

The Anaktuvuk Pass All-Terrain Vehicle Study 1986 - 1988
A Narrative Report of Field Operations and Dispersed ATV Use

by Michael Kunz and Kimberly Troxel
Gates of the Arctic National Park and Preserve
Alaska

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This report was edited by Diana Weaver, Alaska Regional Office, National Park Service. For referencing the report should be cited as follows:

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PREFACE

Documenting physical change through time may be done by personal observation, reviewing a photographic record of the locale, reviewing the written history of the area and by interviewing the local residents. Using a combination of sources creates its own system of accuracy checks through cross-referencing.

In compiling this report all of the above methods were employed. The study plan was developed in consultation with Ahlstrand (NPS, Alaska Region). The senior author worked in the region regularly since 1970 and made numerous trips to and through Anaktuvuk Pass, providing personal or first-hand observation. Other people, primarily pilots, who worked in the region were also interviewed. The photographic record of Anaktuvuk Pass covering the last 40 years or so is quite complete. Especially useful are the high- and low-altitude color infrared aerial photos which provide periodic coverage of the area since the late 1970s. There is a large body of published and unpublished literature dealing with Anaktuvuk Pass and its residents, and that material was used. In-depth observations on the history of the Nunamiut Eskimo at Anaktuvuk Pass may be found in references listed at the end of this report. Primary ethnographic sources on Nunamiut Eskimo are Spencer (1959), Gubser (1965) and Ingstad (1954). For a good overview of Nunamiut culture see Hall (1984).

Information concerning the development of Anaktuvuk Pass village was obtained from village residents through informal conversations and interviews.

Little biological information is available that applies directly to the circumstances at Anaktuvuk Pass. Most studies on the effects of off-road vehicles or ATVs on tundra plant communities deal with much larger and heavier vehicles than the relatively light-weight ATVs used at Anaktuvuk Pass. Data from an NPS study on the effects of the operation of several types of ATVs, including a six-wheeled Argo, of a shrub-tussock community are being quantified at Wrangell-St. Elias National Park and Preserve (Racine and Ahlstrand 1985). Much of this data can be applied to the situation at Anaktuvuk Pass.

Other studies show that off-road vehicle use along the Denali Scenic Highway always affected tundra vegetation, but the effect from a single pass usually produced no long-term effects (Sparrow et al. 1978; Wooding and Sparrow 1979). Willows and shrub birch were more susceptible to damage than low-growing plants, and sedges were the plants most resistant to repeated passes (Bliss and Wein 1976; Sparrow et al. 1978; Wooding and Sparrow 1979).

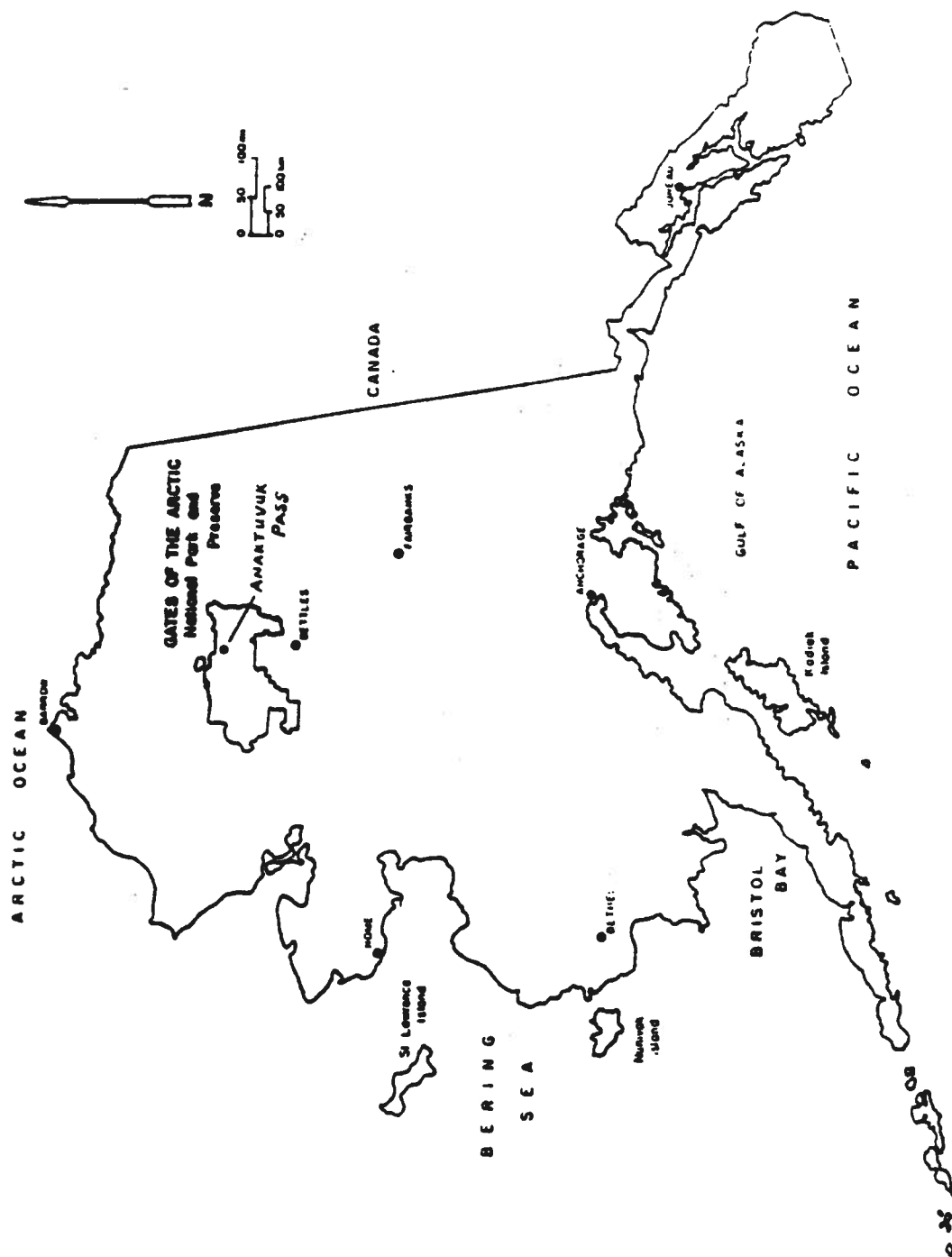
Similar studies conducted on the Arctic coastal plain near Barrow showed that, several years after the tundra surface was affected

by infrequent passes of a Weasel, a light amount of disturbance increased productivity and the quality of vegetation in the slight track depressions (Challinor and Gersper 1975). This increase was due to warmer temperatures and higher-than-normal soluble nutrient levels in the track-influenced soils. The crushed plant remains decomposed and released nutrients more rapidly than did the adjacent undisturbed vegetation. A green strip of vegetation is produced, contrasting with the normal brownish tundra with an accumulation of several years of standing plant remains (Brown 1976). When disturbance was limited to the vegetation and depression of the surface, the tundra usually recovered to near its original state in a few years except for the obvious green plants growing in the vehicle tracks (Abele et al. 1984). On the other hand, shearing or destruction of the organic mat prevented revegetation of the disturbed areas due to subsidence and erosion (Gersper and Challinor 1975; Abele et al. 1984). Regardless of whether a green strip or a water-filled trough develops, long-lasting visual effects are created which contribute to the degradation of the land's pristine aesthetic qualities (Mellor 1980; Ahlstrand et al. 1986).

The data from both of the studies recently conducted in the Anaktuvuk Pass area (Racine and Johnson 1988 and Ahlstrand et al. 1988) appear to be in general agreement with the studies just mentioned. However, when the vegetation was severely affected and the organic soil exposed, subsidence was noted only at the moist tundra sites. In all cases the subsidence was not extensive, and nowhere did it lead to active erosion. Soils in the Anaktuvuk Pass area are less ice-rich and less fine-grained than soils at locations where much of the previous research was conducted.

In 1985 the senior author spent late May through mid-June engaged in field work in the Anaktuvuk Pass area for the National Park Service (NPS). In 1986 and 1987 he spent the months of June, July, August and September working out of the Anaktuvuk Pass village. About 75 percent of this time was spent working in the village; the remainder was spent gathering data from the land surrounding the village. During the summer of 1988, 45 days were spent gathering data in the areas most heavily used for summer subsistence by the Anaktuvuk Pass residents.

This report deals with observations of disturbance to vegetation and soils associated with all-terrain vehicle (ATV) use. Quantitative data regarding the impact of ATVs on the environment is the subject of a separate report (see Ahlstrand et al. 1988) and will be dealt with only tangentially here.



Map of Alaska showing Gates of the Arctic and Anaktuvuk Pass, (after Schoenberg 1986).

BACKGROUND

Titles VIII and II, 201 (4) of the Alaska National Interest Lands Conservation Act (ANILCA, December 2, 1980) provide for the continued opportunity for customary and traditional subsistence activities by local residents in traditional use areas. On the one hand, the park is mandated to permit the subsistence taking of wildlife, fish and plants; on the other hand, such activities must be consistent with maintaining natural and healthy populations of the fish and wildlife. If or when conflicts concerning the use of park resources arise, subsistence uses take precedence over other consumptive uses of those resources. In keeping with the subsistence mandate, the NPS must permit year-round access to traditional subsistence use areas, although the means of access must be consistent with park purposes.

Under the Alaska Native Claims Settlement Act (ANCSA), the residents of Anaktuvuk Pass are designated subsistence users. The people of this community and their predecessors traditionally used the natural resources of the region through a subsistence lifestyle. However, ANILCA does not define mechanized vehicles of any kind as traditional means of transportation. The use of snowmachines, motorboats and (under specific conditions) aircraft as methods of transportation in association with subsistence activities are specifically permitted by the act. Conversely, the act provides no explicit exception to existing park and wilderness regulations that would allow the use of ATVs in association with any subsistence activity.

NPS and Department of the Interior regulations and policies notwithstanding, the use of six- and eight-wheeled ATVs within the park has occurred in the past and is presently occurring. Active enforcement has not been used to achieve compliance with regulations and policies regarding the operation of ATVs on park land.

As a result of the 1983 Chandler Lake Exchange between the Department of the Interior and the Arctic Slope Regional Corporation (ASRC), several sizeable parcels of land around the village of Anaktuvuk Pass were deeded to the Department of the Interior in exchange for federal land of high petroleum potential in the Kaktovik area. This land was originally selected by the regional corporation to serve as a buffer between village land and park land. ATV use was allowed on the land and had occurred for a number of years.

During the land exchange negotiations, North Slope Borough (NSB) representatives said they would protest the exchange unless six- and eight-wheeled ATVs were recognized as a traditional means of transportation for subsistence activities and their use permitted in the park. NPS did not want to argue the issue of free use of

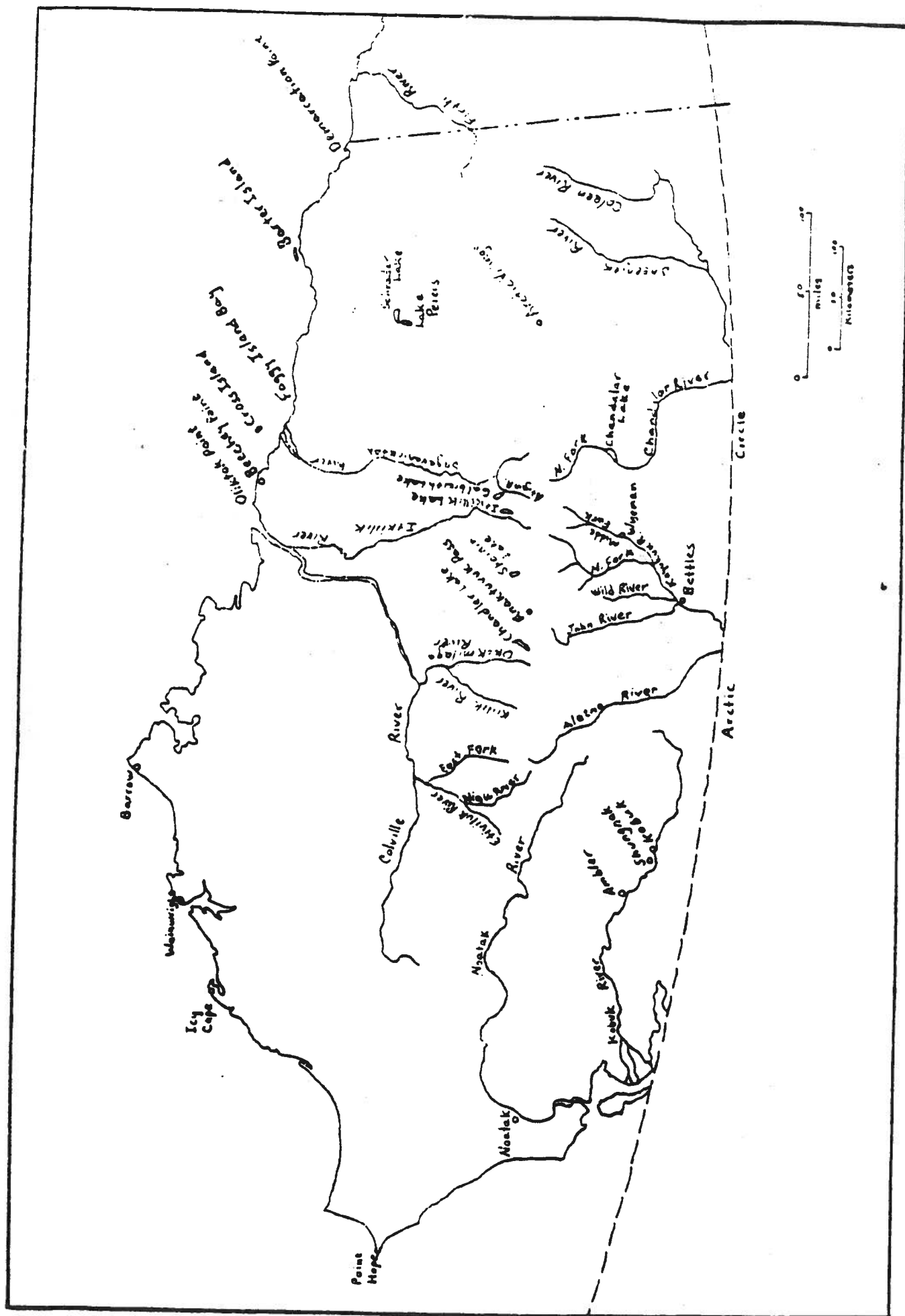
ATVs on park land or the appropriateness of classifying ATVs as traditional means of transportation. Therefore, travel rights of way or easements, specifically designed to provide ATV travel across the exchanged land, were set forth in the warranty deed. By this method it appeared that ATV access to summer subsistence use areas around Anaktuvuk Pass was provided. However, it soon became apparent that the local residents were unhappy with the Exchange agreement. Village residents said that prior to the enactment of the Exchange they had been ill-informed of its ramifications. The villagers said that the easements did not provide for their basic need for hunting access rather than a transportation corridor. When the land was in the ownership of the ASRC, unrestricted use of ATVs was allowed.

During the fall of 1984 the NSB, alarmed at the restrictions placed on ATV use on the exchanged land, commissioned and funded a project to gather data to define areas of traditional use of the Anaktuvuk Pass residents (see Hall et al. 1985). The conclusions generated by that work seek to support the proposition that ATVs should be considered traditional, and therefore should be allowed as a means of transportation in association with subsistence activities on park land. The NPS does not agree that any type of vehicle used to access traditional use areas for subsistence purposes is ipso facto a traditional means of transport.

At about the same time, in reaction to the Anaktuvuk Pass residents' dissatisfaction with the regulations governing the use of ATVs on park land, the Bureau of Indian Affairs (BIA), at the request of the Anaktuvuk Pass IRA Council, decided to conduct an ATV study. The BIA contracted with the U.S. Army Corps of Engineers' Cold Regions Research and Engineering Laboratory (CRREL) to undertake a study. CRREL would conduct a literature search of previously used methods of assessing the effects of ATV traffic on vegetation and its subsequent recovery or degradation; design and test research methods for measuring the effects of both ATV use and caribou migration on vegetation and soil in the Anaktuvuk Pass area; and prepare a final report summarizing the data collected, evaluating the research design and offering suggestions and recommendations concerning future ATV research in the area (see Racine and Johnson 1988).

The BIA proposition was that trail development resulting from ATV use affected the environment to no greater degree than the trails naturally created by migrating caribou. Therefore, the BIA reasoned, if the studies proved their contention to be true, the NPS should consider allowing unrestricted subsistence-oriented ATV use on park land in the Anaktuvuk Pass area.

The study was initiated during the summer of 1985 with the cooperation of the NPS but with the BIA as the sole funding source.



Flap on Northern Alaskan with important place in the history of the region.

Beginning in 1986, in an effort to resolve this problem concerning the regulations governing subsistence ATV use on park land and to arrive at a mutual understanding of the use and impact of ATVs, the NPS, with the cooperation and aid of the BIA, NSB, Nunamiut (Anaktuvuk Pass village) Corporation, City of Anaktuvuk Pass and ASRC, initiated this project to study the use of ATVs, the degree of established ATV use and the effect of ATV use on the local environment. The study was not designed to establish proof for or support of a specific point of view or argument. The project was designed only to collect quantitative and qualitative data to generate information upon which policy decisions could be reviewed and/or altered. Areas of investigation included assessment of the applicability of existing regulations, appropriate management of permitted ATV access, as well as possible land exchanges and/or other changes in land use status.

When the NPS began its fieldwork in the summer of 1986, BIA's preliminary research report had not been completed. However, discussions concerning the initial results of the study and recommendations for future research were conducted with a project investigator during December 1985. These discussions provided NPS researchers with valuable insights regarding the operation and design of their project. A draft copy of the preliminary CRREL/BIA report was made available to the NPS in April 1987, and a final report was published by CRREL in September 1988 (Racine and Johnson 1988).

The village of Anaktuvuk Pass has roughly doubled in size over the last dozen years to about 250 residents at the present time. The village is served daily by scheduled air service. Air travel is the only reasonable means of access to the village. The village, which straddles the continental divide, is located 230 air miles north-northwest of Fairbanks and lies within the boundaries of Gates of the Arctic National Park and Preserve. The use of renewable natural resources for subsistence is part of the lifestyle of many village residents.

The success of a hunter, as well as the productivity of subsistence activities, is directly linked to mobility and access to the available natural resources. In the winter, overland travel and access to game (usually caribou) and/or furbearing animals is easily achieved by snowmachine. The use of snowmachines for such purposes is specifically permitted by the Alaska Lands Act. However, summer access to subsistence resources presents a different situation.

Most Alaska Native villages are located on large rivers, interconnected lake systems, or along the coast where the water provides an excellent medium for travel by motorboat to access summer subsistence resources. However, the Anaktuvuk Pass area has no rivers which are suitable for such travel.

Until about 20 years ago summer transportation of gear and meat, beyond what a person could carry on his own back, was the province of the pack dog. Packing gear and meat on their backs was the summer occupation of sled dogs. Now, primarily due to technological advances and regulatory changes, the use of dogs as beasts of burden in support of summer subsistence activities no longer occurs. The last documented use of pack dogs on a summer hunting trip was in 1978 (Spearman, oral communication, 1984).

About 25 years ago snowmachines became more reliable and began to replace dogs as the motive power for sleds. The number of working dogs maintained by the residents of Anaktuvuk Pass began to decline.

During the same time period the Alaska Department of Fish and Game issued regulations which forbade the use of game animal parts as feed for domestic animals. As did most rural Alaska residents, the people of Anaktuvuk Pass generally maintained their dogs on wild game meat, primarily caribou. Since there are no adequate fish resources near the village, fish could not be used for dog food. This lack of affordable, available dog food may have initiated the decline and eventually the total disappearance of working dogs in Anaktuvuk Pass. Not only did the decades of the 1960s and 1970s herald the demise of the working sled/pack dogs, they also marked the beginning of the use of ATVs in summer subsistence activities.

The first documented observance of ATVs (Weasels) by some of the residents of Anaktuvuk Pass occurred in 1950. A Weasel is a medium size, enclosed, tracked ATV of about 2,700 pounds empty weight. These four- to six-passenger vehicles were used by the U.S. Geological Service (USGS) near Anaktuvuk Pass during the summer of that year and were seen by members of hunting parties over the course of the summer. During the summer of 1951 the USGS field parties stopped at the village with their Weasels on several occasions, and all the village residents got a good look at these machines.

About 1961 one of these vehicles came into the ownership of one of the local residents. This is believed to represent the first, albeit shortlived, use of an ATV for subsistence by an Anaktuvuk Pass resident. Since that time the use of ATVs in support of subsistence activities has at first slowly and, more recently, rapidly and dramatically increased.

Since 1978 the use of small, 700 to 900-pound empty weight, two- to six-person, six- and eight-wheeled ATVs to access subsistence resources has dramatically increased as has their use on park land. In some park areas around Anaktuvuk Pass continuous use of ATVs over the same route has damaged vegetation, disturbed the substrate and formed trails. All of these conditions are inconsistent with Congress' intent to maintain the area's wild and undeveloped character through the creation of the park. Some of the villagers

have said that if they were allowed to wander about the region in their ATVs rather than having to stay on a trail or narrow easement, the park land would experience only minimal and acceptable levels of terrain impact.

During the summer of 1988 the senior author of this report was engaged in a National Historic Preservation Act section 106 archeological compliance survey of park land proposed for exchange. While documenting the cultural resources, the field crew also recorded evidence of ATV activity in the area.

RESEARCH METHODS

This project was conducted jointly by personnel from the NPS Alaska Regional Office and Gates of the Arctic National Park and Preserve. Park facilities in Anaktuvuk Pass housed and supported the research team. Logistic support in the form of helicopter and fixed-wing aircraft were provided by the park and coordinated out of the district headquarters in the town of Bettles, 90 air miles south of Anaktuvuk Pass. Much of the non-expendable field gear was supplied by the park.

The study included establishing vegetation transects along newly established, well-established and closed portions of ATV trails to provide data on volume of vehicle traffic (ATV passes) and the effects on vegetation, depth to permafrost and ground surface profiles. Aside from physical disturbance, customary and traditional as well as other subsistence activities were documented, including use patterns, intensity and cycles as they interrelate with existing flora and fauna populations. Additionally, some data were obtained relating to recent changes in subsistence catchment procedures and methods as well as dispersed (randomly branching off the main trail) ATV use for subsistence. As part of the project, ATVs engaged in subsistence activities were allowed to travel outside the ATV easements on non-wilderness park land and in a specific area of wilderness park land for the research. All ATV operators were required to report their in-park off-easement operations to the research team. ATV use was not allowed in any part of the park not designated as a research area. Two preliminary reports were generated by the 1986 ATV research (Kunz 1986; Ahlstrand 1987) and are on file at park headquarters in Fairbanks and the NPS Regional Office in Anchorage.

The bulk of the in situ time spent in the ATV research area addressed subsistence use and procurement changes among the Nunamiut since the establishment of the village, the effects on the environment resulting from the use of ATVs in subsistence

activities, and the socio-economic changes which occurred among the Anaktuvuk Pass residents over roughly the last 35 years and their effect upon the culture.

Most Anaktuvuk Pass residents understand the reasons for the ATV research and what the benefits, both short- and long-term, may be. Most villagers realize that the project was a basic step toward solving the problem created by the use of ATVs for subsistence on park land. Some of the local residents realized that one of the immediate and direct benefits of the research was that it allowed them to use ATVs on park land. This activity also created the opportunity for researchers to gather data concerning actual ATV use in a variety of conditions and situations.

Most of the trail/detour study sites were set up on sections of trail which lay on Native corporation land. There were two reasons for doing this: logistics and level of use. First, many of the study sites had to be accessible by foot from the village. Second, a fairly high level of ATV traffic was necessary at some sites so that meaningful data concerning rates of trail establishment and rates of natural rehabilitation on moderate to heavily impacted areas could be obtained.

Many villagers felt that study sites located close to the village (most within 6 miles) would not accurately reflect the amount of ATV use on park land. In most cases, park land lay farther than 6 miles from the village. The land near the village received the heavier use while land farther away was used less.

In 1987 the sites were not used. The trails were reopened along their original route, and all the detour and transect stakes were removed. The detours were blocked off with stakes so that vegetation regrowth rates might be measured, but travel along the established trails was not impeded.

The 1986 NPS field crew consisted of two biological technicians, one of the three principal investigators, and a local-hire subsistence liaison and a clerk/typist. The two local-hire positions were funded by the NSB. This crew spent 117 days from June to September working in and around Anaktuvuk Pass, supported by a helicopter and fixed-wing aircraft.

Gary Ahlstrand, NPS regional research ecologist, and Charles Racine, a plant ecologist hired by the NPS regional office to assist in the design and implementation of the ATV project, were the principal investigators for the vegetation impact portion of the project.

During the summer of 1986, Ahlstrand and Racine, assisted by two biological technicians, conducted the initial NPS ATV research in the vicinity of Anaktuvuk Pass. The research documented the

effects of ATV use on vegetation and soil along the routes of established ATV trails.

Michael Kunz, park archeologist/cultural resource specialist, was the third principal investigator and the park's project coordinator. Kunz was responsible for the human-use and qualitative aspects of the project as well as community relations and the operation of the park's Anaktuvuk Pass facilities.

The 1986 field season was slightly more than 16 weeks long, running from June 8 through September 30. All NPS personnel were housed in NPS facilities in Anaktuvuk Pass. Three NPS personnel were stationed in Anaktuvuk Pass throughout the field season -- two biological technicians and the project coordinator. Additional NPS personnel were periodically present during the course of the summer.

The research design also called for documenting surface conditions by color infrared low-level aerial photography (Ahlstrand 1987). Enough area was photographed during an early-season flight so that later comparisons could be made.

In 1986 we conducted fairly regular aerial reconnaissance/observation of subsistence ATV use on park land with rotor-wing and fixed-wing aircraft. This included photo documentation and some ground inspection of park land that had been opened to ATV use. We were able to identify evidence of current ATV use as it occurred over the course of the summer. Through this aerial monitoring we observed that all park land ATV use was not reported.

The attempt in 1986 to quantify the number of ATV passes through the trail study sites by employing time-lapse photography was only partially successful as described as follows by Ahlstrand in his 1988 report.

Photographic and other evidence (Kunz 1986) suggests that the intervals between exposures were excessive and, as a result, some vehicles passed undetected. Film coverage of the sites was incomplete due to a number of other reasons which included low temperatures; weak or dead storage cells; overexposure of film; fog, rain, or snow obscuring the lens; entire systems being overturned by animals, and failure to set all camera and intervalometers switches in the correct positions (Ahlstrand et al. 1988:11).

In retrospect, however, short of conducting daily observation flights of the entire area, it appears that time-lapse photography is the best method of recording ATV traffic.

In the fall of 1986, ATV activity associated with a hunting camp provided an opportunity to examine the effects of dispersed ATV

use. This activity occurred in an area with no recent off-trail ATV use, for a documented period of time, using a known number and type of vehicle. ATV impact on the site was photographically and descriptively documented.

The following description of the quantitative environmental impact aspect of the project is excerpted from Ahlstrand's 1988 report.

Thirteen ATV trail study sites were selected near Anaktuvuk Pass in tundra community types representing a spectrum of moisture conditions. The sites occurred in plant communities typical of those traversed by ATVs and were distributed along the drainages of the Anaktuvuk River, and Kollutarak, Contact, Kongumavik, Akmagolik, and Giant Creeks.

Conditions at each site were studied along 30 m segments on an established and used portion of trail (established), on an established but closed portion of trail (recovery), and on a newly established portion of trail (new) routed parallel to the closed recovery portion. Slope, aspect, elevation and major plant species were recorded for each site.

Three transects were established perpendicular to the trail at the 5, 15, and 25 m point along each 30 m segment. An elastic cord and tape measure were stretched between stakes which were driven into the ground beyond the ends of each transect. Surface profiles were obtained along a 4 m transect centered over the tracks by measuring the distance from the cord to the ground at 5 cm intervals with a meter stick. Six 20 X 50 cm plots were sampled along each transect using a frame at intervals selected to divide the plots evenly between vegetation growing between (between track treatment) the tracks (track treatment), and outside (outside track treatment) the tracks (total of 18 plots per treatment, 54 plots per site). Species included within or overlapping the plot frame were recorded according to one of six cover classes with midpoint cover percentages of 2.5, 15, 37.5, 62.5, 85, and 97.5 (Daubenmire, 1968). In order to document change over time, measurements on the transects were repeated several times throughout the summer. Species cover tended to increase over the course of the summer due to normal plant growth and more than compensated for, in most cases, any decreased coverage attributable to ATV traffic. Therefore, the plot data were used only for the purpose of classifying vegetation communities.

Vegetation types were determined for each site using species coverage data obtained early during the 1986 field season. Data for all new segment and control (outside track) plots for recovery and established segments were used to classify undisturbed vegetation for each site. Coverage by species for plants growing on disturbed areas (tracks) was based on data

from track plots of recovery and established segments. Nomenclature follows Thompson (1984) for lichens, Orum and Anderson (1981) for mosses, Viereck and Little (1972) for shrubs, and Hulten (1968) for all other vascular plants.

A rating scale was devised to evaluate the ATV tracks in each 30 m segment. These ordinal data are useful for comparing differences among segments at a given site, but do not allow quantitative comparisons between sites because of differences in soil moisture and texture, and vegetation composition.

