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Arctic Vegetation Plots, Happy Valley, Alaska, 1994

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Summary

This dataset provides environmental, soil, and vegetation data collected in July 1994 from 56 study plots at the Happy Valley research site, located along the Sagavanirktok River in a glaciated valley of the northern Arctic Foothills of the Brooks Range. Data includes the baseline plot information for vegetation, soils, and site factors for the study plots subjectively located in 17 plant communities that occur in 5 broad habitat types across the glaciated landscape. Specific attributes include: dominant vegetation species, cover, indices, and biomass pools, soil chemistry, physical characteristics, moisture, and organic matter. This product brings together for easy reference all the available information collected from the plots that has been used for the classification, mapping, and analysis of geo-botanical factors in the Happy Valley region and across Alaska.

The dataset includes three data files in *.csv format and three companion files.



Figure 1. Happy Valley Permanent Vegetation Plot SWT-44.

Citation

Walker, D.A. 2018. Arctic Vegetation Plots, Happy Valley, Alaska, 1994. ORNL DAAC, Oak Ridge, Tennessee, USA.
<https://doi.org/10.3334/ORNLDAAC/1354>

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1. Data Set Overview

This dataset provides environmental, soil, and vegetation data collected in July 1994 from 56 study plots at the Happy Valley research site, located along the Sagavanirktok River in a glaciated valley of the northern Arctic Foothills of the Brooks Range. Data includes the baseline plot information for vegetation, soils, and site factors for the study plots subjectively located in 17 plant communities that occur in 5 broad habitat types across the glaciated landscape. Specific attributes include: dominant vegetation species, cover, indices, and biomass pools; soil chemistry, physical characteristics, moisture, and organic matter. This product brings together for easy reference all the available information collected from the plots that has been used for the classification, mapping, and analysis of geo-botanical factors in the Happy Valley region and across Alaska.

The Pre-ABOVE vegetation plot datasets were curated to create the Alaska Arctic Vegetation Archive (AVA-AK; Walker et al. 2016b, Walker 2013). The AVA-AK is a regional database that is part of the larger Arctic Vegetation Archive (Walker 2016a, Walker et al. 2013, Walker and Reynolds 2011). The database contains vegetation plots from homogeneous plant communities with tables of cover or cover-abundance scores for all species and accompanying environmental site data. Field data were collected using Braun-Blanquet, US National Vegetation Classification protocols, or comparable methods.

Project: [Arctic-Boreal Vulnerability Experiment \(ABOVE\)](#)

The Arctic-Boreal Vulnerability Experiment is a NASA Terrestrial Ecology Program field campaign that will take place in Alaska and western Canada between 2016 and 2021. Climate change in the Arctic and Boreal region is unfolding faster than anywhere else on Earth. ABOVE seeks a better understanding of the vulnerability and resilience of ecosystems and society to this changing environment.

Acknowledgements:

These data files were edited by Donald A. Walker, Amy L. Breen and Lisa A. Druckenmiller at the University of Alaska Fairbanks' Alaska Geobotany Center and obtained via the Arctic Geoecological Atlas (<http://arcticatlas.geobotany.org/>), which provides access to existing Arctic vegetation plot and map data in support of the ABOVE campaign.

2. Data Characteristics

Spatial Coverage: Happy Valley, Alaska

ABOVE Grid Location: Ah00v01Bh03v00

Spatial Resolution: Point samples

Temporal Coverage: 19940718 to 19940731

Temporal Resolution: Each plot was sampled once

Study Area: (All latitude and longitude given in decimal degrees)

Site	Westernmost Longitude	Easternmost Longitude	Northernmost Latitude	Southernmost Latitude
Happy Valley, Alaska	-148.8685	-148.8205	69.1689	69.122

Data File Information: There are three data files with this dataset in comma-separated (.csv) format.

Table 1. Data and companion files

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Data File Name	Description
Happy_Valley_Soil_Data.csv	Soil characterization data for Happy Valley research plots
Happy_Valley_Species_Data.csv	Species cover data for Happy Valley research plots
Happy_Valley_Environmental_Data.csv	Comprehensive set of environmental characterization data for Happy Valley research plots including the descriptive site factors. Most measurement data have been processed to provide values at a common 10 cm depth. This measurement comparability facilitates analysis of geo-botanical relationships across Alaska.

Data Descriptions: The column names, their units and descriptions for each of the .csv data files are listed below.

