Anaktuvuk Pass Vegetation Study

Phase II- Pilot Study
GAAR-97-08

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INTRODUCTION

Anaktuvuk Pass is a Nunamuit Eskimo village located on the continental divide in the central Brooks Range (N 68° 08', E 151° 46'). Approximately 300 people live a subsistence lifestyle, with caribou, moose, Dall sheep, and fish representing a large proportion of their diet. All-terrain vehicles, primarily ARGO's (8 wheel vehicles) are used to access areas around the village during the spring, summer, and fall months. These vehicles are capable of driving over the toughest terrain, thereby opening many otherwise inaccessible areas to subsistence and/or recreational activities.

The first year of a pilot study investigating all-terrain (ATV) impact on tundra vegetation was conducted from 5 to 12 August 1997 on Kollutarak Creek near Anaktuvuk Pass, Alaska. This study was phase II of a larger study (Shea 1994, McKee and Irinaga 1995, McKee 1996) involving a land exchange proposal between the U.S. National Park Service and The Arctic Slope Regional Corporation. The primary objective of the study is to monitor the resistance and resialncy of various community types to ATV use. Results from this study will serve as a general resource data base for the area and be used to make management decisions minimizing ATV use impacts.

STUDY AREA

The study was conducted near the village of Anaktuvuk Pass, in Gates of the Arctic National Park and Preserve (GAAR), central Brooks Range, Alaska. Sample sites were located along Kollutarak Creek, which is a tributary of the John River (Fig. 1). The area is dominated by an Arctic climate with a mean summer high temperature of 60°F and a mean winter low of -10°F. Annual precipitation is less than 25cm. The dominant vegetation type is tundra. Cottonsedge tussocks (Eriophorum spp.) dominate much of the landscape. Other plants include grasses (Calamagrostis spp., Festuca spp.) and small shrubs (Betula spp., Salix spp., Ledum palustre), with several herb species being locally abundant in some areas (National Park Service 1986). Two vegetation community types were examined in 1997: tussock tundra and dryas-sedge tundra. Tussock tundra is dominated by the tussock forming sedges Eriphorum vaginatum and Carex bigelowii. Low shrubs are often found growing in between tussock clumps and include Salix pulchra, Ledum palustre, and Cassiope tetragona, along with several species of moss and lichen. Dryas-sedge tundra is dominated by Dryas integrifolia and the sedge Carex scirpoidea. The dwarf willow Salix reticulata is common and forbs (Hedysarum alpinum, Silene acaulis, and Astragalus alpinus) are locally abundant in many areas.

METHODS

Fieldwork was conducted by a biological technician and a field assistant based out of Anaktuvuk Pass; the technician was a plant specialist and the field assistant conducted soil sampling and served a support role (carrying gear, data recording, etc.). Study plots were accessed by foot and floatplane.

Twenty-one 5m x 3m impacted plots were established during the 1997 field season. The first step in this process involved the selection of plant communities in moist and dry drainage classes. The second step was to identify areas of moderate to high ATV impacts within these plant communities using a standardized impact classification protocol (Appendix A). Two communities were selected: tussock tundra (moist) and dryas-sedge tundra (dry). An attempt was made to sample 8 plots per impact class within each community. All plots were characterized to level IV of Viereck et al. (1992). Plots were surveyed with a Global Positioning System and the latitude/longitude was logged for future reference (Table 1). All data was collected using a standardized data collection form (Appendix B). Photodocumentation of plots was also recorded in the following order: plot identification photo, south facing view, west facing view, and north facing view.

RESULTS

Tussock tundra (IIIA2d) was sampled in plots K001-K016. Within this community type plots K001, K003, K005, K006, K009, K010, K011, and K012 were in moderately impacted areas while plots K002, K004, K007, K008, K013, K014, K015, and K016 were in areas of high impact. In areas of moderate impact the vegetation was obviously disturbed, but most of the vegetation composition was still easy to recognize. In these plots, bare soil accounted for 5 to 22 percent of the ground cover while standing water accounted for 3 to 28 percent. ATV track depression ranged from 2.5 to 20 cm with moderate to severe compression of tussock hummocks. In areas of high impact the vegetation was severely torn, flattened or completely denuded. In these plots bare soil accounted for 10 to 45 percent of the ground cover while standing water accounted for 3 to 46 percent. ATV track depression was consistently 15 to 20 cm with severe compression or destruction of tussocks.

