Forest and Fungus - Recipes for a Healthy Forest

Andy MacKinnon
Metchosin, BC

Andy's "techniques provid[ing] the best result to prevent or circumvent weed competition"

7. Collaborate.

- Invasive plants are not only found in agricultural areas, roadside or “waste areas”, but increasingly they are found in our forests. How can we work to prevent the problem?
- What belongs, what doesn’t, how do invaders change the forest for the worst?
- Which fungal/plant species tend to associate with each other and why?
- What natural processes or fungal and forest relationships help make a forest healthier and more resilient to weed invasions?
- How can this knowledge inform natural resource policy to support sustainable, working forests AND provide wildlife protection.

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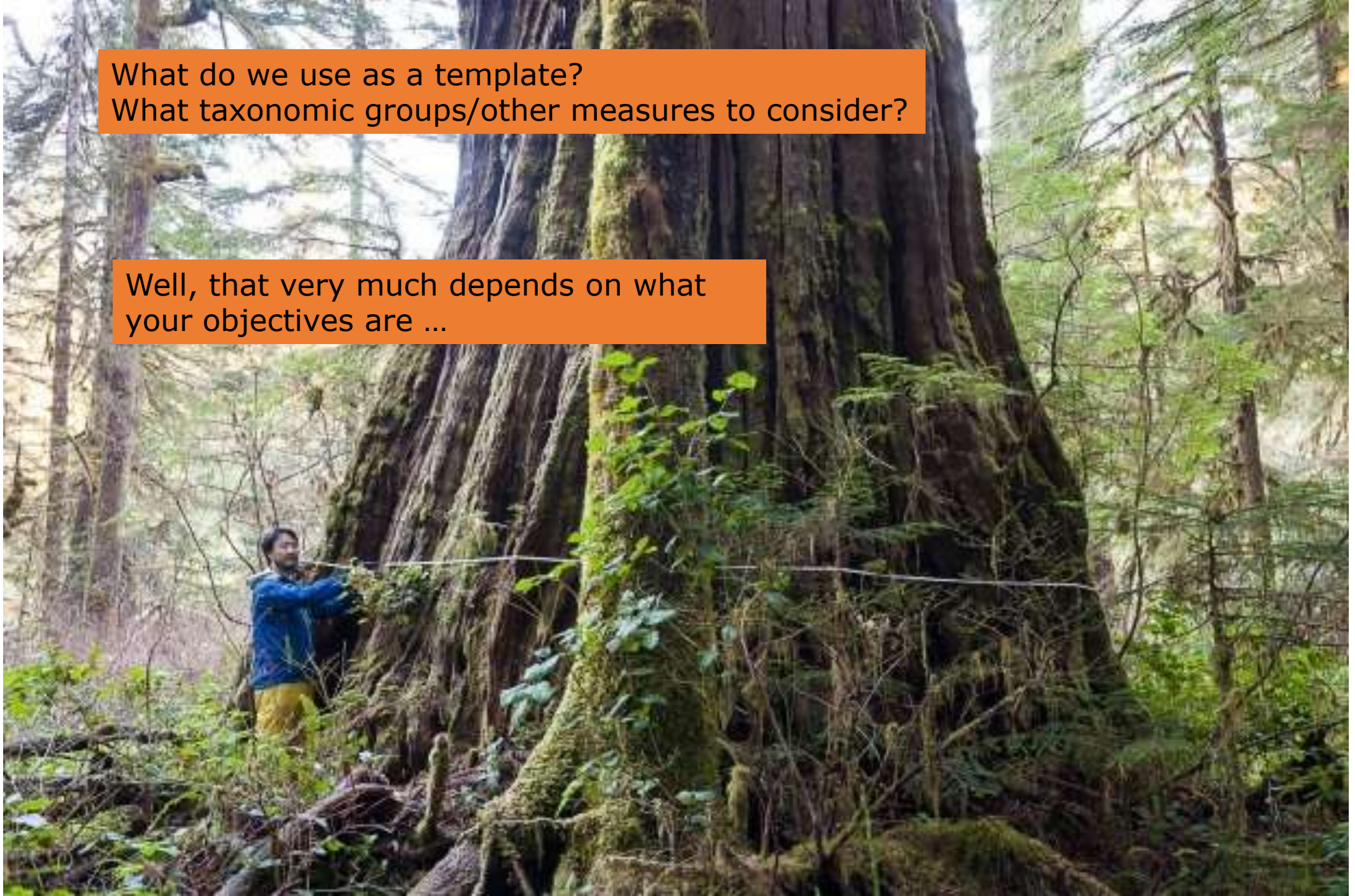
What do we use as a template?
What taxonomic groups/other measures to consider?

