

RESOURCES MANAGEMENT PLAN

WRANGELL-ST. ELIAS NATIONAL PARK AND PRESERVE

Recommended by:

Danny S. Rorup

Acting

Chief, Resources Management

12/30/97

Date

Approved by:

Jonathan B. Garib

Superintendent

12/30/97

Date



Wrangell-St. Elias National Park & Preserve

RESOURCES MANAGEMENT PLAN

**SIGNED 12/30/1997
BY**

Acting Chief of Natural and Cultural Resources

DANNY S. ROSENKRANS

And

Superintendent

JONATHAN B. JARVIS

PURPOSE OF THE RESOURCES MANAGEMENT PLAN.....	5
INTRODUCTION	8
NATURAL RESOURCES :	8
CULTURAL RESOURCES:	12
SUBSISTANCE RESOURCES:.....	16
RESOURCE STATUS AND PROGRAM	20
Natural Resources Baseline Information.....	20
Cultural Resources Baseline Information	22
Subsistence Baseline Data.....	23
WRST C200.00 Historic Resources Management.....	25
WRST C201.00 Historic Resource Study of Wrangell-Saint Elias National Park and Preserve..	27
WRST C202.00 Special History Studies.....	29
WRST C202.01 Special History Studies - Bremner	31
WRST C202.02 Special History Studies - Chisana/Gold Hill	33
WRST C203.00 Develop Historic Contexts	35
WRST C204.00 List of Classified Structures	37
WRST C205.00 Fire Management Plans for Historic Structures	39
WRST C206.00 Develop a Preservation Plan for Historic Structures and Write Historic Structure Reports.....	41
WRST C300.00 Archaeological Site Management.....	43
WRST C300.01 Archeological along the Nabesna and McCarthy Roads.....	45
WRST C300.02 Conduct Archeological Survey for Wrangell-St. Elias NP/P.....	47
WRST C300.03 Develop an Archeological Survey Program for Abandoned Mine Lands.....	49
WRST C300.04 Identify 18th and 19th Century Sites in Wrangell-St. Elias NP/P.....	51
WRST C300.05 Establish Archeological Sites Management and Information System	53
WRST C300.06 Develop Monitoring Program for Archeological Sites on Active Mining Claims	54
WRST C300.07 Archeological Survey of Wiki Peak and Skolai Pass.....	56
WRST C301.00 Identify Cultural Landscapes and Write Cultural Landscape Reports	59
WRST C302.00 Research Obsidian Sources	61
WRST C303.00 Write Archeological Overview and Assessment.....	62
WRST C400.00 Collections Management	63
WRST C500.00 Ethnographic Overview and Assessment	64
WRST C500.01 Ethnographic Overview and Assessment-Ahtna	65
WRST C500.02 Ethnographic Overview and Assessment-Phase II.....	67
WRST C501.00 Traditional Use Study	69
WRST C502.00 Cultural Affiliation Study	71

WRST C503.00 Ethnobotany of the Ahtna	73
WRST N200.00 Air Quality Management	80
WRST N202.00 Pollutant Biological Monitoring Study	82
WRST N203.00 Monitoring of Climatological Conditions	84
WRST N304.00 Long-Term Ecological Monitoring	87
WRST N305.00 Hydrology and Hydrologic Hazards of the Kennicott River Basin.....	90
WRST N306.00 Floodplain Management	93
WRST N306.01 Floodplain Management-Chathenda Creek	95
WRST N307.00 Wetlands Management - Mapping	97
WRST N400.00 Geology of Wrangell-St. Elias National Park and Preserve	100
WRST N400.01 Interpreting the Geology of Wrangell-St. Elias NP/ P	102
WRST N401.00 Glacier Monitoring	104
WRST N401.01 Baseline Study of the Malaspina Glacier	116
WRST N402.00 Preservation of Unique Geological Features	118
WRST N402.01 Geology of the Cross Creek Volcano	120
WRST N402.02 Geology of the McCarthy D-1 Quadrangle	122
WRST N402.03 Geology of the Bering Glacier Quadrangle.....	124
WRST N403.01 Mineral Claim Examinations.....	126
WRST N403.02 Mining and Minerals Management on Claims Located Under the 1872 Mining Law	128
WRST N403.03 Mining and Minerals Management on Non-Federal Lands within Wrangell-St. Elias NP/P.....	130
WRST N403.04 Environmental Geochemistry of Mineral Occurrences Associated with Mining Claims.....	131
WRST N403.05 Impacts of Road Management and Gravel Removal Along the McCarthy and Nabesna Roads	135
WRST N404.00 Determine Extent and Potential Threat of Abandoned Mine Lands	139
WRST N405.00 Coastal Zone Protection	142
WRST N501.00 Vegetation Management.....	144
WRST N501.02 Vascular Floristic Inventory	146
WRST N503.00 Fire Management.....	150
WRST N503.01 Fire History	152
WRST N504.01 Assessment and Mitigation of ATV Impacts	154
WRST N505.00 Forest Products Management	157
WRST N505.01 Landscape Analyses of Spruce-Bark Beetle Infestation and Salvage Logging of Spruce Forests in and around Wrangell- St. Elias National Park and Preserve	160
WRST N506.00 Stock Use Management.....	165
WRST N601.02 Mentasta Caribou Herd Management.....	169
WRST N601.03 Comparison of Standard Moose Survey Techniques with More Cost-efficient Estimates of Composition and Density	176
WRST N601.04 Moose Management	178
WRST N601.05 Dall Sheep Management.....	181
WRST N601.07 Mountain Goat Management.....	184
WRST N602.04 Wolverine Demography Ecology	186
WRST N602.06 Wolf Management	189
WRST N604.00 Long-Term Monitoring of Harbor Seals and northern Sea Lions	192

WRST N605.01 Fisheries Management.....	195
WRST N605.02 The Katie John Case: Providing A Salmon Subsistence Fishery on Tanada Creek.....	196
WRST N605.04 Catalog Fish Genetic Characteristics.....	198
WRST N700.00 White River Paleo - Forest Climatic Study.....	199
WRST N701.00 Inventory and Preservation of Paleontological Resources within Wrangell-St. Elias NP/P, Alaska.....	201
WRST S100.01 Determine the Customary and Traditional Means of Access.....	205
WRST S100.02 Customary and Traditional Use of Park/Preserve Resources By Local Communities.....	209
WRST S100.03 Process Development for Implementation of ANILCA Title VIII Section 804	212

PURPOSE OF THE RESOURCES MANAGEMENT PLAN

The Resources Management Plan (RMP) for Wrangell-St. Elias National Park and Preserve (WRST) was prepared according to Resources Management Plan Guidelines (December, 1994) under the directives of the Management Policies (1988, Chapter 4.2) of the National Park Service. The resources management plan is based on National Park Service policy, legislative mandates, and executive orders.

The purpose of the RMP is to identify, define, program and track the monitoring, inventory, research, mitigation, interpretation, and enforcement activities required to perpetuate park resources and achieve park purposes and objectives. To enhance opportunities for cooperation and coordination for the management of shared resources and to prevent or identify conflicts the RMP has been developed involving formal consultation with the State of Alaska.

The RMP is long-range in nature, thus it identifies problems and needs regardless of the time in which an action is initiated. Additionally, the RMP serves as a funding document, used annually, to allocate staffing and Moines to implement resource programs. Only projects identified in the resources management plan will be considered for funding.

The RMP is divided into three primary sections (Introduction, Present Resource Status, and Resources Management Program).

Introduction - This section states the purpose for which the park was established, describes natural, cultural and subsistence resources values and special designations and summarizes the current resources related management objectives that supplement the broader management objects of the park found in the park Government Performance and Results Act Plan (GPRA).

Present Resource Status - This section summarizes baseline information on the park resources and condition.

Resources Management Program - This section contains the current and proposed resources management plan.

Context

The Resources Management Plan is one of several documents used by park management to guide decision-making and problem solving in the park. Others documents used include:

- General Management Plan
- Statement for Management
- Government Performance and Results Act (GPRA)
- Implementation Plans, including

Development Concept Plan
Land Protection Plan
Resources Management Plan
Interpretive Prospectus
Individual Action Plans, as required: including,
 Interagency Fire Management Plan
 Oil and Hazardous Substances Spill Contingency Plans

Use of the RMP

The Resources Management Plan is primarily intended for use by park staff as a guide which documents past efforts, current resource status, and identifies future direction for the management of park resources. However, since the RMP directs resource management activities on publicly-owned lands, it may be of interest to other agencies (both State and Federal), academic institutions, private land owners (both within and adjacent to the park/preserve), and individuals.

It is, therefore, available upon request for public review.

Update of the RMP

The Resources Management Plan is not a static document but a flexible document that must be responsive to new information. Several components of the plan need yearly updating such as project priorities, information on funded and unfunded activities (Programming Sheets), and staffing and funding levels (Tables 1 and 2). The RMP should be thoroughly reviewed and updated if necessary at least every two years and mandatory every four years.

Agency Relationships

Cooperative management of specific resources and actions is required by NPS policies and ANILCA. NPS policy states that where hunting, fishing and trapping are allowed the management of fish and wildlife must be a cooperative endeavor with the State. A memorandum of understanding was approved in October, 1982 between the State of Alaska Department of Fish & Game and National Park Service (NPS). The memorandum established procedures by which the NPS and the State will consult to ensure the management concerns of both agencies are addressed in an integrated and cooperative management effort.

Fire suppression is also an interagency function under the auspices of a memorandum of understanding. The Bureau of Land Management supplies the suppression forces for all NPS lands in Alaska. The BLM has subsequently subcontracted with the Alaska Department of Natural Resources to provide suppression forces for the southern section of the State. Wrangell-St. Elias lands receive suppression support from both agencies under the guidance of interagency fire management plans. These cooperative relationships strongly influence the implementation of the resource program.

Compliance

The Resources Management Plan is generally not the document that accomplishes National Environmental Policy Act compliance or other specific statutory laws or executive orders. However, the need for environmental compliance is noted within the each project statement. Environmental compliance will take place, unless the project is categorically excluded, once funding is determined to be likely.

Project Statements

Contained within the RMP are project statements that identify resource management issues, problems and needs. The diversity of resources is reflected in the varied content of the project statements. Some issues urgently require action. Others are less pressing and require the systematic collection of data.

The need or theme that pervades the Resource Management Plan and directly or indirectly affects every project statement is the need for basic information. Extremely limited information is available about the park's resources. This is largely due to the remoteness of the area and the cost and complexity of logistics.

Priority Setting

Resources management program priorities are established based upon two primary considerations.

- 1) the severity of current or potential threats to the resources and,
- 2) relationship of the proposed project to the mission of the National Park Service and the specific goals of park management.

INTRODUCTION

This section provides a brief description of the variety and significance of park resources and the mandates that govern their management.

In 1978, most of the area now encompassed by Wrangell-St. Elias National Park and Preserve (WRST) was declared a National Monument by presidential proclamation. The passage of the Alaska National Interest Land Conservation Act in December 1980 re-designated the National Monument to a National Park and Preserve and expanded its boundary to the present size. This conservation system unit, the largest in the National Park Service, contains 13.2 million acres, of which approximately one million acres are privately owned.

The initial draft of the Resource Management Plan was prepared in April 1982. Subsequent review and revision has occurred resulting in the present document.

NATURAL RESOURCES :

Introduction:

Global Significance - In 1979 Wrangell-St. Elias National Park and Preserve and Kluane National Park were established by UNESCO as a World Heritage Site. These two areas were specifically noted for their importance in representing "incredible geological processes" namely glacier dynamics, and "premier wilderness". In 1992, Glacier Bay National Park and Preserve was added to the World Heritage designation.

Natural Resources - Wrangell-St. Elias National Park and Preserve is located in south-central and southeastern Alaska and is an integral part of the greater Copper River ecosystem.

The landscape is dominated by the eastern Alaska, Wrangell, St. Elias and Chugach Mountain ranges. Several of North America's highest peaks are within the park including Mt. St. Elias (18,008 feet) and Wrangell Mountain (14,005 feet), an active volcano. From these mountains flow hundreds of glaciers varying tremendously in size. The Malaspina is one of the largest piedmont lobe glaciers and the Nabesna Glacier is one of the longest valley glaciers. Other glaciers terminate at tidewater and are known for their surging and retreating. Extensive ice fields also occur within the mountain ranges.

The greater Copper River Basin ecosystem lies in one of the most tectonically active regions in the world. Volcanic action, earthquakes and ice have shaped the landscape over the past millennia. The complex topography resulting from these actions has profoundly influenced habitat diversity, distribution of species, biotic processes, and climate.

The park is noted for its geological diversity. The Wrangell region has attracted researchers to investigate volcanism, glaciation, plate tectonics and quaternary geology. The Nizina and Chitistone Canyons are areas where the geologic record is well represented and extensively exposed. The geologic history clearly exhibits the dynamic nature of the processes involved in the formation of the Wrangell and St. Elias mountain ranges.

Southern Alaska, which includes Wrangell-St. Elias NP/P (WRST), is an area composed of allocthonous tectonostratigraphic terraces. Segments of five tectonostratigraphic terraces occur within the park boundaries. The terraces reflect episodes of rifting, basin development, formation of island and magmatic arcs, and orogeny. From north to south they are: Yukon-Tanana, Wrangellia, Alexander, Chugach and Yakutat. Accretion of these terraces (northward migration) during the late Mesozoic and Cenozoic produced this regions complex geologic history. Each terrane contains a different stratigraphic record and is separated by a fault from the adjacent terraces. Unraveling the deformational history resulting from crustal plate interactions and conducting geochemical analysis are the major focus of current geologic research.

Tectonostratigraphic terraces: Within the northeastern part WRST and north of the Denali Fault, a small portion of the Yukon-Tanana terrane is located. This terrane consists predominately of highly deformed and metamorphosed Paleozoic sediments and volcanics. Cretaceous aged plutons intrude the metamorphics.

Wrangellia lies to the south of Yukon-Tanana. It outcrops over the greatest extent within the park and forms the basement of the Wrangell-Volcanic Field. An assemblage of island-arc volcanic rocks (late Paleozoic age - Tetelna Volcanics) lies at the base of the Wrangellia terrane. This volcanic unit is overlain by limestone, shale, and chert sedimentary units of Permian age. The Nicolai Greenstone, a Triassic sequence of metamorphosed basalts flows rests unconformably upon the Paleozoic section. The Upper Triassic through Lower Jurassic stratigraphy consists of limestone, impure limestone, shale and chert recording a deepening sedimentary basin. Cretaceous aged clastic units overlie these units unconformably. Wrangell Volcanics, Tertiary (Miocene) and Quaternary in age, cap the section.

Wrangellia is thought to have originated at lower latitudes prior to being transported northward and joined to mainland Alaska. A sliver of Late Jurassic-Early Cretaceous flysch (Nutzotin Sequence) and a remnant of the Cretaceous Chisana volcanic arc lie between the Totschunda and Denali Faults. Along the south side of the Wrangell Mountains metamorphosed equivalents of the Tetelna Formation, Jurassic Chitina Valley batholith and Late Paleozoic gabbros crop out. The southern boundary of Wrangellia is the Border Ranges Fault.

A small part of the Alexander terrane, consisting of Paleozoic marbles, crop outs proximal to the international boundary. This terrane had amalgamated with Wrangellia prior to the Mid-Cretaceous and accretion along the coast of Alaska.

The Chugach terrane is a belt of Lower Jurassic to Upper Cretaceous flysch (graywackes and slates) which has been intensely folded and weakly metamorphosed. It parallels the Gulf of Alaska along the coastal regions of Southern Alaska. Together with the Prince William Sound

terrane (subterrane of the Chugach Terrane), it records intermittent accretion of volcanoclastic and volcanic (basalt) rocks from Early Jurassic to Eocene.

The Yakutat terrane, is an actively accreting terrane situated on an oceanic crust basement. The Contact Fault lies along its' northern border with the Chugach Terrane/Prince William Sound Terrane. It contains Eocene and younger sedimentary rocks (graywacke and shale) with minor basalt. The terrane traveled northward along the Fairweather Fault system prior to docking along the Gulf of Alaska.

Recent Geology: Wrangell Volcanic Field covers more than 400 square miles and extends from the international border to Glennallen. The field is a continental volcanic arc which developed along a convergent plate margin above a Yakutat block related subduction zone. Heat generated that subduction zone generated the volcanic magma source.

Quaternary surficial deposits are found within the WRST. The most extensive of these are glacial, lake and fluvial. Other Quaternary deposits include: beach and shallow marine sediments along the coast, eolian deposits, and mass wasting (rock glaciers, debris flows and slides and solifluction) features.

The area is seismically active because the Yakutat terrane is accreting to North America. The associated volcanism and active faults zones generate frequent earthquakes.

Six major river systems originate within Wrangell-St. Elias and the lowlands are dotted with lakes and bogs. Major salmon runs occur in the Copper River and tributary streams. Rivers are one focus of recreational use and when frozen provide primary routes for winter access.

The vegetation is influenced by both interior and coastal climatic conditions which help to create a diverse vegetative mosaic. The lowlands on the northern and western slopes of the Wrangell Mountains are covered with extensive black spruce, balsam poplar and aspen stands. These extend southward to the Chitina River Valley. The Bremner River system valleys and the forested portions of the Malaspina Forelands are carpeted with alder thickets and stands of Mountain Hemlock and Sitka Spruce characteristic of the coastal environment.

The diversity of vegetation produces equally diverse wildlife populations. Wildlife species identified as significant contributors to park values include brown/grizzly bears, black bear, moose, caribou, wolf, trumpeter swans, bald and golden eagles, Dall's sheep and mountain goats. Harbor seals and Stellar (Northern) sea lions (a federally threatened species) inhabit the coast along the Malaspina Forelands and Icy Bay. The waters off the coast are frequented by whales and other marine mammals.

Despite the uniqueness and diversity of Wrangell-St. Elias relatively few scientific investigations have been undertaken resulting in a paucity of information about the environment, its inhabitants and the role park/preserve resources play in fulfilling a subsistence lifestyle.

Natural Resources Management Objectives

The diversity and complexity of the natural resources within Wrangell-St. Elias National Park and Preserve demand an integrated resource management program solidly based on the resource management plan.

ANILCA directs that Wrangell-St. Elias National Park and Preserve be managed to maintain unimpaired the scenic beauty and quality of mountain systems, glaciers, rivers, lakes and other landscapes in a natural state, and to protect habitat for varied populations of fish and wildlife. In order to fulfill this mandate, resources management actions will be based upon a comprehensive understanding of natural processes and their interaction with the human uses that depend upon them. A program of research, survey, monitoring, evaluation, interpretation, protection and management will be developed and implemented.

In addition, the National Park Service Organic Act of 1916 directs that the NPS "shall promote and regulate the use of the Federal areas known as national parks, monuments and reservations... to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

Furthermore, the Redwoods Act of 1978 (which clarified, amended and strengthened the Organic Act) emphatically states a requirement for conservation of resource values of national parks, and directs that "The authorization of activities shall be construed and the protection, management, and administration of these areas shall be conducted in light of the high public value and integrity of the National Park System and shall not be exercised in derogation of the values and purposes for which these various areas have been established... ."

Based on these legislative mandates and NPS policies the objectives for natural resources management are:

- To manage natural resources for the purpose of perpetuating ecological systems and for the education and enjoyment of this and future generations
- To consider humans an integral part of the ecosystem, and to encourage traditional users of the park and preserve's natural resources to understand and respect ecosystems and to maintain the natural balance
- To assure the preservation of wilderness resource values and related wilderness recreational opportunities
- To elicit the cooperation of knowledgeable individuals, groups, institutions, and agencies in collecting current and complete information and data about the natural resources
- To the fullest extent possible, allow natural processes to determine the shapes and substances of the environment.

- To work cooperatively and inter-dependently with the Alaska Department of Fish and Game, the Alaska Boards of Game and Fisheries and the Federal Subsistence Board in regulating consumptive uses of fish and wildlife resources
- To the greatest extent possible, maintain rivers in their free flowing state and conduct river studies and prepare river management plans
- To elicit the cooperation of mining interests to maintain high environmental standards for the protection and preservation of natural resources
- To devise the best possible means of management and operations to protect critical wildlife and their habitats
- To maintain opportunities for scientific research in undisturbed ecosystems
- To work cooperatively and inter-dependently with Parks Canada in areas of mutual concerns about natural resources

Natural Resources Research

Research is a critical component of this plan. The overall objective of the research program is the accumulation and synthesis of scientific information concerning the ecosystems of the park. This information is vital for the effective development, execution and evaluation of management programs.

Non-intrusive research and data collection will be preferred. However, where no feasible alternatives exist (including other locations and methodologies), intrusive research may be accommodated. All research is subject to compliance through the National Environment Policy Act, Section 106 of the National Historic Preservation Act, Archeological Resources Preservation Act, Native American Graves Protection and Repatriation Act, and Section 810 of the Alaska National Interest Lands Conservation Act.

Research funded by the NPS will be primarily management oriented. The private-sector and research community will be encouraged to conduct and support basic research.

CULTURAL RESOURCES:

Introduction:

Wrangell-St. Elias National Park and Preserve contains one of the most important groupings of Athabaskan prehistoric and historic archaeological sites in Alaska. The sites include numerous villages, camps and hunting sites of these Indians, as well as the remains of other cultural groups such as the Tlingit and Eyak Indians and the Chugach Eskimo. Important sites include Taral, Cross Creek, Batzulnetas, and the TLXYK TGWD camp. In addition to aboriginal sites, the Park and Preserve also contains historic ruins and structures representing the periods of exploration, mining, transportation, etc. The primary value of the sites lies in the contribution

they can make to our understanding of Athabaskan culture change over time, the results of culture contact between Indian and Euro-American groups, and the development of Alaska after contact. The sites represent a continuum spanning from the prehistoric period to the historic period, including the period of Russian exploration.

Available historical and professional accounts attest to the fact that all of the major drainages within and bordering the Park and Preserve are rich in archaeological values, and the site potential of upland areas away from the drainages is also good. Known archaeological sites reported for the area contain important information for expanding our knowledge of culture history, cultural processes and other cultural dynamics. Thus, the resources of the area provide excellent opportunities for scientific research. Given the paucity of information concerning the archeology of the region, scientific investigations by legitimate professionals will be encouraged. Paleo-environmental reconstructions and establishment of the sequence of Wisconsinan glacial advances and retreats will form an important complement to archaeological research efforts and provide a context in which the interpretation and explanation of cultural processes can occur.

Some of the sites within the Park and Preserve have been and continue to be damaged by the indiscriminate collecting of artifacts, while others are likely being lost through the cumulative effects of natural processes such as erosion.

Wrangell-St. Elias National Park and Preserve, at the time of contact with Europeans, was occupied primarily by Athabaskan Indians, in particular the Ahtna of the Copper River drainage, and the Nabesna band of the Tanana. The southeastern coastal area was occupied by Tlingit Indians and occasionally by Eyak Indians. The latter group occupied the area of the Copper River delta. There is evidence available that the Eyak, at some time in the past, may have occupied interior portions of the Copper River valley. Chugach Eskimos could be found west of the delta though they probably also ventured into more easterly coastal areas. It is reported that they traveled inland to trade with the Ahtna, and the Ahtna likewise are known to have traded with coastal peoples. Archaeological sites relating to the Chugach Eskimo or Eyak Indians may occur within the Park and Preserve, but such sites are unknown at the present time.

In addition, many of the historic period sites associated with early trading activities, exploration, mining, etc., likely constitute important archaeological resources as well and will need to be considered. Examples of sites of this type include the Gold Hill and Chititu mining camps, and the Taral Odinochka, a Russian site, to name but a few.

The time of arrival of Athabaskan Indians in the area is not well known, but they may have been present for more than a thousand years. What groups occupied the area during earlier periods is purely conjectural at present since no sites dating to earlier periods are known from within the Park and Preserve proper. But, it is reasonable to expect that sites representing a variety of Alaskan cultural traditions and dating to between approximately 1,000 and 9,000 years in age will be found here based upon other sites found elsewhere in the Copper River Valley. Despite the numerous known sites within the Park and Preserve, the area, overall, is simply not well known archaeologically.

No prehistoric archaeological sites within Wrangell-St. Elias are listed on the National Register of Historic Places. However, many of the sites, when properly identified and evaluated, will probably qualify for listing. The identification and evaluation of known sites within the Park and Preserve constitutes the major cultural resources management task for the future. The area's potential for containing additional, significant archaeological resources is such that surveys should be undertaken at once to facilitate their identification.

The Copper River is a major source of salmon for traditional peoples. Ethnographic sites, including traditional cultural properties and ethnographic landscapes, along this major drainage and its tributaries are known but undocumented. Many of these sites are of contemporary cultural importance to local Native Alaskans.

It is important to conduct archaeological and ethnographic investigations to identify these sites so that adequate care can be taken to preserve those sites of concern to the local community as well as those sites eligible to the National Register.

Today, descendants of the various Native groups occupying and utilizing the Park and Preserve are very interested in preserving and protecting the significant sites and artifacts representing the remains of their cultural heritage. The National Park Service is committed to consulting with, and assisting Native Alaskan groups in effecting the protection and preservation of cultural sites located within Wrangell-St. Elias National Park and Preserve.

The presence of the Wrangell-St. Elias past is reflected in place names given by explorers, the sites of Russian fur trading posts, the many remains from the Alaska gold rush era, the industrial complexes of the early twentieth century, and the scattered communities along the Copper River Valley.

In July 1741, the European discoverer of Alaska, Vitus Bering, sighted the St. Elias Range, the first European sighting of the Alaskan mainland. Bering may have seen Mt. St. Elias and given it its name which later explorers acknowledged. The Russian discoveries prompted the major powers of Europe to dispatch vessels to explore the new land as well as look for the still hoped for Northwest Passage. By the end of the Eighteenth Century, explorers had charted the major coastal features--for example, Spain's Malaspina named the glacier larger than Rhode Island, and Britain's Cook and Vancouver have peaks named for them in the St. Elias Range above the coast they traversed. French and American place names remain as well.

The formation of the royal monopoly, the Russian American Company, in the 1790's preceded the first efforts by fur traders to establish permanent settlements and to trade beyond the Alaska coast. The Copper River led temptingly to the interior, and by mid-century explorers had ascended to its headwaters and had named Mount Wrangell after Russian governor Baron Von Wrangell. But the killing of explorer Rufus Serebrannikot in 1848 by the Ahtna halted activities for a decade. Presumably, in 1859 a trader opened a post at the Ahtna village of Taral, southeast of present day Chitina and annually traded for furs. In 1867, however, Alaska was transferred to the United States causing the Russian fur traders to abandon the region.

The next group to leave their imprint upon the land were a second wave of explorers, American and foreign. By the 1890's they had ascended the major rivers, discovered passes, mapped the mountains, and attempted and succeeded in climbing Mt. St. Elias, until 1897 believed the highest peak in North America. That year the Italian Duke deAbruzzi and his Alps climbers reach the summit.

The information gathered by explorers aided stampedes during the 1897-1898 Klondike Gold Rush. Though the Klondike was on Canadian territory, some 6,000 prospectors attempted to reach the gold fields via an all American route from Valdez to the Copper River Valley and beyond. The route proved a failure, but the prospectors scattered into the Wrangell and Chugach Mountains. Within a decade and a half several minor placer rushes had caused the establishment of mining camps in the headwaters of the Nizina and Chitina Rivers and the discovery of the massive Kennicott copper mines. The development of the Kennicott mines resulted in the construction of the Copper River and Northwestern Railroad, a major Alaska engineering feat, and brought into existence a string of railroad towns and mining camps. The Kennicott mines, a National Historic Landmark and one of the nation's richest copper deposits, closed in 1938. The Nabesna Gold Mine and the Chisana Historic District are the only gold rush era sites on the National Register, but other period sites are being considered. Since World War II and the decline of mining, the Wrangell-St. Elias region has dwindled in population. The few hunters and climbing expeditions use the Copper River Valley highway communities as an outfit point.

Descriptive material regarding historical resources can be found in the brief "Lower Copper and Chitina Rivers: an Historic Resource Study", the "Reports of an Inter-Agency Study of the Historic Resources of Kennicott, Alaska", and "Kennicott, Alaska, a Historic Preservation Plan" (see the attached Bibliography for specifics).

The following sites are listed on the National Register of Historic Places:

- Kennicott Mines
- Copper River and Northwestern Railroad
- McCarthy General Store
- McCarthy Power Plant
- Chitina Tin Shop
- Nabesna Gold Mine

Although these sites are within Wrangell-St. Elias National Park and Preserve, they are privately owned properties. They must be considered in relation to any planning efforts in their proximity.

Cultural Resources Management

The development of an active and integrated cultural resource management program is essential for the protection and preservation of the vast cultural resources of Wrangell-St. Elias National Park and Preserve.

The objectives for cultural management are as follows:

- To establish programs for the collection of information and data about the cultural resources and for the management and preservation of these resources
- To locate and identify all known historic and prehistoric sites and structures for possible designation in the National Register of Historic Places and the Alaska Heritage Resource Survey
- To assemble cultural resources information and data to be used in interpretive materials and programs for the enjoyment and education of visitors
- To collect oral and written information from actual participants in the initial development of the area
- To elicit cooperation from and provide assistance to private owners of historical sites, structures, and objects so that history may be protected and preserved
- To develop a government to government relationship with federally recognized tribes

To develop and maintain a cooperative working relationship with the Alaska State Historic Preservation Officer and the Advisory Council on Historic Preservation

Cultural Resources Research

Research is as vital to management of cultural resources as it is to natural resources. Overall, research is nonintrusive and initially will be conducted by professional NPS specialists. However, the value of previous research conducted by the private sector is recognized and, when appropriate, research in cooperation with the private sector will be encouraged.

Nonintrusive research and data collection will be preferred. However, where no feasible alternatives exist (including other locations and methodologies), intrusive research may be accommodated. All research is subject to compliance through the National Environment Policy Act, Section 106 of the National Historic Preservation Act, Archeological Resources Preservation Act, Native American Graves Protection and Repatriation Act, and Section 810 of the Alaska National Interest Lands Conservation Act.

Research funded by the NPS will be targeted primarily to address high priority management concerns. The private-sector and research community will be encouraged to conduct and support basic research.

SUBSISTENCE RESOURCES:

Introduction Subsistence Management

Wrangell-St. Elias National Park and Preserve contains within its boundaries lands and resources that have provided for the subsistence use by local residents since prehistoric times. Native groups exploited the fish, game and plant resources as the basis of their economy before the arrival of Europeans and continue to make use of such resources. However, wildlife is hunted to a very limited degree within the park/preserve. Most of the hunting is done along the Glenn-Richardson and Tok cut-off routes, while fishing activity is generally confined to the Copper River.

Europeans entered this region during the 1700's with the attempt by the Russians to foster a local fur trade industry. It was not until the late 1800's and early 1900's that large numbers of non-natives moved into and became a permanent part of the population of the general region. Significant changes in the economy, technology, and socio-cultural scene accompanied these non-natives, but they largely incorporated the use of wild game, fish and plant life into their economic strategy.

Accelerated population growth, economic development, and socio-cultural changes have occurred in the Wrangell-St. Elias area since the mid 1940's. Highways linking the region with urban centers of Alaska and the rest of the continent were constructed. Native populations were drawn into a few settled communities where they had access to jobs, schools, medical aid, and modern conveniences. Homesteading, government employment, construction work, guiding, the opportunity to establish small business, and other developments attracted large numbers of non-natives and led to the firm establishment of such semi-urban centers as Glennallen and Copper Center. The construction of the Alaska pipeline brought with it a virtual explosion of activity and impacts that have permanently altered the socio-economic scene of the region.

Scattered single household units located within the park boundaries must rely on local wild renewable resources to support their isolated lifestyle. Residents residing along the edges of the park continue, in varying degrees, to look to parklands as sources for wild meat, furs, fish and other resources to supplement other forms of income. There is also the desire by many local residents to maintain a sense of identity with a wild environment and to maintain their cultural traditions and practices, especially Native Americans.

Subsistence research efforts during the late 1970's (Subsistence Study of the Wrangell's Region by Holly Reckord, and Local Exploitation of D-2 Lands in the Gulf of Alaska Region by Stephen McNeary) drew a generalized picture of subsistence activities in and around what is now the Wrangell-St. Elias National Park and Preserve. In a general order of importance to local subsistence users the following resources are utilized: salmon, furbearers, moose, caribou, Dall's sheep, mountain goats, waterfowl, hare and bear. Persons living within the park also rely on timber for firewood and building materials. Other resources such as berries, ptarmigan, spruce grouse, trout, etc. are also taken from park lands on a small scale. There are variations in this list of priority resources in accordance with differences in localities and lifestyles. Spatially, the areas of greatest use are the lowlands and foothills of the park.

The Wrangell-St. Elias area is difficult for many residents to utilize. The Copper River, a swift, turbulent, and silt laden stream, separates the parkland from such communities as Glennallen, Gulkana, and Copper Center. Extensive lowland bogs, tussock covered tundra, and smaller

waterways add to the difficulty of summer travel. However, access may be obtained from points along the Chitina to McCarthy, Strelina to Kotsina River, and the Slana to Nabesna Road corridors. Access across the Copper River can be obtained via the concrete highway bridge along the Chitina to McCarthy Road.

Winter conditions solidify the local waterways and smooth over the rough surface with snow allowing for easier access into parklands. For this reason it may be expected that many residents will carry out winter activities into the park.

A number of local residents do gain access to park wildlife resources via light aircraft. The use of aircraft is permissible within areas designated as preserves. By law and regulation, aircraft use in subsistence pursuits is not permitted. Where such use occurs, it must be viewed as a sport hunting activity.

The heterogeneous character of the general population in and around the park and preserve contributes to the complexity of subsistence management. Established Native groups have traditional customs governing priority access to resources, trapline and fishing site ownership, cooperative assistance in resource harvests, sharing patterns, spiritual observances, etc. Subsistence among these groups is generally group oriented. Non-natives have developed patterns of resource use that are in keeping with Western ways. These patterns tend to stress individualism and except for legal constraints, allow each person to decide for himself how resource harvest and use shall be accomplished. This non-native population is in turn made up of such diverse elements as skilled and unskilled laborers, hunting guides, prospectors and miners, small businessmen, government employees, charter pilots, and individuals who have chosen to live in the bush, largely isolated from society.

The Alaska National Interest Lands Conservation Act mandates that federal land managing agencies, including the National Park Service, shall, "...provide the opportunity for local rural residents engaged in a subsistence way of life to continue to do." Other pertinent language includes, "...the utilization of public lands...is to cause the least adverse impact possible on rural residents who depend upon subsistence," and "non-wasteful subsistence uses of fish and wildlife and other renewable resources shall be the priority consumptive uses of all such resources...". To meet these mandates the National Park Service will be required to establish a firm data base from which to establish its subsistence management policies and practices. It will also be necessary to develop a close positive working relationship between itself and such groups as the Alaska Department of Fish and Game, local fish and game advisory boards, local community governing bodies, Native organizations, and the individual subsistence users of the parklands.

Subsistence Management Objectives

The development of an active and integrated subsistence resource management program is essential for the protection and preservation of the resources of Wrangell-St. Elias National Park and Preserve.

The objectives for subsistence resources management are as follows:

- To manage traditional resources uses in cooperation with the users and other interested parties;
- To study traditional resources used and harvests of resources as a basis for preparing a management plan for the customary and traditional use of park and preserve resources;
- To consider humans an integral part of the ecosystems and to encourage their living in harmony with them;
- To work cooperatively and inter-dependently with the Alaska Department of Fish and Game, Alaska Boards of Fisheries and Game, and the Federal Subsistence Board in regulating consumptive uses of natural resources, and
- To encourage subsistence users of the park and preserve's natural resources to understand and respect ecosystems and to maintain the natural balance among them.

Subsistence Resources Research

Research is as vital to management of subsistence as it is to natural and cultural resources. Overall, research is non-consumptive and initially will be conducted by professional NPS specialists. However, the value of previous research conducted by the private sector and the State of Alaska is recognized and, when appropriate, research in cooperation with these entities will be encouraged.

RESOURCE STATUS AND PROGRAM

Natural Resources Baseline Information

In 1986, the National Park Service underwent a process (Natural Resources Assessment and Action Program) to determine the status of natural resources at the national level. This process was highly dependent on input provided to the regions by individual park units. The input provided by Wrangell-St. Elias National Park and Preserve, which serves as WRST's assessment of its natural resources has been reviewed and modified (see Table 1).

Table 1. Natural Resources Baseline Information

Resource Category	Adequacy of Data	Condition of Resource	Threats to Resource
AIR RESOURCES			
Air Quality	Inadequate	Good	Low
Visibility	Inadequate	Good	Low
WATER RESOURCES			
Navigability	Inadequate	N/A	High
Water Quality	Inadequate	Unknown	Moderate
Groundwater	Inadequate	Unknown	Low
GEOLOGICAL RESOURCES			
Plains/Plateaus	Inadequate	Unknown	Low
Mountains	Inadequate	Good	Low
Volcanoes	Adequate	Good	Low
Caves	Adequate	Good	Low
Gorges/Canyons	Inadequate	Unknown	Moderate
Shores	Inadequate	Good	High
Fossils	Inadequate	Good	Moderate
Glaciers	Inadequate	Unknown	Low
Soils	Inadequate	Unknown	Moderate
Permafrost	Inadequate	Unknown	Low
METEOROLOGICAL			
Climate	Adequate	N/A	N/A
Fire Weather	Adequate	N/A	N/A
VEGETATION RESOURCES			
Grasslands	Inadequate	Unknown	Moderate
Forests	Inadequate	Good	Moderate
Shrubland	Inadequate	Unknown	High
Tundra	Inadequate	Fair	Severe

Table 1. Continued

Resource Category	Adequacy of Data	Condition of Resource	Threats to Resource
Aquatics	Inadequate	Unknown	Moderate
Coastal	Inadequate	Unknown	Moderate
WILDLIFE RESOURCES			
TERRESTRIAL MAMMALS			
Caribou	Adequate	Poor	Moderate-High
Moose	Adequate	Good	Moderate-High
Dall's Sheep	Inadequate	Good	Moderate-High
Mountain Goats	Inadequate	Good	Moderate
Lynx	Inadequate	Fair	Moderate
Wolf	Inadequate	Fair	Moderate-High
Marten	Inadequate	Fair	Moderate
Wolverine	Inadequate	Fair	Moderate-High
AQUATIC MAMMALS			
Sea Lions	Inadequate	Fair	High
Seals	Inadequate	Fair	High
Otters	Inadequate	Fair	Moderate-High
Beaver	Inadequate	Good	Low
Muskrat	Inadequate	Good	Low
AVIAN			
Passerine	Inadequate	Good	Moderate
Raptors	Inadequate	Good	Moderate-High
Waterfowl	Inadequate	Good	Low-Moderate
FISHERIES			
Salmon	Inadequate	Good	Moderate
Other	Inadequate	Good	Moderate
INVERTEBRATES			
Aquatic	Inadequate	Unknown	Moderate
Terrestrial	Inadequate	Unknown	Low

The primary issues driving threats associated with the natural resources of WRST are: (1) unknown effects to park resources due to consumptive practices; (2) mineral development; (3) visitor use impacts (access); and (4) the need for additional baseline data. It is these four issues that park management has directed its efforts into better understanding and decision-making.

For those resources that were identified in Table 1 with a rating of moderate-high, high and severe threats, project statement have been developed. Detailed information on the status of these resources and information needs are found within each project statement throughout this plan.

Natural Resources Management Program

The current natural resources management program is outlined in APPENDIX B. Each year this will be updated to document the current ongoing program.

Natural Resources Management Unfunded Program

The prioritized unfunded natural resources management program is outlined in APPENDIX C. Each year this will be updated to document the needs of the natural resources management program at WRST.

Cultural Resources Baseline Information

Although Wrangell-St. Elias Park and Preserve has been in existence since 1980, the breadth and scope of the park's cultural resources are virtually unknown. There have been some studies and inventories, however these appear only to scratch the surface. Until 1992, all cultural resource information was generated by the Alaska Regional Office. In 1992, the park hired its first cultural resources management specialist. It will probably take two to four years before this individual will have a good grasp on the breadth and scope of cultural resources and the potential impacts challenging management in regards to preserving those resources.

In 1991, an Historic Resources Study (HRS) was completed (Mountain Wilderness by W.R. Hunt). The purpose of the HRS was two-fold: (1) to help identify sites that qualify for the National Historic Register; and (2) as a planning aid. The HRS is composed of two parts: (1) the historical narrative; and (2) the recommendation and nomination of historical sites. To date (1993) only part one is complete. Part two is targeted for implementation in 1994. The narrative part of the HRS identified 13 major themes. The HRS themes are as follows:

- Maritime exploration
- Native peoples
- Russian exploration
- American exploration
- Gold mining
- Kennecott
- Chisana

U.S. boundary survey
Mountaineering
Transportation
Science
Local communities
Changing lifestyles

In addition to the HRS, W.R. Hunt wrote Gold Places - A History of Mining in the National Parks in 1990. This serves as an excellent reference.

Although both of these documents provide park management with an historical perspective, they only hint or suggest the importance of the physical attributes (such as condition and integrity) of the cultural resources within the park. The primary physical inventory of cultural resources has been directly tied to the minerals management program.

Archeological resources are virtually unknown. The Alaska Regional Office has initiated an Archeological Overview and Assessment (AOA). The AOA is scheduled for completion in 1995 and this document will help park management focus their efforts in archeological investigations.

The primary issues that potentially impact cultural resources are: (1) mineral development; (2) visitor use impacts (access), and (3) lack of basic data.

Detailed information on the status of several cultural resources and information needs are found within each project statement throughout this plan. Additional information on the status of cultural resources can be in the park Resources Management In Review (APPENDIX A).

Cultural Resources Management Program

The current cultural resources management program is outlined in APPENDIX B. Each year this will be updated to document the current ongoing program.

Cultural Resources Management Unfunded Program

The prioritized unfunded cultural resources management program is outlined in APPENDIX C. Each year this will be updated to document the needs of the natural resources management program at WRST.

Subsistence Baseline Data

Subsistence baseline data should be viewed in two parts: (1) subsistence resources; and (2) subsistence users. Subsistence management requires an integrated approach involving many disciplines such as natural resources management, cultural resources management, resources protection and interpretation.

Resources used for subsistence purposes are included within the Natural Resources Baseline Information portion of the RMP. The challenge in subsistence management lies in identifying subsistence users, establishing a subsistence priority for use of park and preserve resources, and allocating resources among subsistence users when necessary. It is these three issues that drive the subsistence program.

Since the federal assumption of subsistence management on federal lands in 1990, park staff has been directing their efforts at better understanding the condition of subsistence resources and subsistence users.

Detailed information on the status of these resources and data needs are found within each project statement through this plan. Additional information on the status of subsistence resources directly managed by the Resources Management Division can be found in the park Resources Management In Review (APPENDIX A). Additional subsistence management accomplishments are also provided in APPENDIX A.

Subsistence management Program

The current subsistence management program is outlined in APPENDIX B. Each year this will be updated to document the current ongoing program.

Subsistence Management Unfunded Program

The prioritized unfunded subsistence management program is outlined in APPENDIX C. Each year this will be updated to document the needs of the subsistence management program at WRST.

