

A CANADIAN RELEVÉ DATABASE: VPRO, THE CNVC, AND THE CANADIAN ARCTIC IPY

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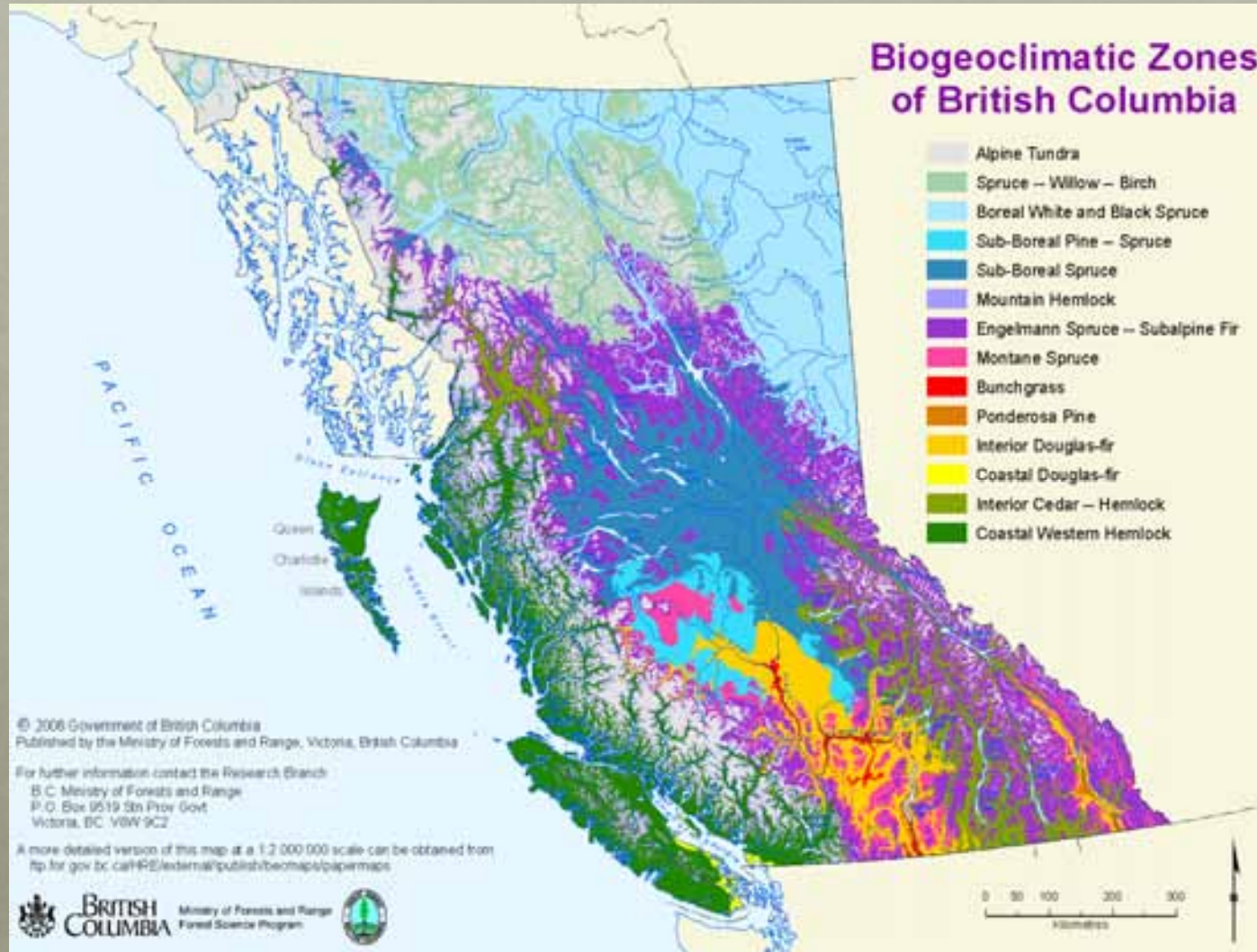
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OUTLINE

- VPRO software for plot and classification management
- Some experiences from data compilations
- Arctic data compilation and classification

