Coastal Forests and Climate Change Resiliency

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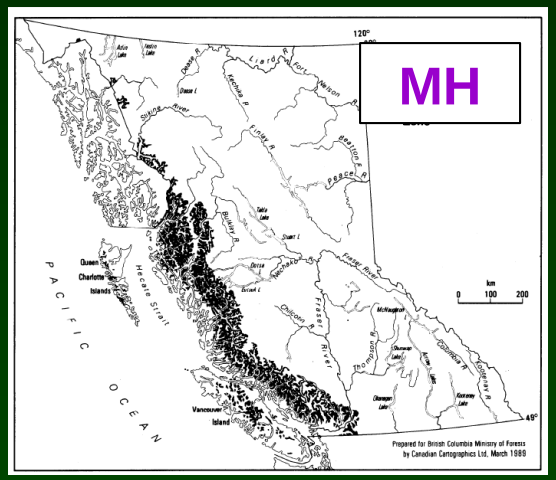
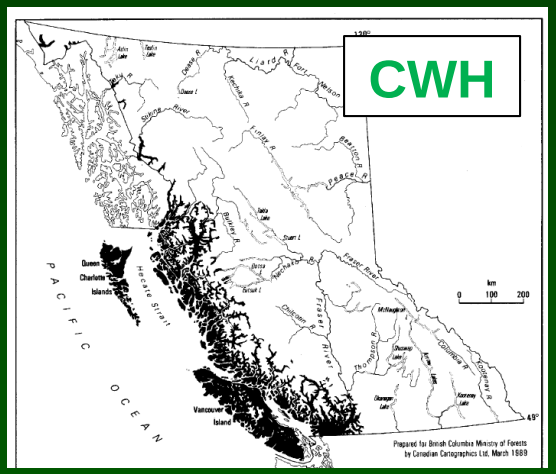
Project TEACH
Fostering forest resilience in the climate change era

Paradigm Shifts

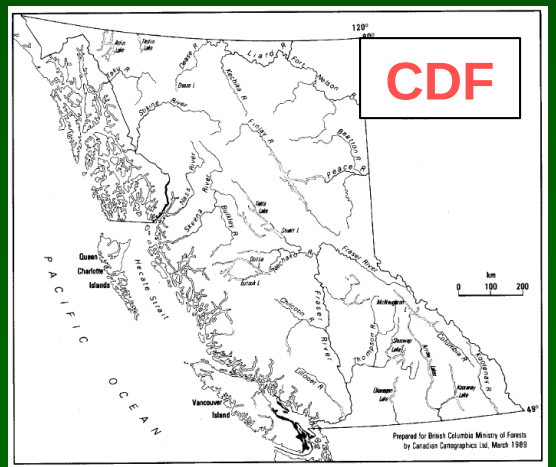
Can you see
the old woman?
the young woman?



MH – subalpine elevations along coast
- transitional to non-forested alpine
>900 masl in south
>300 masl in north



CWH – low-mid elevation along coast
- windward side of coastal mountains
- 0-900 masl in south (1050 inland)
- 0-300 masl in north



CDF – northern limit of range
- se Vancouver Island + Gulf Islands
- strong rainshadow effect
- elevation < 150masl


Are “climax” forests
the same as “old-growth” forests?

BEC: Successional Theory

From Forest Ecology, Kimmins 1997

Traditional Paradigm

20th Century Forest Management

If… the traditional paradigm is correct

Then…

… knowledge site and vegetation predict future

… disturbed forests (clearcuts) will recover, and

… maintain site quality + vegetation potential

= “sustainable”

Sustained timber yield with rotations of 80-100 years is based on the traditional paradigm of succession.

Map courtesy of the Sierra Club

Map courtesy of the Sierra Club

Traditional Paradigm

20th Century Forest Conservation

If… the traditional paradigm is correct

Then…

… any unit of nature = adequate for conservation

… protected ecosystems maintain themselves in balance in their initial, desirable state

Conservation is achieved by excluding people from natural ecosystems to restore the balance of nature.

20th Century Conservation in BC

Map courtesy of the Sierra Club

Protected areas are outlined in red.
Note the size and location of Cathedral Grove.