WRST C200.00 Historic Resources Management

PROBLEM STATEMENT:

Wrangell St. Elias National Park and Preserve encompasses a wealth of historic resources. The trails and structures of mining activities spurred by several major copper and gold strikes in the early 1900's are present throughout the Park. Cabins used by trappers and mail carriers dot the landscape. An inventory of these historic sites, structures, districts, and complexes is required by the National Historic Preservation Act, as amended 1980. This inventory provides information for the preservation, management and interpretation of historic resources. Unique structures and sites or those representative of an activity or era may be nominated for the National Register of Historic Places.

In 1982 and 1983, a Historic Resource Inventory Team composed of professional NPS historians, historical architects, and an archaeologist, conducted a survey of historical resources. The historic significance of each structure was determined. The structures were documented, photographed, and recorded in compliance with NPS procedures and policies. Several areas are being considered for nomination for listings on the National Register of Historic Places. Detailed working drawings were prepared for several structures of historical significance and will serve as guidelines if additional management actions are undertaken.

Due to this intense effort all locations of known historic significance were surveyed and structures inventoried. The historical resource survey provides Park management with the initial data base needed to begin the development of a historic resource management program.

Goal - To preserve and protect the historical resources of Wrangell-St. Elias National Park and Preserve in compliance with federal and NPS regulations and policy.

DESCRIPTION OF RECOMMENDED PROJECT(S):

Park staff is continuing to inventory, document, and record structures not identified by this historic resource inventory. The basic management approach is that of "benign neglect" unless circumstances warrant additional action. Existing structures are monitored to protect them from vandalism.

Documentation of inventoried structures is added to the data base of historic resources. Structure location, condition, and status have been incorporated into the fire management program. Upon completion of recordation, structures are allowed to deteriorate by environmental processes unless specific management actions are warranted and comply with federal regulation and NPS policies.

As structures are discovered; identify, document, and record them to assist with the determination of historical significance. Monitor existing structures to protect against vandalism.

If a structure is determined to be historically significant stabilization is an appropriate management consideration. Requirements are that the structure is accessible and structurally sound and the action is economically feasible. The proposed action and working drawing must be reviewed to ensure that they comply with the National Historic Preservation Act and NPS regulations. The Trail Creek Cabin and structures in Chisana, the Kuskulana/Kotsina Basin, and the Bremner drainage have been identified as potential candidates for stabilization.

The removal of significant artifacts may be considered if they are threatened by vandalism or proposed development. Remote areas like Green Butte, the Kuskulana/Kotsina Basin, and the Bremner drainage that still possess significant artifacts are of special concern.

Artifact retrieval would only occur as a last resort and after curation and cataloging according to approved NPS policy and standards. Artifacts would be stored in designated repositories such as the University of Alaska, Fairbanks.

Federal regulations and NPS policies permit the restoration of historic structures. Restoration, done according to the standards established in NPS-28 involves the recovering of the general historic appearance of a structure by removing incompatible accretions and replacing missing elements. Restorations can be for exteriors and interiors, and may be partial or complete.

In addition, the following studies should be conducted.

1. Conduct a mining theme study to expand the present knowledge of the mining history of the area.
2. Conduct a study of the local native groups to improve the understanding of cultural and traditional values.

Both studies would provide tools for management and improved information for the interpretive program.

These actions will result in an integrated historic resource management program that will provide for the identification, documentation, protection, and interpretation of historical structures and sites. Additional information on native culture will improve management and visitor understanding of native cultural values.

WRST C201.00 Historic Resource Study of Wrangell-Saint Elias National Park and Preserve

PROBLEM STATEMENT:

Mountain Wilderness was written by Bill Hunt in 1991 as part of the historic resource study of the park . This historical narrative addresses several themes including early Native inhabitants, exploration and development, mining enterprises, transportation and scientific endeavors. While this study provides information about the park's history and the resources that may be in the park it does not identify or evaluate specific sites.

A Historic Resource Study (HRS) provides a historical overview of a park or region and identifies and evaluates all of a park's cultural resources within historical contexts. In order to complete the inventory and provide sufficient information for management and interpretation, addenda to the existing study are essential. Multiple property nominations to the National Register addressing themes and resource types discussed in *Mountain Wilderness* are needed. Additional themes and resource types need to be identified and addressed. A historical base map depicting all known sites, cultural landscapes, transportation routes, and archeological and ethnographic resources is necessary.

Goal: To complete the historical overview of Wrangell-St. Elias National Park and Preserve and to identify and evaluate historic resources within historic contexts.

DESCRIPTION OF RECOMMENDED PROJECT(S):

Based upon a literature search and personal interviews.

- (1) Develop a list of potential historical sites and national Register properties located within the Park and Preserve.
- (2) Provide field documentation of these sites where incomplete and compile a list of classified structures.
- (3) Develop a final report on the sites, and site themes, and make recommendations for the management of the area's historic structures.
- (4) Write National Register multiple property nominations for themes and resource types recommended in (3) above.
- (5) Prepare an historical base map depicting all known sites, cultural landscapes, transportation routes, and archeological and ethnographic resources.

FUNDING AND STAFFING:

Funding

Personal Services	\$30,000	\$30,000	-0-	-0-	-0-
Other than Personal Services	<u>10,000</u>	<u>5,000</u>	<u>-0-</u>	<u>-0-</u>	<u>-0-</u>
Subtotal	\$40,000	\$35,000	-0-	-0-	-0-
GRAND TOTAL	\$75,000				

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Sullivan, Michael Sean 1981 Kennecott, Alaska a Historic Preservation Plan. Bellingham: Western Washington University

WRST C202.00 Special History Studies

PROBLEM STATEMENT:

Historical references to events in Wrangell-St. Elias National Park and Preserve began in the 1700s with the arrival of Russian traders and trappers. American explorers arrived in the area during the 1800s. With the discovery of gold in the Klondike in 1896 historical references to events within the park increase dramatically. The advent of copper mining and the construction of the Copper River and Northwestern Railway and the Kennecott Copper Mill and mines contributed even more historical events and references. Support activities associated with gold and copper mining, such as transportation and roadhouses are major themes contributing to the rich history of the Copper Basin.

Because so much of this history has occurred within the last century, there are extensive sources of primary documents still available in newspapers, magazines, personal memorabilia and diaries, geological bulletins and other scientific or scholarly reports. This information is invaluable for interpreters who must answer questions from the public on the history of the area and who need to put together interpretive programs but do not necessarily have the time or the expertise to immerse themselves in the primary source documents. Managers must evaluate cultural resources and make decisions about those cultural resources. The manager may not have an understanding of historical events and associations necessary to make crucial decisions. Generally the primary documents are located elsewhere and are not easily available to park staff developing an interpretive program or to managers faced with making crucial decisions about resources. Additionally there are very few, if any secondary sources written about these topics that can provide this information to the interpreter or the manager.

The special history study fills this need by providing an accessible history of specific events, associations or personalities relevant to the area now encompassed by Wrangell-St. Elias National Park and Preserve. These studies will incorporate information from the myriad of primary source documents into a document useable by interpreters and managers who need an understanding of the events and personalities that contributed to the history of the area.

Goal: To incorporate primary source documentation into useable secondary source documents for managers and interpreters.

DESCRIPTION OF RECOMMENDED PROJECT(S):

The purpose of this project is to incorporate primary source documentation of events and personalities who contributed to the early history of the park area into a well-written narrative history useful for managers and interpreters. This history should be suitable for public distribution and should incorporate illustrations, photographs and maps. It should be attractively packaged for other uses, including sale to the public. In addition to incorporating and synthesizing primary source documents each special history study should address historic

contexts described in the park Historic Resource Study. Potential topics may be tailored to meet management needs and should include: transportation (including trails), roadhouses, big-game hunting (commercial and sport), mountaineering, exploration and settlement, mineral exploration and development and scientific investigations.

It is estimated that each special history study will take approximately 2 years to complete:

Year 1: research and writing

Salary (GS-9 historian/1yr)	\$38,400
Travel	5000
Supplies	500

Year 2: writing, editing and printing

Salary (GS-9 historian/3 mos.)	9600
Printing costs	10,000

WRST C202.01 Special History Studies - Bremner

PROBLEM STATEMENT:

Historical references to events in Wrangell-St. Elias National Park and Preserve began in the 1700s with the arrival of Russian traders and trappers. American explorers arrived in the area during the 1800s. With the discovery of gold in the Klondike in 1896 historical references to events within the park increase dramatically. The advent of copper mining and the construction of the Copper River and Northwestern Railway and the Kennecott Copper Mill and mines contributed even more historical events and references. Support activities associated with gold and copper mining, such as transportation and roadhouses are major themes contributing to the rich history of the Copper Basin.

Because so much of this history has occurred within the last century, there are extensive sources of primary documents still available in newspapers, magazines, personal memorabilia and diaries, geological bulletins and other scientific or scholarly reports. This information is invaluable for interpreters who must answer questions from the public on the history of the area and who need to put together interpretive programs but do not necessarily have the time or the expertise to immerse themselves in the primary source documents. Managers must evaluate cultural resources and make decisions about those cultural resources. The manager may not have an understanding of historical events and associations necessary to make crucial decisions. Generally the primary documents are located elsewhere and are not easily available to park staff developing an interpretive program or to managers faced with making crucial decisions about resources. Additionally there are very few, if any secondary sources written about these topics that can provide this information to the interpreter or the manager.

The special history study fills this need by providing an accessible history of specific events, associations or personalities relevant to the area now encompassed by Wrangell-St. Elias National Park and Preserve. These studies will incorporate information from the myriad of primary source documents into a document useable by interpreters and managers who need an understanding of the events and personalities that contributed to the history of the area.

Goal: To incorporate primary source documentation into useable secondary source documents for managers and interpreters.

DESCRIPTION OF RECOMMENDED PROJECT(S):

The Bremner area was first prospected for gold in 1885 by John Bremner, making it one of the earliest mineral explorations into what is now Wrangell-St. Elias National Park and Preserve. The first gold rush didn't actually occur until 1902. Early mining activities were located on placer claims, but with improved transportation methods and the Copper River and Northwestern Railway to Kennecott lode mining came into its own in the early 1930s. Location of an airstrip and increased air charter tour traffic to Bremner has posed new management problems. A

special history study of the Bremner mining area is essential to understanding the historical events and associations necessary to make crucial decisions. With increasing tourism in the area the special history study is also an invaluable interpretation tool.

The purpose of this project is to incorporate primary source documentation of events and personalities who contributed to the early history of the park area into a well-written narrative history useful for managers and interpreters. This history should be suitable for public distribution and should incorporate illustrations, photographs and maps. It should be attractively packaged for other uses, including sale to the public. In addition to incorporating and synthesizing primary source documents each special history study should address historic contexts described in the park Historic Resource Study.

WRST C202.02 Special History Studies - Chisana/Gold Hill

PROBLEM STATEMENT:

Historical references to events in Wrangell-St. Elias National Park and Preserve began in the 1700s with the arrival of Russian traders and trappers. American explorers arrived in the area during the 1800s. With the discovery of gold in the Klondike in 1896 historical references to events within the park increase dramatically. The advent of copper mining and the construction of the Copper River and Northwestern Railway and the Kennecott Copper Mill and mines contributed even more historical events and references. Support activities associated with gold and copper mining, such as transportation and roadhouses are major themes contributing to the rich history of the Copper Basin.

Because so much of this history has occurred within the last century, there are extensive sources of primary documents still available in newspapers, magazines, personal memorabilia and diaries, geological bulletins and other scientific or scholarly reports. This information is invaluable for interpreters who must answer questions from the public on the history of the area and who need to put together interpretive programs but do not necessarily have the time or the expertise to immerse themselves in the primary source documents. Managers must evaluate cultural resources and make decisions about those cultural resources. The manager may not have an understanding of historical events and associations necessary to make crucial decisions. Generally the primary documents are located elsewhere and are not easily available to park staff developing an interpretive program or to managers faced with making crucial decisions about resources. Additionally there are very few, if any secondary sources written about these topics that can provide this information to the interpreter or the manager.

The special history study fills this need by providing an accessible history of specific events, associations or personalities relevant to the area now encompassed by Wrangell-St. Elias National Park and Preserve. These studies will incorporate information from the myriad of primary source documents into a document useable by interpreters and managers who need an understanding of the events and personalities that contributed to the history of the area.

Goal: To incorporate primary source documentation into useable secondary source documents for managers and interpreters.

DESCRIPTION OF RECOMMENDED PROJECT(S):

In 1913 Chisana was the site of the last gold rush in Alaska and possibly the world. At one time it claimed to be the largest log cabin community in North America with 400 reported cabins. Chisana was also the central community, serving as U.S. Commissioner's and recorder's office, and the post office as well as the supply and jumping off point for the placer mines of Gold Hill.

It is located on the north side of the 13 million acre Wrangell-St. Elias National Park and Preserve in an area increasingly frequented by visitors and hunters. Active mining occurs in the Gold Hill area. A special history study that consolidates and synthesizes all primary documentation for the Chisana Historic District and the mining areas of Gold Hill is essential to understanding the historical events and associations necessary to make crucial decisions about the historic district and Gold Hill. With increasing tourism in the area the special history study is also an invaluable interpretation tool.

WRST C203.00 Develop Historic Contexts

PROBLEM STATEMENT:

The Secretary of the Interior's Standards for Preservation Planning calls for preservation planning and for developing historic contexts. The process of preservation planning is the basis for archeological site conservation. Historic contexts provide a meaningful way to organize information about the archeological record. They provide the foundation for decisions about identification, evaluation, registration and treatment of historic properties. Historic contexts combine details about location, time and theme to establish the criteria on which the significance of these property types is determined. From the historic context, management strategies can be devised for resource management goals and priorities.

Wrangell-St. Elias National Park and Preserve contains over 13 million acres. Within that area are three distinct management and geographic districts. People from four Native groups live in and utilize the park's resources. Euro American history begins in the 1700s with the arrival of the Russians, followed by the British and Americans in the 1800s. Activities include early exploration and settlement, transportation, mining, guiding and subsistence among others.

Eight general themes were identified in the Historic Resource Study. The prehistory and history within the park is more complex than these eight themes represent. More specific themes need to be developed that will describe events which occurred within the park. When combined with locational and chronological elements historic contexts for the park can be developed, with preservation goals generated for each historic context.

Goal: To develop historic contexts for the prehistoric, protohistoric and historic periods of both Native and non-Native habitation of Wrangell-St. Elias National Park and Preserve.

DESCRIPTION OF RECOMMENDED PROJECT(S):

The objective of this project is to develop historic contexts for the prehistoric, protohistoric and historic periods of both Native and non-Native habitation of Wrangell-St. Elias National Park and Preserve. Preservation goals that consider identification, evaluation, registration and treatment of the full range of properties will then be systematically developed.

The first priority is to identify those themes upon which the historic contexts are to be developed. Additionally chronological and locational elements need to be defined. Upon identification of the elements to be used historic contexts will be developed using the Secretary's Guidelines for Preservation Planning. The resulting document will describe the prehistoric or historic processes or patterns that define the context. It will also identify the important persons, property types, events, or cultural values.

The second priority is to establish preservation goals that depict how properties should be identified, evaluated, registered and treated according to the Secretary's Guidelines for Preservation Planning.

WRST C204.00 List of Classified Structures

PROBLEM STATEMENT:

In 1990, the Secretary of the Interior's Annual Control Report identified a material weakness in the preservation of cultural landscapes and historic structures. This weakness was stated as:

"Historic and prehistoric structures and cultural landscapes are damaged by neglect or deferred work due to insufficient funds or staffing."

The first step in preserving the historic and prehistoric structures is to identify them. Wrangell-St. Elias National Park/Preserve has located well over 300 structures. Some of these structures are cabins constructed within the last 50 years, others have unknown dates of origin. Many have been visited only briefly and there is no detailed information regarding the physical description, condition, use, potential impact, treatments, cost estimates for maintenance, or level of significance according to National Register Standards. Completing the List of Classified Structures (LCS) (NPS-28), a computerized database of historic and prehistoric structures under NPS administration will contribute to correcting this material weakness by providing baseline data from which to base management decisions.

As a management tool, LCS data is used in a variety of ways, including Section 106 compliance review, Resource Management Plans, National Register Multiple Resources documentation, Inventory and Condition Assessment Program (ICAP), and Geographic Information Systems (GIS). The inventory also assists in meeting the requirements of Section 110 of the National Historic Preservation Act and NPS Management Policies by maintaining management inventories of cultural resources.

As an automated database, the LCS facilitates the retrieval of information on a variety of levels to assist park managers and cultural resources specialists in making and recording management decisions. The LCS has also evolved into a powerful research tool, providing NPS staff, scholars, and the general public with easy accessible information.

Goal: To include all eligible structures on the List of Classified Structures, to make assessments concerning historic significance and potential impacts and to make recommendations for treatment.

DESCRIPTION OF RECOMMENDED PROJECT(S):

The objective of this project is to include in the List of Classified Structures (LCS) all eligible structures. The LCS is a management tool focused on structures as the base unit. There are four

general types of information contained in each LCS record... Identification, Historical, Management, and Bibliographic.

Completion of the LCS will entail a visit to each known structure by an historian or archeologist and an historic architect. The site will be recorded, photographed and mapped. It will also be assessed as to whether it is eligible to be listed. To be listed on LCS a structure must 1) fit the NPS-28 definition of a structure, 2) the structure must be eligible for the National Register of Historic Places on an individual basis or as a contributing element of a site or a district, and 3) it must be within the boundaries of a park and be owned by the National Park Service.

Upon completion of the survey, each Park will receive hard copies of the LCS records and archival 5x7 prints of each structure. Ultimately, each Park will receive a copy of the software, the LCS User Manual, and floppy disks with their Park's database to facilitate continued upkeep of the LCS.

WRST C205.00 Fire Management Plans for Historic Structures

PROBLEM STATEMENT:

Approximately 6 million acres within the park and preserve are sufficiently vegetated to support fire. Within this zone are numerous identified and unidentified historic structures. Interagency fire management plans call for differing fire suppression regimes depending on the region in the park and preserve. The four suppression types include: critical, full, modified and limited. In areas of limited or modified suppression historic structures are in danger of being destroyed by fire. Some of these structures are significant for a variety of reasons and effort should be expended to preserve these structures.

There are two methods to reduce or eliminate the fire danger to historic structures. The most immediate is to detail a fire crew to the vicinity of the structure during a fire. This method may or may not be effective depending on the type of fire and resources available to fight it. In areas where full suppression is already required this does not pose as severe a problem. However, in areas where full suppression is not in force those structures considered significant by National Register standards need to be identified prior to any threat of fire so that suppression efforts near the structure can be implemented. In order to decrease the danger to a structure pre-suppression techniques such as reducing the vegetative fuel loads around the structure can be implemented.

Approximately 300 cabins are listed in the cabin inventory database. Not all of these cabins are historic. Of the 350 plus historic and archeological sites located in and around the park and preserve those that are historic structures need to be identified and evaluated according to criteria including significance and integrity. A cross-referencing system between the cabin database and the cultural resource inventory files needs to be developed so that as newly identified structures are added they can be incorporated into a smoothly working system.

Goal: To provide a component of the fire management plan that allows for protection of cultural resources.

DESCRIPTION OF RECOMMENDED PROJECT(S):

The goal of this project is to identify and evaluate those structures located within the park and preserve that are historic in nature and that need to be targeted for either hazard fuel reduction or suppression in event of fire.

1) Using all available resources, including the park cabin inventory database, the park cultural resource inventory files and the List of Classified Structures, identify all known historic structures in the park and preserve.

- 2) Evaluate fire danger to historic structures according to fuel type and the fire suppression zone they are located in and whether hazard fuel reduction would be a suitable option.
- 3) Evaluate historic structures as to their significance according to National Register standards and prioritize for hazard fuel reduction and fire suppression activities. Conduct archeological survey and site recording for those sites not previously recorded. Review available literature to assist in determining historical significance.
- 4) Develop a readily accessible and useable component of the fire management plan for the protection of cultural resources that complies with Section 106 of the National Historic Preservation Act. This plan would include suppression and pre-suppression priorities for historic structures and pertinent data useful for fire suppression managers.

WRST C206.00 Develop a Preservation Plan for Historic Structures and Write Historic Structure Reports

PROBLEM STATEMENT:

A major resource on park land is historic structures associated with early mining activities, transportation activities including freighting and early road construction efforts, trapping, exploration and settlement activities. Many of these cabins are in fairly good shape and may be adaptively re-used as shelter cabins or public use cabins along historic and present-day trails. Other structures may be rehabilitated or stabilized and used for interpretive purposes. Structures on the National Register may need to be stabilized in order to preserve their life as representative examples of significant resource types or as interpretive exhibits. At present no plan exists which identifies those structures needing preservation, the method of preservation, the basis for preservation, and to what purposes the building will be used after preservation efforts are completed. Prior to any preservation work a Historic Structures Report and archeological survey and testing are required. The Historic Structure Report is the primary guide to treatment and use of historic structures. A Historic Structure Report is required for all structures managed as a cultural resource.

Historic Structure Reports have been completed for Too Much Johnson cabin, the U.S. Commissioner's Court, the Commissioner's Residence, and the Women's Jail at Chisana, Jake's Bar cabin, Nugget Creek cabin, Bremner Mine Camp cabin and Peavine Bar cabin. A listing of potential rehabilitation and stabilization projects needs to be coordinated between the park Facility Site manager, the Cultural Resource Management Specialist and the Regional Historic Architect. The list will be continually updated as park needs change.

Goal: To develop a plan that would identify what structures need to be preserved, the method of preservation and the steps necessary for compliance.

DESCRIPTION OF RECOMMENDED PROJECT(S):

This project consists of two phases: development of a preservation plan and compliance for that preservation plan.

Phase I

1) Work with maintenance personnel, and Regional Architect on identifying which structures need preservation efforts and which structures will benefit most from preservation efforts.

2) Identify preservation needs for each structure, method of preservation (whether stabilization, rehabilitation, etc.).

3) Identify objective for preservation. Is structure being preserved because of unique historic quality? Will structure be used for compatible purposes?

Phase II

- 1) Conduct literature search and field architectural inventory.
- 2) Conduct Section 106 procedures, including archeological survey and testing if required. Write Determinations of Eligibility or National Register Nominations.
- 3) Write Historic Structures Report, presenting recommended work and alternatives. The Historic Structure Report (HSR) should include the physical description of the structure, modification and use as well as a description of the people and events associated with the structure. The HSR should also define the ultimate treatment and use of the structure, the requirements for treatment, the alternatives for treatment and an analysis of the various alternatives.
- 4) Perform preservation work. Park maintenance personnel will perform preservation work. Preservation skills training is needed for crew supervisor at minimum.

Structures recommended for stabilization/rehabilitation work include:

1. Solo Mountain Relief cabin
 2. May Creek Mail cabin
 3. Frederika Relief Cabin
- 5) Develop a readily accessible and useable component of the fire management plan for the protection of cultural resources that complies with Section 106 of the National Historic Preservation Act. This plan would include suppression and pre-suppression priorities for historic structures and pertinent data useful for fire suppression managers.

WRST C300.00 Archaeological Site Management

PROBLEM STATEMENT:

Of the approximately 75 prehistoric and ethnographic/traditional archaeological sites recorded within the 13 million acre Wrangell-St. Elias National Park and Preserve, only a few have been examined by professionals.

Much of our knowledge about the prehistoric sites within the Park and Preserve is derived from the ethnohistoric research conducted in the area since the early 1970's. Little data concerning the actual nature, extent, and archaeological significance of these sites has been collected. Some of these sites are regarded as historic or cemetery sites of the Ahtna, the primary Athabaskan Indian group known to have resided in the region, and other Native Alaskan groups such as the Tlingit Indians.

Reconnaissance level archaeological site surveys and a few excavations have been conducted west of the Copper River. It is this data base, in addition to the ethnographic information noted above, upon which we must rely for an understanding of prehistoric and ethnographic archaeological resources located within the Park and Preserve. The only site excavation undertaken in the Park and Preserve proper was by James Van Stone in 1950 at the historic Ahtna site of Taral. Other site visits were conducted in the 1970's by Holly Reckord, as part of a Native historic and cemetery site evaluation for purposes of the Alaska Native Claims Settlement Act. Only a few sites were actually visited by Reckord, however, and little substantive evaluation was done.

Goal - To identify and document all archaeological sites and provide for their protection.

DESCRIPTION OF RECOMMENDED PROJECT(S):

Archeological site information will be obtained through a program of reconnaissance level surveys. The park will be divided into geographic zones and a survey program will be initiated for each area. Known sites, reported site locations, and archaeological unknown zones will be inventoried. The report results from this effort will identify and prioritize needed site treatment alternatives for future actions and will make recommendations for management of archaeological resources.

Archaeological site surveys will be conducted incrementally as funding becomes available. The time frame for completion of the project is unknown. Continuity of survey effort and data quality will suffer from this sporadic nature. Availability of information needed for the protection and management of archaeological sites will be delayed.

FUNDING AND STAFFING: This project will be overseen by the park archeologist. The park archeologist will be assisted during field operations by an assistant archeologist. The park

archeologist will plan all phases of the study, coordinate field inventories and prepare final reports.

FY1

Archeologist (GS-09 - 10 months)	\$ 28000
Archeologist (GS-07 - 4 months)	\$ 10000
Travel	\$ 2000
OAS Support	\$ 20000
Sub-Total	\$ 60000

FY2

Archeologist (GS-09 - 10 months)	\$ 28000
Archeologist (GS-07 - 4 months)	\$ 10000
Travel	\$ 2000
OAS Support	\$ 20000
Sub-Total	\$ 60000

FY3

Archeologist (GS-09 - 10 months)	\$ 28000
Archeologist (GS-07 - 4 months)	\$ 10000
Travel	\$ 2000
OAS Support	\$ 20000
Sub-Total	\$ 60000

Grand Total \$ 180000

WRST C300.01 Archeological along the Nabesna and McCarthy Roads

PROBLEM STATEMENT:

The prehistoric archeological resources in Wrangell-St. Elias NP/P (WRST) are virtually unknown. Currently, the lack of basic data hampers management in the areas of planning and land-use. The proposed re-routing and up-grading (gravel resource development) of the Nabesna and McCarthy Roads, ATV use, vandalism, park planning, recreational use and timber harvesting all pose real and potential threats to archeological resources.

The Ahtna have selected numerous sites along the Nabesna and McCarthy Road corridors [Alaska Native Claims Settlement Act 14(H)(1) selections (historical and cemetery sites)] and areas in close proximity to these two roads. Additionally, the McCarthy Road was originally constructed as the rail-bed for the Copper River and Northwestern Railroad.

The Nabesna and McCarthy Roads are the only two roads that provide vehicle access into Wrangell-St. Elias NP/P (WRST). Both of these roads provide primary ATV access for recreation, access to inholdings (residential and commercial), and hunting. Up-grading roads requires the development of gravel resources adjacent to each road. Gravel pits could be located out of the established right-of-way and on NPS lands. Re-routing is also proposed outside of the established right-of-way.

Both the Nabesna and McCarthy Roads are maintained by the State of Alaska and are programmed for up-grading and re-routing over the next 2-5 years. On-going potential threats include ATV use over and through archeological sites, theft and vandalism.

Both the McCarthy and Nabesna Roads are +40 miles in length. Numerous known archeological sites are located along these two roads. Over 300 miles of ATV trails originate from these roads. The magnitude of impacts to archeological resources is not fully understood.

DESCRIPTION OF RECOMMENDED PROJECT(S):

The purpose of the proposed study is to: (1) Conduct a historical/ archeological/ethnographic literature search to gather known information to understand site types and distribution and to prioritize field operations; (2) Develop research design for conducting field operations; (3) Develop GIS themes related to known and potential impacts (road re-routing, ATV use, gravel source development, etc.); (4) Acquire low-level aerial photography; (5) Conduct reconnaissance; (6) Conduct field work (site identification and documentation) and write final report for the Nabesna Road; (7) Construct GIS theme for archeological resources; (8) Conduct field work (site identification and documentation) and write final report for the McCarthy Road. Construct GIS theme for archeological resources.

This project will provide management with sound information to base management decisions. This project will result in the collection of baseline information and lead to the development of an archeological resources monitoring program. All information will be digitized for incorporation into a GIS. Spatial representation of data themes will provide management with an addition tool for decision making.

Funding/Staffing Commitments: The park will provide a GS-11 archeologist to oversee all aspects of the project and develop the study design.

Costs: FY1 - \$ 40000
FY2 - \$ 85000
FY3 - \$ 85000

Benefits of Immediate Funding: Immediate funding will provide an on-going and cooperative working relationship with the State of Alaska Department of Transportation and avert impacts to archeological resources.

WRST C300.02 Conduct Archeological Survey for Wrangell-St. Elias NP/P

PROBLEM STATEMENT:

Section 110 of the National Historic Preservation Act requires that each Federal agency establish a program that will locate, inventory, document and nominate properties eligible to the National Register of Historic Places. Considerable research effort has gone into identifying and recording historic sites on mining claims as a result of a Sierra Club lawsuit. This has resulted in considerable knowledge about historic mining, particularly in the Chisana/Gold Hill and McCarthy areas. Areas not associated with mining activities have received little attention. Approximately 350 sites are known or have been reported in gray literature within the park or immediately adjacent to it. Field identifications of these sites has not occurred. Very little information is available concerning prehistoric and ethnohistoric sites, remote areas of the park, or frequently utilized non-mining associated areas. In order to better manage the park's cultural resources, a more thorough inventory of the cultural resources is necessary.

Goal: To identify and document archeological properties, and to provide critical information with which to make informed management decisions relative to prehistoric and historic sites.

DESCRIPTION OF RECOMMENDED PROJECT(S):

Use existing literature overviews, ethnohistorical studies and paleoecological, geological and geomorphological data to develop survey strategies most likely to yield archeological resources. Utilize GIS methods to help determine areas to survey. Develop long range plans to conduct systematic and opportunistic surveys. Prioritize these areas according to need (real or potential impacts) and optimal site environment. Include reported but unrecorded sites in long range plans.

Although part of the survey will be river based, helicopter support will be necessary for interior portions of the park. The survey will incorporate procedures that will have minimal impact upon archeological sites or objects. In addition, an important element of the project will be the study of the paleoecology of the region and development of a Pleistocene geomorphological model for depicting ancient beach and river terraces, and unglaciated mountain, foothill and lowland regions. Ethnographic and historic accounts of early transportation routes provide additional input for developing a survey model. The results of the survey will be written in a professional manner, suitable for publication, and will include prioritized recommendations for management of the resources of necessary actions to protect the resource values. Paleoenvironmental data will be entered into GIS. Archeological data will be included in the Archeological Sites Management and Information System (ASMIS) and the cultural resource base map. National Register nominations will be written for eligible sites.

Major survey areas include: 1) Interior portions of the park based on a geomorphological and paleoecological model; 2) The upper section of the Copper River and its tributaries; 3) The middle section of the Copper River and secondary tributaries; 4) The Chitina and Nizina Rivers and secondary drainages; 5) The portions of the Nabesna, Chisana and White River drainages located within Wrangell-St. Elias National Park and Preserve; and 6) The Malaspina Forelands along with Yakutat, Disenchantment and Icy Bays. The surveys will examine known sites and reported site locations as a first priority to identify their locations and each year will include and implement a design for examining select areas for which minimal or no resource data currently exists.

A field crew consisting of a principal investigator and at least 5 additional personnel, including field archeologists, paleoecologist and geomorphologist will be required for different portions of the survey. The project will run for 5 years.

Budget:

Personnel	\$559,700
Travel & per diem	26,600
Travel (helicopter, boat, fixed wing)	150,000
Equipment & supplies	10,000
Special studies	18,000
Curation	4,000
Analysis, write-up, publication	5,000
Public outreach/consultation	2,000
 TOTAL	 \$775,300

WRST C300.03 Develop an Archeological Survey Program for Abandoned Mine Lands

PROBLEM STATEMENT:

Approximately 400 abandoned mine sites have been identified within Wrangell-St. Elias NP/P. These abandoned mine lands contain a large number of historic mining sites, many of which played an important part in the history of the area. Including both placer and lode mines, these historic and archeological sites consist of dwellings, water supply features, tailings and processing structures that were an integral part of mineral exploration and development. Affiliated transportation and support features associated with mining activities, such as roadhouses and the Copper River and Northwestern Railway, and later a system of roads also exist. Previous archeological survey of these mineral properties concentrated on unpatented mining claims and historic sites with high visibility.

Some have potential ecological/environmental impacts or health and safety issues that require mitigation. Activities such as mine site reclamation and hazardous waste removal activities require compliance with Section 106 of the National Historic Preservation Act. Section 110 of the National Historic Preservation Act requires that all properties eligible for inclusion in the National Register of Historic Places be located, inventoried and nominated. A systematic program to locate, identify and record historic sites on these lands needs to be developed and implemented. Eligibility to the National Register needs to be determined, and nominations for those eligible properties written.

Goal: To identify and document cultural resources located on abandoned mine lands.

DESCRIPTION OF RECOMMENDED PROJECT(S):

The purpose of this program is to identify and inventory all cultural resources located on abandoned mine lands. Sites, districts or landscapes will be evaluated for significance and eligibility to the National Register of Historic Places. Where necessary develop and implement mitigation plans.

Abandoned mine lands to be surveyed are included in two categories: (1) Working in conjunction with the park geologist and environmental specialist those areas identified as health, safety and environmental hazards would be targeted first. A response to Section 106 of the National Historic Preservation Act may be required on these lands.

(2) In response to Section 110 of the National Historic Preservation Act archeological surveys would be conducted on those lands not falling into category 1.

On all abandoned mining lands archeological and historic sites, structures and landscapes will be identified, documented and mapped. A literature search will be initiated in order to help

determine significance. Documentation will be included in the Archeological Sites Management and Information System and GIS. Historic and archeological sites, districts and landscapes will be evaluated. Eligible properties will be nominated to the National Register of Historic Places.

Recommendations concerning site preservation and management will be made. Where required archeological mitigation plans for abandoned mine lands undergoing reclamation or hazard mitigation will be developed and implemented.

WRST C300.04 Identify 18th and 19th Century Sites in Wrangell-St. Elias NP/P

PROBLEM STATEMENT:

Initial contact between the Athabaskans in the Copper Basin and the Russians occurred in the late 1700s - early 1800s. The Russians explored the area and developed a trading enterprise. In the 1860s the Americans replaced the Russians in Alaska after the sale of Alaska to the U.S. by Russia. The late 1800s saw an increased population of whites from the early exploration of Lt. Allen, through the Gold Rush to the development resulting from the Alaska Road Commission activities. Much of this activity took place in what is now Wrangell-St. Elias National Park and Preserve. Many elder Native peoples from the area remember these events and sites that both proto-historic Athabaskan peoples and white explorers occupied. In a densely vegetated region where standard archeological methods are frequently inadequate, knowledge of these locations by elders is a valuable resource.

Unfortunately many of these Native people are in their 80s and 90s and will not live much longer. Chief Walter Northway, who was 116 or 117 when he died in the winter of 1993, was a teenager when he encountered his first white man. Two other elders from the area who were in their 80s died around the same time. These people have valuable information about the location of 18th and 19th century sites. They also have memories of other site locations. In addition to locating early Russian and American sites, local elders can identify historic and proto-historic Athabaskan sites. Traditionally knowledge of the past was passed down from one generation to the other. The influx of white society has altered that and with the death of the elders much of this information is being lost. As elders die the information about prehistoric and historic sites and Athabaskan use of the park's resources is lost.

Goal: To record information about proto-historic and historic site locations based on information handed down among local elders.

DESCRIPTION OF RECOMMENDED PROJECT(S):

The purpose of this project is to identify historic and proto-historic sites in the park/preserve. These sites include habitation sites, resource use sites, trading sites, trails, as well as sites of contact and conflict with Russian and American explorers.

Elders can identify areas where they lived, hunted, fished, and gathered wild foods. They may also remember sites from stories or from visiting sites with their elders where other events occurred. These include sites of contact with early Russian and American explorers and traders.

Identification of historic and protohistoric sites would be accomplished by accompanying elders into the field to the sites themselves. Information about the site and related stories would be

recorded by elders on tape. Archeologists would conduct surveys and document sites and cultural landscapes. To ensure cultural transmission of this knowledge in a traditional manner to future generations a grandson or granddaughter would accompany the elder and the researcher to the site and would be involved in the identification and recording process.

Upon completion of site and resource identification, archeologists will record archeological sites and cultural landscapes for inclusion in the Archeological Sites Management and Information System (ASMIS). Documentation will include site descriptions, maps and photographs. Maps, photos and narrative descriptions will document resource use in the park.

WRST C300.05 Establish Archeological Sites Management and Information System

PROBLEM STATEMENT:

Approximately 350 archeological, ethnohistoric and historic sites have been identified or reported in the park or in the immediate vicinity. Readily available information on these sites is necessary to conduct park business. In order to facilitate rapid and efficient response to these needs it is important to have this information in the park in the form of a cultural sites inventory.

DESCRIPTION OF RECOMMENDED PROJECT(S):

The Archeological Sites Management and Information System (ASMIS) has been approved and implemented as a paper record system. The computerized database is at least two years away. In the meantime, the data fields are part of the paper ASMIS and will be included in the computerized database, and incorporated into the information that is collected for new sites that are recorded.

Existing information for this inventory will be collated. Additional information will be acquired as it becomes available. Initial data will include site locations on USGS 1:63,360 quad maps and a filing system that contains AHRS site description forms. Additional site information will be included where available. As archeological projects are conducted in the park, the data will be added to site files and to maps. Many sites listed in the AHRS files were reported from existing literature sources. Consequently much of the existing data is sketchy. In the future, minimal data will be standardized to include: a verbal description of the property, a site map, a photographic record, a portion of the USGS 1:63,360 quad showing the site location, a statement of significance of the property in relation to its context, an analysis of the integrity of the property and existing or potential threats to the site, site boundaries, and a record of who visited the site and when. Additional data particular to that site will also be included. When the national ASMIS comes on line site files will be computerized according to national standards.

Initial map and site files will be completed by present staff. Additional site data will be added as projects are completed or as data becomes available.
Current staffing does not allow for computerized encoding at this time.

WRST C300.06 Develop Monitoring Program for Archeological Sites on Active Mining Claims

PROBLEM STATEMENT:

All federal lands within Wrangell-St. Elias NP/P (WRST) are closed to new mineral entry. ANILCA provided for the continuation of existing patented and valid unpatented mining claims. Within the park and preserve there exists the potential for extensive mineral development. There are currently 873 patented and unpatented mining claims and mill sites covering an estimated 19,250 acres. The primary economic commodities include: copper, gold, and silver. Owners of valid existing rights "inholdings" have the right to develop reasonable access across public lands.

With active mining taking place on several claims, a monitoring program is needed in order to insure the continued presence and protection of the cultural resources. A complete inventory with detailed photo record will provide NPS personnel with an accurate database to monitor cultural resources. Currently the majority of active mining operations occur at Gold Hill. However, proposed mining plans of operations are expected for other areas.

An Environmental Impact Statement was prepared to evaluate a range of alternatives for managing mining activities, analyze cumulative impacts and mitigate environmental impacts. The Record of Decision - Final Environmental Impact Statement - Cumulative Impacts of Mining - WRST preferred alternative is to acquire all mining claims. This alternative is the most environmentally preferred as it has the least potential to cause damage to the biological and physical environment. Until funding is available for acquisition, the NPS will process mining plans of operations under Title 36 CFR 9A regulations and prepare environmental assessments as required by the National Environmental Policy Act.

Goal: To ensure that mineral related activities occur in a manner consistent with park values and prevent or minimize adverse impacts to natural and cultural resources.

DESCRIPTION OF RECOMMENDED PROJECT(S):

Previous archeological work has provided detailed information on cultural resources located along drainages. This information includes site descriptions, site maps, drainage maps and artifact inventories.

Monitoring activities along the drainages will ground-truth the computerized database obtained from ARO-CRMIM, and add additional information as appropriate. Photographs will be taken, enabling NPS personnel visiting the site to monitor cultural resources within the drainages and

assess potential impacts. Structural elements of cabins and other features will be inspected to identify potential threats to structural integrity. A system of repeated visits will be devised and implemented.

WRST C300.07 Archeological Survey of Wiki Peak and Skolai Pass

PROBLEM STATEMENT:

The park resource management plan identifies a need to locate and assess archeological sites throughout the park. In order to complete this task the park recognizes the need to conduct these surveys in smaller increments. This project meets not only an obligation to identify and assess sites that are presently threatened, but to identify a scope for future survey requirements in these areas.

Over the last decade archeological survey and inventory efforts concentrated in areas of the park that could potentially receive mining plans of operations. As a result of this survey we have identified and documented over 200 historic sites, but have identified very few prehistoric sites. There is concern that many prehistoric sites are being impacted by increasing visitation. This effect is as detrimental to the resource as active mining operations. Two areas in the park, Wiki Peak/Ptarmigan Lake and Skolai Pass, are receiving greater numbers of visitors. Archeological information about these two areas is minimal and without baseline information the park is unable to develop monitoring programs or provide adequate protection for resources.

The Wiki Peak/Ptarmigan Lake area is located in the northeast corner of the park, adjacent to the Beaver Creek area, site of a recently discovered 10,000 year old site. Periodic visits to the area have revealed at least one extensive Archaic site along Ptarmigan Lake, several lithic scatters and several source areas for what may be (after analysis) Type A obsidian (Cook personal communication). Conversations with the caretaker of the Ptarmigan Lake Lodge revealed the locations of many more lithic scatters. The Wiki Peak/Ptarmigan Lake area is also prime sheep hunting country and lodges supply hunters with horses and guides for sheep hunting excursions. It is also presumed that visits to archeological sites are also on the excursion list. While many identifiable surface artifacts have probably been collected it is essential to identify and document archeological sites in the area before any more information is lost. Protection and monitoring plans can then be developed.

Of all backcountry locations in Wrangell-St. Elias NP/P the most popular and most widely advertised is Skolai Pass. This pass connects the Nizina River and Chitina valley on the south side of the park with the White River country on the north side. Sometimes noted as the famed "Goat Trail" this pass historically connected the gold and copper mines of the Chitina valley with the gold fields of Chisana in the early part of this century. As the route is so obvious and well-known it is assumed that prehistoric peoples used this as a route from the Chitina valley to the White River area and the annual Upper Tanana trade fair on North Fork Island (Reckord 1983). Over the last few years visitor use to Skolai Pass has increased to the point that at any given time there are multiple parties in the pass.

Without good baseline information park management cannot evaluate the effect of impacts to resources by human or natural causes. Nor can it develop monitoring programs or make preservation/protection recommendations.

DESCRIPTION OF RECOMMENDED PROJECT:

The purpose of this two year project is to: 1) develop an archeological survey strategy for the Wiki Peak and Skolai Pass areas of the park that will enable resource management staff to assess the significance of and impacts to sites, 2) inventory and document archeological sites within the survey boundaries, and 3) make recommendations to management regarding future monitoring or immediate preservation needs for these sites.

Year 1: Wiki Peak

Work with the park geologist to gain an understanding of the geomorphology and glacial patterns of the area. Work with local lodge owners to learn where known sites are located and (probably) being impacted. Develop a survey strategy that will link this information to provide the researcher with an understanding of the prehistory of the area and the potential effects to resources. Conduct archeological survey in identified areas and document identified sites. Work with BLM archeologist John Cook to develop methods for continuing obsidian sourcing and dating. Foster as much public education and sensitivity for protection of archeological resources as possible. Final report will provide an insight to prehistory of this little known area of the park, will continue documentation work on obsidian sourcing and dating, and will make recommendations to management for monitoring or preservation needs.