Table 2. Happy_Valley_Soil_Data.csv

Column Name	Units	Description
FIELD PLOT NUMBER		Plot number where the soil sample was collected
SAMPLE ID NUMBER		Soil Sample number
DEPTH	CM	Depth of the soil layer
HORIZON		Soil horizon
SOIL_PH		PH of the soil sample
ELECTRICAL_ CONDUCTIVITY	MMHOS/CM	Electrical conductivity of the soil sample
LIME		Lime in the soil sample
ORGANIC_MATTER	%	Percentage of organic matter in the soil sample
NO3_NH4HCO3_DTPA_EXTRACT	ppm	Extractable NO3-NH4HCO3 in the soil sample
P_NH4HCO3_DTPA_EXTRACT	ppm	Extractable P in the soil sample
K_NH4HCO3_DTPA_EXTRACT	ppm	Extractable K in the soil sample
ZN_NH4HCO3_DTPA_EXTRACT	ppm	Extractable Zn in the soil sample
FE_NH4HCO3_DTPA_EXTRACT	ppm	Extractable Fe in the soil sample
MN_NH4HCO3_DTPA_EXTRACT	ppm	Extractable Mn in the soil sample
CU_NH4HCO3_DTPA_EXTRACT	ppm	Extractable Cu in the soil sample
SAND	%	Percentage of sand in the soil sample
SILT	%	Percentage of silt in the soil sample
CLAY	%	Percentage of clay in the soil sample
TEXTURE		Texture of the soil in the soil sample
CA_NH4OAC_EXTRACT	MEQ/L	Extractable Ca in the soil sample
MG_NH4OAC_EXTRACT	MEQ/L	Extractable Mg in the soil sample
NA_NH4OAC_EXTRACT	MEQ/L	Extractable Na in the soil sample
K_NH4OAC_EXTRACT	MEQ/L	Extractable K in the soil sample
SODIUM ABSORPTION RATIO		Sodium absorption ratio of the soil sample

Table 3. Happy_Valley_Environmental_Data.csv

Note: Coded and scalar variables are followed by a description column (e.g. landform and landform_desc). See the companion file *Happy_Valley_Env_Legend.pdf* for a complete list of coded and scalar variables and their descriptions.

Column Name	Units	Description
FIELD_PLOT_NUMBER		Field plot number
PRINCIPAL_HABITAT		Principal habitat in the plot
PRELIMINARY_COMMUNITY_NAME		Preliminary vegetation type within the plots based on habitat and dominant species
PLANT_COMMUNITY		Primary vegetation types
MICROSITE		Detailed description of microsite within the plots
DATE_SAMPLED	YYYYMMDD	Sampling date
LATITUDE	DD	Latitude of the center of the plots
LONGITUDE	DD	Longitude of the center of the plots
LANDFORM		Landform of the plots
LANDFORM_DESC		Description of landforms of the plots
SURFICIAL_GEOLOGY		Surficial geology of the plots
SURFICIAL_GEOLOGY_DESC		Description of surficial geology of the plots
SURFICIAL_GEOMORPHOLOGY		Surficial geomorphology of the plots
SURFICIAL_GEOMORPHOLOGY_DESC		Description of surficial geomorphology of the plots
MICROSITE_CODE		Microsite of the plots
MICROSITE_DESC		Description of microsite of the plots
GLACIAL_GEOLOGY		Glacial geology of the plots
GLACIAL_GEOLOGY_DESC		Description of glacial geology of the plots
TOPOGRAPHIC_POSITION		Topographic position of the plots
TOPOGRAPHIC_POSITION		Description of the topographic position of the plots
SOIL_UNITS		Soil units in the plot
SOIL_UNITS_DESC		Description of the soil units within the plot
SLOPE	Degrees	Slope of the plots
ASPECT	Degrees	Aspect of the plots
THAW_DEPTH	CM	Depth to permafrost of the plots
THAW_DEPTH_STANDARD_DEVIATION_WHERE_CALCULATED	CM	Standard Deviation in the depth to permafrost of the plots
SITE_MOISTURE		Site moisture of the plots
SITE_MOISTURE_DESC		Description of the site moisture of the plots
SOIL_MOISTURE		Soil moisture content within the plots
SOIL_MOISTURE_DESC		Description of the soil moisture content within the plots
EXPOSURE		Exposure of the plots
EXPOSURE_DESC		Description of the exposure of the plots
ESTIMATED_SNOW_DURATION		Estimated snow duration within the plots
ESTIMATED_SNOW_DURATION_DESC		Description of estimated snow duration within the plots
ANIMAL_HUMAN_DISTURBANCE		Amount of animal/human disturbance