MacMillan Provincial Park (Cathedral Grove)

301 ha of “ancient” forest

Protected in 1947

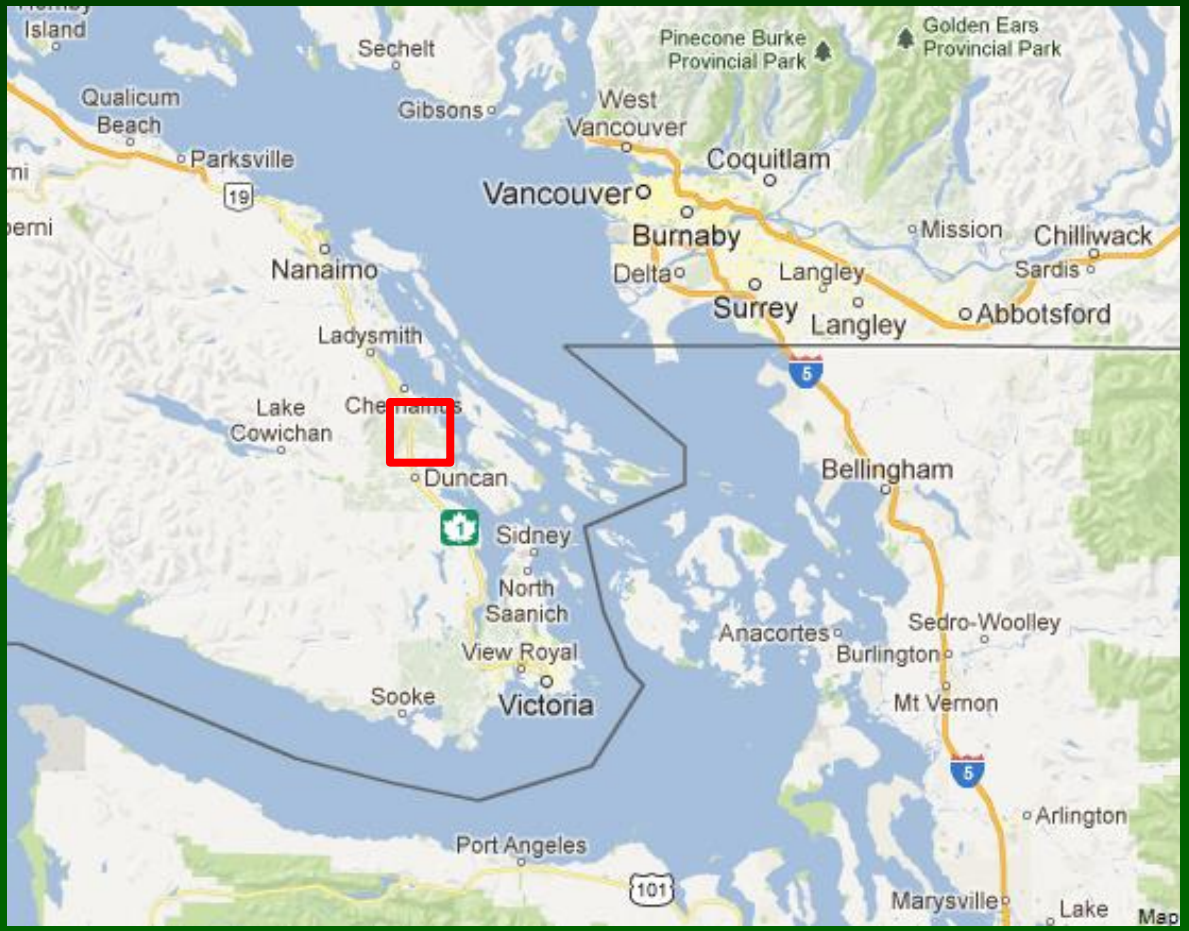
Class A Provincial Park

Historical Changes in the 20th Century: Fire Exclusion and Suppression

Cowichan District, Vancouver Island

Today:

- closed-canopy mixed Douglas-fir, western redcedar and maple forest
- urban areas