Dryas-Sedge tundra (IID1b) was sampled in plots K017-K021. Since there was not enough of this community type within the drainage of interest, only the moderately impacted sites could be sampled, and then only a subset of this class. In these areas the vegetation was only slightly compressed and the trail was often barely perceptible. Bare soil accounted for 10 to 25 percent of the ground cover these sites and standing water was not a factor. ATV track depression was often less than 2..5 cm and never more than 3 cm.

DISCUSSION

Since impacted sites are only now starting to be sampled, no conclusions can be made at this time. However, some trends appear to be obvious after spending a substantial amount of time in the field. The wetter sites are definitely the most susceptible to ATV damage. In tussock tundra standing water, destruction of vegetation and track depths are severe. These areas have wide swaths of impact as successive ATV's attempt to bypass the previous impact. The result is a widened trail area with little or no vegetation and deep ruts. The contrast is most obvious when one looks at dry communities within the same impact class. These sites often have several areas of bare soil, but the depth of ATV tracks is far less severe and the trail width is much narrower. Often the trail is difficult to discern from surrounding ground surface characteristics.

RECOMMENDATIONS

The area around Chandler Lake along Kollutarak Creek does not appear to be the best place to conduct the pilot study. There was not enough dryas habitat available within the appropriate impact class to sample. The area of Kollutarak Creek near where it joins the John River has a substantial amount of dryas tundra with ATV impacts throughout. Another area to consider is the Anaktuvuk River, which also has large amounts of impacted dryas communities. Both of these areas are relatively easy to access and close to Anaktuvuk Pass.

The data gathering system currently being used (fixed area plots) appears to be an efficient method for gathering the desired information. The methods used for determining impact, however, are subjective with no real units of measurement. This method will probably be consistent only if the same person is collecting the data from year to year.

LITERATURE CITED

Hulten, E. 1968. Flora of Alaska and neighboring territories. Stanford, CA: Stanford University Press. 1008pp.

McKee, C. 1996. Anaktuvuk Pass Vegetation Study. In house report GAAR-96-01, Gates of the Arctic National Park and Preserve, 201 1st Ave., Fairbanks, AK 99701.

McKee, C. and M. Irinaga. 1995. Anaktuvuk Pass Vegetation Study. In house report GAAR-95-01, Gates of the Arctic National Park and Preserve, 201 1st Ave., Fairbanks, AK 99701.

Shea, K. 1994. All-Terrain vehicle vegetation monitoring plan for Gates of the Arctic National Park and Preserve. In house report. Gates of the Arctic National Park and Preserve, 201 1st Ave., Fairbanks, AK 99701.