ANIMAL_HUMAN_DISTURBANCE_DESC		Description of the amount of animal/human disturbance
STABILITY		Stability of the plots
STABILITY_DESC		Description of stability of the plots
PLOT_SIZE	M x M	Size of each plot
COVER_TALL_SHRUBS	%	Percentage of tall shrub cover in the plot
COVER_LOW_SHRUBS	%	Percentage of low shrub cover in the plot
DWARF_SHRUB_COVER	%	Percentage of dwarf shrub cover in the plot
COVER_EVERGREEN_SHRUBS	%	Percentage of evergreen shrub cover in the plot
COVER_DECIDUOUS_SHRUBS	%	Percentage of deciduous shrub cover in the plot
COVER_FORBS	%	Percentage of forb cover in the plot
COVER_HORSETAILS	%	Percentage of horsetail cover in the plot
COVER_GRAMINOIDS	%	Percentage of graminoid cover in the plot
COVER_LICHENS	%	Percentage of lichen cover in the plot
COVER_BRYOPHYTES	%	Percentage of bryophyte cover in the plot
COVER_ROCKS	%	Percentage of rock cover in the plot
COVER_BARE_SOIL	%	Percentage of bare soil cover in the plot
COVER_WATER	%	Percentage of water cover in the plot
COVER_FROST_SCARS	%	Percentage of frost scars in the plot
COVER_TOTAL_DEAD	%	
HEIGHT_OF_VEGETATION	CM	Average vegetation height within the plot
ELEVATION_TO_NEAREST_50M	M	Elevation
HORIZON_AT_10_CM		Soil horizon at 10 cm depth
ORGANIC_LAYER_DEPTH	CM	Depth of soil organic layer
SOIL_PH_AT_10_CM		PH of the soil at 10 cm depth
ELECTRICAL_CONDUCTIVITY_AT_10_CM	MMHOS/CM	Electrical conductivity of the soil at 10 cm depth
LIME_AT_10_CM		CACO3 equivalent in the soil at 10 cm depth
ORGANIC_MATTER_AT_10_CM	%	Soil organic matter at 10 cm depth
NO3_N_NH4HC3_DTPA_EXTRACT_AT_10_CM	PPM	Extractable NO3-NH4HCO3 in the soil at 10 cm depth
P_NH4HC3_DTPA_EXTRACT_AT_10_CM	PPM	Extractable P in the soil at 10 cm depth
K_NH4HC3_DTPA_EXTRACT_AT_10_CM	PPM	Extractable K in the soil at 10 cm depth
ZN_NH4HC3_DTPA_EXTRACT_AT_10_CM	PPM	Extractable Zn in the soil at 10 cm depth
FE_NH4HC3_DTPA_EXTRACT_AT_10_CM	PPM	Extractable Fe in the soil at 10 cm depth
MN_NH4HC3_DTPA_EXTRACT_AT_10_CM	PPM	Extractable Mn in the soil at 10 cm depth
CU_NH4HC3_DTPA_EXTRACT_AT_10_CM	PPM	Extractable Cu in the soil at 10 cm depth
SAND_AT_10_CM	%	Percentage of sand in the soil at 10 cm depth
SILT_AT_10_CM	%	Percentage of silt in the soil at 10 cm depth
CLAY_AT_10_CM	%	Percentage of clay in the soil at 10 cm depth
TEXTURE_AT_10_CM		Texture of the soil at 10 cm depth
TEXTURE_TOP_MINERAL_HORIZON		Soil texture at the top of the mineral horizon

CA_NH4OAC_EXTRACT_AT_10_CM	MEQ/L	Extractable Ca in the soil at 10 cm depth
MG_NH4OAC_EXTRACT_AT_10_CM	MEQ/L	Extractable Mg in the soil at 10 cm depth
NA_NH4OAC_EXTRACT_AT_10_CM	MEQ/L	Extractable Na in the soil at 10 cm depth
K_NH4OAC_EXTRACT_AT_10_CM	MEQ/L	Extractable K in the soil at 10 cm depth
SODIUM_ABSORPTION_RATIO		Sodium absorption ratio of the soil within the plot

Table 4. Happy_Valley_Species_Data.csv

Column Numbers	Column Name	Units	Description
1	PASL_TAXON_SCIENTIFIC_NAME_NO_AUTHORS		Current Taxonomy according to the Panarctic Species List (PASL)
2	PASL_TAXON_SCIENTIFIC_NAME_WITH_AUTHOR(S)		Current Taxonomy according to the Panarctic Species List (PASL) including authors names
3	DATASET_TAXON		Dataset taxonomy
4 to 59	HV1 to HV55 (this includes 42a and 42b)		Column headings are all 56 plot numbers. The data values are Species Cover Classes (Braun-Blanquet cover-abundance scale): where r (rare), + (common, but less than 1 percent cover), 1 (1-5 percent), 2 (6 to 25 percent), 3 (25 to 50 percent), 4 (51 to 75 percent), 5 (76 to 100 percent).

