

Broad Ecosystem Classification & Mapping

Applications in Regional Planning

Dawson Regional Planning Conference

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Dawson City, Yukon

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Department of Environment, Yukon government

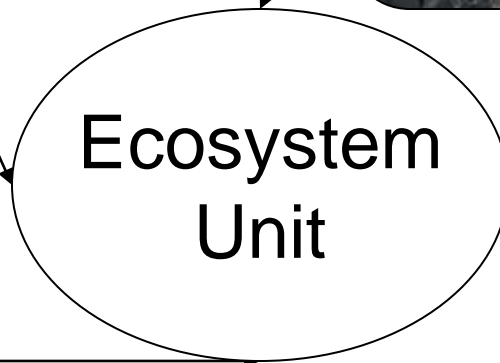
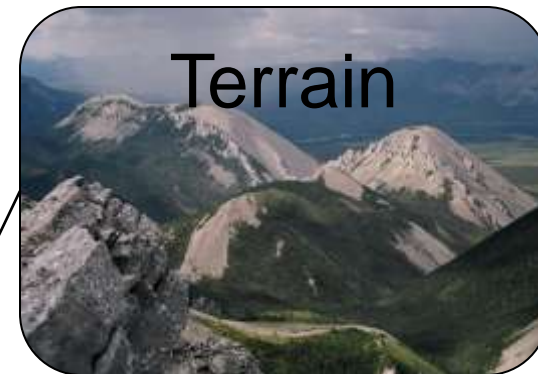
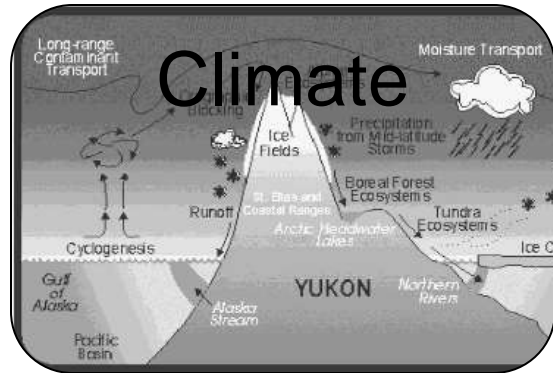


Broad Ecosystem Classification and Mapping



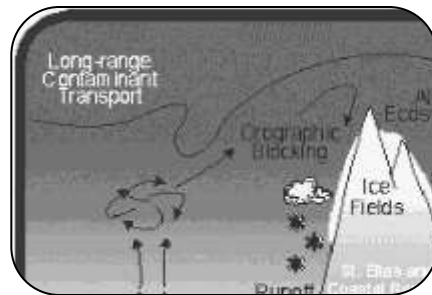
- What
- Why
- How
- Dawson study
 - Predictive Ecosystem Mapping
 - Methods
- Applications

What is ecosystem classification?

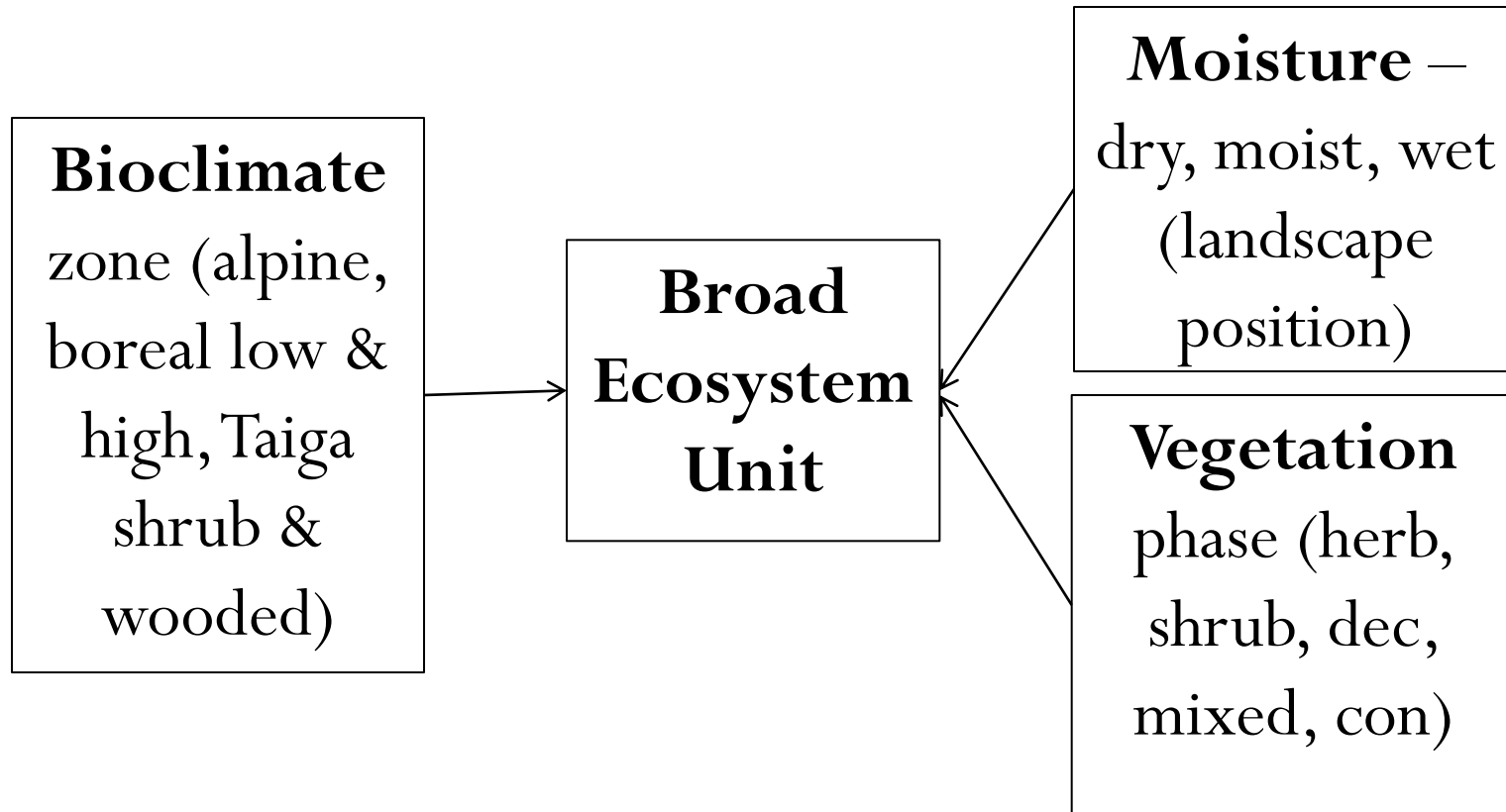


Why?

