Biogeoclimatic Ecosystem Classification

A classification of climates

- Few long-term climate stations
- Vegetation – surrogate to characterise climates
- Bedrock geology, physiography, landform & soils – accessory characteristics

Biogeoclimatic Ecosystem Classification

A classification of ecosystems or sites

- Mature vegetation – used to characterise and label ecosystems/sites
- Landform & soils – as components of the classification

Ecosystem Unit Components

Spruce-Huckleberry (site series)

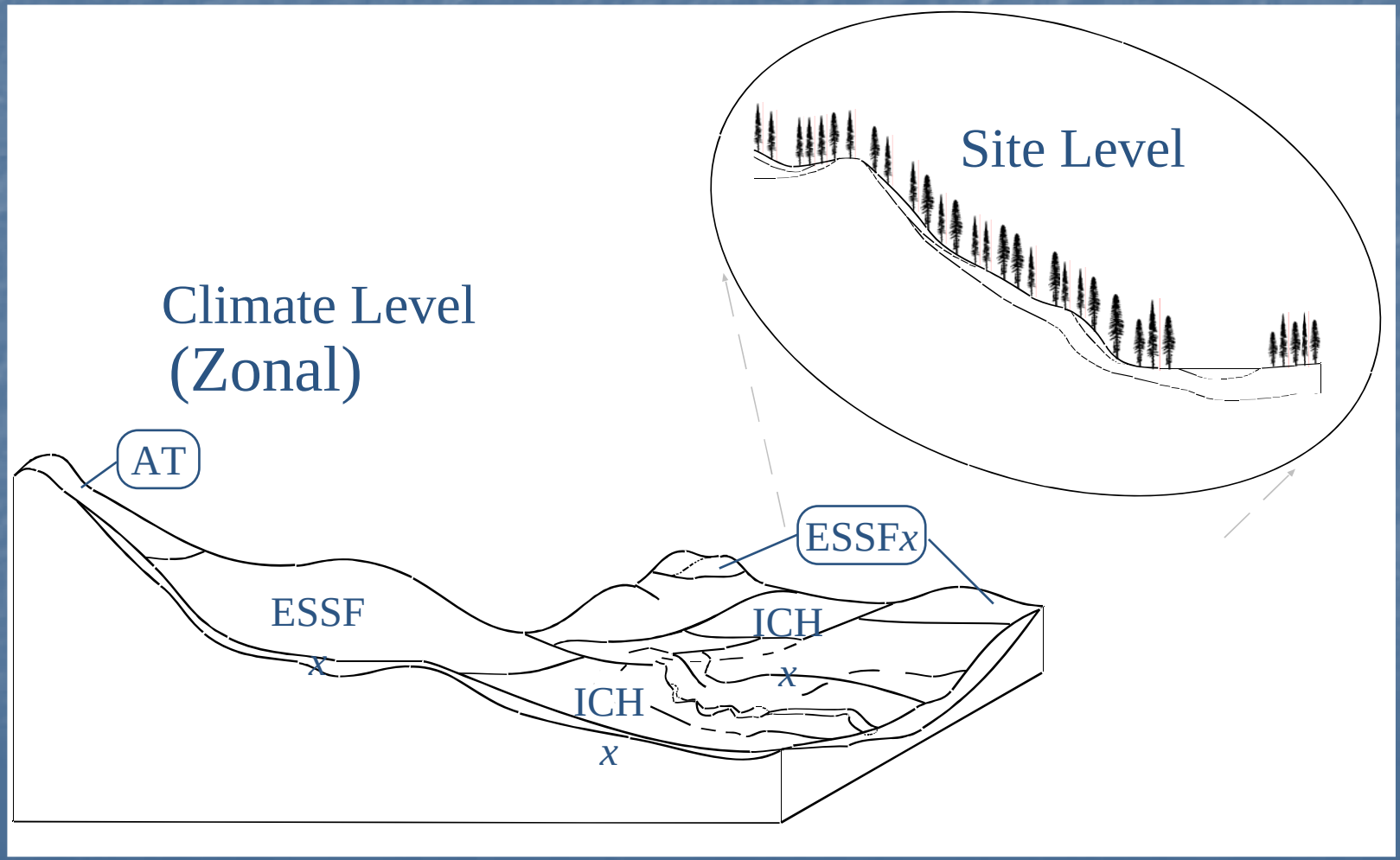
Tall shrub (structural stage)