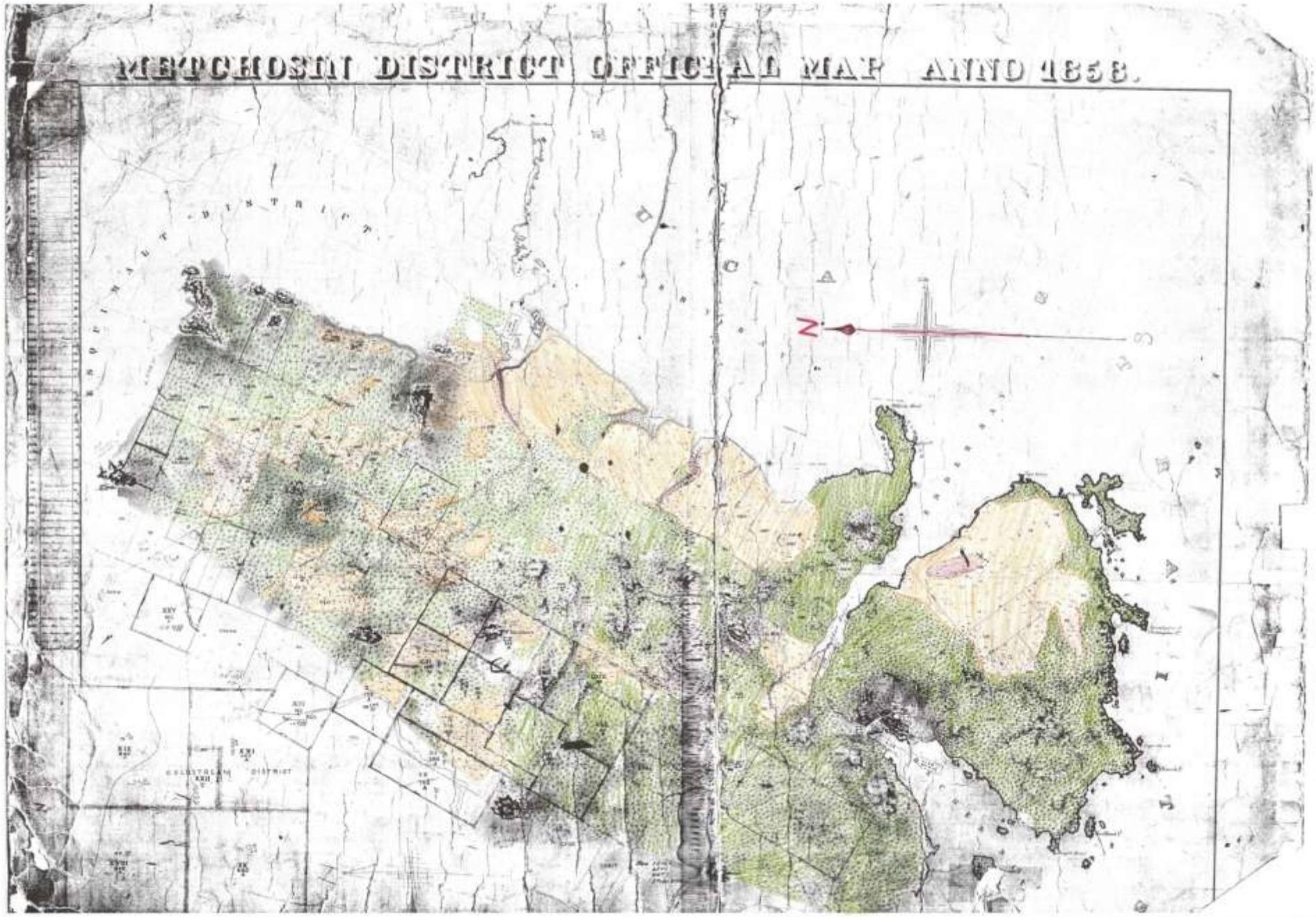

What do we use as a template?
What taxonomic groups/other measures to consider?
Well, that very much depends on what your objectives are …


LOGGING
ANCIENT FORESTS
VANCOUVER ISLAND

CENTINELAN EXTINCTIONS: EXTIRPATION OF NORTHERN TEMPERATE OLD-GROWTH RAINFOREST ARTHROPOD COMMUNITIES

Neville N. Winchester and Richard A. Ring

Selbyana
Vol. 17, No. 1, CANOPY PROCEEDINGS (1996), pp. 50-57


MEYCHOSIM DISTRICT OFFICIAL MAP AMND 1858.
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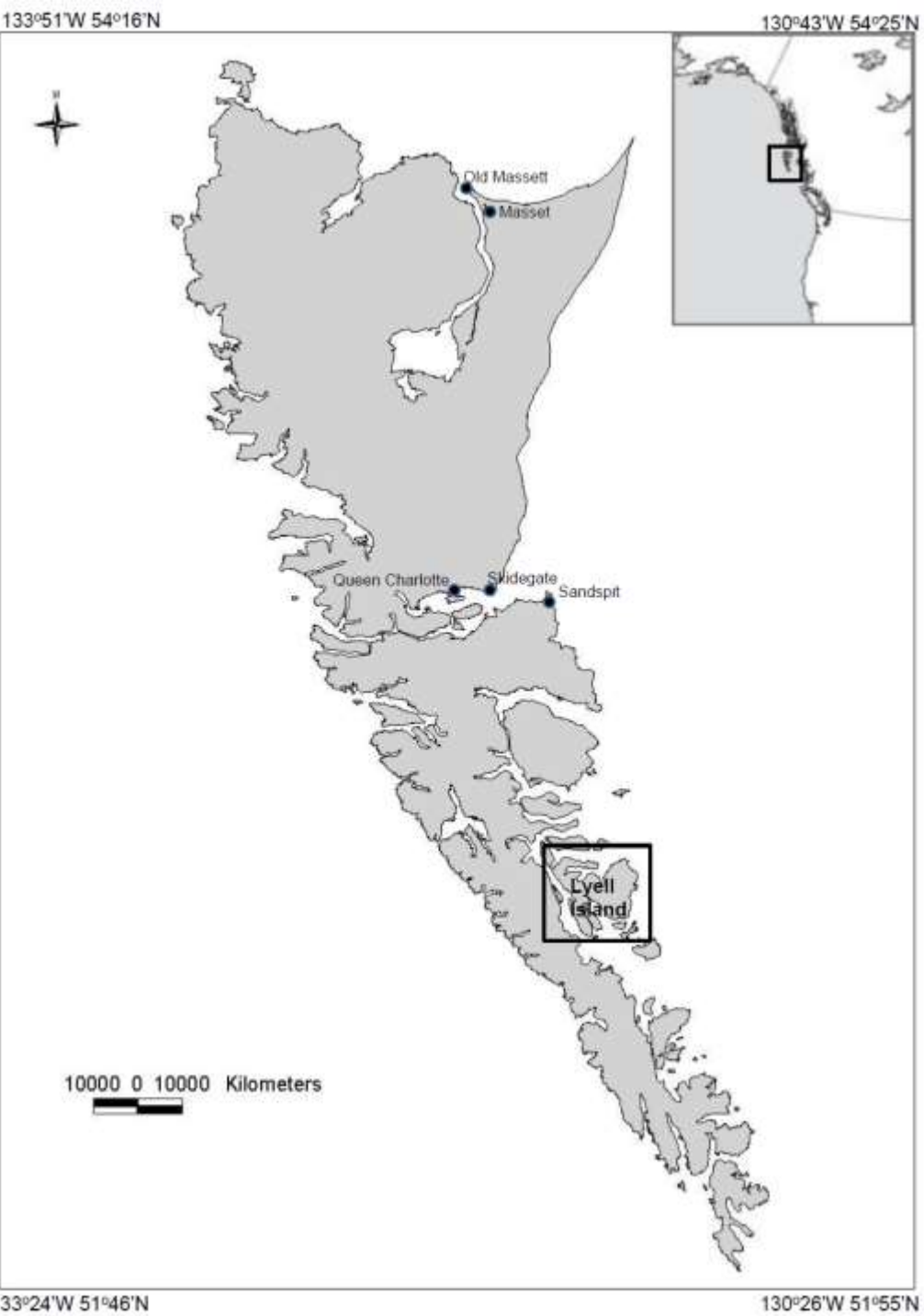


Pearson, A.F. and D. Challenger. 2009. Old-growth forests 1937 – 2007 for Tllga Kun Gwaay.Yaay (Lyell Island) Haida Gwaii (Queen Charlotte Islands) British Columbia, Canada. (unpublished report.)

