



Fire on the Landscape: Past, Present and Future Fire Regimes in Western Oregon

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Outline

- Relationships: climate, vegetation and fire
- Role of Fire in space and time: focus on westside of Oregon
 - Historical role
 - Changing Current role
 - Potential Future role (climate change)

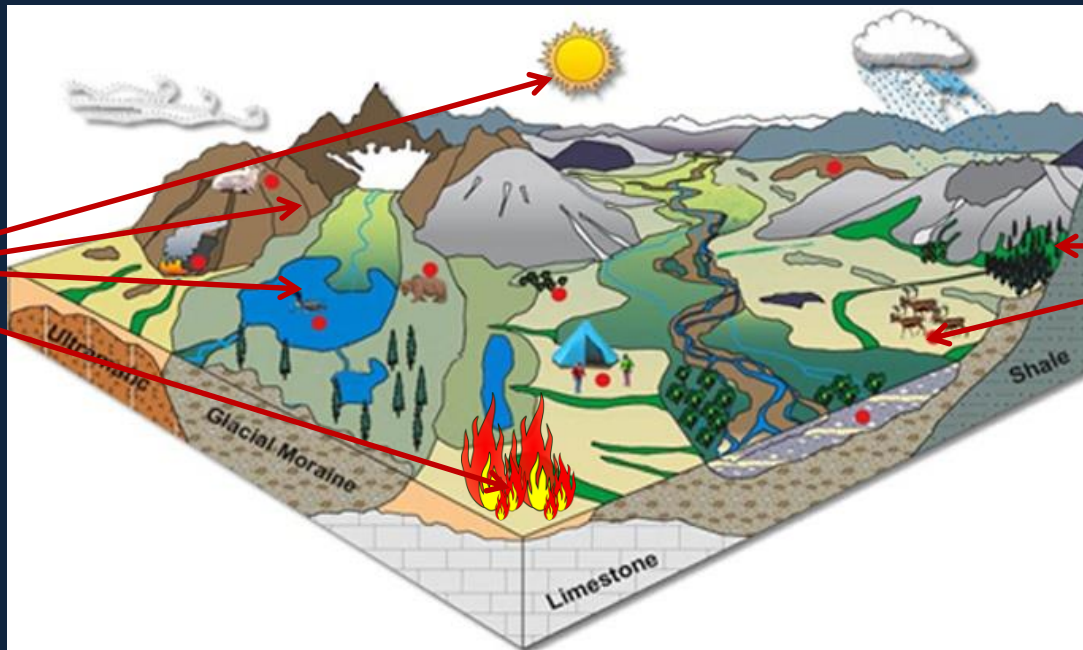


Ecosystems: It's all about the relationships

A system formed by the interaction of a community of living organisms with its non-living environment

Non-Living Environment (Abiotic)

- Climate
- Geology
- Physical Processes

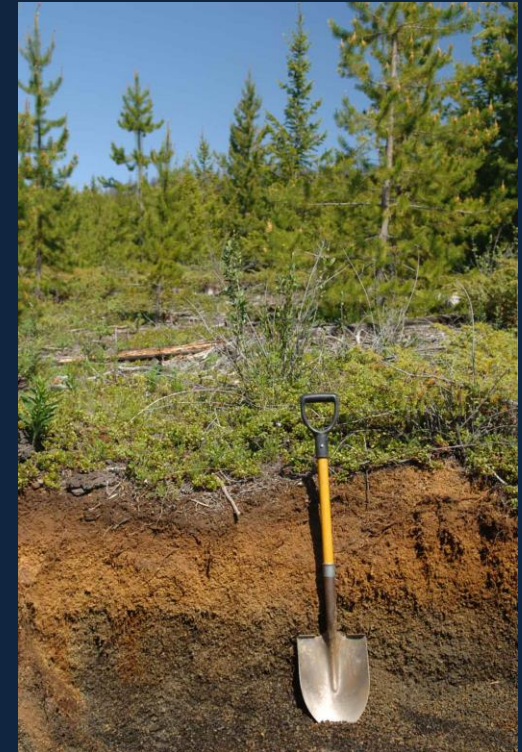


Living Organisms (Biotic)

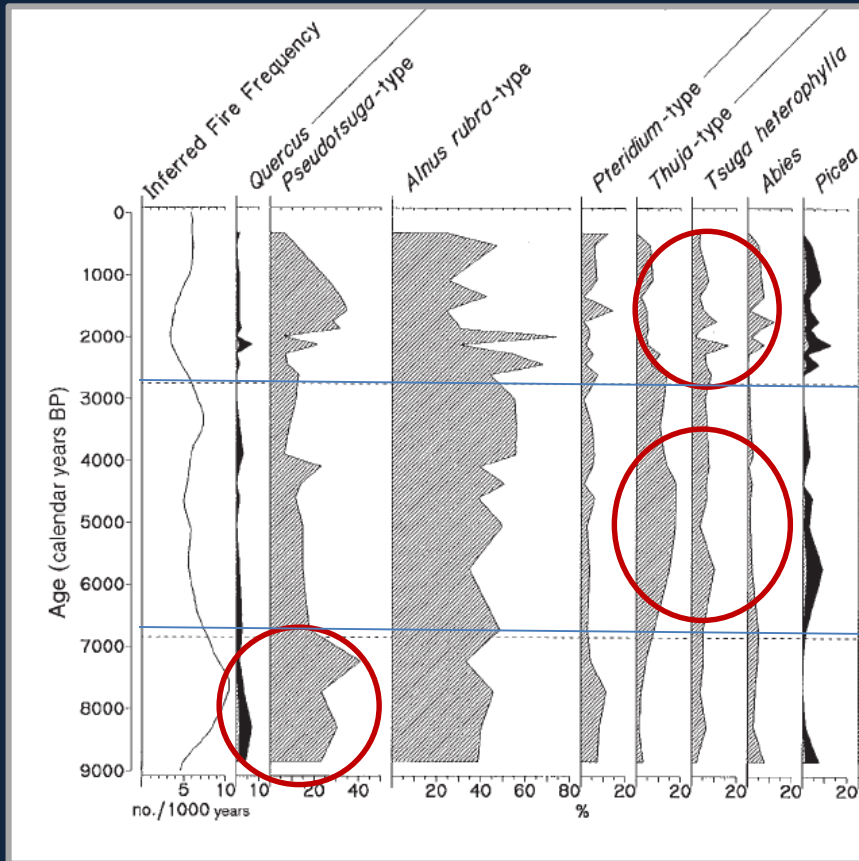
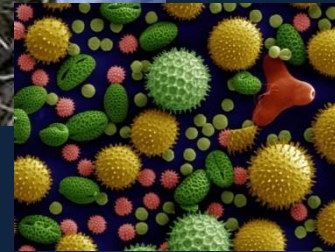
- Plants
- Animals

Abiotic Drivers on Vegetation Composition, Structure and Distribution

- Growth
 - Climate and physical environment
 - species composition and productivity



