSTEMATICALLY	IV PERCENT OF UNIT NOT TESTED SYSTEMATICALLY AND REASON	V TOTAL NO. OF SHOVEL TESTS ATTEMPTED IN TRANSECT GRID	VI ADDITIONAL TESTS EXCAVATED OUTSIDE TRANSECT GRID	VII PERCENT OF TESTS REACHING 30 cm DEPTH OR GREATER	VIII PERCENTAGE OF PITS NOT REACHING 30 cm DEPTH SATURATED SOIL/WATER	IX FROZEN GROUND	X ROCKS	XI DEVELOPMENT/ DISTURBANCE	XII HEAVY VEGETATION OR ROOTS	XIII STEEP SLOPE	XIV OTHER
HEALY-FAIRBANKS TRANSMISSION LINE (Linear Feature 5)													
136	40%	29%	10% Nenana R. 61% steep slope	117		85%			9%		4%		2%
143	98%	98%	2% marsh	199		26%	60%	14%					
146	90%	55%	45% bison pasture, plowed field, gravel road	123		96%	1%		1%		2%		
152	90%	75%	15% marsh; 5% creek; 5% Parks Highway	306	2	50%	2.5%	13.5%	25%	6%	2%	1%	
163	70%	68%	32% Nenana R.	277		23%	33%	35%	8%				1%
169	50%	26%	74% marsh	105		95%		3%					2%
174	35%	41%	15% steep slope 39% marsh 5% railroad bed	168		13%	60%	26%					1%
175	60%	48%	15% steep slope 32% marsh, pond 5% railroad bed	194		27%	37%	36%	2%				
182	94%	100%	--	416	13	37.5%	7%	33.5%	20%		0.5%	0.5%	1%
183	80%	90%	10% marsh	369	31	59%	8%	11%	21%		1%		
188	95%	100%	--	406	8	62%	6.5%	9%	20%		1%	1%	0.5%
188a	80%	72%	28% steep slope	293		31%	10%	15%	38%		2%	3%	1%
189	100%	100%		544	40	17%	13%	29%	38%		2%	1%	
190	100%	95%	5% stream	388		6%	23%	71%					
199	40%	12%	88% marsh	49		29%	71%						
201	75%	38%	62% marsh	155		57%	36%	3%	4%				
209	25%	0%	90% marsh; 10% dense mixed forest	0		0%							
213	10%	3%	97% marsh	12		0%		100%					
217	25%	38%	62% marsh	154		23%	22%	55%					

Table 3-5. Sample Units Along the Healy-Fairbanks Transmission Line (cont.)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV
							PERCENTAGE OF PITS NOT REACHING 30 cm DEPTH						
SAMPLE UNIT	ANTICIPATED SURVEYABILITY OF UNIT	PERCENT OF UNIT SURVEYED AND TESTED SYSTEMATICALLY	PERCENT OF UNIT NOT TESTED SYSTEMATICALLY AND REASON	TOTAL NO. OF SHOVEL TESTS ATTEMPTED IN TRANSECT GRID	ADDITIONAL TESTS EXCAVATED OUTSIDE TRANSECT GRID	PERCENT OF TESTS REACHING 30 cm DEPTH OR GREATER	SATURATED SOIL/WATER	FROZEN GROUND	ROCKS	DEVELOPMENT/ DISTURBANCE	HEAVY VEGETATION OR ROOTS	STEEP SLOPE	OTHER
HEALY-FAIRBANKS TRANSMISSION LINE (Linear Feature 5, continued)													
225	25%	10%	90% marsh	42		0%	62%	38%					
229	25%	36%	64% marsh	148		23%	17%	57%			3%		
245	25%	1%	99% marsh	0	2	0%							
254	99%	97%	3% marsh	396		13%	32%	55%					
255	95%	89%	11% lake, stream, marsh	476	23	15%	16%	69%					
270	70%	80%	20% marsh	332	29	59%	9%	23.5%			8%		0.5%
278	75%	94%	6% marsh, creek	304	4	23%	13%	64%					
282	95%	78%	17% heavy veg. 5% highway	317		81%		6%		9%	4%		
291	90%	100%	--	409		6.5%	4.5%	89%					
296**	40%	63%	17% marsh, 20% steep slopes	(256)		(70%)	(10%)	(10%)	(10%)				
303**	95%	80%	20% marsh	(330)		(22%)	(1%)	(77%)					
304**	90%	80%	20% marsh	(330)		(20%)	(12%)	(68%)					
307**	25%	25%	75% steep slope	(117)		(71%)		(29%)					
308**	29%	34%	55% steep slope 5% gravel pit 6% Parks Hwy.	95		42%		52%	2%	2%	2%		
313**	85%	80%	20% marsh, thick vegetation	(257)		(40%)		(60%)					
314**	90%	75%	25% marsh, thick vegetation	(290)	14	(14.5%)	(6%)	(77%)			(2.5%)		
315**	80%	60%	40% marsh, pond, thick vegetation	(240)		(37%)	(4%)	(59%)					

** = not as systemazically tested as later units
() = estimates; actual figures not tabulated

(in seven of the first eight units) in surveyable portions of the sample units.

3.2.7 Results of the Sample Survey

The data presented in the summary tables (see Tables 3-1 through 3-5) are very useful in evaluating the utility of using predetermined Terrain and Vegetative Units to test projected or anticipated against actual survey coverage of the Sample Units. Table 3-6 further summarizes the data on the basis of percentage point differences. The actual survey coverage of 46% of the Sample Units was within 5% of what had been predicted using Terrain and Vegetative Unit information. Surveyability, the predicted survey coverage of a unit, was obtained by calculating how much acreage of Terrain Units, such as landslide deposits or steep bedrock deposits (cliffs), and Vegetative Units, such as marshland or developed/water, existed within each Sample Unit. By combining the first three columns of the table, it can be determined that actual coverage of 83% of the units was within 20% of the predicted coverage. Reasons for reduced surveyability of the 33 units varying from expected surveyability by 6% to 20% include: more water or marshland than projected (13 units); less water or marshland (13); more cliffs or steep slopes (4); fewer cliffs or less steep slope (1); more dense vegetation (1); and more construction (1). For the 15 units with greater than 20% difference, the reasons include: more water or marshland (6); end of project (4); presence of posted private land (3); presence of bears (1); and more cliffs than projected (1).

The breakdown by Linear Feature in Table 3-6 also indicates where the use of Terrain and Vegetative Unit data best predicted actual conditions. Again, using the 0-5% column, the predictions were accurate in at least half the cases in Linear Features 1, 3, and 4, and least accurate in Linear Feature 5.

