Plant community composition data: Bathurst Inlet and the Canadian Transect

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Background

Two datasets relevant to the Arctic Vegetation Archive include a study of plant community composition, landscape and remotely-sensed spectral diversity from the central Canadian Arctic, Bathurst Inlet area (Gould 1998) and a series of relevés conducted along a climatic gradient in the Canadian Arctic as a component of the Circumpolar Arctic Vegetation Map (CAVM Team 2003). The datasets include plant community composition and associated site environmental characteristics from 12 locations (Fig. 1, Table 1). The objectives of the sampling in the Bathurst Inlet area were to test hypotheses related to species richness patterns and environmental controls along gradients of climate, pH, and landscape heterogeneity (Gould and Walker 1997, Gould and Walker 1999, Gould 2000). The objectives of the Canadian Transect were to bring Arctic vegetation experts to sites along the complete climatic gradient in the Canadian Arctic in order to better understand vegetation patterns, develop a table of major vegetation types along a topographic sequence within climatic subzones, and ultimately develop consensus on bioclimatic zonation for the Canadian Arctic and the Circumpolar region (CAVM team 2003, Gould et al 2003, Walker et. al 2005).

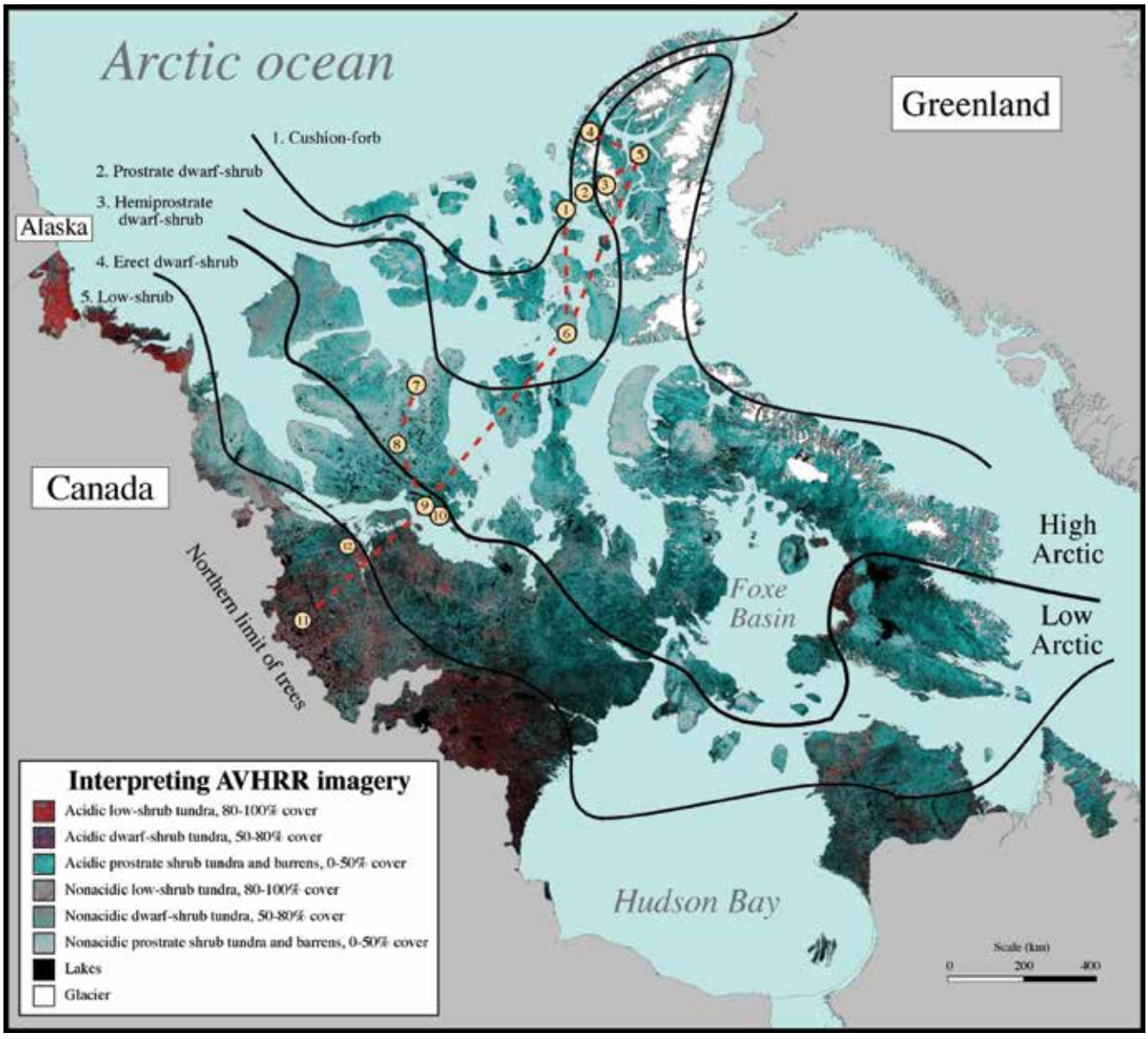

Figure 1. *Location of relevé sampling sites in the Canadian Arctic (modified from Gould et al 2003).*