SB 3b

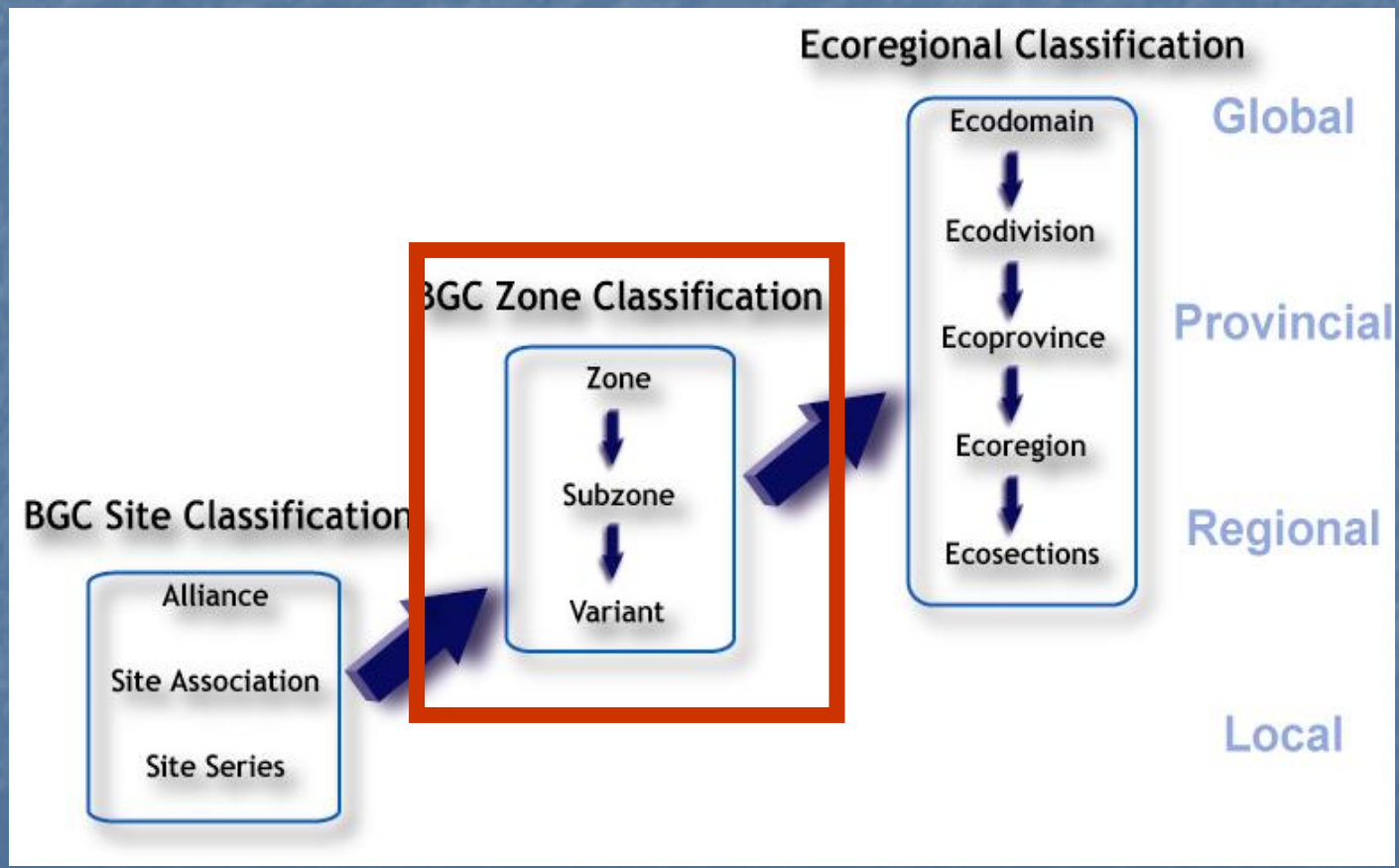
Mb/ck

morainal blanket; coarse textured, kool aspect (site modifiers)