Table 3-6

Summary Comparison of Anticipated Versus Actual Surveyability of Sample Units by Linear Feature

Linear Feature	Variation from Anticipated Surveyability 0-5%	6-10%	11-20%	>20%	Total # of Sample Units
1	10 (56%)	1 (5.5%)	5 (27.5%)	2 (11%)	18 (20%)
2	2 (40%)	0	1 (20%)	2 (40%)	5 (6%)
3	5 (50%)	1 (10%)	2 (20%)	2 (20%)	10 (11%)
4	15 (75%)	2 (10%)	1 (5%)	2 (10%)	20 (22.5%)
5	9 (25%)	8 (22%)	12 (33.5%)	7 (19.5%)	36 (40.5%)
Total # of Sample Units	41 (46%)	12 (13.5%)	21 (23.5%)	15 (17%)	89 (100%)

The predictability percentages would actually increase for all Linear Features if units not totally surveyed due to time and other constraints were deleted. Under those circumstances, the 41 units in the 0-5% category would represent 50% of the total and predictions in four of the five Linear Features would be accurate to within 5% in over 58% of the units.

It appears that, by using the Terrain and Vegetative Units, accurate prediction of surveyability within 5% is possible for about half the cases. If the degree of accuracy required is adjusted to 10%, the predictability increases to 60%, and for 20% accuracy, 83% of the cases are predictable. This would be a useful tool for estimating how much of any unit is surveyable and planning survey and testing accordingly. In such a case the 5% to 10% accuracy would probably be preferred.

3.3 CULTURAL RESOURCES

3.3.1 Introduction

A total of 51 cultural resource occurrences were documented during the Phase II fieldwork (Table 3-7). Of these resources, 40 are generally labelled cultural resource sites, defined as locations containing diverse materials and/or features resulting from past human activity. The size of sites varies depending upon the number of occupants, length of occupation, and activities conducted. Sites are considered single component when the evidence indicates occupation and use by a single prehistoric, ethnohistoric, or historic culture. Multi-component sites are those which indicate occupation by more than one previous culture.

In addition to prehistoric and historic sites, a category designed as "recent" was recorded. Recent sites consist of features or activity areas, such as hunting camps or trap lines, that are generally just a few years old. Information recorded for recent cultural resource sites was generally less detailed than that for sites considered prehistoric, ethnohistoric, or historic. No Alaska Heritage Resource Site (AHRS) numbers have been assigned to these sites.

The primary reason for inventorying recent sites was to provide general contemporary land use information which may eventually be usable in comparison with earlier periods of use of the study area. Information on recent sites also can provide insight into the time it takes for site integrity to be lost.

The final category of cultural resource occurrence is the isolated find (isolate), of which 11 were recorded. Isolates are single occurrences of cultural material that are limited in content and have no contextual information through which to evaluate their place in the prehistory or history of the area, other than intrinsically. Recent isolates are included in this category.

Table 3-7

Cultural Resource Sites and Isolates Located During the Phase II Sample Survey

Sample Unit	Sites (including Recent)	Isolates (including Recent)
3	ANC 536	
	ANC 537	
	3-1	
7	ANC 538	
75	TYO 67	
	TYO 68	
504	TLM 276	504-1
		504-2
444	TLM 108a	
549	549-1	
364		364-1
		364-2
		364-3
382a	HEA 250	
	HEA 251	
404	TLM 274	
451	TLM 110a	
461	TLM 275b	
163	FAI 252	
	163-1	
182	FAI 253b	
	182-1	
245	245-1	
254	254-1	
255	255-1	
278	278-2	278-1
282		282-1
		282-2
303	303-1	
307	307-1	
308		308-1
313	FAI 254	
	313-1	
	313-2	
314	FAI 255	314-1
	FAI 256	
	FAI 257	
	FAI 258	
	314-2	
	314-3	

(continued)

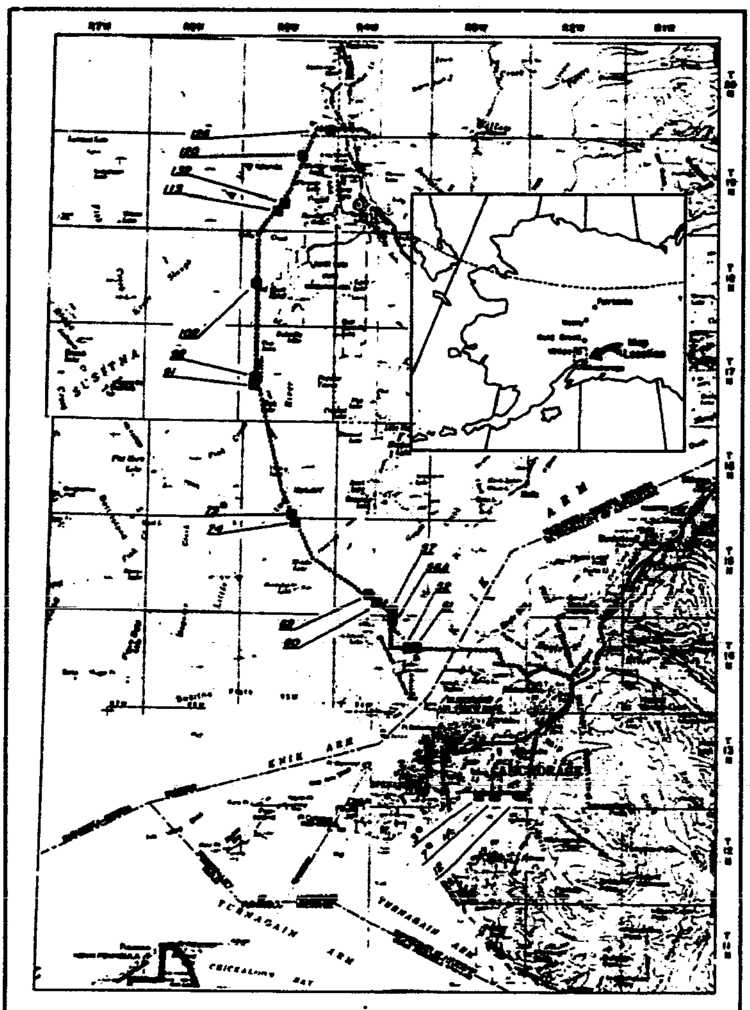
Table 3-7. Cultural Resource Sites and Isolates Located During the Phase II Sample Survey (continued)

Sample Unit	Sites (including Recent)	Isolates (including Recent)
315	FAI 259 FAI 260 FAI 261 FAI 262 FAI 263 315-1 315-3	315-2

[a]Previously recorded site
[b]Located adjacent to Sample Unit

Locations where isolates were located were sufficiently tested to determine that indeed they were isolates and not sites. No AHRS numbers have been assigned to any isolates.