Budget

Salary	
GS-9 archeologist	\$18,600
GS-7 archeologist	12,600
archeological assistance-WRST	in kind
OAS 2000	
Horse rental	5,000
Per diem	2280
Equipment & supplies	1500
TOTAL	41,980

Year 2: Skolai Pass

Work with the park geologist to gain an understanding of the geomorphology and glacial patterns of the area. Work with interpretive personnel and air taxi operators to identify popular visitor travel routes and camping locations. Develop a survey strategy that will combine this information to provide the researcher with an understanding of the prehistory of the area and the potential effects to resources. Conduct archeological survey in identified areas and document identified sites. Work with interpretive personnel to develop educational material targeting the

Skolai Pass backpacker that will engender an appreciation of the resource and a desire to protect it. Final report will document identified historic and prehistoric sites, and incorporate historic and ethnographic information in order to provide an insight into the past uses and users of the trail, as well as make recommendations to management for monitoring or preservation needs.

Budget

Salary

GS-9 archeologist	\$18,600
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GS-7 archeologist	12,600
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archeological assistance-WRST	in kind
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OAS 1800

Per diem	2280
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Equipment & supplies	1000
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TOTAL	\$36,280
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WRST C301.00 Identify Cultural Landscapes and Write Cultural Landscape Reports

PROBLEM STATEMENT:

Historic mining practices dramatically changed the natural landscape in several areas of the park. The landscapes tell the story of mining practices from their early inception to modern times. Wrangell-St. Elias is also home to several groups of Native Americans who have traditionally hunted, fished, or gathered in areas that have spiritual significance. These cultural landscapes are to be managed as cultural resources according to federal law and NPS management policies. Section 110 of the National Historic Preservation Act requires NPS to identify and nominate all eligible cultural resources to the National Register.

In order to effectively manage the park's cultural landscapes they must first be identified and documented. Historic sites and historic vernacular landscapes may be identified in the Historic Resource Study. If not the information may be pulled from existing literature, site documentation, and maps, and from ongoing archeological surveys. Identification of ethnographic landscapes will result from interviews with elders, oral histories and the existing literature.

Once cultural landscapes are identified and documented they must be evaluated for significance to the National Register. Significance and integrity must be assessed. The cultural landscape report (CLR) documents and evaluates the landscape. Interdisciplinary in character, it includes: documentation, analysis, and evaluation of historical, architectural, archeological, ethnographic, horticultural, landscape architectural, engineering, and ecological data.(NPS-28)

Finally preservation of eligible cultural landscapes depends on planning and stewardship. Identification of the type of change that can occur without modifying the culture-defining features needs to be determined.

Goal: To identify cultural landscapes within the park and evaluate their significance and management needs.

DESCRIPTION OF RECOMMENDED PROJECT(S):

Initial field identification and recording will be required for landscapes not previously recorded by archeologists or historians. A literature review will be required to document significance and integrity. Oral history interviews may be required for identifying and evaluating ethnographic landscapes. Evaluation of cultural landscapes will be included in the Cultural Landscape Report (in accordance with NPS-28) and will include statements of significance, and recommendations for management concerning preservation and treatment.

Documentation of cultural landscapes will include field inventory, maps, plans, drawings, and photographs as well as descriptions of the history. In order to fully understand the complexity of

the cultural landscapes aerial photographs will be digitized to construct maps of historic and ethnographic landscapes. Aerial photo coverage will be required where it is currently not available.

WRST C302.00 Research Obsidian Sources

PROBLEM STATEMENT:

Much of the bedrock in Wrangell-St. Elias National Park and Preserve is volcanic in origin. The volcanic stratigraphy may contain obsidian horizons. Obsidian occurs in the Skolai Pass and Ptarmigan Creek areas. Already obsidian artifacts have been identified in the Ptarmigan Creek area. Sites located elsewhere in the state contain obsidian artifacts. Source locations or quarry sites for obsidian have been identified in the state, but not within Wrangell-St. Elias NP/P.

Prehistoric peoples in the Copper Basin area used obsidian in the manufacture of stone tools. Because of the volcanic nature of much of the park it is highly likely that prehistoric peoples in the area quarried local obsidian for their own use and for trade with neighboring peoples. Identification of local obsidian outcrop sources will identify potential locations of archeological sites, technological techniques in stone tool manufacture, and statewide trade routes. Analysis of obsidian artifacts through hydration methods will be used to date sites and to identify source locations for obsidian used in tool manufacture.

Goal: To identify source locations for obsidian and potential archeological sites.

DESCRIPTION OF RECOMMENDED PROJECT(S):

Listed below are specific objectives of this project:

- (1) Work with the park geologist to research and identify possible obsidian locations based on geological maps, geomorphological investigations and oral history.
- (2) Conduct field visits to verify location and extent of resource and collect samples for additional research. Map locations of source material.
- (3) Identify quarry sites and conduct archeological survey in vicinity of source locations to identify temporal and spatial use of obsidian by prehistoric and other peoples.
- (4) Conduct analysis on specimens collected in order to date and source samples. Compare information with other archeologists in the state in order to propose trade patterns.

WRST C303.00 Write Archeological Overview and Assessment

PROBLEM STATEMENT:

Wrangell-St. Elias National Park and Preserve comprises over 13 million acres. Within that acreage are a variety of landforms and resources that provided support for prehistoric peoples. Archeological work to date has identified approximately 75 prehistoric and ethnographic/traditional archeological sites. The Ahtna, Tanana and Tlingit peoples are known to have inhabited and utilized parts of the park. Park units must inventory and evaluate, in consultation with SHPO, its cultural resources. It is essential to have an understanding of the prehistoric and ethnographic archeological sites that have been identified or may be located within the park. This information is essential for protecting and managing the resource.

The overview and assessment is the first step in determining the need for and designing future archeological research. Based on a thorough examination of existing records, the overview and assessment describes and evaluates the known and potential archeological resources. It identifies the need for field survey and physical inventory of resources in an area. Each park unit is required to have an archeological overview and assessment.

Goal: To assess existing baseline archeological information and make recommendations concerning future research needs.

DESCRIPTION OF RECOMMENDED PROJECT(S):

The overview and assessment shall include sections on the environment, previous research conducted in the area, description of archeological resources and recommendations for management. More specifically the overview and assessment shall include:

- 1) Introduction
- 2) Description of the environment and the paleoecology and geomorphology of the region as it may contribute to future research designs.
- 3) Summary of all previous archeological research conducted in the area and any publications or reports that may have resulted from such work.
- 4) Description of the culture history of the area.
- 5) Summary of all archeological sites previously identified and documented in the park and vicinity in relation to temporal and spatial criteria.
- 6) Recommendations for management that discuss deficiencies in the archeological record, outline relevant research topics and provide recommendations for future research.
- 7) Extensive bibliography.

WRST C400.00 Collections Management

PROJECT STATEMENT:

Wrangell-St. Elias National Park and Preserve has approximately 4035 museum objects in its collection. These materials must be documented, protected, and preserved to Department of Interior (DOI) and National Park Service (NPS) standards for museum objects, as stated in the DOI Checklist for Preservation, Protection, and Documentation of Museum Property, the NPS Museum Handbook, Parts I and II, and NPS-28, Cultural Resources Management Guideline. Current staffing and funding are inadequate to accomplish work necessary to correct existing backlog, bring museum collections management up to DOI and NPS standards and continue to manage museum collections. Preparation and submission of reports in response to calls are required including the annual inventory of museum property, the Collections Management Report, and the annual submission of completed Museum Catalog Records. The environment must be monitored and controlled on a regular basis. Objects on exhibit and in storage must be inspected and maintained. Preservation treatments must be accomplished and the museum spaces maintained. Deficiencies must be identified and funding secured for staff, supplies, and equipment needed to manage museum collections at DOI and NPS standards.

Until the recent hire of the park cultural resource management specialist all collection responsibilities have been varied and at times been inadequate. The park's museum collection contains many cataloged as well as uncataloged items. Many items are stored at ARCC for want of adequate storage facilities within the park. Herbarium samples have been acquired but have yet to be mounted and stored adequately. Housekeeping plans need to be written, implemented and monitored for historic structures at Chitina and Chisana and for the collections on exhibit at Yakutat. Increased cultural and natural science baseline data imposes an additional curatorial workload that has not been met. Disaster plans need to be developed for the park collections.

DESCRIPTION OF RECOMMENDED PROJECT(S):

Provide adequate funding and staffing to implement and maintain curatorial/museum plans and programs at DOI and NPS standards. Set priorities of improving collection management. Develop a plan to manage the park's collections on a basic, day to day level. Identify long-term needs/goals for managing the collections. For previously cataloged collections in the park evaluate them for proper packaging, treatment and storage. Make necessary changes. For uncataloged items in the park evaluate, accession, catalog, treat and store as necessary. Accession and catalog collections stored at other institutions after determining extent of collections. Mount biological specimens as necessary. Copy archival material, including field notes on acid-free paper. Develop plans for adequate storage and proper environment in the new Visitor Center. Develop housekeeping plans for historic structures in use, and for exhibit areas.

WRST C500.00 Ethnographic Overview and Assessment

PROBLEM STATEMENT:

Wrangell-St. Elias National Park and Preserve comprises over 13 million acres. Four ethnographic groups of people are known to have inhabited and utilized what is now Wrangell-St. Elias National Park and Preserve. These people are the Ahtna, the Upper Tanana, the Tlingit and possibly the Eyak.

Ethnographic resources take many forms (sites, structures, objects and landscapes), knowledge about a park's ethnographic resources provides useful information and valuable perspectives when implementing NPS policies, programs and activities. NPS Management Policies (5:12) states that "to ensure that NPS plans and actions reflect contemporary knowledge about the cultural context of . . . ethnographic resources, the National Park Service will conduct appropriate cultural anthropological research in cooperation with park-associated groups." Prior to conducting cultural anthropological research, it is essential to identify and summarize previous ethnographic studies and to evaluate and identify data gaps.

Since initial white contact Russian, English and American explorers have written about their interactions with Native peoples they encountered. Additionally researchers have conducted ethnographic studies of these same groups. It is essential to identify previous studies and known anthropological work prior to conducting additional cultural anthropological research. The ethnographic overview and assessment also provides valuable baseline data which is useful in implementing various NPS programs and activities.

Goal: To compile all known ethnographic resource information concerning the Ahtna, Upper Tanana, Tlingit and Eyak groups that occupied and utilized what is now Wrangell-St. Elias National Park and Preserve. Make recommendations for management.

DESCRIPTION OF RECOMMENDED PROJECT(S):

The purpose of the ethnographic overview and assessment is to compile all known ethnographic resource information concerning the Ahtna, Upper Tanana, Tlingit and Eyak groups that occupied and utilized what is now Wrangell-St. Elias National Park and Preserve. Once this data is summarized in a report useful for park managers to reference, gaps in the ethnographic record need to be identified and recommendations for filling those gaps made. This project will primarily be a review of existing literature, including but not exclusive of published documents, unpublished manuscripts, field notes, and oral history tapes. In addition some ethnographic interviews within the local communities may be required to ensure that all data sources have been identified.

WRST C500.01 Ethnographic Overview and Assessment-Ahtna

PROBLEM STATEMENT:

Ethnographic information on the Ahtna people is spotty, dated, and not geared to management concerns and NPS land holdings. Much of the information attempts to reconstruct pre-contact aboriginal life, while acculturative forces affect Ahtna dramatically each day. Because forces of change are so potent, information and life histories of people living today, or in the recent past, are critical and will become increasingly valuable through time.

By involving and recognizing the Ahtna people as valuable and knowledgeable resources, the project will build communication channels between the NPS and Ahtna natives. This oral history project will provide an attractive gathering of information from a contemporary Ahtna perspective.

Information on recent Ahtna use and relations with natural resources are typically quantitative harvest data nested in socio-economic data. The larger cultural context in which natural resource/subsistence takes place is usually ignored. This study will provide a richer context to understand subsistence data as well as Ahtna ethno-science.

DESCRIPTION OF RECOMMENDED PROJECT(S):

The study will investigate one of the four geographic sub-groups of the Ahtna - those Ahtna living in the lower Copper and Chitina Rivers. There are two phases to this project. Phase I consists of an ethnographic overview and assessment of historic Ahtna residences on the lower Copper and Chitina Rivers, in or adjacent to the park. The overview will:

1. Identify, collect, and evaluate written, oral, legal, historic, and prior ethnographic literature about the Ahtna. Collections will be deposited at park headquarters;
2. Synthesize the extant information into a written report;
3. Develop a working relationship with area Ahtna that contributes to the written report; and
4. Critically evaluate documentary resources and identify subject areas that need further research.

Phase II, a directed ethnographic oral history project, will:

1. Conduct oral histories with Ahtna elders, community leaders, and residents of the lower Copper River and Chitina River;

2. Gather information from oral histories and any other ethnographic means on contemporary Ahtna conceptions of natural resources (e.g., animals, glaciers, rivers, etc.), environmental knowledge, resource allocation, and place names; and
3. Write a report summarizing the project's findings which is written for land managers and interested lay persons.

Division of Cultural Resources-Alaska Regional Office has written a 10-238 proposal for this project.

WRST C500.02 Ethnographic Overview and Assessment-Phase II

PROBLEM STATEMENT:

It is essential to identify previous studies and existing anthropological work prior to conducting additional cultural anthropological research. The ethnographic overview and assessment also provides valuable baseline data which is useful in implementing various NPS programs and activities.

Since the arrival of the Russians in the 1700s useful ethnographical information concerning Alaska's Inupiaq, Yupik, and Athabaskan peoples has been presented in various writings and publications. More recently the media for recording ethnography has included oral and video tape. In the two centuries since European contact there has been a tremendous amount of documentation of Alaska's Natives. Ethnographic information can be found in a number of formal anthropological and sociological studies. Some have been published and are well known while others are in progress, unpublished or more obscure. The results of these studies include extensive written documents, papers delivered at professional meetings, transcribed and untranscribed oral histories and interviews, and perhaps other media as well. Other sources include secondary notes in scientific and exploration journals, in diaries and letters from village teachers and tradespeople, and in official documents. Bibliographies dealing with specific research projects or groups of people abound. However there is no exhaustive annotated ethnographic bibliography of the entire state that includes printed, oral and video documentation.

All Alaskan park areas have some association with at least one of those Native groups inhabiting or utilizing resources in park areas. These groups include various bands of Inupiaq, Yupik and Siberian Yupik of the Arctic as well as Athabaskan groups in the Subarctic and Northwest Coast. Managers, researchers and interpreters need to know the available ethnographic literature. The preliminary phase of the early months of many research projects consist of a literature review. Managers and interpreters who do not work with ethnographic material on a regular basis need a comprehensive bibliography that can provide them with a list of pertinent information they need.

The large area of the state, the number and complexity of Native peoples and the great number of references make this a major undertaking. Consequently bibliographies useful for park managers, interpreters and researchers need to be based on culture groups associated with a park or cluster-park.

There is a potential for duplication of ethnographic studies. Many Native people feel that they have already been interviewed extensively. Without a comprehensive annotated bibliography it is difficult to develop unique or unduplicated ethnographic project statements. Ethnographic overviews and assessments may be included in RMPs, but will not be completed for several years. A comprehensive annotated bibliography will provide the manager, interpreter and researcher a resource. Because of the large geographic size of WRST and number of Native

peoples conducting traditional activities in the park (Ahtna, Tanana, Eyak and Tlingit) the overview and assessment will be a major undertaking. Development of an extensive annotated bibliography would provide park management staff with a useful resource that would aid future research studies. It would also be a component of the overview and assessment that may not be completed for a number of years.

DESCRIPTION OF RECOMMENDED PROJECT(S):

The objective of Phase 2 is to develop (1) an annotated bibliography of all ethnographic and sociological projects conducted on the Upper Tanana, Tlingit, and Eyak people who inhabit and utilize resources in the park, (2) an ethnographic resources inventory and (3) a strategy for identifying further studies. The annotated bibliography will document all types of media including published and unpublished documents, oral histories and interviews, videotape and photographs. At a minimum documentation will include: author, title, date published and date project conducted, type of media, if tape whether transcribed, current location of work, status of work if incomplete, geographic boundaries of project and a description of the contents. Bibliographic information will be entered into Pro-cite for integration into other NPS bibliographic systems. In addition, information acquired through the ethnographic inventory will be placed into a relational database for incorporation into a geographic information system.

The project will be conducted by personnel knowledgeable of library science. Compilation of most references can be done through computer searches. Communication with reference librarians, ethnographic professionals, and Native groups will be necessary to acquire other resources.

FUNDING AND STAFFING:

Salary: cultural anthropologist or student (4 months at GS-9 equiv.)	\$13,600
travel and per diem	\$5,000

TOTAL:
\$18,600

WRST C501.00 Traditional Use Study

PROBLEM STATEMENT:

Wrangell-St. Elias National Park and Preserve has a history of traditional use of its resources by Ahtna, Tanana, Eyak and Tlingit peoples. Upon passage of the Alaska National Interest Lands Conservation Act (ANILCA) in 1980 that traditional use did not cease to occur. It continues to occur today and many Native peoples reside within the park and continue traditional activities. Hunting, fishing, and plant gathering are the most obvious of the existing uses of park resources by Native populations. Other activities important to Native peoples also occur but park management does not know the extent and depth of traditional uses of its resources by Native peoples in the area. Management of these resources is critical to both park staff and the traditional user. Impacts to resources occur naturally and as a result of increasing visitor use. In order to manage these resources so that they may continue to be available and accessible for traditional uses they must first be identified.

Although ANILCA requires a priority for subsistence use of fish and wildlife resources by rural Alaskans other resources are of concern to Native peoples but of lesser significance to legislators and managers. Plant resources, traditional resource gathering areas and historic, or spiritual locations are also important for Native peoples. Section 14(h)(1) of the Alaska Native Claims Settlement Act (ANCSA) provides for the selection and withdrawal of historic and cemetery sites from federal land. If management is to protect and preserve traditional hunting, gathering and historic resources and locations they must be identified and the significance to Native peoples must be understood by management.

Goal: To identify resources traditionally used by Native peoples in the park and map traditional resource areas with Native place names so that these resources may be protected.

DESCRIPTION OF RECOMMENDED PROJECT(S):

The objective of this project is to identify resources traditionally used by Native peoples in the park and map traditional resource areas with Native place names. In order for management to understand and appreciate the importance traditional resources have to Native peoples, descriptions of traditional uses of those resources, culturally derived sharing practices and traditional resource management values associated with use of traditional resources need to be included in this study.

Because the park includes a variety of terrain and traditional use groups the study should examine different areas of the park separately. These areas should include the coast traditionally used by Tlingit and Eyak peoples; the area between the coastal zone and the Wrangell Mountains traditionally inhabited by the Ahtna; and the area north of the Wrangell Mountains traditionally used by the Ahtna and Tanana peoples.

The sensitive nature of some of this information, especially the site locations will require consultation with the associated Native groups from the very inception of the project.

TOTAL:
\$18,600

WRST C502.00 Cultural Affiliation Study

PROBLEM STATEMENT:

With the arrival of schools, churches, stores, roads and other public conveniences, Native peoples began congregating and living in larger villages along the road system. Previously they had lived in smaller family groups dispersed throughout what is now Wrangell-St. Elias National Park and Preserve. Scattered throughout the area people had access to and utilized a variety of plant and animal resources within areas of the park. Consequently today many Native peoples continue to use park resources but do not live within the park and preserve boundaries.

Native people in local communities are permitted by the Alaska National Interest Lands Conservation Act to pursue customary and traditional uses of "wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools or transportation; for the making and selling of handicraft articles . . ." (16 USC 3113). Those local communities specifically mentioned include: Tok, Mentasta Lake, Slana, Nabesna, Chistochina, Gakona, Gakona Junction, Gulkana, Glennallen, Tazlina, Copper Center, Kenny Lake, Lower Tonsina, Tonsina, Chitina, Yakutat, McCarthy, and Chisana. Families who once resided in and utilized parts of the park but who do not live in these communities may be restricted from their customary and traditional uses.

In order to manage park resources and to insure that those people who traditionally used the park can continue to do so it is necessary to identify cultural affiliation.

Goal: To identify what families traditionally used park resources.

DESCRIPTION OF RECOMMENDED PROJECT(S):

The project would entail examining existing literature and interviewing people in outlying communities who utilized the park's resources. Information gathered would include kinship information, family ties to traditional use areas, and traditional activities conducted within the current park boundaries.

The project will consist of 3 phases with each phase focusing on a different area of the park. Phases are broken down by geographic area and cultural group and include the Nabesna district traditionally used by Tanana and Ahtna Athabaskans, the Chitina district used by Ahtna Athabaskans and the Yakutat district used by the Tlingit. Existing literature will be examined to provide a base from which to conduct interviews. Most of the work will involve talking to elders and other family members and asking them questions concerning where they were born and raised, where their parents, grandparents, great-grandparents, etc. were born and raised, where in the park they harvested resources and conducted other traditional activities.

Cultural anthropologist (1 year)	\$33,000	
Local consultant (6 months)	13,000	
Travel and per diem	3,000	
Informants fees	3,000	
TOTAL		\$52,000

WRST C503.00 Ethnobotany of the Ahtna

PROBLEM STATEMENT:

The Ahtna Athapaskan, one of four Native American groups which live in the boundaries of Wrangell-St. Elias National Park and Preserve, have occupied lands designated as Park and Preserve except for the coastal regions. The Ahtna territory in the nineteenth century included the Copper River Valley, was bordered on the east by the Wrangell Mountains, on the west by the Matanuska, Talkeetna and Susitna Rivers and to the north by the Alaska Range as far as Cantwell (de Laguna and McClellan, 1981). There are 886,100 acres of conveyed, selected and allotment Ahtna lands within park boundaries (U.S. Department of the Interior, 1986).

Nelson (1973, 1983), Kari (1987), de Laguna and McClellan (1981) and others have documented plant uses by Native subarctic people for food, shelter, fuel and equipment. These uses are similar for different subarctic groups, the most significant plants being trees and shrubs (spruce, birch and willow) and the edible berries. de Laguna and McClellan (1981) treated Ahtna plant use generally when they discussed subsistence uses, however an inventory of Ahtna plant uses has not been compiled or published.

Priscilla Russell, author of Tanaina Plantlore, An Ethnobotany of the Dena'ina Indians of Southcentral Alaska, conducted interviews on Ahtna Native plant uses with members of the four Ahtna dialects during the mid 1970's while James Kari was researching the Ahtna language for his Ahtna Athabaskan Dictionary (1990). Priscilla Russell has not completed this ethnobotanical research with the Ahtna.

Information is scarce on the use of plants by subarctic native people as medicine, the use of plants by spiritual leaders and healers and the role of plants in the spiritual world. Nelson (1973, 1983) theorized that plants may never have been important in the lives of the Tranjik Kutchin and Koyukon except for the economically important ones. However, of the 101 taxa that the Dena'ina recognize by name in their language, forty-seven of these have known medicinal uses (Kari, 1987). Nelson documents Koyukon Distant Time stories where trees were transformed from a human but Nelson feels that only those small plants with economic significance will have a place in the Koyukon spirit world.

The Ahtna, a people with an estimated history of 2000 years (Kari, 1985) would be expected to have developed a pharmacy of plants to treat illness and a body of knowledge associated with this pharmacy. de Laguna and McClellan (1981) discuss the importance of spiritual leaders and healers to the Ahtna but there is no mention of the plants used in healing. Has this knowledge not been transmitted due to the influence of Christianity and acculturation or was there never an extensive use of plants as medicine? It may already be too late to answer this question since many of the Ahtna elders, spiritual leaders and healers have recently died.

The International Union for Conservation of Nature and Natural Resources (IUCN) and the World Health Organization (WHO) published guidelines for the conservation of medicinal plants

(1993) which emphasized the importance of medicinal plants in primary health care, the urgency of identifying and protecting plant resources and the importance of protecting indigenous cultures which hold the knowledge to plant uses. It is the responsibility of land management agencies to identify and protect these resources.

Erna Gunther, in conducting her research on the ethnobotany of Western Washington was discouraged at the rapid loss of knowledge due to acculturation, deforestation and the introduction of weeds. "On the other hand," she says, "sometimes features of the old culture - like medicinal usages - cling with amazing tenacity" (Gunther, 1945). May this be the case with the Ahtna.

Many of Priscilla Russell's informants from her earlier research are no longer living and the remaining few informants are elderly or in poor health. Knowledge of Ahtna plant uses will be lost with this generation if this information is not recorded, compiled and disseminated within the next few years. Funding to study the ethnobotany of the Ahtna, and specifically the medicinal uses of the Ahtna, would allow Priscilla Russell to complete her ethnobotanical interviews and research so that the following objectives could be met.

OBJECTIVES:

- Document the herbal, medicinal and sacred uses of plants by the Ahtna to preserve this knowledge for the Ahtna people and to assist land management agencies in the protection of Ahtna cultural and natural resources.
- Stimulate an interest and exchange among the Ahtna in knowledge of their culture related to plant uses and associated rituals.
- Use the discussions about plants as a vehicle to compile stories about Ahtna life before the arrival of white man, in the nineteenth century and today.

Some specific questions to be addressed are:

- How significant were plants in the lives of the Ahtna before contact with white man? Other than food and shelter were plants important for healing and rituals?
- How many Ahtna alive have a knowledge of herbal, medicinal and sacred uses of plants? Is this knowledge being transmitted to the younger generation?
- What stories and myths involve plants? Are there plants which should be protected, or areas of gathering that should be protected? What rituals are there involving the gathering and use of plants?
- How many plants are recognized by the Ahtna and of these how many have medicinal uses or spiritual significance?

-What plants were used by the spiritual leaders and healers? Did the spiritual leaders and healers receive any power through plants?

-What were the roles and knowledge of men and women in healing practices and medicinal plant use?

-What traditional values are associated with plant gathering? Are there certain practices involved in gathering plants of special significance? What plants would be avoided?

-What plants were used during the rituals of life (birth, puberty, potlatch, war, hunting and death)?

DESCRIPTION OF RECOMMENDED PROJECT(S):

METHODS AND TIME SCHEDULE

Year 1

Compile a bibliography on native plant use by subarctic peoples, review this literature and develop hypotheses about medicinal uses by the Ahtna.

Compile Russell's previous interviews, review for content, determine gaps in information, contact informants.

Conduct interviews.

For medicinal plants the guidelines of Lipp (1989) will be used to document the way in which the medicine is prepared and used and by whom; to document the parts of the plant used in the preparation and whether they are fresh, dried or processed; to describe the illness treated; to estimate the abundance of the medicinal plants in the area of collection and to document when, how and by whom the plant material is collected.

Coordinate native plant workshops with Ahtna elders.

Synthesize data from interviews and past research, compile catalog of plants, names and uses, enter data in computerized databases, analyze data and prepare technical documentation.

Prepare voucher specimens of all plants used by the Ahtna, with the identity verified. Specimen labels will include the Ahtna name and uses.

Year 2

Continue synthesis and analysis of data and the preparation of technical documentation.

Prepare a publication of the results of the research for use by the Ahtna people, ethnobotanists, ethnopharmacologists, ethnographers, anthropologists and land use planners.

Develop a native plant garden at the visitor center.

DELIVERABLES:

Research Documentation

Data collected will be catalogued, entered into databases, analyzed and organized in a fashion that is easily retrievable. Field notes, interview tapes, site maps, species lists with Ahtna names and uses, stories about plants and their uses and any sensitive information will be compiled for use by National Park Service and interested Ahtna individuals. Sensitive information may include locations of plants which may need protection or special collecting areas which may need protection. Some stories may be sensitive to the Ahtna and would also have a restricted distribution.

Scholarly publication of research to be distributed to the Ahtna people, ethnobotanists, ethnopharmacologists, ethnographers, anthropologists and land use planners.

The data acquired in this survey will be disseminated in a way that the Ahtna would receive benefits from any commercial use of the information (WHO, IUCN, WWF 1993). This publication would not be for public sale, but would be distributed at no cost to interested individuals or organizations. The publication would not include any sensitive information as described above. It would include a catalog of Ahtna plants and uses but this information would not be the body of the text.

The format of this publication will to some extent be determined by the nature of the material that Russell acquires. The publication will include black and white historic and current photos of plant gathering activities as well as line drawings of the Ahtna plants.

Stories, myths and essays about the Ahtna with plants as the focus could be interspersed with the ethnobotany text in order to stimulate an interest in the cultural traditions, history, healing practices and problems facing the Ahtna today. These essays would be along the lines of Nabhan's Gathering the Desert (1985) and The Desert Smells Like Rain (1982), accounts of plant use by the Tohono O'odam of Arizona and Mexico.

The data could be organized in a traditional format such as that used for the ethnobotany of the Seri (Felger and Moser, 1985):

I People and Setting

II Ethnobotany

- spiritual life

- rituals of life (birth, puberty, death, potlatch, war, hunting)

- shamanism

myths, stories and history
medicinal uses
shelter and fuel
equipment
dress and adornment
recreation, music and art

III Species Accounts

Collection for the park herbarium

Each plant documented will have a voucher specimen collected with the Ahtna name and uses noted on the specimen label. A field collection could also be prepared to be used in teaching and in workshops.

Native plant workshop

A workshop on native plant uses with Ahtna elders and children would be coordinated and perhaps an apprentice program would be developed whereby young Ahtna could work with Ahtna elders to learn about plant uses.

Medicinal plant garden

A garden of native plants with Ahtna names will be developed at the visitor center for the interpretation of medicinal plant uses.

FUNDING AND STAFFING

I. Responsibilities and Investigators

Priscilla Russell, ethnobotanist, will be the principal investigator and will conduct interviews, synthesize data and write reports.

Anne Worthington, Cultural Resource Specialist for Wrangell-St. Elias NP/P, will supervise the project and coordinate publication activities.

WRST botanist will assist Priscilla Russell as needed with interviews, compilation of notes, documentation and publications and will prepare a voucher collection for the park.

II. Cooperators

Members of the Ahtna Villages will be consulted for participation and approval of the research objectives, methods and proposed products. Botanists from the University of Alaska, Museum will assist in the determination of difficult taxa.

III. Funding

Year 1

Salary for Priscilla Russell	14,000	
Travel and per diem for Russell	9,330	
Informant fee	2,500	
NPS Cultural Resource Specialist	(salary covered)	
NPS Botanist	(salary covered)	
TOTAL		27,030

Year 2

Salary for Priscilla Russell	14,000	
Travel and per diem for Russell	5,265	
NPS Cultural Resource Specialist	(salary covered)	
NPS Botanist	(salary covered)	
Publication costs	20,000	
TOTAL	39,265	
GRAND TOTAL		\$66,295

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WRST N200.00 Air Quality Management

PROBLEM STATEMENT:

The National Park Service is responsible to preserve, protect and enhance air quality and related values of the National Park System units under both its Organic Act (16 U.S.C. 1, 1a-1) and the Clean Air Act (42 U.S.C. 7401 et seq.). As a result of these mandates, it is important to perpetuate the best possible air quality in the National Park System.

The quality of the air in Wrangell-St. Elias NP/P plays a vital role in both visitor enjoyment and perpetuation of historic and natural resources. Clear views of landscapes and enjoyment of the scenic values are identified uses in the enabling legislation. Wrangell-St. Elias NP/P is designated Class II under the Clean Air Act, the second most stringent air quality standards. National Park Service policy dictates that efforts will be made to control, mitigate, or eliminate adverse alteration of air quality.

Existing air quality appears to be good; however, visibility is occasionally obscured by windblown glacial silt and smoke from wildfires. Particulate levels which reduce visibility are major concerns when population centers, air traffic and ground transportation routes are affected.

The park/preserve lacks quantitative baseline information on existing air quality levels and sources of pollution. The nearest air quality monitoring stations are Anchorage, Fairbanks, and Valdez. Therefore, it is unknown if present air quality complies with Class II standards.

Goal: To ensure compliance with the Clean Air Act through the identification of potential and existing pollution sources and the control, mitigation, or elimination of adverse alteration of air quality.

Status: The park/preserve has been operating since 1986 and continues to operate a stack filter sampling unit. In addition, Alaska Environmental Information and Data Center (AEDIC) conducted baseline particulate sampling in 1989 and 1990 as part of the EIS for the Alaska Over-the Horizon Backscatter Radar System.

DESCRIPTION OF RECOMMENDED PROJECT(S):

(1) Initiate an air quality and visibility monitoring program. This program would enable the park/preserve to collect and analyze data to establish baseline conditions of air quality and visibility, identify potential and active pollution sources within and external to park boundaries, and recommend management actions to control, mitigate, or eliminate pollution.

Park management would be provided with information needed to initiate an air quality management program in cooperation with the State Department of Environmental Conservation.

FUNDING AND STAFFING:

Funding identified would be in the form of an increase to operating base for Resources Management.

FY1

Resources Management - Air Quality Monitoring
Personal Services

\$ 3000

COMPLIANCE STATUS: The actions proposed in this statement are judged to be categorical exclusions based on 516 DM 6, Appendix 7.4 E(2) "Day-to-day resource management and research activities". Section 106 compliance with the National Historic Preservation Act may be necessary based on instrument location.

WRST N202.00 Pollutant Biological Monitoring Study

PROBLEM STATEMENT:

In 1988, the U.S. Air Force, proposed the construction of the Alaska Over-the-Horizon Backscatter Radar System. This consisted of the construction of a transmit site in Gakona approximately 1km from the boundary of Wrangell-St. Elias NP/P and a receive site south of Tok. The primary cause for concern is the construction and operation of a 10MW coal/butane fired power plant to support transmit operations.

Atmospheric sulfur, nitrogen, and trace element pollutants are increasing in national park units throughout the system. Pollutants of major concern entering parks include, but are not limited to sulfur oxides, nitrogen oxides, mercury, lead, iron, arsenic, copper, zinc, cadmium, chromium, and vanadium. Several of these elements will be released into the atmosphere once the 10MW coal/butane fired power plant is in operation. At least 15 percent of the park/preserve will be affected by emissions from the power plant based upon wind direction data from AEIDC.

GOAL: To determine the elemental baseline concentration of lichens, mosses, spruce and soils within the fall-out range of the 10 MW coal/butane fired power plant.

STATUS: The 10MW coal/butane power plant was constructed in 1991, however, it was never placed in operation. The U.S. Air Force has transferred ownership of the transmit property to the U.S. Navy. The U.S. Navy through its contractor, Phillips Laboratory, plans to utilize the property and the power plant building to conduct research on the Aurora borealis. They do not plan to activate the power plant. A final EIS was prepared.

DESCRIPTION OF RECOMMENDED PROJECTS(S):

The purpose of the biological monitoring study is to determine the baseline geochemical conditions for soils, lichens, mosses, and spruce trees. Information generated from this study will be used by the National Park Service in responding to environmental documents and air quality permit applications to prevent potential impacts to park resources.

Listed below are specific objectives and proposed responsible parties for achieving each objective and time-frame.

(1) Design a pollutant biological monitoring program to determine the baseline geochemical conditions of soils, lichens, mosses, and spruce trees. This will require the installation of vegetation transects in the affected area for long-term assessment of ecological condition and changes in elemental concentrations of a variety of trace elements within plant and soil materials.

- (2) Implement the pollutant biological monitoring study.
- (3) Analyze data and prepare a final report.
- (4) Utilize report to respond to environmental documents and air quality permit applications.

FUNDING:

FY1

Biological Technician	\$ 14000	
WASO-AQD Travel		4000
Elemental Analysis		15000
Field Logistics (Helicopter)	9000	
Supplies/Equipment		4000
Subtotal	49000	

FY2

Biological Technician(s)	20000	
WASO-AQD Travel	4000	
Elemental Bio-monitoring plots	50000	
Field Logistics (Helicopter)	11000	
Supplies/Equipment		1500
Subtotal	86500	

FY3

Biological Technician		14000
WASO-AQD Travel	4000	
Subtotal	18000	

ESTIMATED TOTAL COST	153500
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COMPLIANCE STATUS: The actions proposed in this statement are judged to be categorical exclusions based on 516 DM 6, Appendix 7.4 E(2) "Day-to-day resource management and research activities". Section 106 compliance with the National Historic Preservation Act may be necessary based on instrument location.

WRST N203.00 Monitoring of Climatological Conditions

PROBLEM STATEMENT:

There is irregular and insufficient systematic collection of climatological data within the boundaries of Wrangell-St. Elias National Park and Preserve.

Wrangell-St. Elias NP/P is located along this major storm center tract. The extent of glaciation, ideal climatic location, and glacier variability make it one, if not the highest priority site within North America for conducting investigations of climate and glacier interactions. The region is understudied considering its potential and unique characteristics.

General descriptions of climatological conditions for the area were presented by the Bureau of Land Management, 1970, and in the Final Environmental Impact Statement prepared by the National Park Service for the proposed Wrangell-St. Elias National Park, 1974. Climatic conditions in the Chitistone Pass area were described by Brazil, A.J. and M.G. Marcus, 1974.

Locations where climatological data is being collected by National Oceanic and Atmospheric Administration (NOAA) and the Federal Aviation Agency (FAA) in the vicinity of Wrangell-St. Elias include: Northway, Slana, McCarthy, Edgerton Highway, Gulkana, Nabesna, Valdez, Cordova, and Yakutat. During the fire season, the AK-DNR collects fire weather data at Chistochina, Tazlina, Tazlina Lodge, Chitina, and Kenny Lake. Although numerous, only the Nabesna and McCarthy sites are within the park, the others lie around the periphery of the park boundary.

High quality climatological data is collected at some sites; however, data quality suffers due to irregularity of data collection and site location.

Due to the wide variety of topographical and ecological features within the park and the peripheral location of existing data collection sites, internal climatological conditions are unlikely to be accurately reflected in present data.

The Park relies on data collected by the State, National Oceanic and Atmospheric Administration, and the Federal Aviation Agency. Climatological observations are made by Park Service personnel on field patrols, but do not occur on a regular and systematic basis.

Climatological information that is currently available is of limited use and probably does not accurately reflect conditions within Wrangell-St. Elias National Park and Preserve.

This lack of information adversely affects the fire management program and park aviation. It does not allow the compilation of baseline data for incorporation into ecological studies and overall field activities planning. In addition, climatological data is important for assessing the effects of severe weather on fluctuations in wildlife populations.

Goal: To develop an accurate description of climatological conditions and their effect upon park resources.

DESCRIPTION OF RECOMMENDED PROJECT(S)

Listed below are specific objectives and proposed responsible parties for achieving each objective and time frame.

(1) Expand the present remote automatic weather station (RAWS). In cooperation with the National Weather Service, identify strategic locations for automatic weather stations within the park and preserve. The use of RAWS will enable weather stations to be located in remote areas of different vegetation types, elevation, and aspect. This network of weather stations will provide the park with aviation and fire weather data that would be unattainable using any other methods. Also, RAWS would allow climatological data to be collected on a regular and systematic basis year around, without the variations experienced in data from manned weather stations.

(2) Establish climatological baseline and historic records. Not only would climatological data be available for aviation and fire management programs, it would also establish baseline and historic records that would assist in park activities and development site planning, as well as provide invaluable information to ecological studies. Weather information also would be valuable to park visitors.

(3) Integrate climatological data collection among agencies. The implementation of this course of action will result in an integrated climatological data collection network which will provide needed information for the fire management program, aviation, planning of park activities, visitor inquiries and ecological research projects.

(4) Provide climatological information for uninhabited areas within the park/preserve. The use of a RAWS network will allow for a regular and systematic collection of climatological data in uninhabited areas on a year around basis. Manned weather stations will allow for the expansion of weather data collection systems during the fire season and ensure continuity of coverage in the event of mechanical failure. Also, this course of action will create opportunities for the rural resident to participate.

FUNDING AND STAFFING:

FY1

Biological Technician (.6 FTE)	\$ 15000	
Expanded RAWS network (2-3 stations)	45000	
Install RAWS network	50000	
Annual Maintenance		30000
Subtotal	68000	

FY2	
Annual Maintenance	50000
GRAND TOTAL	73000

COMPLIANCE STATUS: The actions proposed in this statement are judged to be categorical exclusions based on 516 DM 6, Appendix 7.4 E(2) "Day-to-day resource management and research activities". Section 106 compliance with the National Historic Preservation Act may be necessary based on instrument location.

WRST N304.00 Long-Term Ecological Monitoring

PROBLEM STATEMENT:

The spectacular mountains, glaciers, fjords, rivers, lakes and marine coastline of Wrangell-St. Elias National Park and Preserve (WRST) are the products of plate tectonics, climatic, glacial erosion and melting, and marine currents. These phenomena have interacted to shape the topography and physical setting of the region and contribute to a multitude of physical habitats that provide shelter and substrate to support the high productivity and bio-diversity of the region. The terrain driven habitats range in elevation from 18,000 foot mountain peaks to below 2,000 foot marine depths.

The ecosystem complex lies in one of the most tectonically active regions in the world. Over the millennia, the landscape has been shaped by volcanic action, earthquakes, and glaciation. The 1964 Alaskan earthquake was the largest ever recorded in North America. The complex topography resulting from these processes has profoundly influenced habitat diversity, distribution of species, biotic processes and climate.

Wrangell-St. Elias NP/P is at the heart of North American glaciation and contains some of the northern hemisphere's largest glaciers. The park and preserve encompass two major glacier belts, the Chugach/St. Elias and Wrangell/St. Elias, which merge in the St. Elias Mountains region. Glaciers cover approximately 20 percent of the 13 million acres within the park. Ice covered areas extend from sea level to over 16000 feet altitude. Tide water glaciers and high alpine ice fields are present; most areas over 6000 feet are covered by permanent snowfields or ice. A variety of types and sizes of glaciers exist. Individual glaciers have a wide range in percent area of ablation and accumulation, equilibrium line altitude, and activity levels.

Storm centers which originate in the "Aleutian Low" track northeastward into the coastal mountains of Alaska. Interaction between these storm centers, polar highs and the extreme relief of the St. Elias region produce some of the northern hemispheres highest precipitation and temperature gradients. Climate conditions ranging from wet, warm, coastal/maritime to dry, cold interior are represented within the park.

Wrangell-St. Elias NP/P is located along this major storm center tract. The extent of glaciation, ideal climatic location, and glacier variability make it one, if not the highest priority site within North America for conducting investigations of climate and glacier interactions. The region is understudied considering its potential and unique characteristics.

Wrangell-St. Elias NP/P is the largest unit within the National Park System. With over twenty-five percent of the landmass covered by glacier or permanent snowfield, it contains one of the largest fresh water reserves in the northern hemisphere. The headwaters for the dynamic Copper and Tanana Rivers origin with in the park. Pristine fresh water lakes and glacial melt runoff dominated rivers constitute two major water resources. Complete watersheds (Chitina River) lie within park

boundaries. Diverse subarctic ecosystems have developed and are responding to changes in these water resources.

Potential and unique study locations within basins of which little is known abound. Scientifically valid monitoring protocols (quality and quantity) for these water resources within the park have not been identified. An inventory and monitoring program of the parks water resources is required. Information gathered through implementation of an inventory and monitoring program would be used to determine how water resources influence the ecosystem and are affected by changes (anthropogenic, climatic and natural).

This study would generate a proposal/study plan framework to identify, classify and select specific water resources for: (1) monitoring the quality and quantity of glacial basin runoff waters, large and small and (2) monitoring the clear water rivers, creeks, lakes and pond so that the role these water resources play in the ecosystem/habitat (seasonal and long term) to support water fowl, fisheries, aquatic plants and other resources can be determined.