Climate & Site Levels of BEC



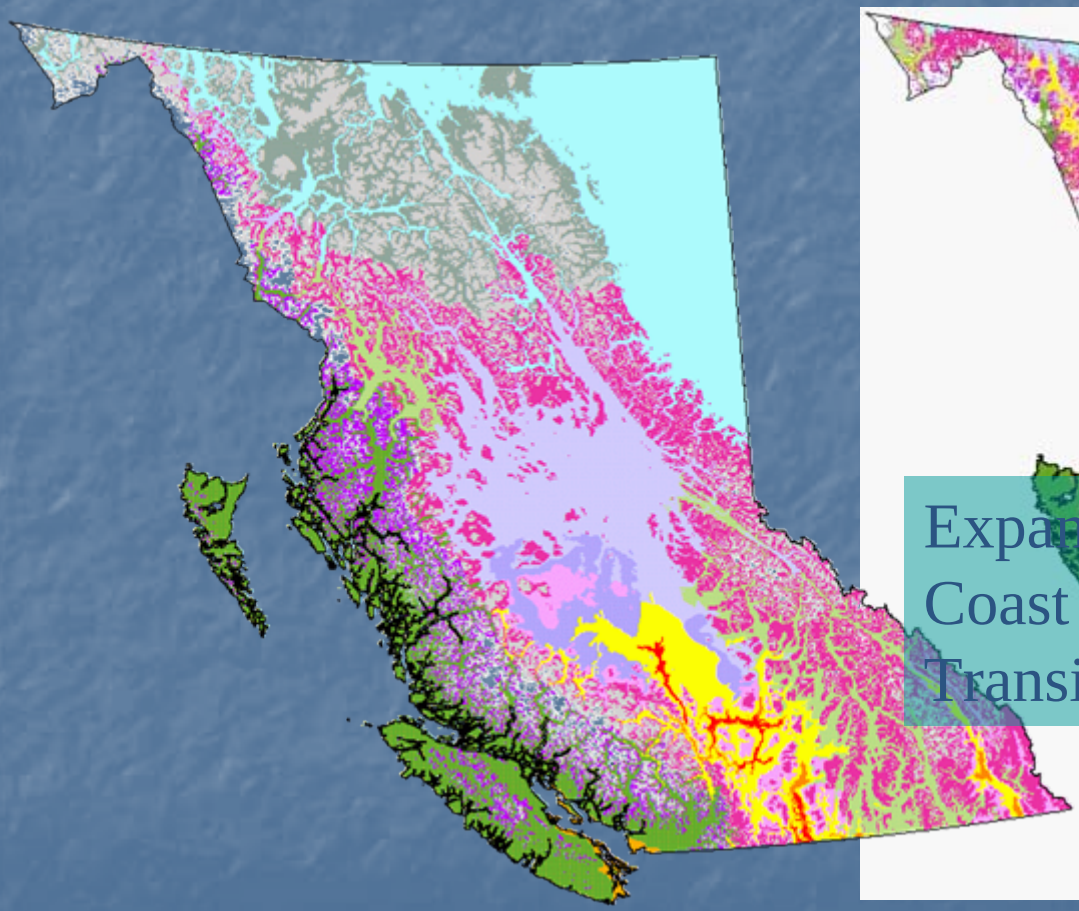
BGC Climate Zone Classification

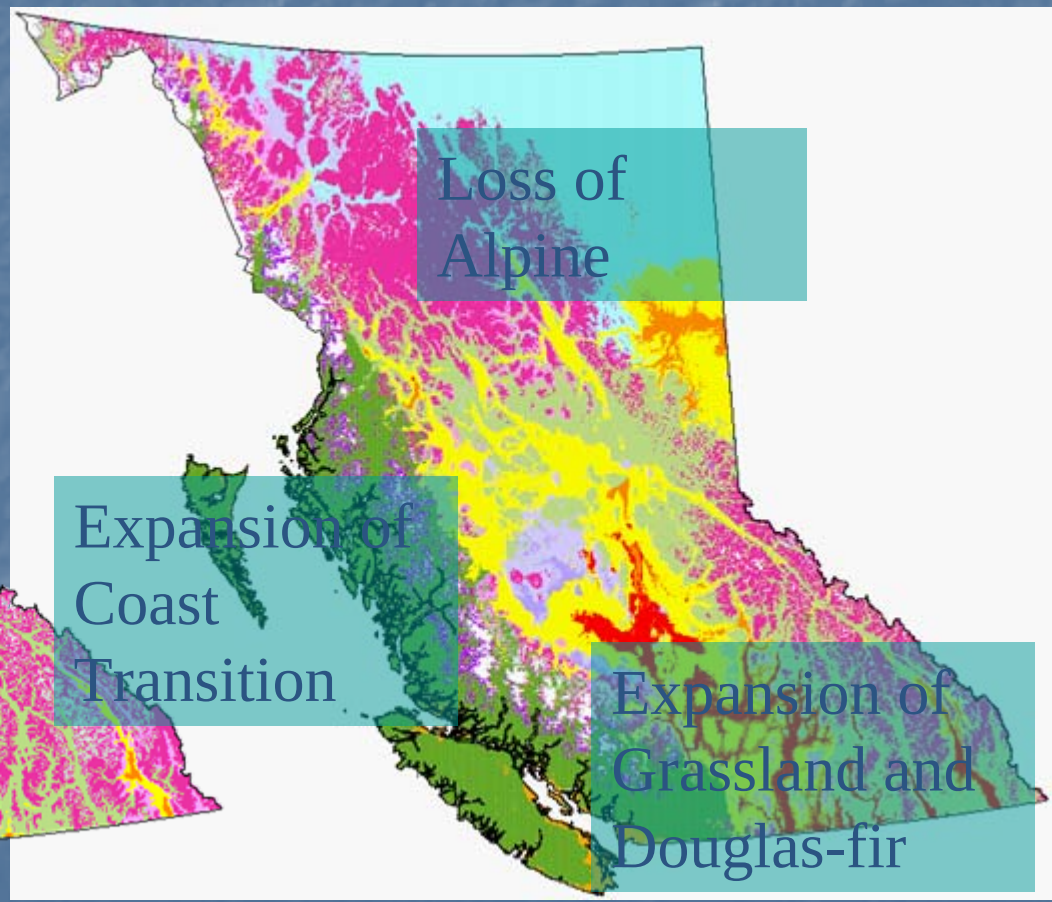


Biogeoclimatic Zones Defined

- Regions of climatic=vegetation similarity
- Defined by mature vegetation on "Zonal Sites"
- Zonal site = Average (best reflects climate influences)
  - BGC Zones defined primarily by climax tree species = regional climate
  - BGC Subzones and Variants by understory composition = wetter/drier, colder/warmer
- Stratifies landscape into "bioclimate" zones

Change in BEC Zone Distribution





Current

2050

Hamann & Wang 2004

Regional climate/zonal level