The general distribution of cultural resources in relation to the Linear Features and the specific Sample Unit with which they are associated is presented in Figures 3-2 through 3-4. Appendix B provides narratives, maps, and site forms for sites and isolates located during Phase II.



SAMPLE UNITS SURVEYED FOR CULTURAL RESOURCES ALONG LINEAR FEATURE I June-August 1985

0 5 10 15 20 25 30 miles

0 5 10 15 20 25 30 kilometers

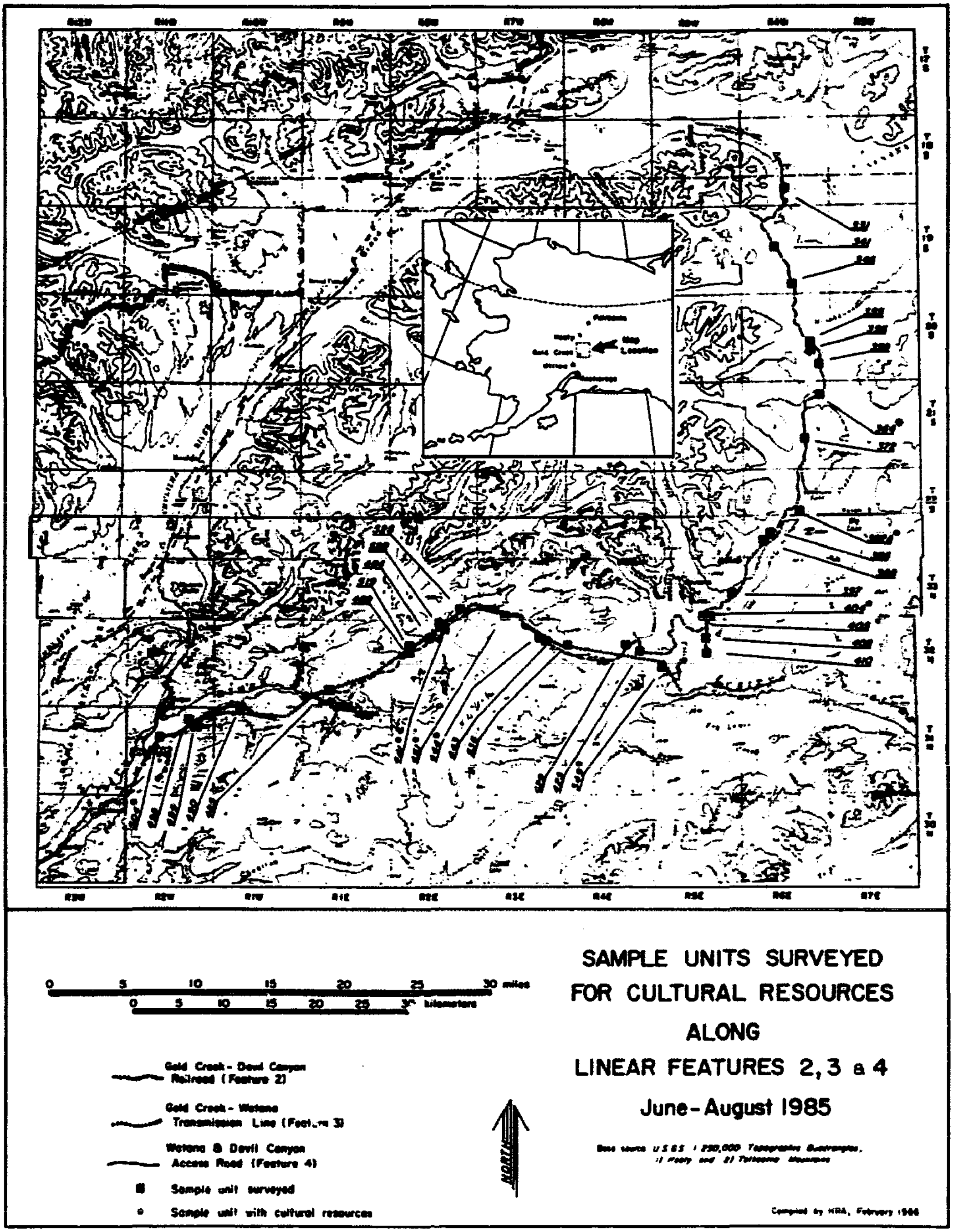
Anchorage-Willow Transmission Line (Feature I)

■ Sample unit surveyed

• Sample unit with cultural resources

NORTH

Figure 3-2



SAMPLE UNITS SURVEYED
FOR CULTURAL RESOURCES
ALONG
LINEAR FEATURES 2,3 & 4
June-August 1985
0 5 10 15 20 25 30 miles
0 5 10 15 20 25 30 kilometers
Gold Creek - Devil Canyon Railroad (Feature 2)
Gold Creek - Watana Transmission Line (Feature 3)
Watana & Devil Canyon Access Road (Feature 4)
Sample unit surveyed
Sample unit with cultural resources
NORTH