Bjorkman and Vellend 2010

Historical Changes in the 20th Century: Fire Exclusion and Suppression

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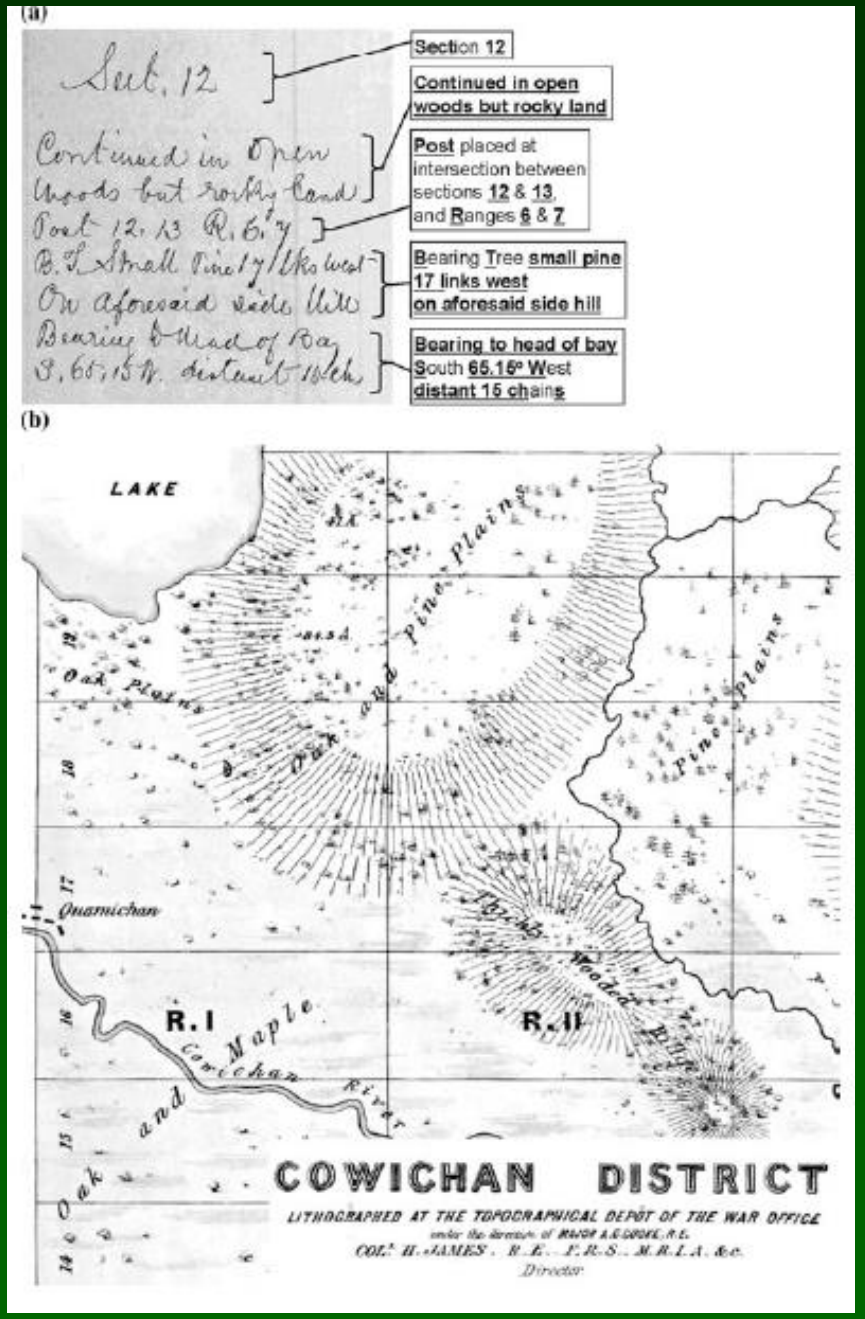
Bjorkman and Vellend 2010