Paleoclimate and Vegetation Composition Little Lake, Oregon Coast Range



Cooler/more humid



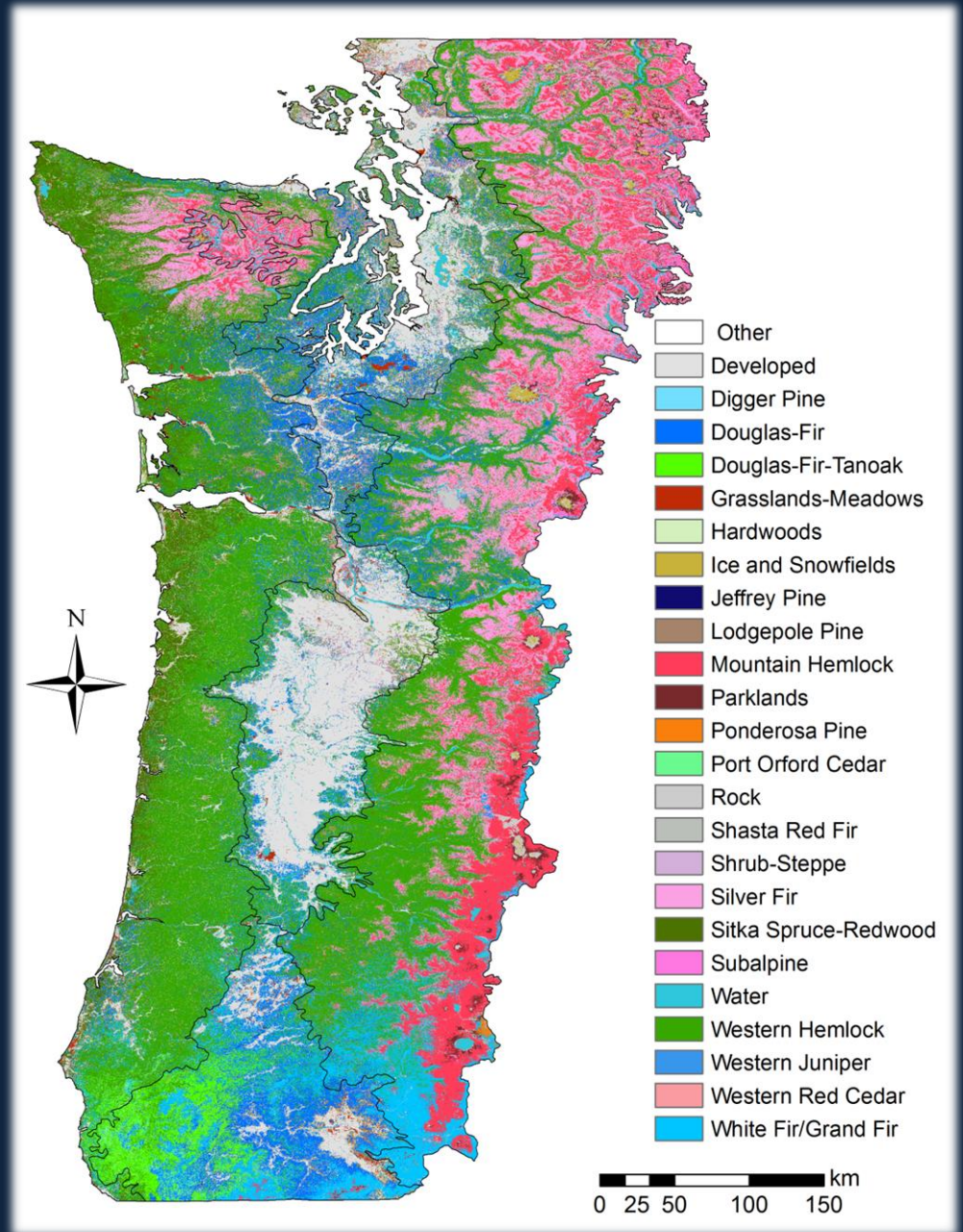
Cool/Humid



Warm/Dry

Long et al Can J. For. Res. 1998

Potential Vegetation Zones



Abiotic Drivers on Vegetation Composition, Structure and Distribution

- Mortality:

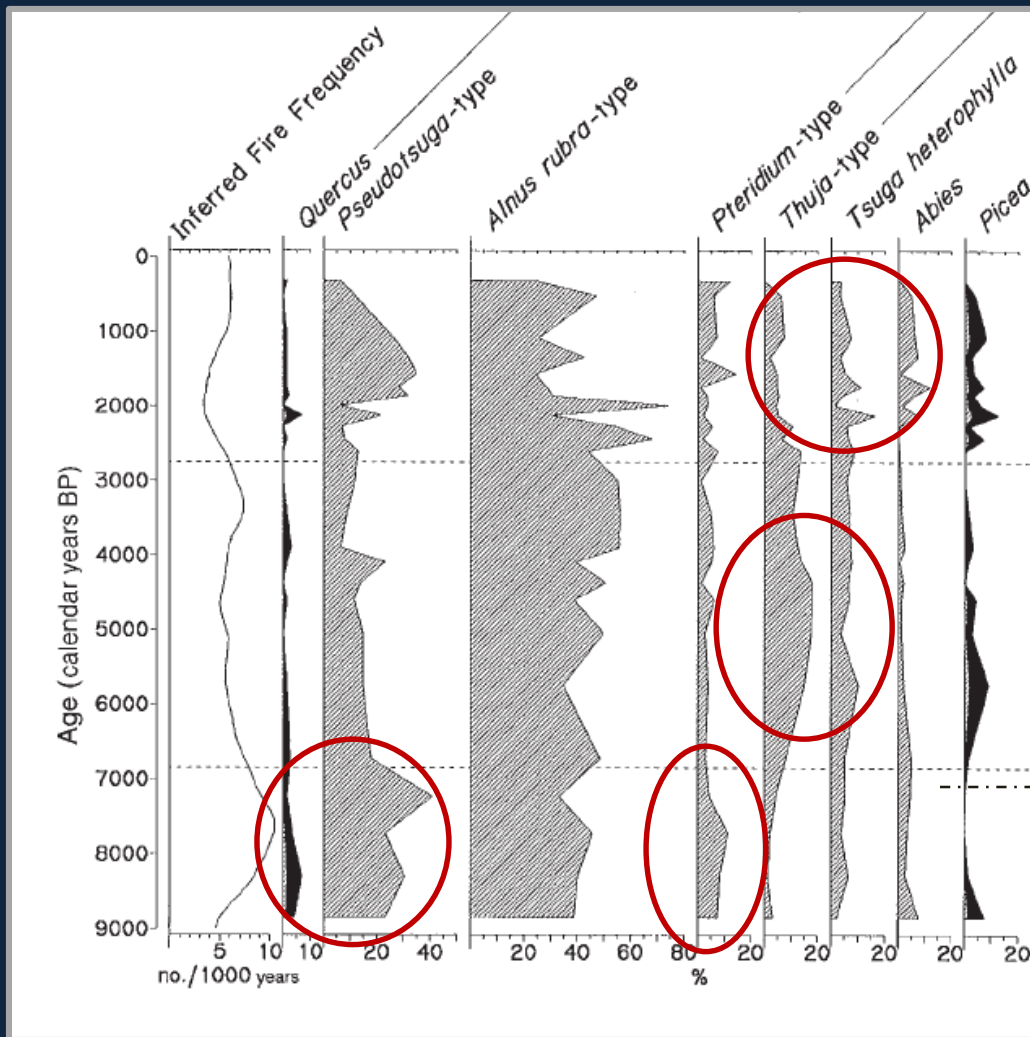
- Fire
- Wind
- Competition
- Pathogens
- Insects