- A common language
- A tool for management decisions



How Broad Ecosystems are classified



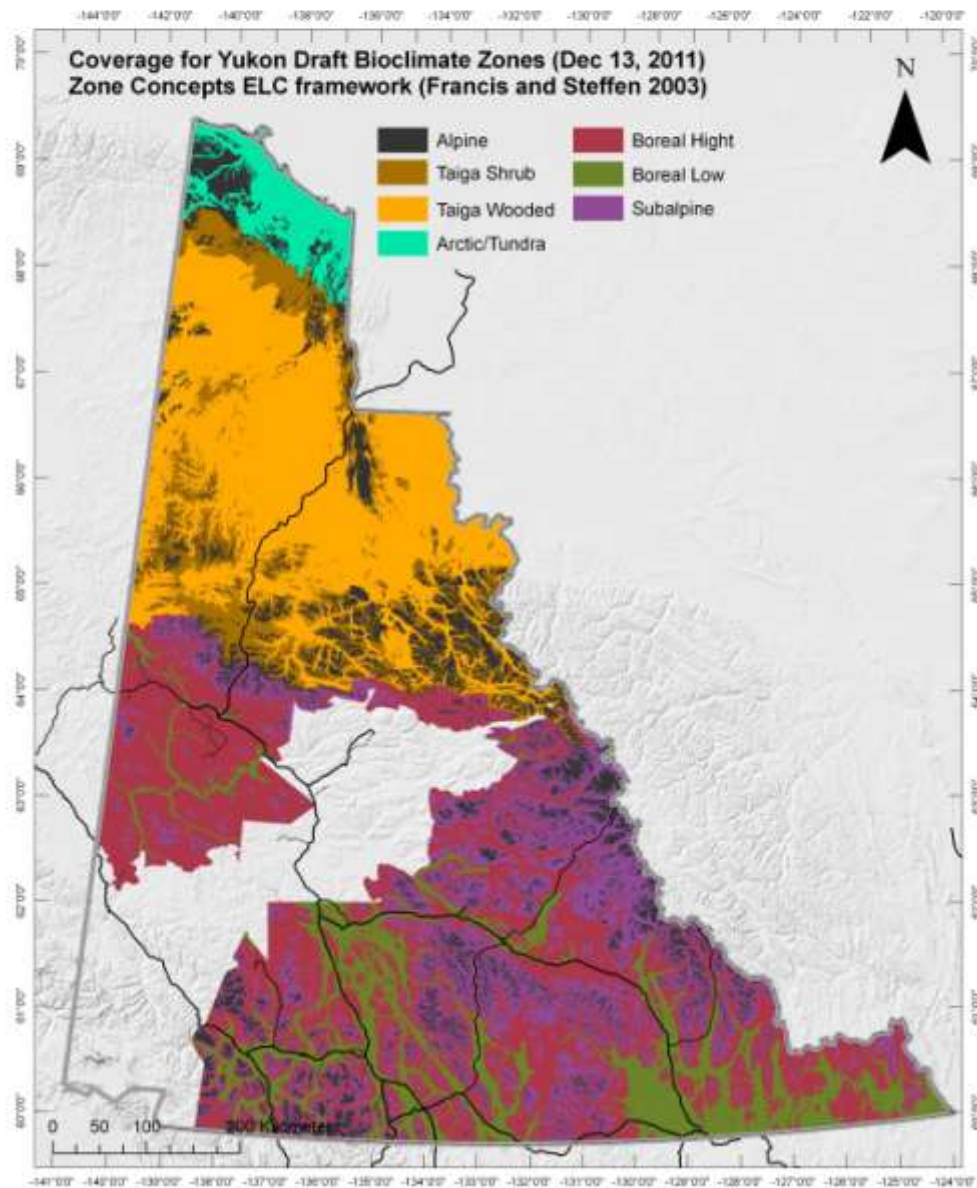
Bioclimatic Ecosystem Classification



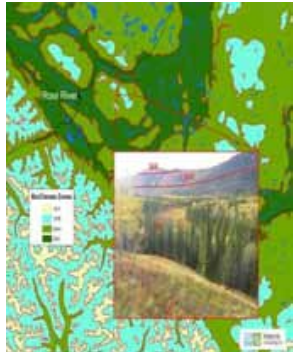
Reference sites

- reflects regional climate
- characterizes bioclimatic zones and subzones
- climate envelop
- Vegetation defined broadly for broad ecosystems

Bioclimatic Zones



Bioclimate Ecosystem Classification



Yukon ELC Level	Description						
Bioclimate Zone	Boreal High						
Bioclimate Subzone	Boreal High, Klondike Plateau						
Broad Ecosystem Unit (BEU)	Steep Slope - Dry		Ridge - Dry		Gentle slopes - Mesic		
Phase	Shrub	Treed, Deciduous/ Mixedwood	Shrub	Treed, Deciduous- Mixedwood	Treed, Coniferous		
Ecosite	Willow/ Sage	Aspen/ Fescue	Willow- Shrub Birch/ Feathermoss	Paper Birch- White Spruce/ Feathermoss	White Spruce/ Lichen	White Spruce-Black Spruce/ Feathermoss	
Phase	3b (tall shrub)	5-7 (young to old forest)	3b (tall shrub)/ES – early seral	4-5 (pole to young forest)/ MS – mid seral	5-7 (young to old forest)	5-7 (young to old forest)	

Broad Ecosystem Classification



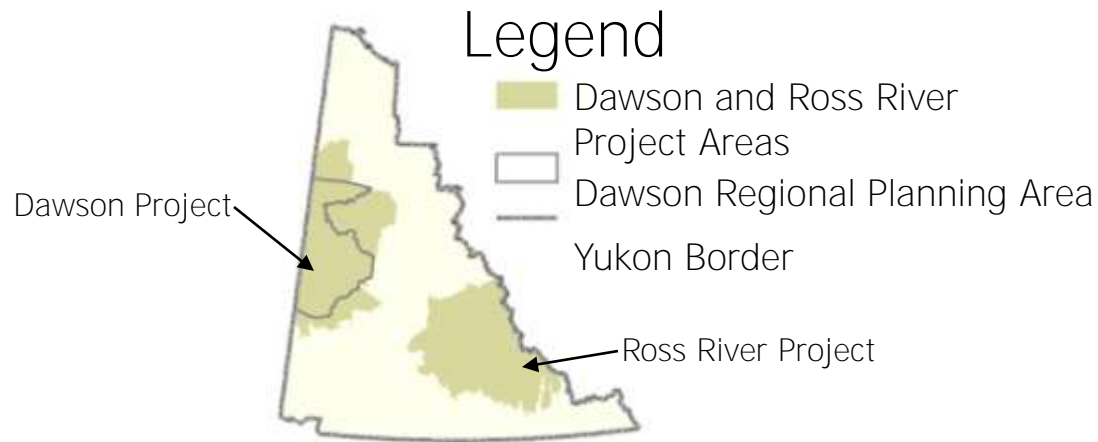
Group	Type	Phase
DRY	Rock (700)	High Elevation Rock (700) Low-Middle Elevation Rock (700)
	Ridge (110)	Herb-Bryoid (111) Herb (111) and Shrub (112) Deciduous (113) and Mixedwood (114) Coniferous (115)
	Steep South Slope (120)	Herb-Bryoid (121) Shrub (122) Deciduous (123) Mixedwood (124) Coniferous (125)
	Upper Slope (130)	Herb-Bryoid (131) and Shrub (132) Deciduous (133) and Mixed-wood (134) Coniferous (135)
MOIST	Gentle Slope and Plain (140)	Herb-Bryoid (141) Shrub (142) Deciduous (143) and Mixedwood (144) Coniferous (145)
	Steep North Slope (150)	Herb-Bryoid (151) and Shrub (152) Deciduous (153) and Mixedwood (154) Coniferous (155)
WET	Drainage/Depression (160)	Herb-Bryoid (161) and Shrub (162) Deciduous (163) and Mixedwood (164) Coniferous (165)
	Wetlands (310)	Herb (311) Shrub (312) Treed (315)
	Floodplains (370/380/390)	Gravel Bar-Herb (371) Shrub (372) Deciduous (383) Mixedwood (384) Coniferous (395)
AQUATIC**	Open Water (400)	Water (401) Ice (Glacier) (403)
DISTURBANCE **		Natural (501) Anthropogenic (502) Mines (503)