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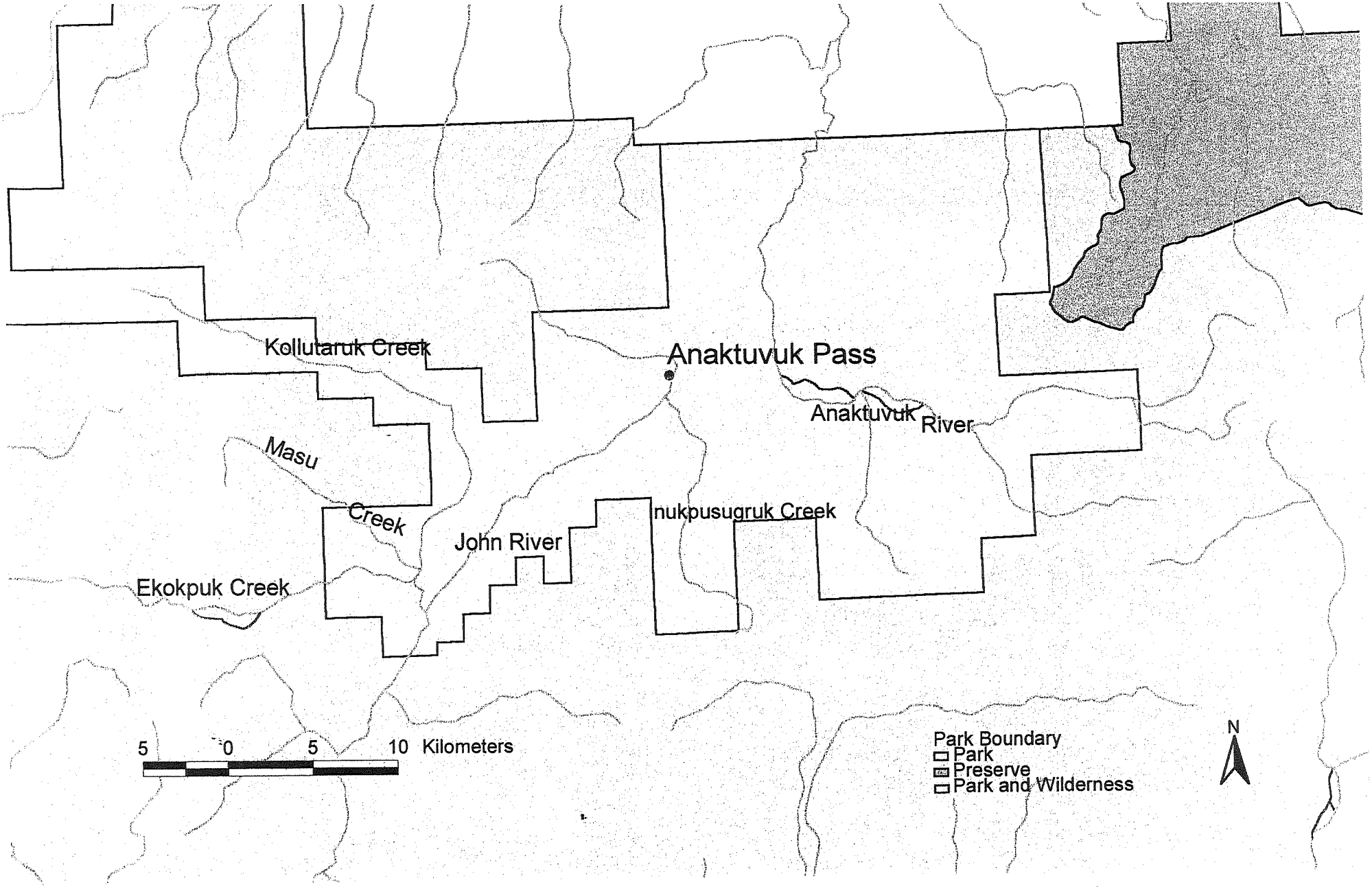

Figure 1. Location of ATV study, Gates of the Arctic National Park and Preserve, Brooks Range, Alaska, June-August 1997.