Ronald F Billings, Texas Forest Service and USDA Forest Service, Region 2, Rocky Mountain Region Archive,

Paleoclimate, Vegetation and Fire

Little Lake, Oregon Coast Range



Fire Frequency

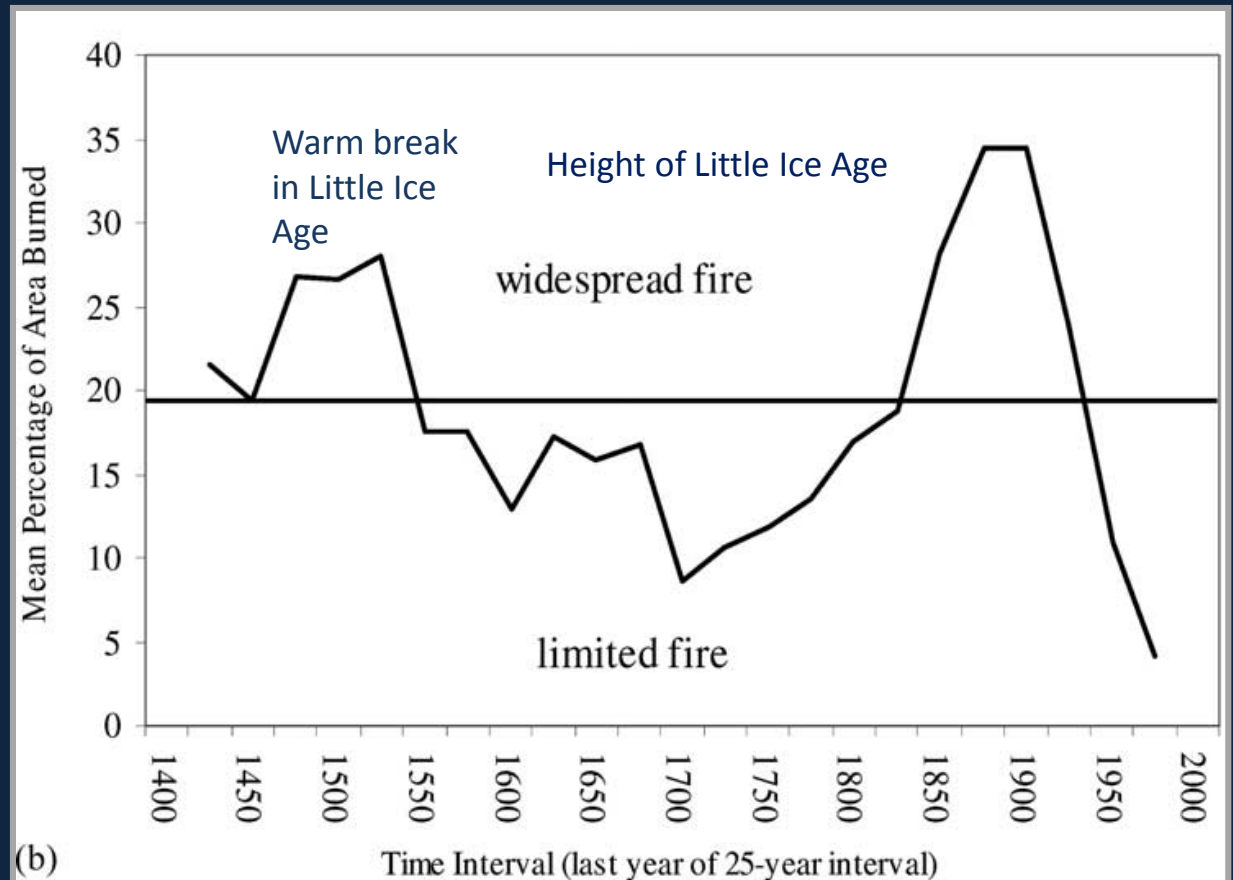
Cooler/more humid
230 yrs

Cool/Humid
160 yrs

Warm/Dry
110 yrs

Long et al Can J. For. Res. 1998

Fire History Studies: Westside Regional Signal



Fire Regimes

Frequency: How often

Severity: How much mortality

Extent: How large

Affects the composition, structural development and landscape pattern

Infrequent High
Severity
Large Extent

Variable