Time-lapse photography was used to record the amount and type of ATV traffic passing through each study site. Intervalometers were used to control battery-operated super 8 mm motion picture cameras equipped with zoom lenses. Kodak Ektachrome Type G, ASA 160, film was used. Single exposures were made every three or six minutes depending upon the field of view afforded at a given site and field logistics. The interval chosen for a particular site was presumed adequate for capturing the passage of an ATV on at least one frame before it left the field of view. At these rates a single 50 ft roll of film (3600 frames) lasted either 7.5 days or 15 days. Accordingly, film and batteries for each system were changed weekly or biweekly. Each system was housed in a clear plastic acrylic resin box to which was added a bag containing approximately 50 g of silica gel desiccant. Each frame of movie film was later examined under 10-45X magnification for the presence of vehicles.

Baseline information concerning the extent of ATV trails in the area before seasonal use began in 1986 was documented using color infrared aerial photography (approximately 1:7000 scale). These photographs will be compared with others taken during the summer of 1987 to note possible changes and will be the subject of a separate report (Ahlstrand et al. 1988).

In 1986 the priority was to obtain as much information as possible concerning past and current ATV use. One of the methods employed to collect current information was the ATV trip report. The ATV operators were considered research collaborators and were requested to contribute data concerning activities associated with each ATV trip they made on park land. Data included the type of vehicle used, the route travelled, reasons for selecting the route, driving techniques used, date and purpose of the trip, estimated weight of the load and number of passes over the route. In 1986 an attempt was made to collect some of the data before the trip was made and some when the trip was completed. In 1987 all this data was collected after the trip was completed. In 1988, trip reports were not required for ATVs to operate on park land.

In 1986 we estimated that about 65 percent of the ATV activity taking place on park land was being reported. When logistically

possible, after a trip the route of travel and camping areas were examined and documented from the air and on the ground. Occasionally we were able to verify in-progress ATV activity through aerial observation.

Interviews with village residents using a standardized interview format was first attempted in 1986. At the beginning of the summer, information was obtained from local residents through impromptu interviews. Additionally, information was obtained by interviewing some of the researchers who worked and lived in Anaktuvuk Pass during the past 40 years.

During the winter of 1986 - 1987, discussions between the NPS and the Nunamiut Corporation concerning an exchange of interests in land adjacent to Anaktuvuk Pass resulted in a tentative agreement. As a result, during the summer of 1987 the park designated the land under consideration for exchange open to ATV access.

During June and July 1987 this newly opened land was examined for evidence of human use, recent and historic, and baseline data were obtained concerning the present natural condition of this land. Some ATV trip data were obtained through operator trip reports. Additional information concerning ATV dependence and use, socio-economic conditions and subsistence resources and exploitation was obtained through interviews and informal conversations with village residents as well as through a limited literature search. Some baseline data were obtained concerning wildlife and cultural resources in park land opened to ATV use in 1987.

In 1987 the research emphasis was on obtaining data for vegetation and ATV trail maps (1:63,360 scale) rather than on the effects of ATV use.

In 1987 the park's project coordinator was the only full-time NPS staff working out of the village of Anaktuvuk Pass. A second NPS researcher, a Student Conservation Association (SCA) student, periodically assisted the project coordinator with data collection in the village and the field. The NSB funded two full-time local-hire positions, although only the subsistence liaison position was filled during most of the summer. The principal investigator and a biological technician collected data from some of the sites in early fall. The late summer/early fall aerial photography mission was successfully completed.

As in 1986 the project coordinator also assisted park rangers and served as the superintendent's representative.

The 1987 field season was slightly more than 18 weeks long, extending from May 26 to September 29. All NPS personnel were housed in NPS facilities in Anaktuvuk Pass. Only the park project coordinator was stationed full time in Anaktuvuk Pass. Additional

NPS personnel were periodically present, including biological technicians, research ecologists, and assorted park management and support personnel. The SCA/park ranger assisted with the cultural/social data gathering and supervised project activities in Anaktuvuk Pass when the project coordinator was in the field or otherwise occupied.

In 1987 oblique aerial photos were taken with 35 mm color positive film at the beginning of the field season of the park land open for subsistence ATV use. The park land newly opened in 1987 for ATV use was also examined and photographed on the ground to document evidence of past use of any type. Photo points were established in the newly opened ATV-use areas so documentation could be conducted from the same location in subsequent years. A late-season color infrared low-level aerial photography mission was flown.

In the early summer of 1987, aerial observation of the site was conducted, noting the visibility of ATV tracks. This monitoring was conducted on several other occasions during the summer.

During the summer of 1987, while doing on-the-ground reconnaissance of the park land recently opened for ATV use, approximately 15 archeological sites were located and recorded. The majority of these sites were prehistoric in age and were located in the Ekokpuk Creek valley.

We estimate that no more than 15 percent of the ATV trips made on park land in 1987 were represented by trip reports. During the winter of 1986-87 the park staff conducted meetings with the Nunamiut Corporation Board of Directors, ASRC, and the Anaktuvuk Pass City Council concerning a potential land exchange agreement to allow the use of ATVs in subsistence activities on specified park land. During the spring of 1987 a tentative agreement was reached. To show good faith, the NPS said that subsistence ATV use on the land included in the tentative agreement would be allowed even though the agreement had not been finalized. As a result, some ATV operators may have decided not to file trip reports if they were going to be allowed to operate ATVs on the land.

During the 1987 field season one of the project staff members, a trained interviewer, reworked the ATV/subsistence questionnaire and succeeded in interviewing local residents who were ATV owners. Of the 24 ATV owners in the village, 23 agreed to be interviewed.

As in 1986, every effort was made to keep the residents of Anaktuvuk Pass informed about the ATV research project. Copies of the project statement and research design were available. During the first two weeks of the summer a notice explaining the operation of the project, the reasons for gathering the data, the methods of gathering the data, the park land upon which ATVs could be used,

and the conditions under which they could be used, as well as a land status/use map (a map graphically depicting where ATVs could be operated) was mailed to the head of every household in Anaktuvuk Pass. Copies of maps and accompanying text in both English and Inupiat were posted in the Nunamiut Store, the Nunamiut Corporation office, the City Council office and the post office. Additionally, periodic announcements in both English and Inupiat concerning ATV project operations were made over the citizens band radio channel monitored by all the village residents.

During the summer of 1988 the senior author was engaged in a National Historic Preservation Act section 106 archeological compliance survey of land north and west of Anaktuvuk Pass. The surveyed area is a regularly used summer subsistence area with a high level of ATV activity. Daily observations were made concerning ATV use, the condition of ATV trails and the degree of dispersed ATV activity while documenting the cultural resources.

In 1988 the trails were monitored through a low-level color infrared aerial photography mission during mid-summer. The aerial photographs taken during the summers of 1986, 1987 and 1988 were interpreted and a map of ATV trails in the Anaktuvuk Pass area was generated from these data.

These data should allow a three-year comparison of ATV trail development and/or extension. However, only the ground in the immediate area of the ATV trails was photographed, providing little photographic data relating to dispersed ATV activity.

ATV USE IN THE ANAKTUVUK PASS AREA

HISTORY

Information regarding the history of ATV use in the Anaktuvuk Pass area was collected using several methods including a literature search of published and unpublished materials and/or information gathered in 1986, 1987, and 1988 by project personnel.

ATVs are defined as medium-sized wheeled or tracked vehicles with an empty weight of roughly 1,000 pounds and a gross weight that does not exceed 2,000 pounds. The brand name currently in use in Anaktuvuk Pass is Argo. Numerous smaller three- and four-wheeled ATVs are primarily used for personal transportation within the village and the immediate vicinity. Because of their diminutive size and capabilities, such vehicles are rarely employed for hunting. They have a minimal effect on park land surrounding the village.

The first documented observance of an ATV by the residents of Anaktuvuk Pass, and possibly the first time a Nunamiut ever rode in an ATV, occurred during the summer of 1950 (Mekiana, 1972). Several Weasels, relatively large tracked vehicles with an empty weight of about 2,700 pounds were used by the USGS near Anaktuvuk Pass that summer to support exploration and mapping work. Mekiana (1972) states that these vehicles were observed several times during the course of the summer by Native hunting parties. During the summer of 1951 the USGS field parties stopped in the village with their Weasels on several occasions and all the village residents got a good look at these machines. Some village residents may have ridden on them (Mekiana, 1972).

Local informants said that a hunting guide operating in the Chandler Lake area used a Weasel to move his clients around during the mid to late 1950s. Residents of Anaktuvuk Pass would occasionally travel to Chandler Lake and use the Weasel when hunting in that area (R. Paneak, oral communication, 1986). About 1960 the guide reportedly gave the Weasel to one of the village residents who brought it to Cache Lake, 3.5 miles north of the present village. The Weasel was used for a short time in the Cache Lake area before it irreparably broke down (R. Paneak, oral communication, 1986).

In 1987 a standardized form was used to interview approximately 90 percent of the current ATV owners in Anaktuvuk Pass. From a historic perspective, 15 of the 23 people interviewed were old enough to be able to comment on the beginnings and evolution of ATV use in the Anaktuvuk Pass region. The following information was retrieved from the interview forms (table 1). The information is accurate enough to depict trends concerning vehicle numbers and types. The people interviewed were those who owned a working ATV in the summer of 1987. People who owned ATVs in the past but did not currently own one were not interviewed. In a closed system, such as Anaktuvuk Pass, once an ATV is imported into the village it never leaves. These vehicles are commonly passed from one person to another as long as they can be made to run. When the vehicles irreparably break down they are abandoned or cannibalized for parts. In 1987 there were roughly a dozen ATVs in the village that were in various states of disrepair and were inoperable. There were at least another dozen that would never run again. A few village residents own two operating ATVs. Usually the older model is only used for transportation around the village.

As recently as 1969 there may have been only a single ATV in the village, a Coot. During the summer of 1970 two Cushman Tracksters were imported into the village. By the mid-1970s the number of ATVs owned by village residents had tripled and the variety of types increased to include Maxes and Sidewinders as well as Coots and Tracksters. In the late 1970s the number of ATVs imported into

Table 1
All-terrain vehicles in Anaktuvuk Pass

Year	Type of ATV						Total ATVs
	Coot	Max	Track- ster	Side- winder	Argo	Not specified	
1969	1	0	0	0	0	0	1
1970	1	0	2	0	0	0	3
1971	1	0	2	0	0	0	3
1972	1	0	3	0	0	0	4
1973	1	2	2	1	0	0	6
1974	1	2	3	1	0	1	8
1975	1	2	3	0	0	2	8
1976	1	4	3	0	0	2	10
1977	2	4	0	0	0	3	9
1978	2	3	0	0	3	2	10
1979	2	5	0	0	8	0	15
1980	2	5	0	0	8	0	15
1981	1	4	0	0	11	0	16
1982	0	3	0	0	14	0	17
1983	0	4	0	0	15	1	20
1984	0	3	0	0	16	1	20
1985	0	2	0	0	18	0	20
1986	0	0	0	0	22	0	22
1987	0	0	0	0	22	0	22

Note: Based on 1987 interviews.

the village began to dramatically increase. Conversely, the range of types of ATVs began to narrow, with the Argo becoming predominant. In 1980 over half of the operational ATVs in Anaktuvuk Pass were either six- or eight-wheeled Argos. By 1987 almost all of the operational ATVs used by the village residents to support summer subsistence activities were eight-wheeled Argos. During the summer of 1986, 1987 and 1988 observation and reconnaissance activities conducted by NPS personnel in the Anaktuvuk Pass region report, with one exception, that all ATV use occurring at a distance of 3 miles or more from the village involved six- or eight-wheeled Argos.

Based on combining NPS data with that of Hall et al. (1985), it appears that the largest number of people obtained a snowmachine for the first time in 1966, 1968 and 1972. These dates average 12, 11 and 11 years earlier than the dates when most people obtained an ATV for the first time -- 1978, 1979 and 1983.

Interviews with NPS personnel stationed at Anaktuvuk Pass or regularly patrolling the area in the late 1970s and early 1980s indicates that prior to 1983 ATVs were never observed on park land (except ATV easements) and that the extent and visibility of ATV trails in the area was considerably less than at the present. An NPS ranger stationed in Anaktuvuk Pass in 1982 reports only six six- or eight-wheeled ATVs in the village at the time. This same ranger briefly visited the Anaktuvuk area in the summer of 1986 and said that the system of ATV trails radiating out from the village and the resultant visible effects on the vegetation and soil was far more extensive than six years earlier.

The various information sources generally agree that ATV use has increased significantly since the park was created. However, the most visible evidence of ATV effects are on land nearest the village. Most of that land is owned or was owned prior to 1983 by either the Native regional or village corporations. Only one area of wilderness park land, the upper Akmagolik Creek area, has been heavily affected by ATV activity. Park staff working in that area in the past report little or no trail formation in the Akmagolik area through at least 1982.

Most of the ATV activity in the upper Akmagolik Creek drainage and the resulting trail formation appears to be directly related to the establishment of the more or less permanent summer camp on the Kongumavik Creek. Kongumavik was used periodically by the Nunamiut and their predecessors as an all-season camping location. It was located to intercept some of the spring and fall migrating caribou. It is also near a summer caribou- and sheep-hunting area and adjacent to a firewood supply of willows, but it was never the site of a camp of any duration. Between the summer of 1979 and 1982 Kongumavik became the site of a camp containing permanent and semi-permanent structures made of plywood, plywood and canvas, and plywood and lumber tent frames and platforms. The development of this camp is documented by high altitude, color infrared, aerial photography on a scale of 1:60,000. Photographs taken of the Kongumavik area in July 1979 indicate no activity at the site. Aerial photographs of the same area taken in August 1982 show the presence of at least eight structures. Reliable, large load capacity ATVs may have allowed some of the local residents to haul construction materials to Kongumavik and establish a comfortable, permanent summer camp. High-paying construction jobs during that time may have provided local residents with the capital to purchase ATVs as well as construction materials for the summer camp structures.

The continued development of this camp is further documented by aerial and ground level photographs taken by NPS personnel during the summer of 1987. An aerial photograph taken on June 2, 1987, shows at least 18 structures at the camp. These are structures that apparently overwintered and therefore can be considered to be permanent or semi-permanent.

Between the establishment of summer camp at Kongumavik and 1982, the ATV trail up Kongumavik Creek leading into the Akmagolik area, which lies on wilderness park land, was improved by local residents through hand grading that made the trail more accessible to Argo type ATVs. With summer camp serving as a base of operations since at least 1982 and with the improved trail, summer ATV travel and use of the Akmagolik area appear to have increased dramatically.

Prior to, and for awhile after the introduction of ATVs at Anaktuvuk Pass, snowmachines were often used during the non-snow months for overland travel/subsistence activities and, therefore, might be considered a sort of predecessor to the ATV. Operation on other than snow-covered terrain is rather hard on snowmachines. Use, therefore, was more closely tied to direct necessity than is present-day ATV use. Employment opportunities for Anaktuvuk Pass residents were fewer in the 1960s than it was ten years later, and as a result, risking costly damage to a snowmachine was generally avoided. Even today snowmachines are occasionally used for summer transportation.

A recent example of summer snowmachine use around the village was observed during the summer of 1987. One of the local residents who was working on the rock/gravel crushing project near the south end of the airstrip drove his snowmachine on the 2-mile round trip from his home to the job site several times a day. The route was along the graveled roads of the village, a surface that is very abrasive and quite hard on the track and undercarriage of a snowmachine.

A recent example of summer snowmachine use away from the village was reported by a park visitor who was camped in the Graylime Creek drainage near Ernie Pass. The camper observed a snowmachine carrying one person, traveling across the tundra, fording Graylime Creek, and disappearing in the direction of the Anaktuvuk River. The area where the snowmachine was observed lies 25 miles east of Anaktuvuk Pass village.

Of the 17 people interviewed in 1987 who were old enough or had lived in Anaktuvuk Pass long enough to have witnessed the replacement of sled/pack dogs by snowmachines, all but two said that they had used their snowmachines for transportation in association with summer subsistence activities. Of the 15 affirmative answers, seven qualified their response by saying that they had not used snowmachines very often in the summer because they overheated easily, broke down easily, did not operate well in steep or wet terrain, or that they most often used them only very close to the village. The other eight respondents indicated that they had used snowmachines for summer subsistence activities in round trips of 8 to 30 miles. Most of the individuals interviewed felt that in addition to the rider and his hunting/camping gear a snowmachine, in reasonable terrain, could carry or pull weight equivalent to one caribou. All of the people responding to these questions agreed that such use was quite hard on snowmachines.

THE ARGO - THE ATV CURRENTLY USED

The eight-wheeled Argo represented at least 75 percent of the ATV use in Anaktuvuk Pass from 1982 through 1984 and nearly 100 percent of the ATV use from 1985 to the present.

The eight-wheeled Argo is an amphibious vehicle with power to all wheels. At best the vehicle is only marginally efficient on water. Tire rotation provides the only motive force, so it is impossible to operate against currents or winds much in excess of 2 miles per hour. The hard use these vehicles are subjected to in cross-country travel quickly renders them unseaworthy in terms of being watertight. Due to its exceptionally limited freeboard, the Argo can carry only a small load when operating in the water and is easily swamped even in minimally rough conditions.

The vehicle is about 5 feet wide and 10 feet long and has a ground clearance of slightly less than 8 inches. Empty weight is generally around 900 pounds depending upon modifications. The vehicle is capable of carrying up to six adults or loads slightly in excess of 1,000 pounds.

The most common low-pressure tire used on the Argos has shallow soft lugs and a tire pressure of about 2.5 psi. The machine is powered by gasoline burning four stroke engines. Horsepower ranges between 12 and 20. It appears that no two Argos are alike. There are minor differences, such as changes in weld patterns, wiring and/or components and engine baffles or shrouding, with each machine manufactured. This, in combination with owner customization such as the addition of wooden cabs, electric winches and drawbars, tends to render each vehicle unique. All of the vehicles are equipped with CB radios so that operators can stay in contact with each other and the village.

The level of technology found in today's Argo, or almost any other brand of contemporary ATV, is unchanged from that found in the ATV progenitors of 30 or 40 years ago. Power is provided by the same type of engines and transmitted to the wheels in the same manner, and steering and braking is accomplished by the same methods as it was in the 1940s and 1950s. The major differences between the ATVs of yesterday and those of today are the space-age materials and the better methods of manufacturing used in construction of modern ATVs. Contemporary ATVs are consequently more reliable, stronger, lighter and more widely used than in the past. Even so, today's ATVs, given the heavy use they receive in Anaktuvuk Pass, require almost constant maintenance.

Observations by project staff as well as information obtained through conversations with Argo owners suggests that, given the normal level and type of use that an ATV receives in Anaktuvuk Pass, an Argo delivered to a village resident in May will probably provide

reasonably trouble-free operation for that ATV season -- June through early September -- four months from the date it is placed in service.

The following season and all seasons thereafter the machine will require almost constant maintenance. Considering that a new Argo delivered to Anaktuvuk Pass in 1987 cost in excess of \$8,000 and that the parts are expensive, only the more well-to-do residents can afford the luxury of owning and maintaining one of these vehicles.

The following observations concerning the operation and capabilities of an eight-wheeled Argo were made on a 14-mile cross-country round trip during the summer of 1987.

Eight-wheeled Argos will go almost anywhere a person would want to go. Argos are also extremely noisy. People sitting close enough to each other to be touching shoulders have to shout to carry on a conversation with the engine running in the normal operating range. The machines are also extremely rough-riding when traveling over much of the terrain common to the Brooks Range, and a person requires a fastened seat belt or a good grip to stay seated. The machine can cross swiftly flowing streams as long as the depth of the water does not exceed 2 feet. In water depths less than 2 feet the machine does not become buoyant and has sufficient weight to maintain traction on the stream bottom. If the water is deeper than 2 feet, the vehicle may begin to drift. If it hangs up on a rock it may be flipped over by the water pressure. Small boulders on the stream bottoms may cause an Argo to become high centered if the driver is not especially watchful. Because this is a relatively common occurrence some people have installed electric winches on their Argos while others carry hand-operated winches with them. An eight-wheeled Argo can successfully descend or climb vertical streambanks less than 1.5 feet high. Stands of relatively large willows commonly line the streambanks of the Brooks Range, and Argos seem to have little trouble bending 6- to 10-foot-tall willows and running over them. Particularly dense stands of large willows are usually avoided.

Mechanical problems increase as the machine gets older and endures continued hard use. Mechanical breakdowns or limited operational capacity due to mechanical problems are quite common. Argos are often seen being towed back to the village by other Argos, or they are left out in the field until the owner has the time or can acquire the parts necessary to repair the vehicle. Spare parts and a tool box are necessities on a cross-country Argo trip.

In the past when an ATV broke down for the final time it was often abandoned where it lay. Dead Maxes, Tracksters and a Weasel can be found, along with dead snowmachines, scattered about the country surrounding Anaktuvuk Pass. However, Argos, at least to date, are not abandoned in the field. Probably because of their monetary worth, they are brought back to the village and usually end up in the backyard of the local ATV mechanic where they are cannibalized

for parts, or one operational machine may be resurrected from 2 or three hulks.

The most common operational problem encountered by Argo operators are flat tires. On a round trip of 15 miles we experienced three tire punctures that required repair. Hitting hidden rocks can also damage wheel rims and axles. Due to the extremely low tire pressures and the fact that there are six or eight wheels driving and supporting the vehicle's weight, a deflated tire generally does not affect the vehicle's operation. This is less true of the six-wheeled model. If a front tire becomes deflated, however, it affects the vehicle's operation, so it is exchanged with a sound tire and wheel from another axle. A flat tire can be run on one of the central axles for extended periods of time without damaging the tire or noticeably affecting the vehicle's operation.

Because tire punctures are common they must be easily repaired in the field. When a flat tire is located it is pumped up with hand pump and the tire is examined until the puncture is located. It is repaired with repair cement and patches.

Another operational problem that occasionally occurs is bogging down. Extremely wet or boggy ground is the most difficult type of terrain for an Argo to successfully negotiate. Argo operators avoid large wet areas whenever possible because extricating a bogged-down Argo is difficult, time consuming and usually requires a lot of wet, muddy work.

The climbing ability of an Argo is quite impressive, especially on firm, dry ground. The most important factor in negotiating steep terrain is driver technique. The axle driving mechanism of an Argo is interconnected in such a way that if one wheel loses traction and spins, all the wheels spin. On this trip we climbed 1,600 feet up from the valley floor and could have continued up another 800 feet to the top of the ridge if we had a reason to do so.

Driving an Argo down steep terrain requires more skill and technique than driving up. The vehicle's speed must be kept quite low. If the engine rpm gets too low the drive mechanism disengages and the vehicle is free wheeling, making it almost impossible to control. A similar situation exists if the engine dies. Such circumstances rarely occur when climbing, as engine rpms are usually quite high.

Most drivers will follow what they perceive to be the most easily negotiated route to their destination. In most cases that route will traverse the most stable terrain in the area. This terrain is usually is the most resistant to the effect of ATVs on vegetation.

Argo fuel economy is reasonably good. Fuel capacity varies, but most of the vehicles have better than a 40-mile range on a tank of gas. An extra 5 gallons of fuel is often carried on extended trips.

EXISTING ATV USE PATTERNS

Areas that are now used for summer subsistence by the residents of Anaktuvuk Pass have been traditionally used since the village was established (Amsden, 1977; Binford 1978). In the past, these subsistence use areas were reached by people traveling on foot accompanied by pack dogs. These areas are now almost exclusively accessed by ATVs, although occasionally an individual will be seen hunting on foot several miles from the village.

The degree of visibility of established trails leading from the village to various use areas is perhaps the best qualitative indicator of the level of use the trail receives. Without question, trails become less visible farther from the village, either because less traffic passes along the more distant trail section and/or because vehicle/trail use is less regular far from the village.

An example of extreme trail use/visibility is the trail from the village to summer camp. This trail is very rutted and muddy from heavy and constant use from the time the snow melts until freeze-up. Constant use precludes any chance of natural rehabilitation. Sections of this trail have become impassable from disturbance and have been abandoned. The new trail sections that bypass these mudholes soon become as disturbed as the abandoned trail sections, and they in turn must also be abandoned. There is little visible evidence on this trail that thermo-karsting or other types of ongoing degradation have been initiated by the ATV activity. However, in other areas, especially on abandoned or little-used trails east of the village, thermo-karsting is evident.

With the exclusion of random recreational trips within a 2- or 3-mile radius of the village and trips to summer camp, table 2 lists some of the ATV-supported subsistence activities that occurred during the summers of 1986 and 1987. This data was collected and/or substantiated through reconnaissance and observation by project personnel, time-lapse photography and trip report forms filled out by the ATV operators.

Most of the trips recorded in table 2 represents at least day-long activities and, in many cases, two or more days of activities. In response to the 1987 questionnaire regarding the use of ATVs, the majority of ATV owners said they did not use their ATVs very often to go hunting after work on week days. However, when berries became ripe in July and early August, evening local use of ATVs increased considerably. Using an ATV to go fishing after work is much more common than using the vehicle to go hunting at the end of the work day. Several ATV owners said that they hunted after work only if they were low on meat. The majority of day-long ATV use occurs on weekends. Sometimes people will take long weekends so that they can stay out longer. Some people who are not working may take trips of a week's duration at least once over the course of the summer.

Table 2
ATV trips in the summer of 1986

Date	Location	Vehicle	Purpose	Load
July 3	Contact Creek	Argo-8	Hunting	1 person/gear
July 7	Giant Creek	Argo-6	Fishing	3 people/gear
July 16	Kongumavik Creek	Argo-8	Hunting	1 person/gear
July 17	Natavakruak Trail	Argo-8	Hunt, Fish(?)	3 people/gear
July 29	Kollutarak Creek	Argo-8	Hunting	600-700 lbs.
July 31	Kollutarak, Masu, Ekokpuk creeks	Argo-8 (2)	Hunting	1 person/gear 1 caribou each
July/Aug	Giant Creek	Argo-6 (5 trips)	Hunt, Fish, Camp, Pick Berries	400-500 lbs. per trip
July/Aug	Anaktuvuk River	Argo-6 (3 trips)	Hunt, Fish, Camp	400-500 lbs. per trip
Aug 2	John River Trail	Argo-8 (3)	Hunt, Pick Berries	600 lbs. each
Aug 2	Kongumavik, Akmagolik	Argo-8 (2)	Hunting	1 person/gear 1 caribou each
Aug 3	Anaktuvuk River	Argo-8	Hunting	600 lbs.
Aug 3	Kollutarak, Ekokpuk	Argo-8	Hunting	600 - 1,200 lbs.
Aug 3	Kollutarak, Masu	Argo-8 (2)	Hunting	4 people each w/gear

Table 2, continued

Aug 3	Akmagolik	Argo-8	Hunting	Unknown
Aug 4	Kollutarak, Chandler Lake	Argo-8 (2)	Hunt, Camp Extended trip	2 people each w/gear
Aug 8-10	Kollutarak, Chandler Lake	Argo-8	Hunt, Camp Extended trip	2 people, 2 caribou
Aug 8-11	Kollutarak, Masu, Ekokpuk	Argo-8	Hunt, Camp, Pick Berries	2 people/gear
Aug 8-11	Kollutarak, Masu, Ekokpuk	Argo-8	Hunt, Camp, Pick Berries	3 people/gear
Aug 8-11	Kollutarak, Masu, Ekokpuk	Argo-8	Hunt, Camp, Pick Berries	3 people, 2 caribou
Aug 16	Kongumavik, Akmagolik	Argo-8	Hunting	1,100-1,300 lbs.
Aug 21/25	Giant Creek	Argo-? (2 trips)	Unknown	Unknown
Aug 25	Anaktuvuk River	Argo-8	Hunting	2 people/gear
Sept 21	Contact Creek	Argo-8	Hunting	1 person/gear
Sept 21	Anaktuvuk River	Argo-8 (2)	Hunting	2 people each /gear
Sept 27	Kollutarak River	Argo-8	Hunting	Unknown
Sept 27	Anaktuvuk River	Argo-8 (2)	Hunting	2 people each /gear
Sept 28	Anaktuvuk River	Argo-8 (2) w/3-wheeler	Hunting	2 people each /gear & 1 on 3- wheeler

Table 2, continued

<u>From observations and trip reports:</u>		
Argo round trips:	42	3-wheeler round trips: 1
<u>From time-lapse cameras:</u>		
Argo round trips:	25	3-wheeler round trips: 1
Total Argo trips documented from all sources	67	Total 3-wheeler round trips documented from all sources 2

The accuracy of the 1986 Trip Report Form information as it reflects actual ATV activity does not appear to be reliable when measured against the data collected in 1987. At the close of the field season, estimates of accuracy by project personnel ranged from 20 percent to 80 percent reliability concerning the actual use reflected by the observation and Trip Report Form data-gathering techniques. At the time the project coordinator believed the data to be 65 percent reliable. After the data from the time-lapse cameras was analyzed and additional information was obtained from ATV owners in 1987, indications were that the amount of actual ATV activity reflected in the data gathered by the methods employed in 1986 was closer to 20 percent than 65 percent reliable.

In response to a question about when days-long ATV trips were made and how often, village residents unanimously replied: "every weekend that my Argo is running." On the average this means eight to 12 two-day trips during the summer for everyone who owns an ATV. That would average roughly 200 two-day ATV trips per summer, at least three times more trips than our 1986 data indicates occurred and four times more trips than our data indicates took place in 1987. Based on correction factors generated for time-lapse camera sites, Ahlstrand et al. (1988) suggests that roughly 100 ATV trips may have occurred in the area surrounding Anaktuvuk Pass during the summer of 1986. Ahlstrand also says that this estimated number may be below the actual number as the data from the 1987 interviews suggests. Data concerning ATV use during the month of September 1986 may be the most unreliable.