Table 1. *Relevé sampling sites in the Bathurst Inlet and Canadian transect studies*

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			Elevation (m)	Dominant Subzone	Vegetation	Mean July Temp. (°C)	Annual Precip. (mm)
Amund Ringnes Island							
Northweast coast	8/2/99	78 41 N, 96 45 W	2	1	cushion-forb		
1 Stratigrapher river	8/2/99	78 38 N, 96 50 W	40 - 50	1	cushion-forb		
Axel Hieberg Island							
2 Cape Levvel	8/2/99	78 58 N, 94 15 W	10	2	prostrate dwarf-shrub		
3 Bunde Fiord	8/1/99	80 30 N, 94 35 W	30-40	2	prostrate dwarf-shrub		
4 Expedition Fiord	8/2/99	79 25 N, 90 45 W	150	3	prostrate dwarf-shrub		
Ellesmere Island							
5 Eureka	7/29/99 - 8/4/99	80 00 N, 84 55 W	20-30	3	prostrate dwarf-shrub	5.4	68.0
Black top Ridge	7/30/99	80 04 N, 85 29 W	200	1	cushion-forb		
Hare Ridge	7/30/99	80 05 N, 86 15 W	200	1	cushion-forb		
East Wind Lake	7/31/99	80 06 N, 85 34 W	135-150	3	hemiprostrate dwarf-shrub		
Cornwallis Island (Resolute area)							
North of Signal Hill	8/6/99	74 44 N, 94 52 W	125	2	prostrate dwarf-shrub		
6 Resolute Bay	8/6/99	74 41 N, 94 55 W	75	2	prostrate dwarf-shrub	4.0	139.6
Victoria Island							
7 Hadley bay	8/8/99	72 31 N, 109 19 W	135	2	prostrate dwarf-shrub		
8 Tuktu River	8/8/99	70 46 N, 109 09 W	150	3	hemiprostrate dwarf-shrub		
9 Thanhieser site	7/28/99	69 08 N, 105 09 W	30	4	erect dwarf-shrub	8.0	141.0
10 Mount Pelly	7/19-28/99, 8/9/99	69 11 N, 104 45 W	60	4	erect dwarf-shrub	8.0	141.0
Mainland							
11 Daring Lake	8/9/99 - 8/11/99	64 51 N, 111 31 W	70	5	low-shrub	9.5	219.5
12 Bathurst Lake	1994 -1997	67 26 N, 108 53 W	0-300	5	low-shrub	12.0	230.0

Methodology

Sampling in both studies involved selecting sites of homogeneous vegetation and locating relevés using the centralized replicate technique (Mueller-Dombois & Ellenberg 1974). Relevés were ranged from 4-50 m^2 and include a list of all vascular plants, bryophytes, and lichens and an estimation of percent cover for each species. Additionally, we recorded vegetation characteristics such as percent cover of growth forms and shrub heights. Plot environmental characteristics recorded typically included associated landforms, surficial geology and geomorphology, site and soil moisture estimates, topographic position, estimated snow duration, stability, exposure, slope, aspect, animal disturbance, and thaw depth. In the Bathurst Inlet study 287 relevés were conducted in a set of 17 sites along the riparian corridor of the Hood River, Nunavut. In the Canadian Transect 115 relevés were conducted at 11 sites, with representative relevés from five positions along a toposequence: Dry exposed ridges, mesic zonal sites, wet meadows, snowbeds, and streamside sites.

Results

In the Bathurst Inlet study we described 24 community types which encompass the range of vegetation found along the Hood River corridor (Gould and Walker 1999). These communities occur within seven Braun-Blanquet phytosociological classes: *Rhizocarpetea geographici, Cetrario-Loiseleurietea, Carici rupestris-Kobresietea bellardii, Scheuchzerio-Caricetea fuscae, Betulo-Adenostyletea, Oxycocco-Sphagnetea*, and *Salicetea herbaceae*. In terms of variation and controls on biodiversity patterns, we found that an increase in site species richness correlated with an increase in the number of communities rather than an increase in the alpha-diversity of individual communities. Moisture and pH controlled most of the differences in composition between communities. Measures of species richness and correlations with moisture and pH within communities differed among vascular, bryophyte, and lichen species. Bryophyte and lichen richness were positively and negatively correlated (respectively) with moisture. Vascular plant richness along a soil acidity gradient peaked at pH 6.5. We concluded that site variation in vascular richness in this region is controlled by landscape heterogeneity, and structured as variation in the number and distinctiveness of recognizable plant communities.