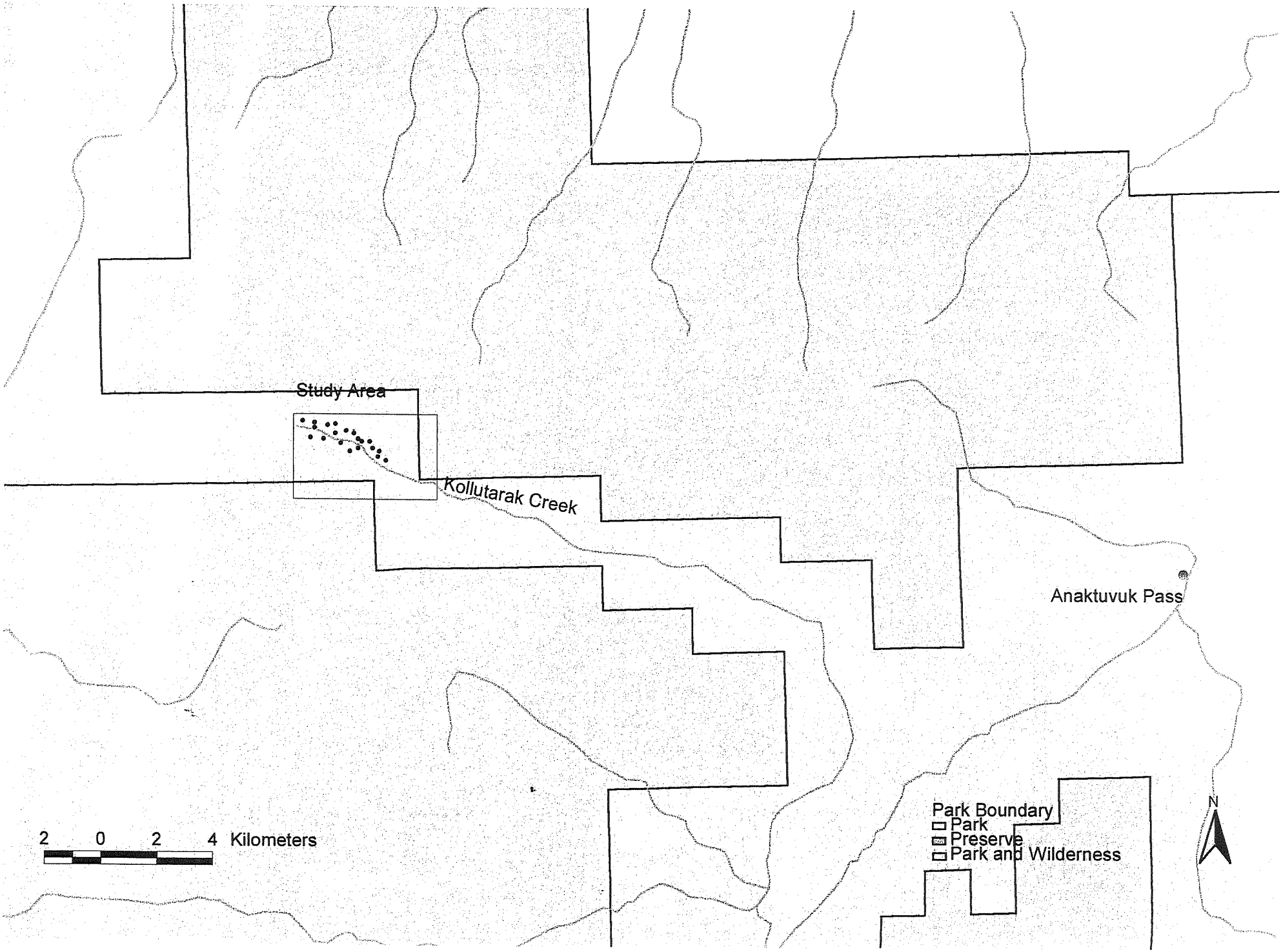
Study Area
Kollutarak Creek
Anaktuvuk Pass
2 0 2 4 Kilometers
Park Boundary
Park
Preserve
Park and Wilderness
N

Table 1. GPS positions for plots at Kollutaruk Creek, Gates of the Arctic National Park and Preserve, Brooks Range, Alaska, August 1997.

Site	Latitude (°N)	Longitude (°W)
K001	68° 12' 03.15"	152° 36' 11.95"
K002	68° 11' 44.59"	152° 31' 22.68"
K003	68° 11' 45.24"	152° 31' 24.96"
K004	68° 11' 45.21"	152° 31' 29.71"
K005	68° 11' 45.58"	152° 31' 35.99"
K006	68° 11' 46.37"	152° 31' 44.13"
K007	68° 11' 48.99"	152° 31' 56.77"
K008	68° 11' 51.00"	152° 32' 04.53"
K009	68° 12' 03.58"	152° 35' 50.72"
K010	68° 12' 03.57"	152° 35' 51.55"
K011	68° 12' 03.28"	152° 35' 55.73"
K012	68° 12' 03.23"	152° 36' 09.37"
K013	68° 12' 03.43"	152° 36' 21.89"
K014	68° 12' 23.96"	152° 39' 37.61"
K015	68° 12' 18.27"	152° 39' 08.70"
K016	68° 12' 18.12"	152° 39' 07.42"
K017	68° 12' 04.05"	152° 37' 28.52"
K018	68° 12' 03.49"	152° 37' 20.73"
K019	68° 12' 03.11"	152° 37' 15.72"
K020	68° 12' 02.85"	152° 37' 13.83"
K021	68° 12'11.48"	152° 38' 29.45"

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Hulten, E. 1968. Flora of Alaska and neighboring territories. Stanford, CA: Stanford University Press. 1008pp.

McKee, C. 1996. Anaktuvuk Pass Vegetation Study. In house report GAAR-96-01, Gates of the Arctic National Park and Preserve, 201 1st Ave., Fairbanks, AK 99701.

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Appendix A. Disturbance Rating Scale for ATV study, Anaktuvuk Pass, Gates of the Arctic National Park and Preserve, Brooks Range, Alaska, 1997.