Data from all sources in 1980 indicates that a minimum of 69 ATV trips occurred beyond a 3-mile radius of the village. Most of the time-lapse cameras were activated on June 30, and the remainder were activated between July 6 and 14. Most ATV activity occurred in the Kollutarak area in the latter part of summer. In terms of use

Table 3
ATV trips in the summer of 1987

<u>Date</u>	<u>Location</u>	<u>Vehicle(s)</u>	<u>Purpose</u>	<u>Load ?</u>
?	Kollutarak Creek	Argo-8	Hunting	1 person/ 1 caribou
June 13	Kongumavik, Akmagolik	Argo-8	Hunting	1 person/ 2 caribou
June 20	Kongumavik, Akmagolik	Argo-8	Hunting	1 person/gear
June 20-21	Kongumavik, Akmagolik	Argo-8	Hunting	1 Family/gear 1 caribou
June 20-21	Kongumavik, Akmagolik	Argo-8 (2)	Hunting	2 people each w/gear
June 20	Kongumavik, Akmagolik	Argo-8	Hunting	2 people/gear
June 20-21	Akmagolik, Tiglukpuk creeks	Argo-8	Hunting	2 people/gear
June 28	Kongumavik & Akmagolik	Argo-8	Hunting	2 people/gear 1 caribou
June 28	Kongumavik & Akmagolik	Argo-8	Hunting	2 people/gear 1 caribou
July 4	Kongumavik & Akmagolik	Argo-8	Hunting	2 people/gear
July 6	Kongumavik, Akmagolik	Argo-8	Hunting	1 person/gear 2 caribou
July 12	C o n t a c t Creek	Argo-8	Hunting	1 person/gear 1 caribou
July 13	Kongumavik, Akmagolik	Argo-8	Hunting	2 people/gear

Table 3, continued

July 18	Kongumavik, Akmagolik	Argo-8	Hunting	2 people/gear 1/2 caribou
July 19	Akmagolik, Tiglupuk creeks	Argo-8	Hunting	2 people/gear 1 caribou
July 31	Kollutarak Creek	Argo-8	Hunting	2 people/gear 1 caribou
July 31	Kollutarak Creek	Argo-8	Hunting	1 person/gear
Aug 2	Giant Creek	Argo-8	Hunt/Pick Berries	1 family/gear
Aug 22	C o n t a c t Creek	Argo-8	Hunt/Pick Berries	4 people 1 caribou
Aug 22-23	C o n t a c t Creek	Argo-8	Hunting	2 people/gear
Aug 22-23	Anaktuvuk River	Argo-8	Hunting	2 people/gear
Aug 22-23	Kollutarak Creek	Argo-8	Hunting	2 people 2 caribou
Aug 22-23	C o n t a c t Creek	Argo-8	Hunting	2 people/gear
Aug 23-25	Masu Creek	Argo-8	Hunting	2 people/gear

Total Argo trips from all sources: 26

intensity, Kollutarak was followed by the Anaktuvuk River, also in the latter part of summer, and then by the Contact Creek area that, probably because of its proximity to the village, appeared to be used regularly over the course of the summer.

In 1987 the highest ATV-use area was Kongumavik/Akmagolik, with most of the use occurring during the first half of the summer (table 3).

Although the data is somewhat meager, it generally confirms the ATV-use patterns demonstrated by the 1986 information.

When compared with the questionnaire data, the documented data appears to be less than accurate reflection of the actual summer subsistence ATV use.

An NPS archeological team camped for 45 days in the Akmagolik area west to Encampment Creek, which the local residents said is the primary summer caribou-hunting locale, and recorded all ATV observations. Five ATVs were observed during the 14 days in the Akmagolik valley; one was on June 24, one on June 25 and three on June 26. No ATV activity was observed on the weekend of July 2.

Based on the ATV activity of the previous two years in the area, sighting only five ATVs during the peak 45 days of the summer suggests reduced ATV activity in the area.

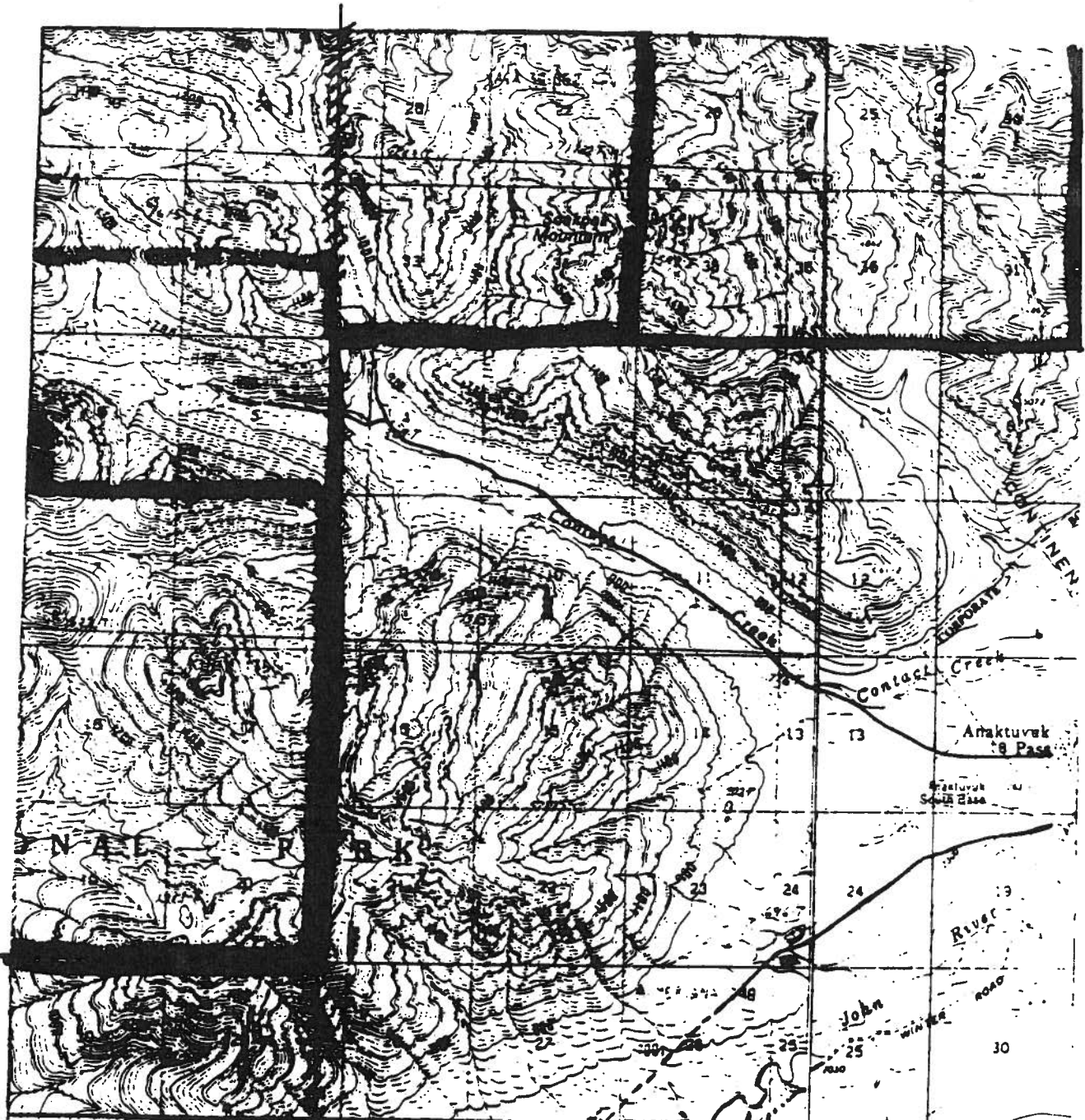
SUMMER SUBSISTENCE RESOURCES AREAS NEAR ANAKTUVUK PASS

Archeological research (Campbell 1962; Pittenger and Staley 1986; Kunz 1986, 1987; Kunz and Phippen 1988 and other sources) indicates that the areas now being used for summer subsistence by Anaktuvuk Pass residents have been regularly exploited since the village was established about 1949. In the past, these summer subsistence resource areas were used by people traveling on foot accompanied by sled dogs. The sled dogs served as pack dogs during the summer, and they did the bulk of the hauling and carrying associated with summer hunting, fishing and gathering expeditions. At present, summer access to these areas is usually achieved by a six- or eight-wheeled ATV, a machine which has replaced the pack dog as a mechanical beast of burden. As transportation methods have changed over the last 40 years, so too have the types of resources harvested. Changes in the types of subsistence resources used reflect the changing lifestyle of the local residents.

Thirteen study areas established in 1986 are described here. For further information see Ahlstrand et al. (1988).

CONTACT CREEK - MAP A

Locally this creek is referred to as Big Contact Creek while a smaller tributary creek, roughly a mile to the north, is known as Little Contact Creek. These two creeks, when joined by Giant (also Inukpasugruk) Creek make up the headwaters of the John River. The valley of Contact Creek lies due west of the village and trends



* ATV Trails along Contact Creek and the West side of the John River.



Current ATV Use Area Boundary



Park Wilderness Boundary



Drawn In Error - Ignore

Map A

northwest/southeast. The main valley which lies below the forks of the creek is roughly 4 miles long. Most of this land belongs to either the regional Native corporation or the Nunamiut Corporation. A small section of land immediately below the confluence of the creek's north and west forks is non-wilderness park land. The area above the confluence of the forks, to the west and north, is wilderness park land.

Because it is close to the village, access is easy and ATVs are active there almost as soon as the snow is gone. ATV activity in the valley continues well into the fall until there is enough snow cover to use snow machines or to preclude the use of ATVs. In the early summer the area is used mainly for general recreation as its proximity to the village makes it an attractive place to "just go for a ride and look around." Once the berry crop is ripe, it is one of the closest areas to the village where berries are abundant and, therefore, is a popular berry-picking location. The extreme upper portion of this drainage, the portion which lies on park land, is used regularly from mid-August through September as a sheep-hunting area. Caribou are occasionally taken in the area where the creek enters the John River Valley. The relatively intense use of this valley is reflected in evidence of the numerous recent campsites.

In the past, marmots were harvested from a colony which lies up a southern tributary valley about a mile below the forks. However, due to changes in the Nunamiut Eskimo lifestyle over the past 35 years, marmots are now only occasionally harvested.

The marmot colony lies along the route of an old summer foot/pack dog trail which runs from the village about 3 miles up the Contact Creek valley then south up a tributary drainage for about a mile, then west for 5 miles through a trough in the mountains where it then follows a tributary creek about a mile south into the Kollutarak Creek valley. Another old summer foot/pack dog trail runs from the village up the Contact Creek valley to the forks, where it turns up the north fork and travels through the mountains roughly 6 miles, entering the upper Tiglukpuk Creek valley several miles southwest of Akmagolik Creek. Both of these old trails are too rough for ATV use once they climb out of the Contact Creek valley.

The Contact Creek ATV trail is slightly more than 7 miles long and runs west-northwest from the village to the forks of the creek where the trail bifurcates. The trail is easily visible, from both the air and the ground, from the village to the forks of the creek. At that point the most visible trail loops north for about 1/3 mile up the valley of the north fork where it peters out at the mouth of a small creek which drains the western slopes of Soakpak Mountain. The other branch of the trail continues west along the west fork of Contact Creek toward the eastern slopes of Nunamiut Mountain and is intermittently visible for approximately 1.5 miles. The west fork of the trail is intermittently visible only because it traverses very rocky ground. Observations during the summers of 1986-1988 suggest

that the western branch of the trail receives more ATV traffic than the shorter northern branch.

The first 6 miles of the ATV trail lie upon land that now or once belonged to either the regional Native or village corporation or the village of Anaktuvuk Pass and, therefore, has been open to the use of ATVs in the past as well as the present. However, the land to the west of the forks of Contact Creek has not been open to ATV use since the park was established in December 1980. The visible ATV trail west of the forks suggests that ATV use has occurred on wilderness park land regularly over the past eight years and quite possibly prior to the establishment of the park. Visual evidence of dispersed ATV use is common along the first 5 miles of the trail.

Contact Creek ATV Trail Study Site No. 1

Site No. 1 was established in 1986 in the NW1/4, SE1/4, NE1/4, Section 13, T15S, R1E, Umiat Meridian. The site lies on the left side of the creek (facing downstream) at an elevation of approximately 2,350 feet about 1.25 miles west of the village at a point where the creek leaves the mountains and enters the broad John River Valley. The site lies on a flat, grassy section of inactive floodplain about 66 feet south of the creek. The vegetation is fairly uniform across the site except on the southern edge, which is more lichen-covered. In the early summer this site is usually somewhat wet but it appears to dry out enough as the summer progresses so that the passage of ATVs causes only limited rutting. Rutting is caused when the wheels of the vehicles break through the vegetation mat and churn up and/or create troughs in the organic and/or mineral soil. This site is located on Native Corporation land.

Contact Creek ATV Trail Study Site No. 2

Site No. 2 was established in 1986 in the SW1/4, SE1/4, NW1/4, Section 11, T15S, R1E, Umiat Meridian. The site lies at an elevation of approximately 2,600 feet about 1.5 miles above (upstream of) site No. 1. The site is gently sloping, and the vegetative cover can be characterized as a heath/grass meadow that is subjected to slope wash drainage. The vegetation is fairly uniform across the length of the site. Running water has caused some disturbance to the vegetation and has caused some limited erosion which appears to have been initiated or aggravated by ATV activity. In early summer, water was running along the wheel ruts in the trail at this location. Rutting appears to occur easily due to saturated soil conditions. This site is located on Native corporation land.

Contact Creek ATV Trail Study Site No. 3

Site No. 3 was established in 1986 in the SW1/4, NW1/4, SE1/4, Section 4, T15S, R1E, Umiat Meridian. The site lies at an elevation of approximately 2,750 feet about a mile above (upstream of) site No. 2. This site lies on an inactive floodplain, is drier than either site No. 1 or No. 2 and is relatively flat. The vegetative description would be a moss/heath meadow flanked by willows and dwarf

birch. Vegetation across the site is quite uniform. Possibly because of its distance from the village, this site appears to get less traffic than either of the lower sites (Ahlstrand et al. 1988; Kunz 1986). Due to reduced traffic and its drier character, only limited rutting has occurred. This site lies on land that once belonged to the regional Native corporation. ATV use was allowed until the land was exchanged with the Department of the Interior and made a part of the park in 1983. Since that time, until the summer of 1986, no ATV use was permitted although, as the evidence suggests, it has regularly occurred.

As mentioned in the introduction to this report, in 1986, as a part of the ATV research project and as a means of easing tensions between the Anaktuvuk Pass residents and the NPS, land was opened to random or dispersed ATV use. This land was owned by the ASRC since the creation of the park (and ATV use was permitted) and was subsequently made part of the park in 1983 (from which time ATV use was permitted only along specified easements). In 1987, as a result of a pending land exchange agreement with the regional and village Native corporations, additional park land was opened to dispersed subsistence ATV use.

In 1987 in the Contact Creek drainage, 6 square miles of wilderness park land was opened to dispersed ATV use. This area includes Sections 5, 6, N1/2 7 and 8, T15S, R1E; S1/2 of Sections 31 and 32, T14S, R1E; Section 36, T14S, R1W; Section 1, T15S, R1W, Umiat Meridian. This area encompasses the entire west fork drainage of Contact Creek from the forks, west up the eastern slopes of Nunamiut Mountain. In a linear sense, this added an additional 3 miles west of the forks of Contact Creek where ATVs could be operated. However, in realistic terms, given the terrain, ATVs probably cannot travel more than 2 miles west of the forks.

In an effort to effect a reasonable method for long-term monitoring of the visual indications of the effects of ATV use on park land, photo points were established at locations which provide panoramic views of areas open to ATV use. Photographs taken from these photo points on an annual basis should provide a visual record of surface changes that occur as the result of ATV use through time.

The location of a photo point is marked by a 3-foot section of 5/8-inch iron reinforcing rod driven about a foot into the ground with a cairn of large cobbles or small boulders erected around or next to it. The rod is international orange in color and has a metal tag affixed to it bearing identification. Three photo points were established on Contact Creek during the summer of 1987.

Photo Point No. 1

This photo point lies about 1/4 mile northeast of the forks of Contact Creek in the NE1/4, SE1/4, NW1/4, Section 4, T15S, R1E, Umiat Meridian. The site provides an excellent view down valley (southeast) and of the first mile of the west fork of the creek from

atop a rubble-strewn hillside spur which lies roughly 198 feet above the valley floor. Photos were taken from this site in late May 1987 and early August 1988.

Photo Point No. 2

This photo point is located at the head of the west fork drainage at the foot of Nunamiut Mountain in the NE1/4, NW1/4, NW1/4, Section 6, T15S, R1E, Umiat Meridian. The site lies on a boulder/rubble-strewn terrace and provides an excellent view east down the valley of the west fork as well as the upper portion of the main valley. The terrain ascends rapidly in the site area, and the locality lies slightly more than 990 feet above the elevation of the Contact Creek valley floor. Photos were taken from this site in mid-July 1987 and early August 1988.

Photo Point No. 3

This photo point is located on an elevated point of land at the confluence of the two small streams which form the north fork of Contact Creek in the NW1/4, SE1/4, SE1/4, Section 29, T14S, R1E, Umiat Meridian. The site lies 330 feet above the elevation of the forks of Contact Creek, approximately 1.5 miles north of the forks, and provides an excellent view of the north fork that extends well beyond the current northern limit of ATV use. Photos were taken from this site in mid-July 1987. All three of the Contact Creek photo points lie on NPS land.

In late May 1987, there had been no ATV traffic on the trail since the last aerial reconnaissance was flown in late September 1986. On-the-ground reconnaissance revealed that the section of trail which runs from the village to study site No. 1 is relatively wet and receives heavy traffic. As a result, this part of the trail is deeply rutted over most of its length. Over the majority of this section of trail the vegetation mat is completely destroyed and most of the trail is a quagmire of exposed organic and/or mineral soil. The section of trail between study site No. 1 and No. 2 is not quite as heavily used as the lower trail segment and most of its length, prior to crossing the creek from the right to the left side, lies on the relatively firm ground of the inactive floodplain, which is more resistant to physical impact. After the trail crosses the creek it moves up and off the floodplain onto the gently sloping valley wall, its route lying 90 degrees to the fall line of the slope. Along this section of trail there are a number of areas where water flows down the trail and two or three locations where considerable erosion has occurred as a result of the running water. Beyond site No. 2 the trail continues to run along the valley wall almost to the location of site No. 3. The trail between sites No. 2 and No. 3 is very visible, and while impacts are less obvious than the lower trail sections, there are numerous mineral and organic soil exposures. Near site No. 3 the trail drops down onto the firmer ground of the inactive floodplain. On-the-ground reconnaissance was not conducted beyond site No. 3 in 1986 or 1987.

On-the-ground reconnaissance was conducted west of the forks in August 1988. The western branch of the ATV trail is continuously visible for about 1/2 mile beyond the forks and intermittently visible for at least another mile. Due to the extremely rocky nature of the terrain the trail is usually visible only where it traverses wet or well vegetated areas. Some churning has occurred in several of the wetter locales.

The northern branch of the trail is visible for about 1/2 mile as it crosses a lichen-covered ridge. As the ground becomes increasingly rocky and the vegetation diminishes, the trail fades out. The visibility of this trail is due to vegetation compression rather than soil disturbance.

During the summer and early fall of 1987 several observation flights were made along the Contact Creek ATV trail, and as a result some general, observational (qualitative) comparisons can be made.

The vast majority of the first 5 to 6 miles of the trail lies on land belonging to the Nunamiut Corporation. At the end of the summer, the ATV trail on this land appeared more pronounced than it appeared at the beginning of the summer. From low-level aerial observation, it seemed that the areas in which organic and/or mineral soil was exposed or churned up appeared more extensive than they were at the beginning of the summer. In other areas the trail appeared more distinct because of greater compaction of the vegetation. In several areas where the soil was quite wet or where there was standing water, the trail had become so boggy and churned up that new trail sections were created to circumvent the boggy areas, reminiscent of concentric meander scars on the floodplain of a stream.

The portion of the trail which lies on NPS land appeared only slightly more distinct than it had at the beginning of the summer. This was probably because the substrate is composed of sand, gravel and rock and is firmer and better drained than the lower-lying land of the main valley. Additionally, portions of the trail lying farther from the village seem to have a lighter traffic load. The farther reaches of the Contact Creek drainage are sheep-hunting areas which are not normally used until mid-August when the country is at its driest. Trails on NPS land, although they may have had a bit more use than in the past, did not seem to extend beyond the visible limits that were observed at the beginning of the summer.

On-the-ground and aerial observation of the Contact Creek ATV trails in August 1988 suggested that the most visible changes occurred above the forks on the west branch of the trail. There the trail appeared generally more visible than in past years and also seemed to extend farther to the west.

Both botanical and archeological fieldwork were conducted in the Contact Creek valley during the summers of 1986, 1987 and 1988. While the botanical work was specifically associated with ATV impact,

the archeological work was conducted throughout the valley and not only within the proximity of the ATV trail. As a result of this work, a dozen human-use sites were located in the valley of Contact Creek. These sites were more than casual-use locales. A casual-use locale is a spot where an individual or group stopped to have lunch or a cup of tea and a cigarette but did not spend a long period of time at the site. A human-use site, at the minimum, is where a group or an individual camped overnight. In the case of the more recent sites, campfire remains and the amount and type of associated trash provides sufficient evidence to make a determination. Any site which appears to be older than 50 years before the present (BP) is considered a human-use site.

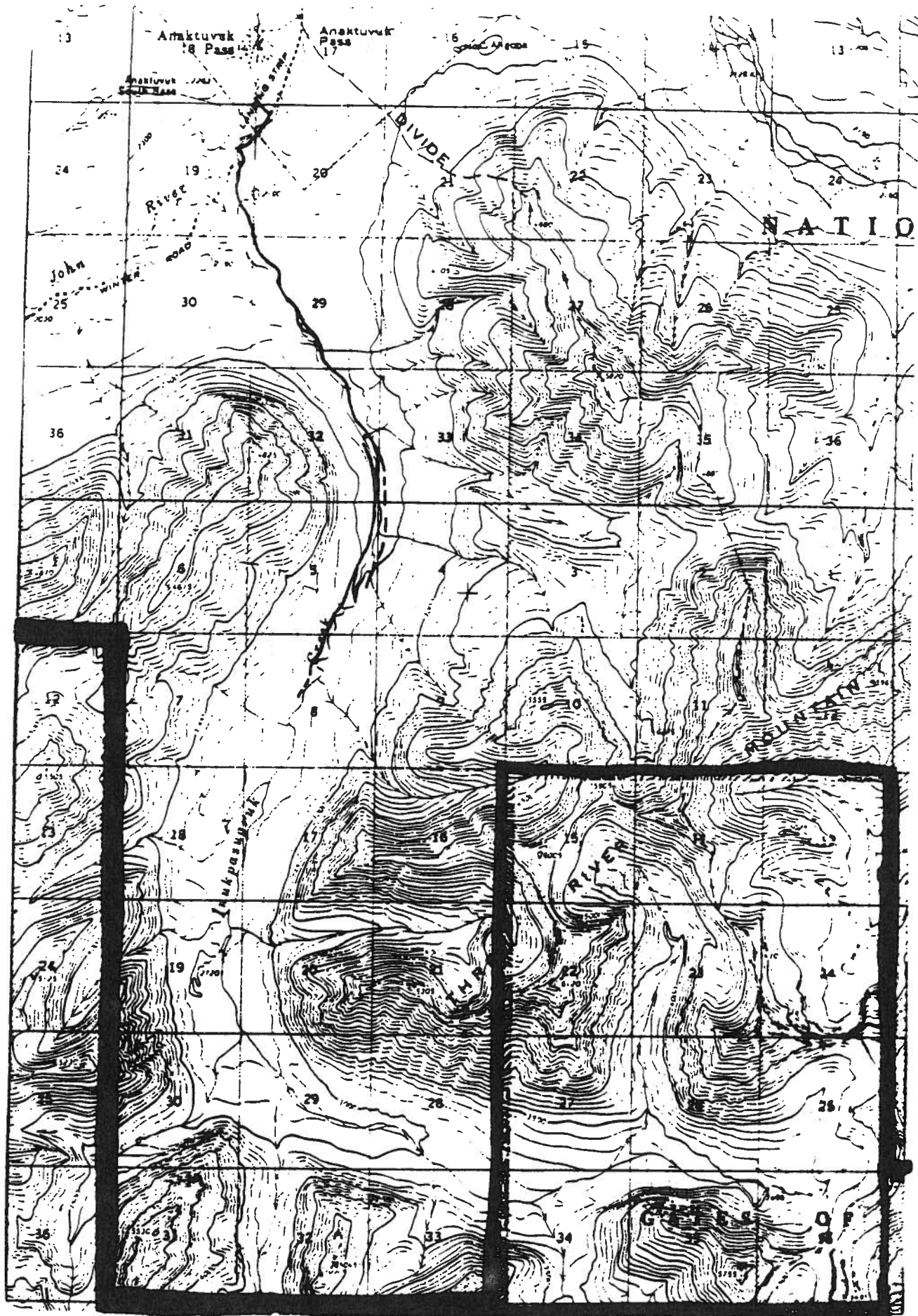
Of the dozen human-use sites located in the Contact Creek valley, only one, a tent ring(s) site, appeared to be older than 50 years BP. The other 11 sites appear to range in age from about 40 years BP to the present. This evidence suggests that use of the Contact Creek valley as a subsistence resource area has been significantly greater over the last 40 years, since the establishment of Anaktuvuk Pass village, than prior to that time.

GIANT (INUKPASUGRUK) CREEK - MAP B

On past and current USGS topographic maps this creek is labeled Inukpasugruk, which in Inupiat means Giant's Valley. The stream is locally referred to as Giant Creek.

The confluence of Giant Creek and Contact Creek, which forms the John River, lies slightly more than a mile south of the village of Anaktuvuk Pass. Giant Creek enters the John River valley from the southeast after flowing about 12 miles from its headwaters in the Three River Mountain area. From its mouth the Giant Creek valley trends east, then south, then east and covers slightly more than 11 miles. The lower 2.5 miles of the valley lie on Native corporation land. The next 7 miles lie on park land that prior to 1983 belonged to the ASRC and upon which unrestricted ATV use was permitted. This land is now classified as non-wilderness park land. Dispersed ATV use was again permitted in this area in 1986 as part of the ATV research. The uppermost 2 miles of the valley lie on wilderness park land that has been closed to ATV use since the creation of the park. This extreme upper portion of the valley was opened to ATV use in 1987.

A popular berry-picking locality lies on the right hand side of Giant Creek about 2 miles above its confluence with Contact Creek. There is a substantial willow patch nearby that is a longstanding and well-used camping location. When the berry crop is ripe about mid-July, families will often camp there for a day or two, picking berries and watching for caribou. Considerable evidence indicating recent use of this area can be seen in the form of scattered trash, prepared campsites, hearths, cached cooking utensils and cut and stacked



- ATV Trails along Giant (Inukpasugruk) Creek.
- Current ATV Use Area Boundary
- Park Wilderness Boundary



firewood. Another campsite locale, displaying evidence of both recent and prehistoric use, is located on a kame terrace approximately 3/4 mile upstream.

On the same side of the creek and slightly more than a mile upstream from the berry-picking locality is a mineral lick. The lick is located at the head of Alugvik Creek, about 1.5 miles east of Giant Creek, at an elevation of 3,900 feet. The lick is occasionally used as a sheep-hunting area from early August through September. A marmot colony lies on the opposite side of the Giant Creek valley from the mineral lick, at an elevation of 3,300 feet. Approximately 2.5 miles farther upstream on the same side of the valley lies another marmot colony at a lower elevation and closer to the creek. In the past both of these areas were regularly used for marmot harvesting. However, due to changes in the lifestyle of the local residents over the last 35 years, little marmot hunting occurs today. About 4 miles upstream from the second marmot colony is a spot which has long been used as a campsite when people are hunting the headwaters area for sheep. However, evidence suggests that in recent times the site has not been used regularly. During the summer months caribou are opportunistically hunted along the first 3 miles of the Giant Creek valley. The bulk of ATV traffic in this area occurs between mid-July and the end of September.

The present ATV trail follows the route of a traditional foot/sled dog trail that was and still is used to access the Savioyok Creek area, which is the closest source of spruce to the village. The Savioyok Creek drainage also has a reliable moose population and in the past was used during the winter as evidenced by ivrulik (winter house) remains (Mekiana, 1972). However, the pass from Giant Creek to the Savioyok Creek/Tinayguk River area was (and basically still is) a one-way pass since it is too steep to use as a return route. The return trip to the Anaktuvuk Pass area was made by traveling south down the Tinayguk River valley about 10 miles to the vicinity of the headwaters of Publituk Creek, following that creek west to the John River and then traveling up the John River valley to Anaktuvuk Pass (Spearman and others, oral communication). The Giant Creek portion of this route was commonly used during the summer as a foot/pack dog trail for accessing the subsistence resources of the Giant Creek valley.