Companion Files: There are three companion files with this dataset in .pdf format.

Table 5. Companion files

File Name	Description
Happy_Valley_Veg_Plots_Report_Walker_1997.pdf	Summary report of all the data collected, methods of collection, maps/plots etc. for the 56 study plots at the Happy Valley research site (Walker et al., 1997).
Happy_Valley_Plot_Photos.pdf	This file contains landscape, plot, and soil photos of the Happy Valley vegetation plots.
Happy_Valley_Env_Legend.pdf	This file contains the legend for some of the environmental parameters for the Happy Valley vegetation plots.

3. Application and Derivation

These data bring together for easy reference all the available information collected from the plots and that has been used for the classification, mapping and analysis of the geo-botanical factors in the Happy Valley region. Derived regional maps of these data will be used in regional models of fluxes of trace gases, water, and energy from tundra surfaces. In addition, a circumpolar vegetation classification resulting from these datasets would be highly desirable to extend the results to the entire arctic region.

4. Quality Assessment

No specific quality assessment information provided.

5. Data Acquisition, Materials, and Methods

The fifty-six study plots at the Happy Valley research site located along the Sagavanirktok River in northern Alaska (shown in Figure 2) were subjectively located in 17 plant communities and 5 broad habitat types including: dry tundra (including river terraces and frost scars) (10 plots), snowbeds (2 plots), moist tundra (including acidic tussock tundra and nonacidic tundra) (14 plots), shrublands (including riparian alders, riparian willow communities, and dwarf-birch shrub tundra) (16 plots), and wet tundra (including fens, poor fens, and aquatic marshes) (14 plots).