Disturbance Level	Description
Vegetation:	
1	Undamaged; no discernible change
2	Slight compression; leaves or stems temporarily bent or rearranged; vehicle passage barely perceptible.
3	Mosses, graminoids and other herbaceous species compressed and leaves flattened; shrub stems becoming compressed.
4	Leaves or mosses and lichens torn or removed; woody shrub stems flattened, with some breakage and abrasion.
5	11-25% of original vegetation composition not discernible.
6	26-50% not discernible,
7	51-75% not discernible
8	76-100% not discernible

Soil:

1	None exposed	5	26-50% exposed
2	1-5% exposed	6	51-75% exposed
3	6-10% exposed	7	76-90% exposed
4	11-25% exposed	8	91-100% exposed

Microrelief:

1	No discernible change or depression of the surface
2	Tracks evident but with less than half of track depressed 1 inch; slight compression of tussocks or hummocks.
3	Surface depression less than 1 inch over majority of track; slight to moderate compression of tussocks or hummocks.
4	Track depressed 1-2 inches; moderate tussock or hummock compression.
5	Track depressed 2-4 inches; moderate to severe tussock or hummock compression.
6	Track depressed 4-6 inches; severe tussock or hummock depression.
7	Track depressed 6-8 inches; severe compression or destruction of tussocks or hummocks.
8	Depression or ruts greater than 8 inches deep; tussocks or hummocks completely flattened or destroyed.

Impact level determined by adding up the 3 categories of impacts: high (20-24), moderate (10-19), and low (0-9). Taken from Sinnott (1990).

Appendix B. ATV study data form, Anaktuvuk Pass, Gates of the Arctic National Park and Preserve, Brooks Range, Alaska, 1997.

ANAKTUVUK PASS ATV IMPACT STUDY: VEGETATION AND SOIL SURVEY

Plot # _____ Date_____ Observers_____

Plot Location:___ ° _____ ' _____ " N; ___ ° _____ ' _____ "W

Vegetation Type: _____

Vegetation

_____Anemone narcissiflora
_____Andromeda polifolia
_____Betula glandulosa
_____Betula nana
_____Calamagrostis canadensis
_____Carex bigelowii
_____Cassiope tetragona
_____Dryas drummondii
_____Dryas integrifolia
_____Empetrum nigrum
_____Epilobium latifolium
_____Eriophorum vaginatum
_____Ledum palustre
_____Rubus chamaemorus
_____Salix lanata
_____Salix pulchra
_____Salix reticulata
_____Vaccinium uliginosum
_____Vaccinium vitis-idaea

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Lichens

_____Cetraria cucullata
_____Cetraria nivalis
_____Cetraria islandica
_____Cladina rangifera
_____Cladina rangiferina
_____Cladina stellaris
_____Nephroma arcticum

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_____
_____
_____

Environmental Variables

_____Slope (deg)
_____Aspect (deg True N)
_____Elevation (m)
_____% Total Vascular Cover
_____% Shrub Cover
_____% Forb Cover
_____% Total Lichen Cover
_____% Total Bryophyte Cover
_____Mean Shrub Height (cm)
_____% Cover Litter
_____% Cover Bare Soil
_____% Standing Water
_____% Rock

Comments/Drawing:

Impacts

_____Evidence of ATV traffic
_____% Shrub Damage
_____% Cover shrubs damaged
_____% Cover abraded shrubs

_____Disturbance Level
_____Soil Exposed
_____Microrelief
_____Visual Desciption

Soils

Surficial Geology: organic mineral gravel bedrock

Surface Texture and approx. thickness (cm)

_____

Subsurface (1) Texture and approx. thickness (cm)

_____

Subsurface (2) Texture and approx. thickness (cm)

_____

Subsurface (3) Texture and approx. thickness (cm)

_____

Subsurface (4) Texture and approx. thickness (cm)

_____

Topographic position: ridge midslope lowerslope valley bottom riparian

Thickness of organic surface layer (cm) _____

Depth to (cm):

_____bedrock
_____permafrost
_____water table
_____saturated soil
_____gleying
_____high chroma mottles

Buried organic horizon? (Y or N) _____

Evidence of flooding (Y or N) _____
If yes, flooding > 1x/yr? (Y or N) _____