Zones & subzones changing; climatic characteristics, species composition & ecosystem processes *as well as* spatial distribution

- AT shrink
- BG expand in warmer drier regions
- IDF move up and north
- Shrubbery (e.g., SWB buckbrush) expand
- More woody vegetation in general for much of BC
- Bryophytes *uber* grasses

Predictions

*Difficult to predict and **monitor** change*

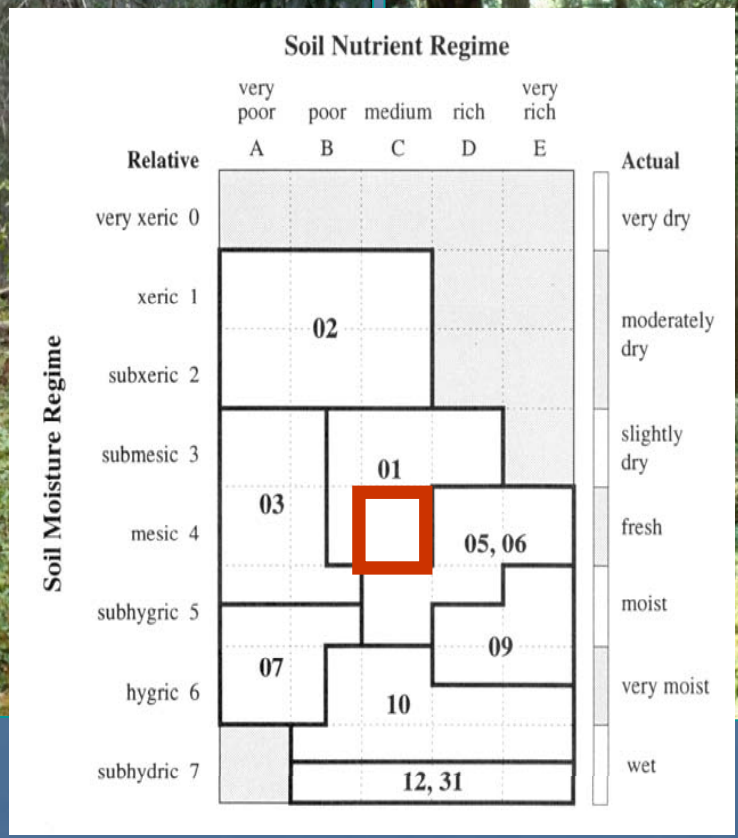
- Insufficient climate data & climate stations
- Vegetative surrogates (e.g., tree species) cannot respond quickly enough
- Species are responding individualistically
- Some insights from palaeoecology but some combinations will be unprecedented