BRITISH COLUMBIA BIOCLIMATIC DIVERSITY



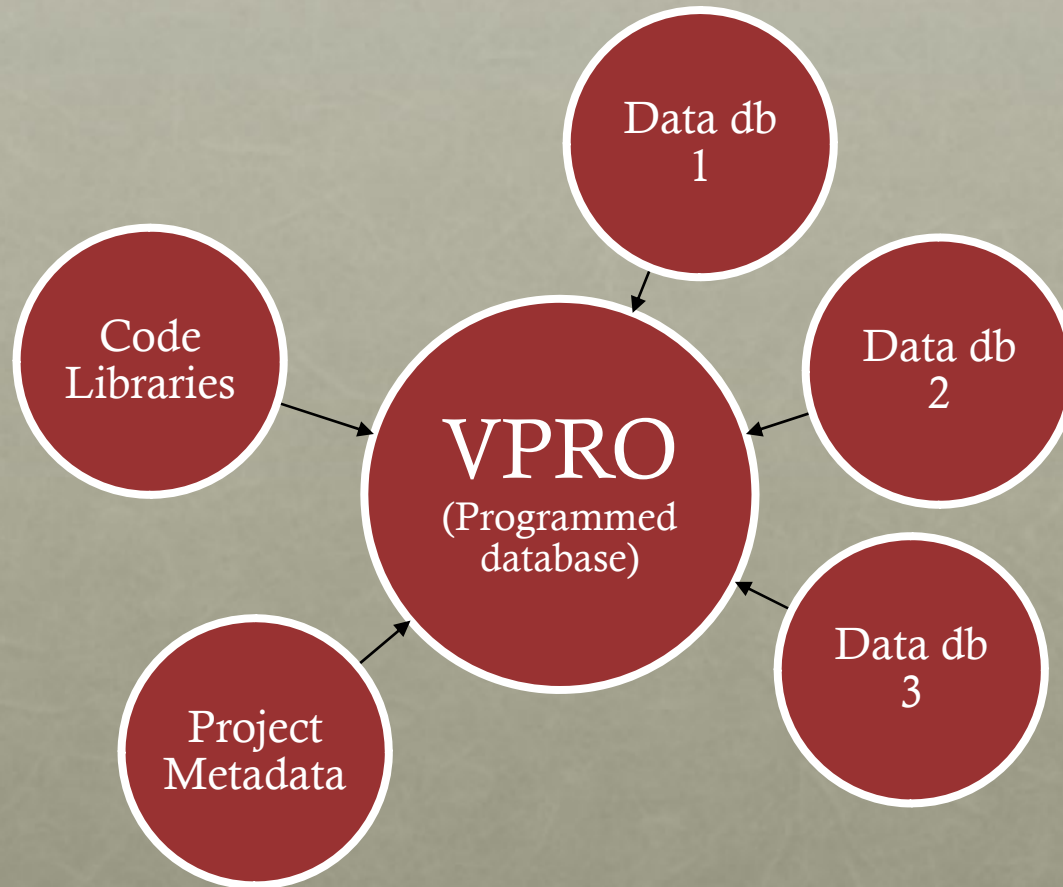
VPRO HISTORY

- British Columbian Biogeoclimatic Ecosystem Classification (BEC) developed to deal with high levels of bioclimatic and site diversity
- Based on Braun-Blanquet methods
- European phytosociologists - Vladimir Krajina at UBC
- BEC system adopted by provincial government for guiding forestry, conservation and resource management - late 1970s
- 1970s and 80s data managed through UBC mainframe program(VTAB) - failing by 1990s
- Development of new data management system based on relational databases architecture :VPRO (1994-).

VPRO (MACKENZIE AND KLASSEN)