Historical maps and air photos inform

Our most important finding is the ability to quantify the original extent of western redcedar, which would be greatly underestimated on Lyell Island without the 1937 photos.

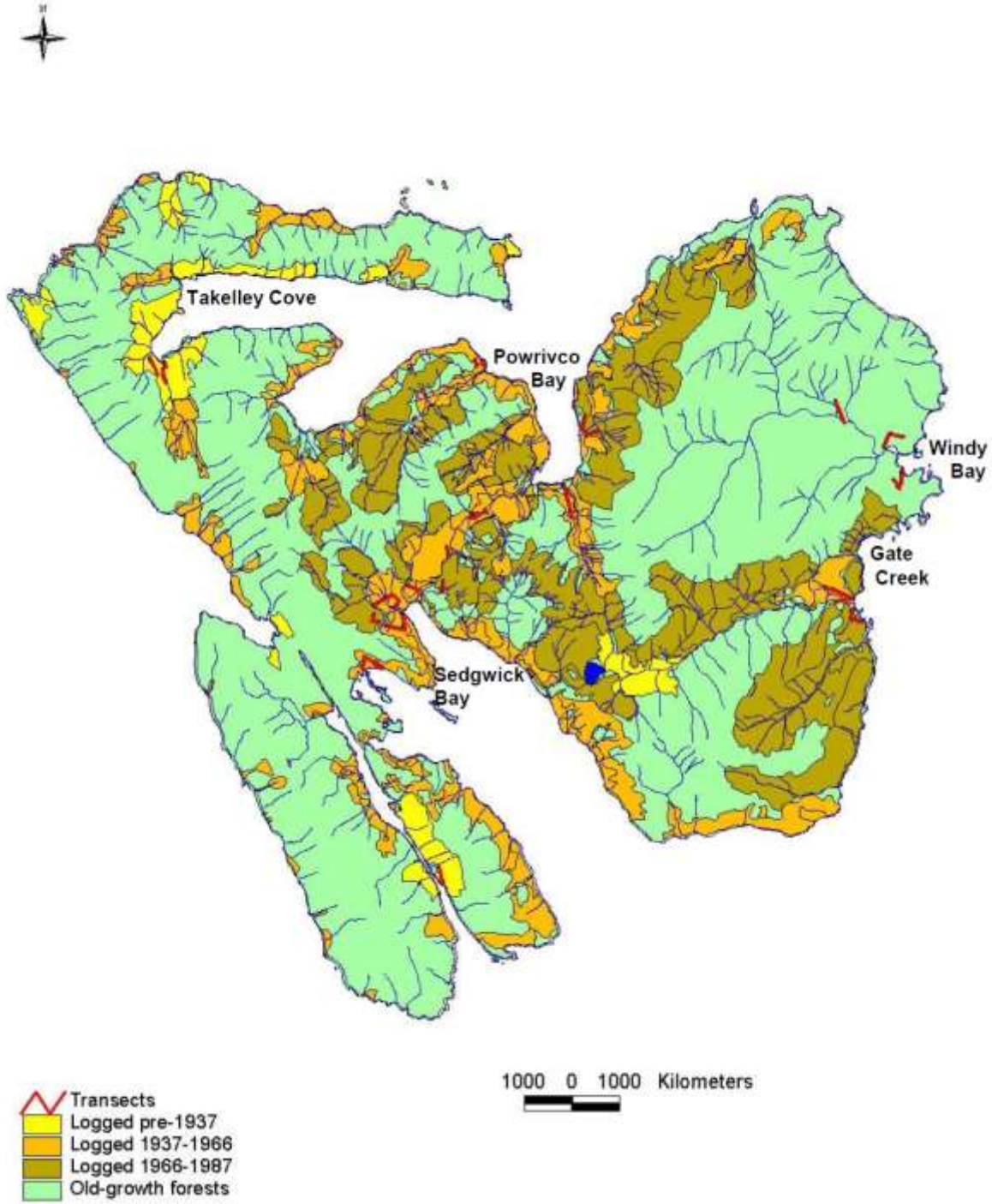
by Audrey F. Pearson, Department of Forest Sciences and Sarah E. Gergel, Centre for Applied Conservation Research(CACR), Forest Sciences, UBC

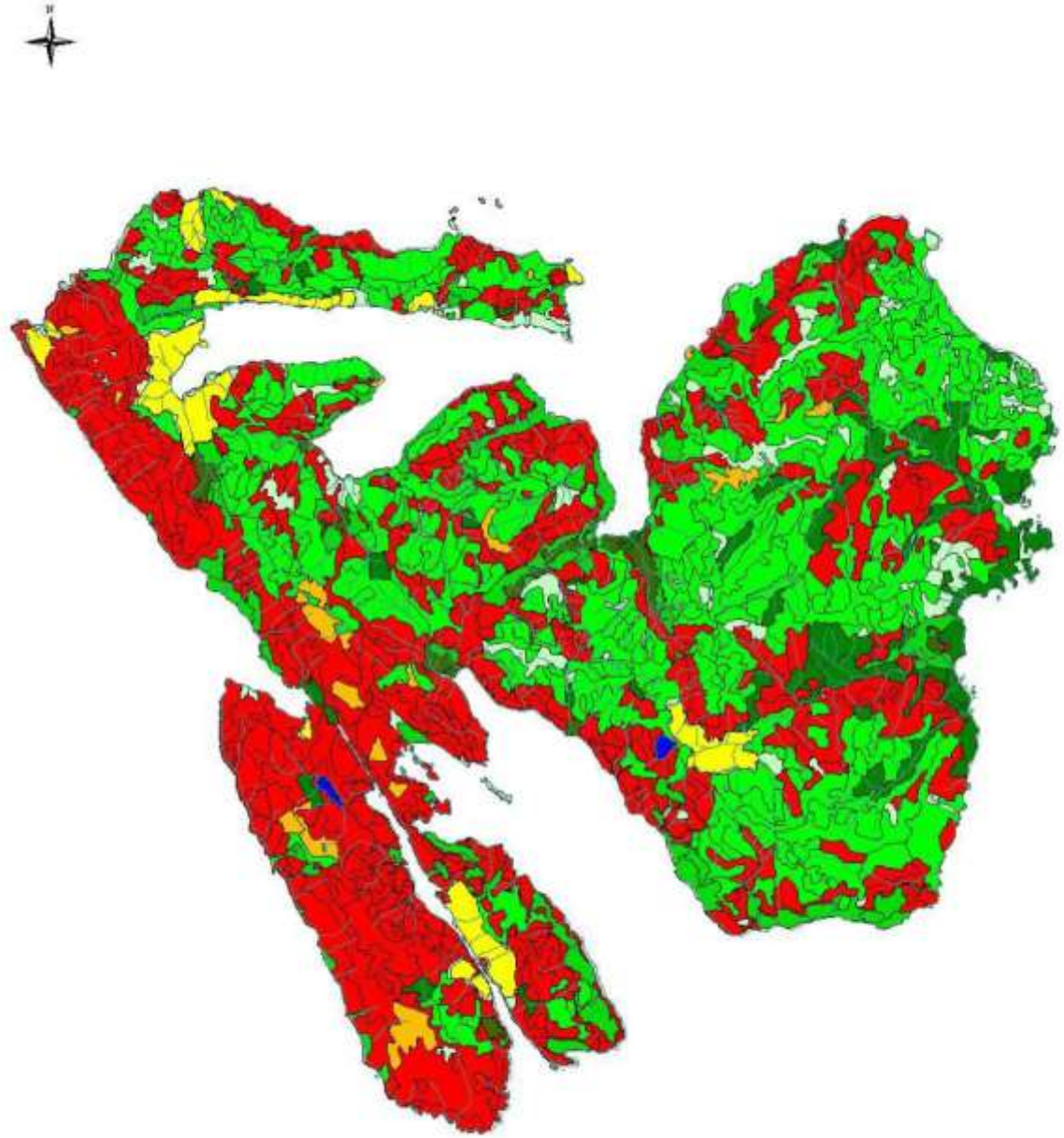
Researchers have shown it is possible to generate digital maps of original forest cover from existing non-digital sources, such as old maps and air photos, at a reasonable cost.

