

HUMAN IMPACT STUDY/VEGETATION TRANSECTS
GATES OF THE ARCTIC NATIONAL PARK AND PRESERVE
FIELD SEASON 1982

Cheryl Green
Park Technician
September 16, 1982

Keywords: vegetation, Human Impact,

JUSTIFICATION AND OBJECTIVES

Human Impact. Combining both the Gates of the Arctic National Park and Preserve (GAAR) backcountry field report system with this vegetation transect study provides complete recording of impacted areas within the Park. GAAR hopes to document and study all areas of current impact. This compilation will be a basis for all future studies.

Baseline data. The human impact/vegetation transects allow for scientific baseline data collection in impacted areas. Not only will this provide GAAR with descriptions of current vegetation but it will document the continuum from the undisturbed to disturbed vegetation in a given microhabitat. Data using percent cover figures can show degrees of impact in areas.

Besides a good description of current vegetation GAAR wants to document impact. The Park specifically wants to document impacted locations, amounts of trash, species indicative of impact, exotic species, mineral soil exposed, the effect of impact on loss of soil cover, and the change in species over time. The far reaching implications gleaned from baseline data are numerous, many of which cannot even be imagined now but will become evident in the future as managers face different threats on the natural resources of GAAR.

METHODOLOGY

Key. Hulten, Eric. Flora of Alaska and Neighboring Territories. A Manual of the Vascular Plants. Stanford University Press. Stanford, CA. 1968. 1008pp.

During the field season 1982 we used Hulten exclusively. This choice was made by our VIP Plant Ecologist Ann Odasz. A key for lichens and mosses was not selected for the season. All nomenclature of these two classifications is from Odasz's experience.

Transects. The field methodology of transect lines, meter squares, percent cover, and "other categories of importance" were a compilation of various field techniques. Ideas were drawn from work done on the Colorado River research (GRCA 1980-81), field work of Plant Ecologists Odasz and Jack Major, PhD, UC Davis, and other plant ecology research. Except for an necessary knowledge of northern Alaska flora any NPS ranger possesses the skills to learn and apply the methodology selected. Overall the idea that too much information is better than not enough was used for data collection.

Specifics. An area of human impact, usually a camping site, is selected. Run a transect line through the center of activity. Continue this line through both undisturbed vegetation representative of the area and impacted vegetation. Run a perpendicular transect line as needed.

Document the area. Put transect markers on endpoints, map, take compass bearings, photograph, write verbal descriptions, etc. See definitions section for specifics. The transect line should be easily reproduced from all documentation at a later date.

METHODOLOGY

Identification. All species were identified in the field by Plant Ecologist Anne Odasz, U of Colorado. Assistance was provided at the Arrigetch sites by Jack Major, PhD., UC Davis, and at the Upper Noatak sites by Pat McGuire, PhD., UC Davis. Field data collection and notation was done by NPS seasonal Park Technicians Maggie Yurick (Arrigetch sites), David Buchanan (Arrigetch sites, Kugrak site), Geoffrey Smith (Bombardment and Red Star Lake sites), Robert Hayden (Embryo Lake site), and Cheryl Green (all sites).

DEFINITIONS

Site name.	Name that states location of study area by geographical feature.
General site location/ description.	Location/description of general area being studied by geographical feature.
Impacted site location/ description.	Specific location of impacted site. Compass bearings and distance from some geographical feature.
Transect line.	This line is selected as described in the methodology. Use line markers on each end and midpoint where possible. Note length of line.
Compass bearings.	These are taken as an azimuth off magnetic north. That means that declination is irrelevant. The compass needle is lined up with N on the compass casing. Readings are taken around the compass from N.
Line marker.	Metal tags wired or nailed to the endpoints and midpoints (where possible) on the transect line. Realize that this is not always possible given the vegetation of northern Alaska.
Meter squares.	Select representative plots of undisturbed, transition, and disturbed vegetation. These are not random but neither are they selected to show particular species. Select representative but "average" squares. Note their location on the transect line and on which side (N,S,E,W).
Type.	This is type of vegetation in the meter square studied. The designations are undisturbed, transition, or compacted. This is a continuum that runs from untouched vegetation through trampled to bare ground or mineral soil exposed. Undisturbed and compacted are clearly defined terms, transition is anything inbetween.
Organic layer.	There are three designations in this continuum, good, variable, or compacted. Define the layer of soil/humus inside the meter square being studied. Good is soil containing much organic material, compacted is hard bare ground or mineral soil exposed, and variable is inbetween.
Photographs.	Photos are taken at key spots to relocate line markers. Black and white 32 ASA film was used in the Arrigetch sites. Color 200 ASA was used in the Noatak and North Fork sites. General "impact" color photos are useful for park slide programs showing change over time. Quality color photographs are not necessary for transect relocation information.