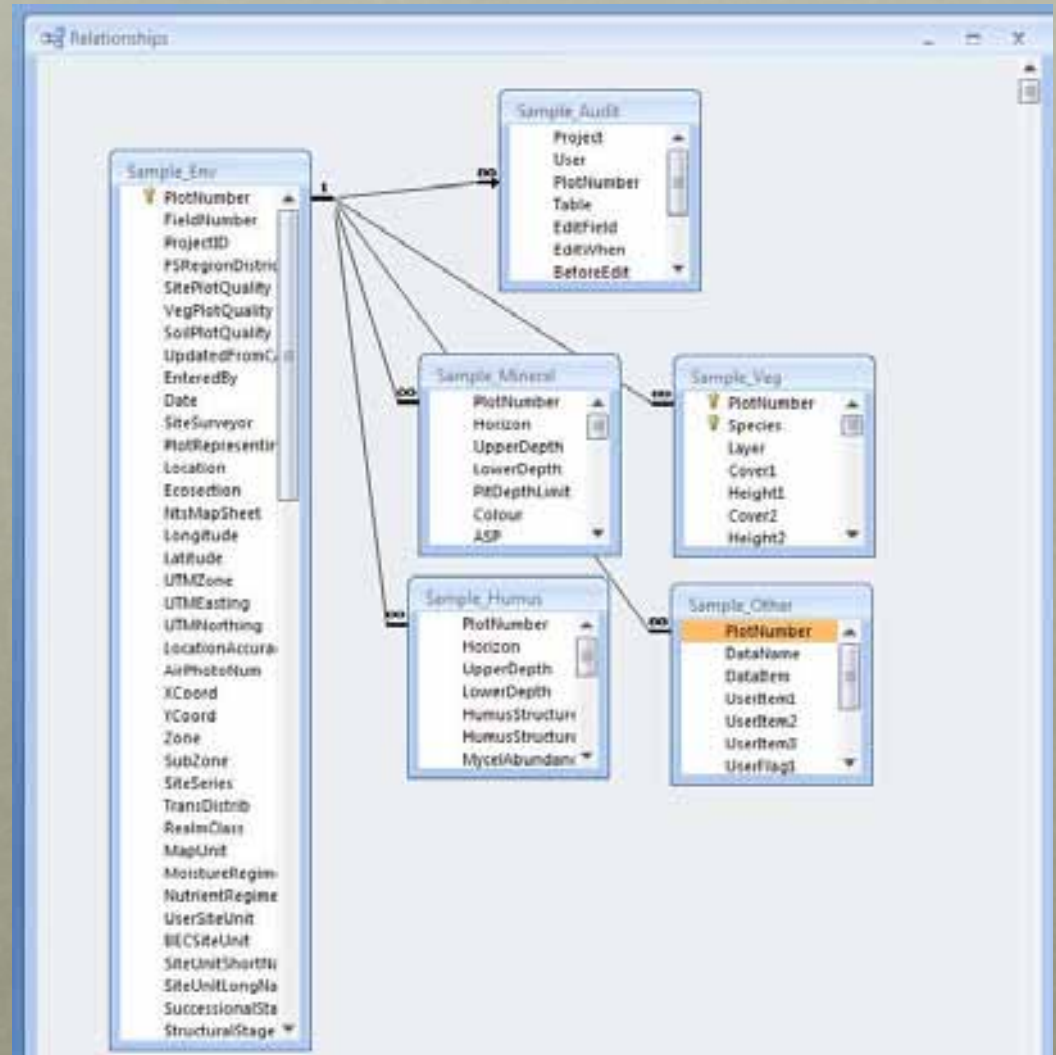
- Programmed Microsoft ACCESS database
- Data stored in relational tables
 - Site-Environment
 - Vegetation
 - Soils/humus horizon and mensuration tables
- Linked taxonomic, environment code libraries and metadata
- Manages hierarchical classification structures
- Reports generated in Excel
- Exports data to various data forms
- Some analysis tools

EXTERNAL DATA LINKED TO VPRO



RELATIONAL TABLES

- Data managed in related table sets called PROJECTS
- Changes in relational databases 'cascade' through related tables



DATA FORMS

ECOSYSTEM FIELD FORM (FS882)															
Site		Vegetation		Veg Other		Soil/Terrain		Other		Audit					
BEC Master		Working Unit		Project ID		Date		Plot Number							
Copy to Working Unit		ryaint - Saxiopp (High Arc)		12Barrett		6/19/87		BA00003							
		Env Master SU Tbl		Edit Project Metadata		Surveyor		Field No.							
						P. Barrett		6							
LOCATION															
General Location		Devon Island, coastal lowland, from Truelove Inlet to Cape Sparbo													
Forest Region/Dist.		Map Sheet		UTM Zone		Easting		Northing		Accur. (m)					
Air Photo No.		X Co-ord		Y Co-ord		Coordinate Method		<input checked="" type="checkbox"/> D.d		<input type="checkbox"/> DM.m		<input type="checkbox"/> DMS.s		Ecosection	
						Latitude		75.88333		Longitude		84.55			
SITE INFORMATION															
Plot Representing		Pedicularo - Dryadetum integrifoliae													
Biogeoclimatic Unit		Site Series		Realm/Class		Transition/Distrib.		Map Unit							
3		7													
Moisture Regime		Nutrient Regime		Successional Status		Structural Stage		Stand Age							
6						2									
Elevation (m)		Slope (%)		Aspect		Meso Slope Pos.		Surface Shape		Microtop. type		Microtop. size			
0		999		LV		CV		NET							
Data Quality		Data		SUBSTRATE %		Photo:		Site Disturbance		Exposure Type					
Site		Lock		Unlock		Org. Matter		Rocks							
Veg						Dec. Wood		Mineral Soil							
Soil						Bedrock		Water							
FIELD NOTES															
Plot size: 100; occurs on flat areas as occasional, small, isolated patches, generally surrounded by hydric sedge meadow communities; appears to be snow-free earlier than surrounding meadow sites; well developed non-sorted circles, generally devoid of plant cover, so veg restricted to borders of circles - distinguishing feature															
OFFICE NOTES															
Did you know that while editing a text box that you can press Shift-F2 to open the Zoom window?															
Plot Profiling															
Save															
Record: 1664 of 8955															
Unfiltered Search															