Broad Ecosystem Mapping – Predictive Ecosystem Mapping (PEM)



Broad Ecosystem Mapping - Dawson & Ross River

- Base layer for integrated resource planning



Predictive Ecosystem Mapping (PEM) – Dawson Planning Region



Goals

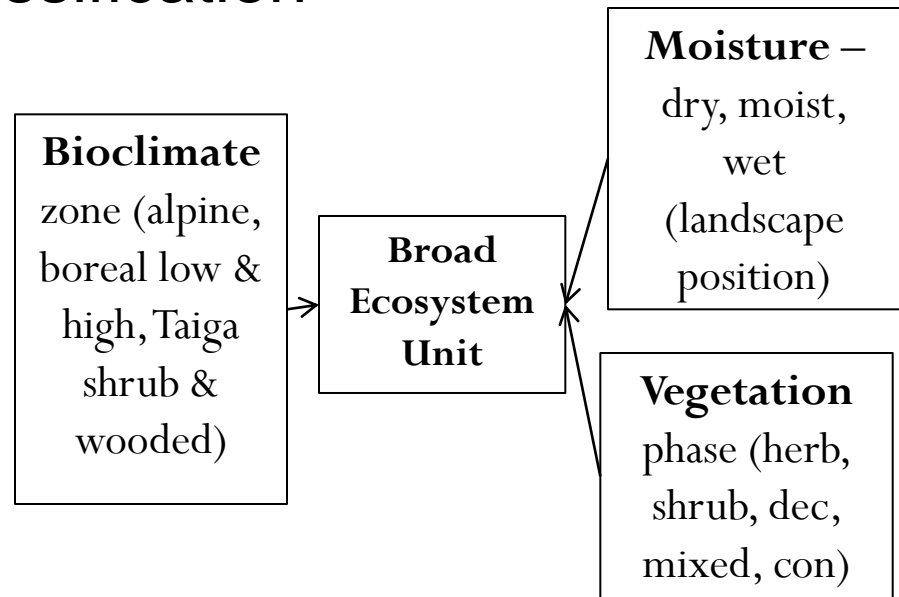
- Develop maps and unit descriptions
- Map special features
- Assess ELC framework concepts

Predictive Ecosystem Mapping (PEM) – Dawson Planning Region



Methods

- Broad ecosystem classification
- Landscape position
- Integrate information
- Ecological context

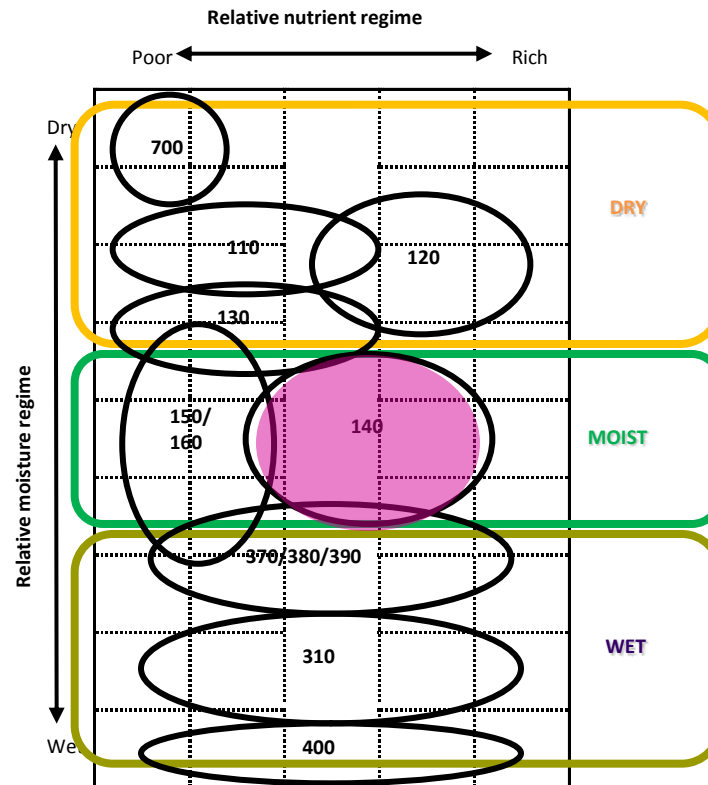


Edaphic grid used to organize broad ecosystems



Landscape Position

- 700 – Rock
- 110 – Ridge
- 120 – Steep South Slope
- 130 – Upper Slope
- 140 – Gentle Slope and Plain
- 150 – Steep North Slope
- 160 – Drainage or Depression
- 310 – Wetland
- 370 – Low Floodplain
- 380 – Middle Bench Floodplain
- 390 – High Bench Floodplain
- 400 – Open Water



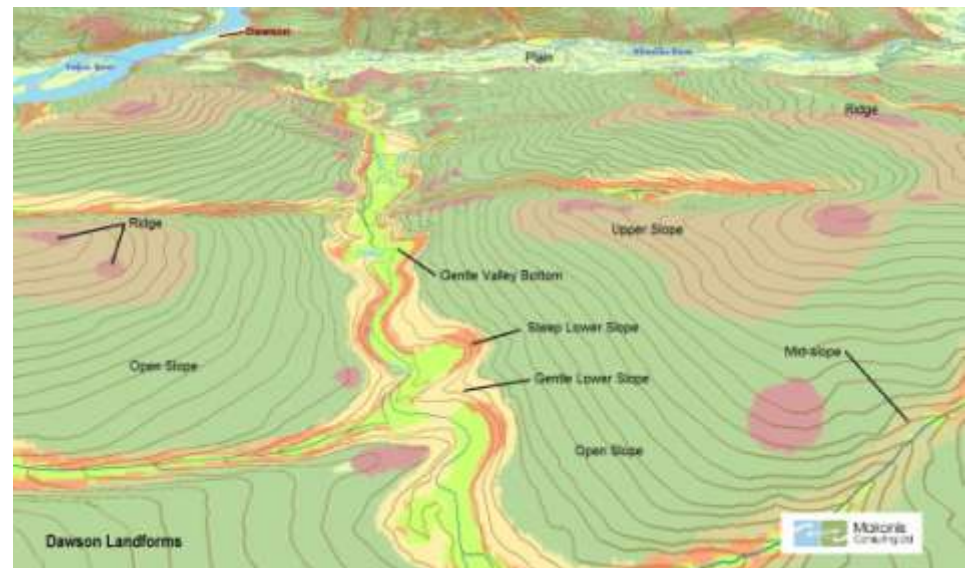
Broad Ecosystem units (BEU)