frequency
Mixed severity
Variable Extent

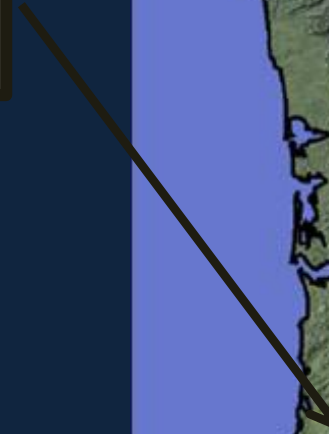
Frequent low
severity



Infrequent Stand Replacing Fire Regime

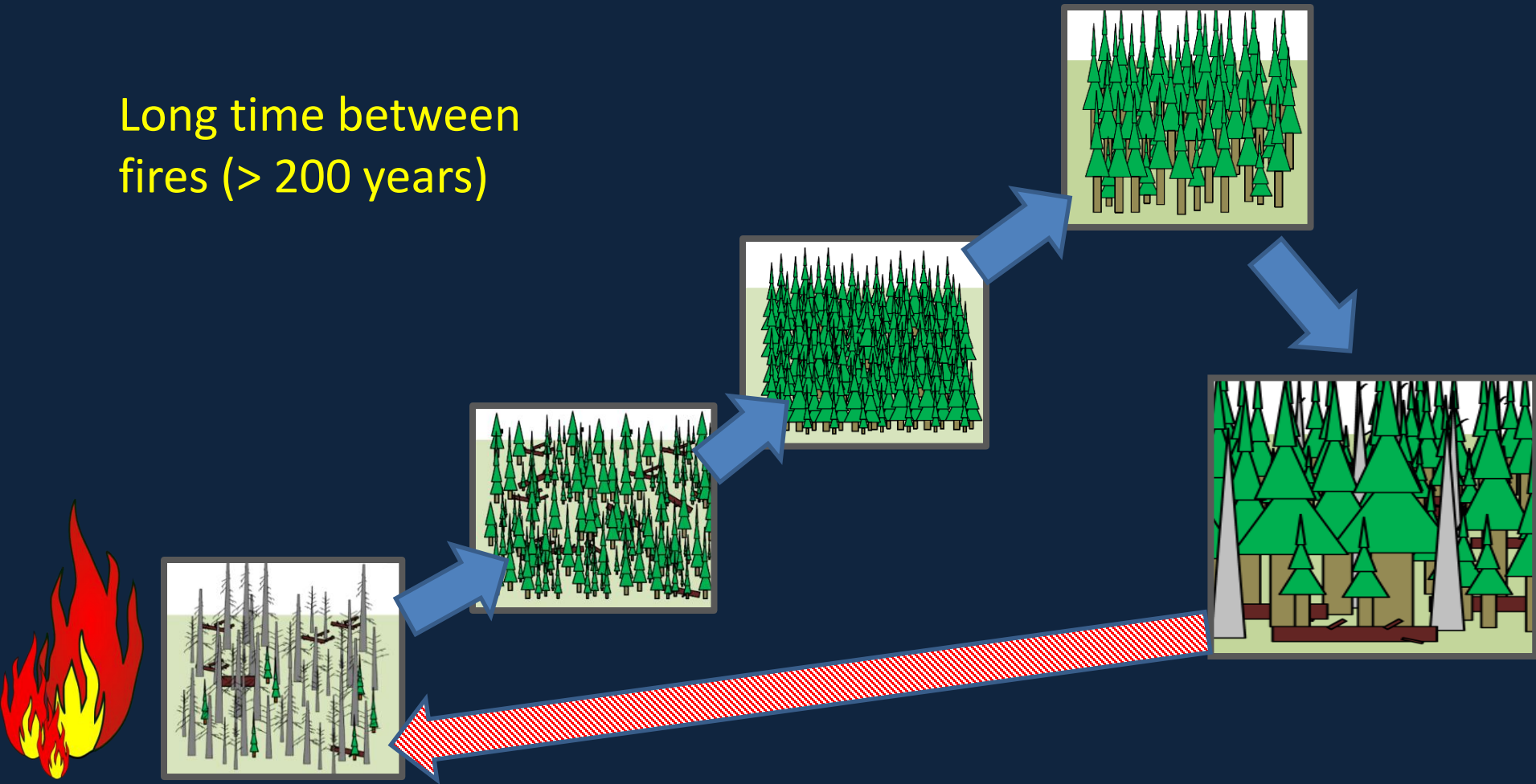
- Dominated Coast Range ecoregion
- Dominated northern West Cascade ecoregion
- More localized further south

Infrequent High
Severity
Large Extent

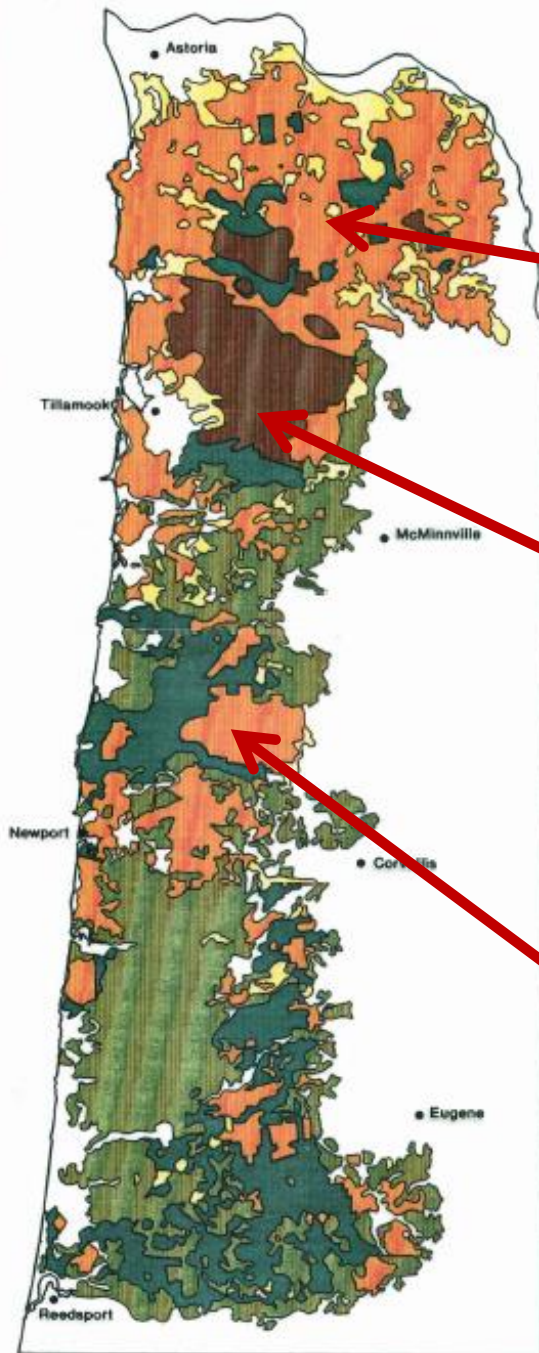


Stand Development Pathways Stand Replacement Fire Regime

Long time between fires (> 200 years)



Oregon Coast Range 1940

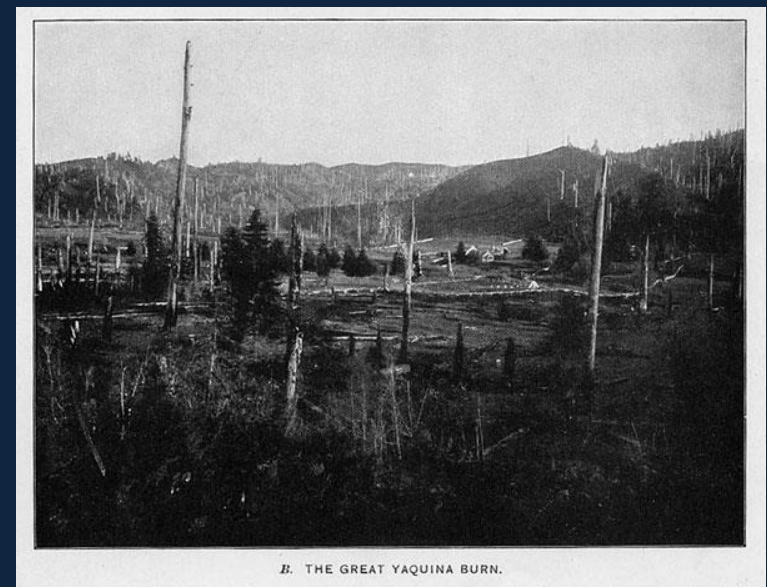
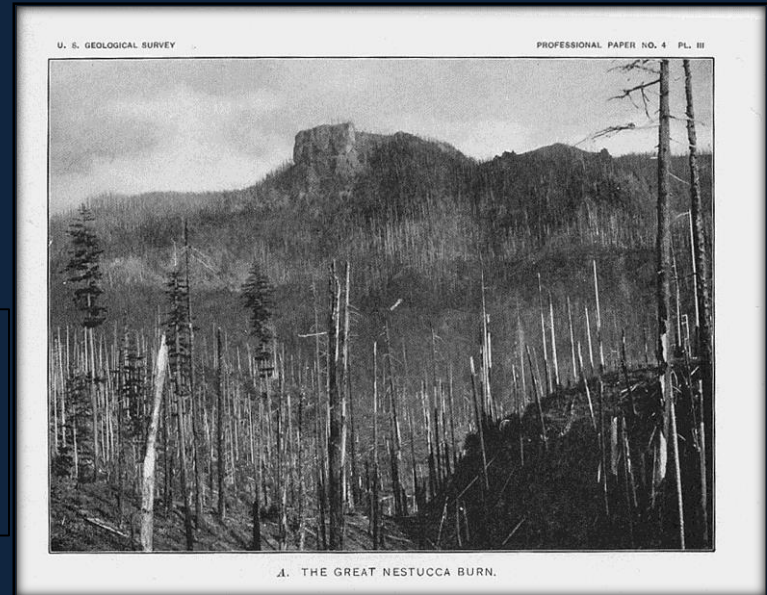