Double-click picture for larger view

OTHER RELATED TABLES

- Site Unit (SU) table
 - dynamic subsets of project data
 - First order classification
- Hierarchy Tables
 - Multi-level, parent-child relationships between SUs

The screenshot shows the 'Data Centre' window for 'VPro 03'. It features three dropdown menus: 'Data Project' set to 'AllArcticData', 'Site Unit' set to 'AllArctic14Mar2011', and 'Hierarchy' set to 'Arctic14Mar2011'. Below these is a 'Forms' section with buttons for 'Full Data Forms', 'Compact Data Forms', 'Site Unit Form', and 'Hierarchy Form'. At the bottom are 'Exit VPro' and 'Exit Access' buttons.

This screenshot shows a detailed view of the 'Data Project' and 'Site Unit' dropdown menus. The 'Data Project' menu is set to 'AllArcticData'. The 'Site Unit' menu is set to 'AllArctic14Mar2011' and is expanded, showing a list of options: 'Attach', 'New', 'Unattach', 'None', a separator line, 'All_Plots_in_BGCs_Robsor', 'AllArctic_Phase3', 'AllArctic14Mar2011', 'AllZonals', 'AlpineWorking_Feb2012' (which is highlighted), 'BECMaster20Mar2013', and 'BECMaster25Apr2012'.

SINGLE LEVEL CLASSIFICATION

- Simple 2-column table
- Use tree control for display
- Linked to plot data

Assign Site Units

Locate Node

Hierarchy Table: Antioch-Hierarchy_Hierarchy
 Site Table: BAFAdv_working
 Plot No: 0116558
 Project ID: Alpine2007

Region	Location					
RNI	Norda Microarea, N. Rockies					
NTS Map	1:250	Excession	SEC Site Unit	User Site Unit		
Zone	Subzone	Site Series	Success	Stratus	Structural Stage	Stand Age
DAI A	my					
SNR	BNR	Elevation (m)	Slope (%)	Aspect	MESO	
1	1E	1070	40	355	UP	
Soil S. Group	Soil Group	Humus F	Drainage	Seepage	R.Z. Particle Size	
O	R				F	
Exposure 1	Exposure 2	Site Dist. 1	Site Dist. 2	Bed Rock Geology 1		
un		1.5				

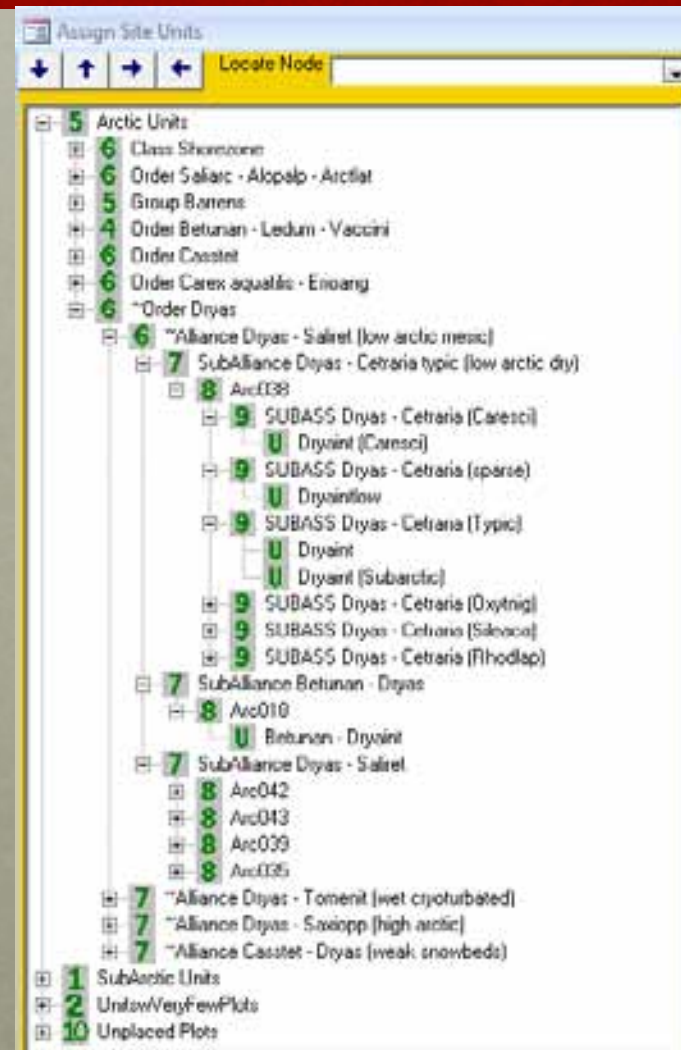
Species	A1	A2	A3	B1	B2	C	D
ABIELAS					0.2		
ANEMNAR						0.1	
ANEMPAR						0.2	
ARCTRUU						1	
BISTVIV						0.5	
CARESCI						0.5	
CASSTET						20	
CETRICAL							1
CETRINV							1
CLADMIT							1
COELACU							1
DACTARC							5
DASIFRUT					0.1		
DICRANU							5
DODEFRI						0.5	
DRYANT						15	
ERIGHUM						0.1	
FESTALT						0.5	
HEDYALP						0.1	
HYLOSPL							15
LOCYRDIG						0.5	
PARNKOT						0.1	
PEDICAP						0.2	
PEDILAN						0.1	
PELTAPH							0.1
POA ALP						0.2	
POLEACU						0.1	
SALIPOL						5	