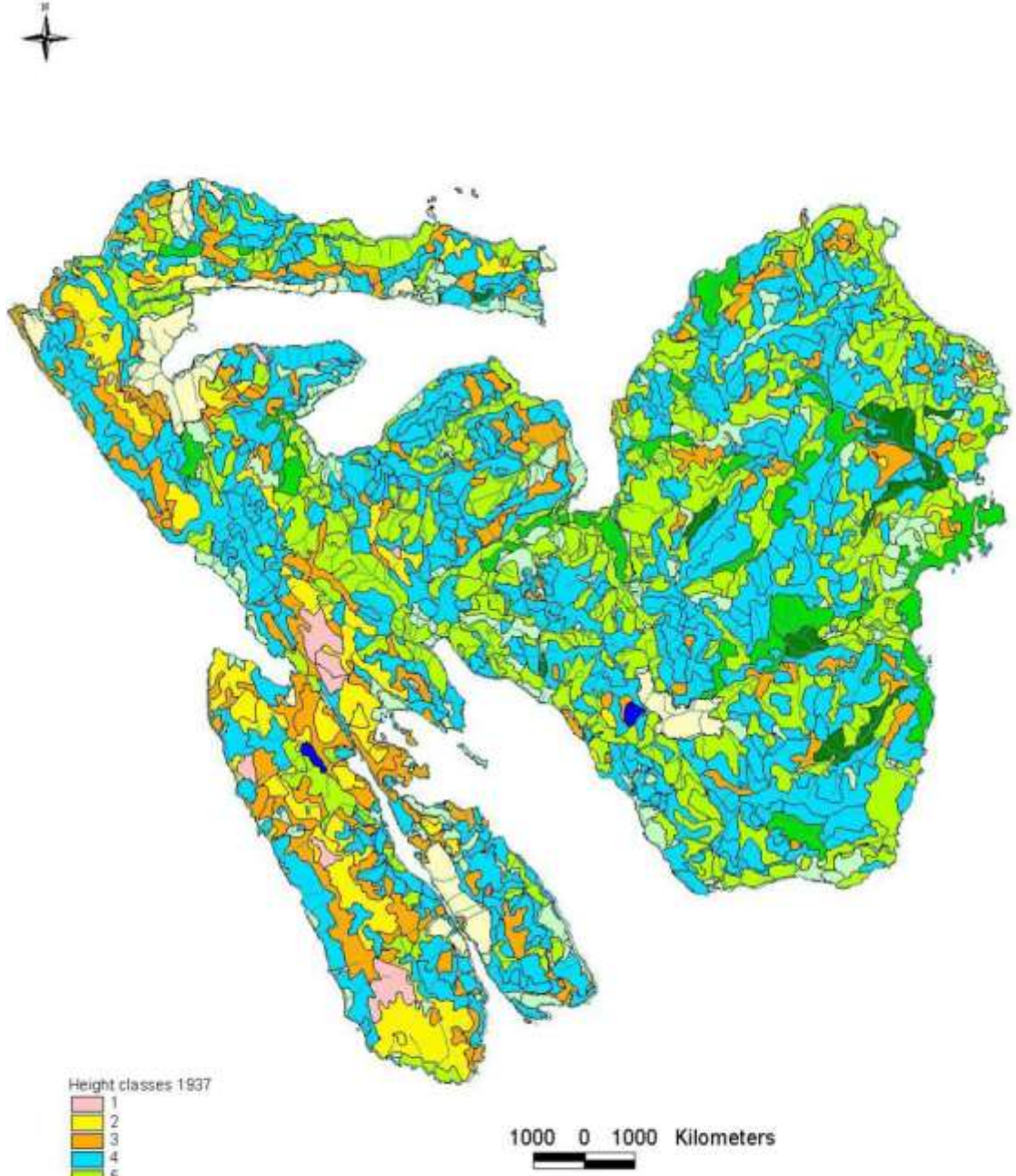
A fundamental information need in forest management is how to use timber inventory databases to meet the new requirements of ecosystem-based management. Often, timber inventories (forest cover maps) are the only landscape-level information available for planning. However, answering basic questions such as "What was the original versus current extent of old-growth forest types?" is not easy with modern timber inventory databases because associated old-growth information is deleted after logging. In many cases, original (pre-harvest) forest composition can only be derived from modelling or by reconstruction from records that pre-date logging.