Tillamook: 1933-1951;
4 fires
355,000 total acres

Nestucca: 1845/6/7
Repeated reburn by
settlers;
300-375,000 total acres

Yaquina 1849;
450,000 total acres

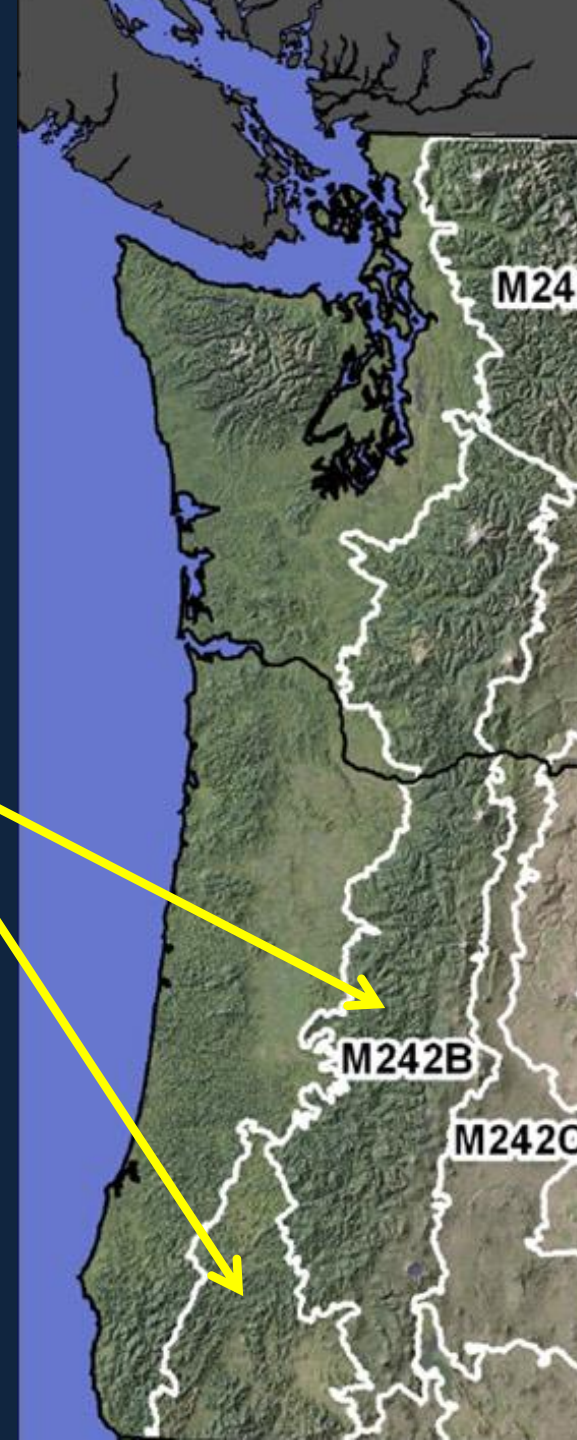
Teensma et. al 1991



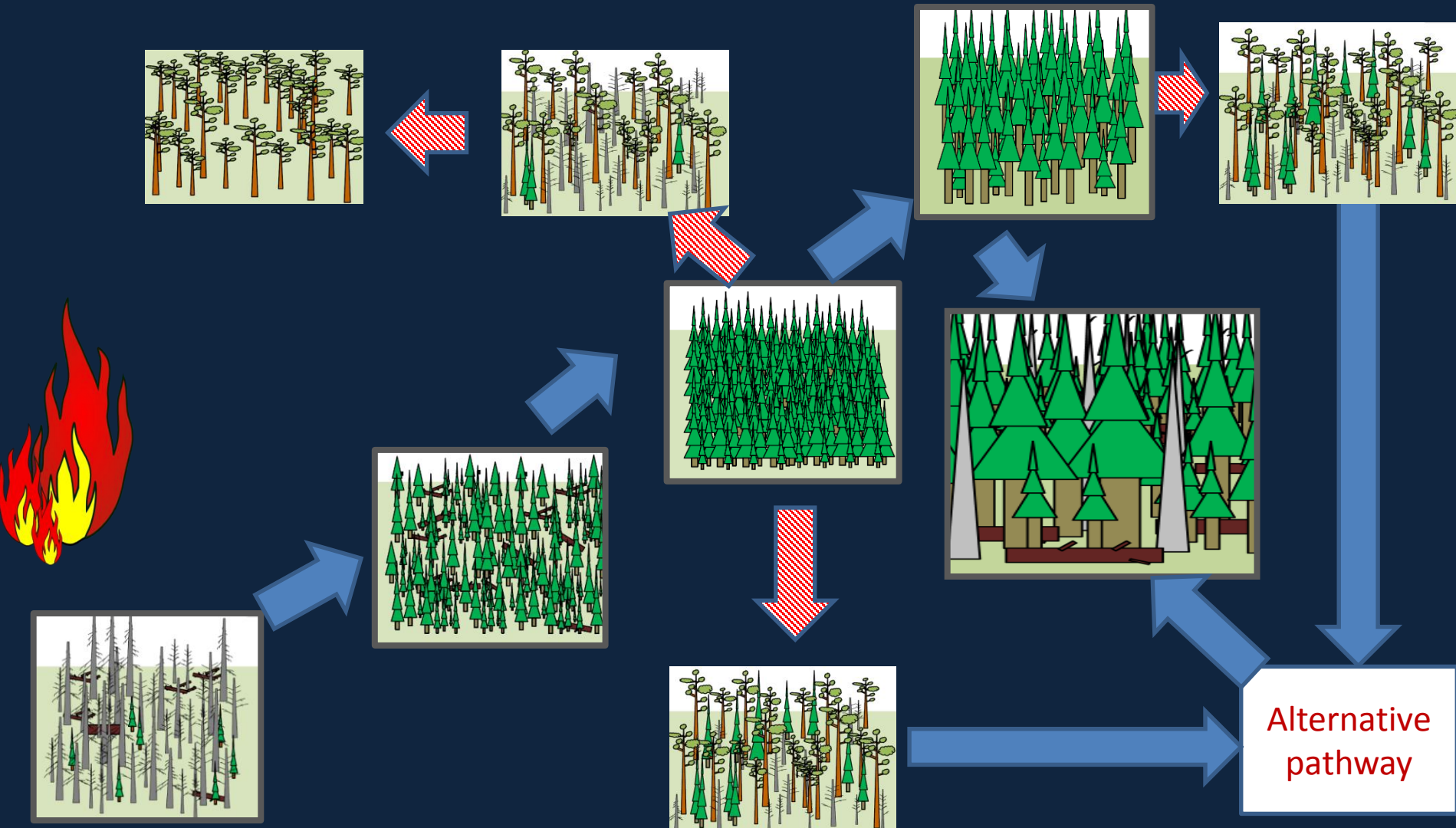
Mixed Severity Fire Regimes

- Dominated Valley margin
- Dominated central/south
West Cascades ecoregion
- Found in mesic vegetation
types in Klamath Mountain
ecoregion