Alaska and the Northwest Regions have numerous glacier melt runoff influenced rivers. Very little is known about the role these systems play in the ecosystem or how to monitor them during their seasonal hydrologic cycles. A common perception is that they are silt laden streams with little to offer and therefore, they have not received the credibility that "pristine" clear water bodies have in support of associated ecosystems. Alaskan wildlife and residents are directly or indirectly dependent upon the glacier fed water resources.

Specific study locations and scientifically valid monitoring protocols (quality and quantity) for these water resources within the park have not been identified. An inventory and monitoring program of the parks water resources is required. Information gathered through implementation of an inventory and monitoring program would be used to determine how the water resources influence the ecosystem and are affected by changes (anthropogenic, climatic and natural).

Freshwater is a critical component among many of the ecosystems within Wrangell-St. Elias NP/P. It is a major mechanism for distributing sediment, organic matter, and nutrients, which, in turn, determine levels of biotic processes in lakes, rivers, and marine environments. Rivers in the Copper Basin carry large amounts of glacial sediment, while the water flow in many smaller systems is more heavily influenced by less turbid snow melt or run-off. An estimated 38 million acre feet per year of water flow into the Gulf of Alaska from the Copper River watershed. The annual sediment load is 100 million metric tons, equivalent to one-quarter of the total sediment load of the Mississippi river, but draining from a watershed a water only a fraction of the size.

Clear water streams and numerous small lakes constitute a second major resource within WRST. The amount surface area covered by many small water bodies has reduced in size during the past 25 years. The cause is undetermined and may be the result of natural successional or climatic processes. Other unknown and undocumented changes are probable. In addition, coastal marine waters lay along the southern margin of the park. Without a baseline date set and monitoring program, ongoing changes resulting from anthropogenic, climatic and natural evolving system causes cannot be identified and differentiated.

WRST serves as classic example where potential threats to water resources could cause significant adverse impacts. There are approximately one million acres of land with nonfederal interests within park boundaries. Direct and indirect impacts are likely from mineral exploration and development, timber harvesting, commercial and non-commercial development, access, visitor infrastructure development, and fisheries exploitation. Both pristine and threatened waters occurs within the park providing a unique opportunity for in park comparisons.

Differentiating between causes of impact and determining their relative significance is crucial to resources management. Park management and planning decisions require a sound understanding of the water resources. Results of a monitoring program would be used for park planning and management.

DESCRIPTION OF RECOMMENDED PROJECTS(S):

Request funding to contract the development of a water resources inventory and monitoring proposal for Wrangell-St. Elias NP/P.

FY 1994:

Travel	\$1000
Contract	\$2500
Total	\$3500

COMPLIANCE STATUS: The actions proposed in this statement are judged to be categorical exclusions based on 516 DM 6, Appendix 7.4 E(2) "Day-to-day resource management and research activities". Section 106 compliance with the National Historic Preservation Act may be necessary based on instrument location.

WRST N305.00 Hydrology and Hydrologic Hazards of the Kennicott River Basin

PROBLEM STATEMENT:

SUMMARY: The purpose of the proposed study is to determine the general hydrologic conditions and associated natural hazards in the McCarthy/Kennicott area. The study will focus on the Hidden Creek Lake outburst flood (jokulhlaup). A secondary component will consist of surveying and monitoring active stream channels in the Kennicott and McCarthy drainages proximal to McCarthy. This is a refinement of the 1993 proposal. Information generated from this study will be used by the National Park Service (NPS) for identifying threats to visitors and planning facilities and transportation routes in an area that is projected to receive high visitor use. Additionally, the information gathered will be used for interpretive purposes.

Floods from the outburst of glacial dammed lakes in Alaska have caused considerable loss of property, damage to transportation links, and threaten human life. Hidden Creek Lake, located approximately 10 miles northwest of McCarthy within Wrangell-St. Elias NP/P (WRST), is dammed by the Kennicott Glacier. Annually, it drains subglacially into the Kennicott River. Flooding events are the dominate cause for migration and rerouting of the active channels in Kennicott River and McCarthy Creek. Public safety, personal and public property, and transportation infrastructure are threatened.

The Kennicott River basin is prone to several natural hazards: rain, snow and ice melt, and glacier outburst induced floods; channel migration; sediment erosion and deposition in outwash plains and alluvial fans; mass wasting; and snow avalanches. Usually one or more large floods occur each year when glacier-dammed lakes suddenly release impounded waters. Six such lakes have been identified in the Kennicott River basin (Post and Mayo, 1971). The largest, Hidden Creek Lake, when full covers about 2 square kilometers and is almost 120 meters deep adjacent to the glacier. [Lake volume estimates range from 7.1 to 9.2×10^7 cubic meters (Friend, 1988)]. The highest discharge in Kennicott River occurs during outburst events from Hidden Creek Lake (Jones S. and Glass R., in press). Smaller volume subglacial and englacial releases also occur during the summer. No precursor to the outburst flood events is documented. Change in water flow volume can be rapid and catastrophic. During flood stages channel scouring and rerouting occurs. Since the early 1900's active channels of the Kennicott River have occupied both western and eastern portions of the outwash plain. Destruction of the railroad and vehicle bridges that once spanned the Kennicott River are evidence of the powerful and dynamic nature of the river in flood stage.

The towns of McCarthy and Kennicott lie within the heart of WRST. McCarthy is situated one-half mile from the present terminus of the Kennicott Glacier and lies at the confluence of McCarthy Creek and Kennicott River. This town is the main business district of the McCarthy/Kennicott area and is easily accessible via an unimproved gravel road (McCarthy

Road). The McCarthy Road terminates at the west bank of the Kennicott River. Visitors and residents of the area access both towns by tramping themselves over the Kennicott River with a hand-tram during the summer months. Hand-trams were needed to cross the two major channels of the Kennicott River prior to 1992. Due to stream piracy, there is a reduced stream flow in the eastern channel and a foot bridge has been constructed which replaces that tram.

Recent surveys and monitoring demonstrates that the active channel on McCarthy Creek is migrating laterally causing bank erosion. Gabions have been employed to protect structures within the town of McCarthy.

Many of the historic properties, access points, visitor facilities (parking areas, lodges, etc.), and roads are within the alluvium of the Kennicott River and McCarthy Creek. During times of flooding the towns of McCarthy and Kennicott can become temporarily isolated from the McCarthy road head; visitors can become separated from their vehicles and one-another. Cars parked on the west bank of the Kennicott River could be damaged during flood episodes.

The NPS over the past few years has gained considerable interest and made progress toward the acquisition of the historic Kennicott mill site (National Historic Landmark). The Kennicott mill site is the primary visitor attraction in this area. Regardless of acquisition, the visitor influx to this area demands that the State of Alaska and the NPS develop adequate facilities to support and protect increased visitation. Before any formal planning can be conducted a better understanding of the Kennicott River drainage is needed.

DESCRIPTION OF RECOMMENDED PROJECTS(S):

Listed below are specific objects and proposed responsible parties for achieving each objective and time-frame,

- (1) Gather and synthesize all available information (historical and contemporary) pertaining to the hydrology and hydrologic hazards of the McCarthy/Kennicott area. Develop an annotated bibliography.

Responsible Party(s)	Time-Frame
Park Geologist	FY1
USGS (Cooperative Agreement)	FY1

- (2) Floods:

Determine the magnitude, frequency, and down drainage response time and relationships, for outbursts floods from Hidden Creek lake, other glacial dammed lakes along Kennicott Glacier, and rain induced floods. Measure stream water flow, high water marks, stream profiles, lake water levels and volumes. Place hydrographs on Kennicott River and in Hidden Creek Lake. Install and maintain flood crest stages.

- (3) Stream Channel Migration:

Survey current stream channel profiles and monitor channel migration, erosion and rerouting in Kennicott River and the lower reaches of McCarthy Creek. Develop baseline information and a plan for monitoring Kennicott River and McCarthy Creek. Map the surficial geology and hydrologic features near the Kennicott Glacier terminus.

Responsible Party(s)	Time-Frame
Park Geologist	FY1 - FY2
USGS (Cooperative Agreement)	FY1 - FY2

- (4) Snow avalanches:
Identify and develop baseline information for snow avalanche hazard areas using annual aerial observations, photography and historical records.
- (5) Landslide and debris avalanche zones:
Identify, map, and develop baseline information using aerial observations, photography and historical records.

Responsible Party(s)	Time-Frame
Park Geologist	FY2
USGS (Cooperative Agreement)	

FUNDING AND STAFFING: The project will be overseen by the park Geologist (30%) and the Chief, Resources Management (10%). The park geologist will coordinate and participate in all field work and the Chief, Resources Management will administer all cooperative agreements.

FY1		
USGS Interagency Agreement	\$15000	
		4000
OAS Support	5000	
Supplies	2000	
TOTAL	\$26000	
FY2		
USGS Interagency Agreement	\$15000	
	3500	
OAS Support	5000	
Supplies	500	
TOTAL	\$24000	
GRAND TOTAL	\$50000	

COMPLIANCE STATUS: The actions proposed in this statement are judged to be categorical exclusions based on 516 DM 6, Appendix 7.4 E(2) "Day-to-day resource management and research activities". Section 106 compliance with the National Historic Preservation Act may be necessary based on instrument location.

WRST N306.00 Floodplain Management

PROBLEM STATEMENT:

Executive Order 11988 "Floodplain Management" requires the identification and delineation of floodplains and high hazard floodways and the implementation of procedures to protect floodplains.

One floodplain has been identified along the Kennicott River. However, there are six major river systems within Wrangell-St. Elias and additional floodplains and high hazard floodways are sure to exist.

Several glacial outburst lakes and only one floodplain have been identified. The six major river systems have not been surveyed to delineate such features.

Development proposals that may affect floodplains or floodways cannot be evaluated and the legislative protection of these features is not being provided.

Goal: To comply with Executive Order 11988

DESCRIPTION OF RECOMMENDED PROJECT(S):

The purpose of this program is to identify and document floodplains and high hazard floodways as directed by Executive Order 11988. This information would assist in the protection of floodplains and visitor safety through the evaluation of planning efforts and development proposals.

Listed below are specific objectives and proposed responsible parties for achieving each objective and time frame.

(1) Initiate a survey of water courses with the NPS or U.S. Geological Survey personnel to identify and delineate floodplains and high hazard floodways.

(2) Prepare maps, transfer mapped information to mylar, digitize information and incorporate into the regional/park geographic information system.

FUNDING: This program would be overseen by the park geologist, however the identification and delineation of floodplains will be accomplished through a cooperative agreement with the U.S. Geological Survey.

FY1

Develop Cooperative Agreement

\$ 30000

FY2

Year 2 of Cooperative Agreement	30000
FY3	
Prepare mylar maps, digitize data	6000
GRAND TOTAL	\$66000

COMPLIANCE STATUS: The actions proposed in this statement are judged to be categorical exclusions based on 516 DM 6, Appendix 7.4 E(2) "Day-to-day resource management and research activities". Section 106 compliance with the National Historic Preservation Act may be necessary based on instrument location.

WRST N306.01 Floodplain Management-Cathenda Creek

PROBLEM STATEMENT:

Executive Order 11988 "Floodplain Management" requires the identification and delineation of floodplains and high hazard floodways and the implementation of procedures to protect floodplains.

The historic town of Chisana (a designated National Historic District) is located on Cathenda Creek alluvial fan 1.5 miles upstream from its confluence with the Chisana River. Portions of the historic mining district and private property are threaten by channel migration and associated sour and deposition. Most stream change occurs during rain induced flood events. The channel has migrated numerous time since the 1950's and currently erodes the northern bank during flood events. This proposal seeks funding to survey the alluvial fan. A base topographic map of the alluvial fan and adjacent bank areas would be the final product. This map would enable park management to monitor and assess potential future alluvial fan and channel conditions and assess the feasibility of any bank stabilization plans by the private landowner.

Cathenda Creek passes through the town of Chisana. It is a glacier feed drainage, but heavy rain fall and snowmelt produce the highest stream flows. The town is situated in the lower reaches of the creek upon its alluvial fan. A portion of the alluvial fan is subject to stream channel migration, aggradation, and scour as the stream attempts to adjust to the high sediment load. Prior to the establishment of the park, area residents diverted the channel, excavated channels and constructed gravel berms to protect and "control" the river.

Alluvial fan channels change naturally and periodically. Sediment scour and aggradation occur during periods of high water flow. A channel direction change in the upper portion of an alluvial fan can result in major changes in its lower reaches. Typically, alluvial fans have a convex upward cross-fan profile and a concave upwards radial profile. The fan profiles control channel migration.

Currently Cathenda Creek occupies a channel along its southern margin. During flood events, most of the unvegetated portions of the fan are covered with water. Secondary channels develop when the main channel is breached. These channels erode the northern stream bank and threaten private property. Erosion caused by floods events during the 1900's has damaged historic mining district features (part of the town is gone). One of the area residents has proposed channel excavation and dike construction to protect his property.

DESCRIPTION OF RECOMMENDED PROJECT(S):

A topographic map of the Chisana alluvial fan between its apex region and where the town is situated would be a valuable resource. A survey of the Cathenda Creek alluvial fan profiles would establish the present channel gradient, and alluvial fan slopes and elevations. This information would enable park management to document current conditions, monitor future change and assess the feasibility and effects of any proposed activity in the floodplain.

OBJECTIVES OF THE RECOMMENDED STUDY:

Listed below are specific objectives and proposed responsible parties for achieving each objective and time-frame.

- (1) Complete field survey of the Cathenda Creek Alluvial fan (10-15 profiles in an area approximately 0.75 miles long by 0.25. miles wide).

Responsible Party(s)	Time-Frame
Private contract	Summer 1995
Park Geologist	Summer 1995

- (2) Prepare topographic map.

Responsible Party	Time-Frame
Private contract	Fall 1995 & 1996
Park Geologist	Fall 1995 & 1996

FUNDING AND STAFFING:

The project will be overseen by the park Geologist. He will coordinate and participate in all field work, report preparation and analysis.

FY1

Field Survey	\$ 3500.00
OAS Support	\$ 1500.00

TOTAL	\$ 5000.00
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COMPLIANCE STATUS: The actions proposed in this statement are judged to be categorical exclusions based on 516 DM 6, Appendix 7.4 E(2) "Day-to-day resource management and research activities". Section 106 compliance with the National Historic Preservation Act may be necessary based on instrument location.

WRST N307.00 Wetlands Management - Mapping

PROBLEM STATEMENT:

Specific authorities for protection of National Park Service (NPS) wetland resources are found primarily in the NPS Organic Act, the Clean Water Act, the National Environmental Policy Act, and Executive Order 11990. Executive Order 11990 "Protection of Wetlands" directs federal agencies to "...avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative..."

NPS management must comply fully with the wetlands planning, compliance, and management guidance found in the NPS Floodplain Management and Wetland Protection Guidelines. Managers must strive to achieve a goal of "no-net-loss of wetlands" as defined by both acreage and function.

The McCarthy Road and the Nabesna Road (59 miles and 42 miles long respectively) are the only two roads that penetrate Wrangell-St. Elias National Park and Preserve (WRST). Additionally, these are the only two roads that provide reasonable access for park visitors and residents within the park.

Both the McCarthy Road and the Nabesna Road are located within right-of-way that were conveyed to the State of Alaska (State) as a result of achieving Statehood. In the case of the McCarthy Road material site rights-of-way were also obtained by the State prior to the establishment of WRST. Material sites rights-of-way were not obtained by the State for the Nabesna Road.

WRST and the State desire to have these roads improved and adequately maintained. Improvements to these roads would support public use of the park. Such improvement is positively addressed in the general management plan for WRST.

The Alaska Department of Transportation (DOT) is presently planning improvements to both roads. Resource information along these road corridors is lacking. Specifically, wetland identification and mapping.

Cook(1988) determined that gravel removal sites along the Nabesna Road have and will continue to create adverse visual impacts for park visitors. Further, the potential for additional roadside disturbance and damage from the lack of vegetation and subsequent soil erosion is very real. Komarov (1980) estimates that "...a one hectare pit clutters six hectares around it and leads to reduction in ground water, the withering of vegetation and other ecological depredations over a minimum of 15 hectares." Gravel pits may also impact local hydrological patterns by diverting surface and subsurface flow. In addition, heavy equipment compacts the substrate and forms a

physical barrier to root penetration thereby reducing moisture holding capacity and increasing the difficulty of revegetation.

According to Cook (1988), the most significant finding associated with the Nabesna Road gravel pits is the lack of organic topsoil at all sites but one. Recent studies on the revegetation of subarctic disturbed sites indicate that the most important factor in native revegetation is the preservation or replacement of upper organic layers of soil (Johnson, 1976; Shave et, al., 1983 and Johnson, 1987).

Eight sites have been proposed for gravel development along the McCarthy Road. Based on the park's experience with gravel management and removal along the Nabesna Road the park has determined that it is critical to develop a gravel management plan in coordination with the State to prevent both aesthetic and ecological impacts.

WRST is playing an active role in the planning process associated with both roads. NPS-77 requires parks to inventory wetland resources as part of the planning process. It is imperative that wetland identification and mapping occur during the planning stage to avoid any impacts to these valuable resources.

DESCRIPTION OF RECOMMENDED PROJECTS(S):

The objectives and methodology of this project are to:

Objective 1 - Work cooperatively with the State of Alaska Department of Transportation to develop a McCarthy and Nabesna Road Plan.

Methodology - The park and the State will work cooperatively to document: (1) historical maintenance of both roads; and (2) existing conditions of both roads including environmental concerns. Based on this information the park and the State will develop minimum road standards, redesign (if necessary) and a maintenance schedule.

Objective 2 - Identify, map and digitize wetlands along the McCarthy and Nabesna Roads.

Methodology - The park will work cooperatively with the U.S. Fish and Wildlife Service National Wetlands Inventory (NWI) group to accomplish this objective. The methodology will be determined by the NWI group. The park will provide aerial photography for both road corridors and the NWI group will classify, map and digitize wetlands associated with the following quadrangles:

- McCarthy B-6, B-7 and B-8
- Nabesna B-5, B-4, and C-5
- Valdez B-1

The following quadrangles have already been mapped by the NWI group and are being digitized (1995) under an ARO-GIS initiative:

Nabesna C-3, C-6
Valdez C-1, C-2

FUNDING AND STAFFING ESTIMATES:

This project will be overseen by the park's Environmental Specialist, Botanist,, and Chief, Resources Management.

The budget is being developed by the National Wetlands Inventory Group. Dollar amount is not to exceed \$30,000.

COMPLIANCE STATUS: The actions proposed in this statement are judged to be categorical exclusions based on 516 DM 6, Appendix 7.4 E(2) "Day-today resource management and research activities". Section 106 compliance with the National Historic Preservation Act may be necessary based on instrument location.

WRST N400.00 Geology of Wrangell-St. Elias National Park and Preserve

PROBLEM STATEMENT:

The geology of Wrangell-St. Elias NP/P constitutes one of the park's greatest natural resources. It is also one of the least documented and understood. The USGS initiated detailed geological investigations of the Nabesna, McCarthy, Bering Glacier, Valdez and Cordova Quadrangles in the 1950s and 1960s. Geologic maps (1:250000) have been published for all areas except Bering Glacier, Gulkana, Yakutat and St. Elias. Presently 25 percent of the area geology (at the 1:63360 scale) is published. There is much unpublished geologic data and numerous incomplete quadrangle investigations. In some areas the geologic mapping is nearly complete and only minimal additional field work is necessary prior to publishing the data.

Unique geological features including: the Wrangell Volcanic Field, paleontological resources, Chisana volcanic arc complex, and Chugach metamorphic complex occur within the park. There are numerous poorly understood components of this region's geology: basement geology of the Chitina Valley, formation specific studies, structural and deformational history along the major faults [Denali, Totschunda, Border Ranges, Contact, St. Elias, and Chitina Valley Fault]. Paleontological resources have been partially documented. The region is seismically active. Large magnitude earthquakes which threaten human lives and could damage infrastructure will probably occur.

Basic geological resource data is required for understanding the resource, interpretation and safety. This is a proposal to obtain funding to support and work cooperatively with the USGS in field related activities.

DESCRIPTION OF RECOMMENDED PROJECTS(S):

Listed below are specific objectives and proposed responsible parties for achieving each objective and time-frame.

- (1) Complete geological field investigations in all 1:250000 scale geologic map areas.

Responsible Party(s)	Time-Frame
USGS and Park Geologist	FY1

- (2) Compile and analyze all geologic and geochemical data. Prepare geologic report and geologic map. Publish information.

Responsible Party	Time-Frame
USGS	FY1

(3) Manage all geologic research

Responsible Party

Park Geologist

Time-Frame

Reoccurring Annually

COMPLIANCE STATUS: The actions proposed in this statement are judged to be categorical exclusions based on 516 DM 6, Appendix 7.4 E(2) "Day-to-day resource management and research activities". Section 106 compliance with the National Historic Preservation Act may be necessary based on instrument location.

WRST N400.01 Interpreting the Geology of Wrangell-St. Elias NP/ P

SUMMARY:

This project proposes to produce illustrated geologic guidebooks and colorful geologic map compilations of Wrangell-Saint Elias National Park & Preserve (WRST), designed for both the geologist and the lay reader, park staff, and visitors. The reports and maps will make available for the first time, in non-technical format, interpretative information on the geologic evolution of the majestic landscapes. Within the Wrangell-Saint Elias Region are classic geologic resources, displaying spectacular evidence of: (1) how the continental margin has expanded by incremental addition of far-traveled geologic fragments; (2) how the arrival of those fragments has prompted voluminous young volcanism and powerful seismicity; (3) how the resulting uplift of the coastal mountains adjacent to the Gulf of Alaska has engendered large and scenic systems of glaciers and the Kennecott ore deposits. Descriptions of this geologic evidence in lay person's terms will provide opportunities for both scientists and non-scientists to understand how plate tectonics has shaped, and is shaping, WRST.

PROBLEM STATEMENT:

There are three priority items of earth science information and interpretation issues: (1) a general interest publication on the geology of the park; (2) a geologic map of the entire Park and Preserve, particularly if developed digitally; and (3) a general interest publication on the descriptive geology of the Kennecott-type copper deposits for which the Park is the type locality. This task proposes to provide these three items, in sequence, over the next three years. Visitation is increasing rapidly to this National Park unit, a much needed alternative destination in southern Alaska to relieve visitor pressure on Denali National Park and Preserve. If the reports are successful, the information and outreach will provide NPS staff information that will assist them in developing and implementing of resource management plans, and also will provide landscape and resource interpretation to visitors, enhancing public enjoyment of the park and education in earth science.

OBJECTIVES OF THE RECOMMENDED STUDY:

Project Objectives:

Many fundamental concepts of accretionary tectonics were developed within the current boundaries of WRST, evinced by the name, **"WRANGELLIA,"** the first lithotectonic terrane so designated, and WRST also contains the northern edge the currently accreting **YAKUTAT TERRANE**, the contemporaneity of which validates accretionary processes. The impingement of the Yakutat terrane on the continental margin, beginning in mid-Miocene, is responsible for

the highly uplifted scenic resources of the park (the majestic Pacific Border Ranges), for the Neogene volcanism of the Wrangell summits themselves (which have built basaltic edifices at the highest eruptive rates known for convergent volcanoes), and for North America's most powerful seismicity in the last 100 years. The uplift also is indirectly responsible for elevating the ranges sufficiently to gather the magnificent alpine, piedmont, and tidewater glaciers that mantle so much of the park. These could be exciting earth science concepts to learn for those who come to WRST--except they are only described in the technical literature. This project proposes to make accessible to Park staff and the laity, through abundantly illustrated narrative and colorful maps and schematics, public interest guides to the geologic features of WRST.

Overall Strategy, Study Design, and Planned Major Products:

The completion in the mid-1990s of more than two decades of regional geologic studies in eastern southern Alaska now makes it possible to provide a synoptic view of the geologic evolution of the Alaskan continental margin from the Pacific Ocean to the Denali fault system. In order to make earth science information on the area accessible for the non-specialist, this project needs to accomplish three tasks, while regional geological experts still are available:

1. Synthesize, from the abundant technical geologic reports and maps of the last twenty years, a concise general interest publication that will highlight the fundamental tectonic processes that have created the geologic mosaic that is today's park. Take information that already is available, simplify and summarize it, and illustrate it amply with color photographs and schematics. This is an office-based digestion and recapitulation phase. The anticipated product is a $\pm$ 50-page summary of geologic highlights of WRST--to be published jointly by the two agencies or by an entity such as the Alaska Natural History Association, but with the NPS and USGS authors' affiliations and logos conspicuous.
2. Recompile unpublished and published geologic mapping in appropriate parts of the Gulkana, Valdez, Cordova, Nabesna, McCarthy, Bering Glacier, Icy Bay, Mount Saint Elias, and Yakutat 1:250,000-scale quadrangles into digital files. This is a time-intensive office-based effort that will necessitate travel to Menlo Park and Anchorage and the part-time services of a digital technician (USGS or NPS). Produce a colored geologic map of the entire WRST, both in hard-copy and in digital format.
3. Produce, for a non-technical audience, the geological story of the Kennecott copper deposits near the center of the park, the genesis of which is an intriguing and peculiar process. (The incredible richness of these deposits prompted the engineering achievement of an 194-mile railroad constructed through total wilderness and the founding of a new major mining corporation.) Many visitors to the Park will have their curiosities piqued by seeing the Kennecott Millsite at the edge of a picturesque glacier, and there are as many dramatic geologic (as there are economic) aspects that led to the development of the mines. This task also is office-based and recapitulative. The expected product is a concise, but well-illustrated color pamphlet or circular with sales appeal, as well as solid earth science.

FUNDING AND STAFFING:

Required Expertise:

FY 1998, FY 1999, FY 2000:

Regional geological knowledge; knowledge of Kennecott-type copper deposits; understanding of digital techniques applicable to geologic map compilations.

Names of Key Project Staff:**FY 1998, FY 1999, FY 2000:**

Gary Winkler, George Plafker, Don Richter (USGS), Danny Rosenkrans (NPS). (Ed MacKevett on non-paid consulting basis.)

Major Equipment / Facility Needs:**FY 1998, FY 1999, FY 2000:**

Use of office space and computer equipment, including scanning and digitizing equipment.

Approximate FTE:**FY 1998, FY 1999:**

Approximately 0.5 FTE, per year, of digital technician.

FY 2000:

None.

Approximate Budget:

	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY2000</u>
Salary (GS-7: 0.5 FTE)	\$16,000	\$16,000	-0-
Travel	\$ 4,000	\$ 4,000	\$ 3,000
Publications	\$10,000 <u>(report)</u>	\$50,000 <u>(map)</u>	\$ 5,000 <u>(short report)</u>
TOTALS	\$30,000	\$70,000	\$ 8,000

Program: National Cooperative Geologic Mapping

Location of Field Area: eastern southern Alaska

Project Start Date: October 1997

Project End Date: September 2000

Project Chief: Gary R. Winkler (Geologist/Emeritus--to-be)

Region/Division/Team/Section: Central/Geologic/Mineral Resources/Alpha

E-mail: gwinkler@musette.cr.usgs.gov

Phone: 303-236-9674

Fax: 303-236-3200

Mail Address: Box 25046-Federal Center-MS905
Denver, CO 80225-0046

WRST N401.00 Glacier Monitoring

PROBLEM STATEMENT:

Wrangell-St. Elias National Park and Preserve (NP/P) is at the heart of North American glaciation and contains some of the northern hemisphere's largest glaciers. The park and preserve encompass two major glacier belts, the Chugach/St. Elias and Wrangell/St. Elias, which merge in the St. Elias Mountains region. Glaciers cover approximately 20 percent of the 13 million acres within the Park. Ice covered areas extend from sea level to over 16000 feet altitude. Tide water glaciers and high alpine ice fields are present; most areas over 6000 feet are covered by permanent snow fields or ice. A variety of types and sizes of glaciers exist with variable ranges in percent area of ablation and accumulation, equilibrium line altitude, and activity levels.

Approximately 5000 square kilometers of the Wrangell Mountains (Skolai Pass to Mt. Drum) is ice covered. It is dominated by the Wrangell Mountain Ice cap and Nabesna Glacier. The largest glaciers in this area include: Nabesna Glacier (greater than 50 miles long), Kennicott-Root-Gates Glaciers, Chisana Glacier, Long Glacier, Nizina-Rohn-Regal Glaciers, Copper Glacier, Nadina Glacier, Kuskulana Glacier, and Ice Fields Plateau.

The northwest St. Elias Mountain Range high altitude accumulation area includes Mt. Bona, Mt. Churchill, Mt. Bear and Mt. Natazhat. The largest glaciers in this area include: Klutlan Glacier, Russell Glacier, Hawkins Glacier, Barnard Glacier, Chitina-Anderson Glaciers, and Logan-Walsh Glaciers.

The Chugach-St. Elias Coastal Region extends from Mt. Hawkins and Mt. Stellar eastward along the Bagley Icefield and Seward Glacier to the Mt. Logan, Mt. Forester and Hubbard Glacier accumulation areas. The largest glaciers in this area include: Bagley Ice Field (largest non-polar ice field), Jefferies Glacier, Tana Glacier, Bremner Glacier, Fan Glacier, Stellar Glacier, Martin River Glacier, Miles-Wernicke Glacier accumulation areas, Bering Glacier accumulation area, Yahtse - Guyot Glaciers, Tyndall Glacier, Baldwin Glacier, Agassiz Glacier, Seward Glacier, Malaspina Glacier (>1000km²), Turner Glacier, Valerie Glacier, and Hubbard Glacier.

Storm centers which originate in the "Aleutian Low" track northeastward into the coastal mountains of Alaska. Interaction between these storm centers, polar highs and the extreme relief of the St. Elias region produce some of the northern hemispheres highest precipitation and temperature gradients. Climate conditions ranging from wet, warm, coastal/maritime to dry, cold interior are represented within the park.

Wrangell-St. Elias NP/P is located along this major storm center tract. The extent of glaciation, ideal climatic location, and glacier variability make it one, if not the highest priority site within

North America for conducting investigations of climate and glacier interactions. The region is understudied considering its potential and unique characteristics.

A transect extending from the coast to the interior has been identified for conducting research and monitoring. Bering Glacier, Bagley Ice Field, Tana Glacier, Kennicott Glacier and Nabesna Glacier lie along the transect and are the focus of investigation.

PROJECT DESCRIPTION:

WRANGELL-ST. ELIAS NP/P COST ESTIMATING FOR TASKS/COMPONENTS WITHIN THE GLACIER-GLOBAL CLIMATE RESEARCH PROPOSAL.

LEVEL I: NPS-PARK BASED COMPONENTS CONDUCTED IN CONJUNCTION WITH AND UNDER A COOPERATIVE AGREEMENT/ARRANGEMENT WITH THE USGS.

A. PREPARATION WORK: SCIENTIFIC LITERATURE BIBLIOGRAPHIC COMPILATION, HISTORICAL PHOTOGRAPH RESEARCH, ACQUISITION, CATALOGING, AND ANALYSIS.

Objective: Establish the foundation for implementing a viable climate - glacier monitoring and research program. Develop bibliographies and databases. Initiate analysis of existing data.

Tasks: Conduct literature and data searches. Create a bibliography (glaciology, hydrology, glacial geology, and climate data) for existing publications covering Wrangell-St. Elias NP/P and the surrounding area. Acquire available literature and photographs. Start a library. Establish an archive and repository for data. Catalog and review data, photographs and literature. Initiate analysis of existing data on glaciers within the park. Develop baseline information.

Expenses:

GS-07/09 geologist/glaciologist position based in the park for 6 months (office and activities)	
\$15000	
Lateral file for glacier monitoring literature, archiving photographs and records	500
Photographs	\$2500
Miscellaneous supplies and maps	\$1500
Travel, lodging, and per-diem	\$3500
Personnel (GS-07/09 and geologist) 6 months	
Estimated FY1 cost including salary (priority 1)	\$23000

B. GROUND STATION PHOTOGRAPHY

Objective: Monitor changes on glaciers (concentrate on small glaciers 1 to 2 km long) that may be indicators of short climatic changes which are undetectable on larger glaciers.

Tasks: Establish stations on selected large and small glaciers, photograph glacier and possibly some rock glacier termini positions, and photograph snow line; analyze and compare historical records and photographs with current photographs. Survey conducted annually (one day a year with helicopter) systematically work through the park with 5 to 15 sites. Tasks include glacier selection, site(s) selection, monument construction, location documentation, photographing, film developing and processing, cataloging prints, analyzing results, and documenting results.

Expenses:

Helicopter	\$1200
Fuel	\$650
Photography/supplies/maps	\$650
Personnel	6-8 days
Estimated cost* (priority 1)	\$2500

* Depending upon helicopter availability and scope, this job would cost 25% of the estimate. Annual cost could reach a high of \$2500. An integral part of this phase would be taking advantage of low cost opportunities to photograph glaciers.

C. LOW LEVEL AERIAL PHOTOGRAPHY AND DOCUMENTATION

Objective: Detailed documentation of glacier information. Emphasis on dated snow line position near end of summer melt period, terminus position, trimlines, rock debris on glacier, glacier dammed lakes and major events follow up/investigation. Data could possibly be used for ground truthing Landsat and SAR imagery.

Tasks: Conduct one day annual survey with a fixed wing aircraft. Systematically survey Wrangell-St. Elias NP/P within a five to ten year cycle/period. Initially, the photographic documentation is with a 35mm camera. Observations are noted on topographic maps and aerial photographs. Results are cataloged and analyzed.

Expenses:

Fixed wing	\$1200
Photographic supplies	\$600
Personnel	3-4 days
Estimated cost* (priority 2)	\$1800

*A large format camera, mounted outside the aircraft or a glass window in the plane would result in higher quality products. This job could be combined with aerial oblique photography.

LEVEL II: SPECIAL PROJECTS AND RESEARCH - USGS LEAD UNDER A COOPERATIVE RESEARCH AGREEMENT WITH NPS.

A. AERIAL OBLIQUE PHOTOGRAPHY

Objective: Gather information and document glacier termini position, snow line, trimline, and major events. Flight coverage of north and south side of the Wrangell-St. Elias Range and north and south side of the Chugach-St. Elias Range.

Tasks: Conduct an annual aerial photographic survey.

Expenses:	\$5000
Personnel:	20 days
Estimated cost including salary (priority 1)	\$5000

B. INDEX SITES ON GLACIERS

Objective: Provide mass balance time series, altitude and flow information at selected sites along the climate-glacier transect from coastal southern Chugach Mountains to northern interior Wrangell Mountains. Glaciers tentatively selected include: Bering-Bagley, Tana, Kennicott and Nabesna. Possible site selections and prioritization are: Bagley Icefield - ELA (priority 1), Nabesna Glacier - ELA (priority 1), Kennicott Glacier - ELA (priority 1), Bering Glacier - ablation (priority 2), Tana Glacier - ablation (priority 2), Kennicott Glacier - (2 sites) ablation (priority 2), Nabesna Glacier - ablation (priority 2). Accumulation areas on the Bagley Ice Field, Nabesna Glacier and Kennicott Glacier are lower priority and more difficult to maintain, and therefore may be established at a later point in the program (priority 3).

Tasks: Select specific location to obtain measurements and establish three surveyed monument locations per site. Establish coordinate system. Establish two index sites per year for the next four or five years. Access, survey, maintain stations and record measurements at all established stations near maximum accumulation and melt periods. Check sites in mid-winter to extend stakes.

First year expenses:

Transportation 11 days helicopter (@ \$1000/day)	\$11000
Transportation 35 hours helicopter flying	\$7350
Fuel	\$2500-\$3500
Fixed wing	\$1000
Equipment Wild T-2 theodolite	\$9000
Miscellaneous equipment	\$1000

Supplies	\$3000
Travel, lodging and per-diem	\$1000
McCall Sampler	\$2200
Travel and per-diem	\$1000

Estimated cost (priority 2) 30000-40000

* Projected cost of this proposal component would be reduced by more than \$10000 if researchers provided some of the necessary equipment. This is a multi-year project which requires a long term commitment.

C. SATELLITE IMAGERY

Objective: Monitor glacier distribution, surface area, accumulation area, ablation area, snow line. Glaciers currently identified as candidates for investigation within Wrangell-St. Elias NP/P include: Logan, Walsh, Hubbard, Bering, Seward/Malaspina, Klutlan, Bernard, Nabesna, Copper, and Martin River.

Tasks: Conduct the ground truth investigations. Analyze Landsat and SAR imagery. One image acquired and analyzed annually (three or four images required to cover the park). Monitor park glaciers on a four year cycle.

Personnel undetermined

Minimum estimated cost (priority 2) \$15000

D. CLIMATE STATION - DATA ACQUISITION

Objective: Establish climate stations. Collect and document temperature and precipitation for current climate conditions. Analyze temperature and precipitation data. Climate data (range, variability and normal frequencies, duration of wet, dry, hot, and cold conditions) would be used in interpreting glacier response to climate. Strategically place precipitation gages, snow course and temperature recording systems to provide information along the glacier transect. Low altitude data could possibly be used for extrapolating to high altitude glacier sites.

Tasks: Long term task is to establish four or five climate stations which record temperature, total precipitation and snow fall. Possible locations include Bagley Glacier ELA, Nabesna Glacier ELA, May Creek, and north flank of the Wrangell Mountains.

Year 1 or 2: Reconnoiter for potential climate station sites near the ELA locations while establishing glacier index sites.

Years 1 to 3: Establish one climate station with precipitation gage (total), temperature recording system and snow course.

Years 3 to 5: Establish a second climate station with precipitation gage (total), temperature recording system and snow course.

Collect and integrate climate data with glacier program: Climate stations with records include: Gulkana, Cordova, Yakutat, Northway, Nabesna, Old Edgerton Highway, McCarthy, Kennicott, Beaver Creek, Chitina, Chisana, May Creek, and Klawasi.
Analyze available climate data.

Year 1, 2 and/or 3 expenses:

Total estimated cost	\$7000 - \$8000
Personnel (annual requirements)	5 to 10 days

Projected requirements for years 3, 4 and/or 5:

Total estimated cost	\$10000 to \$11000
Personnel (annual requirements)	5 to 10 days

Estimated cost* (priority 3)	\$7000 to \$8000
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*Initial funding could be at the \$2000 to \$3000 level.

E. ICE THICKNESS, SURFACE PROFILES AND FLUX

Objective: Measure flux of ice through an index station over time.

Tasks: Establish transect through index point. Survey stations. Measure ice travel times with radio echo sounding. Calculate basin/valley bottom profile, and flux.

Small glacier survey (400m - 500m ice), medium glacier survey (800m - 900m ice) or large glacier survey (Bagley):

Personnel	2 - 10 days
Estimated cost (priority 4)	\$1500 - \$5500

*Cost is dependent on glacier size and location.

COMPLIANCE STATUS: The actions proposed in this statement are judged to be categorical exclusions based on 516 DM 6, Appendix 7.4 E(2) "Day-to-day resource management and research activities". Section 106 compliance with the National Historic Preservation Act may be necessary based on instrument location.

APPENDIX A:
WRANGELL-ST. ELIAS NP/P: LISTING OF GLACIOLOGICAL AND
METEOROLOGICAL STUDIES AND MEASUREMENTS WITHIN THE CHUGACH,
WRANGELL AND ST. ELIAS REGION

BERING GLACIER

Surge origin of folds. (Post,A.)
Runoff and Equilibrium Line Altitude (ELA). (Mayo,L.)
Terminus position retreat. (Molnia, Trabant, and others)

BONANZA RIDGE ROCK GLACIERS

1988 - Holocene rock glacier chronology. (Gordon,J.)

COLUMBIA GLACIER*

Glacier surface altitude, mass balance, ice radar thickness determinations, hydrography and terminus positions, calving speeds, ice flow rates. (Meir and Mayo)

FREDERIKA GLACIER

Successional patterns on moraines and outwash. Ice Field Ranges Research Project. (Scott,R.) (IRRP)

HUBBARD GLACIER

1895 - British Commission mapping.
1963 - Ice thickness measurements with gravity and seismic surveys. (Clarke, G.) (IRRP)
1963 - O18/O16 ratios. (Macpherson and Krouse) (IRRP)
1967 - Airborne radar ice thickness measurements. (IRRP)
1986 & 1988 to 1991 - Advance event (Mayo, Trabant, Krimmel and Post). Terminus position documentation, velocity and movement measurements, ice thickness and height (surface altitude), melt calculations, aerial and ground photo documentation, satellite location and telemetry, bathymetry.
Glacial geology. (Plafker,G.)

KASKAWALSH GLACIER*

Numerous glacier, ice, weather, and snow investigations. (IRRP)

KENNICOTT GLACIER

Late neoglacial fluctuations. (Gordon,J.)

KLUTLAN - NATAZHAT GLACIERS

Neoglacial fluctuations. (Rampart,V.)

MT. BONA

1991 to 1994 - USGS (Fitzpatrick and others in progress)
Ice coring project (Global Circulation Models)

Proposed ice core analysis: light logging, temperature, density profiling, shallow firn and ice stratigraphy, net annual accumulation, thin section - ice strain/ grain growth, metals analysis, stable isotopes, gas content, meteorological record review, radar snow and ice thickness and bottom configuration, velocity and strain nets.

MT. LOGAN*

1974 and 1975 - Glacial surveys.

1978 - Snow pits at elevation, mean annual stable isotope studies.

1980 - Ice core drilling 105 (147 years), 62, and 48 meter holes, determined numerous geophysical ice properties. (Holdsworth,G.).

Ice thickness and temperature measurements.

MT. WRANGELL ICE CAP (Copper, Frosty, Ahtna and Chetaslina glaciers)

Glacier - volcano interactions. (Benson and others)

1948, 1957 and 1972 to present - annual aerial photographs.

Photogrammetry, oblique aerial and ground photographs, precision ground control surveying.

1965 to present - crater ice loss rates and volumes.

Volcanic heat flux (magnitude and variability).

Glacier/ice flow speeds, motion and advances (terminus positions).

1982 - Airborne radio echo sounding of ice thickness.

1982 - Ice coring drilling (43 meters).

Shallow core 10 meters 1961, 1965, 1976, and 1980.

Snow and stratigraphy studies, radar sounding for internal volcanic ash stratigraphy, temperature and stable isotopes.

RUSTY GLACIER*

1968 and 1969 - Mass balance. (Brewer,T.) (IRRP)

Hydrologic studies, gravity and shallow ice temperature.

1969 - Thermal drilling and deep ice temperatures.

SEWARD - MALASPINA GLACIER

1940's - Borehole drilling, flow measurements, mass balance, accumulation and ablation measurements. (Sharp,R.)

1951 to 1952 - Glaciological studies. (Sharp,R.)

1953 - Moraine banding. (Washburn,B.)

1953 - Seismic and gravity investigations. (Allen and Smith)

1958 - Glacial geology. (Plafker and Miller)

1969 - Microclimate studies on glacier snowpack. (Loungeay,R.)

1988 - Side looking airborne radar (SLAR) imagery. (Molnia, Trabant, Krimmel and others)

1989 - Ice thickness and bedrock configuration.

1989 to 1992 - Long wave radar echo sounding studies (proposed).

SKOLAI - CHITISTONE PASS (IRRP)

1959 - Landform mapping.

1963 to 1971 - Numerous climatological and meteorological studies.

1967 to 1969 - Snow melt studies.