Figure 3-3

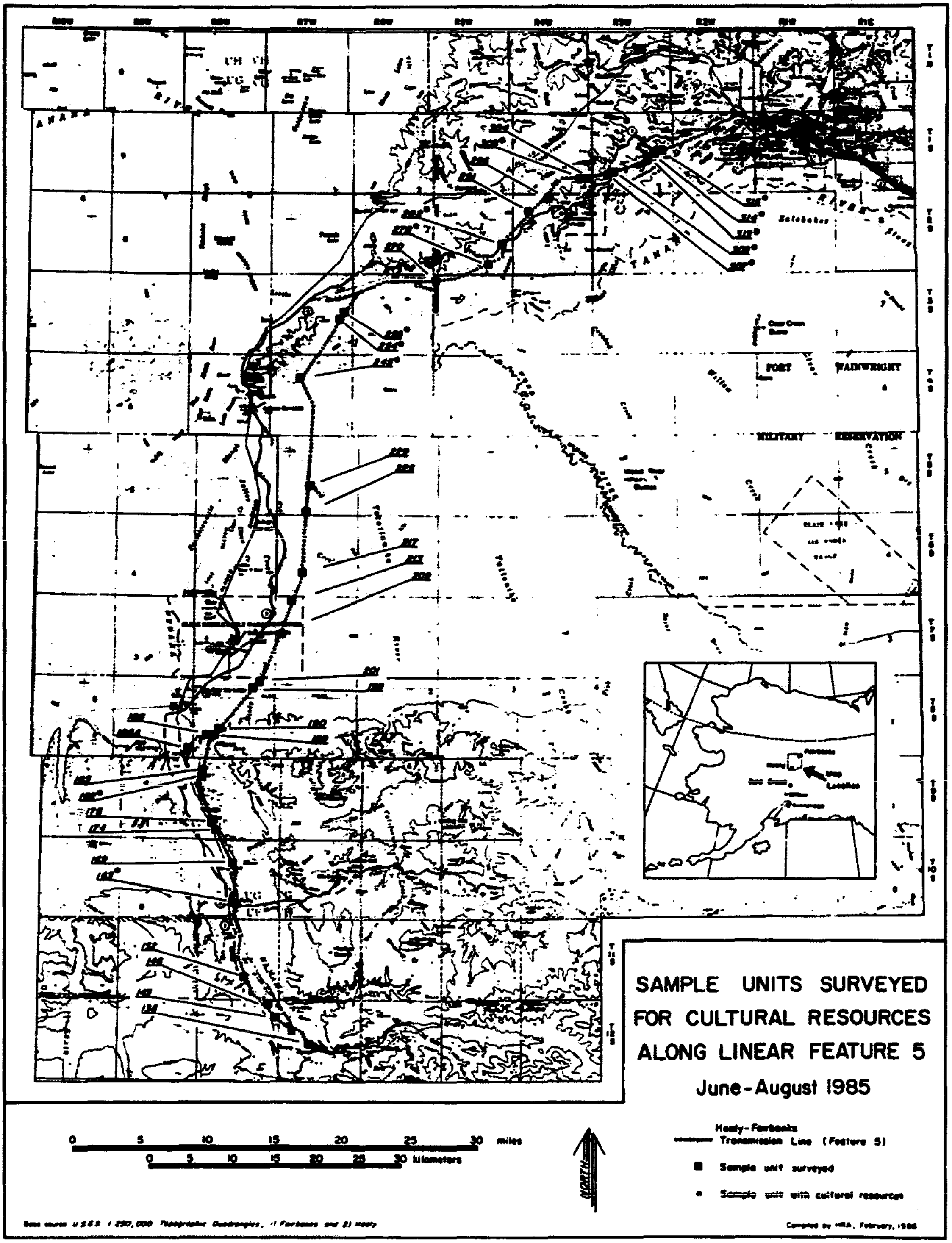

SAMPLE UNITS SURVEYED
FOR CULTURAL RESOURCES
ALONG LINEAR FEATURE 5
June-August 1985
FORT WAINWRIGHT
MILITARY RESERVATION
0 5 10 15 20 25 30 miles
0 5 10 15 20 25 30 kilometers
NORTH
Healy-Fairbanks
Transmission Line (Feature 5)
Sample unit surveyed
Sample unit with cultural resources

Figure 3-4

The prehistoric, ethnohistoric, and historic sites were assigned to site types developed and defined during Phase I research (Greiser et al. 1985:4-19--4-30) in order to conduct the statistical analyses necessary for model refinement. These site types are chipping station/lithic scatter (Site Type 1), cache pit (Site Type 5), historic building/structure (Site Type 21), mining camp or operation (Site Type 27), and recent military activity (Site Type 31). One additional site type was added as a result of Phase II work. This type is the historic dump or trash scatter (Site Type 32), which includes historic material concentrations or scatters containing cans, bottles, stove parts, domestic items, utilitarian items, etc., which have been discarded or abandoned.

Recorded isolates range from prehistoric flakes and a biface fragment, to part of a historic small gauge rail, to recent material including cans; a bottle; a large, wooden-handled knife; a steel trap; a coffee pot; and a razor-tipped arrow. The recent bottle was one of the few items recovered from systematic testing.

3.3.2 Summary of Cultural Resources

The 40 cultural resource sites (Table 3-8) can be divided into the following categories: previously unrecorded prehistoric (5); previously recorded prehistoric (2); ethnohistoric (2); historic (15); and recent (16). The two previously recorded sites have been discussed in detail (Dixon et al. 1985) and will not be addressed here.

Recent sites in the Fairbanks and Healy areas appear to illustrate continued, though varying, land use patterns. Those in other areas may reflect a new pattern of expansion into areas which demonstrate no previous documentation of extended use.

Table 3-8

Prehistoric, Ethnohistoric, and Historic Sites Located During the Phase II Sample Survey

AHRS Site Number	Cultural Materials and/or Features	Results of Testing	Period of Occupation	Functional Category
ANC 536	3 pits	No testing; features obvious	Post-1900 A.D.*	Military related?
ANC 537	Approx. 109 pits	No testing; features obvious	Post-1900 A.D.*	Military related?
ANC 538	29 pits	No testing; features obvious	1925-1950 A.D.	Military related?
TYO 067	1 pit	17 tests; nothing definitive	Unknown	Cache pit?
TYO 068	1 pit	16 tests; nothing definitive	Unknown	Cache pit?
TLM 274	Lithic material	50 tests; 2 cultural levels	Component 2, 450-550 A.D. Component 1, over 3,000 B.C.	Camp? Camp?
TLM 275	Lithic material	No testing; outside Sample Unit	Unknown	Camp?
TLM 276	Historical material, possible burned structure	10 tests; subsurface historic materials	Post-1912	Cabin or tent camp?
HEA 250	Lithic material	12 tests; no subsurface material	Unknown	Unknown
HEA 251	Lithic material	16 tests; no subsurface material	Unknown	Unknown
FAI 252	Historic material	Limited probing; material extends slightly subsurface	Probably 1925-1950	Cabin?
FAI 253	Lithic material	10 tests; at least 1 subsurface component	Unknown	Camp?
FAI 254	Collapsed cabin, 2 prospect pits, historic material	No testing; features obvious	1900-1932	Miner's cabin
FAI 255	Tent(?) base, 2 prospect pits, historic material	Limited probing; material extends slightly subsurface	1900-1932	Miner's camp
FAI 256	Collapsed cabin, 2 prospect pits, 1 tree cache, historic material	No testing; features obvious	Possibly 2 components: 1890-1915, 1919-1940 or 1950	Miner's cabin
FAI 257	Collapsed cabin, 2 prospect pits, limited material	No testing, features obvious	Post-1900*	Miner's cabin
FAI 258	Cribbed log prospect pit	No testing; features obvious	Post-1900*	Mining
FAI 259	Partially collapsed cabin, outhouse, three dumps, material scatter	No testing; features obvious	1930-1960	Miner's(?) or trapper's cabin
FAI 260	Cribbed log prospect pit	No testing; features obvious	Post-1900*	Mining
FAI 261	Two cribbed log prospect shafts, 3 pits	Limited testing; no subsurface	Post-1900*	Mining
FAI 262	Historic scatter	Limited probing	1930-1950 or 1960	Temporary camp?
FAI 263	Historic scatter	No testing; material on surface	Post-1900*	Dump