Variable
frequency
Mixed severity
Variable Extent

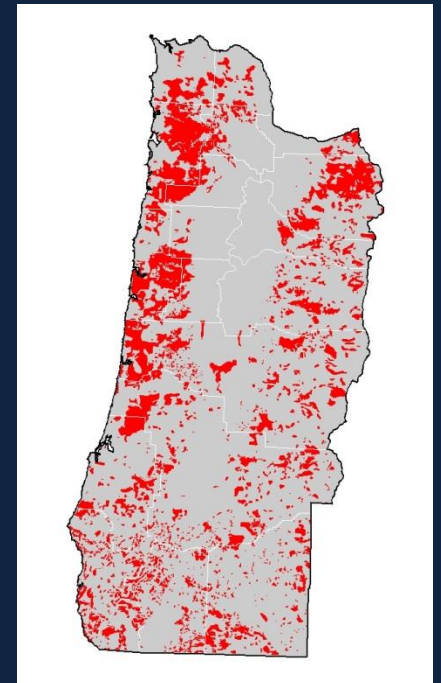
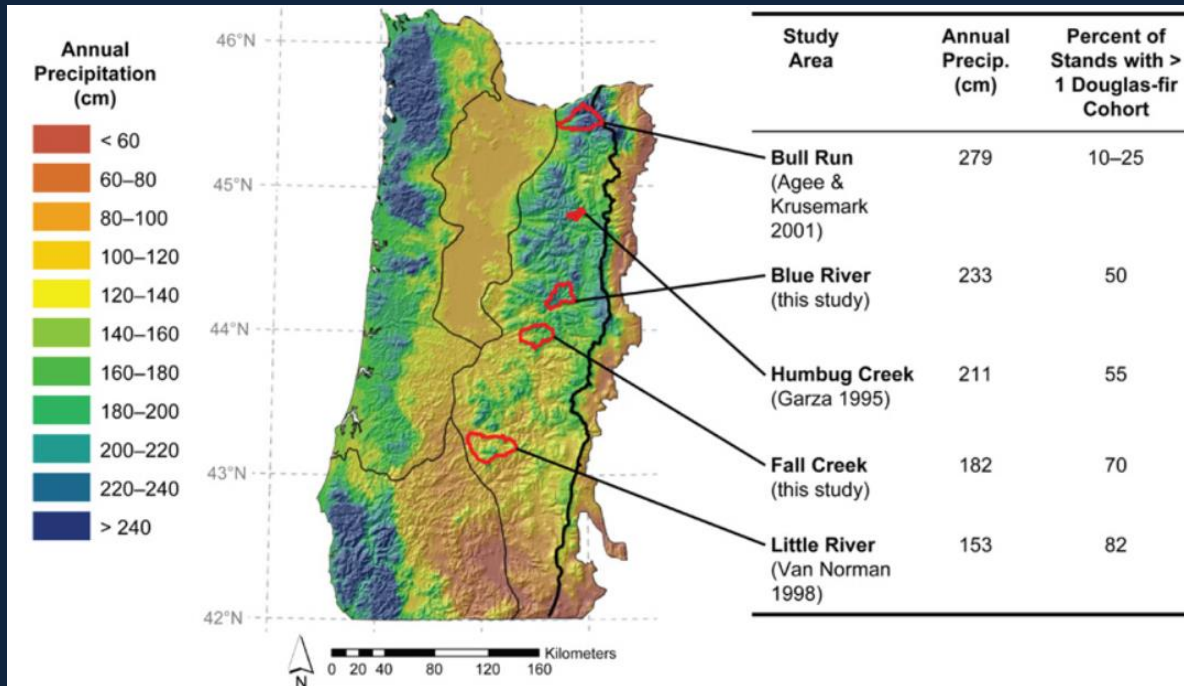


Stand Development Pathways Mixed Severity Fire Regime: It is Complicated!



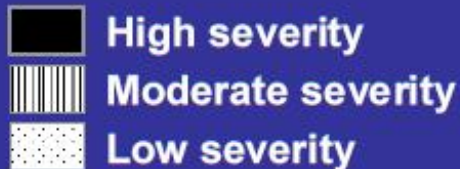
Precipitation, Topography and Mixed Severity Fires

- Precipitation influences fire severity patterns
- Effects of topography stronger with more limiting moisture.



Historical Distribution of Mixed Severity patches: central west Oregon Cascades

Cook-Quentin Study Area (Morrison & Swanson 1990)



Low



Moderate



High

- 9000 acre area
- 1800-1900 fires
- Almost equal area occupied by each severity group
- Most of high severity patches < 25 acres with 2 large patches (250 acres)