The Giant Creek ATV trail runs from the village to the headwaters area of the creek and is slightly more than 12 miles long. There are several ATV trails/routes from the village to the lower end of the Giant Creek valley. All of these trails have merged into a single trail 1.5 miles up the valley. The first 3 miles of the trail, which lie on Native corporation land, are easily visible from both the ground and the air due to the degree of surface disturbance caused by the operation of ATVs. Visible evidence of dispersed ATV use is common in this area. For the next 5 miles the trail is only intermittently visible, becoming less so as it progresses up-valley. This is probably due to a decrease in ATV traffic as well as the fact

that the substrate and surface vegetation in this area are more resistant to ATV disturbance. This section of the trail lies upon park land that was, when owned by the regional Native corporation, open to unrestricted ATV use. This land is now classified as non-wilderness park land. On this land from 1983 through 1985, ATV use was permitted only along a narrow easement on the creek's floodplain. In 1986 the area was opened to dispersed ATV use. At present, visible evidence of dispersed ATV use in this section of the valley is uncommon. The final 4 miles of the Giant Creek ATV route lies on park land, the final 2 miles of which is classified as wilderness. The wilderness land was not open to ATV use from the time of the park's creation until 1987.

In 1987, 12 square miles of wilderness park land was opened to dispersed ATV use. This area includes Sections 13-15, 22-24, 25-27, 34-36, T16S, R2E, Umiat Meridian. This area encompasses the two cirque lakes and the stream which drains the southern slopes of Three River Mountain, all of which combine to form the headwaters of Giant Creek. In a linear sense this area added an additional 2 to 3 miles to the area in which ATVs could be used. However, in realistic terms the terrain in this newly opened area more or less precludes the type of ATV operation that is commonly associated with subsistence activities. In this extreme upper portion of the valley there is virtually no visible evidence of ATV use. A campsite and other scattered evidence suggests that ATVs are operated in this area, only rarely. The ground is very rocky and hard and does not readily display visual evidence of casual ATV use.

Giant Creek ATV Trail Study Site No. 1

Site No. 1 was established in 1986 in the NE1/4, SW1/4, NW1/4, Section 29, T15S, R2E, Umiat Meridian. The site lies at an elevation of 2,200 feet about a mile above the confluence of Contact and Giant creeks. The site lies on the inactive floodplain of the creek which is covered by a fairly uniform vegetation which can be termed mossy/short scrub. Due to its fluvial origin, soil at the site is quite thin and mixed with and underlain by gravel, cobbles and boulders. Due to the nature of the substrate and the vegetation at this location there appears to be little severe surface disturbance as the result of ATV activity. Another reason the surface disturbance is not too great may be because another branch of the ATV trail lies a short distance to the north and carries at least a portion of the traffic. The trail is easily visible, apparently due to the compression and compaction of the vegetation rather than a breaking up of the vegetation mat. This site is located on Native corporation land.

Giant Creek ATV Trail Study Site No. 2

Site No. 2 was established in 1986 in the NW1/4, NE1/4, SW1/4, Section 29, T15S, R2E, Umiat Meridian. The site is located at an elevation of approximately 2,300 feet slightly more than half a mile upstream from Site No. 1. The site slopes gently to the south and west and is covered by a scrub/heath meadow. The site is wet during

much of the summer with either running or standing water in the trail. The trail in this area is very visible due to the breakup of the organic mat and the subsequent churning of the organic soil, which is accompanied by deep rutting. This site is located on Native corporation land.

For long-term monitoring of the visual effects of ATV use, a photo point was established in the Giant Creek valley in the SW1/4, NW1/4, NE1/4, Section 30, T16S, R2E, Umat Meridian. The site lies on the left side of the creek on a hill approximately 198 feet above the valley floor about 3/4 of a mile south of the only lake in the valley. The site provides an excellent view north, down the valley, covering the 4 miles of park land which lie in that direction. The site also provides a good view to the southeast, up the valley into the headwaters area. Photos were taken from this site in mid-July 1987.

In early June 1987, when the on-the-ground reconnaissance was conducted on the Giant Creek ATV trail, no ATV use had yet occurred that season. The following description reflects trail conditions at the end of the 1986 ATV use season.

From the point where the ATV trails cross Contact Creek until they drop down onto the Giant Creek floodplain near site No. 1, the various ATV routes are easily visible. This is due to the breakup of the organic mat and consequent churning of the organic and mineral soil which leads to the eventual rutting of the surface. There are several concentrations of dead-ice glacial features such as kames and eskers in this area and on these drier and firmer localities the trails are much less visible and much less surface disturbance has occurred. However, for the most part, with the exception of the glacial features and the floodplain locations, the trails lie in a wet/moist environment which has been heavily affected by ATV use. Just before the trail enters park land it crosses the creek to the left side of the valley and after less than a mile becomes difficult to continually identify from ground level. While there is little disturbance to the creek bank at the trail crossing, the large willows bordering the creek have been broken, bent, scraped and defoliated from ATV traffic. Up-valley from the stream crossing there is considerably less ATV impact to the vegetation and soil probably due to a combination of drier, firmer ground and less traffic. Upstream of this area the trail is only intermittently visible from the air and almost impossible to identify from ground level. Beyond a point a mile up valley from photo point No. 1 it is almost impossible to find evidence of an ATV track. ATVs are used at the upper end of the valley, but their use is infrequent enough and the vegetation and ground conditions are such that visual evidence can be found only through intense observation and scrutiny.

During the course of the summer and early fall of 1987 a number of observation flights were made along the Giant Creek ATV trail. Additionally, in early August an on-the-ground reconnaissance was

conducted over the lower 4.5 miles of the trail -- the portion of the trail which receives the heaviest use. The following are some qualitative comparisons of observed trail conditions over the course of the summer and early fall of 1987.

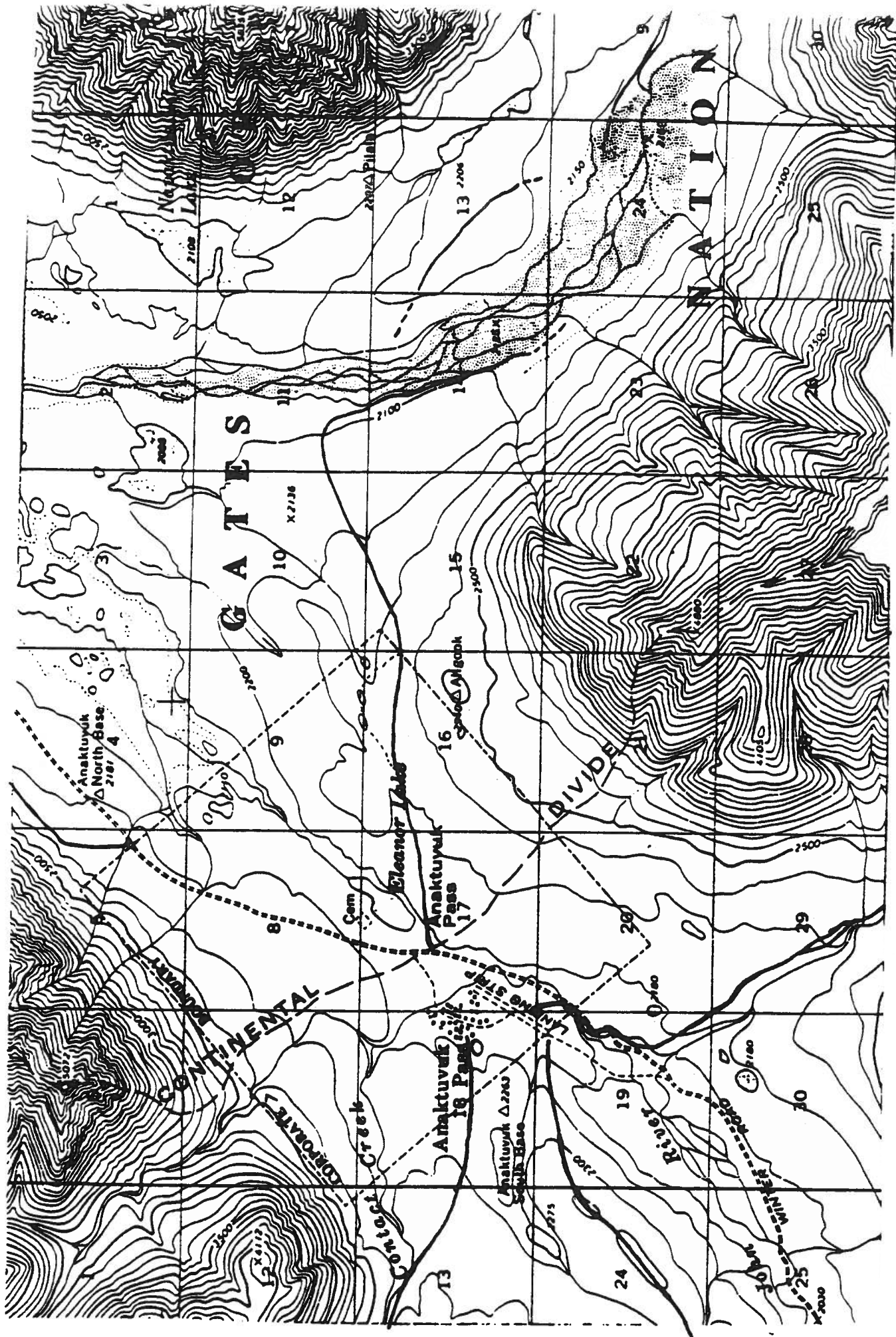
By the end of the summer the first 3 miles of the Giant Creek ATV trail(s) appeared to be more visible than at the beginning of the summer, based on aerial and ground reconnaissance. Regular traffic along wetter portions of the trail caused increased breakup of the vegetation mat and concomitant churning of the organic and mineral soil as well as rutting. Although water was often running along the ruts in the trail, only in one or two instances did erosion appear to be occurring to any observable degree. The worst erosion occurred on the steep side of a kame from which the thin cover of lichen and moss was stripped by vehicles climbing out of the creek bottom. With the scant vegetation cover gone the rocky soil of the kame is very susceptible to water erosion from rain or melting snow. In several locations where the trail passes through low-lying areas with standing water the trail has become so churned up and boggy that ATV tracks can be seen scattered in all directions as drivers attempted to pick their way across. Once the various trails coalesce near the kame/camping area, just below the point where the trail crosses the creek and enters park land, there did not appear to be any observable difference in the trail conditions from the beginning to the end of the ATV-use season. Although some use of the portion of the trail that lies on park land (upper 9 miles) occurred during the summer, the degree of use was low enough so that from a strictly observational viewpoint, no changes in the condition or character of the trail could be detected.

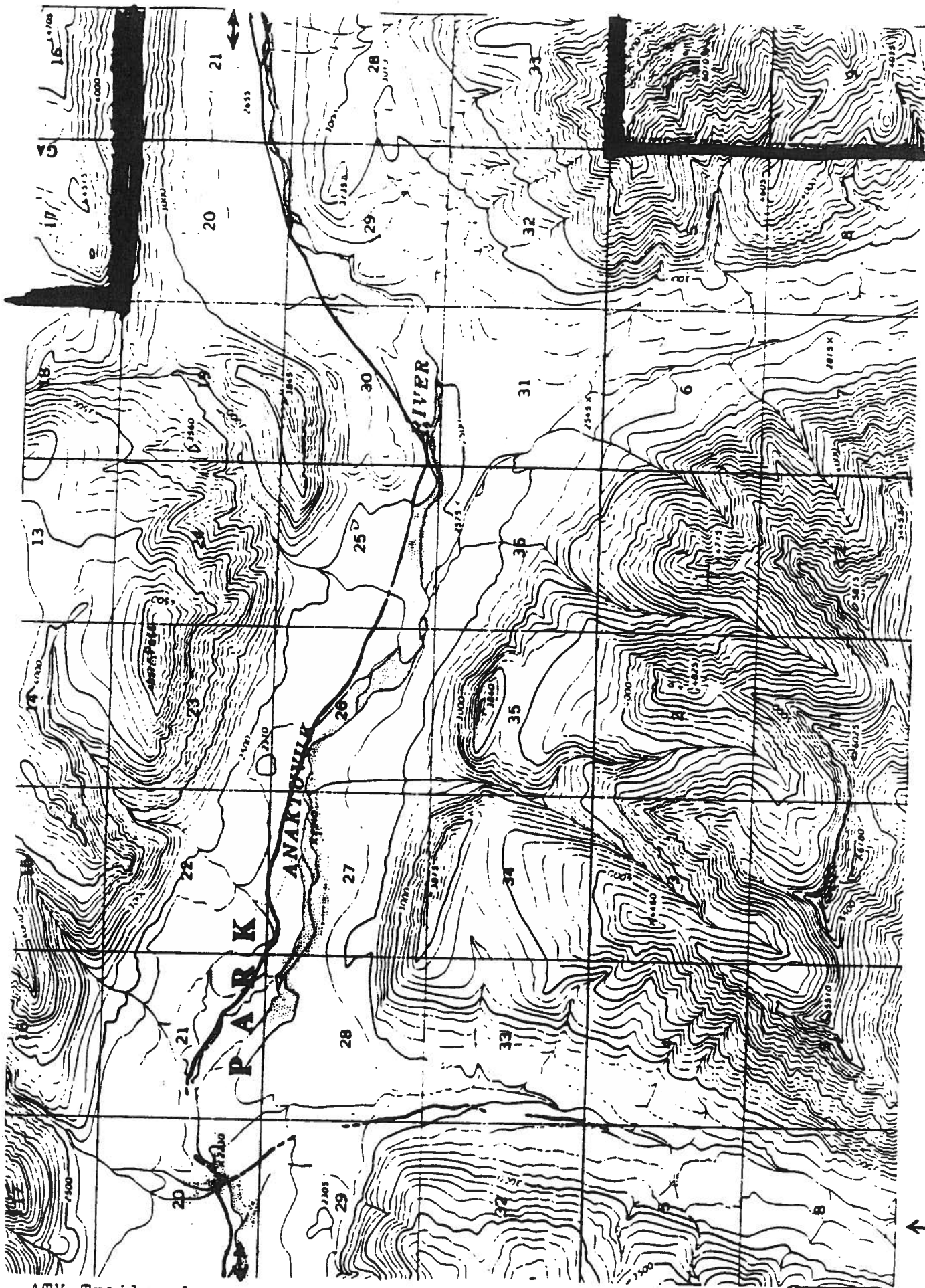
Both botanical and archeological fieldwork were conducted in the Giant Creek valley during the summers of 1986 and 1987. As a result of this work, at least three locations, all mentioned previously, were noted where there was a clustering of human-use sites. Hearths and campfire remains indicate at least eight separate camp locations at each of two of the human-use localities. At the third locality the evidence is sufficient only to say that multiple occupational episodes have occurred.

At only one of these localities was there any evidence of human use occurring in excess of 50 years before the present. This evidence suggests that the use of the Giant Creek valley as a subsistence resource has been significantly greater over the last 40 years than at any other time in the past. The use of the valley as a travel route, however, has probably occurred for thousands of years.

ANAKTUVUK RIVER - MAPS C-1, C-2 AND C-3

The valley of the upper Anaktuvuk River is locally known as Anaktiktoak. The name generally refers to the portion of the river valley that trends east-west, but essentially west from Ernie Pass

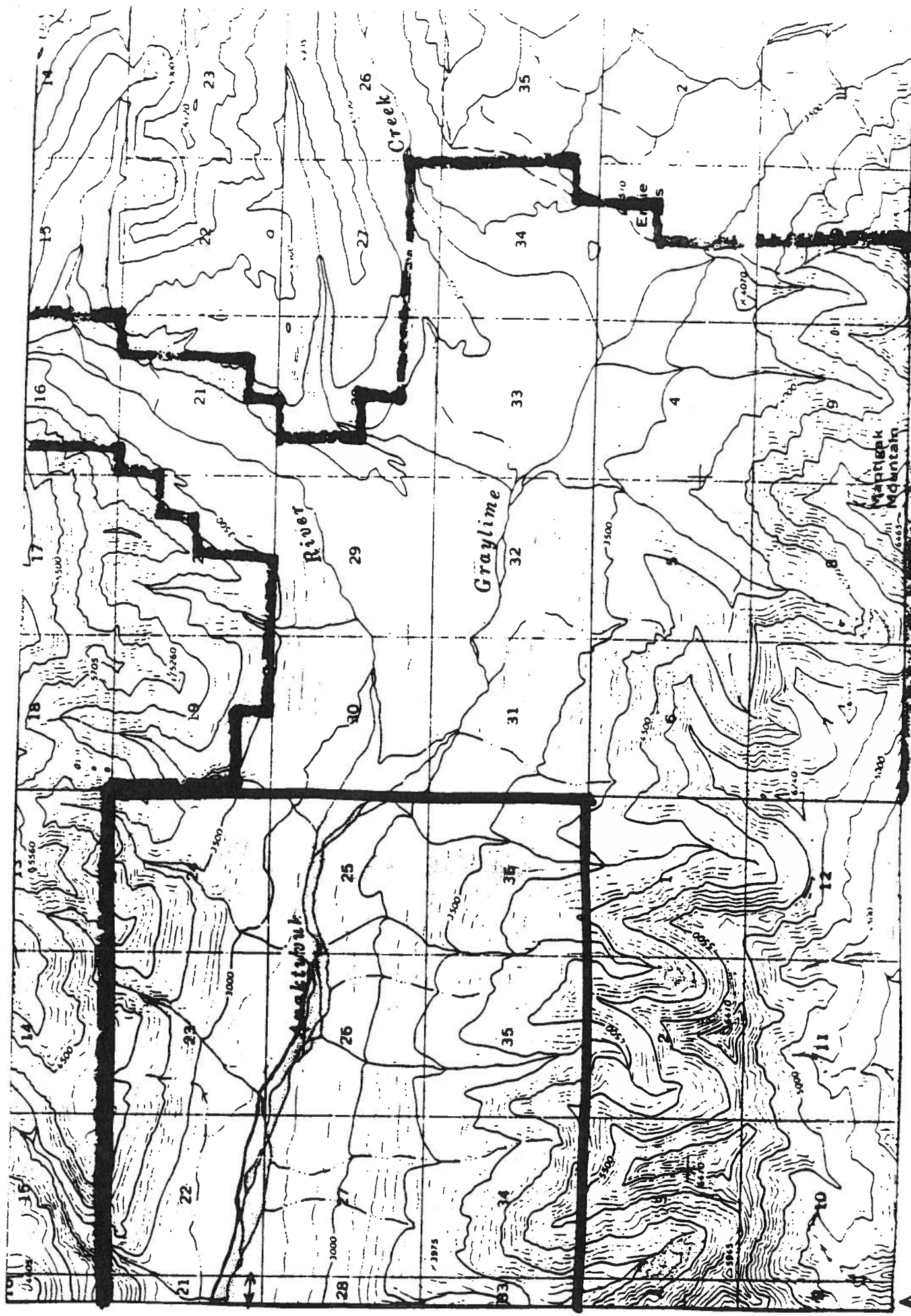




ATV Trails along the Anaktuvuk River (2 of 3 maps).

● Park Wilderness Boundary

● Current ATV Use Area Boundary



ATV Trails along the Anaktuvuk River (3 of 3 maps).  Park Wilderness Boundary

to the point where the valley turns north about a mile south of Napaktualuit Lake. This 18 miles of river valley contains or provides access to a variety of hunting, fishing and camping locales that have been used to varying degrees by the residents of Anaktuvuk Pass since the village was established. The lower (western) 10 miles of the valley lie on Native corporation land and contain a variety of subsistence resource use areas. The following resource areas are located in T15S, R3E, Umiat Meridian: Section 18, sheep-hunting area; NW1/4 Section 16, Imailaq fall sheep-hunting area; SE1/4 Section 16, marmot colony; Section 20, camping locale at confluence of Anaktuvuk River and Kavik Creek; NW1/4 Section 30, Siqsinniquamisua, a creek at the beginning of the fall caribou migration route leading into Giant Creek; the immediate area surrounding Kavik Creek, especially the headwaters, is a reliable sheep-hunting area, fall caribou migration route and some summer caribou; NE1/4 Section 22, sheep-hunting area; SE1/4, Section 22, summer caribou-hunting area; SE1/4 Section 26, summer camping area along Anaktuvuk River; SW1/4 Section 25, summer camping area at the confluence of two creeks and the Anaktuvuk River. In T16S, R4E, Sections 16, 17, 18, there is good sheep hunting up both forks of Kayaak Creek. The following resource areas are located in T15S, R4E: Section 19, sheep-hunting area; Sections 20 and 21, sheep-hunting area; SE1/4 Section 21, summer camping area; NW1/4 Section 22, sheep-hunting area; SE1/4 Section 36, summer caribou-hunting area; Sections 23 and 24, sheep-hunting area. The following resource areas are located in T15S, R5E: NE1/4 Section 31, Paituit fishing hole; SE1/4 Section 21 and NE1/4 Section 28, sheep-hunting area especially good in July and August; NW1/4 Section 26, late summer caribou-hunting area (this is outside the ATV-use area); NE1/4 Section 35 and NW1/4 Section 36, sheep-hunting area -- mineral lick (this is outside the ATV-use area). The following resource areas are located in T16S, R5E: SW1/4 Section 5, sheep-hunting area -- mineral lick -- always dependable for summer hunting; NW1/4 Section 11, sheep-hunting area -- mineral lick -- summer rams (this is outside the ATV-use area).

In general the present ATV trail follows the route of the traditional winter trail that accesses the valley of the North Fork Koyukuk River via Ernie Pass and Ernie Creek. In the past the Anaktuvuk River/Graylime Creek portion of the winter trail was commonly used during the summer months as a foot/pack dog trail for accessing the subsistence resources of the upper Anaktuvuk River valley.

The Anaktiktoak ATV trail is roughly 23 miles long, with the first 13 miles of the route lying on land owned by either the local or regional Native corporation. Unrestricted ATV use has been allowed on this land since before the creation of the park. The trail exits the north end of the village turning east near Eleanor Lake. From this point to the Anaktuvuk River, a distance of 3 miles, there are a number of routes that coalesce on the left bank of the river. Although these routes pass over the flank of the mountains to the east of the village, heavy ATV traffic and some pockets of wet terrain combine to make the trail readily visible both from the air

and the ground. Many of the wet areas have become so boggy and churned up from the heavy ATV traffic that the trail has been repeatedly rerouted around these areas. Even in many of the dry areas ATV traffic has been heavy enough that the vegetation mat has been broken and the rocky substrate exposed.

The trail crosses the Anaktuvuk River in a wide braided area that glaciates heavily during the winter, building overflow ice to thicknesses in excess of 8 feet. As flowing water cuts channels through this ice in the early summer the resulting chasms often create an impassable barrier to the ATVs.

The initiation of seasonal ATV use on the trail above the river crossing is often dictated by the overflow ice conditions. In the first 3 miles above the river crossing a good portion of the trail lies on the active floodplain of the river and it is very difficult or impossible to see due to the exposed gravel surface and the seasonal cleansing effect of the river during spring breakup. Where the trail lies on the inactive floodplain, it is visible from both the ground and the air along most of its length. Trail visibility is due mainly to the compaction and compression of the vegetation as there are very few areas where the vegetation mat has been broken and the organic and/or mineral soil exposed. In the few areas where the trail climbs above the level of the floodplain, the terrain is basically moist/wet grass/tussock tundra, and in these areas considerable surface disturbance has occurred. Where this type of terrain and vegetation are present, much of the vegetation mat has been broken and the organic and mineral soils exposed and churned. Often in areas of standing water or where the trail crosses small drainages, the trail has become so churned up and boggy that it has been rerouted several times. In a few locales water is running along the trail ruts, although it appears that only minor erosion has occurred.

Near the end of this section of trail a spur branches off to the south, crossing the river and heading up Kavik Creek. This trail is difficult to see from ground level and only faintly visible from the air for a distance of roughly a mile up the creek. Evidence of dispersed ATV use is common over this 3-mile section of trail, although it is much more easily seen from the air than the ground.

Over the next mile the trail moves up out of the floodplain area into drier terrain along the top of the oldest of the river's sequential cut banks. For the next 4 miles the trail runs along the top of the cut bank over relatively stable and well-drained ground. Although the trail is visible from both the air and the ground in this area, the visibility is generally due to the compaction and compression of the vegetation rather than the breakage of the organic mat and exposure of the underlying soil. There is some visual evidence of dispersed ATV use along this segment of trail.

Near the eastern end of this 4-mile section of trail another spur takes off to the south, crosses the river and heads up Kayaak Creek. The trail up the creek is only intermittently visible from the ground in the first 3/4 mile of the drainage and only slightly more visible from the air. Approximately a mile west of the boundary park land the trail drops back down to the inactive floodplain and remains there for most of the next 4 miles.

The first 4 miles of park land that the trail crosses is land that was once owned by the ASRC, and prior to 1983 unrestricted ATV use was permitted there. This area became park land in 1983, and between 1983 and 1986 unrestricted ATV use was not permitted, although ATV use on the ATV easement along the creek's floodplain was allowed. In 1986 this land was again opened to unrestricted ATV use.

In this area the trail crosses well-vegetated, well-drained, predominately level terrain. Although this section of the trail is at least faintly visible from the air, from ground level it is often difficult or impossible to see. For the most part the vegetation has been only slightly to moderately affected by ATV use and there are only one or two locales where the vegetation mat has been broken. Visual evidence suggests that little dispersed ATV use has occurred along this section of trail.

About 3/4 mile below the confluence of the Anaktuvuk River and Graylime Creek, in an extensively braided area of the stream, the trail drops onto the active floodplain and slowly works its way across the river to the left side. The trail stays on the active floodplain up to the confluence and there turns up Graylime Creek where it climbs out of the active floodplain onto the inactive floodplain. The trail is intermittently visible from both the air and ground level for about another 1/2 mile before it fades out completely.

The area of wilderness park land opened to unrestricted ATV use in 1987 begins about the point where the trail starts to traverse the inactive floodplain of Graylime Creek. This area includes approximately 30 square miles of park land. This area includes Sections 1-4, 9-12, 13-16, T16S, R4E; Sections 4-9 and portions of 10 and 3, T16S, R5E; Sections 28-34 and portions of 9, 10, 16, 19-21, 27, T15S, R5E, Umiat Meridian. The area encompasses the headwaters of the Anaktuvuk River, the lower two-thirds of the Graylime Creek drainage, and the southeastern headwaters area of Kayaak Creek. In a linear sense this added a possible 8 miles to the ATV trails. At the confluence of the Anaktuvuk River and Graylime Creek the trail bifurcates. One branch may run up the Anaktuvuk River for 4 miles and the other branch may run up Graylime Creek for 4 miles. That additional area opened in the headwaters of Kayaak Creek are for the most part too rugged for the type of ATV operation commonly associated with subsistence activities. There does not appear to be any visible evidence of ATV use in these areas.

However, local residents say that ATVs have occasionally been used there.

Anaktuvuk River ATV Trail Study Site No. 1

Site No. 1 was established in 1985 by Racine and Johnson in the NW1/4, SW1/4, SE1/4, Section 21, T15S, R3E, Umiat Meridian. The site lies on the right side of the river on the inactive floodplain at an elevation of 2,300 feet. The confluence of Kavik Creek and the Anaktuvuk River is located approximately a mile downstream from this site. Vegetation at the site is characterized by moss/scrub overlying a thin rocky soil. The site is relatively dry except during periods of heavy rain runoff or melt such as spring breakup. Due to the robust vegetation and well-drained character of the soil the impact at the site has been primarily limited to compaction and compression of vegetation. This site lies on Native corporation Land.

Anaktuvuk River ATV Trail Study Site No. 2

Site No. 2 was established by Racine and Johnson in 1985 in the SW1/4, NW1/4, NW1/4, Section 26, T15S, R3E, Umiat Meridian. The site is located on the right side of the river approximately 1.5 miles upstream from study site No. 1 and lies on a kame terrace at an elevation of 2,350 feet. Due to its rock and gravel substrate the site is well drained and dry. Vegetation can be described as dwarf scrub/lichen uniform across the site. Due to its well-drained character and robust vegetation, the major ATV effects at this site have been limited to compaction and compression of the vegetation. From ground level the trail is visible, although it might go unnoticed. This site lies on Native corporation land.

Anaktuvuk River ATV Trail Study Site No. 3

Site No. 3 was established in 1986 in the SE1/4, SW1/4, SW1/4, Section 30, T15S, R4E, Umiat Meridian. The site is located on the right side of the river slightly more than 2 miles upstream from site No. 2 and lies at the base of a hill at an elevation of 2,500 feet. The site lies but a few feet from the river and can be described as a moist/wet tussock area. Vegetation type and coverage is uniform across the site. The trail at this site is very visible. Over most of the length of the site the vegetation mat has been broken up and the underlying soils exposed and churning and rutting has occurred. ATV traffic at this site is certainly no greater than at the lower sites, suggesting that the increased visibility of ATV impact at site No. 3 is related to site environment. This site lies on Native Corporation land.

For long-term monitoring of the visual effects of ATV use, two photo points were established on the upper Anaktuvuk River and another was set up on Grayline Creek. All of the photo points are on park land.

Anaktuvuk River Photo Point No. 1

This photo point is located atop a hill/bedrock outcrop in the NW1/4, NE1/4, NE1/4, Section 29, T15S, R5E, Umiat Meridian at an elevation

of 3,400 feet and 330 feet above the valley floor. Almost straddling the valley, the hill lies on the right side of the Anaktuvuk River forcing the stream into a narrow, rocky gorge. The photo point lies on the downstream side of the hill and upstream from the vicinity of the confluence of the river and Graylime Creek, offering an excellent view of the country bordering the river. Photos were taken from this site in early June 1987.

