Pre-ABoVE: Arctic Vegetation Plots, Willow Communities, North Slope, Alaska, 1997

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Documentation Revision Date: 2017-01-24

Data Set Version: V1

Summary

This data set provides environmental, soil, and vegetation data collected in July and August 1997 from 85 study plots in willow shrub communities located along a north-south transect from the Brooks Range to Prudhoe Bay on the North Slope of Alaska. Data includes the baseline plot information for vegetation, soils, and site factors for the study plots subjectively located in three 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 geobotanical factors in the region and across Alaska.

This data set includes three data files in *.csv format and one companion file.

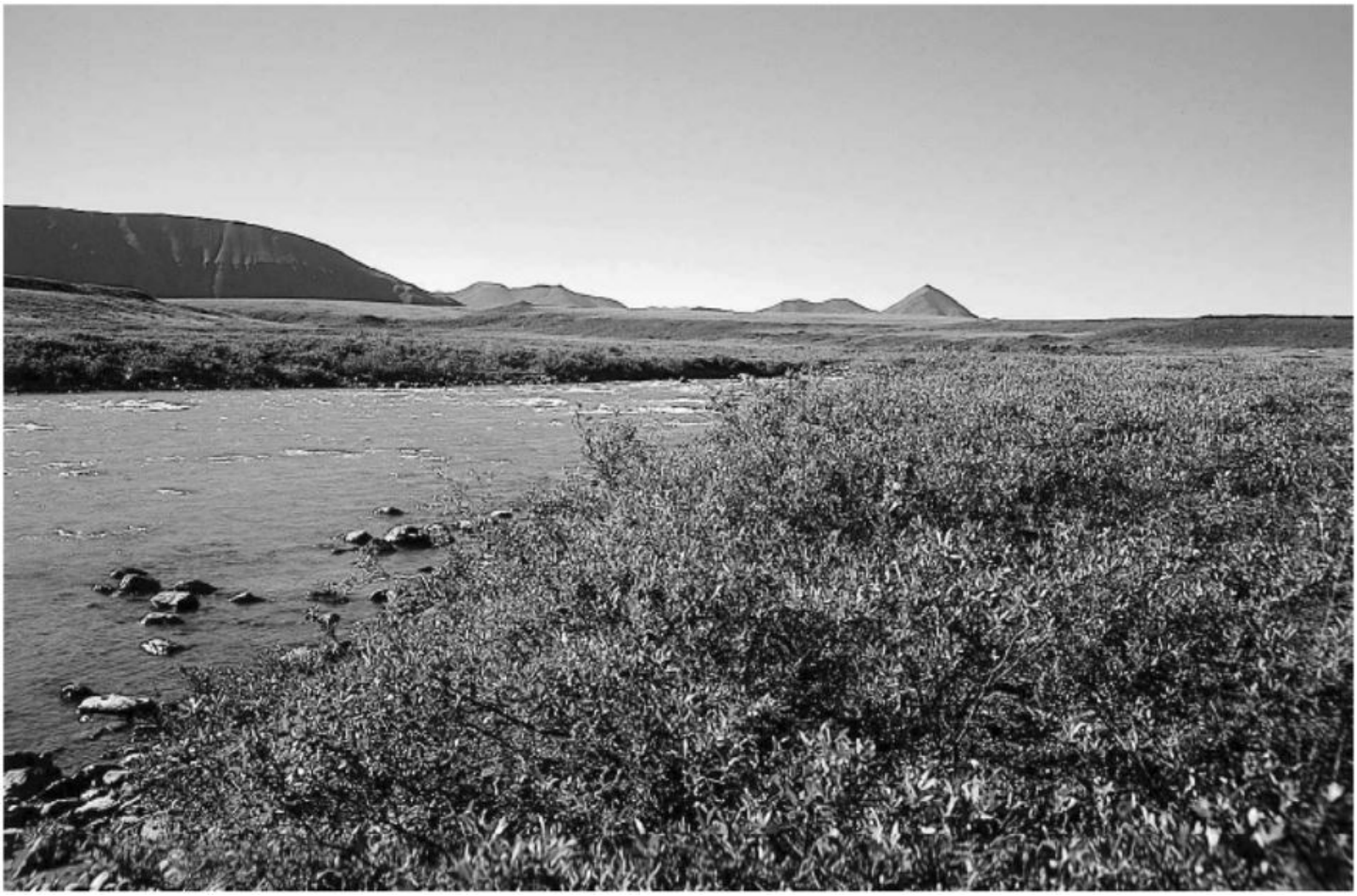

Figure 1: The low willow community Anemono-Salicetum richarsonii (subass. lupinetosum arctici) is widely distributed on upper terraces along the Sagavanirktok River (Schickhoff et al., 2002).