DEFINITIONS CONTINUED

- General area description. Describe the vegetation of the area starting at the top of the canopy down to ground level.
- Sketch. 1) Draw a sketch of where the site is in relation to a geographical feature if no 1:63,330 scale maps are available.
2) Draw a sketch of the transect line, map in the undisturbed and disturbed areas and place key features such as trees and fire rings on the sketch.
- DBH. Diameter at Breast Height. This figure is useful for trees and some shrubs. Use a DBH tape or measure the circumference/ π of the tree.
- % Cover. Each species or item is independent of each other. Project the species or item onto the ground from above. Record the percentage of ground that species or item would cover inside the meter square by itself. These percentages will not add up to 100% since species form a tiered configuration. A spruce bough overhanging the plot may receive a 25% cover value and the sphagnum moss in the same square may receive a 95% cover value. Note that it is useful to have the same individual denote this value to keep the data standardized. Green denoted all cover values in field season 1982.
- Categories.
- Rocks. Any size rock in the meter square regardless of whether it is present due to frost heave or from human placement.
- Litter. Dead organic matter such as leaves, twigs, etc.
- Mineral Soil. Loss of humus and organic layer has left only sand, clay, etc.
- Bare Ground. Ground that has no organic matter on top of it but is not mineral soil.
- Garbage. Trash such as paper, wrappers, etc.
- Feces. Human or animal, note what type.
- Charcoal Regardless of size.
- Trail formation. Human or game trails that pass through the square.
- Disturbance. The amount of trail, trampled or denuded vegetation in square, generally the amount to which the area has been changed from pristine. Note the type of disturbance if possible.
- Species list. These were compiled in the field by observation, then all species except mosses and lichens have been checked in Hulten.

FUTURE SEASONS SUGGESTIONS

- Baseline data. Our descriptions of current vegetation will work as a baseline against which rates of increase can be monitored. Continue the vegetation work in impacted areas. Continue the transect work. if all the impacted areas in the Park/Preserve were completed we would be able to deduce two important rates.
- a) the rate of increase in impact at each specific site
 - b) the rate of increase in impact in the entire GAAR
- Monitor these areas every three to five years.
- Concrete floras. These are floras of a limited area. The area has to include habitat diversity. A concrete flora is a sample. The Soviets have found that they get over 90% of the flora with less than fifteen concrete floras for areas of approximately twenty million acres in size. Plant Ecologists Jack Major and Ann Odasz have sufficient data to produce three and maybe five concrete floras. These would be in the Arrigetch Valley, Pingaluk and Nahtuk Valleys. The advantage to using concrete floras is that one can see as each flora is added what species are added to the known flora. This is an essential management tool. it would assist Park managers in determining carrying capacity of an area, species affected, etc. Given a flora it would be very simple to make keys that could be used to re-run transects, study sheep use of their range, etc. (Suggestion per Jack Major, PhD, UC Davis).
- Collection. Collections need to be done of all plants documented in the data. Special emphasis initially should be placed on "vouchers". These are a technique where collections of difficult to identify species are available for field reference.
- Natural Revegetation. Study the natural revegetation in the GAAR. Find mining and Eskimo impacted sites. Date the areas from tree coring stumps and local history input. Run transects in the areas.
- Exotics. Prepare a plant list and collection of weedy species in Allakaket and Bettles. Use the work done along the Dalton Highway (haul road). Document all exotics found inside the GAAR (note one species was found in field season 1982 at Summit Lake). Monitor which species come into areas first.
- Staff. Amongst seasonal staff, select an individual with a working knowledge of northern Alaska flora. Use VIP's such as Jack Major, PhD, UC Davis and Ann Odasz, U of Colorado to provide expertise on specific short term projects.
- Research. Contact all individuals that do vegetation research in the GAAR. Keep copies of their work on file. Use the literature survey completed in 1981 to draw any information from previous work in the Brooks Range. There are four Universities/Colleges with specific programs in Arctic Studies, contact them.
- a) Institute of Arctic Biology, University of Alaska. Fairbanks, AK.
 - b) Institute of Arctic & Alpine Research, Univ of Colorado. Boulder, CO.
 - c) Institute of Polar Studies, Ohio State University. Columbus, OH.
 - d) Northern Studies Program, Middlebury College. Middlebury, VT.

FUTURE SEASONS SUGGESTIONS CONTINUED

- Research. Conferences like the American Association for the Advancement of Science-Arctic Division held in Fairbanks every fall would be of interest to GAAR.
- Disturbance Scale. Establish some sort of disturbance values that could be used by field rangers on patrol to designate an area. The scale would cover categories such as amount of bare ground, trail formation, garbage, % cover of undisturbed versus disturbed plant cover, etc. Later scientific research in areas could further refine this method.
- Keys. Continue to use Hulten but add additional keys. Argus would be good for Salix species. Vierick, L.A. and Little, E.L. Atlas of United States Trees, Vol 2, Alaska Trees and Common Shrubs. 1974. A key for mosses and lichens is necessary. Steer on mosses and Krog on Macrolichens would be good starters.