Tree control for display:

- U Ag61 Poa_arctica
- U Ah61 Cassiter
- U BAFAdv /
- U BAFAdv /At Dryas-Cetrari
- U BAFAdv /At Oxycodig
- U BAFAdv /At Salpola-Saxila-Potenian
- U BAFAdv /At Salret-Phyllogla
- U BAFAdv /Am Sennin - Corepod
- U BAFAdv /At Catemic-Salpol
- U BAFAdv /At Cassiter-Dryaint
- P 0116549
- P 0116555
- P 0116558
- P 29324
- P 5903056
- P MK04020
- U BAFAdv /At Dryaint-Salret
- P 0116544
- P 0116553
- P 0116557
- P 29321
- P 29334
- P LA-538
- P LA-556
- P LA-573
- P LA-634
- P MK04001
- P MK04021
- U BAFAdv /At Dryaint-Salret (Feathermoss variation)
- U BAFAdv /At Festalt Salret
- U BAFAdv /At Salret - Astraumb - Moss
- U BAFAdv /At Salret-Coremoss-Toment
- U BAFAdv /At12
- U unknown alpine wetland

HIERARCHICAL CLASSIFICATION

- Base units are organized into hierarchical structures
- Reports and exports can be based on the hierarchy (~)



VEGETATION REPORT OPTIONS

- Plot reports (grouped by..) for (Site, Vegetation or both)
- Summary vegetation reports grouped by:
 - Field attributes
 - Lowest Unit
 - Any higher level hierarchical unit
 - Diagnostic report (B-B)
- Options on summary values, strata, combine species, etc

The screenshot shows a software window titled "VPro - Summary Vegetation Report Options". It contains several sections with radio buttons and checkboxes for configuring report output.