Holocene glacial and treeline variations. (Denton,G.)

SUE GLACIER*

Unknown measurements.

STEELE GLACIER*

1935 to 1968 (IRRP) Photogrammetry, aerial photography, glacial history.

1966 to 1968 - Surge investigations and measurements

Ice movement measurements - surge. (IRRP)

1967 - Terminus observations. (IRRP)

ST. ELIAS MOUNTAINS (Ice field ranges project)

1961 to 1965 - High snow field measurements, snow property determinations, depth, accumulation, thermal remote sensing, sedimentation, hydrologic studies. (IRRP)

1961 to 1965 - Meteorology, weather and climate stations and recordations, temperature, wind patterns, isotopic species of water, and solar radiation. (IRRP)

Late Pleistocene stratigraphy and chronology [C14]. (Denton and Stuiver) (IRRP)

1970 - Snow accumulations.

TRAP RIDGE GLACIER* (near Steele Glacier)

1975 to present - Surge studies. (Clark,G.)

VARIEGATED GLACIER

1973 to 1984 - Surge glacier case study. (Kamb, Harrison, and Raymond)

Seasonal speed variation (summer and winter), daily automatic camera photography for a couple of years and all events during the surge years, ice thickness sonar (explosives) and radar - 350 meters of ice, surveying with theodolite, equilibrium altitude measurements, ice temperature, drilling with hot water, T.V. monitoring to observe conditions (ice, rock water and/or glacial mud and debris) at the ice bottom, measured water height in the drill hole - head and pressure indicators at depth, dye testing, and sediment discharge.

WALSH GLACIER

Surge glacier investigations, moraine patterns, maps, velocity profile and advance rates. (Post,A.)

WHITE RIVER VALLEY

Quaternary glaciation. (Denton,G.)

1910 Rock glaciers. (USGS - Capps,S.)

WORTHINGTON GLACIER*

YAKATAGA GLACIER

1909 - Physiography and glacial geology. (USGS Prof. Paper #64)

1957 - Surface velocity. (Miller,D.)

*Glaciers and investigation sites adjacent to Wrangell-St. Elias NP/P with related and pertinent data/information.

APPENDIX B: **HISTORICAL INVESTIGATIONS, EXPLORATION AND DOCUMENTATION**

National Geographic Expedition to Mt. St. Elias - 1891.

Second Expedition to Mt. St. Elias - 1893 (USGS).

Narratives of Exploration in Alaska 1900. (Powell and Rice)

Alaskan Glacier Studies - 1914: National Geographic Society.

Walter Wood Exploration 1940's St. Elias Mountains.

Project Snow Cornice 1948 to 1950's - R.P.Sharp Malaspina-Seward Glacier System.

International Boundary Commission - 1952.

Mt. Wrangell Expedition - 1953.

Icefield Ranges Research Project: The St. Elias Mountains Project 1961-1968. (American Geographical Society and Arctic Institute of North America) Investigations in Glaciology and Climatology.

Icefield Ranges Research Project: The High Mountain Environment Project 1966-1970. (Arctic Institute of North America) Program studies in Climatology, Geomorphology, Periglacial Hydrology, Botany, Plant Geography, and Glaciology.

Surge glaciers documentation 1969. (Post,A.) [The following basins contain surging glacier data: Logan, Walsh, Chitina, Kaskawalsh, Duke River, Steele Creek, Malaspina, Yakutat (Variegated), Klutlan, Donjek, Wolverine Creek, St. Clare Creek, Cement Creek, Count Creek, White River, Chisana River, Nabesna River, Chitistone River (Radovan Gulch), Skolai Creek, Barnard Glacier, Hawkins Glacier, and Bering Glacier. Many additional glaciers have surged since the 1969 documentation. (Post and Wilbur unpublished data.)]

Glacier dammed lakes, outburst floods and runoff. (Post and Mayo)

WRANGELL-ST. ELIAS NP/P

1950's - Aerial photography to construct topographic maps.

1957 to present - Oblique aerial photographic surveys. (Post,A.)

1967 to present - Oblique aerial photographic surveys. (Mayo,L.)

WRST N401.01 Baseline Study of the Malaspina Glacier

PROBLEM STATEMENT:

Malaspina Glacier is an outstanding (world class) piedmont glacier and received a National Natural Landmark designation on August 14, 1970 based on the determination of its significant scientific value. It is a dynamic natural system and is also the largest North American nonpolar glacier, covering an estimated 1035 square mile area. This national natural landmark is located on lands administered by the National Park Service (NPS). Scientific information pertaining to this feature has not been compiled. Baseline data is required for managing, monitoring and interpreting this significant national natural landmark.

The majority of the Malaspina Glacier National Natural Landmark is located within Wrangell-St. Elias NP/P (WRST). The remaining portions lie on Bureau of Land Management, State of Alaska and Native lands outside park boundaries. Malaspina Glacier values of significance include: scientific resource, (size) largest glacier outside polar region, classic example of a piedmont glacier, intricate morainal fold patterns, glacial features, and awesome scenery. It serves as the ablation area for snow and ice accumulation zones originating in the Seward and Agassiz Glacier systems. Glaciers are dynamic natural systems which respond to climate changes. Lands adjacent to the ice covered portions within the landmark include spectacular high mountain and coastal geographical and ecological systems. In 1968, Malaspina Glacier was recommended for consideration as a National Monument (Long W.,1968).

The first recorded observations of the Malaspina Glacier were made by Captain Vancouver in 1794. Initial glaciological research, scientific investigations and photographic documentation started on Malaspina Glacier in the early 1900's. The NPS has a resource management responsibility. WRST does not have the tools (a bibliography or database pertaining to this natural landmark) required to fulfill its management responsibility.

Baseline information is required for natural landmark management, monitoring and interpretation. This is a proposal to: (1) generate a bibliography, (2) obtain copies of all pertinent literature for the park library, (3) review of all literature, (4) develop a database which identifies and catalogs aerial and ground based photographic surveys, (5) review photographs, (6) contact principle investigators from earlier research projects, and (7) write a report which summarizes past investigations and photographic documentation with recommendations for management.

DESCRIPTION OF RECOMMENDED PROJECTS(S):

Listed below are specific objectives and proposed responsible parties for achieving each objective and time-frames

(1) Gather and synthesize all available literature (historical and contemporary) pertaining to Malaspina Glacier. Develop an annotated bibliography for this information. Obtain copies for park library.

Responsible Party(s)

Physical Scientist (NPS or USGS)

Time-Frame

Spring 1994

(2) Identify and document all known photographic data sets (historical and contemporary) pertaining to Malaspina Glacier. Contact scientists who have conducted research within the landmark. Develop a database:

Responsible Party

Physical Scientist (NPS or USGS)

Time-Frame

Fall and Summer 1994

(3) Prepare a report on Malaspina Glacier which summarizes past investigations and photographic documentation. Make recommendations for management.

Responsible Party

Park Geologist (NPS or USGS)

Time-Frame

Fall 1994

FUNDING AND STAFFING: The project will be overseen by the park Geologist. Components of this project may be accomplished by the USGS under a cooperative agreement.

FY1994

Physical Scientist (07) 2 months	\$ 4000.00
Travel	\$ 1000.00
Supplies	\$ 1000.00
TOTAL	\$ 6000.00

COMPLIANCE STATUS: The actions proposed in this statement are judged to be categorical exclusions based on 516 DM 6, Appendix 7.4 E(2) "Day-to-day resource management and research activities". Section 106 compliance with the National Historic Preservation Act may be necessary based on instrument location.

WRST N402.00 Preservation of Unique Geological Features

PROBLEM STATEMENT

One of the purposes for which Wrangell-St. Elias was established is the protection of its unique geological features. Some of these features include: Mount Wrangell, North America's largest active shield volcano, a fairly complete geologic record extending from the Late Paleozoic to Early Tertiary, spectacularly exposed bedrock stratigraphic sections, Late Paleozoic and Mesozoic paleontological resource locations, some of the world's best examples of rock glaciers, natural springs, and possibly caves.

Activities related to potential mining operations, access corridors, non-federal and commercial development, and increased visitor access may threaten or impact these resources. An incomplete inventory of geological features exist. Sensitivity to impacts and documentation of existing conditions is unknown. No recent action has been taken to monitor resources, upgrade existing inventory or manage activities which might affect these resources. Resources management develops its inventory of unique geologic features as time and budget constraints allow.

Goal: To manage human activities within Wrangell-St. Elias in such a manner that unique geological features remain unimpaired.

DESCRIPTION OF RECOMMENDED PROJECT(S):

(1) Inventory and evaluate the park/preserve's unique geological features. A study will be conducted to identify, inventory, and photo document all unique geological features in the park/preserve. Evaluate each feature for sensitivity to potential threats.

(2) Develop management strategies to protect these resources from human-caused disturbance or loss. This will fulfill NPS responsibilities, enhance visitor appreciation, and allow for scientific investigations. Management strategies include developing a monitoring program focusing on features identified as sensitive to potential threats during the inventory project. The timetable for monitoring would be based upon inventory results and activity levels of identified threats.

FUNDING AND STAFF:

FY1

Geological Technicians (1.2 FTE)
Logistic Support

\$ 30000
10000

	Map Preparation	5000	
	Subtotal	\$ 45000	
FY2			
	Geological Technicians (1.2 FTE)	\$ 30000	
	Logistic Support	10000	
	Map Preparation	5000	
	Subtotal	45000	
FY3			
	Geological Technicians (1.2 FTE)	30000	
	Logistic Support	10000	
	Map Preparation	5000	
	Subtotal	45000	
GRAND TOTAL		\$135000	

COMPLIANCE STATUS: The actions proposed in this statement are judged to be categorical exclusions based on 516 DM 6, Appendix 7.4 E(2) "Day-to-day resource management and research activities". Section 106 compliance with the National Historic Preservation Act may be necessary based on instrument location.

WRST N402.01 Geology of the Cross Creek Volcano

PROBLEM STATEMENT:

The United States Geological Survey (USGS) has published a 1:250,000 scale geologic map of the Nabesna Quadrangle (Richter D., 1976). Geological investigations have been conducted since that time focusing on the geology of the Wrangell Volcanic Field. To date thirteen volcanic centers have been identified and studied at various levels of detail. This is a proposal to obtain funding for a field mapping program of the recently discovered (by USGS) Cross Creek volcanic center located in the Nabesna A-4 Quadrangle.

The highest peaks and landscape in the northern portion of Wrangell-St. Elias NP/P (WRST) are Tertiary and Quaternary aged volcanic centers. The geology of WRST constitutes one of the park's greatest natural resources. The Wrangell Volcanic Field is one of the most understudied volcanic fields in North America. It developed above a subduction zone along the continental margin starting 25 million years ago. The USGS initiated detailed geological investigations (1:63,360 scale) of the volcanic field following completion of the general Nabesna Quadrangle Geologic Map. Results of that work have led to a general understanding of the volcanic field.

During 1991, the USGS determined that an un-named peak at the head of Cross Creek and Nikonda Glaciers was probably the erosional remnant of a large unrecognized Wrangell Volcano Field volcano. To date only one day has been spent sampling and conducting reconnaissance observations. It appears that the topographic high parts of the volcano consist of intracaldera lavas filling a large unexplored caldera. In addition, little is known about the volcano's age, history, chemistry or extent.

DESCRIPTION OF RECOMMENDED PROJECTS(S):

Listed below are specific objectives and proposed responsible parties for achieving each objective and time-frame.

- (1) Map and sample the Cross Creek volcano in detail.

Responsible Party(s)	Time-Frame
USGS (Cooperative Agreement)	Summer 1994
Park Geologist	Summer 1994

- (2) Compile and analyze all geologic and geochemical data. Prepare geologic report and geologic map.

Responsible Party

USGS (Cooperative Agreement)
Park Geologist

Time-Frame

Fall 1994 & 1995
Fall 1994 & 1995

FUNDING AND STAFFING:

Research volcanologist and the principle investigator are USGS staff. The park geologist will coordinate and participate in all field work, report preparation and administer all cooperative agreements. USGS will analyze all geochemical samples, generate a geologic map and publish a report on the Cross Creek Volcano.

FY1994

USGS Interagency Agreement	\$ 4000.00
OAS Support	\$ 8000.00

TOTAL	\$12000.00
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COMPLIANCE STATUS: The actions proposed in this statement are judged to be categorical exclusions based on 516 DM 6, Appendix 7.4 E(2) "Day-to-day resource management and research activities". Section 106 compliance with the National Historic Preservation Act may be necessary based on instrument location.

WRST N402.02 Geology of the McCarthy D-1 Quadrangle

PROBLEM STATEMENT:

The United States Geological Survey (USGS) published a 1:250,000 scale geologic map of the McCarthy Quadrangle (MacKevett E., 1978). Only 30 percent of the geology (1:63,360 scale maps) has been mapped and published within the McCarthy quadrangle to date. This is a proposal for funding to complete the field mapping project phase of the McCarthy D-1 area.

The geology of Wrangell-St. Elias NP/P constitutes one of the park's greatest natural resources. It is also one of the least documented and understood. The USGS initiated detailed geological investigations of the McCarthy Quadrangle in the 1960's. In 1984 and 1985 additional detailed surveys were conducted in the McCarthy D-1 Quadrangle. These geological field investigations are almost complete. The eastern portion and older aged rocks of the Wrangell Volcanic Field crop out in McCarthy D-1. This quadrangle includes part of the 26 million year old Sonya Creek volcanic center. The Sonya Creek center is very large, contains a significant suite of differentiated volcanic rocks, and may contain the largest caldera yet recognized (15 km in diameter) in the Wrangell Volcanic Field.

A field check is absolutely necessary before an acceptable geologic map can be produced and the history of the area interpreted. The concept of a very large caldera in the Sonya Creek center did not evolve until after compilation of field data following the 1985 season. Hence some additional ground truthing, in addition to completing field mapping in specific locations is necessary to ascertain whether a caldera of this magnitude is present or not.

DESCRIPTION OF RECOMMENDED PROJECTS(S):

Listed below are specific objectives and proposed responsible parties for achieving each objective and time-frame.

- (1) Complete geological field investigation of the Sonya Creek center and McCarthy D-1 Quadrangle.

Responsible Party(s)	Time-Frame
USGS (Cooperative Agreement)	Summer 1995
Park Geologist	Summer 1995

- (2) Compile and analyze all geologic and geochemical data. Prepare geologic report and geologic map.

Responsible Party

USGS (Cooperative Agreement)
Park Geologist

Time-Frame

Fall 1995 & 1996
Fall 1995 & 1996

FUNDING AND STAFFING:

The research components of the project will be overseen by the USGS Geologist. The park Geologist will coordinate and participate in all field work, report preparation and administer all cooperative agreements. USGS will conduct all geochemical analysis and publish a geologic map and report for the McCarthy D-1 Quadrangle.

FY1994

USGS Interagency Agreement	\$ 5000.00
OAS Support	\$ 7000.00

TOTAL	\$12000.00
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COMPLIANCE STATUS: The actions proposed in this statement are judged to be categorical exclusions based on 516 DM 6, Appendix 7.4 E(2) "Day-to-day resource management and research activities". Section 106 compliance with the National Historic Preservation Act may be necessary based on instrument location.

WRST N402.03 Geology of the Bering Glacier Quadrangle

PROBLEM STATEMENT:

The United States Geological Survey (USGS) has not published a 1:250,000 scale geologic map of the Bering Glacier Quadrangle. None of the bedrock geologic 1:63,360 scale maps have been finalized and published within the Bering Glacier quadrangle to date. This is a proposal for funding to complete the field mapping project phase of the Bering Glacier D-1 and D-2 area. This region is the only remaining area in which additional field work is required to complete and prepare the Bering Glacier 1:250000 scale geologic map.

The geology of Wrangell-St. Elias NP/P constitutes one of the park's greatest natural resources. It is also one of the least documented and understood. The USGS initiated detailed geological investigations of the Bering Glacier Quadrangle in the 1950's. Those baseline geological field investigations are almost complete, except for the northeastern portion of the quadrangle. The Chugach Mountains extend into Bering Glacier D-1&2. The northwestern most exposure of the Alexander terrane crops out near the Chitina and Logan Glaciers, and the Chugach and Wrangellia terranes extend into this region also. Late Paleozoic and Mesozoic aged formations, the largest exposure of the Chitina Valley Batholith, the Border Ranges Fault, and the Chugach Metamorphic Complex occur within this area.

Completed field investigations are necessary before an acceptable geologic map can be produced and the history of the area interpreted.

DESCRIPTION OF RECOMMENDED PROJECTS(S):

Listed below are specific objectives and proposed responsible parties for achieving each objective and time-frame.

- (1) Complete geological and geochemical field surveys of the Bering Glacier D-1 and D-2 Quadrangles.

Responsible Party(s)	Time-Frame
USGS (Cooperative Agreement)	Summer 1994
Park Geologist	Summer 1994

- (2) Compile and analyze all geologic and geochemical data. Prepare geologic report and geologic map.

Responsible Party	Time-Frame
USGS (Cooperative Agreement)	Fall 1994 & 1995
Park Geologist	Fall 1994 & 1995

FUNDING AND STAFFING:

The research components of the project will be overseen by the USGS Geologist. The park Geologist will participate in all field work and administer all cooperative agreements. USGS will conduct all geochemical analysis and publish a geologic map and report for the Bering Glacier 1:250000 Quadrangle.

FY1994	
USGS Interagency Agreement	\$ 20000.00
TOTAL	\$20000.00

COMPLIANCE STATUS: The actions proposed in this statement are judged to be categorical exclusions based on 516 DM 6, Appendix 7.4 E(2) "Day-to-day resource management and research activities". Section 106 compliance with the National Historic Preservation Act may be necessary based on instrument location.

WRST N403.01 Mineral Claim Examinations

PROBLEM STATEMENT:

There are currently 430 unpatented mining claims within the park and preserve. Annual administrative review of filing and recordation requirements is conducted. A field examination is made by a qualified mineral examiner to determine if discovery made at the claim indicated valuable mineral resources in sufficient quality and quantity. If the mineral examination indicated a lack of such discovery, a contest action is submitted to the Bureau of Land Management (BLM). The BLM rules on the validity of the claim. A negative decision may be appealed by the claimant(s) to the Interior Board of Land Appeals (IBLA), or higher.

Since 1983, mineral examinations were conducted on 21 mining claims. This was the first year since the establishment of the park and preserve that field examinations were conducted. Efforts to conduct field examinations were hindered by: 1) limited number of qualified examiners, 2) demands of regional workload, 3) short field seasons, 4) variable weather conditions, 5) difficulties contacting claimants, and 6) coordinating presence of claimants at examinations. Due to these difficulties and the number of claim groups and claims it is anticipated that a number of years, perhaps ten, will be required to complete field examinations.

Unpatented claims must pass these basic conditions and many other legal requirements before they can proceed to patent. They do not have to be patented in order to be mined. However, once patented the claim can be developed for non-mineral purposes if the owner so desires.

Goal: To conduct an administrative adjudication of all unpatented claims within WRST and field examine all claims that are administratively valid within WRST and take all unpatented claims without value to contest for validity determination.

DESCRIPTION OF RECOMMENDED PROJECTS(S):

This project requires two phases: (1) an administrative phase; and (2) a field examination phase.

Phase I would require an adjudicator to conduct an administrative check of both the BLM and State Recording Offices to determine if all unpatented claims within WRST are administratively valid. The following tasks would be accomplished:

- Update the minerals management database records on annual filing;
- Identify any failures to file in either the BLM State Office and the State of Alaska local recording districts;
- Conduct annual checks of all claims for timely filing.

Phase 2 would require park staff to develop a priority list to base field examinations. Present NPS policy requires two qualified mineral examiners to be involved in each case. This provides for collaborative testimony on complicated cases. The following tasks would be accomplished:

- Park management will work with ARO-MMD to determine mineral examination priorities.
- Park/preserve geologist will seek mineral examiner certification;
- Field mineral examinations will take place;
- Invalid claims will be brought to contest.

This project may significantly reduce the number of claims by eliminating those which are found invalid. The control of resources on invalid claims would immediately revert to the park.

COMPLIANCE STATUS: The actions proposed in this statement may require National Environmental Policy Act (NEPA) compliance other than a categorical exclusion based on 516 DM, Appendix 7.4. NEPA compliance will occur on a case-by-case basis. Section 106 compliance with the National Historic Preservation Act may be necessary based on scope of operation.

WRST N403.02 Mining and Minerals Management on Claims Located Under the 1872 Mining Law

PROBLEM STATEMENT:

All federal lands within Wrangell-St. Elias NP/P (WRST) are closed to new mineral entry. ANILCA provided for the continuation of existing patented and valid unpatented mining claims. Within the park and preserve there exists the potential for extensive mineral development. There are currently a total of 889 patented and unpatented mining claims and mill sites covering an estimated 19,250 acres. The primary economic commodities include: copper, gold, and silver. Owners of valid existing rights "inholdings" have the right to develop reasonable access across public lands.

In 1992 two suction dredge operations were approved. Medium scale placer mining and hard rock mineral exploration and development have occurred within the past decade. Future mining activities are highly probable. Regulations promulgated from the 1976 - Mining in the Parks Act control mining related activities on federal claims within units of the National Park System.

An Environmental Impact Statement was prepared to evaluate a range of alternatives for managing mining activities, analyze cumulative impacts and mitigate environmental impacts. The Record of Decision - Final Environmental Impact Statement - Cumulative Impacts of Mining - WRST preferred alternative is to acquire all mining claims. This alternative is the most environmentally preferred as it has the least potential to cause damage to the biological and physical environment. Until funding is available for acquisition, the NPS will process mining plans of operations under Title 36 CFR 9A regulations and prepare environmental assessments as required by the National Environmental Policy Act.

Goal: To ensure that mineral related activities occur in a manner consistent with park values and prevent or minimize adverse impacts to natural and cultural resources.

DESCRIPTION OF RECOMMENDED PROJECTS(S):

Description of recommended projects:

The minerals management staff needs to obtain funding to maintain and expand the park based plan of operations review, analysis, documentation and monitoring of mining operations which ensures protection of park resources and values.

Listed below are the specific objectives:

- (1) Determine validity:

- (a) Determine administrative validity for all unpatented claims.
 - (b) Survey and generate base maps for all patented and unpatented mining claims.
 - (c) Conduct mineral examinations on all unpatented claims.
 - (d) Contest invalid unpatented claims.
- (2) Collect additional data to maintain and develop resource protection goals for "target resources" in all mining areas. EIS quantified target resources include: aquatic resources, grizzly bear, moose, caribou and Dall's sheep habitat, eagles ATV/ORV access.
- (3) Develop physical techniques to mitigate impacts resulting from authorized ATV access.
- (4) Resolve potentially eligible national register site status for cultural resources located on claims.
- (5) Identify mining areas which contain the following high priority acquisition criteria:
 - (a) highly important or critical fish or wildlife habitat
 - (b) endangered species habitat
 - (c) cultural resources of significant and unusual character or quality
 - (d) geological features of rare, unusual or exemplary quality
- (6) Determine whether non mining development and improvements on patented claims would be compatible with park purposes and the park general management plan.
- (7) Conduct title searches on all patented claims.
- (8) Develop mining claim acquisition plan based on EIS acquisition criteria and WRST land protection plan.
- (9) Obtain funding for purchase of claims from willing seller and for claims on which approval of plan of operations will not ensure that mineral related activities occur in a manner consistent with park values and prevent or minimize adverse impacts to natural and cultural resources.

COMPLIANCE STATUS: The actions proposed in this statement are judged to be categorical exclusions based on 516 DM 6, Appendix 7.4 E(2) "Day-to-day resource management and research activities". Section 106 compliance with the National Historic Preservation Act may be necessary based on scope of operation.

COMPLIANCE STATUS: The actions proposed in this statement are judged to be categorical exclusions based on 516 DM 6, Appendix 7.4 E(2) "Day-to-day resource management and research activities". Section 106 compliance with the National Historic Preservation Act may be necessary based on instrument location.

WRST N403.03 Mining and Minerals Management on Non-Federal Lands within Wrangell-St. Elias NP/P

PROBLEM STATEMENT:

There are approximately one million acres of non-federal lands, some of which cover known mineral belts and potential hydrocarbon fields. They may host economically extractable resources. Insufficient regulatory authority exists for controlling mineral development on these non-federal lands within the boundaries of the park and preserve. The primary economic commodities include: copper, gold, and silver. Owners of valid existing rights "inholdings" have the right to develop reasonable access across public lands.

Goal: To ensure that mineral related activities occur in a manner consistent with park values and prevent or minimize adverse impacts to natural and cultural resources.

DESCRIPTION OF RECOMMENDED PROJECTS(S):

- (1) Develop a cooperative agreement with State of Alaska and University of Alaska that:
 - Identifies lands for exchange.
 - Allows for the recognition of park values and protection of park resources.
 - Closes state lands within the unit's boundaries to new mineral entry (navigable and other lands).
- (2) Develop a cooperative agreement with Native groups which own non-federal lands within the unit that:
 - Identifies lands for exchange.
 - Allows for the recognition of park values and protection of park resources.
 - Allows for assessment of selected lands to facilitate final conveyance and relinquishment.
- (3) Validity: Determine administrative validity and conduct mineral examinations on all unpatented claims which have lapsed or been abandoned, and lie within selected and conveyed lands.
- (4) Support the development of CFR 9C regulations.

COMPLIANCE STATUS: The actions proposed in this statement may require National Environmental Policy Act (NEPA) compliance other than a categorical exclusion based on 516 DM, Appendix 7.4. NEPA compliance will occur on a case-by-case basis. Section 106 compliance with the National Historic Preservation Act may be necessary based on scope of operation.

WRST N403.04 Environmental Geochemistry of Mineral Occurrences Associated with Mining Claims

SUMMARY:

Wrangell-St. Elias NP/P (WRST) encompasses a region with numerous mineral properties which have been prospected and developed to varying degrees. Areas with mineral potential have "geochemical signatures" and typically contain elevated concentrations of many elements. Baseline geochemical signatures of mineralized areas within WRST have not been developed. Through the use of baseline geochemical signature data, we would be able to better assess the effects of past and predict environmental consequences of future mineral development. As it currently stands, any environmental assessment of proposed mining activities cannot be adequately evaluated. In addition, at abandoned mine land sites that may require mitigation, the pre-mining undisturbed geochemical baseline are unknown. Thus rendering it difficult to set standards for reclamation.

PROBLEM STATEMENT:

Past mineral exploration and mining activities have impacted the physical, chemical and biotic environments within WRST. Currently, mineral development can occur on Federal mining claims, Native lands, and State lands within the park and preserve boundaries. Mineral development on Federal mining claims is subject to the Mining in the Parks Act; environmental assessments are prepared prior to making a decision whether to authorize proposed activities. However, no regulations exist for mineral development on private lands within the park and preserve. In all cases an understanding of potential adverse effects of mining activities downstream, and on adjacent park lands, is critical. Knowledge of pre-mining geochemistry is necessary to determine the environmental effects of past and any future mineral development.

The current baseline geochemical dataset and our understanding of environmental geochemical signatures at mineral deposits within WRST is inadequate. The data gathered to date within WRST are inadequate because of (1) limited numbers of samples collected, (2) analyses that do not include a broad suite of environmentally significant elements, and (3) analysis with detection limits which are too high for environmental applications. We propose to characterize metal contents in waters, soils, sediments and vegetation surrounding the mined and unmined mineral deposits. Through this effort, we will determine site specific natural chemical baseline levels, and investigate the natural processes controlling metal dispersion and remediation.

The Kennecott stratabound copper, Nabesna and Berg pyrite-Cu-Au skarns, and Cu-Mo porphyry deposits are examples of known mineral deposits within the two highly mineralized belts that flank the Wrangell Mountains. Precious metal vein, Crumb Gulch (epithermal) and Bremner types, with associated gold placer deposits are also present within the WRST. Past

mining activities have been focused at these sites and they are likely to continue to be the target of future mineral development.

Large hydrothermally altered zones (red, orange and tan scars barren of vegetation) with disseminated pyrite, clay alteration assemblages, elevated metal concentrations, and acid pH levels naturally occur within the Cu-Mo porphyry belts. In acid pH systems, metals are more mobile. Elevated metal concentrations such as Cu, Pb, Zn, and As are associated with the skarn, Kennecott copper or gold vein deposits. For example, naturally occurring lead contents in stream sediments collected from the Nabesna Quadrangle range from 10 to 1500 ppm. Water and bedrock geochemical analysis show local anomalous levels above average crustal abundances, and the metal content in water may locally exceed EPA drinking water standards. In addition, mercury introduced during historic placer gold operations is common in the vein and placer gold districts as well as at some millsites.

This proposed study will generate information to assist park management in the: 1.) assessment of potential ongoing adverse impacts to park resources, 2.) reconstruction of pre-mining geochemical baseline levels to determine mitigation and reclamation target levels, 3.) documentation of naturally occurring element concentration ranges and associated mineralogy.

DESCRIPTION OF RECOMMENDED PROJECT:

STUDY RESEARCH COMPONENTS AND STRATEGY:

- (1) Compile, review and assess existing NURE, USGS and NPS geochemical data. Determine whether these geochemical datasets can be used in the proposed environmental geochemical mineral deposit study. If so, use the existing geochemical datasets to guide and aid in the selection of sites for detailed study;
- (2) Sample waters, soils, sediments, tailings and vegetation surrounding the mined and unmined mineral deposits to assess their metal contents. Metal contents in media surrounding the porphyry, skarn and Kennecott type deposits are unknown and need to be defined. Target sites for FY1996 may include Nabesna Mine, Berg-McDougall District, Kennecott Mines, Nike-Becky claim block and the Bremner mining district;
- (3) Analyze solid samples using various extraction schemes and x-ray diffraction to determine where metals reside;
- (4) Investigate whether these metal contents are current or potential environmental hazards;
- (5) For mined areas, establish pre-mining baseline data by investigating adjacent similar unmined occurrences; and
- (6) Determine whether natural remediation processes are effective. Potential processes include pH buffering by carbonate host rocks surrounding the Kennecott and Nabesna deposits, and

extensive seasonal downstream flushing. Natural remediation processes around the porphyry deposits are unknown.

Water will be sampled during midsummer and possibly snowmelt/runoff periods. Samples will be taken from discharge derived from adits, water pooled on or running over tailings, areas upstream of the deposits/occurrences, at intervals below the deposits/occurrences, from adjacent springs, from adjacent drainages, and from control sites distal from known mineralization. Tailings, mineralization and unmineralized rock samples will be collected for chemical and mineralogical analysis. Soil and perhaps vegetation samples will be collected near and overlying the deposits/occurrences. Stream sediments will be collected above and at intervals below the deposits/occurrences to assess metal contents in sediments. For mined areas, similar sampling will be undertaken at adjacent unmined deposits, if feasible.

OBJECTIVES OF THE RECOMMENDED STUDY:

Listed below are specific objectives and proposed responsible parties for achieving each objective and time-frame.

- (1) Compile and analyze and existing geochemical data. Review existing literature at potential study sites. Select study sites.

Responsible Party(s)	Time-Frame
USGS (Cooperative Agreement)	Spring 1996
Park Geologist	Spring 1996

- (2) Conduct geochemical field investigations at two or more mineral deposit/occurrence types.

Responsible Party(s)	Time-Frame
USGS (Cooperative Agreement)	Summer 1996
Park Geologist	Summer 1996

- (3) Analyze and interpret geochemical samples.

Responsible Party	Time-Frame
USGS (Cooperative Agreement)	Fall 1996 & 1997
Park Geologist	Fall 1996 & 1997

- (4) Prepare a final report.

Responsible Party	Time-Frame
USGS (Cooperative Agreement)	1997
Park Geologist	1997

FUNDING AND STAFFING:

The research components of the project will be overseen by the USGS Geochemist. The park Geologist will coordinate and participate in the field work, report preparation and administer all cooperative agreements. USGS will conduct all geochemical analysis and publish an environmental geochemical report.

FY1996

NPS & USGS Interagency Agreement - Cost for geochemical analysis only	\$ 12500.00
NPS - OAS support	\$ 2500.00
NPS - Geologist no cost	0000.00
USGS - Project staffing Costs	\$ 21500.00
USGS - Geochemical analysis and project related costs	\$ 13500.00
NPS FUNDING REQUEST (30%)	\$ 15000.00
USGS PROJECT CONTRIBUTION (70%)	\$ 35000.00
TOTAL PROJECT COST	\$ 50000.00

*Implementation of this project is contingent upon both the USGS and NPS funding their respective amounts.

WRST N403.05 Impacts of Road Management and Gravel Removal Along the McCarthy and Nabesna Roads

PROBLEM STATEMENT:

The McCarthy Road and the Nabesna Road (59 miles and 42 miles long, respectively) are two State of Alaska rights-of-way in Wrangell-St. Elias National Park and Preserve (WRST). Both of these rights-of-way were conveyed to the State of Alaska (State) as a result of achieving Statehood. Additionally, these are the only two roads that provide reasonable access for park visitors and residents within the park. It is imperative that the park work closely with the State of Alaska in the development of a road improvement and maintenance plan.

WRST and the State desire to have these roads improved and adequately maintained. The Alaska Department of Transportation and Public Facilities (AKDOT) is presently planning improvements to both roads. In order to make improvements gravel and rip-rap will be necessary. In the past, AKDOT has taken gravel from within the McCarthy and Nabesna Road rights-of-way resulting in: unsightly pits immediately adjacent to the road; informal camp grounds; trash and sanitation problems.

An intergovernmental work group has developed a draft McCarthy Road Corridor Study and will begin a Nabesna Road Corridor Study in 1996. Both studies aim to provide the visitor with a sense of the "natural" environment. Current road conditions, such as artificial berming and disruption of waterflow and wetlands have resulted in the proliferation of native invader species such as willow and alder along the roadside. Large sections of the McCarthy Road are lined with a wall of invader species, thus giving the visitor a false sense of the environs they are traveling through. The intergovernmental team has recommended that material sites should be managed in such a manner as not to distract from the natural and scenic beauty of Wrangell-St. Elias NP/P. In this case, vegetative screening is necessary to obstruct the visual perception of these areas. Additionally, access into material sites should be restricted and gated. The purpose of these sites must be restricted to just that, materials, and not alternative campsites or parking areas. If alternative campsites or parking are needed then formal planning and design must be conducted to assure proper care and maintenance. All closed material sites must be reclaimed and restored.

Additionally, AKDOT will construct a bridge across the Kennicott River. A major improvement along the Long Lake section of the McCarthy Road occurred this past spring. Improvements to these roads would support public use of the park. Such improvement is positively addressed in the general management plan for WRST.

In order to make improvements gravel will be necessary. In the past, AKDOT has taken gravel from within the McCarthy and Nabesna Road rights-of-way resulting in unsightly pits immediately adjacent to the road. In some cases, these pits have strayed well beyond the limits of the right-of-way. Twelve gravel pits are located adjacent to the Nabesna Road. The average size of the gravel pits is 18,000 square meters. Twenty-five percent exhibit ponding and 58% experience soil erosion.

Cook, (1988) determined that gravel removal sites along the Nabesna Road have and will continue to create adverse visual impacts for park visitors. Further, the potential for additional roadside disturbance and damage from the lack of vegetation and subsequent soil erosion is very real. Komarov (1980) estimates that "...a one hectare pit clutters six hectares around it and leads to reduction in ground water, the withering of vegetation and other ecological depredations over a minimum of 15 hectares." Gravel pits may also impact local hydrological patterns by diverting surface and subsurface flow. In addition, heavy equipment compacts the substrate and forms a physical barrier to root penetration thereby reducing moisture-holding capacity and increasing the difficulty of revegetation.

According to Cook (1988), the most significant finding associated with the Nabesna Road gravel pits is the lack of organic topsoil at all sites but one. Recent studies on the revegetation of subarctic disturbed sites indicate that the most important factor in native revegetation is the preservation or replacement of upper organic layers of soil (Johnson, 1976; Shaver et. al., 1983 and Johnson, 1987).

In the case of the McCarthy Road some material site rights-of-way were also obtained by the State prior to the establishment of WRST. At other locations, material site applications were filed with the BLM but never approved. Significant reserves were delineated at some of these sites which are now located on NPS or native lands. Material sites rights-of-way were not obtained by the State for the Nabesna Road.

Eight sites have been proposed for gravel development along the McCarthy Road. Based on the park's experience with gravel management and removal along the Nabesna Road the park has determined that it is critical to develop a gravel management plan in coordination with AKDOT, University of Alaska Lands Department, AK Department of Natural Resources and the involved Native Corporations to identify material needs and prevent both aesthetic and ecological impacts.

Special Directive 91-6 states that park management should ensure that acceptable sources for mineral are identified and analyzed in appropriate park planning documents and that effects on natural and cultural resources have been considered and evaluated. WRST park managers want to protect the visitor experience along both road corridors. Current practices have undetermined effects on cultural and natural resources and the visitor experience.

DESCRIPTION OF RECOMMENDED PROJECTS(S):

The objectives and methodology of this project are to:

(1) Work cooperatively with the State of Alaska Department of Transportation, University of Alaska, Native Corporations and Alaska Department of Natural Resources to develop a McCarthy and Nabesna Road Plan. This includes identifying potential gravel resource sites along both roads and on NPS lands that if developed would allow for protection of park resources and maintain a quality visitor experience.

Methodology - The park and the State will work cooperatively to document: (1) historical maintenance of both roads; (2) map landforms and surficial geology; (3) conduct reconnaissance field investigations of potential materials sources; and (3) document existing conditions of both roads including environmental concerns. Based on this information the park and the State will develop minimum road standards, redesign (if necessary) and develop a maintenance schedule. The maintenance schedule will determine gravel needs.

Product(s) - FY1997 Development aerial photo based geomorphic and surficial geologic maps along the McCarthy and Nabesna Roads.

FY1998 Development of the McCarthy and Nabesna Road Plans.

(2) Develop a standard "Outline for Information Requirements" for proposed gravel pit development within and adjacent to park lands.

Methodology - Park staff in coordination with regional staff and staff from Denali NP will develop a standard format that specifies the minimum information required to adequately evaluate any proposed gravel pit reconnaissance and development that could potentially impact park lands.

Product(s) - FY1997 Development of a standard "Outline for Information Requirements".

(3) Conduct investigations of potential sites that would determine; quality, quantity and site specific development economics availability of material reserves. Site surveys would include: geologic mapping and testing by NPS and DOT engineers and geologist field crews, and possibly drilling to delineate reserves, and inventory natural and cultural resources.

Product(s) - FY1998 Develop a List of "Preferred and alternative material sites.

(4) Develop a gravel management plan.

Methodology - Park staff in cooperation will identify gravel needs (based on the Road Plans), determine gravel sources, types, juxtaposition to areas of gravel needs, gravel source life expectancy, gravel pit design, and reclamation.

Product(s) - FY1999 Development of a "Gravel Management Plan".

- (4) Assure environmental and cultural compliance.

Methodology - Park staff will develop an environmental assessment on the Road Plan and the Gravel Management Plan. In addition cultural resource compliance will be conducted.

Product(s) - FY1998 Development of and Environmental Assessment.

FUNDING AND STAFFING ESTIMATES:

This project will be overseen by the park's Environmental Specialist, Geologist, and Chief, Resources Management.

Timing: The State of Alaska is prepared to begin road maintenance and gravel extraction immediately.

FY 1

GS-09 Engineering Technician (Temporary)	\$ 33,000
GS-07 Biological Technician (Temporary)	\$ 27,000
Travel (includes field per diem)	\$ 10,000
Workshop	\$ 15,000
GIS Theme Development	\$ 20,000
Transportation (1 vehicle)	\$ 12,000
SUBTOTAL	\$ 117,000

FY 2

GS-09 Engineering Technician (Temporary)	\$ 35,000
GS-07 Biological Technician (Temporary)	\$ 29,000
Travel (includes field per diem)	\$ 10,000
Transportation (1 vehicle)	\$ 12,000
SUBTOTAL	\$ 86,000
GRAND TOTAL	\$ 203,000

COMPLIANCE STATUS: The actions proposed in this statement may require National Environmental Policy Act (NEPA) compliance other than a categorical exclusion based on 516 DM, Appendix 7.4. NEPA compliance will occur on a case-by-case basis. Section 106 compliance with the National Historic Preservation Act may be necessary based on scope of operation.

WRST N404.00 Determine Extent and Potential Threat of Abandoned Mine Lands

PROBLEM STATEMENT:

The 1980 Alaska National Interest Lands Conservation Act (ANILCA) lands encompassed many preexisting mineral properties. The Alaska Region has the majority of federal mining claims within the National Park System. Wrangell-St. Elias National Park and Preserve (NP/P) has approximately sixty percent of the active federal mining claims within the Region (significantly more than all other Alaska units combined, and more than twice as many as the second highest unit).

Currently, there are approximately 875 active federal mining claims within Wrangell-St. Elias NP/P, an area 13 million acres in size. At the time of the land withdrawal, there were approximately 2500 active mining claims. It has been estimated that in the past there were more than 4500 mining claims located within the lands currently encompassed by the park. Five areas were extensively explored and mined in the past. In light of these figures, the potential for the existence of significant hazards associated with abandoned mine lands within Wrangell-St. Elias NP/P becomes obvious.

The Wrangell-St. Elias region has a history of human habitation and settlement including industrial endeavors such as mineral exploration and development as well as the construction of the railroad to Kennicott. Mining infrastructure, tailings, and abandoned property in many instances present hazardous situations with the potential to pollute the environment or threaten the safety of visitors.

In 1984 the park conducted a Waste Refuge Site Inventory. This survey served as a catalyst to stimulate funding using Parks Restoration and Improvement Programming System (PRIPS) moneys in 1985. Throughout 1985 and 1986 the park conducted detailed inventories of hazardous wastes at nineteen sites. [One hundred-thirty three containers of ignitable and non-ignitable hazardous liquids were found and sampled. Solid wastes totaled approximately 167,00 pounds, much of which were stockpiled drilling mud. Explosives were found at seven sites, which included 310 pounds of unstable dynamite.] Many additional sites have not been inventoried.

The PRIPS funding resulted in the documentation of an abandoned oil well drilling site where drilling muds were stockpiled. These muds were exposed to the elements for over 20 years and were leaching heavy metals into the environs. Based on PRIPS moneys and the identification of this site, the park secured NRPP funding in 1987-89 to assess the extent of contamination. The data provided by this NRPP funded program was used by BP Exploration in 1989-90 to develop a mitigation plan for the site. The site has since been mitigated and BP Exploration is conducting post-cleanup monitoring. In addition, the PRIPS monies lead to the removal of explosives from five other abandoned mine land sites.

In 1989-90 the park received support from the Alaska Region - Mining and Minerals Branch to initiate an AML program. The AML program developed a list of approximately 400 known, but poorly documented, abandoned mine lands. Some of these sites are readily accessible by the public, thus creating a visitor safety problem. Many exhibit signs of potential environmental impact. That AML program resulted in the partial mitigation of one abandoned mine area with hazardous waste.

To date, AML program activities have documented occurrences of explosives, unsecured mine openings, deteriorating mill and mining equipment, supplies and structures, tailings, drilling muds and petrochemicals. Some of the more critical areas of concern where significant mining related activity occurred are: Kennicott-McCarthy, Bremner-Golconda Area, Elliot Creek, Copper Creek, the Kuskulana Drainage, Gold Hill, Nabesna, McCarthy Creek, Dan Creek, Chititu, and Orange Hill. A comprehensive list is not available of all existing areas or sites where health and safety and environmental hazards may exist. It is highly likely that some areas may have pressing situations that require remedial actions. New sites with "Abandoned Mine Lands" (AML) hazards are discovered and documented annually. This is the result of "accidental" data acquisition.