Anaktuvuk River Photo Point No. 2

This photo point lies on the same hill as photo point No. 1 but lies several hundred feet north in the SE1/4, SE1/4, SE1/4, Section 20, T15S, R5E, Umiat Meridian at an elevation of 3,450 feet, slightly more than 330 feet above the valley floor. The site provides an excellent view of the land bordering the river to the north-northeast (upstream) to a point about a mile below the confluence of the north and west forks of the river. Photos were taken from this site in early June 1987.

Anaktuvuk River Photo Point No. 3

This photo point lies on a hilltop about 1/2 mile east of Graylime Creek in the NE1/4, NW1/4, NE1/4, Section 3, T16S, R5E, Umiat Meridian at an elevation of 3,510 feet, approximately 215 feet above the valley floor. Looking to the north the site provides an excellent view of the land surrounding the creek up to a point where the creek enters its steep-sided mountain valley. The site also provides an excellent view looking to the west, down the creek, to a point about a mile above the confluence of the creek and the river. Photos were taken from this site about mid-July 1987.

In early June 1987, when the on-the-ground reconnaissance was conducted along the ATV trail in the Anaktuvuk River valley, no ATV activity had yet occurred that season. The general condition of that portion of the trail that lies on Native corporation land has already been described. The following is a description of the evidence of ATV use in the park land opened to subsistence ATV use in 1987.

The only irrefutable visible evidence of the use of ATVs in the newly opened park land lies in the Graylime Creek drainage. The ATV trail that follows the Anaktuvuk River for nearly 20 miles switches to the Graylime Creek drainage at the confluence of the two streams. The trail is faintly and intermittently visible for about a mile above the confluence. This places the last visible 1/2 mile of the trail on the newly opened wilderness park land. This indicates that ATV use occurred on park land that was not opened to such activity prior to 1987. The fact that the trail is only faintly and intermittently visible and peters out soon after crossing onto park land suggests that ATV use in the area has been infrequent and irregular. A fishing locale and associated willow patch campsite lies about 1/2 mile into the recently opened park land. Some of the evidence of use of this campsite is 30 or 40 years old. We found no evidence of use that could be considered historic or prehistoric. Physical evidence at the site, including numerous pieces of burned and fragmented

caribou bone and scattered pieces of monofilament fishing line, suggests that both hunting and fishing have occurred there. Empty aerosol bug dope suggests some summer use of this site. Campfire remains and modern trash are also present. In the fall of 1986, ATV tracks were observed in a light dusting of snow just upstream of this area.

Additional evidence of use of the general area was observed on the divide between the creek and the river about 1/2 mile above the confluence. This evidence consisted of recent tent rings, stones used to hold down the edges of tents. However, due to the exposed location of the rings and the absence of associated trash and fire hearths, these camp locations are probably the result of the activities of park recreational visitors.

Slightly more than 2.75 miles up the Graylime Creek drainage from the confluence is a large, flat alluvial fan formed by two streams entering the creek from the north. Several sets of ATV tracks cross this fan north to south. However, the origin of these tracks is not recent. Visible evidence as well as written accounts suggest these tracks are approximately 37 years old and probably resulted from USGS-operated tracked personnel carriers (Weasels) associated with the initial government oil and gas exploration on the North Slope. The tracks are still visible because of what might be termed vegetation replacement.

Most of the surface of the alluvial fan is covered by a sparse but healthy mat of lichen, Cladonia spp. (caribou moss). The relatively uniform coverage of the fan by the lichen gives the appearance of a yellow-white carpet spread over the ground. The Weasel tracks show up as dark stripes against the light background. However, the tracks are visible not because of ruts or exposed soil but due to a difference in the vegetation. Apparently the lichen, which is easily torn up, was displaced by the Weasel's passage. Due to the rocky substrate and relatively flat surface of the fan, no rutting occurred. Once seriously disturbed it appears to take 30-50 years for Cladonia spp. to reestablish itself. This is more than ample time for other types of vegetation to colonize and establish themselves in the disturbed area. At present a mix of dark green moss and small herbaceous plants grow in the Weasel tracks. This may indicate how recovery of ATV trails will progress if vehicle use on a trail stops.

Additional evidence of past use of the Graylime Creek drainage presented itself in the form of an archeological site located on a creekside knoll on the eastern edge of the above-mentioned alluvial fan. Cultural material on the surface consisted of chert waste flakes, indicating prehistoric human use, and caribou or sheep bone fragments. No evidence of recent or modern use of the site was observed. Three other sites, containing as few as one and as many as four oval tent rings, were located within a mile of this prehistoric site. Evidence suggests that these tent ring sites were

last occupied 75 to 100 years ago (Pittenger and Staley, 1986). Several modern human-use sites have been reported from this area; however, it was not possible to determine if they were the result of ATV activity.

No visible evidence of past or present ATV use was observed in the Anaktuvuk River drainage above its confluence with Graylime Creek. In fact, very little evidence of human use of any type was found in the area.

An archeological site, consisting of an oval tent ring of 23 stones was located on an old river terrace on the right side of the Anaktuvuk River approximately 1/4 mile above the Graylime Creek confluence. The shape of the tent ring and the condition of the stones suggest that the site was occupied not more than 100 nor more recently than 40 years ago. Additional evidence of human use in the area was found on the hill where photo points No. 1 and No. 2 are located. From this hill north to the forks of the river, a distance of 2.25 miles, no other evidence of human use of the area was observed. However, some Anaktuvuk Pass residents have said that they have hunted sheep in this area during the summer.

During the summer and early fall of 1987, a number of observation flight were made along the Anaktuvuk River ATV trail. As a result of this reconnaissance, some comparisons regarding the appearance of the trail at the beginning and end of the ATV-use season can be made. These observations are qualitative in nature.

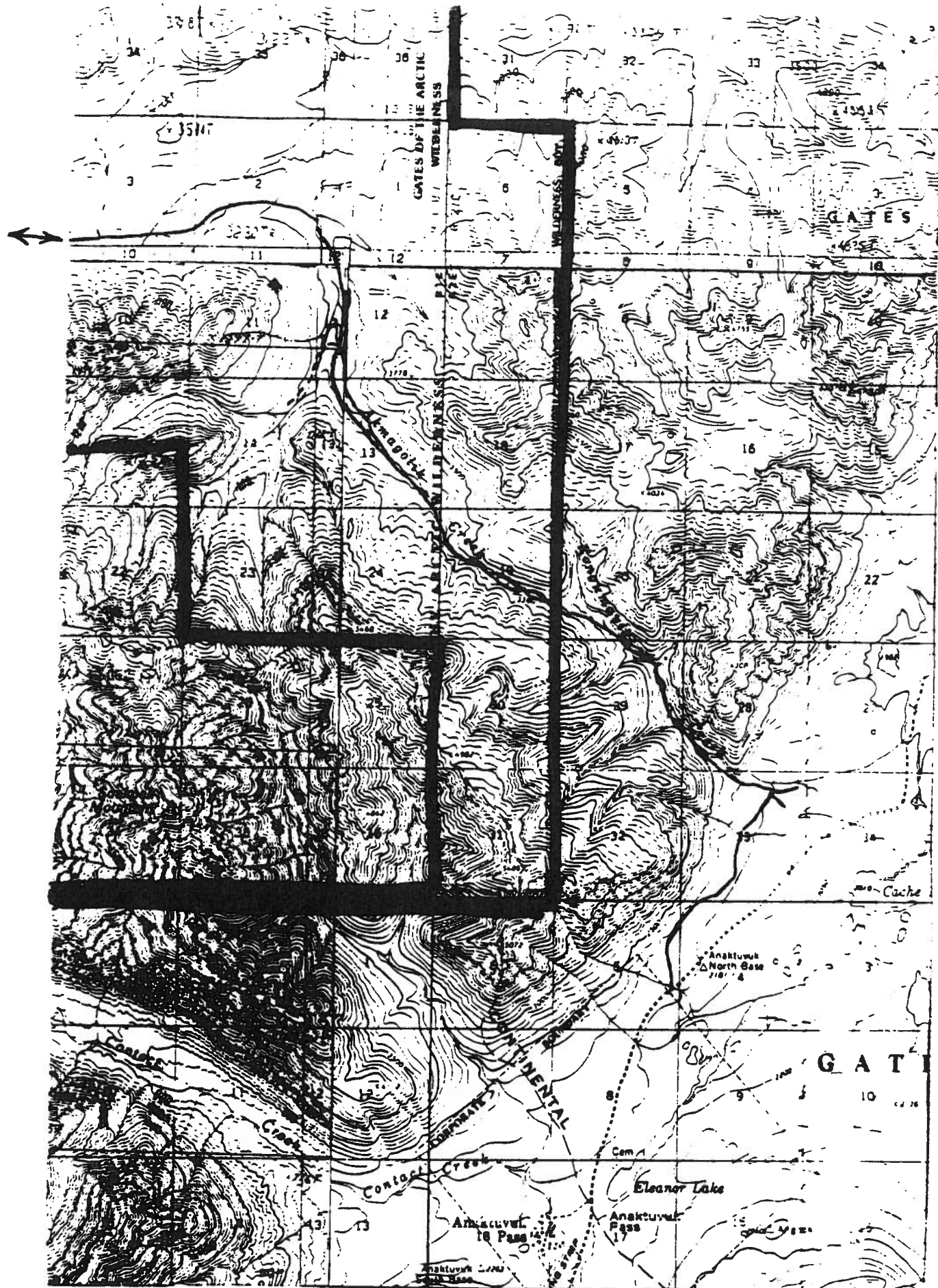
By summer's end, the trails between the village and the river appeared to be more visible than at the beginning of the summer. This may not be a totally valid observation, because the contrast between trail and the dead, brown vegetation of early summer is not as pronounced as the contrast between the trail and the vegetation after green-up has occurred, or the contrast between the trail and the brilliant coloration of the fall vegetation. Once the seasonal ice was gone, ATV tracks could be seen in the gravel of the active floodplain. Tracks on the active floodplain are erased each year by the high water and ice movement/melting of spring breakup. From the river crossing upstream as far as trail study site No. 3, the wet and disturbed areas of the trail appeared to become slightly more pronounced as the season progressed. From study site No. 3 upstream to the confluence of the river and Graylime Creek, no noticeable change in trail conditions occurred, although it is known that ATVs were operating in the area sporadically. Visual evidence of dispersed ATV use appeared to increase slightly in the area between the river crossing and study site No. 3. There was no evidence that ATVs were taken above the confluence of the river and Graylime Creek at any time during the summer. However, for the most part this area is one of depositional glacial features and bedrock outcrops supporting vegetation that does not readily reveal evidence of occasional or dispersed ATV activity.

Both botanical and archeological fieldwork were conducted in Anaktikoat during the summers of 1985-1987. As a result of this work, at least four locations where clustering of human-use sites occurred were noted. These locations were either on Native-owned land or on non-wilderness park land and were mentioned earlier. Each cluster of human-use sites was located at or near the confluence of the Anaktuvuk River and one or more streams, and each was associated with a large willow patch. Each cluster included the remains of six to 12 individual camps. Evidence of use included tent rings, hearth and campfire remains, cached cooking gear, tent poles, water jugs, cut and stacked firewood, snowmachine and ATV parts, pieces and paraphernalia, and modern trash such as bottles, foil, paper and plastic. At none of these localities was there any observable evidence of site use pre-dating the past 50 years. No subsurface testing was conducted at any of these localities so it is possible that earlier human use may have occurred. However, there were enough areas of exposed mineral soil so that if there was any appreciable amount of subsurface material present it would be visible. As previously mentioned, a fifth cluster of recent campsites was located just above the confluence of Graylime Creek and Anaktuvuk River. Aside from the clusters, no more than six individual human-use sites older than 50 years were found in the area.

The total number of human-use sites in this area is much higher than was found along Contact and Giant creeks, the two drainages previously discussed. The Anaktuvuk River/Graylime Creek area encompasses more land, and it appears to have been a major travel route, whereas the other two drainages were not. However, the evidence suggests that here, as in the other drainages, the vast majority of human use has occurred since the establishment of Anaktuvuk Pass Village.

KONGUMAVIK CREEK - MAP D

Kongumavik Creek is a tributary of the Anaktuvuk River. The creek flows into the river from the west, passing beside Kongumavik, the location of summer camp, about a mile above the confluence of the creek and river. Anaktuvuk Pass village lies about 4 miles to the south-southwest. From its headwaters Kongumavik Creek flows east through some relatively rugged and steep terrain. Although the Kongumavik Creek valley is less than 3 miles long, its steep, rugged mountain walls provide good sheep habitat. Sheep are commonly hunted by some of the local residents in the late summer and fall. In the past the vicinity of summer camp was a good location to intercept caribou passing through the Anaktuvuk valley during their seasonal migration. However, in recent years the caribou have not been as regular in their seasonal movements through the area as they may have in the past. All of this drainage lies on Native corporation land.



● ATV Trails along Akmagolik and Kongumavik Creeks and the West side of the Anaktuvuk River Valley.



● Current ATV Use Area Boundary

— Park Wilderness Boundary

VP1

Today in order to reach the Kongumavik ATV trail it is necessary to follow the trail from the village to summer camp. The trail to Kongumavik is roughly 4 miles long, heavily used and very visible. Because of the constant use of this trail the vegetation and soil have suffered much more damage and disturbance than any of the other trails. This trail crosses generally wet or moist terrain. This environment, coupled with extremely heavy use, has caused damage to the extent that total abandonment of use for scores of years would probably not heal the scars. However, much of the initial disturbance along this trail can be attributed to the 1969 winter movement of heavy equipment for use in constructing the Trans Alaska Pipeline. As use of the same route by a variety of ATVs intensified nine or 10 years later, the already badly disturbed surface suffered severely. It had been stabilized only minimally by natural rehabilitation and had little resistance to this type of impact. This trail lies on Native corporation land.

The present ATV trail basically follows the route of the old summer foot/pack dog trail that ran from the village to Kongumavik and then up the steep Kongumavik valley/gorge to the divide that separates the headwaters of Kongumavik Creek from those of Akmagolik Creek. Although snowmachines are now used on this trail during the winter, it was generally considered too steep for dogs and sled.

In fact, in spots the trail is steep enough so that it was exceedingly difficult to get anything but a tracked vehicle up the trail and over the divide into the Akmagolik Creek drainage. In the recent past some of the local residents worked on the steeper portions of the trail with hand tools, making several side hill cuts in the rocky slopes in an effort to make the trail more passable for wheeled ATVs.

There is some disagreement about when this work actually took place. Some local sources indicate that the manicuring of the trail took place during the summer of 1979 and 1980. Other observers claim the work did not take place until 1981 and 1982. It is interesting to note that high altitude color infrared aerial photographs taken of the Kongumavik area in July 1979 display no evidence of an active encampment at the Kongumavik locale. Similar photographs taken in August 1982, three years later, show evidence of at least eight semi-permanent tent structures. This evidence suggests that the evolution of Kongumavik from an occasionally used seasonal hunting camp/residential locale of temporary dwellings to a continually used summer base camp of semi-permanent/permanent dwelling structures is directly associated with the dramatic increase in the number of ATVs in the village following 1979. Since the widespread use of ATVs to the north and west of Anaktuvuk Pass is directly concurrent with the development of Kongumavik as a summer base camp, it therefore seems reasonable to postulate that the hand grading of sections of the Kongumavik ATV trail occurred no earlier than the summer of 1980 and quite possibly after the establishment of the park. The entire Kongumavik drainage lies on Native-owned land.

Prior to this construction work on the Kongumavik ATV trail, wheeled ATVs often accessed Akmagolik by traveling north down the Anaktuvuk River valley to the vicinity of Nasaurak Mountain where they would turn west and intercept the lower end of the Akmagolik drainage following it south into the mountains as evidenced by the well-developed trail.

At present the Kongumavik Creek ATV trail runs from summer camp northwest 2.5 miles to the Kongumavik/Akmagolik divide. The trail is easily visible for its entire length due to considerable surface disturbance. Much of the trail traverses relatively moist, rocky, sparsely vegetated ground. Usually this type of ground is somewhat resistant to severe disturbance as the result of occasional ATV use. However, due to the steepness of the terrain and extremely heavy ATV traffic, most of the trail has had the vegetation stripped from the surface. With the vegetation no longer present and the rocky, gravely soil exposed to the runoff of melting snow and rain, considerable erosion has occurred and is on-going on the steeper sections of the trail. The few wet or moist areas along the trail have become churned and boggy as the result of heavy use. The entire trail lies on Native corporation land.

Kongumavik Creek ATV Trail Study Site No. 1

Site No. 1 was established in 1986 in the SW1/4, SW1/4, SW1/4, Section 28, T14S, R2E, Umiat Meridian. The site lies on the right side of the creek at an elevation of 2,550 feet slightly more than 1/2 mile northwest of Kongumavik. The site is located on a hillside that slopes both to the east and the north. The vegetation cover of dwarf shrub with a mix of low herbaceous plants is quite uniform across the site. The locale is relatively dry except for the lower end, which is somewhat wet. The soil at this site is shallow and rather rocky. Due to the site's side hill lie and the saturated nature of the soil at its lower end, the heavy ATV traffic has churned up the organic and mineral soil creating a boggy area. This site lies on Native corporation land.

Kongumavik Creek ATV Trail Study Site No. 2

Site No. 2 was established in 1986 in the NW1/4, NE1/4, NW1/4, Section 29, T14S, R2E, Umiat Meridian. The site lies on the right side of the creek and on the both sides of the crest of a small rise. Site elevation is 3,200 feet and is located slightly more than a mile upstream from site 1. Vegetation across the site ranges from dry meadow to wet-tussock tundra. Soil at the site is thin and rocky, and where it is wet it has been churned up as the result of the heavy ATV traffic. This site lies on Native corporation land.

The Kongumavik locale in the Anaktuvuk valley has been used in prehistoric, historic and modern times (Ingstad 1954; Gubser 1956; Binford 1978). However, the types of uses have varied considerably. Within the valley of Kongumavik Creek several locations of hunting camps and trapping locales have been noted (Binford, personal

communication, 1985). However, the Kongumavik drainage's major importance is that it provides the most direct access to the Akmagolik valley and other drainages to the west. None of the known human-use sites in the Kongumavik valley appear to be more than 50 years old. Although meager, the evidence suggests that the majority of human use of the Kongumavik valley has occurred since the establishment of Anaktuvuk Pass village.

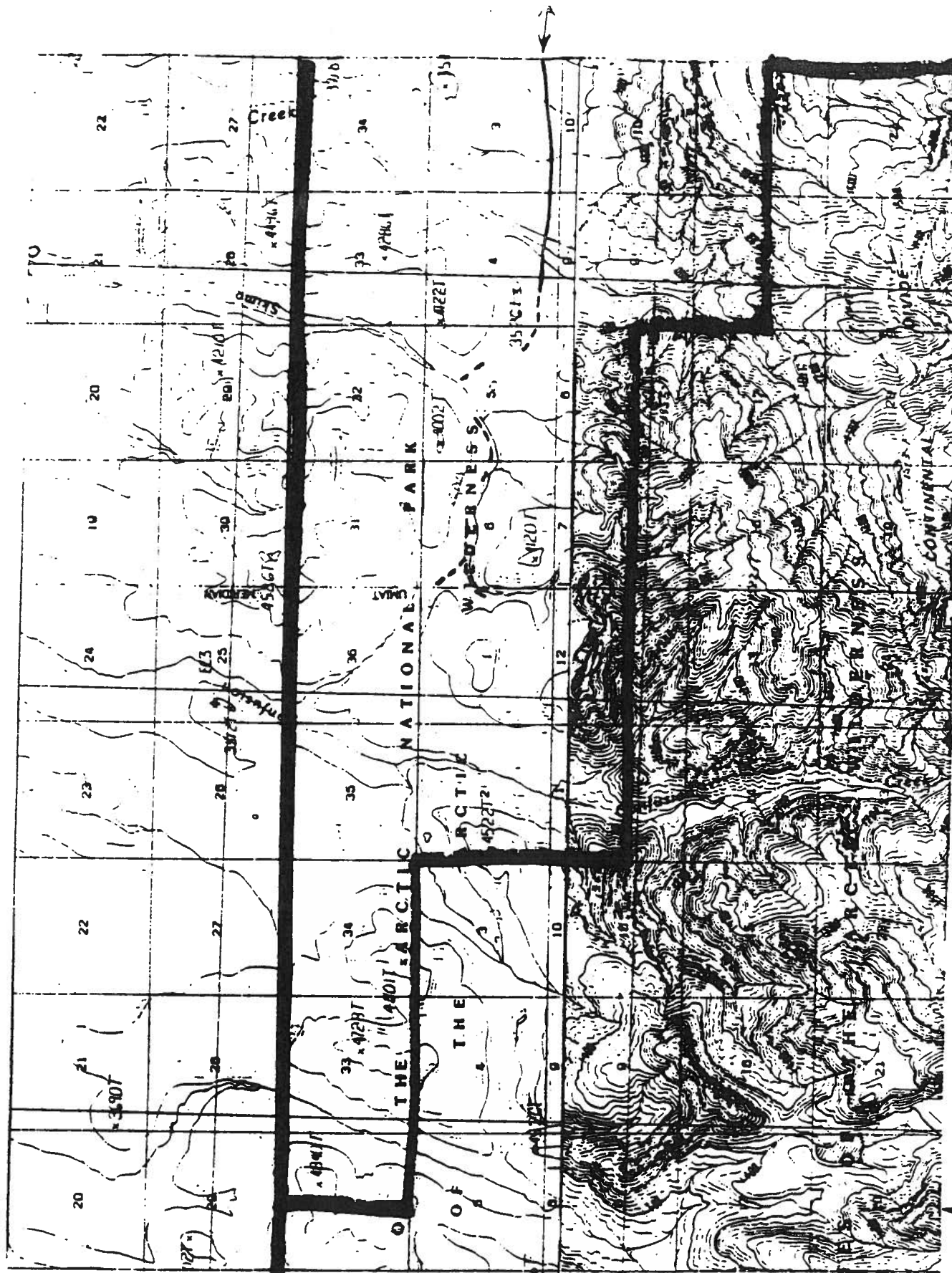
AKMAGOLIK CREEK - MAP E

Akmagolik Creek heads at a small lake on the west side of the divide that separates it from the Kongumavik drainage. The creek flows northwest, then northeast and finally east in a 14-mile loop joining with the Anaktuvuk River 16 miles northeast of Anaktuvuk Pass village. The uppermost 5 miles of this creek lie on wilderness park land, but the remaining 9 miles lie to the north of the park boundary. It is the first 5 miles of this drainage, and the land to the west as far as Encampment Creek, that the residents of Anaktuvuk Pass say is important to them as a summer subsistence resource area.

In July of 1986 the land drained by Akmagolik Creek from its headwaters to the northern park boundary and the area as far west as the right bank of Tiglukpuk Creek was opened by the NPS to subsistence-oriented ATV use to aid in the vegetational impact study being conducted in the area. The Akmagolik area opened for ATV use amounted to roughly 21 square miles and added 6 miles to the length of the main access routes (ATV trails) to the west of the Kongumavik trail. This area included Sections 6, 7, 18, 19, 30-32, T14S, R2E; Sections 1-3, 9-14, 23, 24, and the N1/2 of 15 and 16, T14S, R1E; Sections 35, 36, and a portion of 34, T13S, R1E, Umiat Meridian.

In May 1987 the NPS opened an additional 14 square miles of land to the west of the Akmagolik drainage to subsistence-oriented ATV use. This extended the main ATV access route by approximately 7 miles west of Tiglukpuk Creek. This newly opened land included the area from the left bank of the Tiglukpuk Creek west to the left bank of Encampment Creek and extended from the northern boundary of the park south from 1 to 3 miles.

Today this area is primarily used for hunting caribou. The sheltered north-facing slopes that lie several miles south of the park's northern boundary in the rugged upper portions of the north-flowing Akmagolik, Tiglukpuk, Skimo, Confusion and Encampment creek drainages support extensive snowfields and small cirque glaciers. These snowfields, depending upon winter snowfall and summer temperatures, usually remain extant throughout the summer. During the summer the caribou appear to wander aimlessly, singly or in small scattered groups, along the northern fringes of the Brooks Range. The snowfield areas offer the caribou a refuge from the heat, flies



ATV Trails in the Akmagolik, Tiglukpuk and Skimo Creek valleys.

● Current ATV Use Area Boundary

● Park Wilderness Boundary

Map E

and mosquitos that plague them throughout the warm months. The behavior of caribou is relatively unpredictable excepting the mass movements of spring and fall. The only reliable aspect of summer caribou behavior is that if they are present in the Anaktuvuk Pass area they will usually go to the snowfield areas to escape the heat and the bugs. Because of these circumstances the Akmagolik area is the only locale close enough to the village to be considered reasonably accessible to caribou in numbers worth hunting during the summer. Sheep are also present in the area, and they are often hunted from mid-August through September. Marmot colonies are fairly numerous; however, at present they receive little hunting pressure.

It is only within the last 10 years that this area has been regularly accessed by ATVs. The present ATV trail generally follows the route of the old summer foot/pack dog trail that went up Kongumavik Creek, across the divide to Akmagolik Creek and down the Akmagolik valley to the point where the creek turns northeast. At this point the old foot route diverged, one branch following Akmagolik Creek north beyond the range front, while the other branch turned west toward Tiglukpuk Creek where it joined the trail coming up from Contact Creek to the south.

The Akmagolik Creek ATV trail begins on the west side of the Kongumavik/Akmagolik divide and is at least intermittently visible as far west as Confusion Creek, a distance of roughly 12 miles. The terrain in the divide area is reasonably flat and alternately wet and dry. The trail diverges into several routes in this area. As the fledgling Akmagolik valley begins to descend to the northwest it is little more than a narrow, steep-sided gorge. This area is fairly wet and in an effort to avoid exceptionally wet or boggy areas the trail follows numerous routes that meander about the valley floor. Effects of ATV use, while plainly visible from the divide through the gorge, is nowhere near as serious as it is along the Kongumavik trail. As the valley opens up, the ground remains wet or moist and the ATV trail is comprised of several routes that wander about searching out the drier terrain. The ground becomes better drained as the trails progress west, and at the point where the first major tributary enters Akmagolik Creek from the south, about a mile west of the divide, the meandering trails have coalesced into a single route.

To the east of the south fork of the creek 1/4 mile, a branch of the trail loops off to the south, climbing to the top of a low but prominent ridge where a game lookout site is located. Evidence that this site is frequently used includes stacked firewood, fire hearths, a variety of partially burned trash and empty cartridge cases. This spur trail rejoins the main trail at the confluence of the two streams.

Another branch leaves the main trail and travels along both sides of the south fork towards the snowfields at its headwaters. A camping locale that displays evidence of recent use lies on a low bench about

1/4 mile above the confluence of the two streams. The spur trails coalesce on the left side of the south fork after several hundred yards, and the single trail is faintly visible for almost a mile before it peters out. The modern trash associated with all of the camping locales observed in the valley of the south fork suggests that the majority of human use there as been associated with ATVs and has occurred during the past 10 years. Evidence at some of the human-use sites in the south fork valley suggest that they may have initially been used prior to the introduction of ATVs. However, no evidence was observed at any of these sites that would indicate that their initial occupation occurred more than 40 to 50 years ago.

Several hundred yards above its confluence with Akmagolik Creek the main trail crosses the south fork and passes through a large willow patch that is often used for camping. Several active ATV camps were observed in this location as well as the remnants of several camps that appear to have been used about 40 years ago.

After crossing the south fork the main trail begins to climb out of the Akmagolik valley west toward Tiglukpuk Creek. For the next 2 miles the trail crosses rolling hills with cotton grass/tussock tundra and some extremely weathered bedrock outcrops. Except when crossing a few low wet areas the trail follows a single route to Tiglukpuk Creek where it crosses the creek, passes through a large willow patch and visibly peters out as it climbs west out of the creek valley. Another branch of the trail, which is only intermittently visible, continues down the Akmagolik Creek valley from the confluence of the south fork. The fact that the trail is only intermittently visible suggests considerably less use there than on the main trail. Additionally, when not too willow-choked, the active floodplain of the creek is used as the ATV route, obscuring evidence of ATV use. Near the park boundary the creek, except at high water, flows underground. From that point north, ATVs commonly travel along the creek bed.

At the point where the creek turns to the northeast, several tributaries join the main stream. There is an extensive willow patch bordered by terraces and alluvial fans. In this area considerable evidence of human use has been noted. The majority of this can be directly associated with ATV activity, although at least one site predates the introduction of ATVs. The oldest human-use site observed in the valley is located in this area. Although no lithic detritus is associated with this site, the evidence suggests that it is between 75 and 100 years old.

Another frequently used and only intermittently visible branch of the Akmagolik ATV trail continues north cross-country when the stream turns northeast. This route travels north about 1.5 miles until it drops down into a stream valley that drains west-southwest into Tiglukpuk Creek. The ATV route travels west along the floodplain of this stream until it reaches Tiglukpuk Creek where it travels north and out of the park along the Tiglukpuk Creek floodplain.

The main ATV trail from the headwaters of Akmagolik Creek to Tiglukpuk Creek crossing is easily visible from the ground or the air along its entire length. The effect on the surface vegetation is extensive in terms of compaction, compression and stem breakage of the plants. However, with the exception of the wettest areas, in most cases where there is vegetation the vegetation mat is intact; only rarely are there extensive organic or minimal soil exposures resulting from ATVs. There is also considerable evidence of dispersed ATV use in the area between Akmagolik Creek gorge and Tiglukpuk Creek. Dispersed use is recognizable by very faint, intermittent ATV tracks that randomly leave the main trail and wander about the area.