Zonal Sites

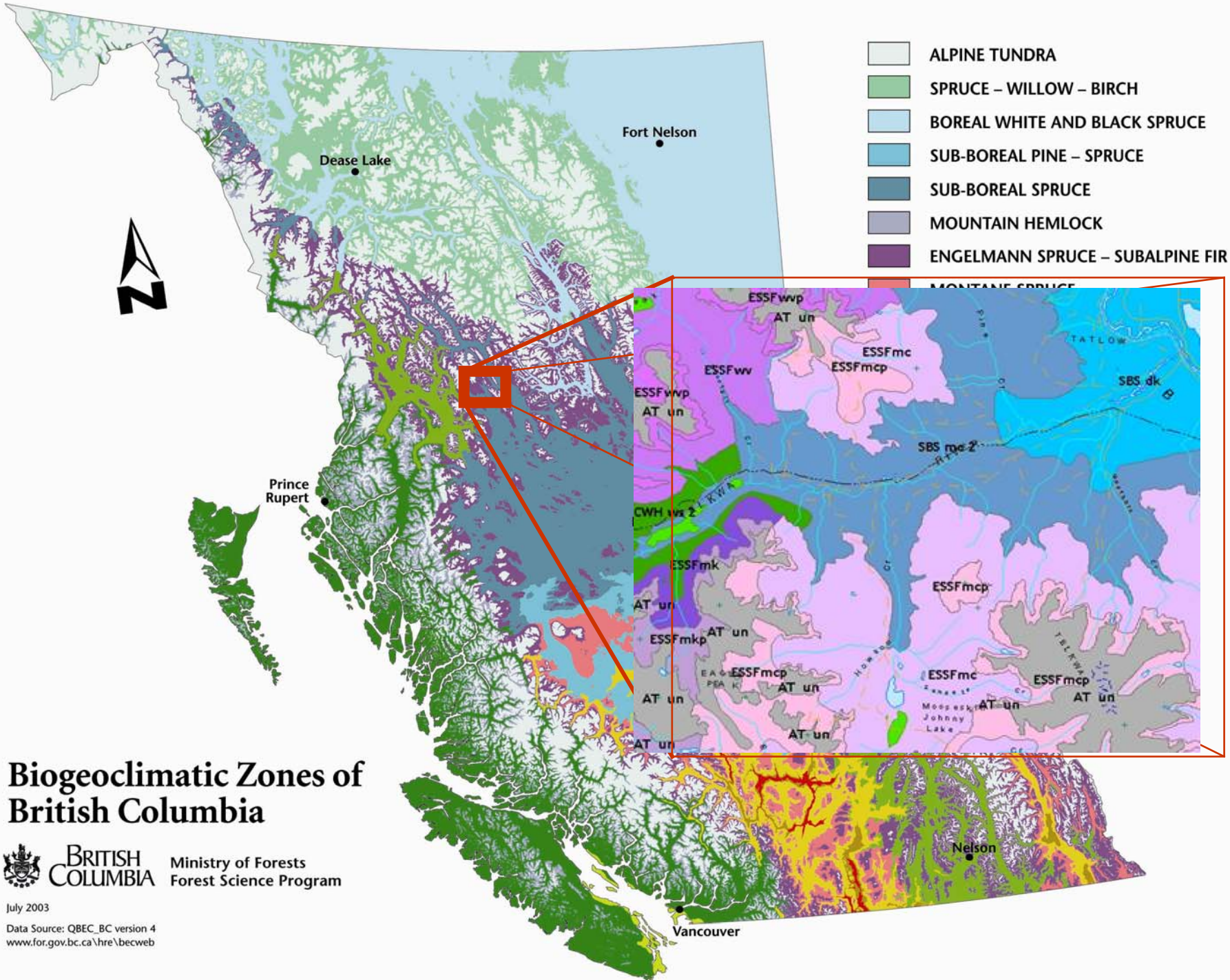
- gentle to moderate slopes
- mid-slope positions that neither shed nor receive an excess of water and nutrients (inputs balance outputs)
- medium soil texture (loamy)
- medium nutrient regime
- moderately well-drained soils
- no root-restricting layers

