

Conifer Encroachment in a Montane Meadow, Western Cascade Range, OR.

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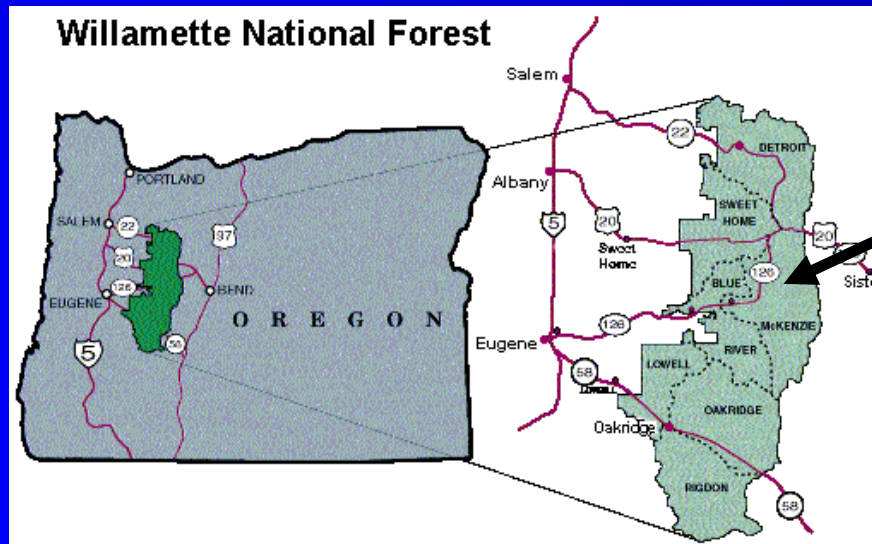
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Conifer Encroachment

- Widespread phenomenon
- Three widely proposed causes
 - Fire suppression
 - Climate change
 - Sheep grazing
- Interactions among causes
 - Woodward et al. 1995, Miller and Halpern 1998

Bunchgrass Meadow, Oregon

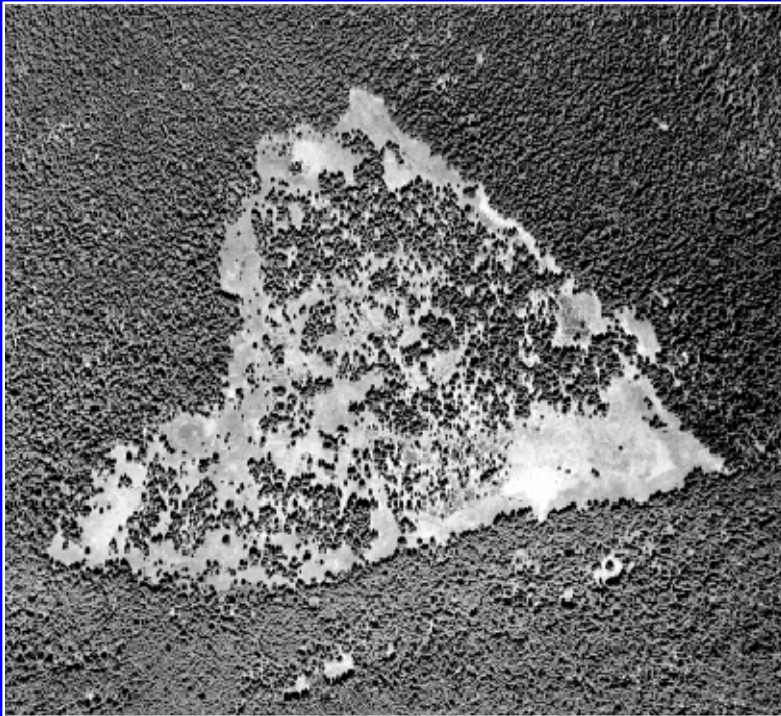
- Site description
 - Dry, montane meadow, 1300m elevation
 - Grand fir and lodgepole pine
 - Soils formed under meadows
- Current studies
 - Process and consequences of encroachment
 - Experimental restoration