Landscape position
+
vegetation type

e.g. Ridge (dry) - herb

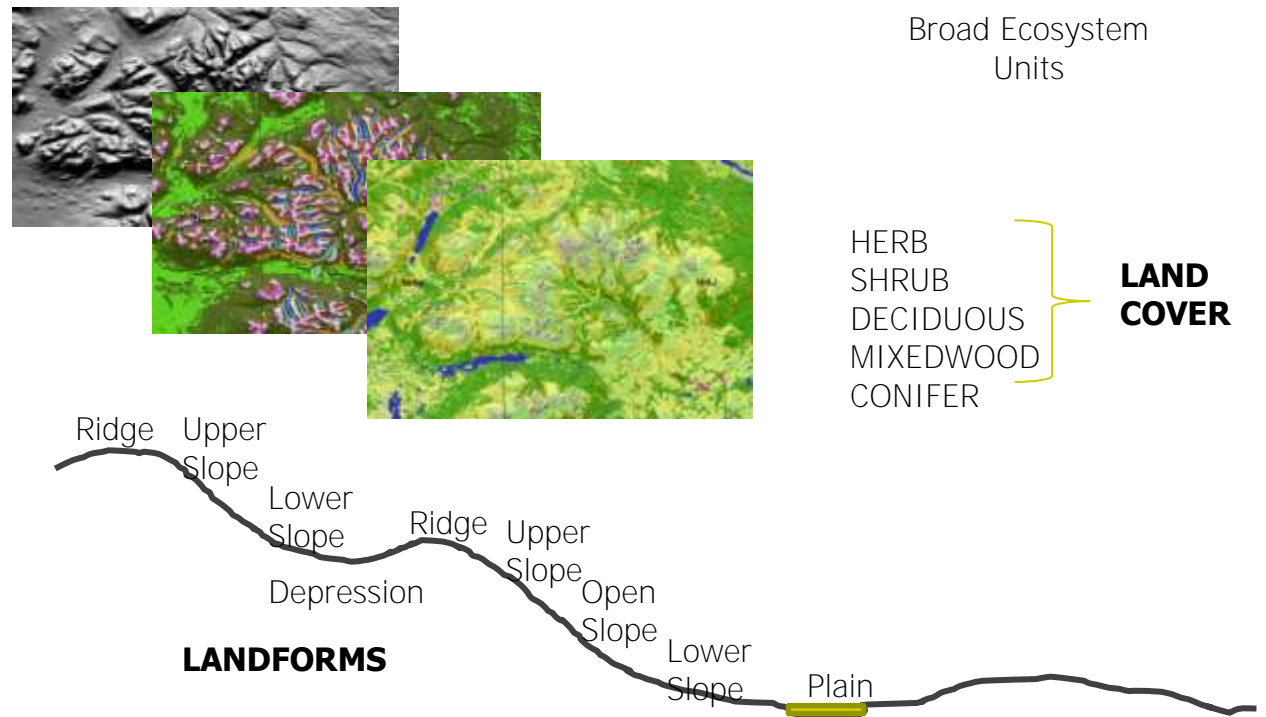
Methods

- Broad ecosystem classification
- Landscape position
- Integrate information
- Ecological context