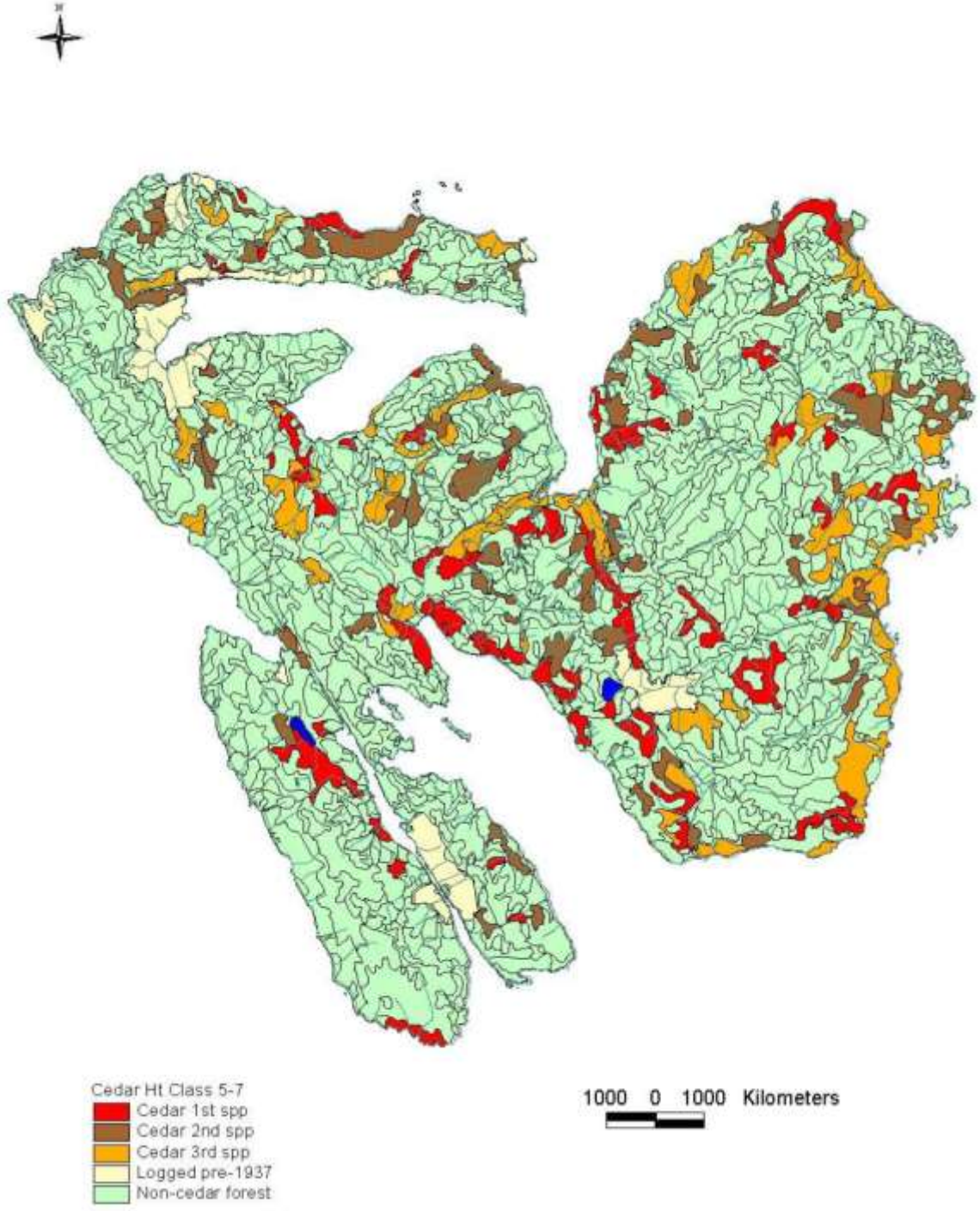
A further consideration is how to use the information in timber inventory databases, both modern