Historical Documents

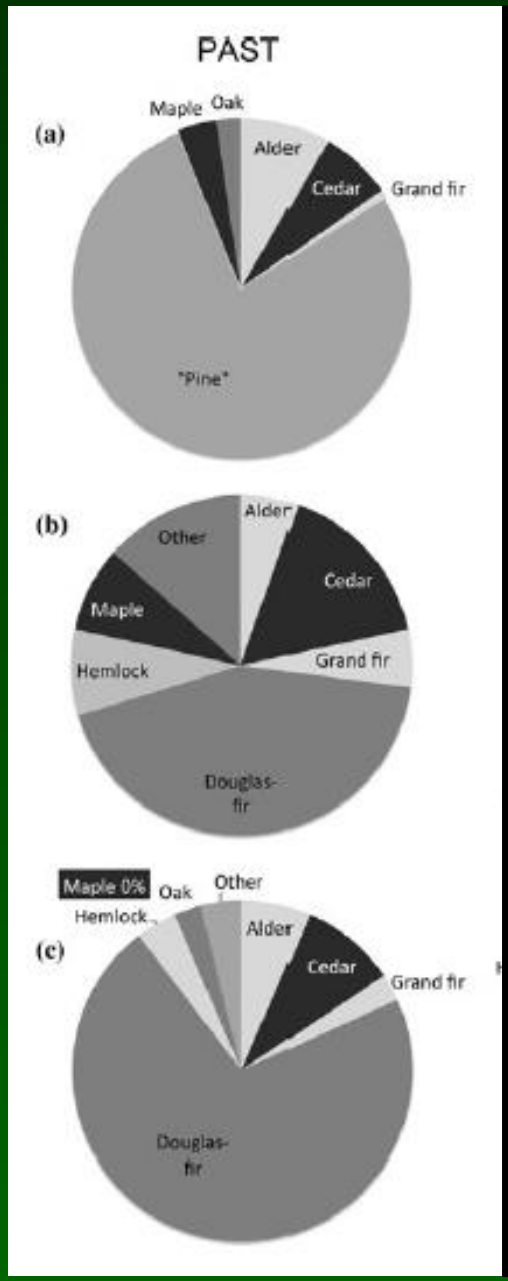
- land survey records (1859–1874)
- 1 km × 400 m grid
- intersections marked with post and one “witness” tree sampled
  - species
  - diameter
  - bearing and distance



Bjorkman and Vellend 2010

Comparison through time

- Contemporary field work to relocate intersections and measure trees
- Changes:
  - ↑ forest cover
  - ↑ tree density
  - ↑ fire intolerants
  - ↓ surface fire