BGC Zones Defined by Old Forest on Zonal Site

Spruce – Huckleberry = SBSmc



W. Hemlock – Step moss = ICHmc


ALPINE TUNDRA
SPRUCE – WILLOW – BIRCH
BOREAL WHITE AND BLACK SPRUCE
SUB-BOREAL PINE – SPRUCE
SUB-BOREAL SPRUCE
MOUNTAIN HEMLOCK
ENGELMANN SPRUCE – SUBALPINE FIR
Fort Nelson
Dease Lake
Prince Rupert
Nelson
Vancouver
ESSFwvp
AT un
ESSFmc
ESSFmcp
ESSFwv
SBS dk
SBS mc 2
CWH ws 2
ESSFmk
ESSFmkp
Biogeoclimatic Zones of British Columbia
BRITISH COLUMBIA
Ministry of Forests
Forest Science Program
July 2003
Data Source: QBEC_BC version 4
www.for.gov.bc.ca\hre\becweb

Microclimate/site level

Ecosystems/sites characterised by veg, landform, soils, moisture & nutrient regimes; arrayed on edatopic grid

- Pattern of site series on grid won't change much
- Zonal sites will remain zonal; dry poor sites will remain relatively dry poor; seepage sites will persist as such
- Patterns of moisture & nutrients won't change much in short & medium term
- Long-term Δ; look to palaeoecology for hints

Microclimate/site level

*Vegetation **is** changing*

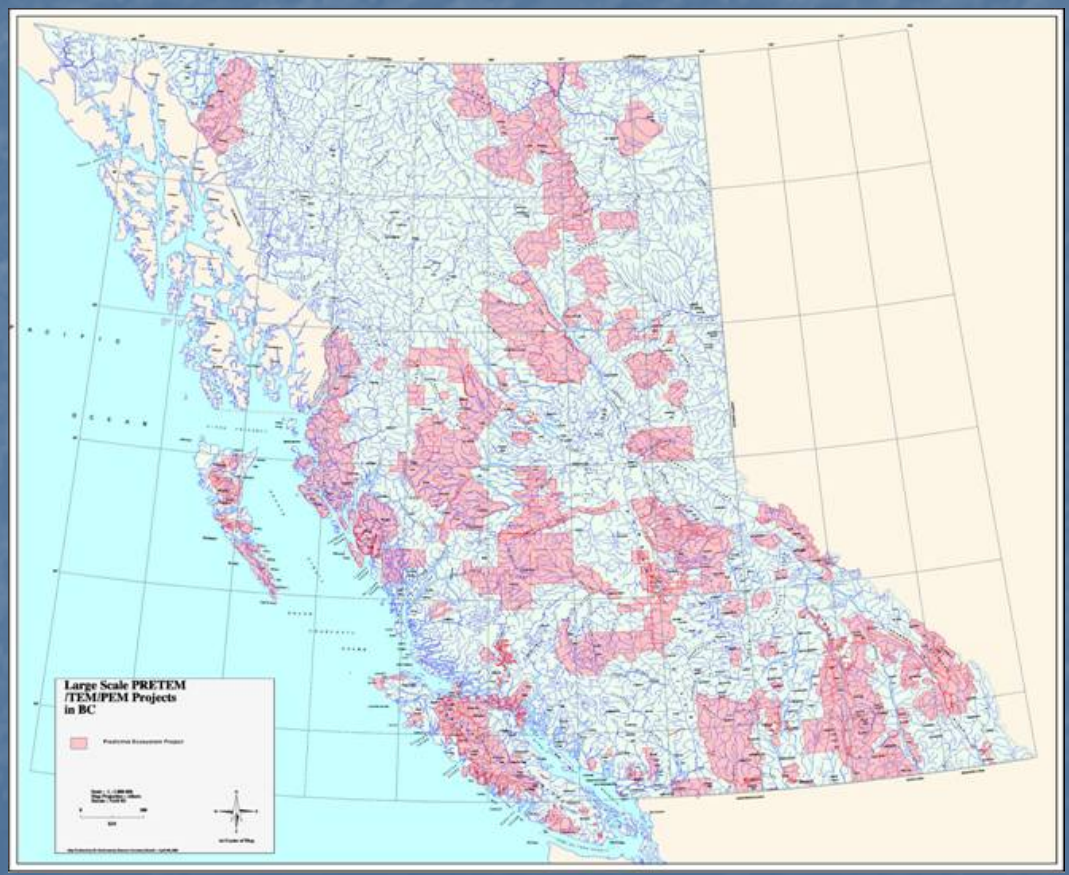
- No guarantee a devil's-club site will continue to have an abundance of devil's-club
- But site will continue to be 5-6/D-E for some decades at least
- Could become dominated by *Rubus* spp.
- Different combinations of species will emerge
- Vegetation will continue to integrate all factors but it takes time to do the calculus
- V = *f* (climate, organisms, topography, parent material, soil, disturbance, time)