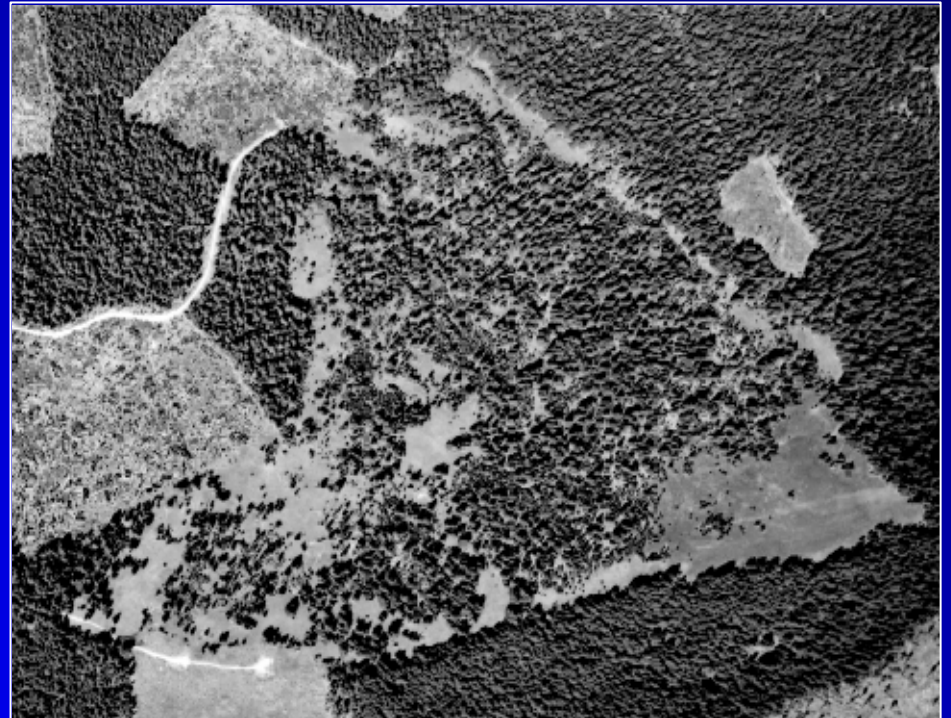
Bunchgrass
Meadow

Bunchgrass Meadow, Oregon

1946



1990



4, 1 ha Intensive Sampling Plots

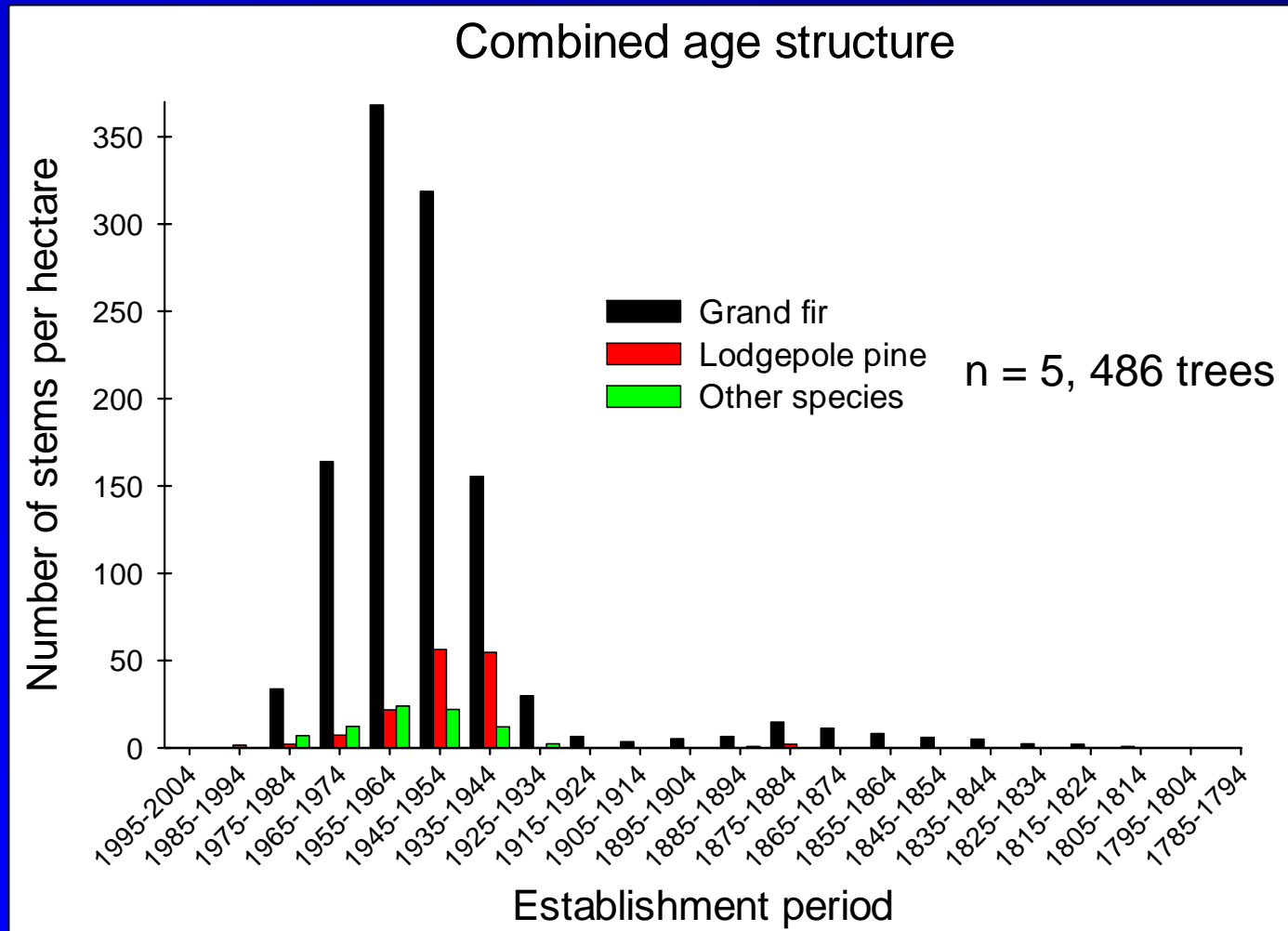


Objectives

- Examine temporal patterns and potential causes of conifer encroachment
 - Climate variation
 - Grazing
 - Changing fire regime / Native American use
- Describe spatial patterns of conifer encroachment
 - Spatial distributions through time
 - Role of species interactions

Timing of Establishment

- 1825 – 1904, 1915 - 1984



Climate

- Precipitation, PDSI, Temperature, Snow Pack
 - Climate reconstructions from Miller 1995
- Spearman Rank Correlation
 - Positive correlation with snow pack ($p < 0.01$)
 - 92.5% of total precipitation September through May
- Substantial conifer establishment 1930-1939

Sheep Grazing

- Burke (1979)
 - Lookout Mountain / Mt. Washington Allotment
 - 1912-1938
 - 2445 sheep/year
- Historical Records, Willamette NF
 - Too many “Bunchgrasses”...
- Substantial establishment prior to 1938