*Probable date

Summary details of the remaining cultural resource sites are presented in Table 3-8. The table briefly describes cultural materials or features recorded at each site; number and results of subsurface tests; chronological placement of the site based on cultural materials observed; and tentative categorization, if possible, of each site based on the features and materials observed.

The five prehistoric chipping station/lithic scatters ranged from surface visible with no subsurface (HEA 250 and HEA 251), to surface visible with subsurface (FAI 253), to subsurface multi-component with no surface visibility (TLM 274). A single site (TLM 275) located outside the sample area was recorded on the basis of surface materials but not subjected to testing.

Deposition occurring at prehistoric sites appears to be somewhat variable based on the limited sample obtained. Even sites located on fairly exposed surfaces within several miles of each other (HEA 250, HEA 251, and TLM 274) appear to have been subjected to variable deposition rates. In the case of TLM 274, development of soils is at least partially explained through the deposition of volcanic ash layers which were not subsequently eroded.

The pattern of location of prehistoric sites generally fits two of the intuitive patterns suggested by previous investigators. All of the sites are located where the view is good to excellent, and in four cases (HEA 250, HEA 251, TLM 274, TLM 275), outlet drainages or confluences are within the nearby viewshed. Thus, the current data support the intuitive site location models hypothesizing overlooks and outlets/confluences as prime site locations.

Two sites are tentatively identified as cache pits associated with former Athapaskan occupants of the area (TYO 067 and TYO 068). Although no conclusive data were obtained during testing and recording of the sites, a number of factors seem to indicate their use as cache pits. The general size and shape of the pits fit the range for previously recorded cache pits. The sites are located on a well-drained terrace not too far from the Little Susitna River, and in close proximity to a trail and ford of the river used by the Tanaina. A recent fishing camp and tree cache are located nearby.

The 15 historic sites include historic building/structures (Site Type 21 - FAI 254, FAI 255, FAI 256, FAI 257, FAI 258); historic mining camps or operations (Site Type 27 - FAI 258, FAI 260, FAI 261); recent military (Site Type 31 - ANC 536, ANC 537, ANC 538); and historic dump or trash scatter (Site Type 32 - TLM 276, FAI 252, FAI 262, and FAI 263).

The primary distribution pattern is large in numbers of historic sites in sample units adjacent to the major population centers of Anchorage and Fairbanks. Three sites are tentatively identified as related to movements of United States ground troops stationed in Anchorage during World War II. Members of the Council on America's Military Past (formerly the Council of Abandoned Millitary Past) who were contacted indicated that, although the descriptions of pits sounded unusual for fox holes, it was possible that some other related activity might have occurred. It is possible that the site features could be tests or prospecting pits, which would then resemble the even stronger pattern of mining-related sites in the Fairbanks area. Further investigation in the Anchorage area of adjacent sites, such as the cabin foundation near Sample Unit 7, as well as the recorded sites, should include additional archival research to better address questions of site function.

A summary of the historical events prominent in Alaska in the late 1800s and early 1900s provides insight into sites recorded in the Fairbanks area. The discovery of gold at Turnagain Arm in 1895 radically altered the course of Alaskan history. This strike, and a subsequent discovery on the Klondike River two years later, resulted in an influx of miners. In 1898 and for several decades thereafter, the U.S. Government, under the auspices of the U.S. Geological Survey, funded major expeditions into the Alaskan interior. The information obtained during these surveys increased interest in Alaska as a potentially mineral-rich area. In addition to prompting increased government funding for exploration, the gold strikes in the mid-1890s resulted in widespread prospecting ventures throughout the interior. Miners worked in virtually every major drainage, hoping to locate rich mineral deposits.

Although prospectors first discovered gold within the study area near Fairbanks in the 1870s, they were ill-equipped to develop the deposits. It was not until the early 1900s that the gold deposits in the Fairbanks region were mined productively. Strikes on Pedro, Cleary, and Fairbanks Creeks during the summer of 1902 led to a rapid influx of miners and settlers, and the growth of both Fairbanks and Chena. The Fairbanks mining boom was short-lived, however, and by 1920, the population of Fairbanks had dropped from a high of over 5,000 in 1904 to less than 1,200.

Other mining districts in the study area flourished briefly shortly after and as a direct result of the Fairbanks strikes. Most of the areas that included the Yentna and Willow Creek Districts were discovered by miners who were either en route to Fairbanks or who had been unsuccessful in prospecting the Fairbanks placers.

The evolution of Alaska's economy during the early 1900s prompted the U.S. Government to develop dependable transportation facilities. The extensive network of overland trails that miners and settlers used to travel from the coast to interior settlements were often unreliable due to weather. Thus, in 1915, the U.S. Government began construction of the Alaska Railroad. Although the project was not completed until 1923 and proved far more expensive than initially expected, it provided reliable and relatively easy access to previously isolated areas.

The mining boom and the construction of the Alaska Railroad characterized the economic development of Alaska during the first two decades of the 1900s. These two developments were directly responsible for the establishment of support industries, including agriculture and service-related businesses. As stated above, the mining boom was brief and relatively few miners were successful. However, many prospectors remained in the various mining districts, working the known deposits during the spring and summer months and trapping fur-bearing animals in the winter.

Out of the 10 historic sites recorded along Alder Creek, 8 have been identified as related to mineral prospecting. The remaining two may be material scatters related to mining or possibly trapping. In any case, the oldest occupation may predate 1900. At least broad bracketing dates have been established for most of the sites on the basis of diagnostic features, or even dates on bottles and cans (Fontana et al. 1962; Tolouse 1971; Ward et al. 1977). A review of documents (see Section 6.2, References Reviewed) on file at the Fairbanks District Recorder's Office indicate that 377 mining claims were filed along Alder and Emma Creeks between 1930 and 1940, although no map was prepared. As a result of this archival inventory, records of mining location notices were reviewed which may contain sufficient detail to recreate a map of mine claims. Preparation of such a map should be undertaken as part of additional research on selected sites in the area. Sites FAI 254, FAI 256, and FAI 259 have well-defined features including at least partial cabins and subsistence-related materials.