Continuing the present management situation entertains the possibility of human or ecological tragedy. Toxic chemicals which leach into the environment can be concentrated up the food chain. Fisheries and wildlife would be adversely affected. Pollution of adjacent water courses could occur. The accidental or spontaneous detonation of aged explosives as well as the obvious hazards involving mine openings and deteriorating industrial facilities could eventually lead to serious injuries or loss of life. It is reasonable to expect tragic consequences if these and similar hazards are not located and mitigated on a priority basis.

DESCRIPTION OF RECOMMENDED PROJECT:

The objectives and methodology of this project are to:

Objective 1 - Identify and document significant health, safety and environmental hazards associated with abandoned mine lands.

Methodology - Research This would involve reviewing, compiling, and organizing data that has previously been collected in hazardous wastes surveys, cultural resource surveys, and USGS, USBM and DGGS geological reports. Such data would need to be evaluated to determine completeness and suitability for assessment purposes applicable to the problem. Research would also involve investigation of district, state, federal, and court records to determine the locations of as many of the old mining claims as possible to allow for subsequent field investigation. Criteria will be developed to direct field investigations. Land status of mineral properties will be determined.

Product(s)

FY1994 Identify, determine location, and compile and review available published literature on potential AML sites.

Develop an abandoned mine lands database.

Develop ranking criteria for prioritizing field investigations and development of reclamation and mitigation plans.

FY1995 Continual update of database.

Field Inventory Based on ranking criteria, abandoned mine land sites will be field inventoried. This would entail field verification of existing data, inventory of sites for which data is not available, and gathering of data necessary to provide engineering design parameters for reclamation or mitigation. In addition, acreage of disturbed areas and volumes of dumps, pits, and tailings would be determined for reclamation purposes. Baseline data on park water quality would also be collected. This aspect would focus on ecological hazards. Sampling will be conducted within drainages which experienced mining activities to identify sources of toxic waste discharge.

Product(s)

FY1994 Inventory sites. Level I hazardous substances surveys and Level II surveys as needed.

FY1995 Inventory sites. Level I and II hazardous substance surveys.

FY1996 Inventory sites. Level I, II and III hazardous substance surveys.

Objective 2 - Develop reclamation plans for the high priority sites.

Methodology - Design of Reclamation or Hazard Mitigation This would involve the development of individual abandoned mine land site mitigation plans which will determine necessary and alternative levels of reclamation or mitigation (i.e. hazardous substance abatement, explosives mitigation, mine opening closure, environment reclamation/restoration, monitoring, and management alternatives).

Product(s)

FY1996 Develop reclamation/mitigation plans

FY1997 Develop reclamation/mitigation plans

FY1998 Develop reclamation/mitigation plans

Objective 3 - Work with all responsible parties (past owners of abandoned mine lands, State and Federal agencies) to mitigate abandoned mine land sites.

Methodology - Hazard Elimination in Field This would involve cooperative work among agencies and private enterprise to mitigate abandoned mine lands.

Product(s) - A strategy to gain cooperation/participation of responsible parties in reclamation/mitigation of abandoned mine land sites that threaten the environment and human health and safety. A program to encourage contributors to cleanup public lands.

WRST N405.00 Coastal Zone Protection

PROBLEM STATEMENT:

Approximately 110 miles of the southeastern boundary of the park/preserve is delineated by the mean high tide line of the North Gulf Coast of Alaska. This coastal zone provides important habitat for marine mammals, waterfowl, shorebirds, and commercial and sports fisheries. This zone also serves as an important flyway for migratory birds.

The North Gulf Coast experiences some of the harshest marine weather conditions in the world. Boating accidents are unfortunately routine. In recent years, shipping losses have included a luxury cruise ship, several large seagoing barges, and numerous fishing vessels.

The possibility of a serious accident involving a large vessel, oil tanker, barge hauling hazardous substances, or offshore drilling platform is quite real. The effects of a major oil spill from such an event could be disastrous to the coastal environment.

Goal: To ensure that the resources at risk along the coastal zone have been identified and that adequate procedures and capability are in place to provide maximum protection in the event of an oil spill or similar event.

Status: The U.S. Coast Guard and Alaska Department of Environmental Conservation share responsibility for oil spill prevention, containment, and cleanup. The effectiveness of their containment and cleanup efforts can be significantly enhanced if they are provided information on the shoreline and beach conditions as well as resources threatened before taking action. Park Service coastal inventories to date have focused on public use sites, commercial fishing and guiding facilities, and gross observations of wildlife. Similarly, the Yakutat District Coastal Management Program addresses general development and human activities along the coastal zone as well as generally describing natural resources by broad categories and areas of occurrence.

A capability to detect, contain and cleanup oil spills is maintained by the U.S. Coast Guard and Alaska Department of Environmental Conservation. However, there is no site specific information available on beach conditions or resources involved. A liaison between the Park and these two agencies does not exist.

DESCRIPTION OF RECOMMENDED ACTION:

Continue Present Management: Oil spills would be contained and cleaned up without the benefit of site specific information and clear procedures for reporting spills or assisting work efforts by National Park Service personnel. Coastal resources could be damaged through the application of inappropriate techniques; inappropriate response due to lack of information on resources at risk, or needlessly lost due to delayed response.

Coastal Zone Survey: Detailed information regarding beach conditions, the seasonality, extent and location of wildlife dependency upon coastal resources, and other pertinent data would be collected. This information would be updated on a regular basis through

monitoring efforts. It would significantly improve the efficiency and effectiveness of any oil spill abatement efforts.

Cooperative Oil Spill Abatement Program: In cooperation with the U.S. Coast Guard, Alaska Department of Environmental Conservation, and other interested federal, state, or local agencies roles, functions and procedures to follow in the event of an oil spill or similar event would be documented. This would promote awareness of the potential for such an event, organize the limited capabilities in this area in a cooperative manner, and clearly identify responsibilities and procedures. The effectiveness of oil spill abatement would be significantly enhanced.

WRST N501.00 Vegetation Management

PROBLEM STATEMENT:

Vegetation is either directly or indirectly affected by every resource management program described in this plan. It is also being altered by natural processes and outside influences. Development, demands for forest products, grazing, access, and agriculture are impacting plant communities within Wrangell-St. Elias National Park and Preserve. These impacts can both subtly and dramatically change the composition, structure, and distribution of the park/preserve's vegetation.

Fire behavior and wildlife populations are directly affected by vegetation. The development and implementation of fire and wildlife management programs has been hindered by the lack of accurate and detailed vegetation information. Data from gross surveys has been used to prepare maps which differentiate forest, shrub thickets, and tundra types.

LANDSAT data has been used experimentally to prepare rudimentary plant community maps in the Chitina Valley.

An extensive species list has not been prepared and the park/preserve has not been surveyed to determine if exotic plant species are established. Several localities of Montia bostockii, a species nominated for listing as threatened on the Federal Threatened and Endangered Species list, has been identified in the park/preserve. Its distribution is unknown. A survey for additional threatened or endangered species has not been conducted.

Until a comprehensive detailed description of the vegetation communities and species is available, cultural and natural resource management and research will be hindered by insufficient information.

Goal: To develop baseline data necessary to monitor changes in the vegetation and to ensure the perpetuation of natural processes.

Status: Since 1983, FIREPRO crews have investigated the effects of fire; determined fuel loading; and documented vegetation response to fire. A byproduct of their work has been the collection and identification of vascular and non-vascular plants including lichens and mosses

A preliminary survey of a few ATV trails was conducted to determine vegetation and soil type. No additional efforts to collect vegetation data have been undertaken.

LANDSAT and elevation data have been purchased for the Alaska region to serve as the foundation for a geographic based information system. A major benefit of this system will be the generation of a vegetation map with a resolution of approximately five acres. However, the timetable of its availability for use by park/preserve staff is around 1994.

Information collected from past studies has not been synthesized. Current studies are ongoing and will continue to provide additional vegetation information. A species list

has been developed, however, a comprehensive system for the access and integration of vegetation information has not been developed. A description of vegetation communities, species and fuel types is not available.

DESCRIPTION OF RECOMMENDED PROGRAMS(S):

Conduct a floristic study to develop species lists and delineate species distribution. Specimens will be collected to develop working herbarium. The status of candidates or listed rare, threatened, or endangered species and exotic plants will be determined. Recommendations for the development of a monitoring system to identify changes in species composition and condition will be made. This alternative may result in minimal impact due to the collection of plants. No adverse environmental impact will result from this alternative.

Nonvascular plants are of particular importance because of their role in the Alaskan environment. Trained specialists will be contracted to properly identify specimens. The herbarium is extremely valuable as a mechanism to enhance identification and to transfer knowledge. Local Alaska field guides are not available for the identification of many mosses and lichens. The distribution of species will be delineated and monitoring techniques recommended.

Prepare a vegetation map using digitized LANDSAT data when data is available. This is the only practical method to obtain this information because the area is remote and immense. Vegetation types will be identified and mapped. Data collected by FIREPRO study will be used to assist ground truthing efforts. This information can be employed to identify fuel types, potential fire hazard zones, archaeological sites, and wildlife habitat and document resource deterioration. This alternative should be implemented at cyclic intervals of 10-20 years. This will provide management with a method monitoring vegetation changes, effects of development, and resource deterioration on a large scale.

All proposed programs are recommended to meet the pressing need for information concerning the vegetation of the park/preserve. This information is needed to improve the quality of natural and cultural resources management and interpretive programs. Recommendations for the development of monitoring systems generated by these studies and surveys will be used to implement a monitoring program to be conducted by park personnel.

COMPLIANCE STATUS: The actions proposed in this statement are judged to be categorical exclusions based on 516 DM 6, Appendix 7.4 E(2) "Day-to-day resource management and research activities". Section 106 compliance with the national Historic Preservation Act may be necessary based on instrument location.

WRST N501.02 Vascular Floristic Inventory

PROBLEM STATEMENT:

Wrangell-St. Elias National Park & Preserve (WRST) encompasses a unique cross section of boreal, subarctic and coastal ecosystems in Alaska with floristic influences from Beringia, the Yukon, the arctic and the Pacific Mountain systems. The diversity of plant communities in this region is unsurpassed for a park unit in Alaska due in part to the expansiveness of the park, the three climatic zones it covers (interior, montane and transitional) and the wide variety of geologic features found within its boundaries.

The flora of Wrangell-St. Elias is one of its greatest resources, one that has not yet been inventoried. "A basic vegetation inventory is the first step in vegetation management" (The Natural Resources Management Guideline, NPS-77, p.15). The Park Service has been mandated to initiate surveys to determine the presence and extent of endangered species of flora and fauna (General Management Plan, p.42), however there has not yet been an inventory of park vegetative resources. Current funding is unavailable to conduct baseline inventories of vegetation resources and I & M funds will not be available to WRST for at least three years.

Published floristic studies within WRST have been limited to a few geographic areas: Skolai Creek, Chitistone Pass and the Chitistone River (Murray 1968 and 1971, Neilson 1972); Russell, Sheep and Guerin Glaciers (Murray 1969); Chitistone, Skolai and Frederika Valleys (Scott 1968, 1974); Long Glacier and Dadina River (Saltmarch 1976) and Bonanza ridge near Kennicott (Nordell and Schmitt 1977). Limited botanical surveys have been conducted in association with other park projects (GIS mapping, timber and grazing surveys, all-terrain vehicle studies and environmental assessments for mining compliance).

Park staff have documented 121 vascular plant range extensions, one category 2 taxa (vulnerable but not enough data available for listing by USFWS as threatened), and three category 3 taxa (taxa previously being reviewed for listing). Twenty-two taxa occurring in WRST are being monitored by the Alaska Natural Heritage Program (AKNHP). Seven-hundred and four vascular taxa are known to occur in WRST, 585 of these are represented in the herbarium. There are 1023 vascular and 190 non-vascular specimens in the herbarium.

There are large areas within WRST that have never been surveyed botanically. This is most obvious by the range maps in the Flora of Alaska (Hulten 1969) in which the "Wrangell Void" is seen for many taxa in areas where these taxa are expected to occur. Large unexplored areas are very likely to have significant disjuncts and rare taxa. A complete vascular floristic survey of WRST would take many years using a full staff of botanists, therefore this survey will focus on three types of study areas: (1) Those areas known to have rare species, a high number of endemics and a high number of major disjuncts; (2) areas of phytogeographic significance (sand dunes, mud volcanoes, south facing steppe slopes and glacial nunataks) and (3) areas where no floristic work has been done but which have a high potential for the occurrence of rare species, species new to the park and unique floristic associations.

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DESCRIPTION OF RECOMMENDED PROJECTS:

The purpose of the proposed study is to inventory the flora of selected areas within the park to assess the genetic diversity of the region, to identify rare taxa and disjuncts and to acquire the basic data needed for an understanding of the park's resources in order to protect the biodiversity of the natural systems within the park. Specific objectives of this study are:

(1) Information from all past floristic studies conducted in WRST and information on rare plant occurrences will be gathered and synthesized. This will include data from the Alaska natural Heritage Program element occurrence database.

(2) Inventory areas have been preliminarily delineated, prioritized and grouped by region. Access will be by fixed wing when possible. However most areas will require

helicopter access and a move every four to six days. Some aerial reconnaissance will be necessary before sites are chosen. A proposed schedule for surveys follow. Additional survey areas are on file at WRST.

<u>Year</u>	<u>Survey Area</u> <u>Access**</u>	<u>Type*</u>	<u># of Days</u>	
1	White River (Lime Creek, Wiki Peak, Ptarmigan Creek, Solo Flats)	1	20	F, H
	West Glacier, Copper Glacier, Nabesna Glacier, Black Mt., Cooper Pass	1	20	F, H
	W slopes of Mt. Drum and Mt. Sanford	1	10	F, H
	Iron Mt., Kuskulana Mts.	1	10	H
2	Granite and Centennial Ranges	3	20	H
	Chugach Mts. (Klu, Hanagita, Tana and Bremner drainages)	1,3	20	F, H
	E side of Copper R. from Bremner R. to Chitina	1,3	10	
	H			
	Mentasta Mts.	1,3	10	
	F, H			
3	Glacial nunataks in Bagley Ice Field, Malaspina, Yahtse and Guyot Glaciers	1,2,3	30	H
	Steppe associations on S facing bluffs	2,3	20	H
	Sand dunes and mud volcanoes	1,2,3	10	H

* Refer to types of study areas described above

** F = fixed-wing, H =helicopter

(3) Qualified botanists, familiar with the flora of this region will compile complete species lists for each area, collect voucher specimens of taxa new to the herbarium or unique for a particular area, identify rare and endemic taxa, identify disjuncts and provide basic ecological descriptions for each site. Botanists from the University of Alaska, Fairbanks Museum (ALA) and the Alaska Natural Heritage Program (AKNHP) may be interested in accompanying park botanists to particular areas. The addition of their expertise, when available for planning and for field surveys will be encouraged.

(4) Data on rare plant occurrences and range extensions will be compiled into a database which was initiated in 1992. Authorities at ALA will be consulted for difficult determinations, rare taxa and range extensions. All herbarium specimens will be cataloged, labeled and prepared for addition to the WRST herbarium.

(5) Range extensions and noteworthy floras of particular areas will be published in the botanical literature (i.e. Canadian Field Naturalist). A checklist of the flora, a booklet on the rare plants of WRST and an annual report documenting the results of the areas surveyed will be prepared.

FUNDING AND STAFFING: The project will be overseen by a botanist (GS 9/11, term appointment) and the Chief, Resources Management. The project botanist will be

assisted during the field season by an assistant botanist (GS 9, seasonal). The project botanist will plan all phases of the study, co-ordinate the field inventory and prepare final reports.

FY1		
Botanist (GS-9/11 - 10 months)	\$35,968	
Botanist (GS-9 - 4 months)	11,724	
Travel		2,000
OAS Support (Helicopter flight time & availability)	50,000	
Supplies (GPS unit and field press)	1,000	
Specimen Verification by ALA	3,000	
AKNHP Database		500
TOTAL		104,193
FY2		
Botanist (GS-9/11 - 10 months)	35,968	
Botanist (GS-9 - 4 months)	11,724	
Travel		2,000
OAS Support (Helicopter flight time & availability)	50,000	
Specimen Verification by ALA	3,000	
TOTAL	102,693	
FY3 Same as FY2	102,693	
GRAND TOTAL		\$309,579

COMPLIANCE STATUS: The actions proposed in this statement are judged to be categorical exclusions based on 516 DM 6, Appendix 7.4 E(2) "Day-to-day resource management and research activities". Section 106 compliance with the National Historic Preservation Act may be necessary based on instrument location.

WRST N503.00 Fire Management

PROBLEM STATEMENT:

Approximately six million acres within the park and preserve is sufficiently vegetated to support fire. Given the nature of the vegetation and current knowledge of fire in Alaskan ecosystems, it can be assumed that at least four million acres have burned; although not as extensively or severely as other portions of interior Alaska.

Basic objectives which guide the development of fire management actions and strategies include: 1) protection of life and physical developments, 2) maintenance or restoration of fire as a naturally occurring factor in the ecosystem, 3) economy and efficiency in fire suppression and control actions, and 4) protection of cultural/historic sites, and sensitive habitats from total loss due to fire or disturbance during suppression activities.

A more detailed information base is required to comprehensively address the basic issues. For example, inventories of physical developments, cultural/historic sites, sensitive habitats, and access routes for suppression forces do not exist or are incomplete.

The natural fire regime is unknown for the area. The determination of the natural fire regime is clouded by man's activities for the past 100 years.

A policy of total fire suppression has been applied to the area for almost 50 years. During the 50 years prior to establishment of that policy, industrial exploitation and development (mining, grazing, prospecting, railroad, etc.) resulted in a large number of man-caused fires and the harvest of timber in large quantities. The extent and nature of aboriginal involvement in prescribed fire is unknown, although well established for natives in similar vegetation types in Canada.

Goal(s): To allow fire to play its natural role in the maintenance of the Park/Preserve ecosystem. To protect archaeological and historical sites, private property, NPS facilities, and human life.

STATUS:

In June 1983 two interagency fire management plans were implemented which affect lands with Wrangell-St. Elias. The Forty-mile Plan includes lands north of the crest of the Wrangell Mountains. The Copper Basin Plan extends southward from the crest of the Wrangell Mountains to the Bagley Icefield. The plans provide for integrated fire management based on the objectives of the land managing agency or owner.

The area encompassed by the interagency fire management plans include the locations of all fires that are known to have occurred within the park and preserve. The plans identify management zones that direct fire management activities ranging from immediate suppression to monitoring of fires that are allowed to burn unimpeded. Management zones also establishing priorities for the allocation of suppression forces in the protection of human life, physical structures, cultural and historic resources and sensitive or endangered habitat. Suppression efforts are expected to be commensurate with values at risk.

The area south of the Bagley Icefield remains a total suppression zone, as required by both NPS policy and the State of Alaska Constitution, since it is not covered by an approved fire management plan.

A memorandum of understanding between the Bureau of Land Management (BLM) and the NPS established the BLM as the fire suppression force for lands under NPS jurisdiction within Alaska. The BLM has subcontracted suppression activities to the Alaska State Department of Natural Resources (DNR) in the south-central portion of the state. The BLM is the suppression force for the area covered by the Forty-mile Plan. The Copper Basin Plan area receives suppression forces from DNR.

Staff members are sent to fire management training courses to qualify for positions under the National Interagency Fire Qualification System (NIFQS).

Through funding made available by Normal Fire Year Programming (FIREPRO) a three year study began in the summer of 1983 to determine fire frequency, history and effects as well as vegetation patterns following fire. In addition, identification and documentation of structures within the park and preserve was initiated to facilitate fire management planning and allocation of suppression forces. FIREPRO also prepares personnel for monitoring the behavior of fires that occur within management zones where fires are allowed to burn.

The fire management plans allow the opportunity for fire to play its natural role in maintenance of the Park/Preserve ecosystem while providing protection to life and property.

Ongoing studies are gathering information which will assist in refining these initial fire management planning efforts. Monitoring activities performed under auspices of FIREPRO provide opportunities for staff members to develop and refine fire behavior monitoring skills.

DESCRIPTION OF RECOMMENDED PROGRAMS(S):

Within the framework of the Forty-mile and Copper Basin Interagency Fire Management Plans an action plan will be prepared identifying areas where prescribed fire is needed. It will also describe the specific methods and conditions under which prescribed burns will be conducted, natural fires will be monitored, and identify staffing levels required. Prescribed fire will only be used to reduce unnatural fire danger or where its use will increase the safety of inhabited areas or protection of critical resources. The prudent use of prescribed fire will result in reduction of fire danger and increased opportunity for fire to assume its role as a regulatory mechanism in natural systems.

COMPLIANCE STATUS: The actions proposed in this statement may require National Environmental Policy Act (NEPA) compliance other than a categorical exclusions based on 516 DM 6, Appendix 7.4. NEPA compliance will occur on a case by case basis. Section 106 compliance with the National Historic Preservation Act may be necessary based on scope of operation.

WRST N503.01 Fire History

PROBLEM STATEMENT:

Land management agencies in Alaska are moving from past practices of fire control toward management of fire as a tool to meet resource management objectives. Information on the natural role of fire and the effects of fire in the northern environment is badly needed as a basis for formulating fire management plans (Viereck and Schandelmeier 1980).

Approximately six million acres within the park and preserve is sufficiently vegetated to support fire. Given the nature of the vegetation and current knowledge of fire in Alaskan ecosystems, it can be assumed that at least four million acres have burned; although not as extensively or severely as other portions of interior Alaska.

Alaska fire records have only been kept since 1940. Statistics for the period from 1940 to the present have been compiled by Barney (1969, 1971) and the Bureau of Land Management (USDI 1978). Difficulties in determining fire history have been identified by Barney and Stocks (1979). These authors point out that climate, especially lightning frequency, has not changed in the last 100 to 150 years. The question of periodic or cyclic patterns in the occurrence of large fire years remains unresolved (Viereck and Schandelmeier 1980).

Goal(s): To understand the fire history of the park/preserve and use this information to help support fire management decisions.

STATUS: Ongoing studies are gathering information which will assist in refining these initial fire management planning efforts. Monitoring activities performed under auspices of FIREPRO provide opportunities for staff members to develop and refine fire behavior monitoring skills.

LITERATURE CITED:

Barney, R.J. 1969. Interior Alaska Wildfires, 1956-1965. USDA/USFS, Pacific N.W. For. and Range Exp. Stn., Inst. North. For., Juneau, Alaska. 47 pp.

_____. 1971. Selected 1966-69 Interior Alaska Wildfire Statistics with Long-term Comparisons. USDA/USFS, Pacific N.W. For. and Range Exp. Stn., Portland, Oregon. Res. Note PNW-212. 8 pp.

_____. and B.J. Stocks. 1979. Fire Frequencies in the Industrial Period. *In* R.W. Wein, ed. Fire in Northern Circumpolar Ecosystems. Proceedings of a symposium. October 22-24, 1979. Fredericton, New Brunswick.

Heinselman, M.L. 1978. Fire Intensity and Frequency as Factors in the Distribution and Structure of Northern Ecosystems. *In* H. Mooney, J.M. Bennicksen, N.L. Christensen, J.E. Lotan, and W.A. Reiners, eds. The Role of Past and Present Fire Frequency and Intensity on Ecosystem Development and Management. Proceedings of a symposium, sponsored by the International Scientific Committee for Problems of the

Environment (SCOPE). USDA For. Serv. Gen. Tech. Rept., Washington, D.C.
Proceedings in press.

USDI Bureau of Land Management, Alaska. 1978. Fire Statistics. Page 24 in
The Land. Winter, Vol. 6.

Viereck, L. A. and L.A. Schandelmeier. 1980. Effects of Fire in Alaska and Adjacent
Canada - A Literature Review. USDI/BLM, BLM-Alaska Technical Report 6, 124pp.

DESCRIPTION OF RECOMMENDED PROGRAM(S):

The natural fire regime of an area has been defined by Heinselman (1978) as the total pattern of fires characteristic of a natural region or ecosystem. The pattern includes variations in ignition, fire intensity and behavior, average area of ecological significant fires, reoccurrence intervals, and the general ecological effects on the ecosystem.

The objectives of determining fire periodicity include:

- 1) Determine fire frequency;
- 2) Determine the fire cycle.

Additional objectives include:

- 1) Determine fire intensity to indicate the type or amount of heat created by a fire;
- 2) Determine fire severity to indicate the effect of the fire on the ecosystem.

COMPLIANCE STATUS: The actions proposed in this statement are judged to be categorical exclusions based on 516 DM 6, Appendix 7.4 E(2) "Day-to-day resource management and research activities". Section 106 compliance with the National Historic Preservation Act may be necessary based on instrument location.

WRST N504.01 Assessment and Mitigation of ATV Impacts

PROBLEM STATEMENT:

Like other ANILCA Parks, Wrangell-St. Elias National Park and Preserve (WRST) is required to provide reasonable and feasible access to inholders (43 CFR 36.10 ANILCA 1110) and subsistence users (36 CFR 13.46, ANILCA 810). Currently most of this access is via all-terrain vehicles (ATV'S). WRST also permits recreational use of ATV's on established trails. The demand for recreational ATV use is projected to increase due to both current trends of increased visitor use and further increases following the completion of proposed road improvements within WRST.

In the Parks' general management plan, it was acknowledged that "Because of the complexity of access and transportation issues related to Wrangell-St. Elias, planning ... will be an ongoing process. The National Park Service will continue to document past and current uses of the park and inventory access routes and special study issues". It was also noted that "some methods of access have greater potential than others for causing resource damage or degrading natural values and visitor experiences." ATV use was identified as having a high potential for causing resource damage. Additionally, Executive Order 11644 requires that we permit recreational ATV use only if that use does not pose a significant threat to park resources.

At present there are 500-600 miles of trails, affecting 2,000,000 acres of Park/Preserve land in WRST. Early research in WRST (Ahlstrand and Racine 1990) indicated that resource damage occurred with as little as 10 ATV passes. The impacts of ATV's and the type of vegetation and terrain that the trail traversed. Of particular concern are the numerous areas where the trails traverse wetlands, permafrost soils, and steep slopes. Past research and monitoring within WRST have indicated that ATV use has caused adverse impacts on Park lands, including shifts in species composition, decreased frequency and cover of plant species, thermokarsting, erosion, and increased trail width (Cook 1990a). Research in other Arctic areas has indicated that sites will continue to degrade if the organic mat has been destroyed, even if use ceases (Rickard and Brown 1974, Sparrow et al. 1978, Walker et al. 1987).

Previous work within WRST has provided information on the distribution and number of trails through the park, a rough estimate of the amount of use that each trail received (Beck et al. 1985, Beck 1987), and a broad estimate of vegetation types and disturbance along each trail. Additionally, for 3 trails used by miners in the Gold hill area, we have preliminary measurements of ATV impact in certain areas (Cook 1990a).

However, we do not have the data to determine which trail environments are most susceptible to damage (vegetation type, trail design), or how much use given trail types can sustain. Additionally, although our preliminary information suggests that ATV use is having an adverse impact, we do not have sufficient information to make a decision on whether or not the impact is significant enough to justify trail closure or changes in ATV trail management. Additionally, we have little information on the amount and impacts of ATV use outside of Gold Hill. Because the park is not

scheduled to receive I&M funding in the next 3 years, we do not anticipate gaining the needed information through that avenue.

Due to the legal requirement to provide access for inholders, we will be hard pressed to justify closing trails, for often there is no other reasonable or feasible access alternative. In that situation, and where we are concerned about trail deterioration, we need to develop management prescriptions that will minimize and mitigate ATV impacts.

ATV use is not an issue that is unique to WRST. All Alaskan ANILCA parks are required to provide access for subsistence users and inholders. Throughout the region, ATV's are a primary method of travel. Due to their reduced cost and availability, ATV's are experiencing increased popularity and use, both in and outside of NPS units (Sinnot 1990). Therefore, this issue is not only presently highly significant to Resource Management within WRST, but the problem is expected to get worse, both within WRST and throughout the region.

LITERATURE CITED:

Ahlstrand, G. M., and C. H. Racine. 1990. Response of an Alaskan Shrub-tussock community to selected all-terrain vehicle use. National Park Service Research/Resources Management Report AR. 114 pp.

Beck, K. A. 1987. Inventory of trails in the Gold Hill Area. Unpublished report. Wrangell-St. Elias National Park and Preserve, P.O. Box 29, Glennallen, AK.

Beck, K. A., B. Connery, and C. A. Meyers. 1985. Aerial inventory of mechanized vehicle trails in Wrangell-St. Elias National Park and Preserve. Unpublished report. Wrangell-St. Elias National Park and Preserve, P. O. Box 29, Glennallen, AK.

Cook, M. B. 1990a. Monitoring report for access to mine claims in the Gold Hill areas in Wrangell-St. Elias National Park and Preserve, Alaska. Unpublished report. Wrangell-St. Elias National Park and Preserve, P.O. Box 29, Glennallen, Ak. 131 pp.

Cook, M. B. 1990. Review of methods used to monitor use on Gold Hill mining access trails, 1987-1990 with data summaries and recommendations for monitoring. Unpublished report. Wrangell-St. Elias National Park and Preserve, P. O. Box 29, Glennallen, Ak. 79 pp.

Rickard, W. E. and J. Brown. 1974. Effects of Vehicles on Arctic Tundra. Env. Cons. 1:55-62.

Sinnott, R. 1990. Off-road vehicles and hunting in Alaska; Report to the Board of Game. Unpublished report. Alaska Department of Fish and Game, Division of Wildlife Conservation. 86 pp.

Sparrow, S. D., F. J. Wooding, and E. H. Whiting. 1978. Effects of off-road vehicle traffic on soils and vegetation in the Denali Highway region Alaska. J. Soil Water Cons. 33:20-27.

Walker, D. A., D. Cate, J. Brown, and C. Racine. 1987. Disturbance and recovery of Arctic Alaskan tundra terrain: a review of recent investigations. U. S. Army Corps of Engineers Cold Regions Research and Engineering Laboratory, Hanover, NH, CRREL report 87-11. 63 pp..

DESCRIPTION OF RECOMMENDED PROJECT (S) :

The goals of the proposed project are to:

- 1) Gain a better understanding of the effects of ATV use in various vegetation types , trail configurations, and use patterns:
- 2) Develop mitigation methodologies which are practical, effective, and economically feasible.

The specific project objectives are to:

- 1) Develop an updated park database on
 - a) trail environments (vegetation, aspect, slope),
 - b) trail use pattern (frequency, season, and intensity of use),
 - c) ATV impacts;
- 2) Design and evaluate mitigation prescriptions;
- 3) Develop a trail management plan;
- 4) Develop a trail monitoring and mitigation program, and
- 5) Incorporate mitigation measures into approved mining

WRST N505.00 Forest Products Management

PROBLEM STATEMENT:

There is a continuing demand for forest products near centers of subsistence activity, specifically McCarthy, May Creek, Chisana and road corridors. Firewood and house logs are being consumed at an increasing rate.

The number of residents within the park is expected to increase. The state recently disposed of 41 lots at Fireweed Mountain near McCarthy. Private lands are being subdivided and sold. Local native corporations and the state will acquire patent to approximately one million acres within the park boundaries which may eventually be developed. These increases will place further demands on a resource that, in some areas, is already stressed.

The areas which sustain tree growth are largely below the 3,000 foot contour. Tree size, quality, and stand density are related to aspect, elevation, proximity of alluvial stream bottoms, and the presence of permafrost. The most abundant tree species are white and black spruce, aspen, and balsam poplar. A small but productive stand of Sitka Spruce and western hemlock occurs in the Malaspina Forelands.

In the 1973 Final Environmental Impact Statement for Wrangell-St. Elias National Park and Preserve, the National Park Service estimated that the park/preserve would include 43,000 acres of prime forest land producing as much as 20,000 board feet per acre. These "prime forested areas: were not mapped or delineated. There is no reliable information on the availability, vitality and productivity of forest resources near centers of subsistence activity. The effects of intensive cutting in localized areas on plant communities, wildlife habitat, cultural resources and soils are not known.

Management of forest products by other agencies within the Copper River Basin (Bureau of Land Management and Department of Natural Resources) has been accomplished by: 1) granting permits in response to site-specific requests, and 2) the establishment of woodlots near population centers.

ANILCA provides for the continued subsistence use of live timber where permitted by the Superintendent if such cutting is determined to be compatible with the purposes for which the park and preserve were established.

Goal: To provide for the continued subsistence harvest of green trees in a manner which does not cause unacceptable environmental impacts or impair productivity of forested stands.

Status:

Until 1987 there was no reliable information on the availability, vitality and productivity of forest resources near centers of subsistence activity. In 1987, resources management personnel developed and "Inventory Forest Resources Standard Operation Procedure". The purpose of this document is to establish a basic forest resources inventory methodology for future inventories as well as to provide instruction for those unfamiliar with forest inventory procedures.

Resources management personnel began to collect forest resources data in 1987 from areas adjacent to subsistence communities and areas where specifically hose log cutting had occurred. Throughout 1988 and 1989, resources management personnel worked with the U>S> Forest Service and the Institute of Arctic Forestry to develop a "Timber Harvest Management Plan". The objective of this document was to institute a program that provided for the continued subsistence harvest of green trees in a manner that did not cause unacceptable environmental impacts or impair the productivity of forest stands.

In 1989, the Superintendent issued a 'Subsistence Green Log Policy' in order to implement the subsistence use of standing live timber over three inches in diameter for local rural residents [36 CFR Part 13.49(a)].

Beck, Kathryn A. 1987. An Inventory of Forest Resources at the Chisana Timber Stand - Nabesna District, Wrangell-St. Elias NP/P, 38 pp.

Beck, Kathryn A. 1987. An Inventory of Forest Resources - Nabesna and Chitina Districts, Wrangell-St. Elias NP/P, 89 pp.

Beck, Kathryn, A. 1989. Establishment and Utilization of the Timber Harvest Compartment System - Chisana, Nabesna District, Wrangell-St. Elias NP/P, 41 pp.

Beck, Kathryn A. 1987. Inventorying Forest Resources Standard Operation Procedure. Wrangell-St. Elias NP/P, 85 pp.

DESCRIPTION OF RECOMMENDED PROJECTS(S):

At low levels of forest product use, the individual on-site inspection and compliance checks are adequate protection for the park resources. However, in areas of high level use, the present level of knowledge is insufficient to properly manage consumption in a manner that leaves the resource unimpaired.

- (1) Determine use patterns and projected needs of forest resource.
- (2) Based on objective one identify forested areas that may be identified to supply forest resources and determine annual productivity.
- (3) Implement the park's Forest Resources Management Plan.
- (4) Monitor use areas to ensure that resource deterioration does not occur and to evaluate the effectiveness of management actions.

FUNDING AND STAFFING: This program would only be funded if new areas were identified for the harvesting of timber resources.

FY1

Biological Technician (1.2 FTE)	\$30000
Logistical Support	5000
GRAND TOTAL	\$35000

COMPLIANCE STATUS: The actions proposed in this statement may require National Environmental Policy Act (NEPA) compliance other than a categorical exclusions based on 516 DM 6, Appendix 7.4 NEPA compliance will occur on a case by case basis. Section 106 compliance with the National Historic Preservation Act may be necessary based on scope of operation.

WRST N505.01 Landscape Analyses of Spruce-Bark Beetle Infestation and Salvage Logging of Spruce Forests in and around Wrangell- St. Elias National Park and Preserve

SUMMARY:

The goal of this project is to foster regional ecosystem management of spruce forests within the administrative boundaries of Wrangell-St. Elias National Park/Preserve (WRST), seeking management solutions that both preserve and protect park values while accommodating management objectives of other landowners within the administrative boundary. The project addresses a major issue identified in the NPS-Alaska Region's Natural Resource Strategic Action Plan (NARSAP), and by the developing National Biological Service Prince William Sound-Copper River Ecosystem Initiative (PWS-CRE) Partnership. Further, landowners from the Copper River Basin participating in the PWS-CRE Partnership, including WRST, the Bureau of Land Management (BLM), State of Alaska, and Native corporations, recognize spruce bark beetle infestation as a major resource management issue in the region. Areas infested with spruce bark beetles in the Copper River Basin is the fastest growing in Alaska and currently affects approximately 170,045 acres. Logging of the beetle-killed timber is used by some landowners to reduce fire hazard and salvage commercial value of timber within WRST. The effects of beetle-kill and forest harvest on forest landscapes, vegetation communities, wildlife habitat, subsistence resources, and agency management goals is not known.

We propose to promote coordinated ecosystem management by: (1) forming a local land-use planning team, (2) conducting landscape analyses of beetle-infestation and logging patterns within WRST, (3) establishing long-term ecological monitoring of plant and animal communities in the beetle- and logging-affected landscapes, and (4) forming research partnerships with the National Biological Service, Alaska Department of Fish and Game, BLM, and university cooperators. In this proposal, we identify management and research components of the overall study, and request funding specifically for management components. Additional funding from NBS-NRPP is being sought for FY1996 to further leverage cooperative research studies by research partners. Other funding opportunities are being sought through the PWS-CRE Partnership.

PROBLEM STATEMENT:

Current land and ecosystem management theory recognizes that preservation of naturally functioning ecosystems transcends administrative boundaries. Both the Vail Agenda group and NARSAP listed transboundary threats and their impacts on park ecosystems as significant servicewide and regional issues in the National Park Service. Currently, infestation of bark beetles and ensuing logging practices on private lands are the primary threats to ecosystem integrity within WRST. Despite the immediacy of the problem, relatively pristine conditions still exist in extensive boreal forests of WRST, which presents a unique opportunity both to understand and seek management solutions to transboundary issues before widespread adverse impacts occur.

At the present time, National Park Service (NPS), private landowners, and DNR land-managers within WRST have not assessed the relative distribution of commercially-valuable timber among their jurisdictions. In the 1973 final Environmental Assessment for WRST, the NPS estimated that the proposed WRST park would include 43,000 acres of prime forestland producing as much as 20,000 board-feet per acre. These prime forested areas were not mapped or delineated. There is no reliable information on the availability, vitality and productivity of forest resources near centers of subsistence activity. The effects of forest harvesting on vegetation communities, wildlife habitat, cultural resources, and soils are not known. Moreover, reductions in habitat by logging could adversely affect subsistence hunting and trapping opportunities that are so important to local communities.

The Alaska Forest Resources and Practices Act of 1990 requires reforestation of cutover lands. There is substantial background information, however, suggesting that regeneration of deforested lands is problematical in interior Alaska. Previous studies indicate that reforestation is hindered by competing vegetation that inhibits growth of tree seedlings. Moreover, methods of controlling competing vegetation may be costly, both in terms of capital and controversy, and efficacy of various regeneration strategies have not been assessed adequately.

Because forest harvesting has already begun, and is expected to intensify in the very near future, the proposed research is needed immediately for coordinated planning of forestry practices in WRST. Understanding of spatial distributions of commercially valuable forests may permit coordination among agencies to help ensure that the timing and arrangement of clear-cuts does not adversely affect land management goals for the region. Moreover, additional understanding of forest regeneration techniques is needed to provide landowners a set of choices they can select from for the most attractive and cost-efficient reforestation program consistent with management goals. Lastly, basic research on vertebrate responses to landscape pattern and vegetation structure will assist in developing forest cutting strategies aimed at maintaining biological diversity of vertebrate communities within the park and adjoining lands. Improved understanding of forest dynamic processes and wildlife-habitat relationships would have broad applicability to federal, state, and private land managers in interior Alaska.

MANAGEMENT OBJECTIVES (NPS Funding Required):

1. Initiate a Copper River Basin Ecosystem Management Partnership to foster communication and coordination among landowners concerning resource management goals and activities.
2. Catalogue and synthesize existing literature and geographic information on forest stands in the upper Copper River Basin.
3. Complete inventory of forest stands in the upper Copper River Basin and prepare Geographic Information System (GIS) themes of land-cover, land ownership, commercial value, and proposed management activities.
4. Conduct landscape analyses of beetle infestation and proposed management activities in relation to ownership boundaries, subsistence and recreational access routes, subsistence resources, and agency management goals.

5. Establish permanent reference plots for long-term monitoring of vegetation and animal resources in beetle-killed, unaffected, and logged white-spruce forests.

RESEARCH OBJECTIVES (NBS Funding Required):

6. Prepare literature review of factors influencing stand dynamics and wildlife/forest relationships in northern boreal forests.

7. Following completion of objectives #1, #2 and #6, conduct a workshop for evaluating state-of-understanding of forest dynamic processes in the Copper Basin, prioritizing research objectives, and examining research tasks for objectives 8-10.

8. Determine history, frequency and scale of forest dynamic processes shaping boreal forest landscapes in the upper Copper River Basin.

9. Determine factors influencing reforestation success in the upper Copper River Basin.

10. Determine wildlife community responses to forest stand structural characteristics and landscape patterns in the upper Copper River Basin.

SCOPE AND METHODS:

Management Studies (NPS Funding Required)

The study will be conducted in recently logged, beetle-infested, and undisturbed white spruce forests in the upper Copper River Basin within and adjacent to WRST. We propose a three-step approach to project implementation. The first step consists of developing a partnership among agencies and individuals having interests in the management of those forests, and sharing existing ecological and geographical information on forests of the Copper River Basin (Objectives 1-2). The second step involves synthesizing the existing geographic information in a manner such that landowners in the region can conduct landscape analyses of proposed management activities (Objectives 3-4). The last step involves establishing a permanent monitoring program for evaluating the long-term effects of forest disturbance and succession (Objectives 5, 6).

Objectives 1-2: We propose to construct a metadata file in which we will compile all existing biological and geological data on forest resources in the upper Copper River Basin. All spatial data will be digitized and entered as GIS themes. Information will be compiled from and shared with both Ahtna and Chitina Native Corporations, DNR and other land owners in the Basin.

Objective 3: After compiling all existing geographic information on forests of the Copper River Basin, we will complete an inventory of forest stands in the Basin. We propose to extend, or develop where needed, GIS themes corresponding vegetation cover classes (e.g., Viereck Level-3 vegetation class), stand canopy closure and size-classes, extent of beetle infestation, and use existing GIS themes on land ownerships and access routes. Vegetation cover and size classes will be determined within a core study area from the Chitina to the Sanford Rivers, east of the Copper River. Cover and size classes will be derived from TM-imagery and 1:10,000-scale, color-infrared, aerial photographs. Polygons will be mapped and ground-truthed extensively using helicopter access. Data from previous photography and surveys (e.g., Copper River Basin Mapping Project,

Alaska Department of Natural Resources, FIREPRO) will be reviewed before conducting additional surveys and will be used to determine the rate of spread of beetle infestation in the Basin. As mentioned above, geographic information will be shared among the collaborating land owners.

Objective 4: We will use ARC-INFO to conduct geographical analyses of proposed management activities. Although the specific questions addressed will be posed by the ecosystem partners, some potential examples might include: (1) What is the distribution of white spruce forest on private land versus NPS land within the legislative boundary of WRST? (2) What landscape configurations might exist after proposed logging within each land-ownership category and in the ecosystem? (3) What are effects of proposed developments on habitat suitability for wildlife?