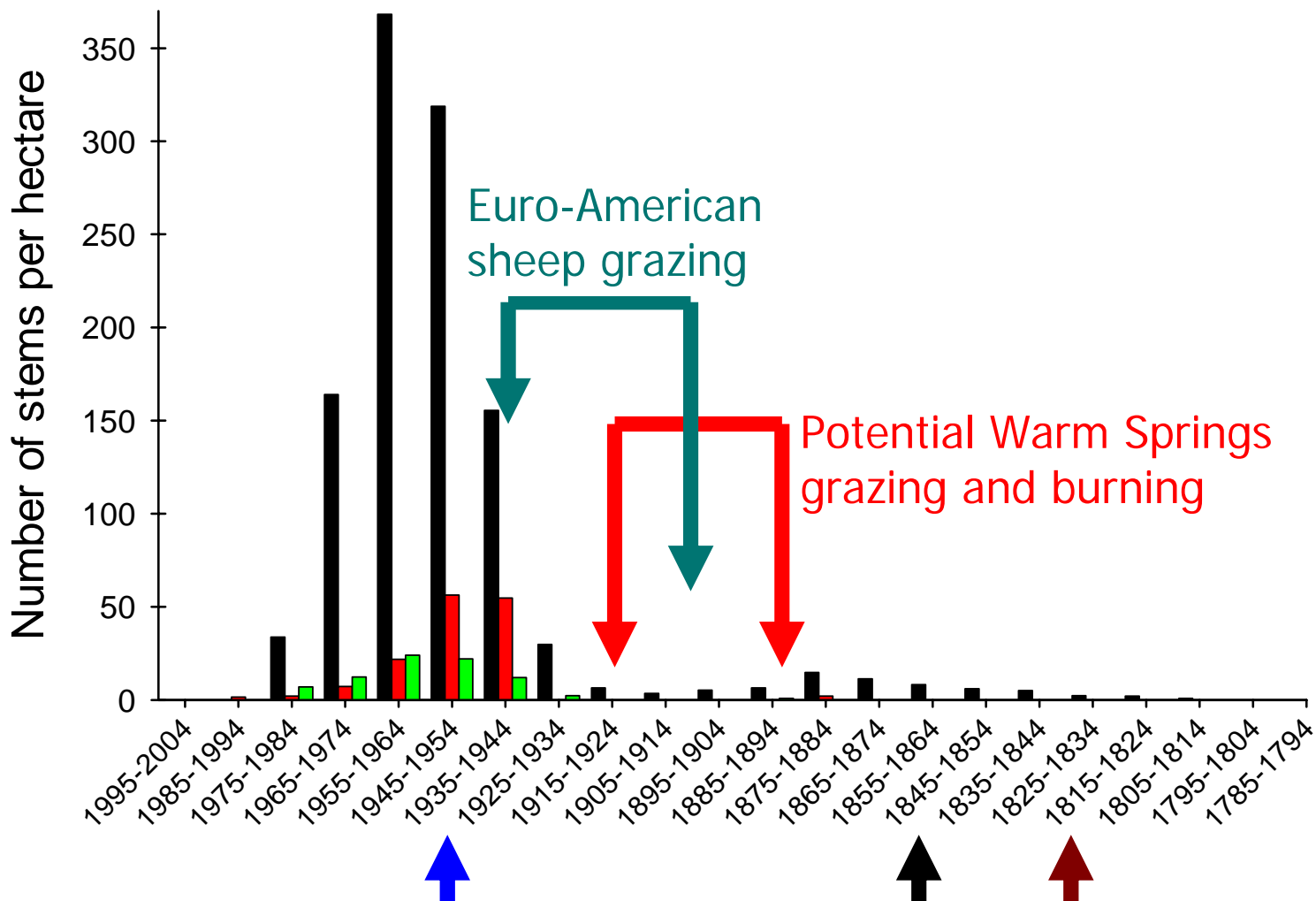
Fire History

- Mixed severity landscape
 - Morrison and Swanson (1990) and Stewart (1986)
- Lack of physical evidence
- Potential influence of Native Americans
 - Unique resources
 - Native American use of fire widely debated

Native Americans

- Molalla Indians
 - Possible historic use
- Disease epidemics 1830s
- 1855 executive order ceded Molalla lands, relocated to Grand Ronde Valley
- Warm Springs Indians
 - late 1800s to 1920s
 - Potential grazing and burning