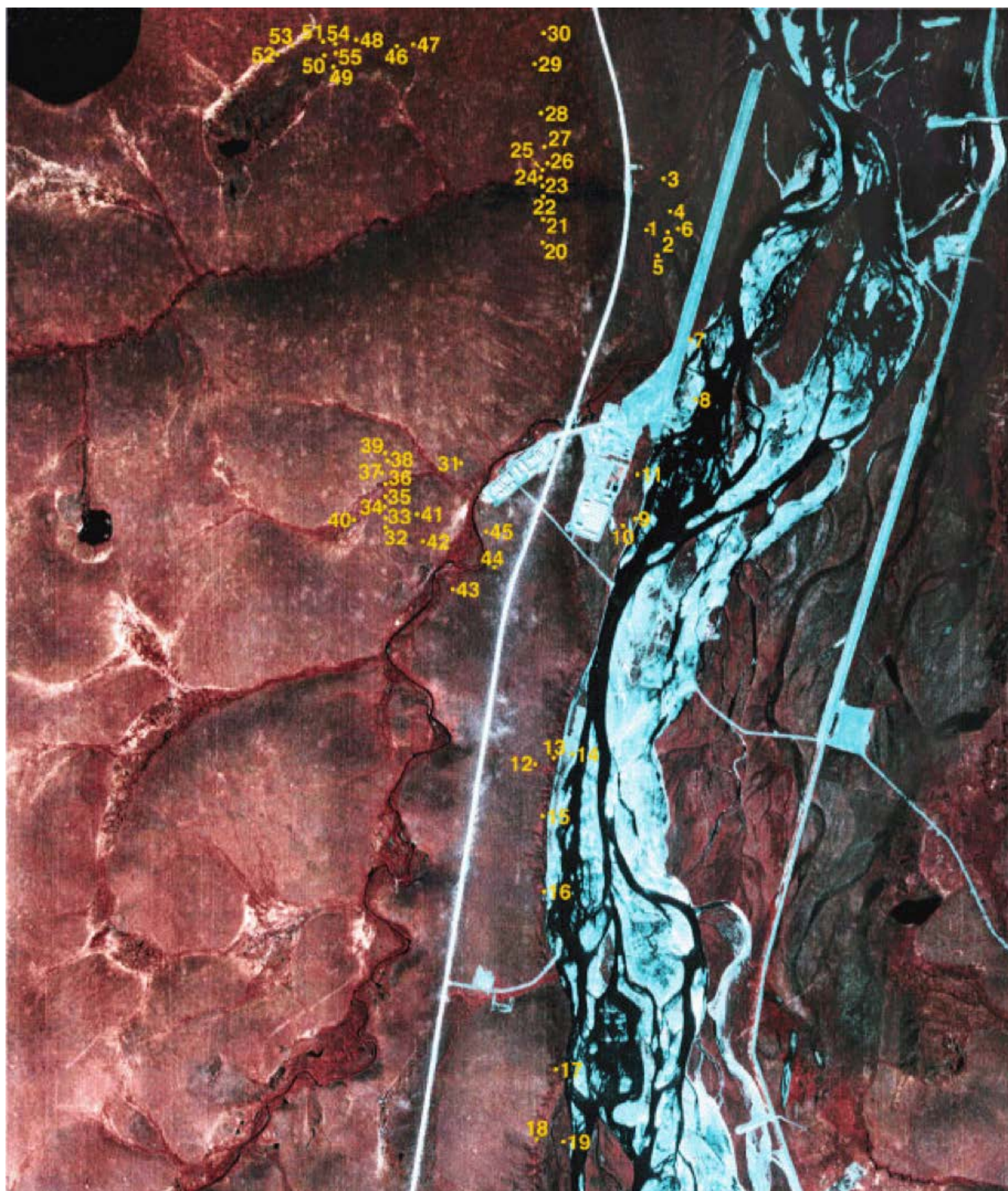


Figure 2. Location map of the 56 Happy Valley Permanent Vegetation Plots.

Vegetation Plot Sampling

A formal relevé sampling of the designated plots was done during the period 18-27 July, 1994 to sample the diversity of vegetation types of the region. All the plots were permanently marked with a 4-foot black and white-striped 1-inch PVC pipe with the plot number stamped into an aluminum tag at the top of the post. The plots had no fixed size in order to obtain a complete species list, however the size of the plots were estimated and are included within these data. For more details see *Happy_Valley_Veg_Plots_Report_Walker_1997.pdf*

Sampling of the plots included:

1. Taking photographs of the general site (Figure 1), close-up of vegetation (Figure 3), and close-up of the soil profile (Figure 4). Photos are provided in *Happy_Valley_Plot_Photos.pdf* and *Happy_Valley_Veg_Plots_Report_Walker_1997.pdf*.
2. Measuring site factors listed in Table 3 plus measurements of thaw depth, estimates of cover of bare soil, rocks, the height of vegetation and the major plant growth forms as summarized in Table 4
3. Field sampling of soils where soil pits were dug adjacent to the plots and described and classified according to the U.S. soil taxonomy [Walker et al., 1997]. Soil samples were collected from each horizon and air dried in the laboratory. Bulk density and soil moisture samples were taken from the sides of the soil pits or from large solid plugs for the wet soils using a 240-ml soil can.
4. Laboratory analysis of soil samples included routine analysis on all samples [pH (saturated paste); electric current; NO₃-N, (KCL extract); P, K, Zn, Fe, Cu, Mn, (NH₄HCO₃-DPTA extract); lime estimate, texture estimate (by hand); organic matter (Walkley-Black or ash method); and Sodium Adsorption Ratio]. Selected samples were analyzed for percent sand, percent silt and percent clay; and Ca, Mg, Na, K (NH₄OAc extract).
5. Estimating vegetation cover using the Braun-Blanquet cover-abundance scale (r = rare; + = common but less than 1 % cover; 1 = 1-5%; 2 = 6-25%; 3 = 25-50%; 4 = 51-75%; 5 = 76-100%). Plant communities were determined and sample plots were marked with stakes. The area surrounding each plot marker was searched until no new species in the plant community being sampled were encountered. Cover abundance values are relatively broad subjective classes, and were determined by estimating cover within the general area of the stake. Voucher collections were made for all vascular plants, bryophytes, and lichens occurring in the relevé.



Figure 3: Vegetation at one of the Happy Valley permanent plots (Plot SWT-43).



Figure 4: Soil profile at one of the Happy Valley permanent plots (Plot SWT-54).

6. Data Access

These data are available through the Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).

[Arctic Vegetation Plots, Happy Valley, Alaska, 1994](#)

Contact for Data Center Access Information:

- E-mail: uso@daac.ornl.gov
- Telephone: +1 (865) 241-3952

7. References

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