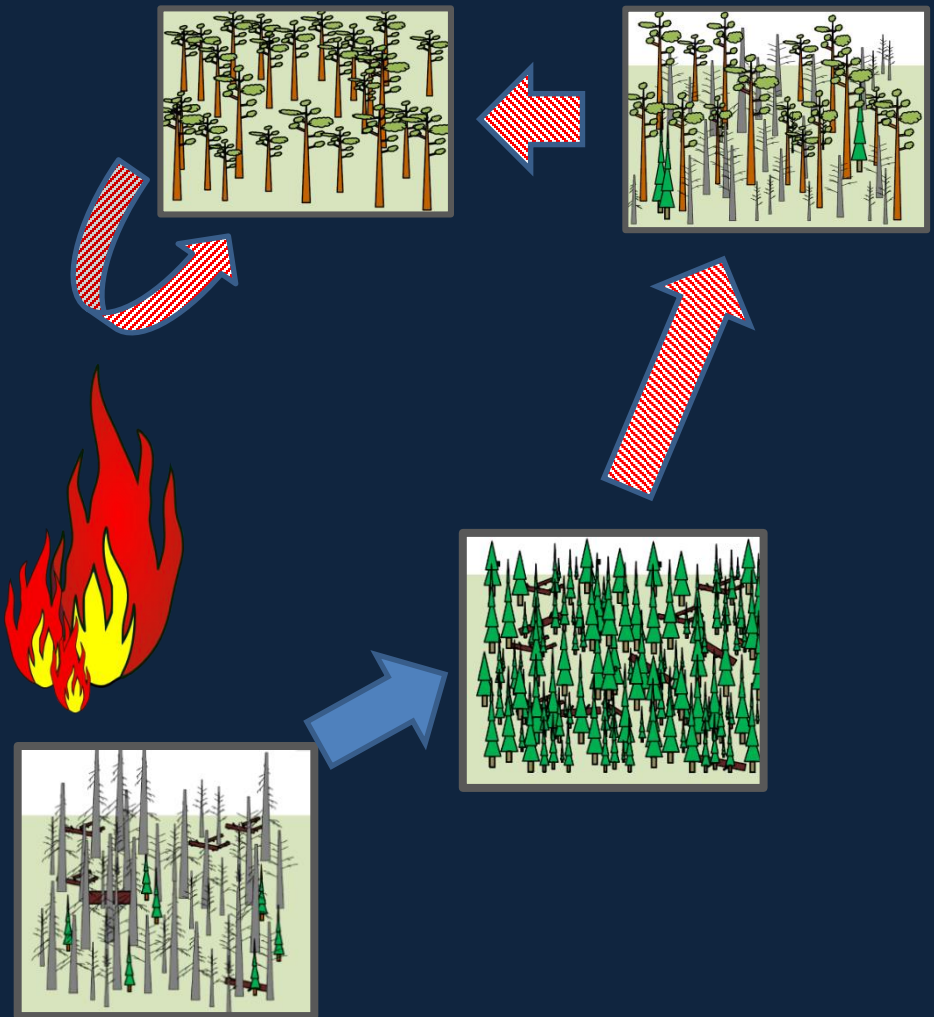
Frequent Low Severity Fire Regimes

- Willamette Valley
- Dry sites in south West Cascades and Klamath Mountains

Frequent low severity



Stand Development Pathways Low Severity Fire Regime



5-25 year Fire return interval



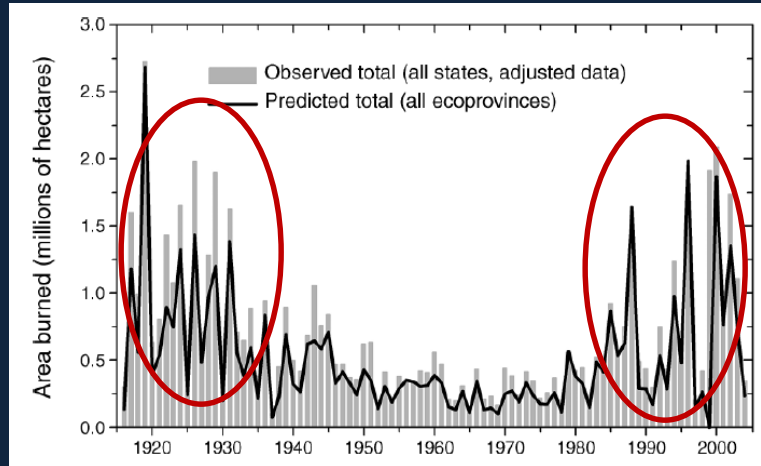
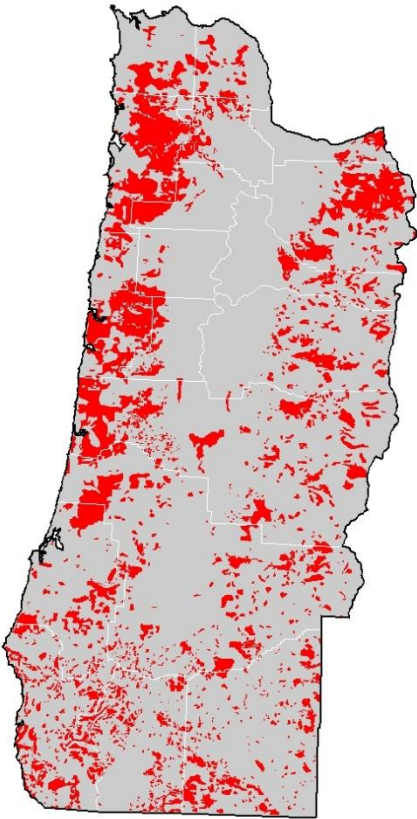
Oak forests
and savannas

Mixed conifer/
Ponderosa pine



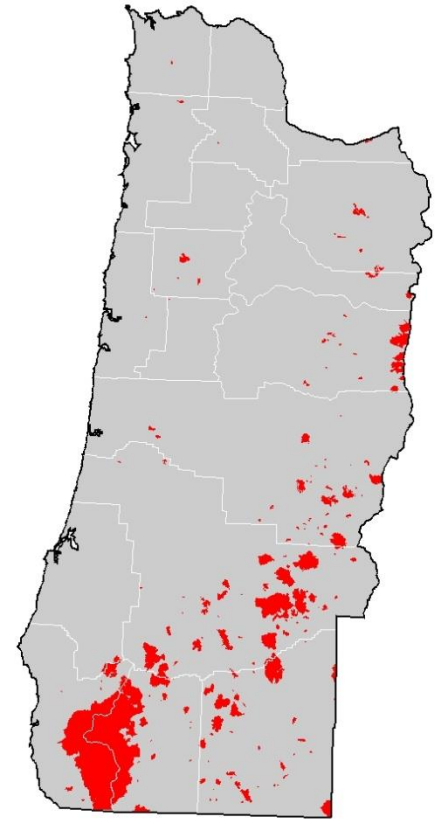
20th Century Fire Activity

1900-1946



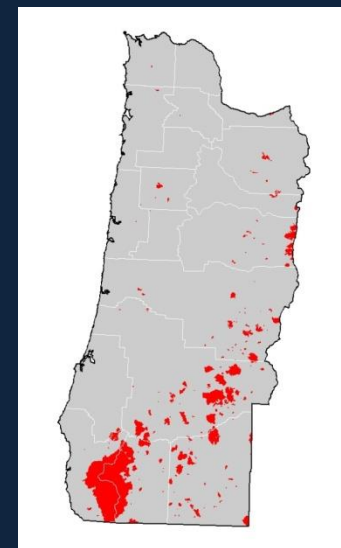
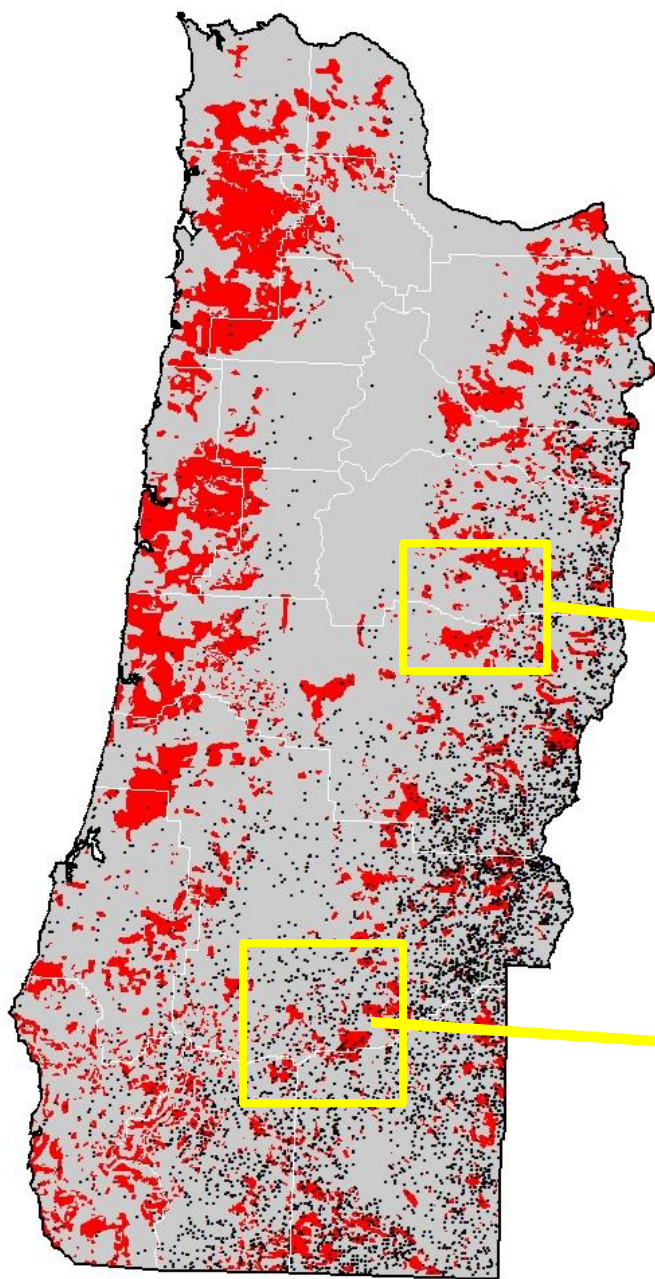
Littell et al. 2009, Ecological Applications