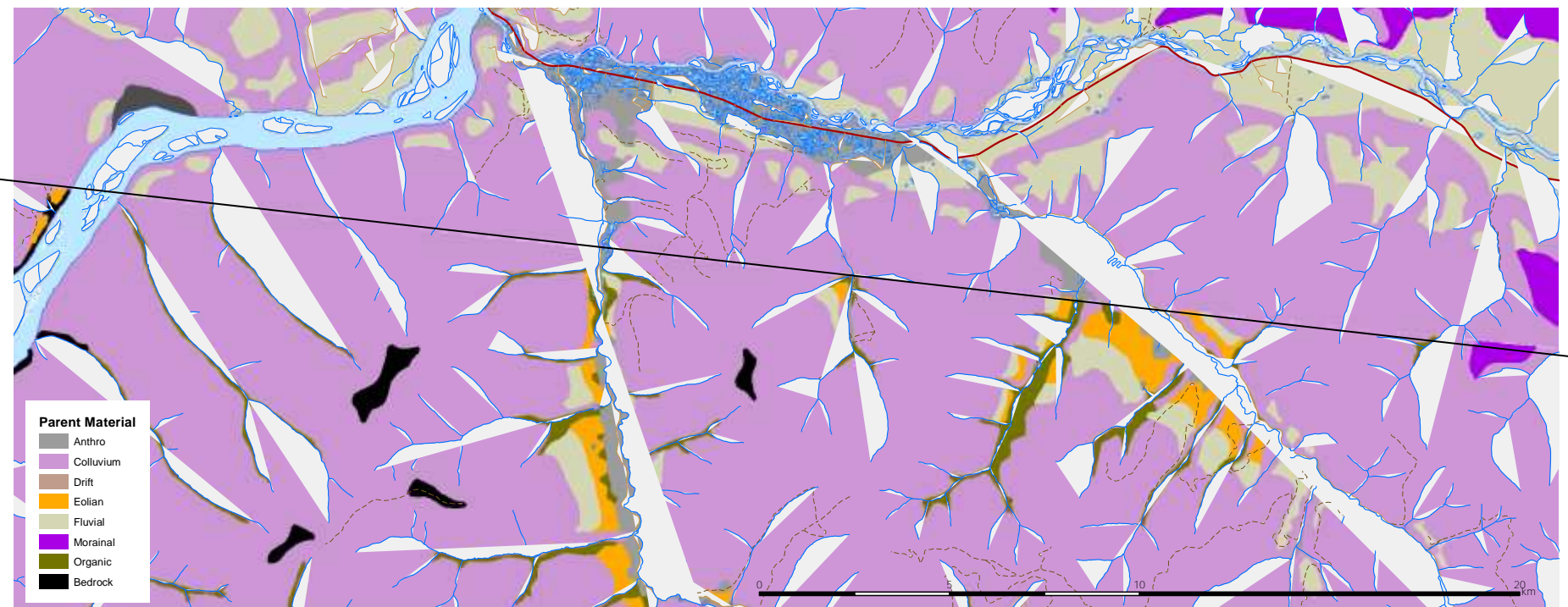


Methods

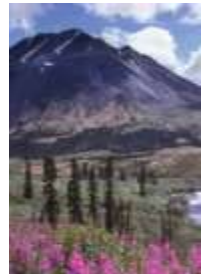
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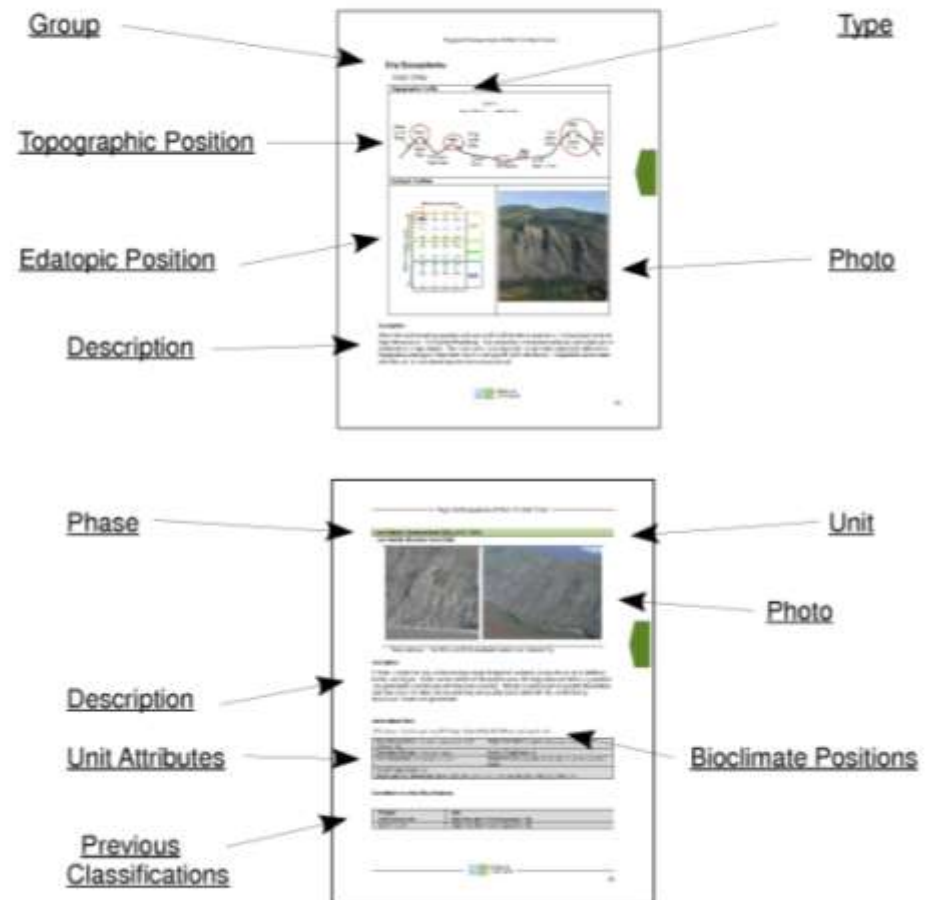
Challenges integrating spatial data



Methods



- Broad ecosystem classification
- Landscape position
- Integrate information
- Ecological context



Group

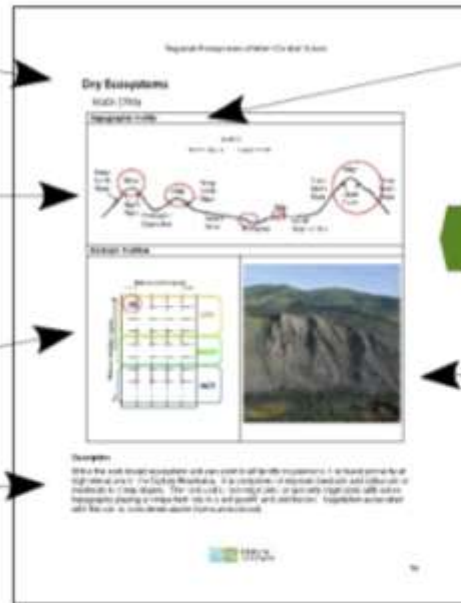
Topographic Position

Edatopic Position

Description

Type

Photo



Phase

Description

Unit Attributes

Previous Classifications

Unit

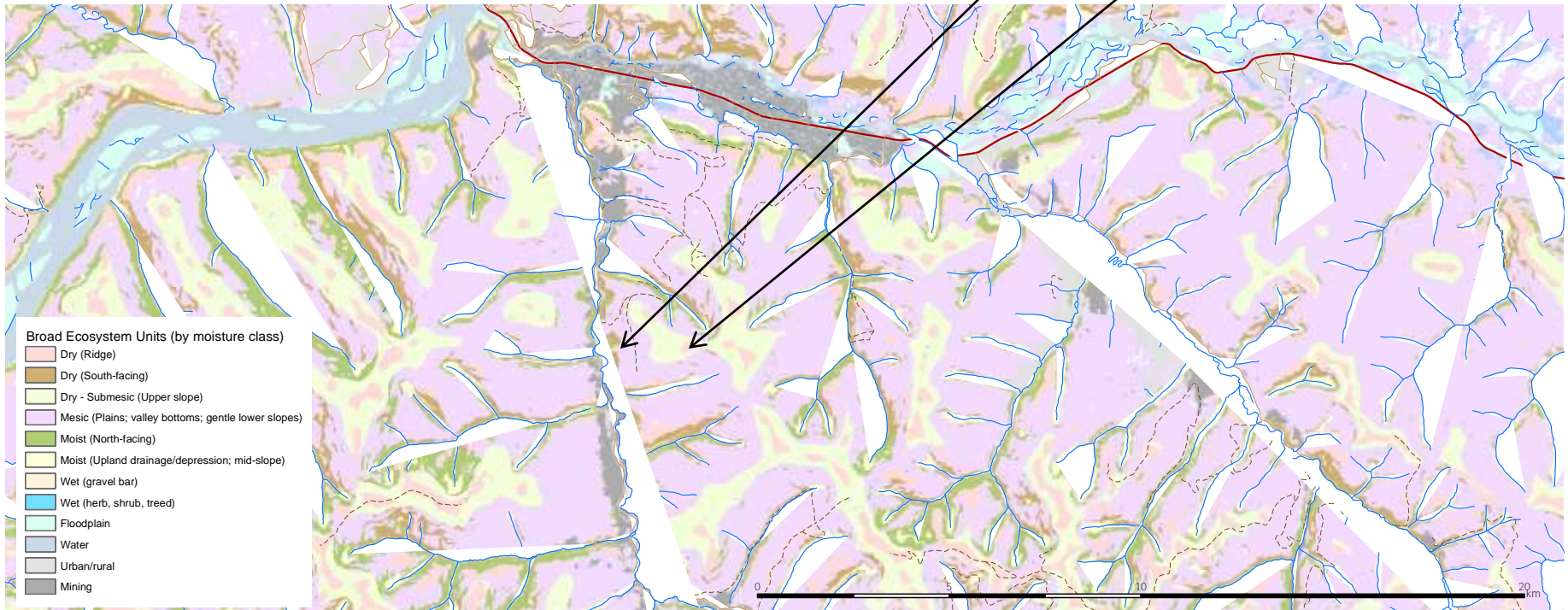
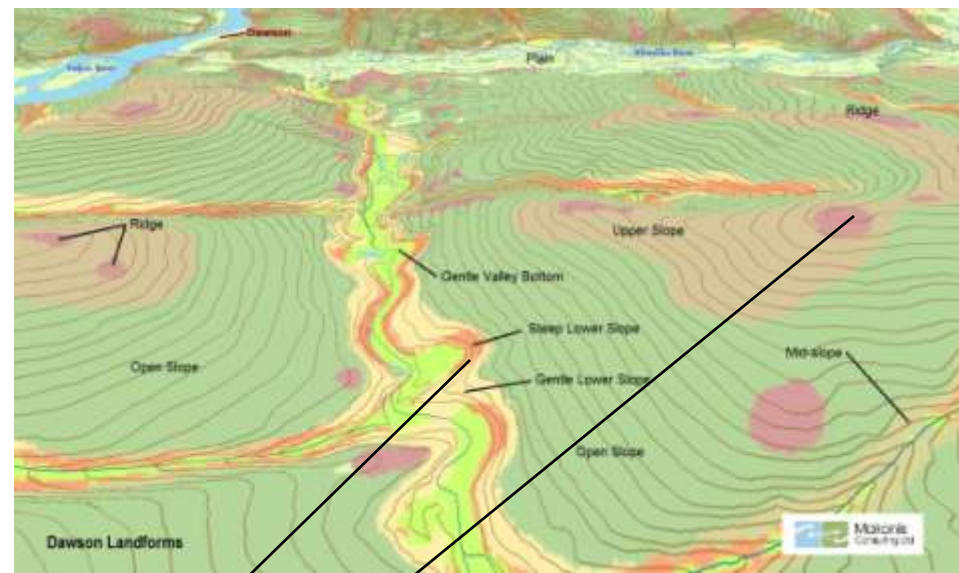
Photo