Citation

Schickhoff, U., D.A. Walker, A.L. Breen, and L.A. Druckenmiller. 2017. Pre-ABoVE: Arctic Vegetation Plots, Willow Communities, North Slope, Alaska, 1997. ORNL DAAC, Oak Ridge, Tennessee, USA. http://dx.doi.org/10.3334/ORNLDAAC/1368

Table of Contents

1. Data Set Overview

This data set provides environmental, soil, and vegetation data collected in July and August 1997 from 85 study plots in willow shrub communities located along a north-south transect from the Brooks Range to Prudhoe Bay on the North Slope of Alaska. Data includes the baseline plot information for vegetation, soils, and site factors for the study plots subjectively located in three 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 geobotanical factors in the region and across Alaska.

The Pre-ABoVE vegetation plot data sets 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 Raynolds 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 (ABoVE) 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 were obtained from the Alaska Arctic Geoecological Atlas (http://agc.portal.gina.alaska.edu), which provides access to existing Arctic vegetation plot and map data in support of the ABoVE campaign.

2. Data Characteristics

Spatial Coverage: North-south transect from Brooks Range to Prudhoe Bay, Alaska

ABoVE Grid Location: Ah1v0Bh2v2, Ah1v0Bh2v3

Spatial Resolution: Point samples

Temporal Coverage: 19970709 - 19970817

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
Willow Vegetation Plots, Alaska	-149.851	-148.084	70.187	68.033

Data File Information

The data set includes three data files in *.csv format -- *Willow_Environmental_Data.csv*, *Willow_Soil_Data.csv*, and *Willow_Species_Data.csv* -- and one companion file *Willow_Veg_Plots_photos.pdf*.

Table 1. Data files

Data File Name	Description
Willow_Soil_Data.csv	Soil characterization data for the willow transect plots
Willow_Species_Data.csv	Species cover data for the willow transect plots
Willow_Environmental_Data.csv	Comprehensive set of environmental characterization data for the willow shrub transect 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 geobotanical relationships across Alaska.
Companion File Name	**Description**
Willow_Veg_Plot_photos.pdf	This file contains landscape photos of willow vegetation from Shickhoff et al., 2002.

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

Table 2. *Willow_Soil_Data.csv*

Column Name	Units	Description
PUBLICATION_RELEVE_NUMBER		Plot number from Schickhoff et al. 2002
FIELD_RELEVE_NUMBER		Plot number
SOIL_WATER_CONTENT	G	Water content in the soil sample
BULK_DENSITY	G/CM^3	Bulk density of the soil sample

PH_PASTE		pH of the soil sample
ELECTRICAL_CONDUCTIVITY	UMHOS/CM	Electrical conductivity of the soil sample
SOIL_ORGANIC_MATTER	%	Percentage of soil organic matter
NO3-N	PPM	Extractable NO3-N in the soil sample
P	PPM	Extractable P in the soil sample
K	PPM	Extractable K in the soil sample
ZN	PPM	Extractable Zn in the soil sample
FE	PPM	Extractable Fe in the soil sample
MN	PPM	Extractable Mn in the soil sample
CU	PPM	Extractable Cu in the soil sample
ROOT_PENETRATION_INDEX		Scalar value representing degree of root penetration (strong, medium, weak)
SOIL_COLOR_AT_10_CM		Color of soil sample at 10 cm depth
GRAVEL_AT_10_CM	$G/100CM^3$	Gravel content of soil sample at 10 cm depth
SAND_AT_10_CM	%	Percentage sand content of the soil sample
SILT_AT_10_CM	%	Percentage silt content of the soil sample
CLAY_AT_10_CM	%	Percentage clay content of the soil sample
SITE_MOISTURE		Site moisture (MST:moist or WET:wet)
SOIL_TEXTURE		Soil texture (LOM:loam, SND:sand, CLY:clay, or SLT:silt)

Table 3. *Willow_Environmental_Data.csv*

Note: Coded and scalar variables are followed by a description column (e.g. SNOW_COVER and SNOW_COVER_DESC).