Figure 1. *1937 ortho photo mosaic of Lyell Island*

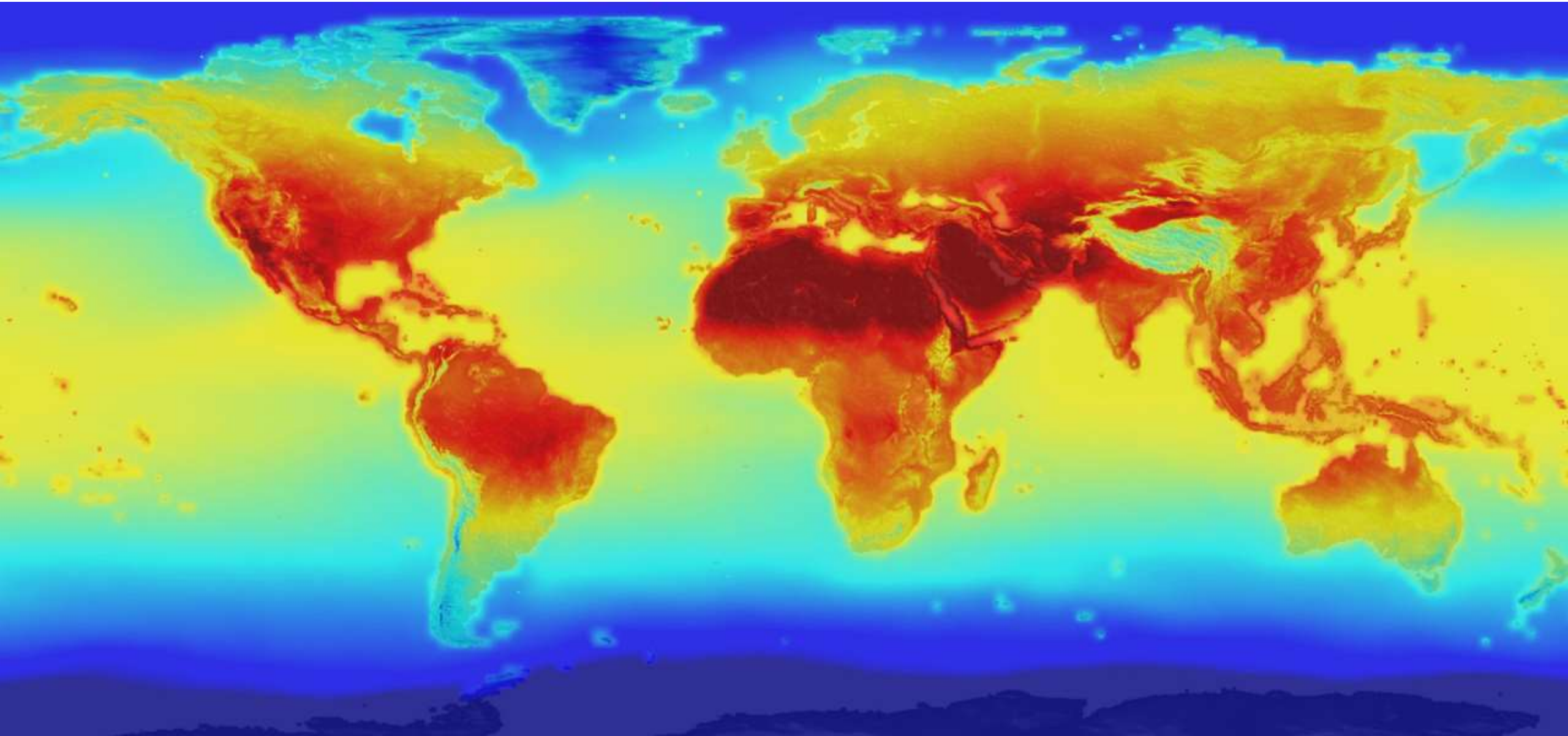

Takelley Cove
Powrivco Bay
Windy Bay
Gate Creek
Sedgwick Bay
1000 0 1000 Kilometers
Transects
Logged pre-1937
Logged 1937-1966
Logged 1966-1987
Old-growth forests


Old growth in 1937
Cedar
Yellow cedar
Hemlock
Spruce
Logged pre-1937
Young/mature and non-prod forest
1000 0 1000 Kilometers


Height classes 1937
1
2
3
4
5
6
7
Logged pre-1937
Young/mature and non-prod forest
1000 0 1000 Kilometers

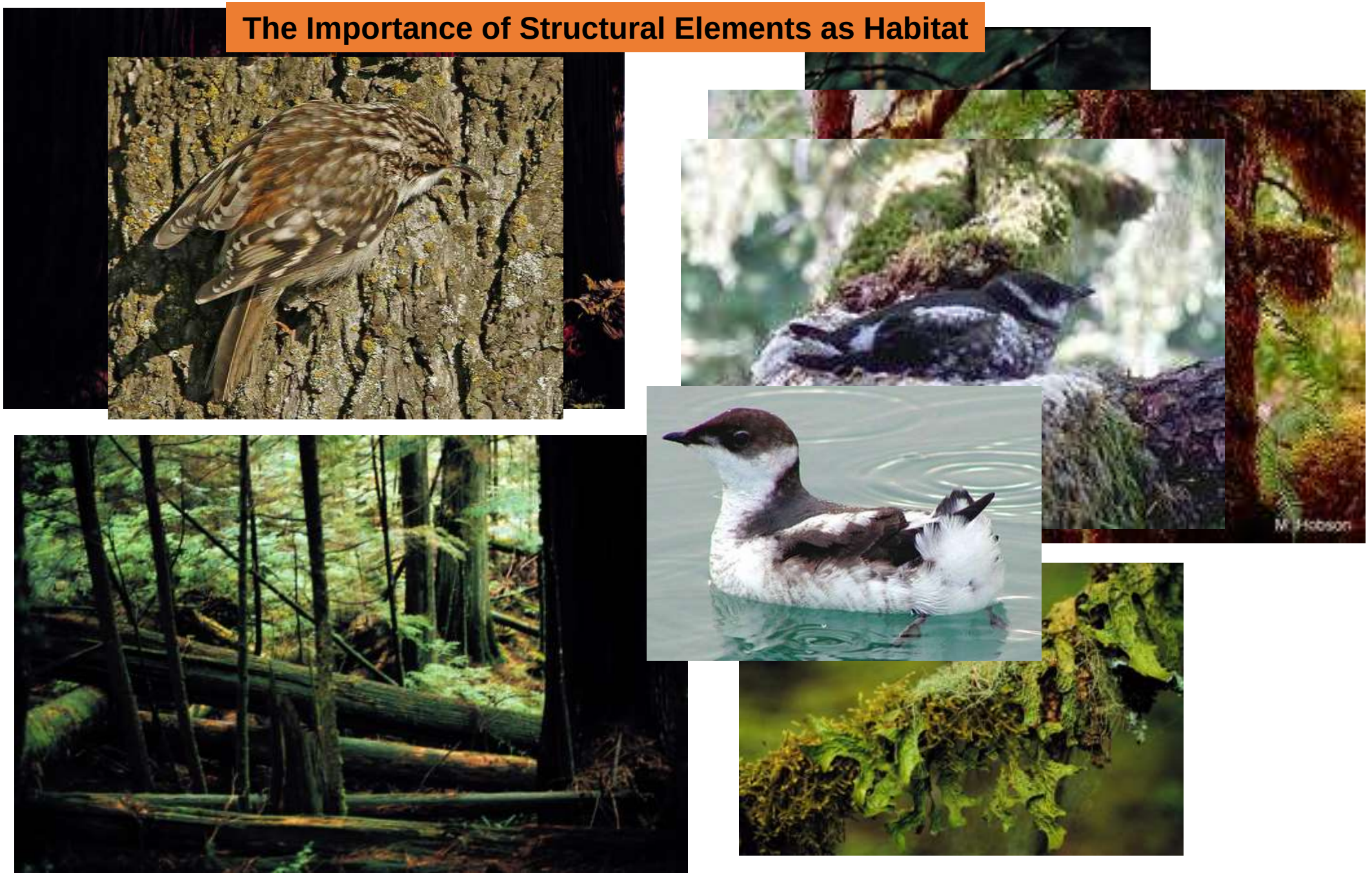

Cedar Ht Class 5-7
Cedar 1st spp
Cedar 2nd spp
Cedar 3rd spp
Logged pre-1937
Non-cedar forest
1000 0 1000 Kilometers

Does it make sense to use historical records as a template in a time of rapidly changing climate?