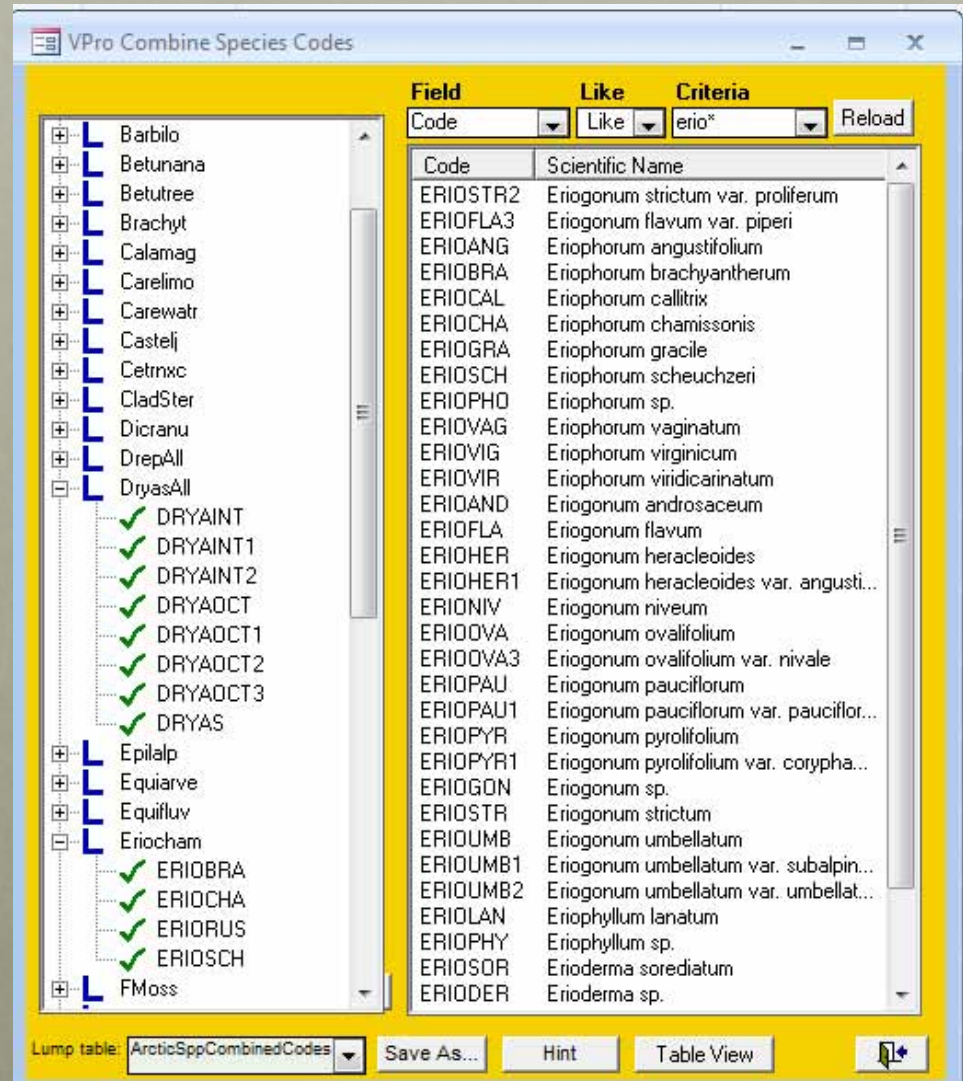
- Summary Report Units:** Radio buttons for "Current Site Unit Table", "Break Points as Units" (selected), "SU's Below Breaks", and "User Selected Fields".
- Diagnostic Report Units:** Radio buttons for "Site Units" and "Lowest Breakpoints".
- Group by:** Radio buttons for "Layer", "Strata", "Lifeform" (selected), and "None".
- Average:** Radio buttons for "By n Plots" (selected) and "Characteristic".
- Display Values:** Radio buttons for "% Presence and % Cover" (selected), "Presence Class and Significance Class", and "Presence Class and % Cover".
- Prominence Class / Goldstream Class:** Radio buttons for "Prominence Class" and "Goldstream Class".
- Show:** A sub-section with radio buttons for "Class" and "Value" (selected).
- Treat subspecies/varieties as species?** Checked checkbox.
- Include hierarchy header?** Unchecked checkbox.
- Combined Spp List:** A dropdown menu showing "ArcticSppCombinedCodes".
- Report Title:** A text field containing "All Zonal".
- Show english name** and **Create report summary**: Both checked checkboxes.