This entire section lies upon wilderness park land that was not open to ATV use until 1986. The network of ATV trails in this area and the degree that they are established indicates that ATV use was occurring there after the creation of the park but before the area was opened to ATV use in 1986. This can be further documented by NPS observations since 1985 and the observations of others prior to 1985 (B. Collins; B. Points; W. Roberts; R. Bain; V. Brown; oral communication 1987). Additional documentation of pre-1986 use of this area by ATVs can be found in Racine and Johnson (1988) in their report on the soil, vegetation and microrelief disturbance levels on the Akmagolik ATV trail using data gathered in 1985. It should be noted that the evidence also indicates that ATV use of the area probably occurred prior to the park's establishment when such activity was allowed under the existing land-use regulations.

Akmagolik Creek ATV Trail Study Site No. 1

Site No. 1 was established in 1986 in the NE1/4, NW1/4, SE1/4, Section 13, T14S, R1E, Umiat Meridian. The site lies in a moist/wet meadow on the left side of the creek at an elevation of 3,175 feet. The pond, which is the source of the creek, is located approximately 1.5 miles upstream (southeast) from the site. The site lies on flat terrain and the tussock tundra vegetation is relatively uniform across the site. The trail is easily visible across the site; however, serious rutting has occurred only where the site is wettest. This site is located on wilderness park land.

Akmagolik Creek ATV Trail Study Site No. 2

Site No. 2 was established in 1986 in the NW1/4, NE1/4, NW1/4, Section 13, T14S, R1E, Umiat Meridian. The site lies on the right side of the creek at an elevation of 3,100 feet a bit more than 1/2 mile downstream from site No. 1. The site lies on relatively flat terrain that can be described as a wet meadow. Vegetation cover and species composition are reasonably uniform across the site. The ATV trail is easily visible in the area due to the compression and compaction of the vegetation; however, breaks in the vegetation mat and exposure of the organic and mineral soil is rare. This site lies on park land.

For long-term monitoring of the visual effects of ATV use in the area, several photo points were established during the summer of 1987 overlooking the Akmagolik and Tiglukpuk drainages.

Akmagolik Photo Point No. 1

This photo point lies on a hill/bedrock outcrop in the SE1/4, SW1/4, SE1/4, Section 2, T14S, R1E, Umiat Meridian at an elevation of 3,400 feet, roughly 430 feet above the valley floor. The hill lies on the left side of the Akmagolik Creek valley near a point where the creek turns to the northeast. The photo point lies near the eastern face of the hill near the location of a large stone cairn that was erected on the hilltop some years ago. The site offers an excellent view of the Akmagolik valley to the southeast (upstream) and to the northeast (downstream). Photographs were taken from this site in mid-June 1987 and early July 1988.

Akmagolik Photo Point No. 2 and No. 3

These photo points are located on a hill/bedrock outcrop in the SW1/4, SE1/4, SE1/4, Section 4, T14S, R1E, Umiat Meridian at an elevation of 3,400 feet. On the west the hill rises 430 feet above Tiglukpuk Creek while on the east the ground slopes away toward Akmagolik Creek 2 miles away. Photo point No. 2 lies on the eastern edge of the hill and provides an excellent view of the area west of photo point No. 1. Photo point No. 3 lies about 110 feet to the west of photo point No. 2 and provides an excellent view of the Tiglukpuk Creek valley. Photographs were taken from these locations in mid-June 1987 and early July 1988.

Both aerial and ground observation were conducted in the Akmagolik Creek drainage during July and August of 1986. Both air and ground observation of the area continued through the summer of 1987 and by the end of that summer qualitative comparisons could be made and indicated that ATV activity in the area had noticeably increased.

There is little doubt that this area receives the bulk of the ATV traffic from early June through early August. On one weekend day in mid-June 1987, six different ATVs were encountered along Akmagolik Creek. Four of these hunting parties were operating out of Kongumavik on a daily basis. The other two parties were camping out in the field. Based on observational and other data, this amount of ATV activity appears to be about average for the area on weekends in June and July when the weather is good. Aerial reconnaissance in early August 1987 showed the main ATV routes in the area to be more visible than they were earlier in the season, suggesting a constant level of ATV use over the course of the summer. Additionally, the visible evidence for dispersed ATV use in the area appeared to have increased.

Observations made in the Akmagolik area from the air from 1985 to 1988 as well as on the ground from 1986-1988 indicate, from a qualitative point of view, that the main trail network is becoming more visible. This is probably due both to increased use in recent

years as well as the cumulative effects of past use. Increased trail visibility can generally be equated with increased disturbance to the vegetation on the trail's surface. Evidence of dispersed ATV use in the area has also increased but not to such a visually dramatic degree as trail visibility.

Both botanical and archeological fieldwork were conducted in the Akmagolik area between 1985 and 1988. As a result of this work 16 human-use sites were located. Three of the sites -- a shooting blind, a long term camp, and a short term camp -- appear to be no older than 50 years. As previously mentioned, the oldest site in the area appears to be a short-term camp used between 75 to 100 years ago. No lithic implements or detritus were associated with any of these sites. During our work in the area we noted the location of at least a dozen human-use sites that can be directly attributed to subsistence hunting using ATVs. Most of these sites appeared to have experienced numerous occupational events over the last 10 years. This evidence suggests that the area is more heavily used now than it was at any time in the past, primarily because ATVs make the area more accessible to hunters and because the regional population of the Nunamiut Eskimos is now centralized, sedentary and more numerous than at any time in the past. It is quite probable that all but one of the human-use sites noted in this area are directly attributable to the establishment of Anaktuvuk Pass village.

In 1987 approximately 15 square miles of wilderness park land encompassing portions of the upper drainages of Tiglukpuk, Skimo, Confusion and Encampment creeks were opened to ATV access. This area is a portion of the land included in the proposed land exchange and includes Section 31-33, T13S, R1E; Sections 5, 6, the NE1/2 of 7 and 8 and a portion of 4, T14S, R1E; Sections 33-36, E1/2 of 32, T13S, R1W; Sections 1, 2 and N1/2 11 and 12, T14S, R1W, Umiat Meridian. This includes those lands west from Tiglukpuk Creek to Encampment Creek extending 2 to 3 miles south from the park's northern boundary (map E). This is a summer subsistence resource area important to the residents of Anaktuvuk Pass. This area included 5 linear miles of the Tiglukpuk valley, 4 linear miles of the Skimo Creek valley, 3 linear miles of the Confusion Creek valley and 1 linear mile of the Encampment Creek valley.

TIGLUKPUK CREEK - MAP E

Tiglukpuk Creek heads on the northern slopes of the Nunamiut Mountain at an elevation of 5,000 feet and flows northeast 7 miles to the park boundary. The portion of the creek that lies within the park is entrenched in a relatively narrow and steep-walled valley. Within the park, except for the northernmost mile and one or two other scattered locations, the floodplain is quite constricted and nonexistent in some areas where the creek has carved its channel through bedrock. Except for the northernmost mile, the left wall of the valley is quite steep with the mountains rising almost from the

waters edge. On the right side of the valley the mountains do not rise as steeply or abruptly, although these gentler slopes are frequently cut by deep, narrow, steep-walled drainage gullies.

When the ATV trail from the Akmagolik valley reaches Tiglukpuk Creek it does several things. The most visible branch of the trail crosses the creek and climbs the western side of the valley. The lower slopes of the valley, moist/wet cotton grass and sedge tundra, show the ATV tracks quite well. However, as the terrain becomes drier higher up the slope, the trail begins to fade and disappears before the top of the slope is reached. Another branch of the trail turns north and travels downstream along the floodplain and beyond the park boundary. Some village residents say that they have accessed this general area of the park by coming up Tiglukpuk Creek from the north. The third and least visible branch of the ATV trail turns south at the stream crossing and heads upstream. This branch of the trail quickly becomes intermittently visible as it travels the length of an extensive willow patch. Evidence of ATV use extends slightly more than 1/4 mile upstream. Beyond that point the valley floor terrain becomes rough enough to discourage ATV use.

The degree of vegetation disturbance resulting from ATV use on the right valley wall of Tiglukpuk Creek is considerably greater than on the left side. On the right side of the creek the trail crosses a steep slope vegetated with lichen, grass and low herbaceous plants. The ground is firm and the substrate rocky. ATV traffic has compacted the vegetation over this entire section of the trail. Areas where the vegetation mat has been removed and the organic and mineral soil exposed are common. However, no serious erosion has occurred. On the left side of the creek the slope is not as steep as on the opposite side, however, the soil conditions are much wetter. The vegetation consists mainly of sledges at the base of the slope where the ground is wettest, changing to cotton grass/sedge tundra as the ground becomes drier upslope. This type of vegetation is usually more visibly affected by ATV traffic than is the type of vegetation found on the other side of the creek. However, as previously mentioned, the trail on the right side is more visible.

This suggests that much of the ATV traffic that reaches Tiglukpuk Creek does not go any farther west. Based on trail visibility, evidence indicates that the majority of ATV traffic reaches Tiglukpuk Creek from the east and then either returns to the east or travels north along the creek. As previously mentioned, some ATV traffic may enter the area from the north and then follow the trail east to Akmagolik/Kongumavik.

No quantitative study of ATV effects on vegetation were conducted in the Tiglukpuk drainage. However, random qualitative observations of ATV impact were made from the air and on the ground during the summers of 1986-1988. Although little difference in trail conditions and dispersed use was noted in the area from 1987 to 1988, the trail did appear to have become more visible in August of 1986 than it had

been at the beginning of the season. The evidence of dispersed use appeared to remain constant over this period of time. Observations of the Tiglukpuk area over the past three years and the well-established condition of the trails indicate that ATV use occurred in the area prior to 1987 when the NPS first permitted such activity.

Several human-use sites were observed within that portion of the Tiglukpuk Creek Valley that lies inside the park.

The largest cluster of human-use sites is found in the large willow patch on the valley floor in the area where the ATV trail crosses the creek. At least half a dozen modern or recent campsite remains were observed in this area. The modern sites are represented by obvious campfire/hearth remains and modern trash, suggesting ATV activity.

Several campsites had hearth/fire remains containing burned bone fragments. These were almost completely covered by vegetation. The tins cans associated with these sites were well incorporated into the vegetation mat and almost destroyed by rust. These sites probably represent use from 30 to 40 years ago. Although no evidence was observed, some older sites appear to be present. Binford (1978) notes that he visited several sheep-hunting sites (mineral licks) and one campsite on Tiglukpuk Creek. At the time of Binford's visit, about 1970, the sites had not been used since 1955 when intensive sheep hunting was being conducted in the Anaktuvuk area. One of the kill sites and a camp-site are located several miles upstream from the ATV crossing while the other kill site is located about 3 miles below the crossing. Binford states that these sites have received recent, historic and prehistoric use.

As has been the case in the other drainages in the Anaktuvuk area, the majority of the human-use activity in the Tiglukpuk Valley seems to have occurred since the establishment of Anaktuvuk Pass village. However, that portion of Tiglukpuk Creek that lies within the park has less evidence of modern use as well as a lower volume of use in general than the drainages that lie closer to the village. Indeed, it appears that the Tiglukpuk drainage serves as more of an end point or turning point for ATV traffic than it does as a resource procurement locale.

SKIMO CREEK - MAP 2

In 1987 the NPS opened roughly 5 square miles of wilderness park land to ATV use in the Skimo Creek area; Sections 32 and 33 T13S, R1E; Sections 5, 6 and N1/2 of 7 and 8, T14S, R1E, Umiat Meridian. This was done in conjunction with the ATV research project and a pending land exchange agreement.

Skimo Creek heads on the northern slopes of Nunamiut Mountain at an elevation of 4,400 feet and flows northeast about 8 miles where it

joins Tiglukpuk Creek 4 miles north of the park boundary. That portion of the creek that lies within the park is deeply entrenched within a narrow, steep-walled valley that in some places is confined enough to be called a gorge. Along the entire length of the creek the stabilized floodplain is quite restricted and is in many places, due to the narrowness of the valley, nonexistent. The only stable level ground is provided by terrace remnants or inactive floodplain. At one point about a mile north of the park boundary where the creek has cut through bedrock the sheer valley walls are separated by no more than 5 feet above the slightly wider creek bed. Except for two locations where tributary valleys enter from the west the terrain rises steeply and abruptly almost from the water's edge along the entire length of the valley. Although perennial, at first glance the creek appears to be intermittent as it periodically flows beneath the surface for distances as great as 1/4 mile before resurfacing.

From the top of the ridge on the west side of Tiglukpuk Creek there appear to be two routes used by ATVs to reach the Skimo Creek drainage. Along both of these routes the visible evidence of ATV use is faint and discontinuous. One of the routes follows a small intermittent stream drainage west for about 3/4 mile where it joins Skimo Creek slightly more than 1/2 mile downstream of the creek's turn to the north. There is a relatively large, well vegetated, terrace/alluvial fan remnant, and several dispersed-use ATV tracks are faintly visible in the vegetation. The other route traverses the gully-dissected tableland to the south of the first route and joins the creek valley about 1/3 mile upstream of the other trail. At this point the two routes coalesce. Some evidence of dispersed ATV use is visible across the tableland area.

There is little evidence that ATV activity has occurred along Skimo Creek much farther north (downstream) than where the northernmost branch of the ATV trail enters the valley. This is probably due to the rugged terrain and confined nature of the valley north of that location. From this point the route travels upstream on the left side of the valley for about a mile where the main route turns west up a tributary valley toward Confusion Creek. Another branch of the route continues up the Skimo Creek valley for another mile or so until the terrain becomes too rugged for ATV use.

Along its entire length the Skimo Creek ATV trail is only intermittently visible. This is due to the fact that much of the ground is unvegetated and rocky. Where the ground is vegetated it is firm and well drained and covered by a healthy mat of moss, lichen, low herbaceous plants, scattered clumps of grass and scrub willow. When this type of vegetation is subjected to irregular and infrequent ATV traffic it is fairly resistant to disturbance and displays little visible evidence of ATV passage. This trail condition suggests that the volume of ATV traffic along this route is relatively light, possibly no more than four or five vehicles per year.

No quantitative study of ATV effects on vegetation was conducted in the Skimo Creek valley. However, random qualitative observations of ATV impact were made from the air in 1986 and from the air and on the ground in 1987 and 1988. The ATV traffic in the Skimo Creek valley has been irregular and light. In the three years of project field research we never observed an ATV in that area. As a result, the effect on vegetation has been limited to minor bending of plant stems and leaves and light compression of the vegetation mat. No soil exposures resulting from vegetation stripping nor any erosion initiated by ATV activity have been observed.

Evidence of recent ATV use was observed while conducting on-the-ground archeological reconnaissance along Skimo Creek during July 1988. This was the only indication that ATV activity had occurred in the Skimo Creek area since the end of the 1987 season. The evidence appeared to be the result of a single round trip through the area by a single ATV.

A total of four human-use sites were located in the Skimo Creek drainage. At one of these sites there was evidence of ATV activity. Two of the sites were campsites that appear to have originally been used between 35 and 40 years ago and have more recently been used by hunters traveling by ATV. Both of these sites display some modern trash as well as rectangular tent rings, weathered willow tent pegs, a few extremely rusted tin cans, dog tethers, hearth remnants and scattered burned and unburned bone fragments. The presence of an old aerosol insect repellent can suggests that these sites were originally used during the summer. The ATV trail passes through both of these sites. The fourth site appears to be the remains of a meat cache constructed of small stream boulders. The skulls of two large bull caribou lie just a few feet from the cache. The degree that the cache stones are incorporated into the vegetation mat, the amount of lichen growth on the cache stones and the weathered condition of the caribou skulls suggest the site is 30 to 40 years old.

The evidence of human use in the Skimo Creek drainage indicates that most of it has occurred since the establishment of Anaktuvuk Pass village. As was the case in the Tiglukpuk Creek drainage, the limited number of human-use sites may be a function of the valley's limited useable area as well as its distance from the village.

CONFUSION CREEK - MAP 2

In 1987, in conjunction with the ATV research project and a pending land exchange agreement, the NPS opened approximately 5 square miles of wilderness park land in the Confusion Creek drainage to ATV use. This area included Sections 1, 2, N1/2 of 11 and 12 T14S, R1W; Sections 35, 36, T13S, R1W, Umiat Meridian.

Confusion Creek is fed by the meltwater of three cirque glaciers that lie at the 5,600 foot level on the north face of Nunamiut Mountain.

From its headwaters the creek flows north 5 miles to the park's northern boundary. Outside the park the stream continues north for 18 miles where it joins with Tiglukpuk Creek to form the Siksikpuk River.

The portion of the Confusion Creek drainage that is within the area that has been open to ATV use since 1987 lies in a fairly open section of the valley. In this area the valley floor that contains the creek and the active and inactive floodplain averages 200 feet wide and is bordered on both sides by 20- to 30-foot-high bedrock bluffs. On the right side of the creek these bluffs give way to a series of gradually rising, rolling terraces that abut the base of the mountains slightly less than half a mile from the creek. On the left side of the creek, directly behind the bluffs, a ridge rises rather steeply to an elevation of slightly more than 400 feet above the valley floor.

Several hundred yards downstream of the point where Skimo Creek makes an abrupt turn to the south a tributary valley opens to the west. It is through this valley that the ATV route accesses the Confusion Creek valley crossing the moist/wet sedge/tundra area at the mouth of this small drainage and travels along the right side of this drainage until it reaches the base of a weathered bedrock hill. There is no specific trail across this wet area and several sets of ATV tracks are intermittently visible. These ATV tracks diverge while crossing the wet area toward the top of the low divide that separates the drainages of Confusion and Skimo Creek. Several sets of intermittently visible tracks wander off along the north side of the valley until they fade out in the higher and drier terrain. What appears to be the more frequently used route, which is very faint but continuously visible, climbs up along the south side of the valley until it reaches the crest of a bedrock hill. This hilltop appears to have been used as a game lookout in the recent past. At this point the trail becomes less distinct as it begins to traverse a high bench paralleling a west-flowing tributary of Confusion Creek. A fractured exposure of bedrock lies at the point where the bench begins to break up into terraces as it descends toward Confusion Creek, which lies approximately a mile to the west.

From the bedrock outcrop the ATV route descends west toward Confusion Creek, crossing terraces, kames and eskers. In this area the ATV route is faint and only intermittently visible. Visible evidence of the ATV route fades out about 1/4 mile east of the creek.

The only other ATV tracks observed in the Confusion Creek valley lie on the west side of the creek. The sudden appearance and disappearance of these tracks suggest they are the result of dispersed or random ATV use and that the vehicle crossed a type of vegetation that readily displays the effects of this type of activity.

The degree of vegetation disturbance resulting from ATV activity in the Confusion Creek drainage appears to be minimal. Essentially all of the ATV activity that has occurred in the area can be considered dispersed or random in nature. This type of activity usually has little lasting effect on any but the most fragile of plant communities. The vast majority of vegetation cover in this part of the Confusion Creek valley consists of moss, lichen, grass and low woody and herbaceous plants that all usually display no lasting effects from light or dispersed ATV traffic. Additionally, due to the late Pleistocene glacial activity in this area, the majority of the substrate is composed of boulders, cobbles, gravel, and sand overlain by only a thin veneer of soil. This seems to provide a firm, stable and well-drained base for the vegetation mat, and may allow it to be even more resistant to any lasting effects of casual ATV activity.

As a result there is only a marginally perceptible ATV route crossing the area. In general, ATV use in this area has been infrequent enough that evidence of ATV activity can be seen only where the type of vegetation and soil moisture content are such that almost any surface activity leaves some visible sign.

No quantitative study of ATV effects on vegetation were conducted in the Confusion Creek drainage. However, random qualitative observations of ATV effects were made from the air and on the ground during the summers of 1987 and 1988.

During an on-the-ground reconnaissance of the divide area between Skimo and Confusion creeks in July 1988 some ATV tracks were observed that were not present at the end of the 1987 season. This suggests that at least one ATV-supported hunting party had operated in the Confusion Creek drainage in 1988.

Although some of the local residents said they operated ATVs in the Confusion Creek area for a number of years, the available physical evidence is not sufficient to determine if ATVs were used in this area prior to 1987. However, based on the known chronology of ATV use in adjacent areas of the park, it is reasonable to assume that it did.

For long-term monitoring of the visual effects of ATV use in the area, two photo points were established overlooking portions of the Skimo and Confusion creek drainages during the summer of 1987.

Confusion Creek Photo Points No. 1 and No. 2

Photo points No. 1 and No. 2 are located on a hill/bedrock outcrop in the SE1/4, NE1/4, NE1/4, Section 1, T14S, R1W, Umat Meridian at an elevation of 3,400 feet, about 430 feet above the Skimo Creek and Confusion Creek valley floors. The hill lies 1/4 mile west of Skimo Creek's right angle turn to the east and approximately 1.25 miles southeast of Confusion Creek. Photo point No. 1 provides an excellent view to the east overlooking the eastern-flowing portion

of Skimo Creek. Photo point No. 2 provides an excellent view to the north and northwest and along the west-flowing tributary of Confusion Creek. Photographs were taken from this site in early August 1987 and early July 1988.

In addition to the previously mentioned game lookout, two ATV camps were located during an archeological reconnaissance of the area in 1988. One camp was located on a creek terrace on the east side of Confusion Creek and consisted of modern trash and the remains of a rectangular tent ring, a hearth and some cut willow branches. The leaves were still attached to the willow branches, suggesting that the site was occupied during the last several years. The other ATV camp is located along the tributary that drains the western side of the divide between Skimo and Confusion creeks. This site has modern trash associated with it as well as hearth remains and the type of bone fragments that suggest that caribou ribs were roasted over the fire.

The 1988 fieldwork in this area also located five archeological sites. Two of these sites, both short-term camps, appear to have been occupied about 40 years ago. Two other sites, also short-term camps, appear to be between 75 and 100 years in age. The fifth site is a fairly large campsite and appears to have had two periods of occupation, the most recent occurring between 150 and 300 years ago and the initial occupation occurred about 700 years ago.

More than half of the human-use sites located in this portion of the Confusion Creek drainage appear to be directly related to Anaktuvuk Pass village. This is not surprising as subsistence resources in the area are currently good. Both caribou and sheep appear to be reliably available throughout the summer. Grayling and dwarf Arctic char are abundant in the creek.

Given the availability of subsistence resources in the area, the paucity of evidence of ATV use is somewhat surprising. The low level of ATV activity in the area may be due to the distance between Anaktuvuk Pass and Confusion Creek.

ENCAMPMENT CREEK - MAP 8

In 1987, in conjunction with the ATV research project and a pending land exchange agreement, the NPS opened 2.5 square miles of wilderness park land in the Encampment Creek area to ATV use. This area included Sections 33, 34, E1/2 32, T13S, R1W, Umiat Meridian. Prior to 1987 ATV use had not been permitted in this area.

The headwaters of Encampment Creek are fed by several cirque glaciers at the 6,000 foot level on the north face of Invalurak Mountain. From its headwaters the creek flows 6 miles north to the park boundary. Beyond the boundary the stream continues north for 10 miles where it joins Confusion Creek.

Only a single mile, the northernmost within the park, of the Encampment Creek valley is included in the area open to ATV use. That portion of the valley has little to recommend it as a subsistence resource area. The valley slopes are generally composed of moist/wet cotton grass tussock tundra where frost boils and solifluction lobes are common. There is little or no floodplain bordering the creek and hence no willows as the valley walls begin rising almost from the water's edge. Additionally, the size of the area is so small that in itself it has no practical value. Even when considered in association with the Confusion Creek ATV-use area, the resource value of the Encampment Creek area rises only minimally.

Both aerial and ground reconnaissance was conducted during the summers of 1987 and 1988 in that portion of the Encampment Creek drainage open to ATV activity, including the area that lies between Encampment Creek and Confusion Creek. Within the limits of the park land being considered for exchange no evidence of ATV activity, tracks, camps or lookouts has ever been observed farther west than 1/2 mile beyond Confusion Creek. Although some of the local residents have said they occasionally travel as far west as Encampment Creek with ATVs, there is no evidence that they have done so on park land. Neither is there evidence that ATVs have entered that portion of the Encampment Creek valley that lies within the park from the north. Encampment Creek lies 14 air miles northwest of Anaktuvuk Pass and is the western limit of the park land open to ATV use.

For long-term monitoring of the visual effects of ATV use in the area, a photo point was established during the summer of 1987.

Encampment Creek Photo Point

This photo point is located atop a ridge on the right side (east) of Encampment Creek in the NE1/4, SW1/4, SE1/4, Section 28, T13S, R1W, Umiat Meridian at an elevation of 3,800 feet, roughly 300 feet above the valley floor. The site lies about 1/4 mile south of Encampment Creek's abrupt turn to the east and lies almost on the park's northern boundary. The site offers an excellent view to the east encompassing the area as far as the Confusion Creek photo points as well as south up the Encampment Creek valley. Photographs were taken from this site in early August 1987 and late July 1988.

KOLLUTARAK (QALUTAGIAQ) CREEK - MAPS F-1, F-2, F-3

There are three ATV trails that travel south from the village of Anaktuvuk Pass down the John River valley. These trails are used to access the Kollutarak/Masu/Ekokpuk subsistence resource areas that lie about 8 miles south of the village on the west side of the valley, and the Kollutuk Creek sheep-hunting area that lies on the east side of the valley.



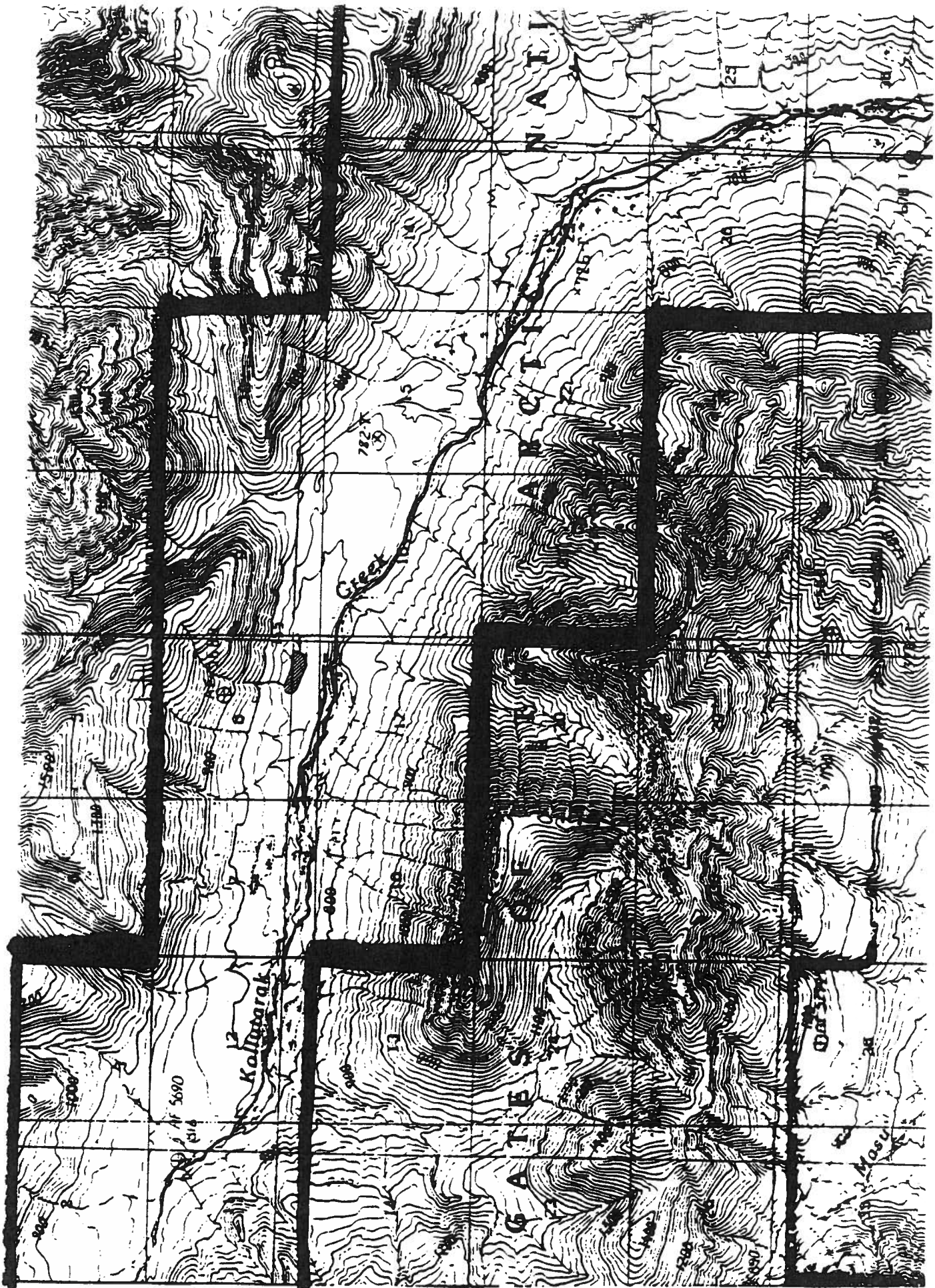
ATV Trails along the West side of the John River Valley, Kollutarak and Masu Creek valleys (1 of 3 maps).