Objective 5: We propose to establish permanent reference plots and transects for long-term monitoring of vegetation and wildlife communities inhabiting beetle-killed, unaffected, and logged white-spruce forests in WRST. The design of long-term monitoring protocols will be developed with input from NBS Inventory and Monitoring Program, approved WRST Inventory and Monitoring protocols, as well as from other NBS, university, and private cooperators. Although the protocols will evolve through a process of peer-review and cooperator inputs, we envision establishing 2-ha permanent reference plots for monitoring long-term trends in vegetation. Woody vegetation >3-m tall will be mapped throughout each reference plot. Density of woody vegetation <3-m tall will be measured in permanent 10-m² plots, whereas cover of herbaceous vegetation will be measured in 1-m² plots along permanent transects. We propose to monitor relative abundance in breeding birds using point counts along off-road transects following the protocol developed by the Alaska Partners in Flight working group. We will measure small mammal population density and characteristics using mark-recapture sampling methods at trapping grids. Population abundance and characteristics will be estimated using robust statistical models for open populations. Lastly, monitoring systems for species important to subsistence (e.g., furbearers, moose) will be developed using track counts and browsing pressure as relative indices of abundance. Wildlife habitat analysis will be conducted for moose and selected furbearers.

Research (NBS Funding Required)

Objective 1: We will compile and update existing bibliographies of pertinent literature on forest dynamics, regeneration, and forest/wildlife relationships in the boreal forests. Additionally, we plan to host a series of working meetings with the members of the PWS-CRE partnership and academic forestry and ecological experts to assist with definition and priorities of specific research tasks. We will form research partnerships with academic personnel who participate in the research scoping meetings. Funds for additional research would be leveraged by encouraging cooperative studies by partners with outside funding.

Objective 2: Specific research tasks aiming to elucidate relationships among forest dynamic processes will be developed following synthesis of information and assessment of research needs.

Objective 3: We propose to conduct studies of factors influencing forest regeneration in partnership with university and NBS researchers already working in this field. We

propose to implement experimental protocols from other studies in progress throughout Alaska. These experiments will consist of establishing nine 0.2-ha plots, including three replicate plots of three site preparation treatments. Within each replicate plot, 4 different transplants of native white spruce will be evaluated. Each seedling will be evaluated yearly to determine growth and survival. During each annual measurement, cover of competing vegetation will also be examined near each seedling. These experiments will help identify the optimum combination of site treatment or seedling type for use in forest restoration in the region.

Objective 4: We propose to describe wildlife community responses to stand and landscape characteristics by examining responses of individual wildlife species to stand structural characteristics and landscape patterns. We plan to establish 6 research sites in and around current logging activities in the Copper River Basin. We plan to establish 4 500-m transects at each research site, including transects in the interior of a logged area, edge of a logged area (100 m from forest edge), forest edge (100 m from clear-cut edge) and interior forest (>400 m from clear-cut edge). We will establish 6 sample points on each transect at 100-m intervals for a total of 24 sample points at each research site (4 transects X 6 sample points). At each sample point we plan to sample vegetation structure and composition, browsing use by hares and moose, relative abundance of bird species using a point count method, and presence or absence of small mammals using 4 3x3x12-inch Sherman traps and 4 8x8x30-inch Havahart live-traps at each sample station. We will compare habitat characteristics, browsing use, species abundance, and wildlife community attributes (e.g., species richness, evenness, and diversity) among clear-cut and interior forest and distance from edge. To further assess mammalian use patterns during winter we will examine trail crossings by ungulates and furbearers along paired transects within and outside the logged areas.

TIMING AND STAFFING

Time Schedule:

- | | |
|-----------|--|
| FY1996 | --Complete objectives 1, 2, 6, 7
--obtain aerial photography and TM imagery for obj. 3.
--peer review of permanent monitoring protocols
--select study sites
--initiate pilot research studies |
| FY1997-98 | --map and ground-truth vegetation cover
--baseline monitoring of permanent vegetation and wildlife plots
--develop and upgrade GIS layers with improved vegetation cover
--conduct landscape analyses
--research studies |

Staffing: Management studies will be supervised and coordinated by Chief of Resources Management, Wrangell-St. Elias National Park and Preserve. Research studies will be supervised and coordinated by the PWS-CRE Coordinator and the Tundra/Boreal Forest Branch both within the Alaska Science Center, NBS. Project objectives will be accomplished through cooperative agreements and contracts with a variety of project cooperators identified during the first year of the study.

WRST N506.00 Stock Use Management

PROBLEM STATEMENT:

Stock use creates two management concerns in Wrangell-St. Elias National Park and Preserve: the impacts of stock use and the effects and management of horse grazing permits.

Several guides and commercial operators who offer services within park/preserve boundaries rely on stock, at present exclusively horses, for transportation of clients and gear. The public also brings stock into the park/preserve to facilitate recreational or subsistence activities. Though most stock use is concentrated along a few trails, the extent, amount, and patterns of use are unknown. In addition, effects of stock use on soils, plant communities, wildlife, water quality, and other park users are unknown.

Grazing is an historical use of lands within Wrangell-St. Elias National Park and Preserve. The National Park Service honored all BLM issued grazing leases when it assumed management authority for the area in December, 1979. That practice continues under a special use permit issued by the Superintendent. Permittees are concessionaires who use stock to support commercial services including hunting, fishing, and sightseeing. In 1983, nine permits were active on park/preserve lands, varying in acreage and number of animals permitted.

In general, though the permitted areas are quite large, the areas of concentrated grazing use are small. During summer months, stock is drawn to the narrow band of productive floodplain. Grazing is concentrated on windswept (snow free) gravel bars during winter months. Much of the land included in grazing leases is less preferred terrain for grazing during winter month by horses.

Little is known about the effects of grazing in Alaskan environments. Resource alterations that could occur due to grazing include disruption of plant communities by elimination or suppression of preferred species or introduction of exotic species, soil compaction or erosion, and competition with wildlife for limited range resources.

Some information regarding grazing use patterns is available from BLM records. During BLM's management, stock was counted each winter and rough estimates of range conditions were made. Some habitat manipulation by burning was attempted. Habitat manipulation is not conducted by or endorsed by the NPS to enhance range quality. NPS personnel continue to make winter aerial counts of the number of horses in each permit area as well as checks of their general condition.

NPS Management policies and regulations prohibit the pasturing or grazing of livestock except: 1) As specifically authorized by Federal statutory law; 2) As required under a reservation of use rights arising from acquisition of a tract of land; or 3) As designated, when conducted as a necessary and integral part of a recreational activity or required in order to maintain a historical scene. There is no Federal statutory law which specifically authorized the issuance of grazing permits although ANILCA (Sections 811 and 1110) provides for the use of traditional means of non-motorized access subject to reasonable regulation. None of the grazing permits are required under a reservation of use rights. All of the grazing permits involve commercial outfitters who use and graze horses as an

integral part of the authorized visitor services which they provide under a concession permit. In most cases, the remote nature of the grazing allotments and the hazardous nature of surface routes to the outfitter's base camps, combine to make the annual herding of horses into and out of the Park a hazardous and uneconomical enterprise.

The current practice of issuing special use permits for historic grazing leases recognizes the importance of horse use in providing several authorized visitor activities and the impracticality of conducting commercial services of this nature without designated areas for grazing stock inside the park/preserve. However, where grazing is allowed, resource deterioration must not result and the needs of any competing wildlife must be met.

Goal: To manage stock use in a manner that does not result in unacceptable resource damage on or adjacent to park/preserve trails and camping areas or on permitted grazing areas.

Status: Grazing permits are renewed through the Wrangell-St. Elias Administrative office and aerial winter counts are conducted to assess compliance with lease limits on stock numbers.

Range conditions (i.e. summer/winter productivity and availability) of permit areas are unknown. Though winter stock counts are made, numbers of animals using permit areas during other seasons are unknown. Some winter use patterns and preferred locales are known, but others are not. If resource deterioration is occurring, it goes undetected. Levels and impacts of stock use along transportation routes are unknown.

Literature Cited:

Connery, Bruce, and P. Bullington. 1988. Follow-up Monitoring Survey on the Chitina River Bison Habitat Permanent Transects, Wrangell-St. Elias NP/P, 18pp.

Happe, Patricia. 1992. Grazing Bibliography, Wrangell-St. Elias NP/P. XXpp.

Miquelle, Dale. 1985. Food Habits and Range Conditions of Bison and Sympatric Ungulates on the Upper Chitina River, Wrangell-St. Elias NP/P, 112pp.

DESCRIPTION OF RECOMMENDED PROJECT(S):

Listed below are specific objectives and proposed responsible parties for achieving each objective and time-frame.

(1) Continue to renew grazing permits.

(2) Stock use would be inventoried, including when and where it occurs, types of activities, number of participants, numbers of animals used and compliance with any permit stipulations.

(3) Conduct a study to: (1) develop techniques for range assessment; (2) assess current range conditions; and (3) develop techniques for monitoring range conditions and identifying resource deterioration. The study would include the identification of seasonal use patterns, locations of concentrated use, productivity and resiliency of

different plant communities, establishment of exotic plants, and the effects of transient stock use.

(4) Conduct a stock/wildlife competition study. This study would be undertaken to determine the effects of competition between horses, moose, bison or other wildlife using limited range resources. The information obtained will guide management recommendations regarding stock numbers and use of supplemental feed.

(5) Range conditions would be monitored regularly to facilitate management and prevent resource deterioration.

(6) Monitor trail conditions. Once baseline data is established continued monitoring will enable detection of resource alteration, prevent deterioration, and provide a scientific basis for management decisions. This synergistic approach will focus data from several sources toward effective management of stock use and the determination of stock carrying capacity.

FUNDING AND STAFFING:

FY1

Research - Range Study (Contract/Coop. Agree.)	\$ 40000
Research - Competition Study (Contract/Coop. Agree.)	\$ 40000
Resource Protection - Stock Use Annual Inventory	
Logistical Support	\$ 2000
Interpretation	

Subtotal	\$ 82000
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FY2

Research - Range Study (Contract/Coop. Agree.)	\$ 40000
Research - Competition Study (Contract/Coop. Agree.)	\$ 40000
Resource Protection - Stock Use Annual Inventory	
Logistical Support	\$ 2000
Interpretation	

Subtotal	\$ 82000
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FY3

Research - Range Study (Contract/Coop. Agree.)	\$ 40000
Research - Competition Study (Contract/Coop. Agree.)	\$ 40000
Resource Protection - Stock Use Annual Inventory	
Logistical Support	\$ 2000
Interpretation	

Subtotal	\$ 82000
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FY4		
	Resources Management - Monitor Range Conditions	
	Resources Management - Monitor Trail Conditions	
	Biological Technician (1.2 FTE)	\$ 30000
	Logistical Support	\$ 10000
	Resource Protection - Stock Use Annual Inventory	
	Logistical Support	\$ 2000
	Interpretation	
	Subtotal	\$ 42000
	GRAND TOTAL	\$288000

WRST N601.02 Mentasta Caribou Herd Management

PROBLEM STATEMENT:

The National Park Service (NPS) is mandated by the Alaska National Interest Lands Conservation Act (ANILCA) to protect wildlife habitats and populations within Wrangell-St. Elias National Park/Preserve (WRST). Simultaneously, the NPS is required by ANILCA to allow limited sport-harvest within the National Preserve, as well as local and traditional subsistence uses of wildlife resources within both the National Park and Preserve. Historically, Alaska Department of Fish and Game (ADF&G) managed both sport- and subsistence-harvests of wildlife within WRST. Recently, however, ADF&G was ruled to be out of compliance with Title VIII Section 804 of ANILCA, and responsibilities for managing subsistence harvest of wildlife within WRST were relegated to the NPS. Data necessary to manage subsistence harvests while preserving viable populations, however, are lacking for many species in WRST.

The Mentasta caribou herd, a small herd centered on the slopes Mt. Sanford and Mt. Drum in northern WRST, is a key subsistence resource for people of the upper Copper River Basin. Small population size, low recruitment, high predation rate, intermixing with adjacent caribou herds, suspected heavy poaching, and easy access for hunters along the Nabesna Road all pose unique problems for management of sport and subsistence harvest of the Mentasta herd. Better information is needed on the abundance, distribution and population dynamics of Mentasta caribou to develop appropriate caribou harvesting quotas that safeguard against overharvest. In addition, when populations decline as in the current situation, ANILCA requires that subsistence harvest must be given priority over sport use. This requires a degree of sophistication of information that can be used in decision-making and defended in the public forum.

Hunter harvest acting in concert with heavy predation and winter severity has been implicated in the decline of several caribou populations in Alaska (Bergerud 1980, Bergerud and Ballard 1988, Davis et al. 1980, Doerr 1980, Van Ballenberghe 1985). Based on his review of 30 caribou populations from throughout North America, Bergerud (1980) concluded that caribou populations could sustain up to 5% either-sex harvest where predators were few, but that recruitment of yearling caribou barely replaced natural losses where wolf populations reached normal densities of 1 wolf/100mi². Relationships among winter weather, nutritional condition and predation risk of caribou are unclear, but suggest that density-independent effects of weather may also exert a strong controlling influence on caribou populations (Van Ballenberghe 1985). Producing a sustained harvest of caribou, particularly in the presence of high predator populations and largely unpredictable winter weather, clearly requires close vigilance of caribou population trends and demographic traits.

Population size, herd composition and harvest statistics of the Mentasta herd have been monitored routinely by ADFG since 1972. Prior historical data on Mentasta caribou is scant, but 5000 adult caribou were estimated in the mid-1960s (Skoog 1968). Between 1972 and 1987 the estimated fall population averaged 2660 animals (cows, bulls and calves), as determined from annual total counts during the post-calving aggregation (Lieb and Tobey 1990). The population appears to have increased from approximately 2200 animals in 1973, to a peak of 3100 in 1985, and then to have declined to a low count of

approximately 1900 in 1991 (Fig. 1). Calf recruitment measured in fall has ranged from 8-25 calves:100 cows, but also appears to have declined since 1985 (Fig. 2) (Lieb et al 1989, 1990). Calf production in spring 1991 reached an all-time low of 3 calves:100 cows (unpubl. data). Hunter success rate, a crude index of population size, has declined from an average 35% in the late 1970's to 25% in the late 1980s (Fig. 3).

Caribou harvest quotas established by ADFG for the Mentasta herd have become more restrictive as understanding of caribou/predator population dynamics has grown. Prior to 1977, harvest of Mentasta caribou was open to all licensed hunters. From 1977 to 1987 either-sex hunting of Mentasta caribou was limited to 150-428 issued permits, although actual harvests ranged from 52-112 caribou (Lieb et al. 1989). In 1988, harvest was limited to bulls only in response to a suspected decline in Mentasta caribou and increase in predator populations on the Mentasta range. Harvest of Mentasta caribou herd was restricted to 50 bulls in 1990, and further restriction to 30 bulls is proposed for 1991.

Despite the apparent decline of Mentasta caribou, population trends were obscured until very recently by high variation in the annual population estimates. Currently, an attempt is made each year to count the entire Mentasta herd during the post-calving aggregation. Population estimates have varied by up to 51% of the previous year's estimates. High variability between years could reflect actual population fluctuations, but more likely, it reflects annual differences in observers, pilots, and visibility conditions, as well as differences in aggregation behavior and distribution of caribou. Additionally, population estimation determined from a single total count of the population each year provides no means of estimating statistical confidence bounds on the estimate. Without an estimate of statistical confidence, suspected population trends were substantiated only after several years of corroborative data were obtained. Continued allowance of sport and subsistence harvest of Mentasta caribou within WRST will require development of more precise methods of monitoring population trends and impacts of hunting.

Management of harvest of Mentasta caribou has also been complicated by intermixing on winter range with the numerically superior Nelchina caribou herd. Nelchina caribou have increased at a rate of approximately 8% a year from a low of approximately 8000 caribou in the early 1970s to approximately 40,000 caribou presently (Lieb and Tobey 1990). State management objectives for the Nelchina herd call for maintaining the population at approximately 30,000 animals through annual harvest of 7% of the adult population (Lieb and Tobey 1990). Currently, that objective is being met primarily through fall and winter hunting seasons in Alaska Game Management Units (GMU) 13 and 14b, the traditional range of Nelchina caribou. In addition, in 1983, the Alaska Board of Game established a special winter hunt in GMU 12, the traditional winter range of Mentasta caribou. That winter hunt was established at the request of residents from Tetlin and Northway to hunt segments of the Nelchina caribou that migrate east of Mentasta Pass and intermix with Mentasta caribou. Traditionally, problems have arisen in setting quotas for harvesting Nelchina caribou in GMU 12 without impacting a stable or declining smaller sub-population of Mentasta caribou. Additionally, mixing of Nelchina and Mentasta caribou herds during winter has prompted speculation that population decline in the Mentasta herd could be caused in part by emigration of Mentasta caribou to the Nelchina herd as they leave the wintering grounds (Lieb et al 1989).

Recognizing these management concerns, a cooperative study was conducted by ADF&G and WRST to gather baseline data on population dynamics of Mentasta caribou between 1987-1989 (Lieb 1989, 1990). Fifty-four caribou were radio-collared in the Mentasta

herd to determine natality, survival and emigration rates, as well as distribution of Mentasta caribou. Pregnancy rates of adult cows averaged 76%, whereas annual mortality rates of cows and calves averaged 17% and 89%, respectively during two years of study. While the study provided valuable information on demographic rates of Mentasta caribou, and confirmed the importance of predation in the population dynamics of the herd, mixing of Nelchina and Mentasta caribou during the radio-collaring period prevented an assessment of dispersal as a factor in the suspected decline. The study did not adequately assess the degree of mixing between Nelchina and Mentasta caribou herds, as needed to more closely manage the winter hunt of Nelchina and Mentasta caribou. Furthermore, previous research did not assess long-range impacts of predation, sport harvest, and dispersal on the long-term viability of the population.

As directed by NPS policy, the management of fish and wildlife in Alaskan parks and preserves will be a cooperative endeavor with the State. Management of the Mentasta caribou herd will result from consultations with the State and the integration of NPS management concerns with those of the State.

Goal: To cooperatively manage the Mentasta Caribou herd with the Alaska Department of Fish and Game in order to:

- 1) maintain a naturally fluctuating caribou population on parklands;
- 2) assure that humans do not drive the natural variability of the population;
- 3) promote scientific research, as dictated in ANILCA, in the investigation of a unique and unusual wildlife population.

DESCRIPTION OF RECOMMENDED PROJECTS(S):

The purpose of the proposed study is to provide basic demographic information on Mentasta caribou critical for management of sport and subsistence hunting in Wrangell-St. Elias National Park and Preserve. The proposed study focuses where previous research and inventory is inadequate, i.e., we plan to develop improved population estimation techniques, assess dispersal as a factor in the population dynamics of Mentasta caribou, and determine rates of mixing between the Mentasta caribou herd and the larger, expanding Nelchina caribou herd. The proposed study will also build upon two-years of previous research compiling basic demographic attributes of the Mentasta caribou herd, including pregnancy rate, recruitment rate, and mortality rate. Improved techniques of population estimation will be used to monitor effects of hunting and establish harvest quotas. Improved understanding of mixing between Nelchina and Mentasta caribou herds on the wintering ground will provide important data needed to regulate winter hunting of Nelchina caribou. Estimates of basic demographic rates will be used to develop stochastic population simulation models for predicting combined and isolated effects of predation, dispersal and sport and subsistence hunting on the long-term viability of the Mentasta caribou herd.

Objectives:

- (1) Develop techniques for estimating population size of Mentasta caribou herd.
- (2) Determine movements and seasonal distribution of Mentasta caribou.

- (3) Determine range overlap and mixing with Nelchina caribou.
- (4) Determine dispersal rates and sex and age composition of dispersing Mentasta caribou.
- (5) Determine pregnancy, recruitment and mortality rates of Mentasta caribou.
- (6) Develop index of nutritional condition of Mentasta caribou.
- (7) Develop computer simulation model of dynamics of Mentasta caribou herd.

The benefits derived from the recommended actions would improve the capability for management of the Mentasta caribou herd consistent with the objectives of the State and the NPS. The program would be a cooperative effort with the Alaska Department of Fish and Game.

In addition, park staff will develop and implement a harvest quota system in cooperation with ADF&G and the U.S. Fish and Wildlife Service.

FUNDING AND STAFFING ESTIMATES:

	FY92	FY93	FY94	
1. Salaries and Wages				
NPS investigators (Park Base)	----	----	----	
ADFG cooperators (ADFG)		----	----	----
Fixed-Term Bio. Tech. (GS-7)	27000	29000	31000	
OAS Pilot (4 mo @ GS-12)	15000	16000	17000	
2. Equipment				
Radio-collars @ 400 ea	10000	8000	8000	
Radio Receiver/Scanner/Ant.	3000	----	----	
Repairs and Parts		----	500	500
Big game Dart Gun		900	----	
3. Capture				
Helicopter ¹	15000	15000	15000	
4. Radio-tracking				
Fixed-wing @ 80/hr	30000	30000	30000	
5. Calving/Post Calving Surveys				
Fixed-wing @ 80/hr	2560	2560	2560	
Helicopter		8500	8500	8500
6. Fall Composition Counts				
Helicopter			3000	3000 3000
7. Winter Surveys				
Fixed-wing @ 80/hr		7680	7680	7680
8. Mortality Investigations				
Helicopter		12500	12500	12500

9. Condition Indices				
Helicopter		7500	7500	7500
Laboratory Analyses @ 50/sample	2000	2000	2000	
10. Computer Modeling				
Software		600	---	---
11 Supplies/Misc.				
Maps, film, notebooks	500	500	500	
Darts/drugs		2000	1000	1000
12. Travel	2000	2000	2000	
TOTAL ANNUAL COST		149740	145740	147740

¹Helicopter budget computed at a rate of \$1500/day (availability plus pilot per diem) plus \$250/hr (includes fuel)

COMPLIANCE STATUS: The actions proposed in this statement are judged to be categorical exclusions based on 516 DM 6, Appendix 7.4 E(2) "Day-to-day resource management and research activities". Section 106 compliance with the National Historic Preservation Act may be necessary based on instrument location.

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WRST N601.03 Comparison of Standard Moose Survey Techniques with More Cost-efficient Estimates of Composition and Density

PROBLEM STATEMENT:

Standard moose survey techniques are too expensive to be used routinely in Park and Preserve lands (Gasaway et. al. 1986). NPS units frequently resort to trend counts but, trend counts provide no estimation of population size and there is no estimate of precision. NPS lands with significant moose populations are often small ecological or political units. In addition, they often contain or are adjacent to significant mountainous terrain. Because of moose migrations and early winter habitat use, these areas often have higher moose sightability than typical Alaskan moose habitat. The combination of standard survey techniques to decrease costs at little or no loss of information, precision or accuracy.

DESCRIPTION OF RECOMMENDED PROJECT:

We propose to test the effectiveness of a technique that departs slightly from standard methods and reduces cost 40-60%. This technique consists of surveying all survey units at lower intensity than standard (1.25 min/sq. mi. vs 5 min./sq. mi.), however, sightability corrections are made at the same intensity as standard (12 min./sq. mi.) This results in elimination of the time, personnel and cost of the intensive stratification step used in the standard technique yet, still provides a true density estimate and an estimate of precision.

We propose to test this technique against standard methods by employing both methods in a 1600 mi. sq. area of WRST. In late November or early December 1993.

BUDGET

Standard (Gasaway) Method (1600 mi. sq.)

Aircraft	
PA-18 92.5 hrs. @ 135/hr x 1.08 (OAS)	13,500
C185 18.75 hrs. @ 220/hr x 1.08 (OAS)	4,500
Per Diem 6 @ 110 x 5 days	3,300
Fuel 850 gals @ 1.5/gal	1,275
Subtotal	22,575

Modified Method (1600 mi. sq.)

Aircraft	
PA-18 62.5 hrs @ 135/hr x 1.08 (OAS)	9,200
Per Diem 2 @ 110 x 5	1,100
Fuel 560 gals @ 1.50/gal	850
Subtotal	11,150
Sub total	33,725
Miscellaneous	1,275
Total	35,000

WRST N601.04 Moose Management

PROBLEM STATEMENT:

Moose are an important component of Wrangell-St. Elias National Park and Preserve's (WRST) ecosystem. They are a major prey species for predators and scavengers, an aesthetic attraction for visitors, a game species for sport hunters and a meat source for subsistence hunters. Passage of ANILCA in 1980 provided for the formation of WRST and mandated the National Park Service and other federal agencies to monitor the status of fish and wildlife on public lands under their control. Up until 1990, monitoring of moose populations in WRST was done primarily by ADF&G biologists from Glennallen, Tok, and Juneau, and by the staff of Tetlin National Wildlife Refuge in Tok.

ADF&G biologists from Glennallen have monitored at least one, and sometimes two, different trend areas since 1955. Only one of these, a 287 mi² area situated along the west side of Mount Drum, has been consistently monitored. The Mount Drum survey area provides important trend data, however, its location is away from areas of high hunting pressure (Nabesna and McCarthy roads) and it contains a recent burn (1981) which may influence localized population trends. Additional count areas have periodically been done, but funding and staff have precluded their continuation.

Tetlin National Wildlife Refuge (TNWR) and ADF&G biologists from Tok have conducted moose population trend counts on 1 to 4 count units on the north slope of the Nutzotin and Mentasta mountains since 1981 (Breezer 1988, Doyle 1989). Two of these count units lie within WRST and all four provide good information about moose population trends along WRST's northern boundary. In 1990, TNWR initiated a stratified census (Gasaway et. al. 1986) of the moose population in G<U 12 including their refuge and a portion of WRST. The survey, which was a cooperative effort between TNWR, ADF&G, and WRST, provided an estimate of 0.32 moose/mi² or 1,339 moose (plus or minus 197 with 90% CI) inhabiting the north slope of the Nutzotin Mountains (Haggstrom 1990). This moose population spends the fall rutting period in WRST, but primarily inhabits the Tetlin flats area north of the park/preserve during summer.

ADF&G biologists from Tok have periodically conducted composition surveys of moose between the Chisana and White River, but the data are incomplete and provide little information on population size and trend.

ADF&G biologists stationed in Juneau monitor a small population of approximately 250 moose that inhabit the Malaspina Forelands in GMU 5B (Dinneford 1989). this population is not well understood and only a portion of the area has been surveyed since 1982. Adverse weather conditions along the coast have hampered efforts to conduct surveys consistently or at time of year when sex and age are distinguishable. Trend data in this area are, at best, difficult to interpret.

National Park Service management policies strive to perpetuate the native animal life as part of the natural ecosystem. Moose management objectives allow for subsistence hunting, which is considered part of the natural system under ANILCA, but the needs of other species, predators and scavengers, must concurrently be considered. thus NPS

needs for reliable data on moose populations exceeds that of other agencies concerned primarily with providing huntable stocks. WRST should conduct moose surveys using acceptable techniques in all areas where data are inadequate.

The Gasaway technique (Gasaway et. al. 1986) is considered the standard for moose in Alaska. However, it's too expensive to be used annually in Park and Preserve lands. Therefore, National Park Service units frequently resort to trend counts, even though they provide no estimation of population size and there is no measurement of precision. The Gasaway technique should be used every 5-10 years and efforts should be made to develop a more cost efficient method. Annual surveys should be conducted on smaller trend areas, but using methods that are statistically comparable between years.

DESCRIPTION OF RECOMMENDED PROJECTS(S):

- 1) Conduct population estimates including at 5-10 years using the standard Gasaway procedure for moose inhabiting the following areas within WRST: (1) the northwestern Wrangells; (2) the southwestern Wrangells; (3) the north slope of the Nutzotin Mountains; (4) the eastern Wrangells and White River area; and (5) the Malaspina Forelands.
- 2) Evaluate a more cost efficient alternative to the Gasaway procedure for estimating moose population composition and density.
- 3) Determine the extent of natural and human-caused mortality, dispersal, habitat use and movements of moose in heavily hunted areas (e.g. Nabesna Road corridor, Chisana area)
- 4) Establish methods for conducting annual trend counts, which are more reliable and statistically sound than traditional trend area counts.
- 5) Develop a data base/tracking system to summarize WRST, ADF&G and USFWS population trend and harvest data.
- 6) Identify and map all known and potential moose habitat within WRST.

BUDGET

Objective 1 (Standard Gasaway Method)

Aircraft		
PA-18 92.5 hrs @ \$135/hr + 8% OAS	\$ 13,500	
C185 18.75 hrs @ \$220/hr + 8% OAS	4,500	
Per Diem 6 people @ \$110/day @ 5 days	3,300	
Fuel 850 gals @ \$1.5/gal		1,275

SUB-TOTAL **\$**
22,575

Objective 2 (Modified Methodology)

Aircraft		
PA-18 62.5 hrs @ \$135/hr + 8% OAS	\$ 9,200	
Per Diem 2 people @ \$110/day @ 5 days	1,100	

Fuel 560 gal @ \$1.5/gal	850
SUB-TOTAL	11,150
Supplies and Materials	1,275
GRAND TOTAL	\$ 35,000

COMPLIANCE STATUS: The actions proposed in this statement are judged to be categorical exclusions based on 516 DM 6, Appendix 7.4 E(2) "Day-today resource management and research activities". Section 106 compliance with the National Historic Preservation Act may be necessary based on scope of operation.

WRST N601.05 Dall's Sheep Management

PROBLEM STATEMENT:

Wrangell-St. Elias National Park and Preserve (WRST) contains one of the largest populations of Dall's sheep in Alaska, and in the past has contributed approximately 29% of the statewide harvest. In Game Management Unit (GMU) 12, which comprises the northern section of WRST, current regulations allow the harvest of full-curl rams by sport-hunters from land designated as National Preserve. In the remainder of WRST in GMU 11, local subsistence hunters are permitted to harvest any Dall's sheep on both Park and Preserve lands, and sport-hunters are also permitted to harvest any sheep, though from Preserve lands only. Recent monitoring activities indicate that total numbers of Dall's sheep may have decreased by approximately 50% in areas of GMU 11. There is widespread concern that liberal hunting seasons for Dall's sheep (i.e., "any sheep") and accessibility may be contributing to declining populations of mature rams in GMU 11.

The development of statistically sound techniques for monitoring Dall's Sheep populations has been a high priority in WRST to help ensure that management of harvest is consistent with NPS policy objectives. Previous research, completed in 1992, led to the development of new techniques for estimating the abundance of Dall's sheep parkwide. While these techniques will provide the basis for long-term monitoring of population abundance, there is concern among guides hunters, and park management staff that effects of hunting Dall's sheep rams is most likely to be detected in changing sex and age ratios, rather than in overall trends in total population. Optimum sampling techniques and procedures for estimating population composition of Dall's sheep have not been determined for areas as large and diverse as WRST.

Population composition surveys of Dall's sheep are accomplished more easily and safely using helicopters rather than fixed-wing aircraft. Recent studies, however, have indicated that helicopter surveys may influence movements of bighorn sheep, which confounds attempts to count adjacent units and invalidates double counting methods that utilize helicopters. Furthermore, our own attempts to survey population composition of Dall's sheep in WRST suggests that estimating population composition will be expensive due to the extensive use of helicopters and the spatial variability in population composition. Thus, research is needed to assess whether helicopters present problems in surveying Dall's sheep in WRST and to derive the most efficient sampling protocol for estimating population composition.

DESCRIPTION OF RECOMMENDED PROJECTS(S):

The goal of this research is to develop and test guidelines for estimating Dall's sheep abundance and composition for selected populations in the park and preserve and to compare population composition among selected park and preserve segments.

Techniques developed during this project will be implemented as part of a long-term monitoring plan for Dall's sheep in Wrangell-St. Elias National Park and Preserve.

SPECIFIC OBJECTIVES:

1. Compare sightability biases of Dall's sheep surveys as computed from logistic modeling and ratio-estimation procedures.
2. Examine the influence of search intensity on visibility biases in Dall's sheep population surveys.
3. Use simulation procedures to determine minimum sampling intensity required to produce sex-and age-ratio estimates with acceptable statistical precision and power to detect changes in composition ratios.
4. Conduct peer-review of all Dall's sheep population estimation techniques evaluated in WRST and provide recommendations for long-term monitoring.

PROJECT DESCRIPTION:

Sex and age composition will be examined in three population segments of Dall's sheep in WRST; one population segment will be surveyed per year for three years. Survey units, each corresponding to a population segment of Dall's sheep, will range in size from approximately 2,000-2,400 km². Survey units are designed with the intent of being large enough to minimize the effects of annual differences in movement patterns on sex and age ratios, and such that each includes both park and preserve lands. Population segments selected for monitoring will be chosen on the basis of the unique management concerns each presents. In 1994, sex and age-composition will be examined in the western Wrangell Mountains where Dall's sheep populations appear to have declined approximately 25% in recent years.

Each year, the survey units sampled will be partitioned into 12 sampling units averaging approximately 180 km² each. Sex- and age-composition will be determined for all sampling units within each survey unit. From this total sample we propose to test statistical efficiency of three sampling methods and five sampling intensities to determine the optimal sampling strategy, short of a total count, for estimating population composition. Sampling methods examined will include completely random sampling, rank-ordered systematic sampling, and stratified random sampling. Sampling intensities examined will include random selections of 16% (i.e. 2/12 sampling units), 34%, 67% and 83% of all sampling units in a survey area. Dr. Lyman McDonald, senior biometrician from WEST, Inc. will provide statistical services assisting in the study design and analysis of survey data.

Effects of helicopter surveys on Dall's sheep movements will be determined by radio-collaring approximately 15 ewes in the survey sampling areas in fall, 1994. Effects of survey technique will be assessed in summer, 1995, to minimize effects of helicopter capture on disturbance responses of ewes. Daily sheep movements will be monitored daily from fixed-wing aircraft for three days prior to a helicopter survey, the day of a survey, and for three days following a survey. We will test hypotheses that daily movements of sheep do not differ before and immediately after a composition survey for Dall's sheep.

FY1

AIRCRAFT (SURVEYS)	\$13,500
STATISTICAL SERVICES	\$ 2,500
EQUIPMENT AND SUPPLIES	\$ 1,000

	TRAVEL	\$ 1,000
	SUB-TOTAL	\$18,000
FY2		
	AIRCRAFT (SURVEYS)	\$13,500
	STATISTICAL SERVICES	\$ 2,500
	FUEL AND SUPPLIES	\$ 1,000
	EQUIPMENT (RADIOCOLLARS)	\$ 4,000
	AIRCRAFT (CAPTURE)	\$ 4,000
	SUB-TOTAL	\$25,000
FY3		
	AIRCRAFT (SURVEYS)	\$13,500
	STATISTICAL SERVICES	\$ 2,500
	FUEL AND SUPPLIES	\$ 1,000
	EQUIPMENT (RADIOCOLLARS)	\$ 4,000
	AIRCRAFT (CAPTURE)	\$ 4,000
	SUB-TOTAL	\$25,000
	GRAND TOTAL	\$68,000

COMPLIANCE STATUS: The actions proposed in this statement are judged to be categorical exclusions based on 516 DM 6, Appendix 7.4 E(2) "Day-to-day resource management and research activities". Section 106 compliance with the National Historic Preservation Act may be necessary based on instrument location.

WRST N601.07 Mountain Goat Management

PROBLEM STATEMENT:

Before the establishment of the National Monument and subsequent creation of Wrangell-St. Elias, goat populations within the area were accessible to sport hunters. Now a limited population occupies land within the Preserve boundaries where sport hunting is allowed. State regulations do not allow hunting of Unit 12. The remaining herds occupy lands where only subsistence users can hunt.

Little is known about the size and distribution of the goat herds, their habitat use or movement patterns because of the lack of research investigations.

Several potential threats to the herds exist from outside sources. Winter range, southwest of Icy Bay may be affected by forest clear-cutting on state land. There is potential oil and gas development near Icy Bay and the use of winter range that extends to sea level may be affected by proposed marine mineral exploration. The effects of these actions on the population cannot be evaluated until present conditions have been established.

Goals: To ensure that mountain goat herds are managed cooperatively and provided protection mandated by federal and state regulations.

Status: ADF&G biologists have regularly surveyed herds in the southeast portion of the Park and Preserve to establish population status and trends. Goats were counted in conjunction with Dall's Sheep surveys in the Wrangell Mountains and south of the Chitina River. The ADF&G maintains harvest records.

Limited and incomplete population and distribution data are available. The effects on the goat population of proposed developments in Icy Bay cannot be evaluated. Changes in distribution, population size, and movement patterns cannot be detected or evaluated due to lack of baseline data.

DESCRIPTION OF RECOMMENDED PROJECTS:

Continue Present Management: Present management would continue as previously described. Limited data would be available for evaluation of proposed developments or herd management alternatives. Goat herds could be impacted by development.

Mountain Goat Ecology Study: Conduct a goat ecology study in the Icy Bay System. Of particular importance would be the determination of distribution, population density, movement patterns and habitat use. Also, this study would assess monitoring techniques and recommend methods and timetables for the monitoring of the goat population. This study would provide baseline information needed for proper management of the goat population.

Implement Monitoring Program: Monitoring activities would be conducted in accordance with recommended timetables. Data would be used to document and evaluate condition and changes in the mountain goat populations.

WRST N602.04 Wolverine Demography Ecology

PROBLEM STATEMENT:

The National Park Service (NPS) and Alaska Department of Fish and Game (ADF&G) are concerned about decreasing trends in wolverine harvest in portions of Alaska. Wolverines are sensitive to overharvest and human development making them dependent upon remote wilderness, yet only 4 major studies have been conducted on wolverine in North America.

NPS units created in Alaska by the Alaska National Interest Lands Conservation Act (ANILCA) must allow for human harvest unless such harvest is inconsistent with sound management principles and the conservation of healthy populations of fish and wildlife (16 USC 3112). Additionally, rural residents must be given a priority for subsistence uses of fish and game if restrictions become necessary (16 USC 3114). Furthermore, title VIII of ANILCA requires that Federal land and resource managers communicate and cooperate with ADF&G to "monitor the status of fish and wildlife populations on the public lands harvested for subsistence uses..." (S. Rep. No. 413, 96th Cong., 1st Sess. 271-272 (1979). Harvest statistics suggest wolverine harvests are declining within WRST; however, the relationship between harvest and actual abundance is unknown. WRST managers successfully argued for harvest restrictions on wolverine within WRST during the 1992-93 trapping season. Unfortunately, we lack the sound biological data needed to assess whether such restrictions are sufficient or whether they are indeed necessary.

Because of the apparent downward trend in wolverine numbers and the paucity of sound biological information, wolverines will likely be listed by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Listing under CITES would require mandatory monitoring of harvested populations of wolverine to ensure against overharvest.

The proposed study will: 1) provide an evaluation of wolverine status and management concerns for a large area in south-central Alaska including WRST; 2) result in a long-term monitoring plan for WRST that would be applicable to others NPS areas; and 3) provide a wolverine management strategy for all agencies that is consistent with sound management principles as directed by ANILCA and CITES.

The NPS has a history of cooperating with ADF&G to ensure consistency of wolverine seasons and bag limits on State and Federal lands. Entering into cooperative research on wolverine population monitoring techniques will help foster consistent management of wolverine across interagency jurisdictions.

A two year pilot study has been completed in 1993 as a prelude to a projected five year examination of wolverine demographics and management in south-central Alaska. As a result of this pilot study, two sites have been selected for intensive study, one within WRST and the second is located in the Talkeetna mountains west of WRST.

DESCRIPTION OF RECOMMENDED PROJECTS(S):

The objectives of the five year cooperative study are to examine: natality, dispersal, mortality, habitat utilization, predation and the effects of human harvest on wolverine. With this information park staff will construct a population model that will help managers estimate harvest levels and evaluate the importance of remote areas where access to harvest is limited. To this end, the role of National Parks as potential reservoirs, and the commitment from the NPS to evaluate this role, is crucial.

Ten adult wolverines will be captured by ADF&G in the Talkeetna mountains study area during winter 1993-94 by darting from a helicopter or by using live-traps. All captured wolverines will be immobilized with telezol, standard measurements taken, a blood sample and tooth collected, and fitted with a radio-collar before release. These ten will bring our sample of radio collared wolverines to fifteen, and together will provide demographic information as well as an evaluation of density and monitoring techniques.

Wolverine density estimates will be obtained twice for each of the two study sites using a probability sampling procedure (Becker, E.F. 1991. A terrestrial furbearer estimator based on probability sampling. J. Wildl. Manage. 55:730-737). The procedure requires flying systematically placed line transects or random plots within 48 hours after a snowstorm to detect wolverine tracks. The probability of observing wolverine tracks is then used to generate statistically robust population estimates with bounds on precision. Replication of the procedure on each study site will help in determining repeatability of the methods.

Current and past inventory and monitoring work on ungulates will be examined to determine the availability of food for wolverine in the study areas and the presence and abundance of large predators which may provide carrion for wolverines or be a source of mortality.

A population model will be constructed using a broad array of historical and present information. Sealing records and trapper questionnaires will be analyzed to determine trends in wolverine harvest over time. The age, sex, and reproductive status of harvested wolverines will be assessed through analysis of carcasses purchased from trappers in both the Nelchina (Talkeetna) and Copper River (WRST) Basins. Teeth will be aged by cementum annuli, reproductive tracts will be examined for corpora lutea and placental scars, and general condition will be rated from fat content and body measurements. The age, sex, reproductive status, habitat requirements, vulnerability to harvest, natality, and natural mortality of the general wolverine population will be further evaluated from our sample of radio-collared wolverines. This population model will be developed this year and refined throughout study as more information and additional collared animals provide.

FY1 Objectives:

- 1) Select intensive study sites that are both logistically feasible and contain good numbers of wolverine;
- 2) Estimate the density of wolverine within the two intensive study sites;
- 3) Evaluate capture and handling methods;
- 4) Document the relative abundance of large ungulates and predators as food sources; and

5) Analyze available harvest data.

FY2 & FY3 Objectives:

1) Increase the number of radio-collared wolverines in the Talkeetna mountains study area to 15;

2) Determine wolverine density in both the Talkeetna and Wrangell mountains study areas;

3) Document the relative abundance of large ungulates and predators as food sources in both study areas;

4) Begin constructing a population model to help managers better evaluate sustainable harvests; and

5) Search out and evaluate available information on wolverine population and harvest trends in other areas of Alaska.

BUDGET

FY1 - \$ 18,000

FY2 - 35,000

FY3 - 35,000

FY4 - 35,000

FY5 - 20,000

COMPLIANCE STATUS: The actions proposed in this statement may require National Environmental Policy Act (NEPA) compliance other than a categorical exclusion based on 516 DM, Appendix 7.4. NEPA compliance will occur on a case-by-case basis. Section 106 compliance with the National Historic Preservation Act may be necessary based on scope of operation.

WRST N602.06 Wolf Management

PROBLEM STATEMENT:

Wolf management is highly contentious in Alaska, especially in areas where ungulate populations are decreasing or are considered low in relation to their habitat. Furthermore, predator/prey dynamics are poorly understood for small caribou herds. It has been argued that small caribou populations, such as those inhabiting Wrangell-St. Elias National Park and Preserve (WRST), are limited at low densities over prolonged periods by predation from wolves that are sustained at high densities by alternative prey species such as Dall's sheep and moose. Information on the numeric or functional responses of wolves to changing prey density is critical to understanding long-range influences of wolves on population fluctuations of ungulates.