1970-2014



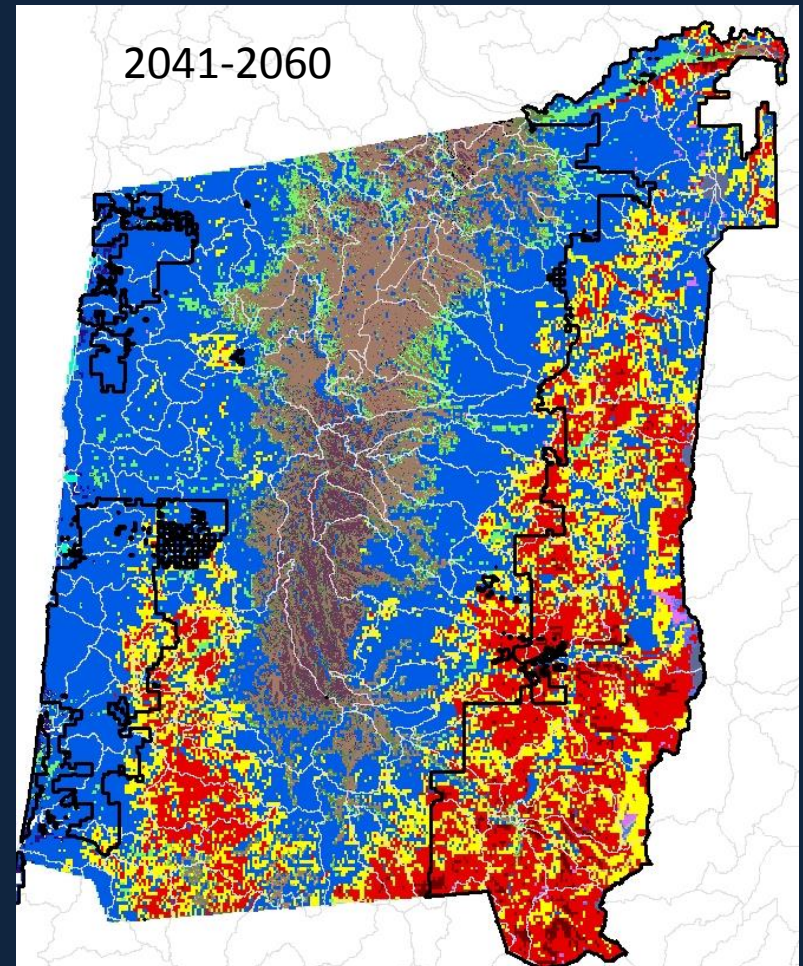
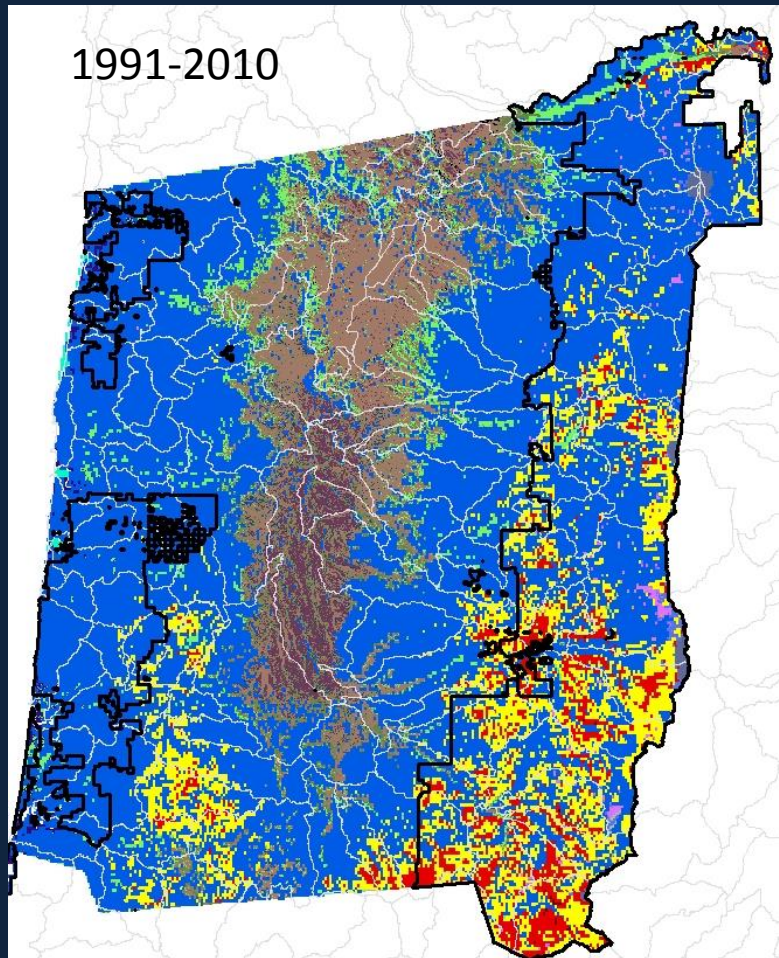
Lightning Fires 1990-2012 and early 20th Century Fires

Opportunities for mixed
severity fires?



What about the future?

Large Wildfire Suitability through time



A photograph of a forest fire at night. The background is filled with intense orange and yellow flames consuming a dense forest of tall, dark trees. In the foreground, a dark, rocky path leads towards the fire. Two small, dark animals, possibly deer or elk, are standing in the path, facing the fire. The overall scene is dramatic and dangerous.

Questions?