SPECIES LIBRARY

Codetyp	OldCode	Code	ScientificName	SplCode	Lifeform	Authority	EnglishName
S	DREPREV2	SCORREV	Drepanocladus revolvens var. revolvens	SCORREV	9		
S	DREPREV3	SCORCOS	Drepanocladus revolvens var. intermedius	SCORCOS	9	(Lindb.) Grout	
U	DREPSAB	DREPSAB	Drepanolejeunea saballiana	DREPSAB	10	Schust.	
U	DREPSEN	DREPSEN	Drepanocladus sendtneri	DREPSEN	9	(Schimp.) Warnst.	chalk hook-moss
S	DREPSEN2	DREPSEN	Drepanocladus sendtneri var. wilsonii	DREPSEN	9	(Lindb.) Warnst.	
U	DREPSOR	DREPSOR	Drepanocladus sordidus	DREPSOR	9	(C. Müll.) Hedenäs	
S	DREPTRI	WARNTRI	Drepanocladus trichophyllus	WARNTRI	9	(Warnst.) Podp.	
S	DREPTUN	WARNTUN	Drepanocladus tundrae	WARNTUN	9	(Arnell) Loeske	
S	DREPUNC	SANIUNC	Drepanocladus uncinatus	SANIUNC	9	(Hedw.) Warnst.	
S	DREPUNC4	SANISYM	Drepanocladus uncinatus var. symmetricus	SANISYM	9	(Ren. & Card.) Grout	
S	DREPUNC5	SANIUNC	Drepanocladus uncinatus var. uncinatus	SANIUNC	9		
S	DREPVER	HAMAVER	Drepanocladus vermicosus	HAMAVER	9	(Mitt.) Warnst.	
U	DROSANG	DROSANG	Drosera anglica	DROSANG	7	Huds.	great sundew
U	DROSER	DROSER	Drosera sp.	DROSER	7		
U	DROSLIN	DROSLIN	Drosera linearis	DROSLIN	7	Goldie.	slenderleaf sundew
U	DROSROT	DROSROT	Drosera rotundifolia	DROSROT	7	L.	round-leaved sundew
U	DROSROT1	DROSROT1	Drosera rotundifolia var. rotundifolia	DROSROT	7		round-leaved sundew
U	DROXOB	DROXOB	Drosera x obovata	DROXOB	7	Mert. & W.	hybrid sundew
U	DRYADRU	DRYADRU	Dryas drummondii	DRYADRU	12	Richards. ex Hook.	yellow mountain-avens
U	DRYADRU1	DRYADRU1	Dryas drummondii var. drummondii	DRYADRU	12		yellow mountain-avens
U	DRYADRU2	DRYADRU2	Dryas drummondii var. glandulosa	DRYADRU	12	Pers.	yellow mountain-avens
U	DRYADRU3	DRYADRU3	Dryas drummondii var. tomentosa	DRYADRU	12	(Fair) Williams	yellow mountain-avens
S	DRYAHOO	DRYAOCT2	Dryas hookeriana	DRYAOCT	12	Jur.	
U	DRYAIN1	DRYAIN1	Dryas integrifolia	DRYAIN1	12	Vahl	entire-leaved mountain-avens
U	DRYAIN1	DRYAIN1	Dryas integrifolia ssp. integrifolia	DRYAIN1	12		entire-leaved mountain-avens
U	DRYAIN2	DRYAIN2	Dryas integrifolia ssp. sylvatica	DRYAIN2	12	(Hult.) Hult.	entire-leaved mountain-avens
U	DRYAOCT	DRYAOCT	Dryas octopetala	DRYAOCT	12	L.	white mountain-avens
U	DRYAOCT1	DRYAOCT1	Dryas octopetala ssp. alaskensis	DRYAOCT	12	(Pers.) Hult.	white mountain-avens
U	DRYAOCT2	DRYAOCT2	Dryas octopetala ssp. hookeriana	DRYAOCT	12	(Jur.) Hult.	white mountain-avens
U	DRYAOCT3	DRYAOCT3	Dryas octopetala ssp. octopetala	DRYAOCT	12		white mountain-avens

COMBINE SPECIES

- Simple 2-column table
- Displayed in Tree control
- Codes selected from Species Library



POST PROCESSING IN EXCEL

1	Dryas Alliances							
2	Vegetation Table							
3	Vegetation was lumped using CombinedSpp_Lump table							
4			n Plots	136	321	192	38	
5	LifeForm	Spp	Order	Casstet - Dryas (weak snowbeds)	Alliance Dryas - Saliret (low arctic mesic)	Alliance Dryas - Saxiopp (high arctic)	Alliance Dryas - Tomenit (wet cryoturbated)	Common Name
6	12	Cassiope tetragona	1.0	■■■■■			■■	four-angled mountain-heather
7	12	Salix reticulata	1.0	■■■	■■■		■■■	net-veined willow
8	11	Cetrnxc	0.9	■■■	■■		■■	
9	12	DryasAll	1.0	■■■■■	■■■■■	■■■■	■■■■	
10	12	Salix arctica	1.0	■■	***	■■■	■■■	arctic willow
11	07	Saxifraga oppositifolia	0.8	**		■■■		purple mountain saxifrage
12	06	Carex bigelowii	1.0				■■■■	Bigelow's sedge
13	09	FMoss	0.9				■■■■	
14	09	Tomentypnum nitens	1.0				■■■■	golden fuzzy fen moss
15	06	Eriophorum angustifolium	0.9				■■■	narrow-leaved cotton-grass
16	05	Equiave	0.7				■■	

EXPORTING DATA

VPro 07

File Tools Add-Ins Acrobat VPro

Import/Export Validate Vegetation Environment Other Library User Help
Tables Setup References Help

Import Export

VPro 03 Project
VPro XML Project
PC-ORD Compact Veg Form
PC-ORD Environment Matrix
TurboVeg CC File
TurboVeg Juice CSV
Export to R
User Species List
User Site Units