Column Name	Units	Description
PUBLICATION_RELEVE_NUMBER		Plot number from Schickhoff et al. 2002
PLANT_COMMUNITY_NAME		Primary vegetation types
RELEVE_SIZE	m^2	Plot size
ELEVATION	m	Plot elevation
SHRUB_COVER	%	Percent shrub cover in the plot
HERB_COVER_GRASSES_AND_FORBS	%	Percent herb, grasses, forbs cover in the plot
MOSS_AND_LICHEN_COVER	%	Percent moss and lichen cover in the plot
CHARACTER_SPECIES		Plot dominant species
PLANT_COMMUNITY_DESCRIPTION		Plot plant community description
FIELD_RELEVE_NUMBER		Plot number from field survey (in Figure 2)
AUTHORS_DESCRIPTION_OF_RELEVE_LOCATIONS		Author's plot descriptions
MOSS_LAYER_HEIGHT	cm	Height of moss layer in the plot
SNOW_COVER		Snow cover code
SNOW_COVER_DESC		Description of snow cover code
DISTANCE_TO_WATER_TABLE	m	Distance to water table
FLOOD_FREQUENCY		Flood frequency
SOIL_WATER_CONTENT	g	Water content of soil sample
BULK_DENSITY	g/cm^3	Bulk density of soil sample
PH_PASTE		pH of soil sample

ELECTRICAL_CONDUCTIVITY	umho/cm	Electrical conductivity
SOIL_ORGANIC_MATTER	%	Percent organic matter of soil sample
NO3-N	ppm	NO3-N in soil
P	ppm	Phosphorous in soil sample
K	ppm	Potassium in soil sample
ZN	ppm	Zinc in soil sample
FE	ppm	Iron in soil sample
MN	ppm	Manganese in soil sample
CU	ppm	Copper in soil sample
ROOT_PENETRATION_INDEX		Root penetration code
ROOT_PENETRATION_INDEX_DESC		Root penetration code description
SOIL_COLOR		Color of soil sample
GRAVEL_AT_10_CM	$g/100cm^3$	Gravel content of soil sample
SAND_AT_10_CM	%	Percent of sand in soil sample
SILT_AT_10_CM	%	Percent of silt in soil sample
CLAY_AT_10_CM	%	Percent of clay in soil sample
SITE_MOISTURE		Site moisture of the plots
SOIL_TEXTURE		Soil texture of the plots
TOTAL_VEGETATION_COVER	%	Percent vegetation cover of the plots
ESTIMATED_LATITUDE	decimal degrees	Latitude of the center of the plots
ESTIMATED_LONGITUDE	decimal degrees	Longitude of the center of the plots

Table 4. *Willow_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_AUTHORS		Current Taxonomy according to the Panarctic Species List (PASL) including author's names
3	DATASET_TAXON		Dataset taxonomy
4 to 84	10428 to 10512		Column headings are all 85 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).

3. Application and Derivation

These data bring together for easy reference all of the available information collected from the plots that has been used for the classification, mapping, and analysis of the geo-botanical factors from plots on the willow transect along the Dalton Highway in northern Alaska. 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 data sets 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 eighty-five study plots are located along a N-S transect from the southern slope of the Brooks Range to the Arctic coast in the vicinity of Prudhoe Bay/Deadhorse. The transect follows the northern segment of the Dalton Highway. Plot locations are depicted in Figure 2. The major portion of the transect lies within the drainage system of the Sagavanirktok River on the North Slope of Alaska. The plots were subjectively located in three broad habitat types including: tall willow shrub communities on floodplains, gravel bars, and lower terraces as well as on upland montane stream banks (27 plots); open low willow shrub communities on the banks of upland tundra streams as well as upper terraces from about 950 m in elevation down to the coastal plain (35 plots); and low willow shrub communities restricted to the most humid and acidic banks of upland tundra streams in the Arctic foothills, roughly between 400 and 800 m in elevation (23 plots).