3.4 ETHNOGRAPHIC INTERVIEWS

During the course of the Phase II fieldwork, four interviews were conducted with Athapaskan people who were known to have knowledge, or who were thought might have knowledge, of various parts of the Linear Features area. The interviews were conducted to gather as much additional information as possible about sites located during the field survey; to gather initial information about additional sites on or near the Linear Features outside the Sample Units; and to identify other knowledgeable individuals for further contact.

Interviews were conducted with Shem and Billy Pete (Upper Cook Inlet Tanaina), who formerly lived, trapped, and hunted in a large area south of Willow to the Little Susitna River; with Henry Peters and Jake Tansy (Western Ahtna), who trapped and hunted in the Deadman Creek area and were knowledgeable through oral history of people, places, and events in the general area; and Thomas Albert (Lower Tanana), who was generally knowledgeable about Athapaskan use of and movements through the study area, but who was more familiar with areas further east.

Attempts were made to visit recorded sites with each interviewee, but both Shem Pete and Thomas Albert were not able to walk to the sites recorded in their areas due to their health and difficult access to the sites. Henry Peters and Jake Tansy were both taken to accessible prehistoric sites in their areas, but they had no knowledge of them.

In all cases, the interviewees knew of a range of sites in their specific areas. Sites on or reasonably near the Linear Features are listed in Table 3-9. More information on these sites, as well as sites further from the study area, is presented in Appendix C. The age range of sites varied from early contact or possibly even precontact sites known through oral history, to abandoned cabins or campsites known first hand to sites still occupied as part of their annual subsistence cycle.

Table 3-9

Cultural Resource Sites On or Near the Linear Features Identified through Interviews with Selected Athapaskans

Linear Feature 1

(1) Cabin site at the mouth of Shem Pete Slough - built in 1925 and used until 1940s by Shem Pete and Wilson Nicolie families; apparently washed away.

(2) Head of Shem Pete Slough - terminus of one of the trails from Red Shirt Lake used historically and probably earlier; canoe storage area.

(3) Red Shirt Lake Village - previously recorded (see Fall 1981:382-384); also contains a nearby abandoned trapper's cabin used over the past 30 to 40 years.

(4) No identifiable locations, but cache pits should be fairly numerous throughout the area.

Linear Feature 4

(1) Trapper's cabin (or possibly two cabins) southeast of Deadman Creek near where it enters the timber (not located).

(2) Tent camp located at the confluence of Deadman Creek and the outlet stream from Pass Lake; used by Jake Tansy as a trapping base camp from 1926-1940; cultural material still visible.

(3) Salt or mineral lick area south of the summit between Deadman and Brushkana Creeks; no known or visible sites.

(4) Laughing Ole's (prospector) cabin, located near a tributary to Lilly Creek; built around 1924; cabin collapsed but still visible.

(continued)

Table 3-9. Cultural Resource Sites on or near the Linear Features Identified through Interviews with Selected Athapaskans (continued)

<u>Linear Feature 5</u>

(1) Old Indian village at Suntrana.

(2) Old Indian village at Healy.

(3) Old Indian trail in the vicinity of the current route of the Alaska Railroad, at least from Healy to Rex.

(4) Old Indian trail paralleling the Alaska Range and running at least from Toklat to Ferry, then east to Japan Hill.

(5) Clarence Bundy's cabin, located next to the railroad south of Browne; cabin still standing.

(6) Happy Jack's cabin, located near the railroad just north of Browne; current status unknown; one of the buildings possibly is at Browne.

(7) Barlow cabin, located near the railroad somewhere between the previous two cabins (#5 and #6 above); current status unknown.

(8) Stite's (?) Roadhouse, located either between Browne and Rex or possibly at the river crossing near Rex; current status unknown.

(9) Nenana River ford near Rex [formerly Colby(?)]; used by Indians prior to any bridges across the river.

(10) A series of fishing/hunting cabins of uncertain age are located along the Tanana River in the general vicinity of Linear Feature 5. These include cabins identified as belonging to Teddy Elkins, Gene Lake, the Wrights, Mrs. Albert (Thomas Albert's mother) at Six Mile, the Targhee's, and Frank Jones.

As indicated by ethnographic data reviewed and summarized during Phase I research, the Tanaina area, which is most closely associated with Linear Feature 1, produced the only known village sites. The village sites visited or learned about are located near inlets or outlets of larger lakes where salmon could be exploited and other food and fuel resources would be available during the winter. It should be noted that even at Red Shirt Lake Village, which was occupied into the early 1900s, the primary visible evidence at the site is a series of pits which are heavily revegetated. This kind of evidence suggests that at least Athapaskan sites used on a short term basis will have an even more subtle expression archeologically and that finding knowledgeable elders may be a key to initial site location.

4.0 REFINING THE PREDICTIVE MODEL

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Predictive Modeling Consultant

4.1 EVALUATION OF SAMPLE SELECTION MODIFICATION

Several factors necessitated changes in the proportional distribution of acres in Vegetative and Terrain Units. These factors have been detailed in Chapter 2. The results, which varied from unit to unit, are summarized from Table 2-1 (Tables 4-1 and 4-2), but the final effect was negligible. For example, in the research design for testing the predictive model (Greiser et al. 1985a:6-36), it was proposed to survey 346 acres classified as the "Organic Materials" Terrain Unit (A1). Due to changes in the sample, discussed in Chapter 2, only 258 acres were in the surveyed sample. Since the proportion of acres proposed for survey in each unit was judged to be similar to the proportion of acres in the corresponding population unit (Greiser et al. 1985:6-37 to 6-39), the appropriate question to ask of the surveyed sample is whether the rank order of topographic and vegetative units in the survey sample can be predicted from knowing the rank order of numbers of acres in the population's units.