Project: Arctic /
Site/Veg Soil/Terra

based on 1998 Ec

lot No.	VO00073
ate	Field No.
005-07-23	501
urveyor	NM, CV, MI
egion/Dist.	
lot Quality	
eg Quality	
oil Quality	

LOCATION

General location Isachsen - Grid 2

Map S	Coordinate Method	<input checked="" type="checkbox"/> D.d	<input type="checkbox"/> DM.m	<input type="checkbox"/> DMS.s	Acc
	Latitude	78.78565	Longitude	103.5514	
Zone	Northing	Easting	Air Photo No.	X Coord	Y Coord
				Map Unit	

SITE INFORMATION

lot Pucang, Posaabr, Papdah

representing

Biogeoclimatic Unit	Site Series	Transition/Distrib.	Ecosection
1	4		
SMR	SNR	Succ. Status	Struct. Stage
		Stand Age	Realm/Class

VPro - Export to compact format

Include species with % mean cover > than %

Break point options

Ungrouped plots from SU ☐
SU table Groups ☐
Hierarchy break point Groups ☒
SU groups under breakpoints ☐
Ungrouped plots under breakpoints ☐

Treat strata as unique species ☐
Treat layers as unique species ☐
Use species codes only ☐

Combined Species List
Edit Combined List

Continue

PROJECT METADATA

- Field project metadata characterized in Vpro tables.

Project Meta Data

BEC Project Metadata Form

Project ID 12Barrett		Project Title Phytogeocoenoses of a Coastal Lowland Ecosys							
Coordinating Agency U. of New Hampshire		Proponent/Funder							
Field Company/Agency		Field Leader Paul E. Barrett							
Field Data Collection Team									
Purpose of Project To test the utilization of the community-unit theory in a Canadian High Arctic situation, and assess it									
Geographic Study Area High Arctic, Ellesmere Island		Region Devon Island							
Start Date July-01-87		End Date September-01-89							
No. of Project FS882 Plots 72		No. of Site Visits							
FS882 DATA COLLECTED									
	Site	Veg	Soil	Terrain	Mens.	CWD	Wild Tree	Soil Chem.	Other
Complete	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Partial	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
None	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Georeference Method		GPS		Base-correct		Pre2000		Map	
Datum		NAD27		NAD83		UTM		dd.ddd dd.mm.mmm dd.mm.ss.s	
Ecosystem Collection Standard		DEIF 1980		DEIF 1990		DTE 1998		Other	
Vegetation Cover Method		Percent		Braun-Blanquet		Domin-Krajina		Other	
Mensuration Method		Fixed		Prism		Paired Prism		Other	
Extra Vegetation Field Description plot size 100m2 or 25m2, few irregular									
Plot Method		20x20		Nested		1x1		Transect	
Data Custodian		Adrian de Groot		Storage Location					

DATA COMPILATIONS IN VPRO

- British Columbia Wetlands (1994 – 1998) [8000 plots]
- Biogeoclimatic ecosystem classification BEC (1999 - ongoing) [55,000]
- Canadian National Vegetation Classification CNVC (2003 - ongoing) [additional 50,000]
- International Correlation w/US (incomplete)
 - Coastal (50,000?)
 - S.Interior (2007) [30,000]
- Canadian Arctic and SubArctic (2009 - 2011) [15,000]

LESSONS LEARNED FROM DATA COMPILATIONS #1

- Actual database used is not important but unequal data field characteristics is a problem
- The more consistent/standardized the datasets are, the easier to compile.
- Unique plot number as key field leads to less problems with plot duplication
- Table data is less likely to lose meaning overtime when it is interpretable without reference to data codes

LESSONS LEARNED #2

- Environmental attributes:
 - Good georeferencing is very important for most purposes
 - Quantitative variables are not a problem
 - Categorical data based more challenging in some cases
- Vegetation
 - Taxonomy options: Convert or combine codes using synonym list
 - The list of taxonomic challenges for classification species is short
 - Data collected in strata/layers defined differently
 - Categorical conversion to Percentile data

LESSONS LEARNED #3

- Project Metadata essential
- Working with 'dynasets' of a single Master database very useful model
- Some additional fields very useful for exploring /filtering the data
 - E.g. Data quality, administrative area, bioclimatic area, species lifeform

VPRO

POSITIVES/NEGATIVES

- + Active fully integrated data sets (not an archive)
- + Management and use of hierarchical classifications
- + Wide array of reporting/exporting functions and options desirable for BB-style classifications
- + Commercial relational database functionality
- Tied to commercial software (Bill Gates)
- Single dataset limited to 2Gb (about 250k records though multiple sets can be linked)

END