Combined age structure



Shift to cooler,
wetter climate

Molallas moved
to Grand Ronde

Molalla Disease
Epidemics

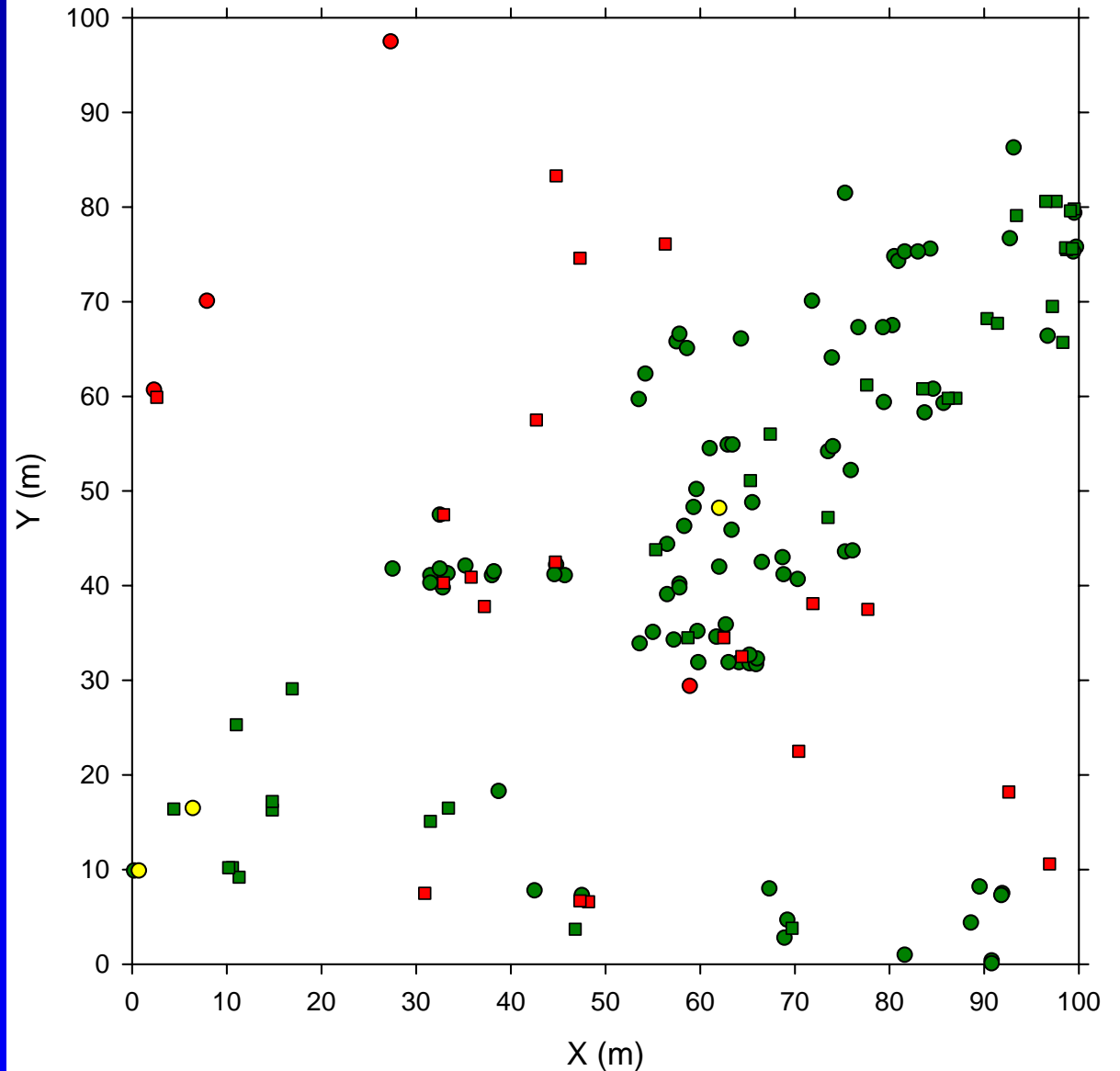
Spatial Patterns of Establishment

- Spatially and temporally complex
- Species specific



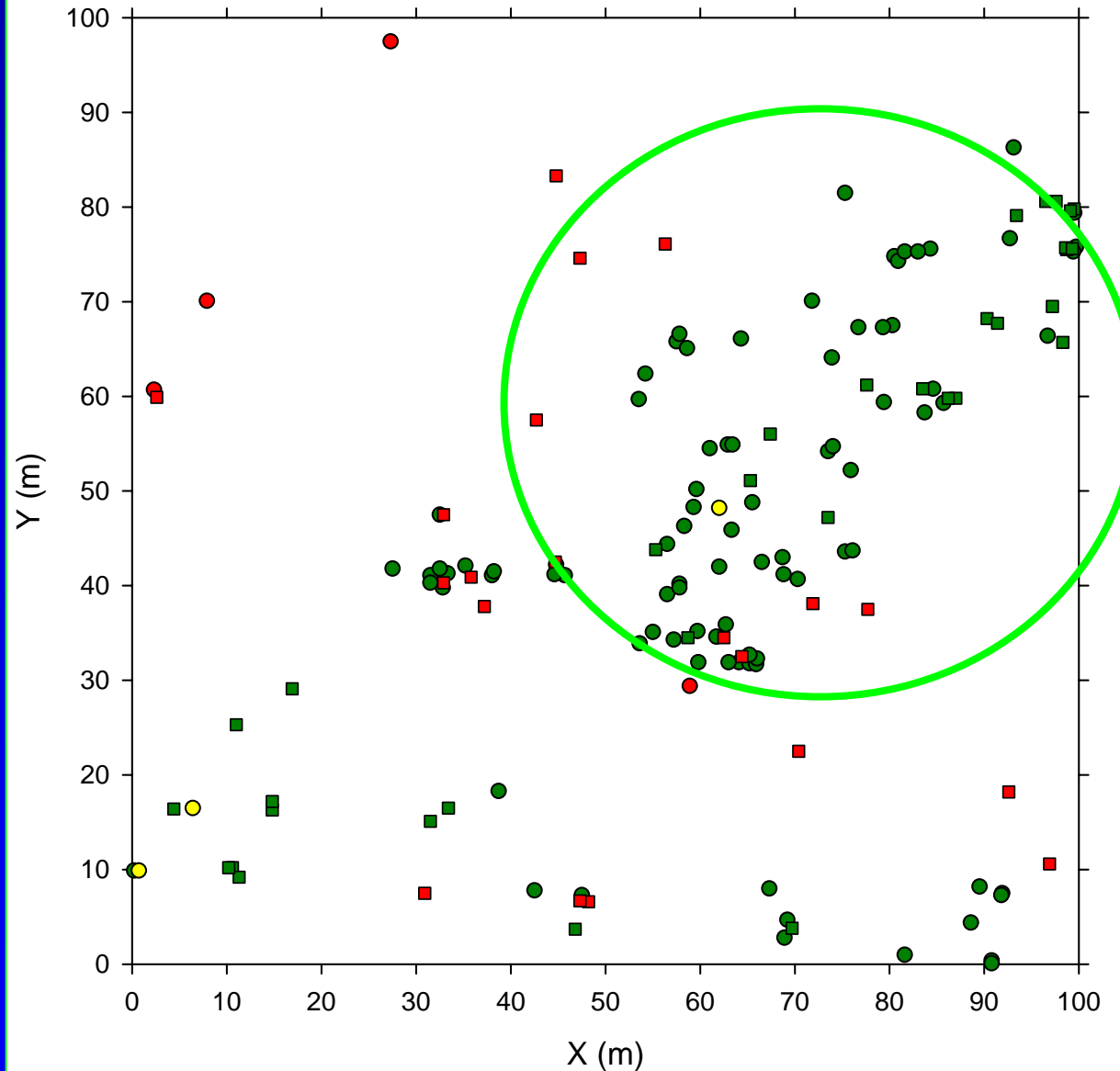