Again, the Spearman rank order correlation coefficient was selected to measure association between each pair of series. In the original sample, the calculated rank order coefficient between the proposed Vegetative Unit sample and the study area Vegetative Unit ranks was $\underline{r}_s = 0.99$ (Greiser et al. 1985:6-37). The correlation coefficient between the surveyed sample and the project area ranks (Table 4-3) is $\underline{r}_s = 0.95$. This observed value also exceeds the table value of 0.783 for the nine Vegetative Units at the 0.01 significance level. Thus, it is concluded that

Table 4-1
Acreages of Vegetative Units in the Sample and Survey Areas

Vegetative Unit	Projected Acres in Sample	Projected Acres in Population	Observed Acres in Sample
C1	944	7,527	1,408
C2	1,237	6,521	2,960
C3	455	3,792	2,274
C4	478	7,474	2,510
C5	2,672	16,035	541
C6	3,996	26,611	2,279
C7	3,709	18,831	1,139
C8	269	1,462	649
C9	--	67	--

there is very little lost in predictability and one order can be predicted by knowing the other.

As field crews surveyed Sample Units, they recorded dominant vegetation percentages that they observed. As mentioned in Section 2, the data recorded by the archeological crews are likely to differ somewhat from that which would be recorded by trained biologists. The data, presented in Table 2-1 and summarized in Table 4-1 and Table 4-3a, indicate some gross discrepancies, probably due to lack of training in vegetation categorization. The correlation of coefficient between the projected or anticipated vegetation in the sample and the observed vegetation was $\underline{r}_s = 0.33$, below the critical value of 0.60 at the 0.05 significance level. When comparing the rankings of the projected versus the observed vegetation combining Vegetative Units 3/7 and 4/5, a closer correlation is observed. The value of the Spearman's Rank Order Coefficient is 0.89_3, which is significant at the 0.01 level. This indicates that the rank order of the anticipated vegetation can be used to predict the observed vegetation.

Table 4-2
A~reages of Terrain Units in the Sample and Survey Areas

Terrain Unit	Acres in Sample	Acres in Population
A1	258	2,547
A2	616	4,632
A3	1,674	9,314
A4	0	701
A5	545	2,671
A6	475	3,256
A7	455	4,975
A8	609	4,342
A9	948	6,205
A10	565	3,285
A11	0	316
A12	210	896
A13		
A14	393	3,579
A15	1,161	5,986
A16	390	1,515
A17	0	80
A18	839	6,871
A19	0	91
A20	0	1
A21	182	1,465
A22		
A23	19	51
A24	0	210
A25	0	594
A26	15	15
A27	1,363	7,559
A28	874	4,809
A29	50	243
A30	5	306
A31	241	1,512
A32	196	798
A33	509	3,180
A34	226	1,222
A35	14	14
A36	513	2,965
A37	150	840
A38	265	1,274

Table 4-3a
Rank Proportions of Vegetative Units in Sample and Survey Areas

Vegetative Unit	Rank Proportion of Projected Acres in Sample	Rank Proportion of Acres in Projected Project Area	Rank Proportion of Observed Acres in Sample
C1	5	6	5
C2	6	4	9
C3	3	3	6
C4	4	5	8
C5	7	7	2
C6	9	9	7
C7	8	8	4
C8	2	2	3
C9	1	1	1

Table 4-3b
Rank Proportions of Vegetative Units in Sample and Survey Areas
(some combined)

C1	3	4	3
C2	4	3	5
C3/7	7	5	7
C4/5	5	6	6
C6	6	7	4
C8	2	2	4
C9	1	1	1

Similarly, the data were reviewed to determine whether the survey sample still suggests agreement between the ranks of acres for each Terrain Unit in the sample and the ranks of acres for each Terrain Unit in the study area (Table 4-4). The calculated coefficient $\underline{r}_s = 0.99$ exceeds the critical value of 0.47 for 0.01 significance level and 31 ranks. This result is almost identical to the value obtained for the proposed sample and the study area (Greiser et al. 1985:6-39). This again suggests a great deal of predictability between the study area ranks and the sample ranks.

Table 4-4
Rank Proportions of Terrain Units in Sample and Survey Areas

Terrain Unit	Rank Proportion of Acres in Sample	Rank Proportion of Acres in Project Area
A1	13.5	16
A2	24	24
A3	28	31
A4	1.5	7
A5	21	17
A6	18	20
A7	17	26
A8	23	23
A9	25	28
A10	22	21
A12	10	10
A14	16	22
A15	26	27
A16	15	14.5
A17	1.5	3
A18	23	29
A21	8	13
A23	6	6
A26	5	1.5
A27	27	30
A28	24	25
A29	0	4
A30	3	5
A31	12	14.5
A32	9	8
A33	19.5	19
A34	11	11
A35	4	1.5
A36	19.5	18
A37	7	9
A38	13.5	12

4.2 EVALUATION OF SURVEY DATA

The survey results were collected in a fashion intended to allow comparison to the two hypothesized models generated by the background research (Greiser et al. 1985:5-7). The hypothesized models are outlined in the Phase I Report as:

(1) The first predictive settlement model is derived from previous archeological work, the factor analysis, and the ethnographic and historic records. This model hypothesizes that there are preferred geographic settings for particular activities.

(2) The second is a model which is analogous to the null hypothesis used in inferential statistics. The model specifies a hypothesized settlement pattern with environmental uniformity -- a random site distribution when considered across the relevant geographic variables.

HRA's survey crews recorded or observed 24 cultural resource sites containing 25 components (Table 4-5) in the survey of 13,760 acres ($\bar{X} = 1.8 \times 10^{-3}$ sites per acre or 1 site per 550.4 acres for the overall area). Eight of the 25 components (32%) are classified as chipping station/lithic scatter (Site Type 1). Five of the 25 components (20%) are classed as Historic building/ structure (Site Type 21). None of the other components occurred in frequencies this high (Table 4-6). These two types of components also were among the most frequently reported classes in the sample used for the background research and predictive model. Table 4-3 in the Phase I report (Greiser et al. 1985:4-32) shows that chipping station/lithic scatter is the single most frequent

Table 4-5

Recorded Cultural Resource Sites Within and Adjacent to the Linear Features During the 1985 Linear Features Sample Survey