RECOMMENDATIONS

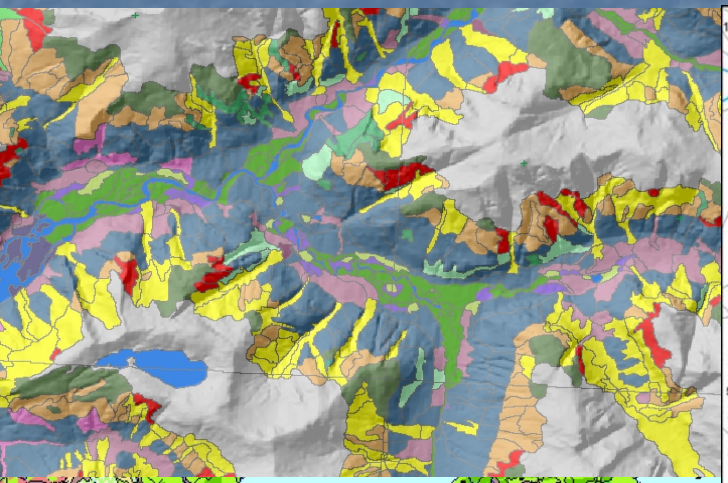
1) Pay more attention to "enduring features"

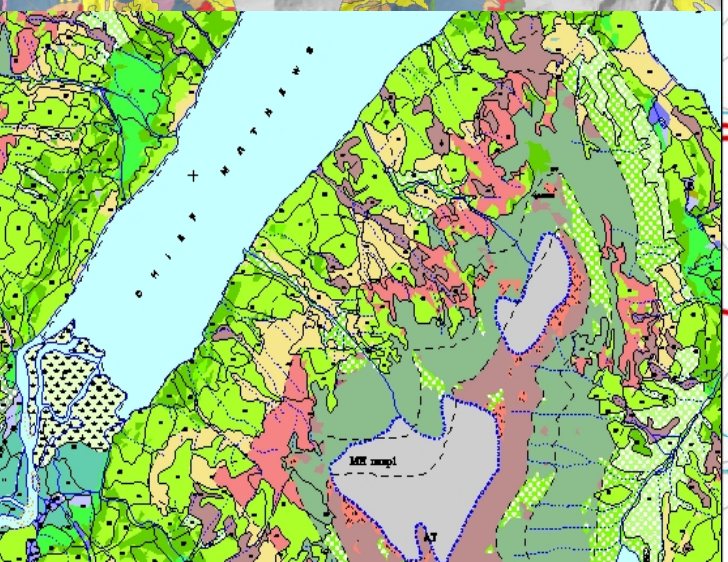
- In time of climate change, should rely on the less labile, mutable ecosystem components
- So-called enduring features: bedrock geology, landform, soils (although soils can change faster than most of us think, even without climate change)