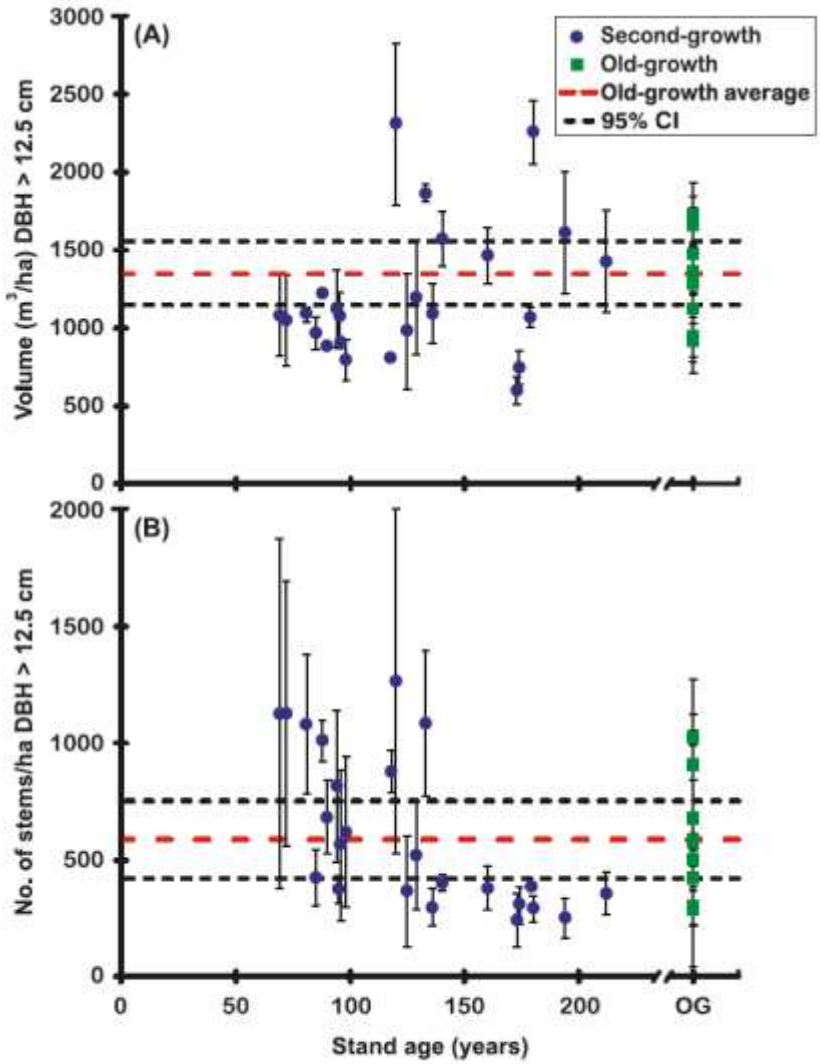

What do we use as a template?
What taxonomic groups/other measures to consider?
Not plants
Not most vertebrates

The Importance of Structural Elements as Habitat

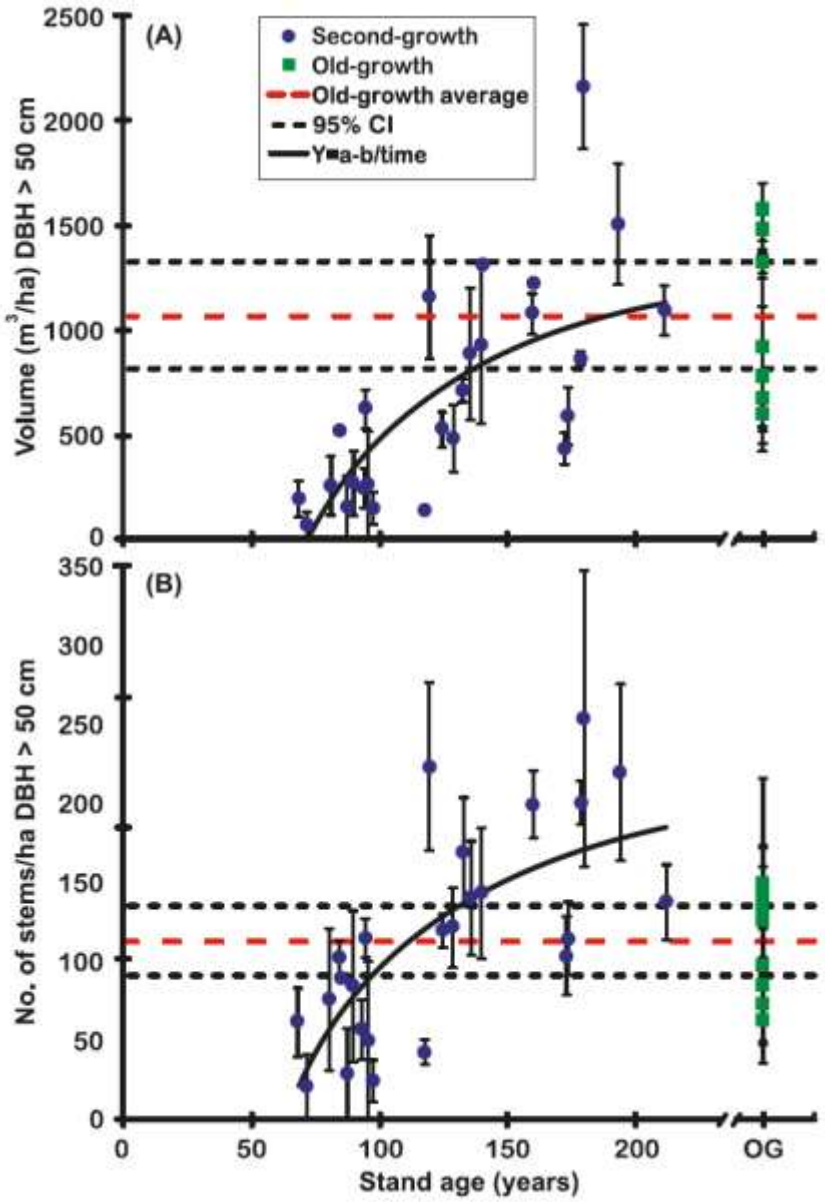


Why Structure?

- sometimes possible to get baseline data (from existing stands or old data sources)
- takes a long time to develop
- is one of the most distinctive and extraordinary elements of our PNW forests, and many species are adapted to it
- is the most profoundly-changed attribute in second-growth forests
- much of the work can be done by unemployed or under-employed people who know how to use chain saws



very large trees, with diameters up to 185 cm for hemlock and 310 cm for redcedar.



Gerzon, M., B. Seely and A. MacKinnon. 2011. The temporal development of old-growth structural attributes in second-growth stands: a chronosequence study in the Coastal Western Hemlock zone in British Columbia. Canadian Journal of Forest Research 41(7): 1534-1546.

Table 3. Summary of attributes tested for correlation with age.