● Park Wilderness Boundary

● Current ATV Use Area Boundary

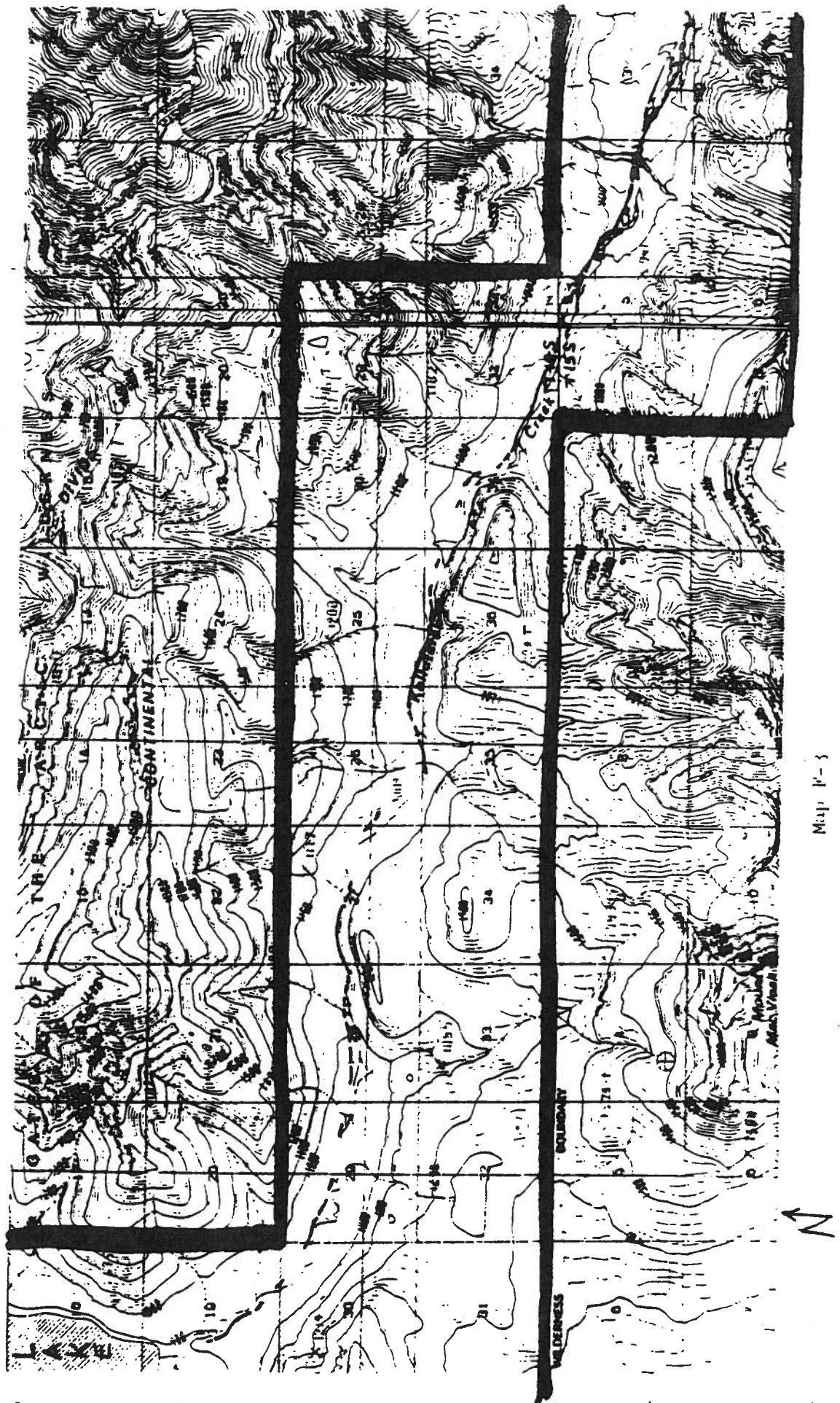
Map F-1



ATV Trails along the middle portion of Kollutarak Creek (2 of 3 maps).

Current ATV Use Area Boundary

Park Wilderness Boundary MAP F-1



Map 10-3

ATV Trails along upper Kollutarak Creek to Chandler Lake (3 of 3 maps).

Current ATV Use Area Boundary

Park Wilderness Boundary

One route crosses the valley floor on the right (west) side of the river. Another route, also on the right side of the valley, travels over higher ground lying an average 1/2 mile west of the river. The third route crosses Contact Creek to the left (east) side of the valley and crosses the high ground on that side of the river until about 1/2 mile above the mouth of Kollutuk Creek where it crosses the John River traveling west to a kettle lake-dotted morainal remnant where it converges with the other two trails and drops down onto the floodplain of Kollutarak Creek. The land that these trails pass over is owned by either the village or regional Native corporation.

These three ATV trails are easily visible from both the air and the ground. The high trail on the west side of the valley is the least visible, suggesting that the vegetation was affected along this route to a lesser degree than the other routes. Only rarely can areas of churned organic or mineral soil be seen. Vegetation types, amount of soil moisture and the composition of the substrate appear to be the factors that limited the visible impact along this trail. Observations over the last two years indicate that the majority of ATV traffic follows this route to access the Kollutarak valley.

The ATV trail that closely parallels the John River along the valley floor displays the greatest visual evidence of ATV effects on vegetation. Churned and boggy areas that are the result of ATV use are common along this route. This, in part, is probably due to the predominance of wet, marshy ground and that portions of the route follow the course of a pipeline construction road, a previously disturbed area.

The high route along the east side of the valley crosses some wet areas as well as terrain that is frequently dissected by narrow, steep-walled drainage gullies. This type of terrain requires ATVs to work hard, which tends to impact the vegetation to a greater degree than does easy running.

The valley of Kollutarak Creek trends west-northwest from a point on the John River slightly more than 8 air miles southwest of the village of Anaktuvuk Pass. The valley terminates 4 miles east of Chandler Lake at the continental divide, which at that point is little more than a low ridge. Another valley immediately begins on the west side of this low divide and runs 4 miles west to Chandler Lake. Except for the fact that the direction of the drainage flow changes at the continental divide, the divide itself is low enough to make the two valleys appear as a single valley. Indeed, the Kollutarak valley is considered by the local residents to run from the John River to Chandler Lake. This 22-mile-long valley provides access to a variety of hunting, fishing and camping locales that have been used to varying degrees by the residents of Anaktuvuk Pass since the establishment of the village. These valley locales were also used historically.

The land that constitutes the floor and lower slopes of the Kollutarak valley was owned by the ASRC prior to, and during the first several years of the park's existence. As the result of the 1983 Chandler Lake Exchange between ASRC and the Department of the Interior, this land became non-wilderness park land. As part of the Exchange, an ATV-use easement was established along the active floodplain of the creek. However, prior to the exchange unrestricted ATV use was allowed in the valley.

The following subsistence resource areas are located in the Kollutarak Creek valley: In T15S, R1E, Umiat Meridian, SW1/4 Section 32, is an occasional sheep-hunting locale and SW1/4, Section 30 is a year-round sheep-hunting area. In T15S, R1W, Umiat Meridian: NW1/4 Section 11 has a marmot colony (a resource that is rarely used today); NE1/4 Section 9, Kugukpuk, has good sheep hunting in the general area as well as an old and popular camping area; NW1/4 Section 22 has a mineral lick and the S1/2 Section 18 has a sheep-hunting area. In T15S, R2W, Umiat Meridian: NW1/4 Section 13 has a mineral lick; SE1/4 Section 4, a fall camping area; and NE1/4 Section 4 and NW1/4 Section 3, a year-round caribou- and sheep-hunting area. In T14S, R2W, Umiat Meridian: SE1/4, Section 31, an old camping area; SW1/4 Section 30, a sheep-hunting area; and NW1/4 Section 31 and NE1/4 Section 36, a year-round sheep-hunting area. In T14S, R3W, Umiat Meridian: SW1/4, Section 28 and S1/2 Section 29 have a sheep-hunting area; NW1/4 Section 28, a fall and winter camping area; NW1/4 Section 28 and NE1/4 Section 29, a sheep-hunting area and SE1/4, Section 18, a marmot colony.

In general the Kollutarak Creek ATV trail follows the route of the winter sled/snow machine trail. The old summer foot/pack dog trail did not go down the John River valley to Kollutarak Creek, But rather took a shorter and more profitable (in terms of hunting possibilities) route up Contact Creek about 3 miles, then south up a tributary drainage a mile or so, then west for 5 miles through a trough in the mountains, then south down a tributary creek into the Kollutarak valley 6 miles west of the John River. However, ATVs cannot follow this trail because of the steepness and roughness of the terrain beyond the Contact Creek valley.

The Kollutarak Creek ATV trail is probably the most visible of all the established ATV trails over the majority of its length. Only the Anaktiktoak ATV trail comes close to the Kollutarak trail in terms of visibility. Both of the routes were frequently used winter dog sled trails regularly used by the area residents for the last 40 years. Additionally, these routes have been heavily used by snowmachines over the past 25 years. Both dog sleds and snowmachines crush vegetation that stands above the snow, leaving a visible trail after the snow melts. Both of these routes have been used during the summer by ATVs for the last dozen years.

The main difference between these two routes in terms of trail visibility is probably due to the much higher level of snowmachine

traffic that the Kollutarak route receives as the main route to the Chandler Lake area. Additionally, the valley floor of Kollutarak Creek contains far more and extensive willow patches than does Anaktiktoak, and a trail through the willows is very visible. The various ATV routes from Anaktuvuk Pass come together on a moraine remnant at the mouth of the Kollutarak valley. There are wet areas between the lobes of the moraine, and in these areas the ATV trail is very visible as the vegetation and organic soil has been churned up and ruts have formed. The visibility of an ATV trail on morainal deposits, with its vegetational cover of lichen and moss, is typically faint. As the ATV trail drops down to the floor of the Kollutarak valley it once again becomes highly visible as it passes through a wet area bordering a pond. From the point the ATV trail descends to the valley floor it remains on the valley floor it remains on the active and inactive floodplain for a distance of slightly more than 5 miles crossing the creek twice. Over this distance, except when crossing portions of the active floodplain, the trail is highly visible from both the air and the ground. The trail's visibility in this area appears to be primarily due to the extreme compaction and compression of the vegetation and the destruction of the scrub and the taller willows that makes the trail appear as a swatch cut through this higher-standing vegetation. There are very few locales along this section of the trail where the vegetation mat has been broken up as the result of ATV activity. Additional evidence of ATV use can be found at a favored camping location at the western end of this section of trail. The variety and volume of trash, including paper, tin cans, hearth remains, tent fabric and gas and oil cans, suggests this site is often used as a base for snowmachine- and ATV-supported hunting trips. The ATV trail enters non-wilderness park land about the point where it arrives on the floodplain of the creek. Prior to that the trail crosses Native corporation land.

Over the next 8 miles the ATV trail is intermittently visible. Much of the route lies on the active floodplain of the creek, which consists of unvegetated gravel and cobbles. As a result there is little visual evidence of the passage of ATVs. Where the trail crosses sections of the vegetated inactive floodplain it is quite visible as the result of compression and compaction of the vegetation and the destruction of the scrub. At several locations along this section of the route the trail climbs out of the valley bottom and crosses the tussock tundra vegetation above the oldest cutbanks. Frequently in these tundra areas ATVs have broken through the vegetation mat and some churning of the organic soil and rutting has occurred. Additional evidence of ATV use can be found about 4.5 miles east of the continental divide at an often-used campsite located where south- and north-flowing tributaries enter Kollutarak Creek directly opposite each other. This campsite is predominately used in the late summer and early fall as a base for ATV-supported caribou and sheep hunting.

To the west between the above-mentioned campsite and the continental divide, visual evidence of ATV use becomes scanty. Much of the trail lies on the active floodplain where visual evidence of ATV activity is at best slight. When not crossing the inactive floodplain, the limited occurrence of ATV traffic this far up the valley has left little visible sign of activity. In this area the ATV trail is only intermittently and faintly visible. Even this far up the valley the trail can be traced from the air with only minimal difficulty; however, from ground level it requires diligence to follow the route.

West of the continental divide the roughly 5 miles of ATV trail between the divide and Chandler Lake is exceedingly difficult to follow even from the air. Even though the trail crosses wet sedge meadows and tussock tundra, limited ATV traffic over the last 5 miles of the trail has left little visible evidence. Additionally, caribou trails meander through this area. These naturally created trails are more pronounced than the ATV trail and tend to obliterate, camouflage and disguise the fainter ATV trail. On the flat alluvial fan, which supports a wet sedge meadow/tussock tundra area where the ATV trail emerges from the mountains on the edge of Chandler Lake, several sets of ATV tracks can be clearly seen. In the three years that ATV project observation was conducted in this area, only one ATV trip from Anaktuvuk Pass to Chandler Lake was documented, although other trips may have occurred. The single documented trip consisted of three ATVs traveling together in the late summer of 1986. Prior to that trip some very faint ATV tracks along the lake shore were attributed to an ATV trip that was reported to have occurred several years previously. Observations in the area over the past three years and conversations with village residents suggest that ATVs make a trip from the village to Chandler Lake at most only twice a summer. Those trips probably represent virtually all of the ATV activity on the Kollutarak trail west of the continental divide.

Kollutarak Knoll ATV Trail Study Site

The study site was established in 1986 in the NE1/4, NW1/4, NE1/4, Section 12, T16S, R1W, Umiat Meridian at an altitude of 2,170 feet. The site is located on a morainal remnant on the right (west) side of the John River valley and at the mouth of the Kollutarak Creek valley, approximately 8.5 miles southwest of the village of Anaktuvuk Pass. The site lies at the eastern edge of an extremely flat and level portion of the moraine. The western half of the site is located on the thin moss and lichen vegetation that covers the dry, rocky, gravelly soil of the moraine. The eastern portion of the site lies just off the edge of the moraine deposit in a moist/wet environment that supports a heath-type vegetation. The three ATV routes running south from the village to the Kollutarak valley coalesce about 330 feet east of the site. This means that virtually all ATV traffic traveling from the village south to the Kollutarak, Masu or Ekokpuk valleys passes across this site. ATV effects at this site were compression and some dislodging of the thin vegetation on the dry portion of the site. Some churning of the vegetation and the

ome rutting occurred on the wet portion of the
es on Native corporation land.

area that was owned by the ASRC in the Kollutarak
to dispersed ATV use. The total area opened to
of 46 square miles; however, only 25 square miles
TV operation. No additional park land in the
as opened to ATV use in 1987.

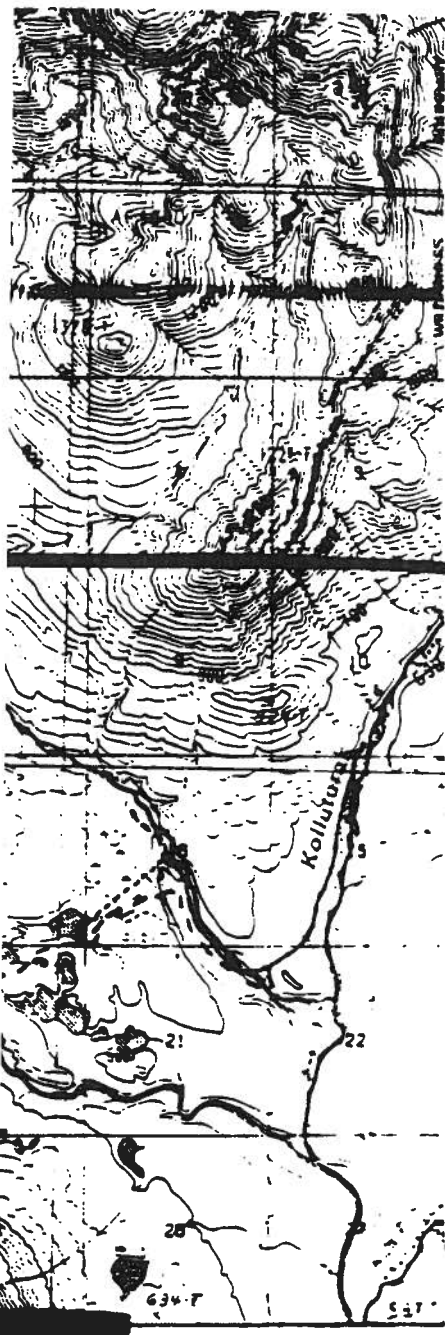
ATV-accessible area in the Kollutarak valley was
l ATV use prior to the creation of the park until
ment existed on the floodplain of the creek from
established trail route was never closed to ATV
season no photo points were established along the

round monitoring of the Kollutarak Knoll site in
cated some increase in ATV traffic. Over the
season the wet area at the eastern end of the site
and ATV drivers detoured around portions of the
summer of 1987 there was little increase in
areas. Less than 330 feet west of the site the
the eastern end of a rectangular pond. The left
trail heads south toward the Ekokpuk and Masu
right branch heads northwest up the Kollutarak
of the pond is wet, and ATV traffic through this
the vegetation and organic soil. These boggy
band over the summer of 1986. An increase in the
noticeable over the 1987 summer season. The
TV's on both trails appeared to be equal,
unts of traffic along both routes. However, the
ak valley is so much more visible and pronounced
the south that it seems quite unlikely that both
ced equal amounts of vehicular traffic except
nt past. The Kollutarak route is also a winter
effects on the vegetation may be the result of
by dog sled and snowmachine.

l ATV use in the Kollutarak valley suggests that
ited to general areas along the length of the
seems to roughly correspond to the previously
resource areas.

archeological survey was conducted along the
(Pittenger and Staley, 1986). A single site,
s located at the trail terminus on the eastern
e.

s of other archeological surveys in similar
uvuk area, more archeological sites than were
survey are probably present in the Kollutarak
establishment and monitoring of the Kollutarak



Creeks.

to the west and north which
because there is no evidence
IV's. Map 1

eastern end of the valley,
the locale was observed.

are observed in the valley
and or, if older, appear to
be the last 40 years. Most
to be used.

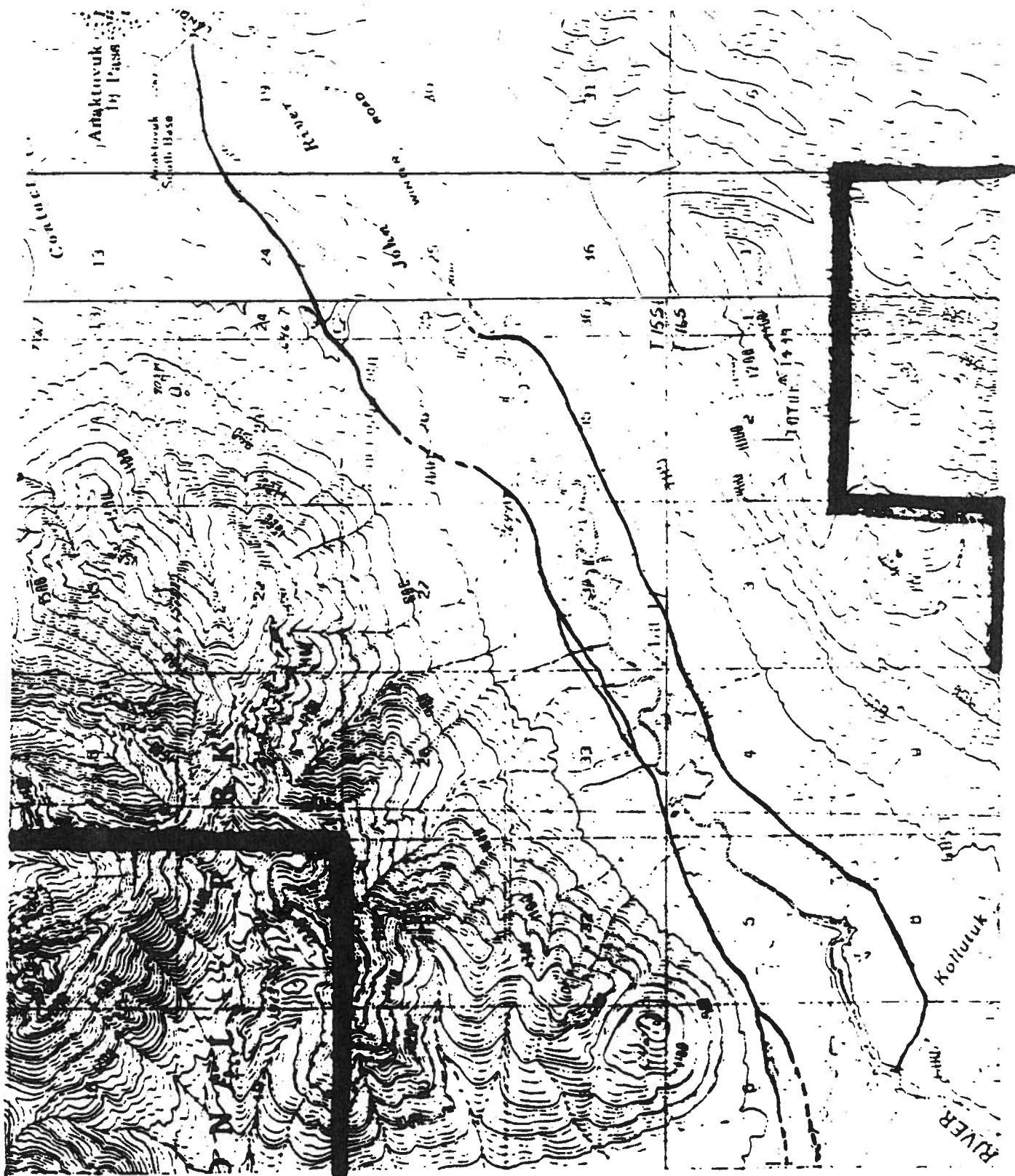
in the Kollutarak valley
Anaktuvuk Pass village. In
is a travel route between
than it was used as an

NCE - MAPS G AND H

rak Creek, Ekokpuk Creek
and the John River all
miles. This locale lies
the village of Anaktuvuk
Native corporation land
ately 18 square miles.
hat includes: the lower
lutarak Knoll study site
John River; the last 4.5
Pass boundary southeast to
ak; and the easternmost 3
wilderness boundary to the

ing south from Anaktuvuk
ds west of the Kollutarak
the two branches of the
the other travels down the
then turns west, crosses
of depositional glacial
g locale on the left side
fluence with Kollutarak
operations that occur in
campsite.

1. One trail travels up
y visible from the air.
rikes overland south and
valley, which lies about
es an area of morainal
tle lakes, and gradually
nally used campsite



ATV Trails along the East and West sides of the John River Valley between Anaktuvuk Pass and Kollutarak Creek.

Current ATV Use Area Boundary

Park Wilderness Boundary

Map H

located about a half mile inside the park/wilderness boundary. A third and less often-used trail runs down Masu Creek toward the Kollutarak Creek confluence roughly a mile to the southeast. Although all three trails are easily visible from the air, and in most cases from the ground as well, much of the terrain that the trails pass over is relatively level and well drained. As a result there has been little noticeable disturbance to the vegetation and soils.

In addition to the main travel routes there is considerable evidence of dispersed ATV use in the confluence area. Most of the tracks made by ATVs wandering randomly over this area are recognizable only from the air. The bulk of the ATV use in this area occurs during August and September.

As might be expected, several prehistoric archeological sites were located in the moraine/kettle lake topography between the mouths of Ekokpuk and Masu creeks during cursory archeological surveys conducted in 1986 and 1987. About half a dozen more recent human-use sites were observed in the area. All of the recent sites appear to have been used since the establishment of Anaktuvuk Pass village, and the majority of these seem to be directly associated with ATV activity.

Given the uniqueness of this locale, the confluence of three stream drainages with a major river, there is little doubt that an intensive archeological survey of the area would locate more archeological sites. In terms of human use, an area such as this would be more important to the regional inhabitants in pre-village times as a resource procurement/travel crossroads area than it would be today when the human population is less nomadic. Therefore this might well be the only locale in the Anaktuvuk area where pre-village human-use sites outnumber contemporary human-use sites.

MASU CREEK - MAP G

Masu Creek heads at an elevation of 5,000 feet in the mountains on the right side of the John River valley 17 miles west-southwest of Anaktuvuk Pass village. From its headwaters the creek flows southeast slightly more than 8 miles where it joins Kollutarak Creek 2 miles above its confluence with the John River. The lower 3.5 miles of the creek lie on Native corporation land while the remainder lies on wilderness park land. Prior to the summer of 1987 ATV use was not permitted in the portion of the Masu Creek valley that lies on park land.

On Masu Creek about a mile above its confluence with Kollutarak Creek lies a traditional fall camping locale. This location is often used as a base of operations during late summer and fall caribou hunts in

the Kollutarak-Masu-Ekokpuk-John River confluence area. Most of the ATV use in the area occurs at that time.

About a mile farther upstream is a large berry patch. This berry patch is mainly exploited by hunting parties when in the area as other excellent berry resources are located much closer to the village. However, prior to 1960 when a number of families still lived seasonally at different locations in the Anaktuvuk Pass area this berry patch may have been regularly harvested. Approximately 1.5 miles upstream from the berry patch and just inside the wilderness boundary lies an old winter campsite. This site, complete with the remains of an ivrulik (moss/sod house), was last occupied by an Anaktuvuk Pass family in the 1950s. About 2.5 miles above the old winter camp on the mountain slopes on the right side of the creek lies a mineral lick. The lick lies about 500 feet above the valley floor 1/4 mile southwest of the creek on the left side of a major tributary. In the past this has been a fairly reliable sheep-hunting locale, although evidence suggests that it has not been regularly used in recent times.

At present the ATV trail along Masu Creek begins at the campsite location and runs about a mile downstream (southeast) to the creek's confluence with Kollutarak Creek and also travels upstream (northwest) slightly more than a mile before it fades from view. All of the Masu Creek trail lies on Native corporation land. From the air the trail is only moderately visible, suggesting that ATV traffic over the route has been light. Indeed, the ATV trail from the Kollutarak Knoll study site to the Masu Creek campsite and the ATV trail from Masu Creek to Ekokpuk Creek are much more visible than is the trail along upper Masu Creek. Visible evidence of ATV use in the Masu Creek valley stops short of the park boundary. However, conversations with local residents indicate that on a few occasions in the past ATVs have been used on sheep-hunting trips and were taken up the creek to a point about 1.5 miles beyond the wilderness boundary to the vicinity of a mineral lick. The lack of visible evidence of dispersed ATV use in the area suggests that it has been a number of years since this type of activity has occurred. Current information from Anaktuvuk Pass residents indicate that there is no good reason nor would it be worth the trouble to try to take an ATV beyond (upstream) the area of the mineral lick.

In 1987, 4 square miles of park land in the Masu Creek drainage were opened for ATV use. This area includes Sections 35, 36, T15S, R2W; Sections 1, 2, T16S, R2W, Umiat Meridian. Because of the narrowness of the upper portion of the creek valley, only a small portion of the 4 square miles is accessible by ATVs. It would be exceedingly difficult to operate an ATV in this portion of the valley except within close proximity to the creek or on the lower end of its major tributary that flows north past the mineral lick. In a linear sense the addition of the 4 square miles added a potential length of 2.25 miles to the Masu Creek ATV route. However, the uppermost mile of

potential trail is rough enough to discourage any ATV operations normally associated with hunting activities.

In an effort to visually monitor the long-term effects of ATV use in the area, two photo points were established on Masu Creek during the summer of 1987.

Photo Point No. 1

This point lies about 180 feet north of the confluence of Masu Creek and its major tributary in the NE1/4, NE1/4, SW1/4, Section 35, T15S, R2W, Umat Meridian. The site is located on a sparsely vegetated knob that rises about 50 feet above the valley floor on the left (north) side of the creek and provides a good view down the valley to the park wilderness boundary as well as south up the lower portion of the tributary stream. The view from the site upstream is limited to slightly more than 1/4 mile by the local topography.

Photo Point No. 2

This point is slightly more than 2 miles upstream from photo point No. 1 in the SE1/4, NW1/4, NW1/4, Section 27, T15S, R2W, Umat Meridian. This photo point lies slightly more than a mile beyond (upstream) the limit of the area open to ATV operations. The site is located on the left (north) side of the creek on a bench that rises about 100 feet above the valley floor. The site offers a reasonably good view down the creek to a point about 1/2 mile short of photo point No. 1. Local topography, a turn in the valley and abruptly constricting valley walls, precludes overlapping fields of view from the photo points.

At the time the photo points were established in mid-July 1987, there was no visual evidence of ATV activity on park land in the Masu Creek drainage. Photographs were taken from the Masu Creek photo points at midsummer of 1987.

During the summers of 1986 and 1987 several observation flights were made along Masu Creek, and at no time was any evidence of ATV activity on Masu Creek park land observed.

A cursory archeological survey of the Masu valley during the summer of 1987 produced little evidence of human use of the area even though some Anaktuvuk residents said that the locale was an often-used sheep-hunting area. Few human-use sites were observed, and none was older than 40 years.

Local informants as well as the literature (Ingstad, 1954; Mediana, 1972; Binford, 1978) provided information that suggests that the most concentrated use of the Masu valley occurred during the first five years of the 1950s when one of the Anaktuvuk families regularly overwintered there. During the same time period the area sheep populations were hunted intensively and most of the evidence of camping near the mineral lick dates from that era.

EKOKPUK (IKIAQPAK) CREEK - MAP G

Ekokpuk Creek heads in a small mountain lake at 4,000 feet approximately 30 air miles west-southwest of Anaktuvuk Pass. The creek flows 21 miles east where it joins Kollutarak Creek. Kollutarak in turn joins the John River after flowing a mile to the south.