Bioclimate Positions

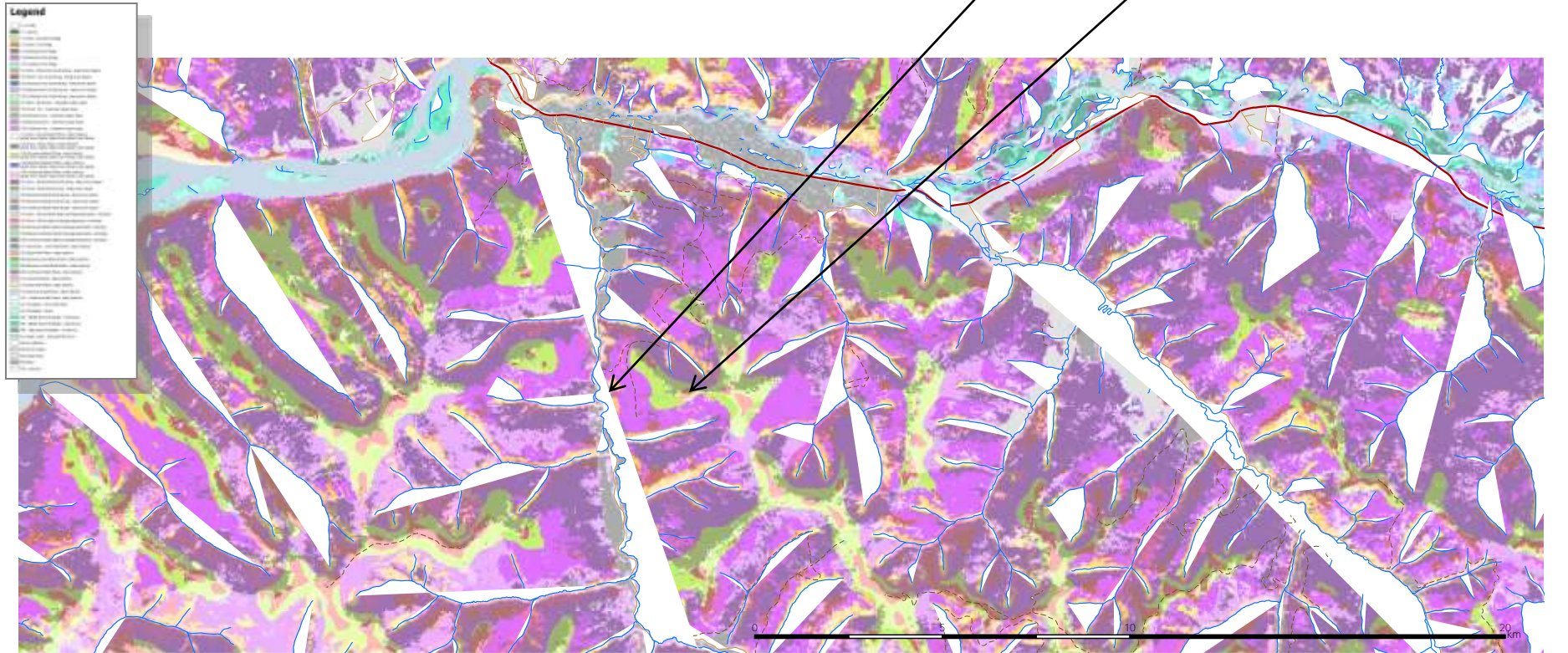
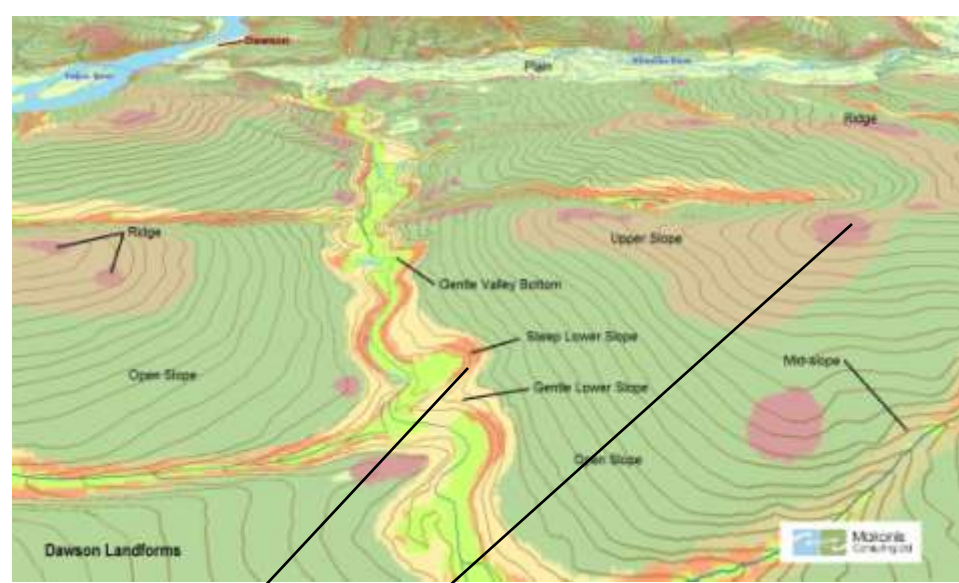