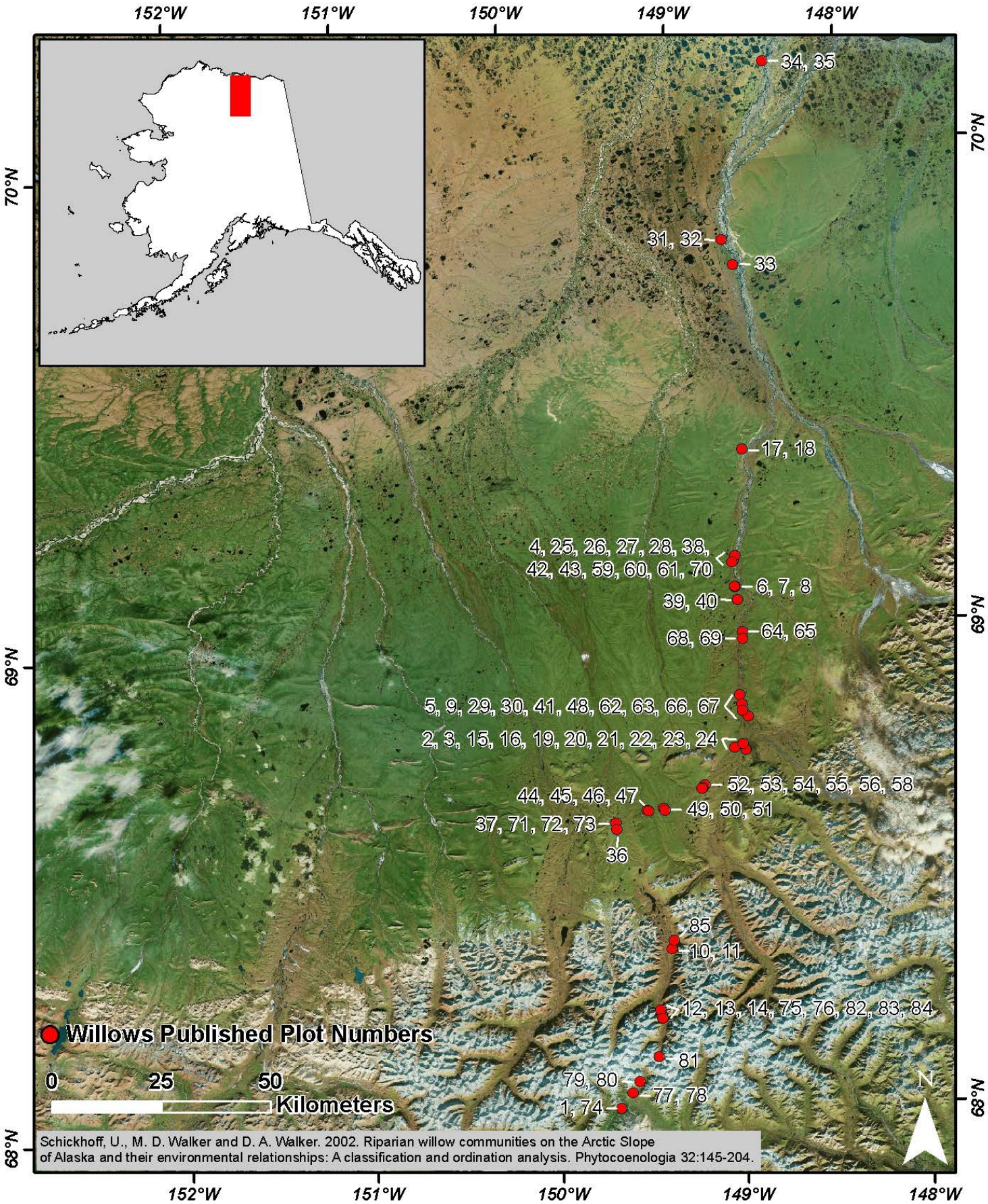

Figure 2. Location of the willow transect plots in northern Alaska

Vegetation Plot Sampling

The study sites were selected along rivers and streams of different orders in order to cover the full variety of riparian shrubland habitats between the

Brooks Range and the coastal plain. The plots were sampled according to the Braun-Blanquet approach. Phytosociological and environmental data collection was conducted between July 9 and August 17 1997. Sample plots were of square or rectangular shape. Representative samples of the *Salix*-communities required minimal areas between 50 m^2 (low shrublands) and 100 m^2 (tall shrublands). Shrub, field, moss and lichen coverage were measured or estimated for each of the sample plots. Species cover was estimated according to the traditional Braun-Blanquet cover-abundance scale.

Estimates of a number of habitat factors, such as frequency of flooding, soil moisture, site moisture, snow cover, percent cryoturbation, and animal disturbance were recorded. Additionally, the vertical distance to the water table was measured, and information on the locality, on the entire size of the sample stand, on microtopography and geomorphic processes, and on the surrounding vegetation types was noted.

A soil pit was dug on each sample plot. Soil profiles were described according to Schlichting et al. (1995) with regard to active layer depth, thickness and type of horizons, color, texture, humus contents, moisture conditions, and root patterns. Soil samples were collected from 10 cm depth in each soil pit. Fresh field samples were oven-dried at 105 °C for 72 hours in camp to determine percentage weight loss and soil moisture. Laboratory soil analyses (Soil, Water and Plant Testing Laboratory, Colorado State University) comprised soil pH (saturated paste method), electrical conductivity, percent organic matter, NO3-N, plant available P, K, Zn, Fe, Mn, Cu, and percent gravel, sand, silt, and clay.

Figure 3. *Salix alaxensis*-communities are not restricted to lowland river banks. As true pioneer communities they occupy gravelly montane stream banks in the Brooks Range, which might show only periodical streamflow (subass. polemonietosum acutiflori). Stand productivity and vigor of Salix alaxensis is reduced (Schickhoff et al., 2002).

Figure 4. Sites of *Salix pulchra*-stands are characterized by a very shallow active layer. Thick moss layers provide perfect insulation of the subsoil (Schickhoff et al., 2002).

6. Data Access

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

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Contact for Data Center Access Information:

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

7. References

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