The confluence of Ekokpuk Creek and Kollutarak Creek lies slightly more than 12 miles southwest of the village of Anaktuvuk Pass. An area of morainal topography supporting a scattering of kettle lakes extends from the confluence of the two creeks west-northwest for 3 miles into the mouth of the Ekokpuk valley. It is through the northern portion of this area that the ATV trail enters the Ekokpuk Creek drainage. The park wilderness boundary lies about 1/2 mile west of the westernmost kettle lake, just inside the valley mouth.

Over the first 4 miles of its length above the Kollutarak confluence, the creek flows through a topography of glacial deposits. It is confined to a single, well-defined channel bordered by steep cutbanks 10 to 15 feet high. There are no tributary streams of any consequence joining the creek in this area, and there are only small stands of willows at the tributary confluences. In this area the land immediately bordering the creek is quite open with the vegetation alternating between the moss, lichen and grass of the well-drained glacial deposits to the hummocky, tussock tundra and wet sedge areas of the lower, less well-drained ground. Small stands of willow are thinly scattered along the creek's active floodplain.

As it leaves the moraine, about 1/2 mile west of the park wilderness boundary, the character of the creek begins to change and the channel becomes somewhat braided. This change in character enhances the winter buildup of isolated seasonal ice deposits that may linger into August and occasionally remain extant throughout the summer. Farther west 2 miles the vegetation and stream physiography change dramatically.

A sizeable tributary stream enters the creek from the north 1/4 mile northeast of the point where the creek has captured a small lake. A large willow patch with many willows of extraordinary size borders the tributary stream. Evidence of a number of human-use sites can be found in this willow patch.

Several hundred yards to the west of the willow patch Ekokpuk Creek begins the process of splitting into four major and numerous small, ill-defined channels. These channels meander about on an active floodplain 3/4-mile wide bordered by abruptly rising 15- to 20-foot-high cutbanks. Although briefly constricted at its midpoint, this type of stream valley physiography continues for a distance of slightly more than 4 miles to a point about 1/4 mile west of the confluence of the creek's northern and western forks. With the

exception of a 160-acre unvegetated area where a large buildup of seasonal ice occurs yearly, the valley floor in this area is covered by an enormous willow patch. Many of the willows are in excess of 15 feet high and more than 8 inches in diameter. Numerous small stream channels weave their way through these willows.

West of the point where the valley floor briefly constricts to a width of $1/4$ mile, the number of major stream channels is reduced to two and the number of smaller channels is also greatly decreased. However, the willows remain as robust and prolific as they are to the east. To the west of the confluence of the creek's north and west forks the valley floor of the west fork narrows to about $1/4$ mile yet the stream remains braided and the willows large and abundant.

From its junction with the Ekokpuk valley, north for a distance of 3 miles to its head, the valley floor of the north fork of Ekokpuk Creek averages about $1/2$ mile in width. The only exception to this occurs at a point about $1/3$ mile above the confluence of Ekokpuk's north and west forks where a hill and a high bench briefly constrict the valley floor to a width of about 300 feet. The broad, relatively flat floodplain of the north fork supports an extensive and robust willow patch that extends almost to the head of the valley. The stream is quite braided and numerous channels meander about the floodplain for most of the valley's length. Along the majority of its length, 5- to 10-foot-high cutbanks border the active floodplain, although there are several locales where alluvial fans built by tributary runoff drainages gently grade out onto the floodplain. The lower slopes of the bordering valley sides are more rocky, firmer and better drained than are the valley slopes along Ekokpuk Creek below the confluence. However, some areas of moist cotton grass tussock tundra and low poorly drained areas supporting wet sedge meadows are present. The head of the valley marks the confluence of the two streams that form the north fork of Ekokpuk Creek and marks the limit of the area open to ATV use during the summer of 1987.

In the Ekokpuk valley, from the park boundary west to the confluence of the creek's north and west forks, the terrain and accompanying vegetation along the lower slopes of the valley away from the creek can be best termed as rough. In general the lower valley slopes support either moist tussock tundra or a dense shrub/heath dissected by numerous entrenched and willow-choked runoff drainages. This is particularly true of the northern slopes of the valley. Walking through this landscape is arduous. Operating an ATV in this terrain would be extremely difficult and quite probably injurious to the machine. However, the cutbanks are often incised by deeply entrenched runoff drainages and the floodplain, while open enough to permit walking is, for the most part, too densely covered by willows to permit reasonable ATV operation. As a general rule the terrain on the right (south) side of the valley is more easily crossed than that on the north.

The valley floors and the terrain bordering the north and west forks of the creek are much easier to negotiate on foot or by ATV than the lower portions of the valley. However, it is doubtful that ATV operators would more than rarely be tempted into the region due to the extreme difficulty of traversing the terrain of the lower valley.

In terms of past human use of the valley there is ample evidence of recent, historic and prehistoric exploitation of its natural resources. The large willow patch that lies in the SW1/4, NW1/4, SW1/4, Section 26 and the SE1/4, NE1/4, SE1/4, Section 27, T16S, R2W, 1/4 mile east of the stream-captured lake, displays evidence of both recent and historic use and was probably used as a campsite in prehistoric times as well. A small section of Ekokpuk Creek that lies in the NE1/4, SE1/4, NE1/4, Section 33, T16S, R2W, is a fishing locale (Qaluich) traditionally used during the summer, fall, and spring. Additionally, village residents say that a little over a mile west-northwest of the fishing hole, on the mountain side, in the NW1/4 of Section 28 lies a mineral lick that has been used as a fall sheep-hunting area.

In July of 1985 a brief archeological survey was conducted in the Ekokpuk Creek valley (Pittenger and Staley, 1986). This survey located the four described sites. Two of these sites contained only a prehistoric component, both flake scatters; another, a stone hunting blind/shelter, probably represents use within the last 75 years. The fourth site was reported to have surface and subsurface prehistoric cultural material present as well as recent and modern detritus. This site lies on a hilltop just inside the park boundary and appears to have served as a campsite, probably its function in prehistoric times as well.

During early July 1987 an on-the-ground environmental reconnaissance of the Ekokpuk valleys was conducted to assess the degree of past and present ATV use in the valley. Ancillary to this reconnaissance 13 archeological sites were located. The number of archeological sites incidentally located suggests that if a well-planned archeological survey were to be conducted in the area more sites would be found.

On the 13 archeological sites found in 1987, four exhibited both prehistoric and recent cultural detritus while the remainder were represented by either historic or prehistoric remains (Kunz, 1988).

Additionally, a number of recent human-use camps were found that were not associated with archeological sites as well as isolated bits of evidence indicating recent use of the area.

Recent use of the area refers to use that appears to have occurred since the establishment of Anaktuvuk Pass village. Typically, the cultural detritus observed at these sites includes the remains of a hearth containing charcoal and charred willow, several axe-cut willow poles, bone fragments, some tin cans, food wrappers and cigarette butts. At the lower end of the valley near the park boundary

scattered recent evidence of general use was observed that was absent farther up the valley. Such evidence consisted of scattered pieces of sleds such as sections of runners, runner shoes, chunks of plywood and boards and pieces of rope. Snowmachine parts such as skis, drive belts, chunks of track, pieces of windshield and track cleats were also observed.

In general all of the evidence of recent human activity in the Ekokpuk valley within the park does not appear to have resulted from the use of ATVs. Evidence of summer human use of the area appears to pre-date ATVs. This suggests that pack dogs were used as beasts of burden and suggests use prior to the mid-1970s. The use of mechanized transportation in the valley west of the fishing hole seems to have been limited to snowmachines. All of the upper valley camps appears to be the result of a single occupational episode.

One resident of Anaktuvuk Pass said that the general mineral lick location, about a mile north and west of the fishing hole, is the usual western limit of ATV use in the valley. However, on-the-ground inspection of this area produced no visible evidence of ATV use. Additionally, aerial observation conducted periodically over the course of the summer of 1986 indicated that ATV use stopped near the park boundary. Similar aerial and ground reconnaissance conducted during the summer of 1987 indicated that ATV use extended only as far as the willow patch in Sections 27 and 28, about 2 miles beyond (west of) the park wilderness boundary. This was the first time evidence indicating the use of ATVs on park land was observed in the Ekokpuk valley. If prior ATV use has occurred in the Ekokpuk valley on park land it was infrequent.

However, the general evidence for past human use of the Ekokpuk valley far exceeds that of any other area examined by project personnel. There is no doubt that the Ekokpuk valley was heavily exploited for its subsistence resources in both the prehistoric and recent past. The main reason for this appears to be that the valley contains year-round subsistence resources of a variety and abundance that are not found in the other valleys near Anaktuvuk Pass.

The enormous willow patch that covers much of the valley floor provides the extremely large willows that were so important to ivruluk (winter house) construction in the past. Additionally, a willow patch of this size provides an almost inexhaustible supply of firewood and a relatively sheltered environment for winter living. A secondary benefit of the willow patch is that it provides an excellent year-round moose habitat. Observations over the last two years indicate that between 20 and 30 moose occupy the valley on a year-round basis. Periodic aerial observation of this moose herd suggests that no human predation has occurred at least since 1986. Many of the residents of Anaktuvuk Pass have said that they only kill moose very close to the village, usually in the large willow patch that lies on the eastern side of the air strip, because the large animals are so difficult to handle and time-consuming to butcher.

Additionally, Ekokpuk Creek abounds with grayling and "Old Man" fish (dwarf Arctic char) that are available throughout the year by using either hook and line or nets. Large caribou herds move through the valley in the spring and fall and sheep are available in the surrounding mountains. Berries and other varieties of vegetation eaten by humans are seasonally abundant, although the aboriginal Nunamiut Eskimo diet is estimated to have contained less than 5 percent plant material (Hall, 1961).

Of equal importance in terms of human use is the fact that the Ekokpuk valley is strategically located as a travel route. The Ekokpuk valley connects the John River/Anaktuvuk River valleys with the Agiak/Amiloyak lakes area as well as providing access to and from the Killik River drainage. Chandler Lake is also accessible through the Ekokpuk valley.

The changing lifestyle of the Nunamiut has rendered the subsistence resources of the Ekokpuk valley, especially those necessary for winter survival, of less importance than they once were.

Range line 1W/2W has been the park wilderness boundary in the Ekokpuk valley since the park was created. The land east of that line to the John River valley is owned by the ASRC, and land lying to the west of the line is wilderness park land. Prior to the summer of 1987, ATV use was not allowed on park land in the Ekokpuk valley, nor was there any visible evidence that unauthorized ATV use had occurred on park land in the valley. None of this area had been opened to ATV use in 1986 when the ATV project was initiated, and as a result no study sites had been established.

In 1987, 21 square miles of park land in the Ekokpuk drainage were opened to subsistence oriented ATV use. This land included Sections 19-34, T16S, R2W and Sections 12, 13, 24, 25, 36, T16S, R3W, Umiat Meridian. While much of this area is far too rugged for ATVs, the potential exists for a linear extension of the trail from the park boundary west and north for a distance of 10 miles to the upper end of the valley of the creek's north fork. Three photo points were established in the valley so the gradual development of an ATV trail could be monitored and documented if it occurred.

Photo Point No. 1

This point is about 1/4 mile north of the confluence of the two streams that form the north fork of Ekokpuk Creek in the NW1/4, NW1/4, NE1/4, Section 12, T16S, R3W, Umiat Meridian. The site lies on a mountainside terrace about 165 feet above the valley floor and provides an excellent view down-valley south for 3 miles to the confluence of Ekokpuk Creek's north and west forks.

Photo Point No. 2

This point is slightly more than a mile northwest of the confluence of Ekokpuk Creek's north and west forks in the SE1/4, NE1/4, SE1/4, Section 23, T16S, R3W, Umiat Meridian. The site lies atop a hill

that projects spur-like from the valley wall and lies between the two tributaries. The site location rises about 200 feet above the valley floor and provides an excellent view east down the main valley about 4.5 miles to the vicinity of the stream-captured pond. The site also provides an excellent view north up the north fork valley for a distance of roughly 2 miles and an excellent view west up the valley of the west fork, although this area had not been open to ATV use.

Photo Point No. 3

This point is on a hill on the north side of Ekokpuk Creek in the NE1/4, SW1/4, SE1/4, Section 24, T16S, R2W, Umat Meridian. The site lies slightly less than 1/2 mile west of the park wilderness boundary and rises about 130 feet above the valley floor. The view from the site is excellent, extending west up the valley for more than 4 miles and east down the valley to the creek's confluence with Kollutarak Creek, a distance slightly less than 4 miles.

The photo points were established in early July 1987 and photographs of the valley were taken from the photo points when they were set up. In late May and early June, photographs of the portion of the Ekokpuk valley that was being opened to subsistence ATV use were taken during aerial reconnaissance flights. At these times no evidence of ATV operation on park land was observed. Several more aerial reconnaissance flights were made during the course of the summer, but it was not until mid-September that visual evidence of ATV use beyond the wilderness boundary was observed. The evidence of ATV use consisted of what appeared to be a single set of ATV tracks, visible only from the air, running west from the park boundary toward the large willow patch located in sections 26 and 27. The tracks faded from view before reaching the willow patch. The disappearance of the tracks was probably due to a change in the vegetation. The tracks appeared to be the result of a single episode of use and represent the only documented evidence of ATV activity on park land in the Ekokpuk valley.

DISPERSED ATV USE

The dispersed use of ATVs is considered to be use that occurs off the established trails. It can be described as wandering activities directly associated with subsistence hunting in which the ATV rarely makes more than one and almost never more than three passes over the same route. Additionally, because this type of use is episodic, only by sheer chance would subsequent ATV activity occur on a route that was previously used. Data concerning the dispersed use of ATVs were collected from both actual random and controlled activity.

Dispersed use of ATVs was randomly monitored from June through September during the summers of 1986 and 1987 and late June through

early August 1988. Observations were made independently and under a variety of conditions by two biological technicians, the project coordinator, a botanist, a sociologist, an archeologist and a park ranger/subsistence specialist. As a result of these independent observations, a number of general consistencies became apparent. The following statements are based on three summers of qualitative observations and relate only to the use of six- and eight-wheeled ATVs. The degree that most of the visual and physical impacts to vegetation resulting from dispersed ATV activity will endure beyond two growing seasons is not known.

1. There are two effects of any ATV use, visual and physical. However, the dichotomy between the two is considered more pronounced in dispersed use than in multiple passes over the same location. For example, the tracks resulting from the single pass of an ATV over a segment of ground may be readily visible from the air even though the physical effect on vegetation may be extremely minimal.
2. It appears that in most cases one to three passes by an ATV with an average internal load of 600 to 800 pounds over reasonably level, dry and well-drained ground and associated surface vegetation causes minimal surface disturbance and leaves a trail that is usually easy to locate and visible only from the air.
3. Most visual signs of vehicle passage seem to fade rather quickly if the dispersed ATV use occurs on reasonably well-drained ground and early in the growing season, before the majority of the plants are out and before many have reached maturity.
4. Visible signs of vehicle passage are slight and fade away gradually if dispersed ATV use occurs on reasonably well-drained ground prior to the first killing frost when the majority of plant species are still alive.
5. The visibility of the trail is more pronounced when dispersed ATV use occurs on reasonably well-drained ground after several killing frosts have occurred than it is when the vegetation is still living. Frost-killed vegetation appears more prone to compaction, breakage and leaf stripping than do the more resilient living plants.
6. The effect on surface vegetation is easily visible on the ground as well as from the air when dispersed ATV use occurs on poorly drained or submerged ground. The visible effects of ATV passage through a wet environment appear to dissipate quite slowly, although cursory examination of the vegetation suggests that physical disturbance is relatively minimal.

7. By and large surface vegetation does not appear to be more than slightly impacted physically and moderately impacted visually by one season's dispersed ATV activity. Scrub vegetation such as dwarf birch and willow appears to be impacted to the greatest degree because these plants are woody and, therefore more brittle than grasses, sedges and herbaceous plants. Additionally, scrub vegetation generally grows to greater heights above the surface of the ground so that it may become enmeshed in the running gear of the vehicle as it passes. The relatively low, flat, boat-like bottoms of ATVs tend to flatten taller scrub vegetation. This can result in trunk/stem/branch breakage, as well as skinning and bruising the trunk and branches and stripping the leaves.

8. Visibility of ATV tracks resulting from dispersed or random activity depends on a number of variables. These include the angle at which the terrain is observed, vegetation types, surface moisture (tracks are much more visible after a rain, heavy dew or light dusting of snow) and the angle of the sun.

OBSERVATIONS OF RANDOM ATV USE

About September 20, 1986, a hunting camp was established in the Ekokpuk Creek valley about 3 miles west (upstream) of the creek's mouth, in the NW1/4, SW1/4, NE1/4, Section 19, T16S, R1W, Umiat Meridian. The camp consisted of three wall tents, two ATVs and an unknown number of people. The camp was used for at least two days before it was abandoned, and evidence at the site indicated that the hunters took several caribou.

The camp was set up on a small hill with a substrate composed of gravel, cobbles, and boulders. Most of the surface of the hill except for the northern edge is quite dry. Vegetation at the site consists mainly of lichen, moss, grasses, scattered herbaceous plants and some dwarf birch. The northern edge of the site is wet and supports a small but robust stand of willows that reach heights of 6 feet. A small area of standing water or ice lies in a low spot in the willow patch. At the time the hill was used as a campsite, the surface vegetation had been frost-killed for some time and much of the surrounding area, although not the hill itself, was covered by a light dusting of snow.

From the air ATV tracks were visible in the vegetation. Two sets of tracks, sometimes parallel, sometimes merging, suggested a single trip south from the hunting camp to Ekokpuk Creek and back to camp, probably to obtain water. A trail that entered the valley from the northeast appeared to be the access/egress route to the campsite from the John River valley. Another ATV track meandered west from the camp to the park boundary and returned to the camp. The majority of

the ATV tracks ran north from the camp, through the willow patch and along the lower slopes of the mountains where the hunting activities were conducted. These tracks, mostly visible only from the air, meandered in a random fashion along the mountain flanks, rarely making more than a single pass along a given route. The only track that was easy to locate and visible from ground level was the route of access/egress from the camp to the hunting area. A number of passes were made along this route; this, as well as the wet/moist terrain, contributed greatly to the track's visibility.

On-the-ground inspection of the site was conducted the day after the camp was abandoned. In order to locate the ATV tracks on the ground they first had to be located from the air. A representative ATV track was located from the air. The helicopter landed on the track, but even with the helicopter parked on the tracks, it was almost impossible to see them from ground level. To graphically depict the difference between aerial and ground level visibility of ATV tracks, a colorful marker was placed on the ATV track. The marker and ATV track were photographed both from the air, about 200 feet above ground level, and from the ground. In the aerial photos both the marker and the ATV track are visible, but in the ground-level photographs only the marker can be seen. The ATV tracks crossed lichen/moss/grass and tussock tundra plant communities with the degree of visibility appearing to be the same on either type of vegetation.

The same photographic technique was employed on the route used to access the hunting area. This route had experienced multiple ATV passes and was much more visible from both the air and ground than were the dispersed-use ATV tracks. However, ground level visibility of this route was most pronounced in the willows and the wet area at the north edge of the campsite. The tracks began to fade from ground-level view as this route reached tussock tundra and the ATV traffic became a bit more dispersed.

Two days later additional reconnaissance and documentation of this site was conducted. The dispersed-use ATV tracks appeared to be slightly less visible than they were two days earlier, although the tracks through the willows and wet ground at the north edge of the site appeared to be as visible as they had at the time of the original inspection. A day or so later a light dusting of snow had fallen on the area, and the snow brought the ATV tracks into stark relief. Some ATV tracks that previously were not visible from the air were made visible by the snow.

During the summer of 1987 aerial reconnaissance of this site was conducted on a number of occasions between late May and the end of September. The first inspection was made shortly after the snow had melted and before most of the vegetation began growing. At that time it appeared that most of the previous year's dispersed-use ATV tracks were faint but visible. The multiple pass access and egress route at the northern edge of the campsite was plainly visible. As the

summer progressed and the vegetation continued to grow, the dispersed-use ATV tracks became more difficult to see. By the end of the growing season most of the dispersed-use ATV tracks could be seen from the air only if approached from the proper angle or if the angle of the sun was complementary. The multiple pass route at the north edge of the site became less pronounced as the growing season progressed, but it remained visible from the air throughout the summer. No on-the-ground inspection of this site was conducted in 1987.

In 1988 two aerial reconnaissance flights were made over this site on June 24 and on August 7. The aerial reconnaissance revealed no visual evidence of the ATV activity that occurred at the site in 1986 except for the multiple pass route that crossed the small willow patch and wet ground at the north edge of the site. This evidence, although visible, was difficult to locate and it is doubtful that it could have been noted by people unfamiliar with the locale's ATV history.

In the Ekokpuk Creek valley during the summer of 1987 what appeared to be a single or double pass (single episode) TV track was noted. The track crossed the terrain between the previously mentioned ATV campsite and a large willow patch about 2 miles to the west-southwest. The tracks appeared to fade out several hundred feet east of the willows, possibly due to a change in the vegetation. During ground reconnaissance these tracks could not be located. In 1988, early and late summer aerial reconnaissance of the area failed to locate this track, suggesting that the visual effects of that ATV activity were no longer identifiable.

During the summer of 1987 there were several opportunities to observe first-hand the impact on vegetation resulting from random or dispersed operations by eight-wheeled ATVs. On June 20, our field camp was visited by one of the local residents who was caribou hunting on his eight-wheeled ATV. The vehicle contained the driver, a passenger, camping gear and supplies sufficient to remain in the field for up to five days. The vehicle load was approximately 450 pounds.

Our camp was located in the SW1/4, SW1/4, SW1/4, Section 1, T14S, R1E, Umiat Meridian, on an alluvial fan at the confluence of Akmagolik Creek and an unnamed tributary stream near the point where Akmagolik Creek turns from a northwest to a northeast heading. The surface of the fan is, in micro-topography, lumpy, but on a larger scale relatively even and gently sloping toward the south. The surface of the site is well vegetated by a robust mat of moss, lichen, low woody and herbaceous plants and scattered patches of grass. The locale is well-drained and quite dry.

The driver drove the vehicle on the fan from the creekbed and across approximately 300 feet of the fan's surface to our tents. The

vehicle was parked for about 15 minutes before the hunting party departed to the southwest.

After the vehicle departed, its route from the creekbed and across the fan was examined. In the creekbed the vehicle's tracks were easily visible in the gravel and silt. Crossing the inactive floodplain, the vehicle's route was only occasionally, faintly visible where it had passed through small stands of low willow. Some of the willow and occasional patches of grass were slightly bent over. Climbing the 10-foot-high bank from the floodplain to the surface of the fan, the vehicle's track was faintly visible in the grass and low scrub. Once on the surface of the fan it was very difficult to see any sign of the passage of the vehicle, although with effort the route was traceable.

Late in the afternoon of the following day the route was again inspected. The track had to be picked up on the creekbed as signs of the vehicle's passage across the fan vegetation had faded to the point that the track could not be found. Once on the inactive floodplain, it became very difficult to follow the vehicle's trail as the majority of the willows had rebounded and only an occasional broken branch, scraped stem or freshly broken dead shrub indicated that a vehicle had passed through the area. The most visible portion of the route was where the ATV had climbed the bank from the floodplain to the surface of the fan. Even there, prior knowledge of the vehicle's passage would have been necessary to identify the track.

Several weeks later aerial observations could not discern visible evidence of an ATV had crossing the surface of the fan or the creek's inactive floodplain.

During the summer of 1988 we examined the route of the previous year's dispersed ATV activity in detail, and no visual evidence of the two passes made by the ATV could be detected, either from the ground or from the air.

During July 1987 on-the-ground and aerial reconnaissance was conducted in the Skimo/Confusion/Encampment Creek area. Evidence of dispersed ATV use was noted in the divide area between Skimo and Confusion Creeks. The majority of these single-use episode ATV tracks occurred on the north side of a Confusion Creek tributary valley. Caribou often congregate in this area after mid-July. Three faintly discernible sets of tracks were intermittently visible from the air, but they were extremely difficult to locate on the ground.

From early July through early August 1988 the dispersed-activity ATV tracks noted the previous summer could not be seen at ground level or from the air except for some extremely wet areas at the valley bottom. However, several ATV tracks were noted that were not there the previous summer, indicating recent dispersed ATV activity.

On August 11, 1987, the research team used an eight-wheeled Argo to travel to the Giant Creek valley. During this 15-mile round trip they crossed large streams with water depths to about 2 feet; boggy, wet, moist, and dry ground; tussock tundra; willow patches; and flat, steep, rocky and unvegetated terrain.

When crossing most virgin terrain an ATV will leave a visible trail that remains for varying lengths of time depending upon the type of vegetation cover and moisture condition of the ground. However, over the course of this journey, nothing that could be construed as amounting to anything greater than slight physical disturbance to the vegetation was noted as a result of a single ATV pass. On this trip the most noticeable disturbance to the surface occurred when climbing stream banks. Although the degree of disturbance varied with the steepness, height, substrate composition and vegetation cover of the bank. Only where the main trail crossed the stream was any bank degradation evident. Often stands of large willows, 2 to 3 inches in diameter and 6 to 8 feet high, flank the streams. We passed through several patches of large willows and the machine easily pushed the willows down to ground level and drove over them. Healthy willows of this size appear to be quite resilient, rebounding to their original position almost immediately. They seem to be able to take such treatment for several passes without showing any debilitating effects beyond scraped bark, some stripped leaves and an occasional broken or shredded branch. However, it appeared that more than four passes over the same route through large willows in an eight-hour period (allowing no time for recovery), had a more lasting effect. The willows became increasingly scarred and bruised and remained bent over to some degree. It appeared that large dead or dying willows tended to fracture, split or break completely when pushed over by an ATV.

On August 19, eight days after the ATV trip up Giant Creek, an aerial reconnaissance of the route was made. From the point where the ATV left the established trail the vehicle's tracks were only intermittently visible. The tracks were most visible on the tussock tundra areas or on the extremely wet or standing water locales.

OBSERVATIONS OF CONTROLLED ATV USE

Monitoring actual dispersed ATV activity provides information on the physical and visual effects of ATV use as well as data concerning areas used and frequency of use. This activity does not necessarily occur in all micro-habitats in the area. Therefore, it was decided to conduct controlled passes with an eight-wheeled Argo over the spectrum of locally occurring micro-habitats. The following are the qualitative observations made during that activity.

The observations were made on September 3, 1986, after several killing frosts had occurred. As a result the leaves on the dwarf birch and willow would fall at the brush of a walking person's pant

leg. During the previous few weeks, several snowfalls of 2 inches or less had subsequently melted. The week prior had been one of intermittent rain and the ground, while not saturated, was wet.

The area chosen for this work lies about a mile north and east of the village on village corporation land. A local resident operated the eight-wheeled Argo (his personal vehicle), and two biological technicians recorded observations of each of five passes by the vehicle through a variety of micro-habitats. Recordings included a description of the habitat and observations of the effects of the ATV on the vegetation accompanied by photographs.

Site No. 1

Dry heath/shrub. After one pass the track was not visible except on very close inspection that revealed slightly compressed vegetation. After three passes the plants and shrubs were compacted to the point where the track was slightly visible. After five vehicle passes compaction of the vegetation was greater and the track was more evident than after three passes. However, the track still was not obvious.

Site No. 2

An area of 3-foot high willow with an understory of dwarf birch and moss. After one pass the moss was slightly compressed, and the vehicle track would not have been evident except for the leaves that fell from the shrubs. The vehicle track became progressively obvious with additional passes. After five passes the track was easily visible mostly because the leaves had fallen off the shrubs. The moss was more compacted, and there was some breakage and bruising of twigs and stems.

Site No. 3

A wet/moist area vegetated with grasses and sedges. This site lay adjacent to a small pond/bog. The vehicle track was easily discernible after a single pass. Severe compression of sedges and the displacement of moss and organics became more pronounced after each additional vehicle pass.

Site No. 4

A moist area of cotton grass tussock/heath tundra. After a single pass a slight compression of the tussocks was discernible, and the track itself was slightly visible if viewed from the correct angle. After three vehicle passes the compression of the tussocks was a bit more noticeable and there was a slight loosening of the lichens, although most of the vegetation appeared to be only temporarily impacted. After five passes more tussock and some shrub compression were evident, and the lichens and moss were beginning to break up.

Site No. 5

An area of low shrubs and grass. After one pass the visibility of the vehicle track was largely attributed to the fragile nature of the dead but standing grass. Some compression and tearing of shrubs

was also noticeable. The visibility of the vehicle track increased slightly with each additional pass. The dwarf birch appeared to be less susceptible to disturbance than was the willow.

One week later the sites were revisited and the following observations made:

Site No. 1

The vehicle track could be seen from certain angles depending upon what the predominate vegetation was. Scattered bits of organic material were visible upon close inspection.

Site No. 2

The vehicle track was not visible at this site. The vehicle track was visible at the time the passes were made because the dead leaves were knocked off the willow and scrub birch. In the intervening week most of the leaves had fallen off the shrubs and the vehicle track was no longer visible. Close inspection of the shrubs revealed some broken and scraped twigs and stems.

Site No. 3

The vehicle track at this site was very noticeable as the compressed, dead vegetation had not rebounded following the vehicle passes. Ruts and churned-up organics were evident.

Site No. 4

Evidence of ATV use at this site could not have been found without close inspection of the vegetation and prior knowledge of the location of the vehicle pass.

Site No. 5

The vehicle track was visible at this site primarily because the dead grass had not rebounded. Close inspection of the vegetation revealed some bruised and broken twigs and stems of the dwarf birch and willow.

Over a week's time, with the exception of site No. 3, it appeared that some degree of recovery had occurred on the ATV tracks at the various sites.

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