Attribute	OG average ± 95% CI	Time to reach OG (mean ± SE; years)	Regression equations	R^2 and p value for regression
Trees with DBH > 50 cm				
Volume	1071 ± 260 m^3/ha	190±53	$Y = -123814/X + 1720$	0.49; <0.001
No. of stems/ha	113±22 stems/ha	112±15	$Y = -16896/X + 265$	0.51; <0.001
No. of snags with DBH > 50 cm	23.3±NA snags/ha	>200±NA	NA	NA
Nonresidual CWD	430±170 m^3/ha	240±90	$Y = 1.8X - 5$	0.24; 0.015
Percentage cover of shrub and herb layers	83%±27%	158±53	$Y = -8419/X + 136$	0.34; 0.003
Trees with DBH ≥ 100 cm				
Volume	470±260 m^3/ha	Probably >250±NA	NA	NA
No. of stems/ha	19±9.6 stems/ha	Probably >250±NA	NA	NA
No. of snags with DBH ≥ 100 cm	8±5.6 snags/ha	Probably >250±NA	NA	NA
SD of DBH	27.4±6.2 cm	Probably >250±NA	$Y = 0.05X + 7.6$	0.28; 0.007
CV of DBH	75±23 (no units)	Probably >250±NA	NA	NA

Note: OG, old growth; CI, confidence interval; DBH, diameter at breast height; CWD, coarse woody debris; SD, standard deviation; CV, coefficient of variation. NA for SE indicates that the SE could not be estimated from the field data. NA for R^2 and for regression indicates that correlation could not be established from the data. Yet, some of these noncorrelated attributes do change within longer time scales. Hence, timing to reach old-growth average was estimated for them as well.


What do we use as a template?
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Lungwort (Lobaria pulmonaria)

Orabatid mite (Phthiracaridae)

Why Lichens (esp. cyanolichens)?

- sometimes possible to get baseline data (from existing stands)
- takes a long time to arrive (poorly dispersed; perhaps just require time?)
- is one of the most distinctive and extraordinary elements of our older PNW forests
- is a profoundly-changed attribute in second-growth forests
- can be an important contributor in N-limited ecosystems

Why Canopy Arthropods?

- sometimes possible to get baseline data (from existing stands)
- takes a long time to develop
- are one of the most distinctive and extraordinary elements of our PNW forests
- is a profoundly-changed attribute in second-growth forests
- high component of predators and parasitoids; may be important in controlling populations of herbivorous arthropods

TECHNICAL REPORT 104

Polypores of British Columbia (Fungi: Basidiomycota)

2017

BRITISH COLUMBIA

104

TECHNICAL REPORT 108

Macrofungus Species of British Columbia

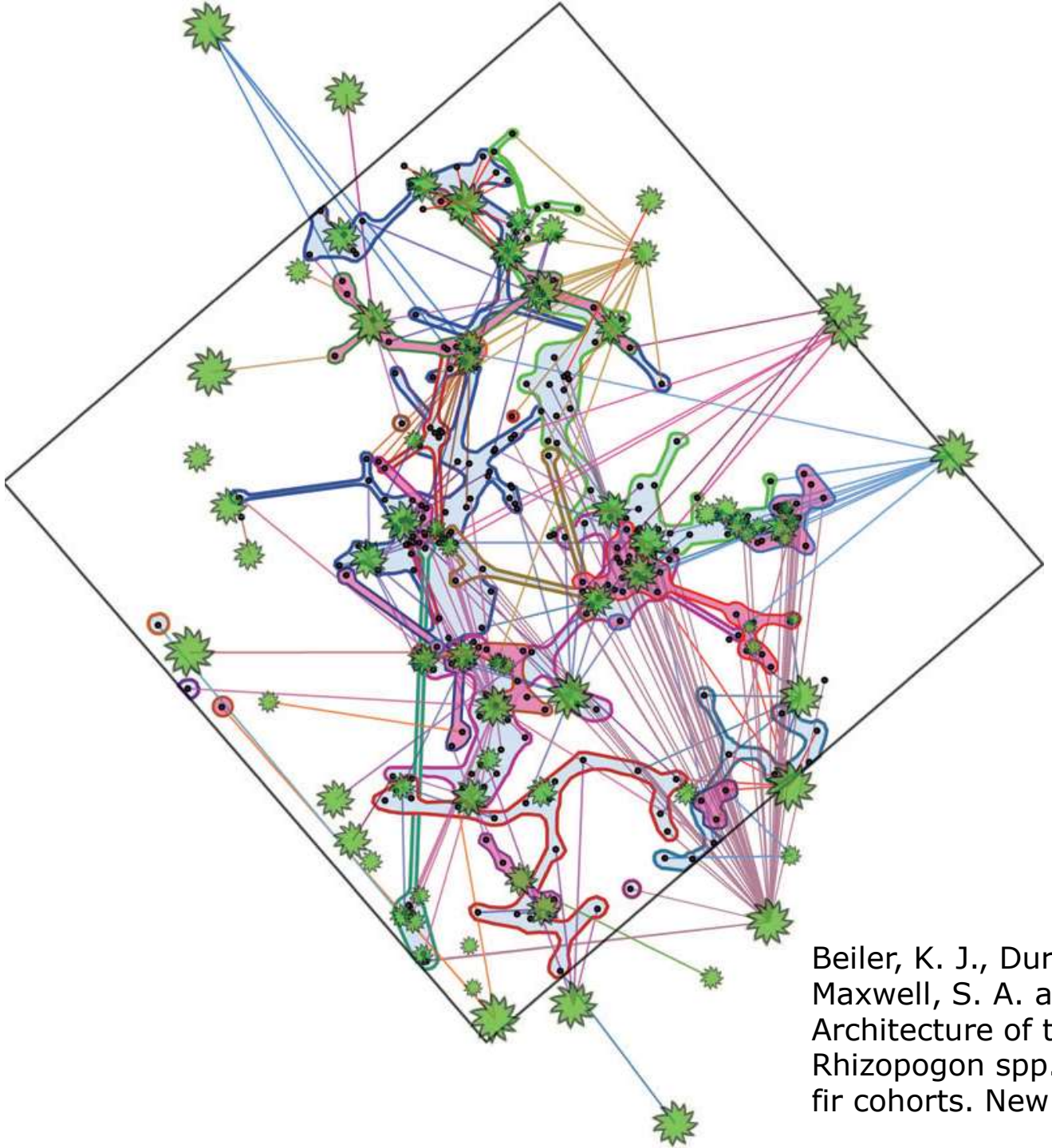
2017

BRITISH COLUMBIA

108

Candystick (*Allotropa virgata*)

- Mycoheterotrophic
- Fungal associate: pine mushroom (*Tricholoma magnivelare*)



Rhizopogon vinicolor

Beiler, K. J., Durall, D. M., Simard, S. W., Maxwell, S. A. and Kretzer, A. M. (2010), Architecture of the wood-wide web: Rhizopogon spp. genets link multiple Douglas-fir cohorts. New Phytologist, 185: 543–553.

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