Preliminary Results

Broad Ecosystem Units by Relative Moisture Regime

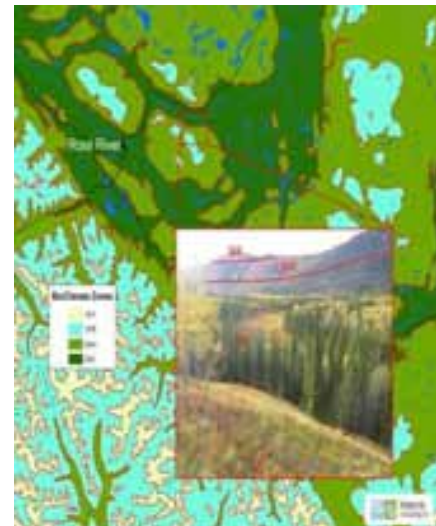


Broad Ecosystem Units



Methods

- Broad ecosystem classification
- Landscape position
- Integrate information
- Ecological context
- Interpretation for resource management



Regional land use planning



- Cumulative effects assessment
- Wildlife habitat suitability/capability
- Map sensitive or rare ecosystems
- Map land capability
- Identify ecological patterns and processes



Regional land use planning



Transportation / Access

- Identify access routes and potential effects
 - Habitat
 - Wetlands
 - Floodplains
 - Other interpretations



An Example: Mapping land capability



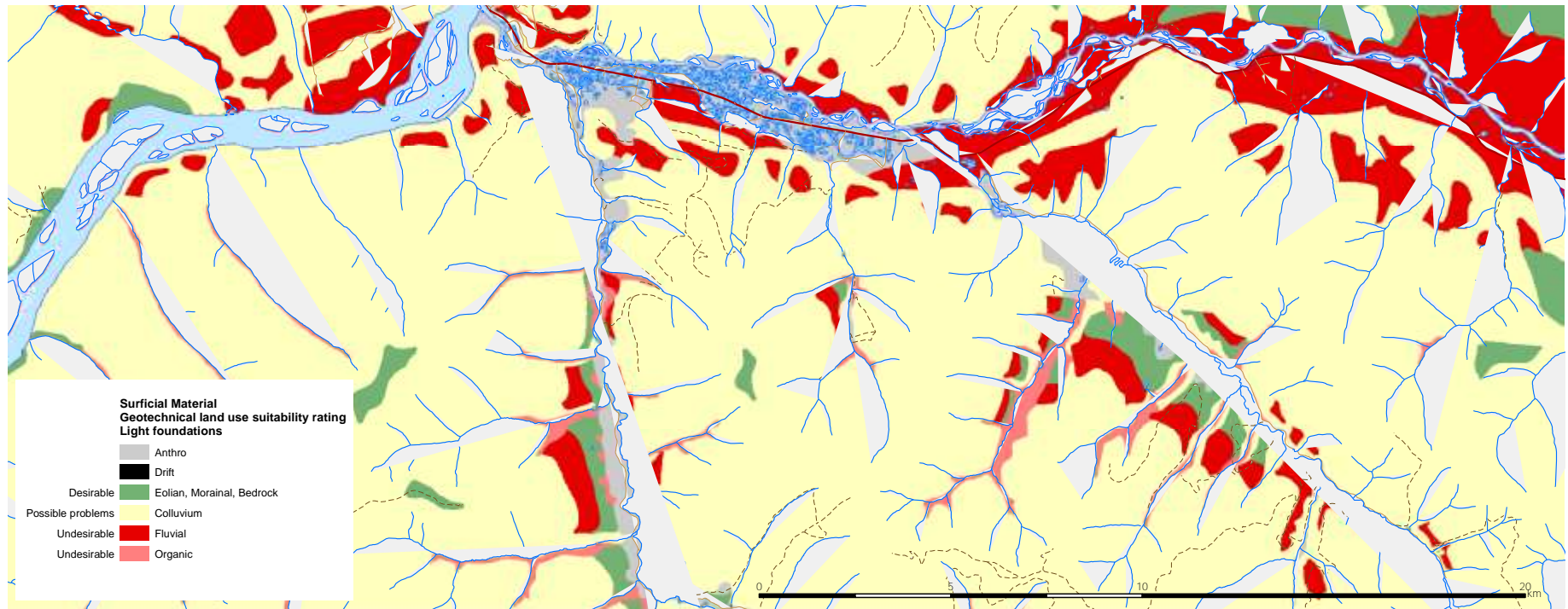
*Table 1. Geotechnical land use suitability ratings
and potential hazards of various surficial materials.
(based on Ryder and Howes, 1986)*

Surficial Material	Map Unit	Constraints	Potential Hazards	Light Foundations	Heavy Foundations	Excavations	Liquid Waste Disposal	Solid Waste Disposal	Highways Railroads Airfields	Unpaved Roads	Above Ground Water storage
Colluvial	C	slope drainage topography	landslides	-2	-3	-2	-3	-3	-3	-2	-3
Eolian	E			-1	-3	-1	-2	-3	-1	-1	-3
Fluvial - active	F ^A	drainage	floods, shifting channels	-3	-3	-1	-3	-3	-1	-1	-2
Fluvial - inactive	F ^I			-1	-1	-1	-2	-3	-1	-1	-3
Glaciofluvial	F ^G	topography		-1	-1	-1	-2	-3	-1	-1	-3
Glaciolacustrine	L ^G	drainage	erosion, slumping	-1	-3	-1	-2	-1	-2	-1	-2
Lacustrine	L	topography	permafrost, thermokarst	-1	-3	-1	-2	-1	-2	-1	-2
Organic	O	drainage		-3	-3	-3					
Till - basal	M	drainage		-1	-1	-2	-2	-1	-1	-1	-1
Till - ablation	M	topography		-1	-1	-1	-2	-3	-1	-1	-3
Bedrock	R			-1	-1	-3	-3	-3	-3	-3	-3