In WRST, the Mentasta herd has declined approximately 60% since 1990. It has been hypothesized that the decline is due primarily to expanding predator populations on the calving grounds. Moose, an alternative prey for wolves, are at low densities in and around the Mentasta calving grounds. Further, sheep populations are believed to have declined approximately 25%-50% in the western Wrangell Mountains in and around the Mentasta calving grounds. Currently, caribou, moose and sheep populations are being monitored in WRST, but wolf populations are poorly documented.

Best estimates of wolf density in Game Management Unit (GMU) 11, which includes the Mentasta calving grounds, suggest wolf numbers have remained relatively stable at approximately 105 wolves since 1985 (Tobey, R. W. 1991. Wolf survey-inventory management report-GMU 11, Wrangell Mountains. ADF&G, Fed. Aid Wildl. Rep. W-23-3, Study 14.0). However, those estimates are based on subjective reports of wolf packs observed by local biologists, trappers and guides, rather than through systematically conducted surveys. Consequently, those estimates are not thought to depict wolf population trends accurately on the Mentasta calving grounds (B. Tobey, Alaska Dep. Fish and Game, pers. comm.).

Estimates of wolf population abundance with corresponding estimates of precision are currently lacking, but they are needed to interpret wolf-caribou interactions and assess effects of trapping harvest on wolf populations in WRST. Estimation of wolf numbers, together with existing moose, caribou and sheep population estimates, would permit the assessment of predator:prey ratios and effects of predation on ungulate populations in WRST. Further, long-term monitoring of wolf population density would contribute to an understanding of wolf numerical responses to declining prey base in WRST and responses of prey to natural cyclic variation in predator and prey densities. That understanding is critical both for interpreting park management philosophies and policies to local hunting constituencies and for developing long-term strategies for managing predators and prey in WRST.

DESCRIPTION OF RECOMMENDED PROJECT(S):

Our primary objective is to estimate the winter abundance of wolves on the core calving range of the Mentasta caribou herd in WRST. Wolf density will be estimated by attempting to radio-collar at least one individual in each pack within the study area. Past attempts to estimate wolf densities on the Mentasta calving grounds have been hindered by high winds and poor tracking conditions (B. Tobey, Alaska Dep. Fish and Game, pers. comm.). Therefore, we propose to radio-collar a sample of up to ten wolves on the Mentasta caribou calving range during fall or early winter, 1994-95, to assist in determining wolf density. All efforts will be made to collar one or two members of each pack observed in or adjacent to the core calving area. Density estimates will be derived from repetitive counts on marked and unmarked packs in the study area.

In addition to this traditional method of estimating wolf density, we hope to assess the validity and applicability of using a more statistically robust estimator based on the probability of encountering wolf tracks from aircraft along transects (Becker, E. 1992. A terrestrial furbearer estimator based on probability sampling. J. Wildl. Manage. 55:730-737). Probabilities of line transects intersecting a wolf track can be determined in two ways: (1) determining daily movements by tracking wolves from their location at the end of a recent snowstorm to their present location or (2) by radio-tracking a collared sample of wolves to determine the probability that a collared animal crossed a transect since a recent snowstorm. Track surveys will be conducted within 48 hrs of a fresh snowfall exceeding 15 cm. Wolf tracks will be sampled by flying 12 30-km transects distributed using a systematic-random sampling scheme (Becker, 1992). Movement distances will be determined by mapping wolf tracks and by locating collared animals as frequently as possible from the time snowfall ends until after the survey is completed. Wolf tracks will be followed from supercubs using three pilot/observer teams. Tracks will be followed until the number of individuals per pack can be determined with certainty. Computation of density and precision of the estimate will be computed following Becker (1992).

If proven useful, this density estimator could be used to monitor wolf population trends in WRST as well as other NPS areas. The advantage of using an estimator based on tracks is that the collaring of wolves is unnecessary. This would save money and minimize the need to subject wolves to capture and handling.

WRST is requesting **\$20,000** of Regional funding to conduct this work. This proposal is timely in that on-going research on the Mentasta caribou herd would be able to provide some aircraft and staff support.

BUDGET:

Project	Assets ^a	Funding	
	<u>Available</u>	<u>Needed</u>	<u>Total</u>
Radiocollars 3,500	3,500	0	
Misc. equipment 1,500	500	1,000	
Aircraft (helio, collaring) 10,000	2,000	8,000	
Aircraft (cub, collaring) 5,000	1,000	4,000	
Aircraft (radiotracking) 5,000	2,000	3,000	
Aircraft (line transects) <u>4,000</u>	<u>0</u>	<u>4,000^b</u>	
Totals 28,000	8,000	20,000	

^a = Equipment and services already purchased, available through cooperators, or assumed as part of ongoing research and monitoring activities.

^b = In the event weather prohibits conducting the density estimator, this portion of the funding could be returned.

COMPLIANCE STATUS: The actions proposed in this statement may require National Environmental Policy Act (NEPA) compliance other than a categorical exclusion based on 516 DM, Appendix 7.4. NEPA compliance will occur on a case-by-case basis. Section 106 compliance with the National Historic Preservation Act may be necessary based on scope of operation.

WRST N604.00 Long-Term Monitoring of Harbor Seals and northern Sea Lions

PROBLEM STATEMENT:

Harbor seals inhabit coastal waters in Alaska from southeast Alaska to the Aleutian Islands and the Bering Sea. Previously considered abundant, surveys in the 1980's indicated declines as great as 86% in parts of Alaska from south-central portions of the state to the west. While the rate of decline appears to have slowed, the numbers of seals in these areas are substantially lower than they were in the early 1970's. Although harbor seal populations in southeast Alaska appear stable at least since the 1970's, census data for southeast Alaska are considered inadequate for evaluating the status of harbor seals in this area.

The status of harbor seals in WRST, specifically Icy Bay, is largely unknown, yet these areas appear to be important breeding and feeding grounds. Several factors may affect seal and sea lion populations in this area. Local residents have reported declines in Steller sea lions in Yakutat Bay. A sea lion rookery/haul out area along the Malaspina forelands (WRST) supported about 200-300 animals in the early 1980s. This number gradually decreased to zero by 1991 (R. Mossman, NPS). Harbor seals may be experiencing similar declines but no data are available. Proposed development of the Icy Bay area could affect unstudied pinniped populations. Offshore oil drilling may occur west of Icy Bay in 1994 and south of Yakutat Bay in 1995. Marine mammals are at risk from potential oil spills and pollution if oil is developed in adjacent offshore areas. Logging is occurring along west and east of Icy Bay. Increases in logging-related boat traffic may disturb seals. Increases in tourism in Icy Bay by cruise ships trying to observe calving glaciers and kayakers may also disturb seals hauled out on ice flows since they are especially sensitive to vessel activity. Commercial fishing occurs throughout Yakutat Bay and may affect seal populations. Because harbor seals are distributed within coastal waters, they are commonly caught incidental to commercial and subsistence net fishing operations. The degree of take is unknown but could be significant in some salmon and herring gill net and purse seine fisheries. An unknown number are also shot by commercial fisherman when they disrupt their nets.

Northern (Steller) sea lion populations in parts of Alaska have also declined severely since the early 1980's. Decreasing population trends were first documented in the eastern Aleutian Islands, where they are most dramatic, and later in the central Gulf of Alaska. From 1956 to 1985 populations from the central Gulf of Alaska to the central Aleutian Islands declined 52%. As a result of these documented declines, the northern sea lion was declared threatened under the U.S. Endangered Species Act in November 1990. As with harbor seals, northern sea lion populations in southeast Alaska do not appear to be declining, although monitoring efforts here have been patchy and information from Wrangell-Saint Elias suggest declines may be occurring in the Yakutat area.

Sea lion distribution and abundance in the Yakutat area have not been systematically monitored and this area was not included in a statewide survey of this species in 1989. As part of the proposed harbor seal aerial survey, we would begin monitoring sea lions in

Yakutat Bay using aerial photographs of key haulouts and breeding areas and documenting seasonal use of important inland streams, e.g. Alsek River.

In response to the alarming declines in parts of Alaska and as directed by the 1988 amendment to the Marine Mammal Protection Act, the National Marine Mammal Lab launched a three-year study to determine minimum population estimates for certain pinnipeds in Alaska. Southeast Alaska is scheduled to be surveyed in 1993. While minimum population estimates are extremely important for baseline information, data collected in the above study are not designed to detect statistically significant changes in population numbers between years.

DESCRIPTION OF RECOMMENDED PROJECTS(S):

There are no baseline data on harbor seal numbers for the Yakutat area. Seals in Icy Bay are spread out over a large area and there are no high points from which land based counts of the entire area can be made. Given these constraints, we are proposing to use aerial strip transect methods for seals on ice habitat (Stirling et al. 1977) with GPS (Global Positioning System) to estimate seal numbers at ice haul outs.

I. OBJECTIVES

- 1) determine a minimum population estimate for harbor seals for Icy Bay,
- 2) determine the timing of pupping and pupping rates,
- 4) assess the precision and accuracy of population estimates derived from aerial transects using standard methods and GPS,
- 3) determine the distribution of seals and sea lions in Icy Bay.

Methods used to achieve objective three will be tested by comparing abundance estimates from aerial transects to results from simultaneous land counts in Johns Hopkins Inlet (GLBA).

Objectives which will be addressed in years 2 and 3 of the WRST study include:

- 1) document trends in harbor seal and sea lion populations,
- 2) document trends in pupping rates,
- 3) determine whether the distribution of seals or sea lions changing within the study areas.

II. METHODS

There is virtually no information on the timing of pupping and molting in Icy Bay. Baseline data are needed so that the timing of aerial surveys may be refined. Timing of pupping will be documented by land based observations from a base camp in Icy Bay.

Minimum population estimates of harbor seals and sea lions will be determined from aerial photographs of haul-out sites. During pupping in June, 3 flights will be made to photograph land and ice haulouts. During the molting period (late July and August), 6 flights will be made within three days of the monthly low tide, since this is when maximum numbers of seals are expected to haul out on land. Seal herds resting on land will be photographed using either a video camera or a still camera equipped with an 80-200 mm lens and 200-400 ASA color slide film. Slide images will be projected onto

white paper so they can be marked as seals are counted. Aerial photographs of seals on land and ice haulouts will be used to determine the ratio of adults to pups.

Seal abundance will be estimated using established line transect methods coupled with the use of GPS. Transect strip widths will be delineated using marks placed on the wing struts at pre-determined angles. The observer then counts only those seals which fall within the strip bordered by the strut markers. The GPS will be linked to a laptop computer so locations are automatically downloaded as seals are being counted.

Seal (ice) distribution will be determined either from a high altitude photograph of the study area (2000-4000 ft) or GPS fixes taken during a flight around the periphery of occupied ice. Using GPS way points, randomly selected transect lines will then be flown over ice haulouts at a fixed altitude (500-800 ft). Estimates of the mean number of animals per transect will be made by counting seals in randomly selected frames. The optimal number and size of transect strips needed to most accurately estimate numbers present will be experimentally determined. Aerial survey estimates will be verified using land-based counts made during flights over Johns Hopkins Inlet. Similar methods will be used for estimating seal numbers on ice haulouts in the Yakutat area, however land-based verification for the entire area is not possible.

BUDGET

	FY1	FY2	FY3
	30,000	30,000	20,000
<u>Personnel</u>			
Principal Investigator			
WRST (2 mons)			6000
Seasonal Biotech (6wks) GS7			3000
Seasonal Biotech (3 mons) GS5			5400
Per diem			2158
<u>Flight Time</u>			
Icy Bay 40 hrs (½ NPS & ½ OAS)			4500
Alsek River 30 hrs			1700
<u>Equipment</u>			
WRST			
80-200 mm lens for camera			400
Motor drive for camera			250
Field Observation Equipment			500
<u>Expendable Supplies</u>			
Film w/ processing			200

TOTAL

COMPLIANCE STATUS: The actions proposed in this statement are judged to be categorical exclusions based on 516 DM 6, Appendix 7.4 E(2) "Day-to-day resource management and research activities". Section 106 compliance with the National Historic Preservation Act may be necessary based on instrument location.

WRST N605.01 Fisheries Management

PROBLEM STATEMENT:

The waters that are contained within the boundaries of the park and preserve have received limited attention concerning fisheries. The Alaska State Fisheries Atlas provides some information on species and their distribution but a comprehensive survey of park and preserve waters has not been conducted. The Alaska Department of Fish and Game (ADF&G) maintains a weir on private land at the outlet of Long Lake to collect information on the runs of Coho Salmon (*Oncorhynchus kisutch*), Sockeye Salmon (*Oncorhynchus nerka*) and Steelhead (*Salmon gairdneri*). The Bureau of Land Management and ADF&G are currently conducting a cooperative steelhead study, in the Copper River and tributaries outside the park boundary to identify overwintering sites and spawning grounds and collect information on movements, run timing and other ecological factors. Waters that may be used by the steelhead that occur within the park and preserve including the Chitina and Tebay Rivers have not been surveyed.

Goal: Survey park and preserve waters to identify fisheries; their distribution, movements, timing of seasonal movements and habitat.

DESCRIPTION OF RECOMMENDED ACTION:

Survey of Fisheries: Conduct a systematic survey of park waters to identify fisheries location and distribution. In addition to fisheries information data would be collected on stream and lake characteristics such as rate of flow and surface area as well as basic water chemistry. Waters adjacent to or in the vicinity of habitation or areas anticipated to receive increased use would be targeted as high priority sample sites.

Steelhead Habitat Use Study: Participate in a cooperative study with BLM and ADF&G to investigate the distribution, migration, spawning areas, and additional ecological factors. Areas of primary concern would be the Tebay and Hanagita Rivers.

Fisheries Monitoring: Develop a program to systematically monitor on a regular basis specific fish populations based upon initial survey of park and preserve waters. Populations will be selected for monitoring if they occur in areas that are expected to receive a significant increase in use or are determined to be representative of the fishery. Monitoring will focus on changes in abundance, distribution and species composition in particular bodies of water. Information on the physical characteristics of the habitat will continue to be collected.

WRST N605.02 The Katie John Case: Providing A Salmon Subsistence Fishery on Tanada Creek

PROBLEM STATEMENT:

Copper River sockeye salmon are an important fishery resource. These salmon are marketed internationally as Copper River Reds and are considered as a premium quality fish. The Copper River fishery provides for a commercial, personal use, sport and subsistence fishery. Although it provides for all of these uses it did not provide a subsistence fishing opportunity on a tributary of the Copper River, Tanada Creek. Specifically, there was no subsistence fishing opportunity at the old village site of Batzulnetas along Tanada Creek.

In 1985, plaintiffs Katie John, Doris Charles and the Mentasta Village Council filed suit in the U.S. District Court against the State to enable them the ability to subsistence fish at Batzulnetas within Wrangell-St. Elias NP/P. This suit has become known as the Katie John case and it is the landmark case driving the federal assumption of subsistence fishery management. If the park were to assume management of this fishery today we would have to adopt the State harvest strategy that (1) is not firmly based on biological information to determine harvest limits, (2) does not meet the needs of the plaintiff in numbers of fish to be harvested, seasons and methods and (3) may have to manage the fishery under Section 804 of ANILCA.

The Copper River system supports a complex combination of over 124 known individual sockeye salmon stocks. Of these there are at least 12 stocks that spawn above the confluence of the Copper and Slana Rivers, two of which pass through Tanada Creek and spawn in Tanada Lake. In addition, there is one very small stock of chinook salmon that spawns in Tanada Creek. Based on spawning surveys, the Tanada Lake sockeye range between 1500-6000 fish and the chinook range between 50-100 fish. This is an extremely small run and based on fishing pressure desired by the plaintiff the Tanada Creek fishery will almost certainly lead to significant or permanent damage (ADF&G Fishery Biologist).

The current regulations permit the plaintiffs the ability to fish 3 days per week from June 1 through September 1 and it restricts the gear to dipnets and a total catch of 1000 sockeye. The plaintiffs wish to seek relief from the State through the federal system and request a change in season, increase the catch, and change gear to fish traps (which are illegal statewide) or seine nets. Without implementing a proactive escapement monitoring system any changes would result in an adverse impact to the Tanada Lake fishery.

DESCRIPTION OF RECOMMENDED ACTION:

The park works cooperatively with ADF&G to obtain spawning information for the Tanada Lake fishery. The problem with this approach is that it estimates spawning after harvest has occurred on Tanada Creek, thus it isn't possible to establish escapement goals and set harvest limits. To resolve this problem we proposed to work cooperatively with

ADF&G to install and man a weir to determine escapement prior to initiation of subsistence fishing activities. We also propose to work closely with the plaintiffs to collaborate on seasons, bags limits and methods to be employed on these sensitive fishery resource.

Project Support: Fish weir development and instructional operation will be conducted by ADF&G. ADF&G will also provide training in fish identification. The NPS will furnish one biological technician (GS-07) and one resource technician from Mentasta Village (GS-05).

PROPOSED BUDGET

	FY1	FY2	FY3
PERSONNEL			
GS-07 Biotech 10pp	12K	12K	12K
GS-05 Resource Tech	9K	9K	9K
OAS			
Aerial spawning survey	2K	2K	2K
SUPPLIES AND MATERIALS			
Weir construction	1K	-	-
TOTAL BUDGET	24K	23K	23K

WRST N605.04 Catalog Fish Genetic Characteristics

PROBLEM STATEMENT:

Within and adjacent to the park and preserve are six major river systems. Innumerable lakes occur within the boundaries. Some of these waters contain distinct stocks of various fish species. However, no studies have been undertaken to determine the genetic characteristics of these stocks. Changes could occur in the genetic characteristics through introduction of genetically different stocks. Introduction could occur from the stocking/planting of fish, presence of downstream hatcheries or habitat manipulation that circumvents or eliminates barriers that separate genetically distinct populations.

Goal: To determine and catalog the genetic characteristics of fish populations in identified drainages.

DESCRIPTION OF RECOMMENDED ACTIONS:

Continue Present Management: Present management action would continue as previously described. No information concerning the genetic composition of fish populations would be obtained. This could result in the genetic alteration of a natural population and a loss of native genetic breeding stocks.

Fish Stock Genetic Characteristic Study: Conduct a study in identified key drainages to determine and catalog the genetic characteristics of salmon and trout populations. These drainages would be identified based upon probability of the presence of genetically isolated populations and potential for genetic alteration. Tebay and Hanagita River systems are anticipated to be the initial area of study because of the probable existence of a variety of genetically unique stocks, distance from the Copper River and interest of scientific community to obtain information from these systems.

WRST N700.00 White River Paleo - Forest Climatic Study

PROBLEM STATEMENT:

Global climate change is an international concern. The National Park Service and various federal and non-federal organizations conduct research projects on global change. Tree - ring analysis has been shown to document paleoclimate conditions. The eruption of the White River Ash, originating from Mount Churchill, buried spruce forest in the White River Region of Wrangell - St. Elias NP/P. This buried forest may contain uniquely preserved paleoclimate data and allow the Alaskan paleoclimate record to be extended further back.

Three-ring cores provide a source of paleoclimate data. Lamont - Doherty Earth Observatory (LDEO) staff conduct tree -ring coring projects at numerous locations in the northern and southern hemisphere. A broad based data set on tree - ring width and density is currently being generated by research scientists. This data can be used to document paleoclimate conditions and constrain global climate models. Tree-ring width and density data are used to interpret past climate (temperature and rainfall) conditions. Living trees have a limited life span. Preserved and/or buried forests provide opportunities to extend the tree-ring record back in time.

Holocene stratigraphic sections are well exposed along the White River. This area is unique. It has a high potential for yielding new sampling sites which would produce additional climate data. Two tephras, dated at 1250 BP and 1890 BP, buried ancient forests (Denton and Karlen, 1977).

This proposal is to obtain funding for a cooperative study between the WRST and LDEO Tree Ring Laboratory. The goal is to identify and sample trees at new locations along the White River. Trees buried by tephra and old growth stands in marginal environments are the focus of this project.

DESCRIPTION OF RECOMMENDED PROJECTS (S):

Listed below are specific objectives and proposed responsible parties for achieving each objective and time - frame.

- (1) Assess, identify and core trees in the White River area.
Tephra buried trees and old growth forest are prime site candidates.

Responsible Party (s)
LDEO (Cooperative Agreement)
Park Geologist

Time - Frame
Summer 1994
Summer 1994

- (2) Measure and analyze all tree - ring cores (width and density).
Prepare report on findings.

Responsible Party
LDEO (Cooperative Agreement)
Park Geologist

Time - Frame
Fall 1994 & 1995
Fall 1994 & 1995

FUNDING AND STAFFING

Research expertise and necessary equipment for the project will be provided by the LDEO principle investigator. The park geologist will coordinate and participate in all field work, report preparation and administer all cooperative agreements. LDEO will publish a report on the White River project results.

FY1994

LDEO Cooperative Agreement
OAS Support

\$ 2500.00

TOTAL

\$ 2500.00

* This could be a proposal for cost sharing also.

COMPLIANCE STATUS: The actions proposed in this statement are judged to be categorical exclusions based on 516 DM 6, Appendix 7.4 E (2) "Day-to-day resource management and research activities". Section 2106 compliance with the National Historic Preservation Act may be necessary based on instrument location.

WRST N701.00 Inventory and Preservation of Paleontological Resources within Wrangell-St. Elias NP/P, Alaska

SUMMARY:

Wrangell-St. Elias National Park and Preserve (WRST) encompasses unique and significant geological resources. Among these resources are fossils that were collected and studied for the purpose of interpreting and reconstructing the regions geologic history. This is a proposal to have the U.S. Geological Survey (USGS) inventory paleontological resources within WRST. No field work is proposed. Very little is known about individual specimen significance, field location, associated literature, and collections repository. The uniqueness and spectacular condition of some of these fossils, their proximity to visitor destinations and potential threats posed by individuals collecting paleontological resources in back country areas necessitates resource information for management. Significant fossil sites may require monitoring and protection.

PROBLEM STATEMENT:

WRST, is unrivaled among units of the National Park system for its geologic record of the plate-tectonic processes by which continents are constructed. The accreted terrane model was in part developed from studies of Wrangellia conducted within WRST. Major portions of the mid Paleozoic through Holocene stratigraphic record crop out within WRST. Our understanding and interpretation of this "collision zone" has been based in part on paleontological specimens and associated research. Fossil occurrences are widely distributed within the park.

A summary of the complicated accreted terrane geology follows. The eastern extension of the modern Aleutian trench and subduction zone cuts through the southeast portion of WRST. The Yakutat terrane of late Mesozoic and Cenozoic submarine-fan deposits are colliding and being overridden by Cenozoic and late Mesozoic accretionary prisms of the Prince William and Chugach terranes; these were previously accreted against the southern margin of Alaska. Different crustal blocks of older rocks are juxtaposed by major fault zones. Most of the older stratigraphy belongs to the Wrangellia terrane--part of the more extensive Wrangellia composite terrane--which is bounded from the Chugach terrane to the south by the Border Ranges fault and from other accreted terranes to the north by the Denali fault. The Wrangellia terrane includes a late Paleozoic island-arc complex that forms the basement of a kilometers-thick early Mesozoic basaltic oceanic plateau. Younger Mesozoic strata of the terrane record submergence of this oceanic plateau and its accretion as part of the larger Wrangellia composite terrane onto the North American continent.

Fossils have played a critical role in the interpretation of this complicated accretionary history and continuing tectonic disruption of the rocks. They serve to interpret sedimentary environments, relative geologic ages, and the paleogeography of the various terranes. Specimens also have importance for purely taxonomic and morphologic studies. Many of the occurrences of fossils within WRST are widely known by paleontologists, and requests for future collecting and study are anticipated.

Park managers know very little about individual specimen significance, field location, associated literature, and collections repository. Some of these fossils are "megafossils" and include large ammonites, gastropods, pelecypods, corals and plant fragments. Existing knowledge of the occurrence of fossils in WRST results primarily from geologic field investigations carried out by the USGS since the early part of the 20th Century. These studies and associated collections are not catalogued in a format that enables park managers to know the resource and adequately protect it. Collections made during these previous investigations and the pertinent documentation are presently housed at the Reston, Denver, and Menlo Park regional centers of the USGS and at the U.S. National Museum in Washington, D.C. References to these occurrences and collections and their interpretations are scattered through a voluminous literature.

The uniqueness and spectacular condition of some of these fossils, their proximity to visitor destinations and potential threats posed by individuals collecting paleontological resources in back country areas necessitates resource information for management. Significant fossil sites may require monitoring and protection. In addition, if researchers are able to study specimens held at repositories, the NPS can avoid authorizing unnecessary collecting and field related research. Fossils in situ and on loan from collections can also be used for interpretation and back country planning.

The proposed inventory of paleontologic resources will be concerned mainly with the existing USGS materials. However, information will also be provided about paleontologic material known to be in the collections of several universities. The inventory will be concerned exclusively with "megafossils," i.e., fossils that can be observed in outcrop by the unaided eye. These are largely marine invertebrate and plant fossils. As in most of Alaska, fossils of land mammals and reptiles are unknown, and only isolated occurrences of Mesozoic marine-reptile bones have been recorded from WRST. "Microfossil" occurrences, although of great scientific interest, do not require the same management strategy as do the megafossils.

Currently the USGS is reorganizing; the infrastructure for paleontological information and data management (branch of paleontology and stratigraphy) is targeted for closure. Therefore, the future status of existing USGS collections is unknown. Collections identified during this project could be accessioned by the NPS. Regardless of the future status of the USGS, there is insufficient information for park management to protect, interpret, and manage the paleontological resource.

DESCRIPTION OF RECOMMENDED PROJECT:

STUDY RESEARCH COMPONENTS AND STRATEGY:

Geologic and Geographic Distribution of Megafossils within WRST include:

- The oldest fossils known in WRST are questionable Devonian (mid-Paleozoic) corals from the part of the Wrangellia composite terrane known as the Alexander terrane in the St. Elias Range near the International Border.

- Permian (late Paleozoic) marine invertebrate fossils are abundant and diverse in limestones associated with island-arc volcanic rocks of Wrangellia in several different parts of the Wrangell-St. Elias Mountains.

-Numerous early Mesozoic fossil localities are known from Wrangellian rocks along both the north and south flanks of the Wrangell-St. Elias Mountains and from the upper Chitina Valley. Fossil localities are also known in nearby younger Mesozoic strata within and overlapping Wrangellia. Some of the fossils at these localities in Mesozoic marine rocks are spectacular from an aesthetic viewpoint, in addition to having important scientific interpretational value. These localities require special management as does those of Cretaceous (late Mesozoic) fossil leaves and plants near Chisana.

-Late Mesozoic bivalves and other marine mollusks occur at various places in the highly deformed rocks of the Nutzotin Mountains along the northern margin of Wrangellia and are especially significant for the interpretation of the accretionary history of Wrangellia.

-Most of the Chugach terrane, south of the Border Ranges fault zone, is metamorphosed and unfossiliferous, but in the Yakutat terrane Cenozoic marine mollusks and plant fossils are known from hundreds of localities near Yakutat Bay.

Description of Proposed Inventory:

A data-base structure will be developed using dBase III plus. The database will include the following kinds of information:

- 1.) Site Name--Locality name.
- 2.) Site Number--Each site will have a unique number (WRST-0000-F)
- 3.) Occurrence--Locality description (including latitude and longitude [decimal degrees], geologic unit and context); quality of preservation and abundance.
- 4.) Kind(s) and age of fossils; faunal lists where available (scientific and common name).
- 5.) Significance--Scientific value for age, paleoecologic, and biogeographic interpretations; uniqueness and value for visitor education (e.g., potential for visitor-center displays, trail-guide information, etc.).
- 6.) Management recommendations--Potential for additional collecting and discovery; desirability of protection and/or visitor access.
- 7.) Location and conditions of existing collections--Repository of collection(s) (i.e., building, room, case numbers, etc.); location of type and figured specimens of taxonomic value (which is usually not the same as for the collections themselves).
- 8.) Annotated bibliographic references to both localities and fossil collections.

OBJECTIVES OF THE RECOMMENDED STUDY:

Listed below are specific objectives and proposed responsible parties for achieving each objective and time-frame.

- (1) Identify and compile all known megafossil paleontological collections information for specimens from WRST. When feasible, identify micro fossil information also.

Responsible Party(s)
USGS

Time-Frame
1996 & 1997

- (2) Develop a database structure and enter paleontological information. Data must be in a format compatible with development of a GIS layer in Arc Info (scale 1:63360).

Responsible Party(s)
USGS

Time-Frame

1996 & 1997

(3) Determine significance of specimens and repository of collections .

Responsible Party(s)
USGS

Time-Frame

1996 &1997

(4) Make recommendations to NPS for protection, interpretation, collections, and preservation.

Responsible Party
USGS

Time-Frame
1996 &1997

(5) Prepare a final report containing a megafossil paleontological database.

Responsible Party
USGS

Time-Frame
1996 &1997

FUNDING AND STAFFING:

The inventory and database entry components of the project will be overseen by the USGS. USGS will provide a draft and final report. The park Geologist will review all reports and advise the USGS regarding the paleontological database applications/uses and management objectives. He will administer any agreements.

Accomplishment of project goals will require a two year (FY96 & 97) effort at the USGS field center in Denver, CO, which is Nichols' duty station. Salary and incidental travel costs for Nichols will be covered by the USGS, Office of Regional Geology.

Travel will be necessary to visit USGS centers in Reston, VA, and Menlo Park, CA, as well as the U.S. National Museum in Washington, D.C. to access fossil-locality information in the USGS Paleontological Registers, card files, and other documentation housed at these facilities. Visiting these centers is also necessary to ascertain exactly where collections are presently housed, their state of preservation, and the size of the individual collections. The actual collections from the WRST and their documentation are widely scattered (even among the various USGS and USNM facilities in the Washington, D.C., area alone), and tracking them down will require some effort. Nearly all of the lower Mesozoic collections of fossils and their locality information are presently in Denver.

Principal Investigator: Kathryn M. Nichols
U.S. Geological Survey Phone: 303-236-5799
MS-919, Box 25046, DFC FAX: 303-236-5690
Denver, CO 80225 E-mail: knichols@sedproc.cr.usgs.gov

FY1996 &1997

NPS - Geologist no cost	0000.00
USGS - Project staffing costs (two years GS-13)	\$??000.00
USGS - Travel	3000.00
NPS FUNDING REQUEST	0.00

WRST S100.01 Determine the Customary and Traditional Means of Access

PROBLEM STATEMENT:

The Alaska National Interest Lands Conservation Act (ANILCA) mandates that federal land managing agencies, including the National Park Service, shall,

"...provide the opportunity for rural residents engaged in a subsistence way of life to continue to do so."

ANILCA further states that

"The Secretary shall ensure that rural residents engaged in subsistence uses shall have reasonable access to subsistence resources on the public lands".

In addition, 36 CFR §13.46(a) states that

"Notwithstanding any other provision of this chapter, the use of snowmobiles, motorboats, dog teams and other means of surface transportation traditionally employed by local rural residents engaged in subsistence uses is permitted within park areas except at those times and in those areas restricted or closed by the Superintendent".

Furthermore, the General Management Plan for Wrangell-St. Elias NP/P (WRST) stated that the use of ORV/ATV for subsistence access was determined to be traditional.

However, Executive Order 11989 directs that:

"...the respective agency head shall, whenever he determines that the use of off-road vehicles will cause or is causing considerable adverse effects on the soil, vegetation, wildlife habitat or cultural or historic resources of particular areas or trails of the public lands, immediately close such areas or trails to the type of off-road vehicle causing such effects, until such time as he determines that such adverse effects have been eliminated and that measures have been implemented to prevent future recurrence."

Many ATV trails undoubtedly began as game and foot trails or winter access trails. Others were constructed to provide equipment access to mining prospects and claims. Some trails follow seismic lines constructed to support oil exploration during the early 1960s. Where these trails follow stream beds they are regularly scoured by high water eliminating most visual impacts of the trail. Where the trails pass through relatively dry and well drained sites a fairly stable two-rut trace is established. Trails passing through muskeg or poorly drained sites are particularly susceptible to rapid deterioration. These areas quickly become rutted, altering drainage and resulting in puddles or quagmires. Users re-route trails to adjacent drier areas when impassable sections are encountered. The Tanada Lake Trail exemplifies this process and is over ¼ mile wide in places.

It is known that the degree and rate of any resource deterioration is a function of vegetative type, soil and terrain characteristics, the time and amount of use, water table

level, presence of permafrost, vehicle type, and operator behavior. We do not know to what extent the visual scars presently observed are the result of past use, particularly by bladed heavy tracked equipment. We do not know to what extent current ATV use causes or accelerates damage.

The park/preserve is difficult for many residents to utilize. The Copper River, a swift, turbulent, and silt laden stream, separates the parkland from such communities as Glennallen, Gulkana, and Copper Center. Extensive lowland bogs, tussock covered tundra, and smaller waterways add to the difficulty of summer travel. However, access may be attained from points along the Copper River, McCarthy Road, Kotsina Road, Nabesna Road corridors. Access across the Copper River can be attained via a concrete highway bridge along the McCarthy Road.

A number of local residents do gain access to park/preserve wildlife resources via light aircraft. The use of aircraft is permissible within areas designated as preserves. By law and regulation, aircraft access for the purpose of conducting subsistence activities in the park is not permitted.

Numerous studies have been conducted by the State identifying subsistence resources both in quantity and spatially, however access to those resources have not been well documented. Access reports were prepared by the NPS in the mid-late 1970's, however these reports fail to distinguish between sport and subsistence users of park/preserve resources or more specifically federal subsistence versus state subsistence users. Considerable discussions have occurred among the members of the WRST Subsistence Resource Commission (SRC) concerning the prohibition of aircraft to access subsistence resources within the park. It is felt by the SRC that this prohibition restricts access to subsistence resources temporally. The SRC has made a formal recommendation to the Secretary to allow the use of aircraft to access subsistence resources within the park. This recommendation has been denied.

DESCRIPTION OF RECOMMENDED PROJECT:

The purpose of this program is to determine the customary and traditional means and use of access points and routes as they relate to the temporal and spatial use of subsistence resources. For the purposes of this program the federal definition of customary and traditional will be applied.

Phase I

(1) Work with Regional Office personnel and consult with State Subsistence personnel to define "traditionally employed" as it relates to access in WRST. The definition of "traditionally employed" should include: where ATV/ORVs were "traditionally employed"; what type of ORVs; seasons of use; and for what purposes.

(2) Collect and synthesize all historic and contemporary data, computerize, digitize and represent both temporally and spatially.

(a) Gather data used by NPS to determine aircraft use for the purposes of hunting park resources and determine sport versus subsistence use and park versus preserve.

(b) Gather and synthesize all published, unpublished, raw data and oral histories that relate to subsistence use and users of resources within WRST.

(c) Computerize and digitize all data, develop data themes and incorporate into a GIS to give a spatial interpretation of the data.

<u>Data to be computerized</u>	<u>Data to be digitized</u>	<u>Themes already/being developed</u>
1a)All harvest data by UCU within GMU's 5a, 5b, 6a, 11, 12, 13, 20d, and 20e.	1b)Airstrip database 2b)Stratton Maps* 3b)Mills Maps 4)Trap lines 5)Species habitat 6)Range maps 7)Fisheries maps 8)Land status 9)AEIDC maps	1c)NPS ATV trails 2c)UCU's and GMU's 3c)Political boundaries

*Stratton Maps will require developing digitized themes by community and by species. Species themes will require analytical evaluation to approximate an area traditionally used to seek subsistence resources.

(d) Overlay themes to create the following maps (Note: this can and should be expanded)

- Map 1 - 1a+1b=potential harvest related to aircraft access
- Map 2 - 1a+1c=potential harvest related to non-aircraft access
- Map 3 - 1a+2b=harvest as it relates to where communities hunt
- Map 4 - 1a+2b+5+6=harvest as it relates to where communities hunt, habitat and range
- Map 5 - 1a+3b=harvest as it relates to where Yakutat people hunt
- Map 6 - 1a+3b+5+6=harvest as it relates to where Yakutat people hunt, habitat and range
- Map 7 - 1a+2c=harvest data distributed with GMU and UCU
- Map 8 - 1a+1b+2c=harvest data related to aircraft and UCU
- Map 9 - 1a+1c+2c=harvest data related to non-aircraft and UCU
- Map 10- 1a+2b+2c=harvest data related to community hunt area related to UCU
- Map 11- 1a+3b+2c=harvest data related to Yakutat hunt area related to UCU
- Map 12- 1a+9+5+6
- Map 13- 1a+9
- Map 14- 1a+9+2c
- Map 15- 1a+9+1b
- Map 16- 1a+9+1c
- Map 17- 1a+9+1c+2c
- Map 18- 1a+9+1b+2c
- Map 19- 1a+2b+1b+2c
- Map 20- 1a+2b+1c+2c
- Map 21- 1a+3b+1b+2c
- Map 22- 1a+3b+1c+2c

(d) Obtain RS2477 maps from the state.

(e) Analyze the above information and determine if additional information is needed and make recommendations. If additional information is needed then develop Phase II.

Phase II

(1) Conduct an ethnography study.

Budget:

Phase I	
GS-09 Cartographic Technician (6 months)	\$22000
GS-11 Natural Resource Manager (3 months)	\$22000
Travel/Per Diem	\$ 5000
Supplies and Materials (mylar, mylar cabinet)	\$ 3000
20" Color Monitor	\$ 3000
ARCVIEW II Software	\$ 500

GRAND TOTAL	\$55500
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WRST S100.02 Customary and Traditional Use of Park/Preserve Resources By Local Communities

PROBLEM STATEMENT:

Title VIII of the Alaska National Interest Lands Conservation Act (ANILCA) [16 U.S.C §3111-3126] requires the Secretary of the Interior...to implement a joint Federal Subsistence Management Program to grant a priority for subsistence uses of fish and wildlife resources on public lands in Alaska. ANILCA goes on to state that subsistence uses are confined to those subsistence uses engaged in by rural Alaskan residents. Furthermore, 36 CFR Part 13.41 further limits eligibility in National Parks/Monuments and Preserves to local rural residents. Compounding the National Park Service's eligibility requirement of being a local rural resident is 50 CFR Part 100.4 which requires that all subsistence hunters of a particular wildlife population must be residents of those rural areas determined to have customary and traditional use of that particular wildlife population.

In 1981, the National Park Service promulgated regulations which defined local rural residency (36 CFR Part 13.42) as: (a) any person who has his/her primary, permanent home within a resident zone; or (b) any person authorized to engage in subsistence uses...by a subsistence permit issued pursuant to 36 CFR Part 13.44. Those communities and areas identified were; Tok, Mentasta Lake, Slana, Nabesna, Chistochina, Gakona, Gakona Junction, Gulkana, Glennallen, Tazlina, Copper Center, Kenny Lake, Lower Tonsina, Tonsina, Chitina, Yakutat, McCarthy and Chisana.

Several problems arise concerning eligibility. These include: (1) Do the communities/areas identified 36 CFR Part 13.73 contain a significant concentration of subsistence users with a customary and traditional use of park resources without the use of aircraft?; (2) The WRST Subsistence Resource Commission has requested that Northway be considered as a resident zone.; (3) Several species within Game Management Units 11,12, and 5b have not had customary and traditional findings.; and (4) Are the customary and traditional findings conducted by the State of Alaska and adopted by the Federal Subsistence Board valid?

DESCRIPTION OF RECOMMENDED PROJECT(S):

The objective of this project is to conduct an evaluation of the customary and traditional use of subsistence resources by community or area within the Copper River Basin, upper Tanana area and the Yakutat area. Each evaluation shall identify the specific community's or area's use of fish and wildlife resources, timber resources and other subsistence resources. This process may be applicable for determining the customary and traditional subsistence use by an individual.

Community, area or individual evaluations will be based on the analysis of the following criteria:

- 1) a long-term consistent pattern of use;
- 2) a pattern of use recurring in specific seasons for many years;
- 3) a pattern of use consisting of methods and means of harvest which are characterized by efficiency and economy of effort and cost;
- 4) the consistent harvest and use as related to past methods and means of taking near, or reasonably accessible from the community of area;
- 5) a means of handling, preparing, preserving and storing which has been traditionally used;
- 6) a pattern of use that includes the handing down of knowledge of skills, values or lore;
- 7) a pattern of use where harvest is shared or distributed; and
- 8) a pattern of use which relates to reliance on a wide diversity of resources.

Budget and Tasks

FY1

GS-11 Cultural Anthropologist (3 yr. term appt.)	\$ 45000
Conduct C&T determinations for the following six communities (Northway, Tok, Mentasta Lake, Slana, Nabesna, Chistochina)	
GS-11 Natural Resource Manager (6 mths)	\$ 22500
Synthesize all harvest data for GMU's 11, 12, 13, 5a and 5b. Computerize into DBase III+	
Digitize all spatial information	\$ 10000
Travel and Per Diem	\$ 5000
SUBTOTAL	\$ 82500

FY2

GS-11 Cultural Anthropologist (Year 2)	\$ 47000
Conduct C&T determinations for the following six communities (Gakona, Gakona Junction, Gulkana, Glennallen, Copper Center, Tazlina)	
Travel and Per Diem	\$ 3000
Digitize all spatial information	\$ 5000
SUBTOTAL	\$ 55000

FY3

GS-11 Cultural Anthropologist (Year 3)	\$ 50000
Conduct C&T determinations for the following seven communities (Kenny Lake, Chitina, McCarthy, Chisana, Lower Tonsina, Tonsina, Yakutat)	
Travel and Per Diem	\$
3000	
Digitize all spatial information	\$ 5000
SUBTOTAL	\$ 58000
GRAND TOTAL	\$195500

WRST S100.03 Process Development for Implementation of ANILCA Title VIII Section 804

PROBLEM STATEMENT:

Title VIII of the Alaska National Interest Lands Conservation Act (ANILCA) [16 U.S.C §3111-3126] requires the Secretary of the Interior...to implement a joint Federal Subsistence Management Program to grant a priority for subsistence uses of fish and wildlife resources on public lands in Alaska. ANILCA goes on to state that subsistence uses are confined to those subsistence uses engaged in by rural Alaskan residents. Furthermore, 36 CFR Part 13.41 further limits eligibility in National Parks/Monuments and Preserves to local rural residents. Compounding the National Park Service's eligibility requirement of being a local rural resident is 50 CFR Part 100.4 which requires that all subsistence hunters of a particular wildlife population must be residents of those rural areas determined to have customary and traditional use of that particular wildlife population.

However, Section 804 of ANILCA states "Whenever it is necessary to restrict the taking of populations of fish and wildlife on such lands for subsistence uses in order to protect the continued viability of such populations, or to continue such uses, such priority shall be implemented through appropriate limitations based on the application of the following criteria:

- (1) customary and direct dependence upon the population as the mainstay of livelihood;
- (2) local residency; and
- (3) the availability of alternate resources."

Management at Wrangell-St. Elias National Park and Preserve may be approaching the situation where it becomes necessary to restrict the taking of one or more species of wildlife. This is especially true in regards to the Mentasta caribou herd. Presently, all hunting is closed on this herd. However, as the herd begins to meet National Park Service management objectives limited harvest opportunity may be permitted. Currently, there is no process in place outside of eligibility to determine who among eligible subsistence users would have priority over other eligible individual subsistence users for the opportunity to take a limited number of animals.

DESCRIPTION OF RECOMMENDED PROJECT(S):

The criteria laid out in Section 804 needs to be refined both through policy and regulation so that an 804 process can be applied at the park level. It is conceivable that elements of the State of Alaska Tier II process and federal customary and traditional use

determination process could be combined to structure an application and process for determining prioritization among individuals.