Data from the Canadian transect is compiled in an extensive data report, which includes information on soils, environmental factors, species occurrence and abundance, and site photographs (Gonzalez et al. 2000). The transect contributed to a successful collaboration among an international group of Arctic vegetation experts (Fig. 2), consensus on zonation terminology (Fig. 3) and progress in the development of the Circumpolar Arctic Vegetation Map (CAVM team 2003). The report documents the occurrence of 156 vascular, 200 bryophyte, and 140 lichen taxa among the set of relevés (Gonzaléz et al. 2000).

Figure 2. *Canadian Transect participants at the Daring Lake research camp. Standing from left to right: Christine Hill, Howard Hill, Boris Yurtsev, Fred Daniëls, Sylvia Edlund, Arve Elvebakk, April Desjarlais, Dianna Alsup.*
Seating from left to right: Skip Walker, Nadya Matveyeva, Bill Gould, and Chris Schadt (Gonzaléz et al 2000).

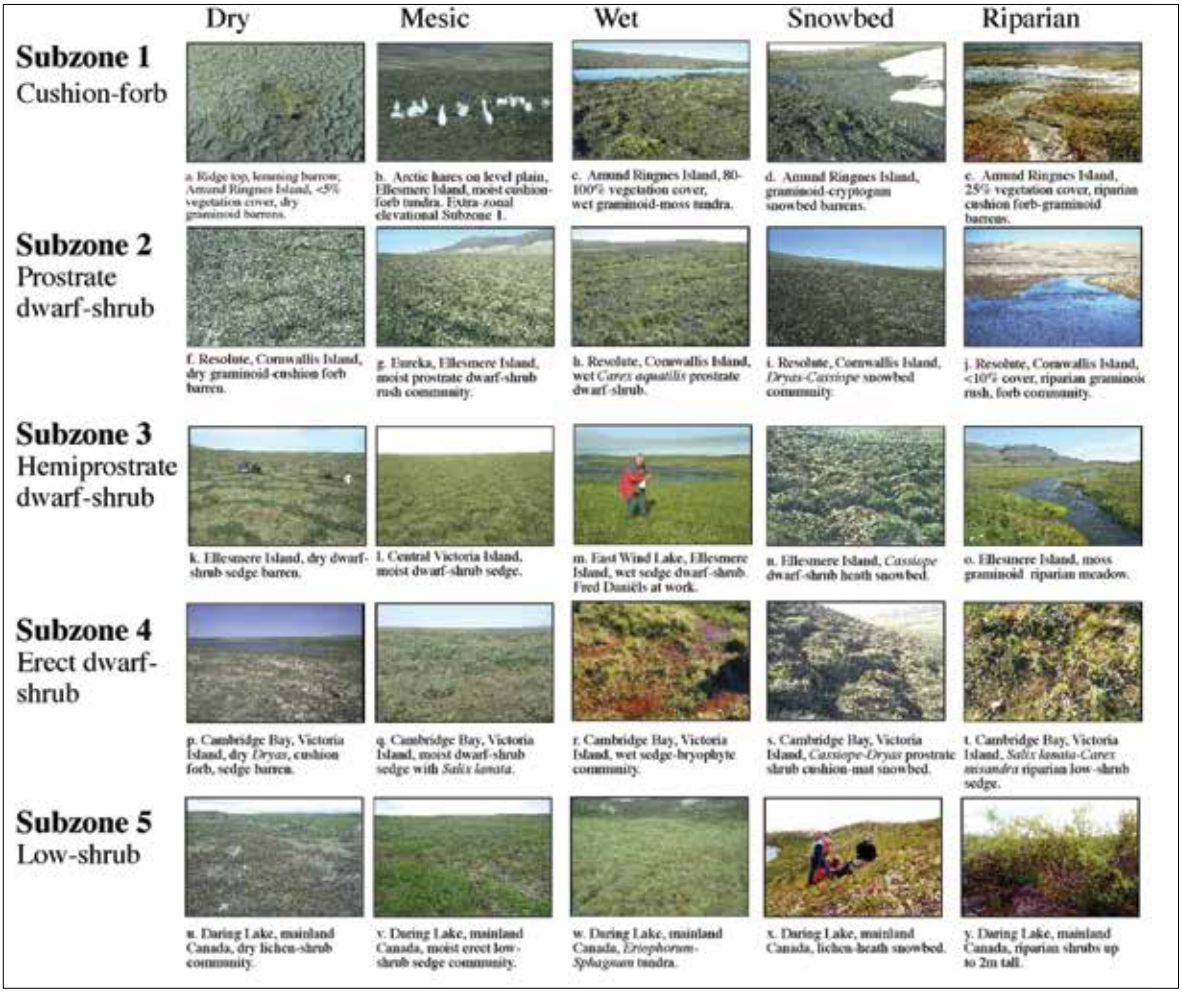

Figure 3. *Characteristic vegetation communities along a mesotopgraphic sequence in each of five subzones of the Canadian Arctic (Gould et al. 2003).*

Conclusion

The 403 relevés from the Canadian Arctic included in these datasets can represent a significant contribution to a North American Arctic Vegetation Archive and companion dataset to the Alaskan Vegetation Archive.

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