AHRS Site Number[a]	Terrain Unit A[b]	Terrain Unit B[b]	Expected Vegetative Unit C[b]	Site Size (m^2)	Distance to Water (m)	Site Type[b]	Period of Occupation[b]
ANC5360	A09	B19	C07	800	400	31	1
ANC5370	A09	B16	C03	12,000	300	31	1
ANC5380	A09	B17	C05	25,000	450	31	1
FAI2520	A09	B17	C05	30	400	32	1
FAI2530	A10	B03	C04	77	200	1	0
FAI2540	A27	B03	C07	150	300	21	1
FAI2550	A27	B17	C03	560	33	21	1
FAI2560	A27	B27	C03	600	100	21	1
FAI2570	A27	B17	C03	768	19	21	1
FAI2580	A27	B03	C03	100	76	27	1
FAI2590	A27	B16	C04	1,500	100	21	1
FAI2600	A27	B18	C03	20	100	27	1
FAI2610	A27	B16	C04	4,500	150	27	1
FAI2620	A27	B18	C07	100	2	32	1
FAI2630	A27	B18	C07	10	50	32	1
HEA2500	A03	B13	C06	780	200	1	0
HEA2510	A03	B19	C06	112	200	1	0
TLM1080[c]	A08	B16	C01	270	100	1	0
TLM1100[c]	A03	B01	C01	52	20	1	0
TLM274A	A05	B08	C06	200	122	1	3
TLM274B	A05	B08	C06	200	122	1	7
TLM2750	A12	B08	C06	50	700	1	0
TLM2760	A02	B18	C05	112	10	32	1
TYO0670*	A18	B16	C04	25	480	5	3
TYO0680*	A18	B16	C04	25	380	5	3

[a]Alaska Heritage Resources Survey (AHRS) site numbers are based on the three-letter abbreviation of the 1:250,000 USGS maps on which they are located, and the specific number assigned to that site.
[b]Definitions of these variables are presented in the Phase I Report.
[c]Previously recorded site within a surveyed sample unit.

Table 4-6

Site Type Frequency in the Sample Area

Site (Component) Type	Frequency
1 - Chipping station/lithic scatter	8
5 - Cache pit	2
21 - Historic building/structure	5
27 - Mining camp and operation	3
31 - Recent military activity	3
32 - Dump/historic trash scatter	4
	$\underline{n}$ = 25

Prehistoric component type as well as the most frequent overall component type. Historic building/structure is the most frequent of the Historic component types.

In addition, three pieces of isolated lithic material were recorded during the sample survey (Table 4-7). Isolated stone tool or flake (Site Type 7) was one of the cultural resource variables included in the Phase I data.

The survey results do not include enough sites or isolates to use inferential statistics to test the relationships between the survey results and the two hypothesized models. However, the survey reported information on site density, which does provide some indication of low site densities throughout the study area.

Table 4-7

Recorded Lithic Isolates Within and Adjacent to the Linear Features During the 1985 Linear Features Sample Survey

Isolate Number	Terrain Unit A	Terrain Unit B	Vegetative Unit C	Site Size (m^2)	Distance to Water (m)	Site Type	Period of Occupation
364-1	A38	B19	C1	1	450	7	0
364-2	A5	B19	C6	1	120	7	0
364-3	A38	B1	C6	1	75	7	0

For density analysis, the survey area was first divided into three units (Table 4-8), each of which has been divided further into 160-acre subunits. Table 4-9 presents the relevant information by Linear Feature unit. Inspection of Table 4-10 indicates that overall site density does not vary much, with a project area-wide figure of 0.29 sites per 160-acre unit. Linear Feature values vary between a low of 0.28 sites per 160-acre unit for Linear Feature 1, to a high of 0.33 sites per 160-acre unit for Linear Feature 5. While overall cultural resource occurrence does not seem to vary much, the proportional contribution of historic versus prehistoric properties does seem to vary greatly.

Table 4-8
Cultural Resource Components Located Within Linear Features

Number of Components	Linear Feature 1 (18 subunits)	Linear Features 2, 3, and 4 (32 subunits)	Linear Feature 5 (36 subunits)
0	17/16*	27/31	35/32
1	0/1	3/1	1/2
2	1/1	2/0	0/0
3	0/0	0/0	0/0
4	0/0	0/0	0/1
5	0/0	0/0	0/1

*Prehistoric/historic components per 160-acre subunit

Table 4-9
Summary Cultural Resource Component Data by Linear Feature Units

Unit	No. of 160-acre Units	No. Prehistoric Components & Percentages per 160-acre Unit	No. Historic Components & Percentages per 160-acre Unit	Totals
LF1	18	2/0.11	3/0.17	5/0.28
LF2, 3, 4	32	7/0.22	1/0.03	8/0.25
LF3	36	1/0.3	11/0.36	2/0.33
Totals	86	9/0.11	14/0.16	25.0.29

Table 4-10
Percentages of Prehistoric and Historic Components by Linear Feature Units

Unit	% Prehistoric in Unit	% Historic in Unit
LF1	40	60
LF2, 3, 4	88	12
LF5	8	92
Total Project Area	60	60

The five components in the Linear Feature 1 160-acre parcels are relatively evenly split, with two prehistoric and three historic components reported by the survey crews. This proportion is identical to that calculated for the study area as a whole. A different pattern is suggested, however, for both of the remaining units. Eight components were found in the group comprised of Linear Features 2, 3, and 4. Seven of those eight sites (88%) are coded as prehistoric. The opposite pattern is indicated when considering the 12 sites found in the group of 160-acre units coded within the Linear Feature 5 unit. Eleven of the 12 components (92%) are coded as historic.

Site density information is important to archeologists for many reasons. These range from the theoretical issues of intensity of human occupation in a specified area, to the practical management considerations of sample size and predictive efficiency. The latter reasons are of particular interest here. As mentioned earlier, 5 of the 25 components recorded during the survey were classified as historic building/structure. Three of the five were recorded in Coniferous forest (C3), in which 455 acres were surveyed (Table 4-11). This provides a population estimate of 1 site per 151.67 acres of Coniferous forest. This leads, then, to a question regarding the accuracy of this estimate. Because a relatively rare occurrence is being dealt with ($\bar{x} = 6.6 \times 10^{-3}$ components per acre), the Poisson series is assumed and a 95% confidence interval for the sample mean is calculated (Burstein 1971). Calculations indicate that the odds are about 19 out of 20 chances that the true population mean ($\underline{u}$) lies between 0 and 14.0 9.24×10^{-2} components per acre, or 0 and 14.01 components per 1,000 acres.

Table 4-11
Phase II Site Types in Relation to Expected Vegetative Units

Vegetative Unit	Site (Component) Type 1	5	21	27	31	32	Total
1 - Dry Tundra	2	0	0	0	0	0	2
3 - Coniferous Forest	0	0	3	2	1	0	6
4 - Deciduous Forest	1	2	1	1	0	0	5
5 - Mixed Forest	0	0	0	0	1	2	3
6 - Low Shrub	5	0	0	0	0	0	5
7 - Dwarf tree shrub/ Tall shrub	0	0	1	0	1	2	4
Total	8	2	5	3	3	4	25

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