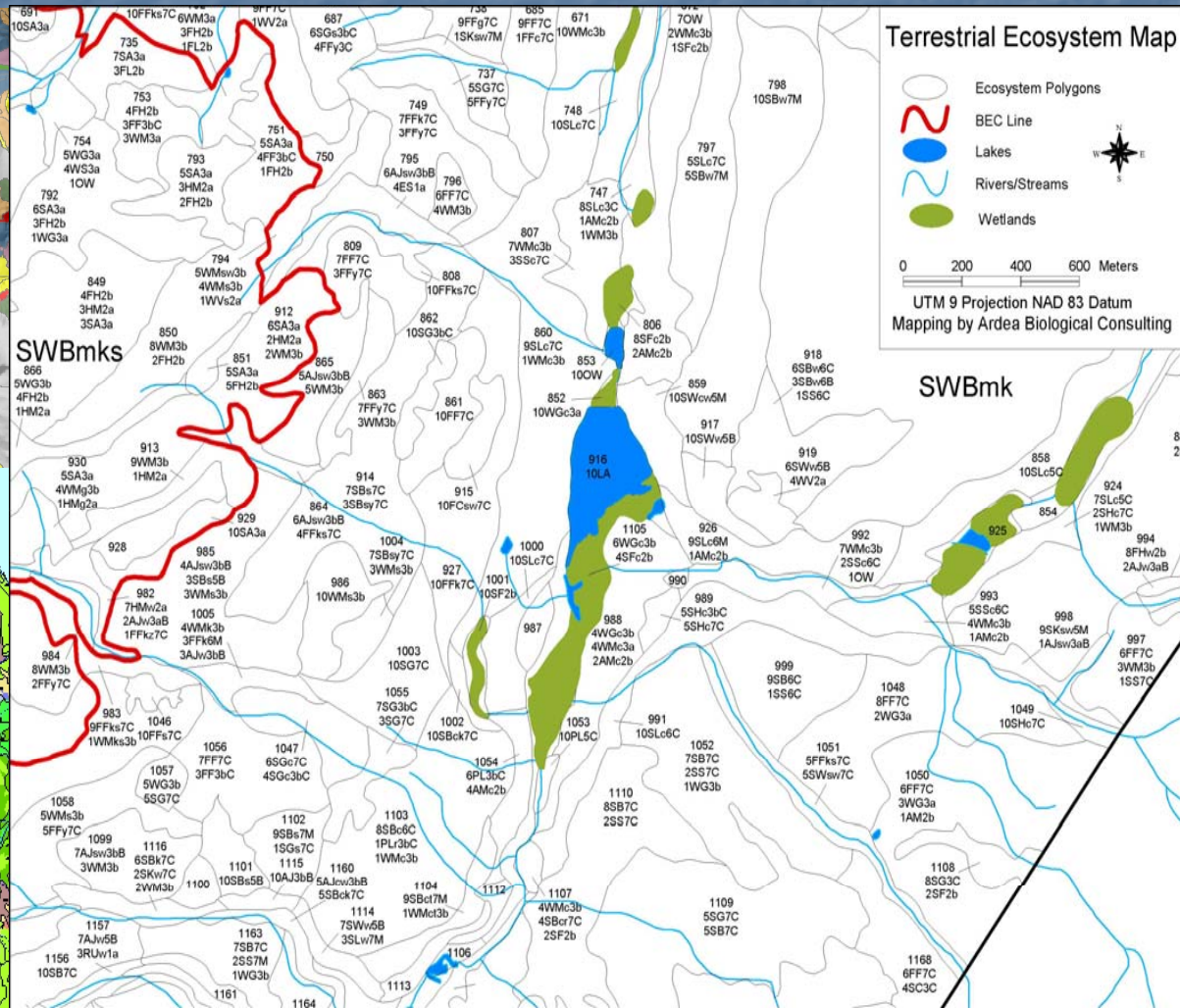
2) Use existing landform/soil and good ecosystem mapping



Examples of TEM Maps







3) Resurrect landform/soil classification and mapping

- Used to be done by Agriculture Canada and Ministry of Environment
- Work has virtually stopped

4) Recall Stan Rowe's work on "biogeoecosystems"

Real structured *volumetric systems* occupying relatively fixed earth spaces

- real live chunks of earth space
- layered, site-specific systems—a lake, a wetland, a particular landform-based forest—into and out of which mobile organisms come and go

5) Back to basics (i.e., autecology)

Assemble the life history characteristics of key plant species (not just trees)

- Mode of reproduction
- Pollination & dispersal mechanisms
- Response to disturbance; shade tolerance
- Perennial, annual; woody, non-woody, etc.; saprophyte, parasite, hemiparasite
- Weedy syndrome

Develop some spatial models of subzonal assemblages (covarying aggregates) of species & how they could migrate over time

6) Need much more prescribed burning

but probably won't be able to use it much as a management tool

7) More attention to increasing role (frequency, amplitude) of geomorphic and hydrologic processes

8) Monitoring is crucial

- Satellite imagery useful, especially for distinguishing interannual variation from decadal trends
- Need permanent plots, but they require long-term commitment (**alien concept** to government)
- Key role of understory vegetation (forest understory components can drive forest regeneration, below-ground properties, and long-term succession; Nilsson & Wardle 2005 *Frontiers in Ecology & Environment* 3: 421-428)

9) Conservation message: *Go Big or Go Home*

- Protection of biggest widest deepest possible biophysical stage, upon which the ecological drama can play out.

- Benchmark role as well as conservation of biodiversity

10. Download the regional ecologists

- asap, before they leave or retire
- their knowledge and decades of field experience are irreplaceable

FORUM July August 2005

"In British Columbia, we have resorted to short-term, minimum-cost tactics at the expense of a visionary, committed strategy that can sustain our environment and natural resources, our communities, and local and provincial economies. ... I question the future we are creating for long-term environmental, social and economic sustainability."

Jane Perry, RPF

Love in the Time of Cholera
Gabriel Garcia Marquez

- Aging, Love, Obsession, Epidemics, Medical Ethics, Doctor-Patient Relationship, Time

- It is possible not only to swear undying love but to actually follow through on it, to live a long full life premised on such a pledge.