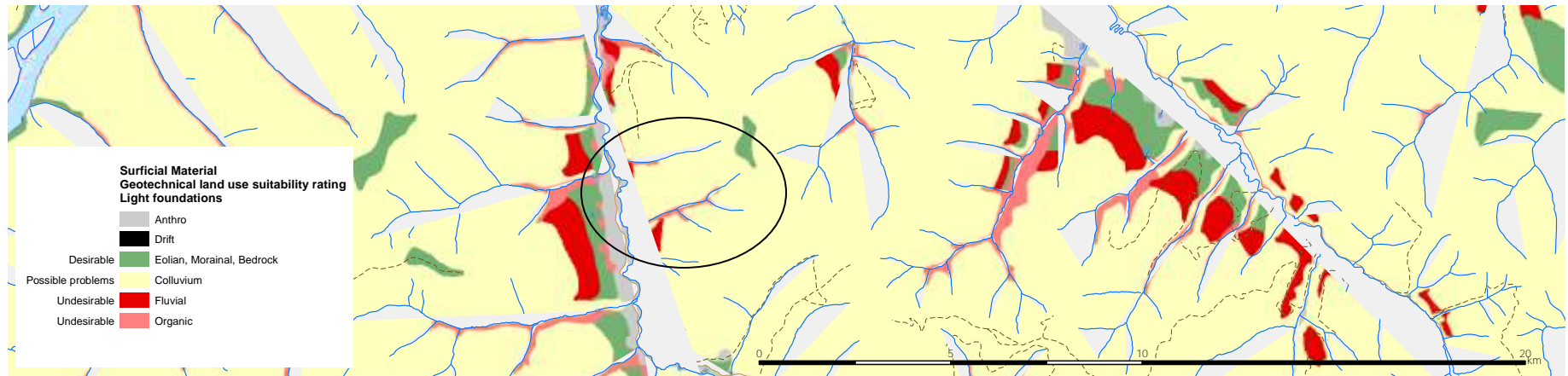
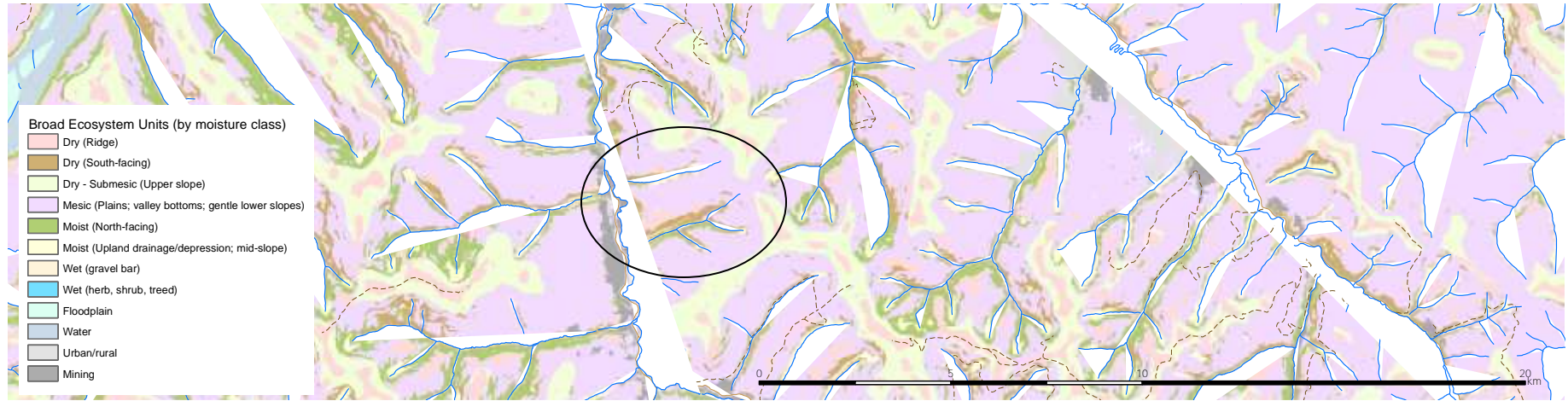
- 1 = Desirable:** terrain is generally capable of supporting the indicated land use.
- 2 = Possible problems:** terrain may be suitable for the indicated land use, but potential problems exist.
- 3 = Undesirable:** terrain is generally unsuitable for the indicated land use, although substantial modification of existing conditions (e.g., drainage, landfill) may overcome natural constraints.

Land capability – surficial interpretation

“Light foundation”



Land capability – broad ecosystem interpretation



Key Questions



- Will ELC play a prominent role in policy, planning, environmental assessment, and decision-making?
- Will we form ELC policy (or best practices) around mitigation measures, restoration methods, cumulative effects assessment?

Thank you!

Questions?



What is ecosystem classification?



Ecological equivalence: different ecological processes

Shrub Taiga – Willow

- adjacent to streams and seepage area
- gentle sloping
- moderately drained
- moist to wet soils in sheltered valleys



Wooded Taiga – Willow

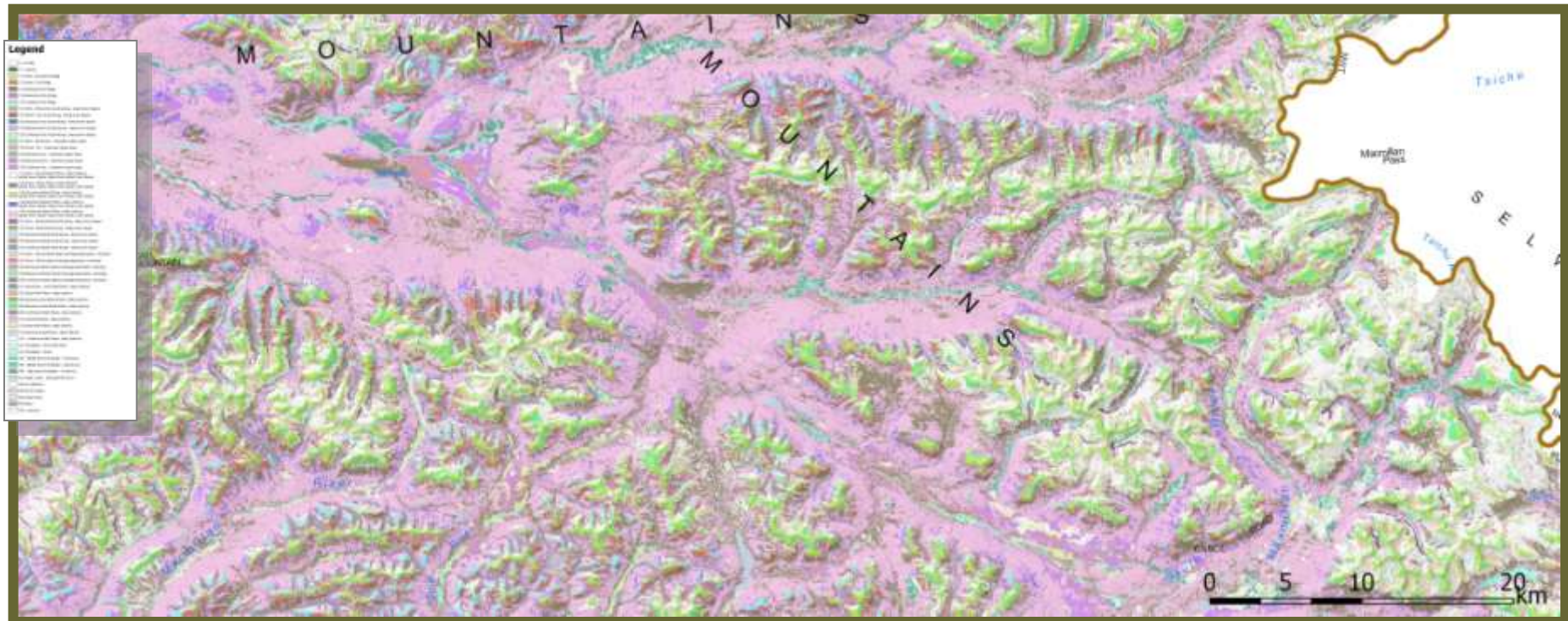
- steep slopes such as avalanche chutes
- well drained submesic to xeric soils.



Current projects



Preliminary results – Ross River





Local Ecosystems – Ecosystem Patterns

Within a bioclimate subzone, ecosites are organized based on landscape position, or along a toposequence. Along this toposequence, characteristic ecosites occur in predictable locations, based on slope, aspect, parent material, and soil moisture and nutrient conditions. The reference ecosite occurs in the relatively level, moderately drained position.

North South