APPENDIX II

RADFORTH MUSKEG COVER CLASSIFICATION SYSTEM

An important feature of muskeg is that it is characterized by a finite number of vegetation structural types. These types consist of nine basic cover classes, each designated by one of the first nine letters of the alphabet, listed in table I in combinations called cover formulae.

Form 2

cover class	Description
<u>A</u> - %	Trees over 15 ft. high
B	Trees up to 15 ft. high
C	Non-woody, grass-like 2-5' ft. high
D	Woody, tall shrubs or dwarf trees 2-5 ft. high
E	Woody shrubs up to 2 ft. high
F	Sedges and grasses up to 2 ft. high
G	Non-woody broad-leaf plants up to 2 ft. high
H	Leathery to crisp mats of lichen up to 4 in. high
I	Soft mats of moss up to 4 in. high

TABLE I - MUSKEG COVER CLASSES

cover classes

0-5 5-25 25-50 50-75 75-95 95-100
 1 2 3 4 5 6

slope

major species & sensitivity to disturbance

shrub height

check out Walker 1982a3
(Fetia)

The cover classification does not depend on the naming of plant species, and since these classes can be used to describe any muskeg, the system has worldwide application.

On any given muskeg area, certain of these cover classes are found in combination, and the cover formula used to describe that muskeg area is derived by listing in descending order of prominence the cover classes which can be observed to be growing there. To be included in the cover formula, any cover class must represent at least 25% of the total cover, based on estimate from visual observation. This estimate may seem to be a rather subjective type of evaluation, but in practice there is rarely any doubt that a given cover class represents more or less than 25% of the total cover.

As an example of the application of this classification system, a muskeg area covered by tall spruce trees over 15 ft. high, woody shrubs from 2-5 ft. high, and woody shrubs up to 2 ft. high would be referred to as ADE. A muskeg area covered by grasses and sedges up to 2 ft. high and a carpet of moss would be called FI and so on.

It might appear that all the combinations of the nine cover classes in groups of two or three would lead to an unwieldy number of possible cover formulae. In reality many possible

APPENDIX II

RADFORTH MUSKEG COVER CLASSIFICATION SYSTEM

An important feature of muskeg is that it is characterized by a finite number of vegetation structural types. These types consist of nine basic cover classes, each designated by one of the first nine letters of the alphabet, listed in table I in combinations called cover formulae.

Form 2

cover class

Description

A - 96

Trees over 15 ft. high

B

Trees up to 15 ft. high

C

Non-woody, grass-like 2-5 ft. high

D

Woody, tall shrubs or dwarf trees 2-5 ft. high

E

Woody shrubs up to 2 ft. high

F

Sedges and grasses up to 2 ft. high

G

Non-woody broad-leaf plants up to 2 ft. high

H

Leathery to crisp mats of lichen up to 4 in. high

I

Soft mats of moss up to 4 in. high

TABLE I - MUSKEG COVER CLASSES

cover classes

0-5 5-25 25-50 50-75 75-95 95-100
1 2 3 4 5 6

slope

shrub height

major species & sensitivity to disturbance

The cover classification does not depend on the naming of plant species, and since these classes can be used to describe any muskeg, the system has worldwide application.

On any given muskeg area, certain of these cover classes are found in combination, and the cover formula used to describe that muskeg area is derived by listing in descending order of prominence the cover classes which can be observed to be growing there. To be included in the cover formula, any cover class must represent at least 25% of the total cover, based on estimate from visual observation. This estimate may seem to be a rather subjective type of evaluation, but in practice there is rarely any doubt that a given cover class represents more or less than 25% of the total cover.

As an example of the application of this classification system, a muskeg area covered by tall spruce trees over 15 ft. high, woody shrubs from 2-5 ft. high, and woody shrubs up to 2 ft. high would be referred to as ADE. A muskeg area covered by grasses and sedges up to 2 ft. high and a carpet of moss would be called FI and so on.

It might appear that all the combinations of the nine cover classes in groups of two or three would lead to an unwieldy number of possible cover formulae. In reality many possible

combinations, such as GAD, and BGC, do not occur. The most common include: ADE, ADF, ADI, AEH, AEI, AFI, BDE, BDF, BEF, BEH, BEI, BFI, C, CI, DEF, DFI, DI, EFI, EH, EI, FI, FEI, FIE, G, HE.

The fact that muskeg vegetal cover can be classified depends on the recurrence of cover formulae on a worldwide scale and this in turn reflects the orderliness and predictability of conditions such as peat depth, water content and climate which prevail in areas where muskeg occurs. The significance of this fact is that results obtained from tests on one muskeg area of a given cover type are applicable to all other muskeg areas with the same cover type.