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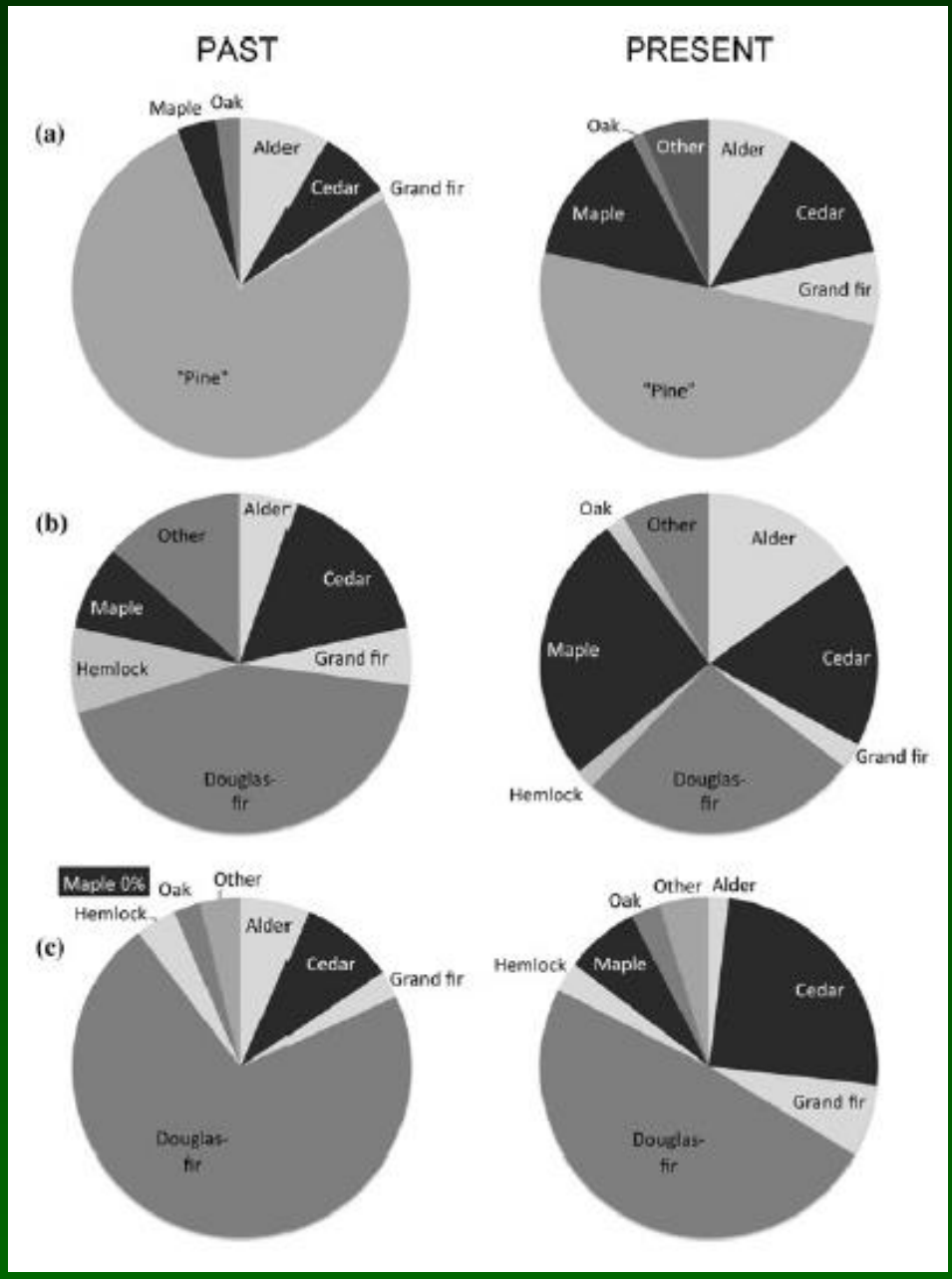
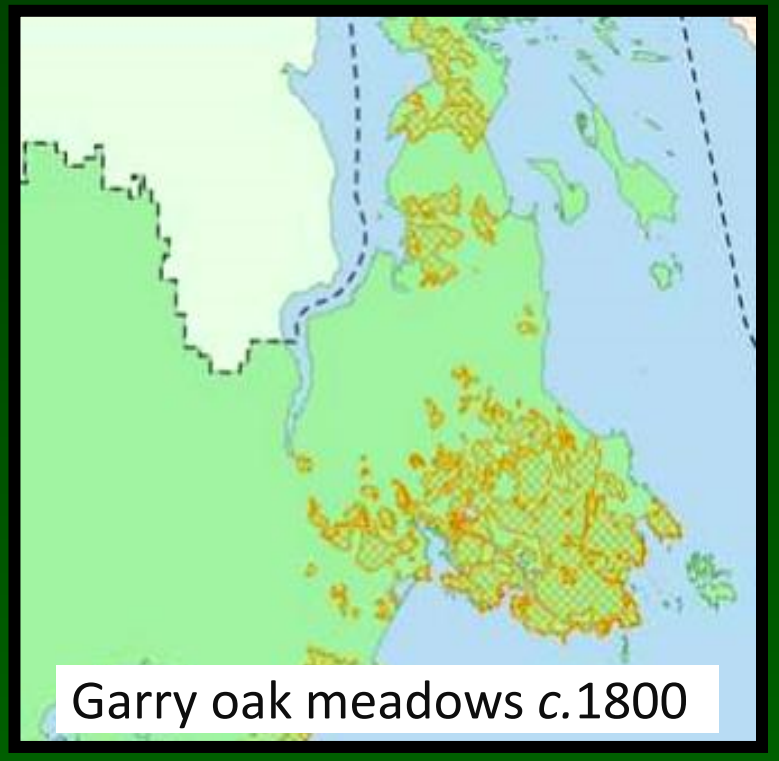


Bjorkman and Vellend 2010

Land Use & Cover Change:
Wildland Urban Interface in Capital Regional District



http://margaretmunro.wordpress.com/2013/02/07/exposing-a-devils-bargain/
http://www.billcasselman.com/canadian_garden_words/cgw_two.htm

Land Use & Cover Change:
Wildland Urban Interface in Capital Regional District

Take Home Message:

Management + conservation are based on the traditional view of disturbance and succession.

It assumes vegetation reflects primarily climate, physiography and soils and all three are relatively stable.

It assumes disturbance history is a secondary influence and decreases with time since the last severe event.

Rethinking Successional Theory

Traditional Paradigm

- Predictable
- Deterministic
- Equilibrium
  - Climate and soils
- Managed /conserve stable states
- Stand-level decisions
- Homogenized landscapes

Contemporary Paradigm

- Complexity
- Multiple pathways
- Non-equilibrium
  - Disturbance and variation
- Manage to maintain processes
- Multi-scale management
- Increase heterogeneity

Solutions

- Manage multifunctional landscapes
- Manage for resilience to climate + climate-mediated disturbances
- Diversify species and silviculture

- Actively restore for ecosystem composition, structure + function
- Adapt to mistakes + surprises