Plot 3

• 1904



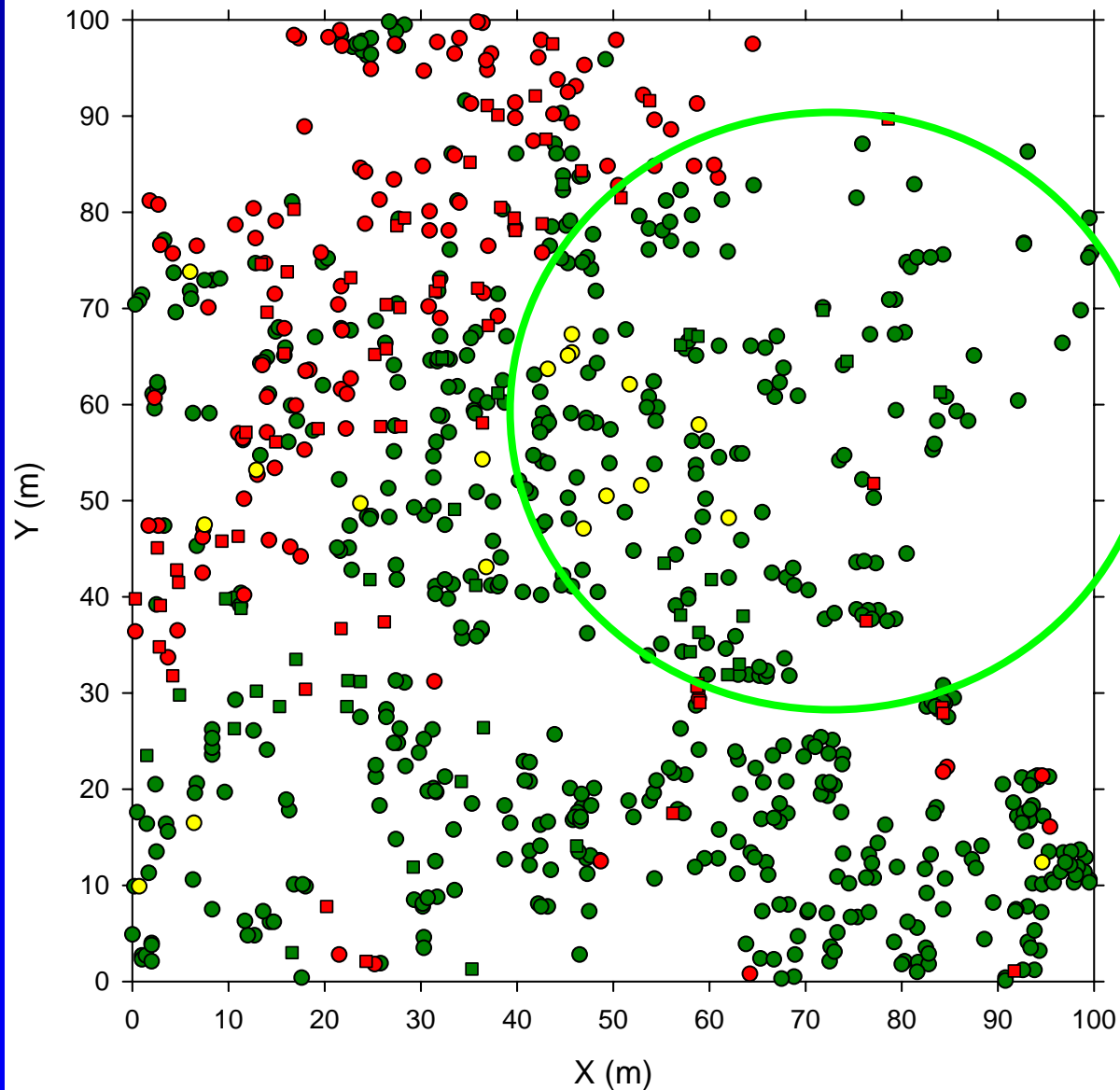
Plot 3

• 1904



Plot 3

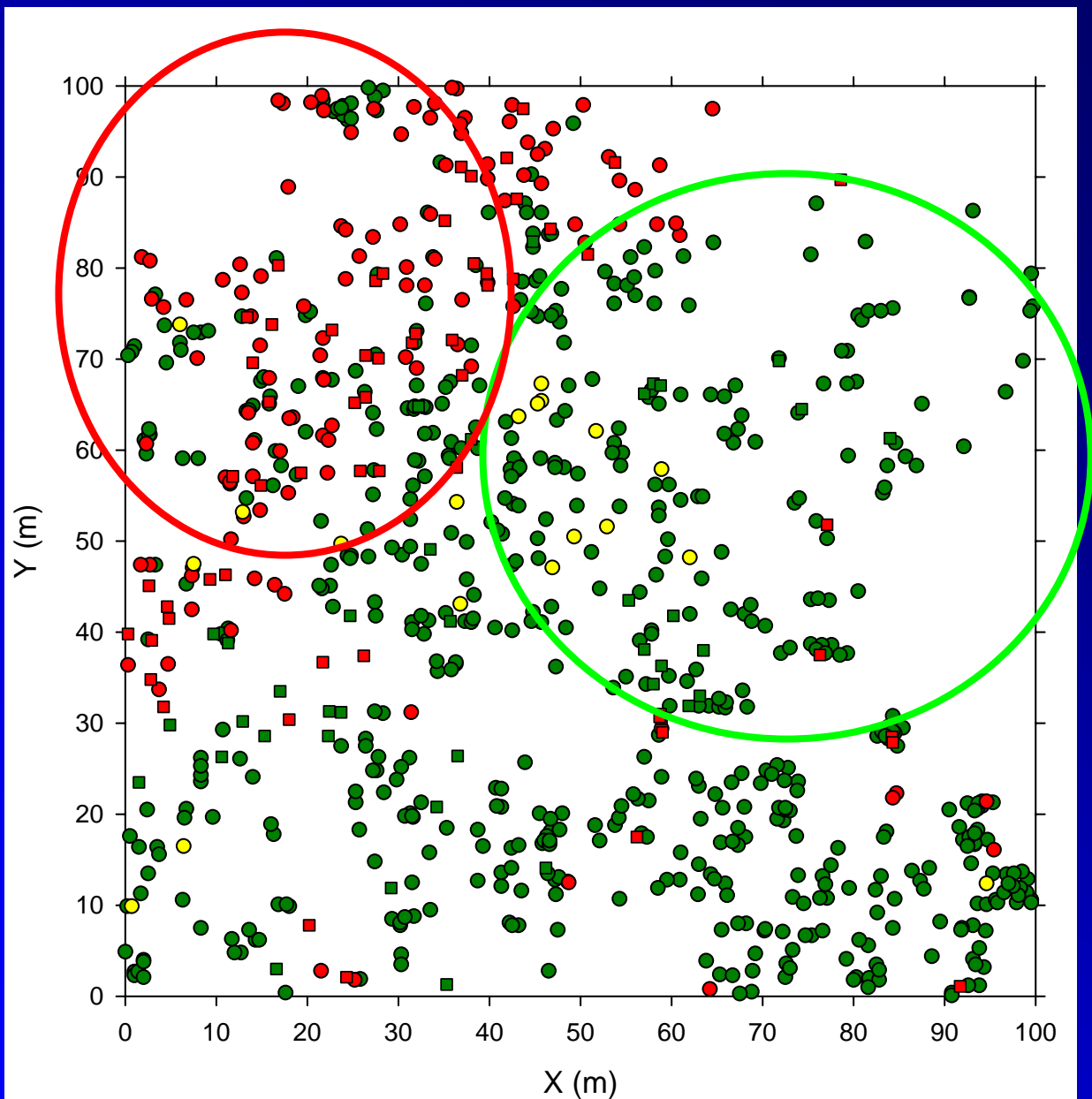
• 1954



- Grand fir
- Lodgepole pine
- Other species
- Dead grand fir (15-30 cm dbh)
- Dead lodgepole pine (15-30 cm dbh)

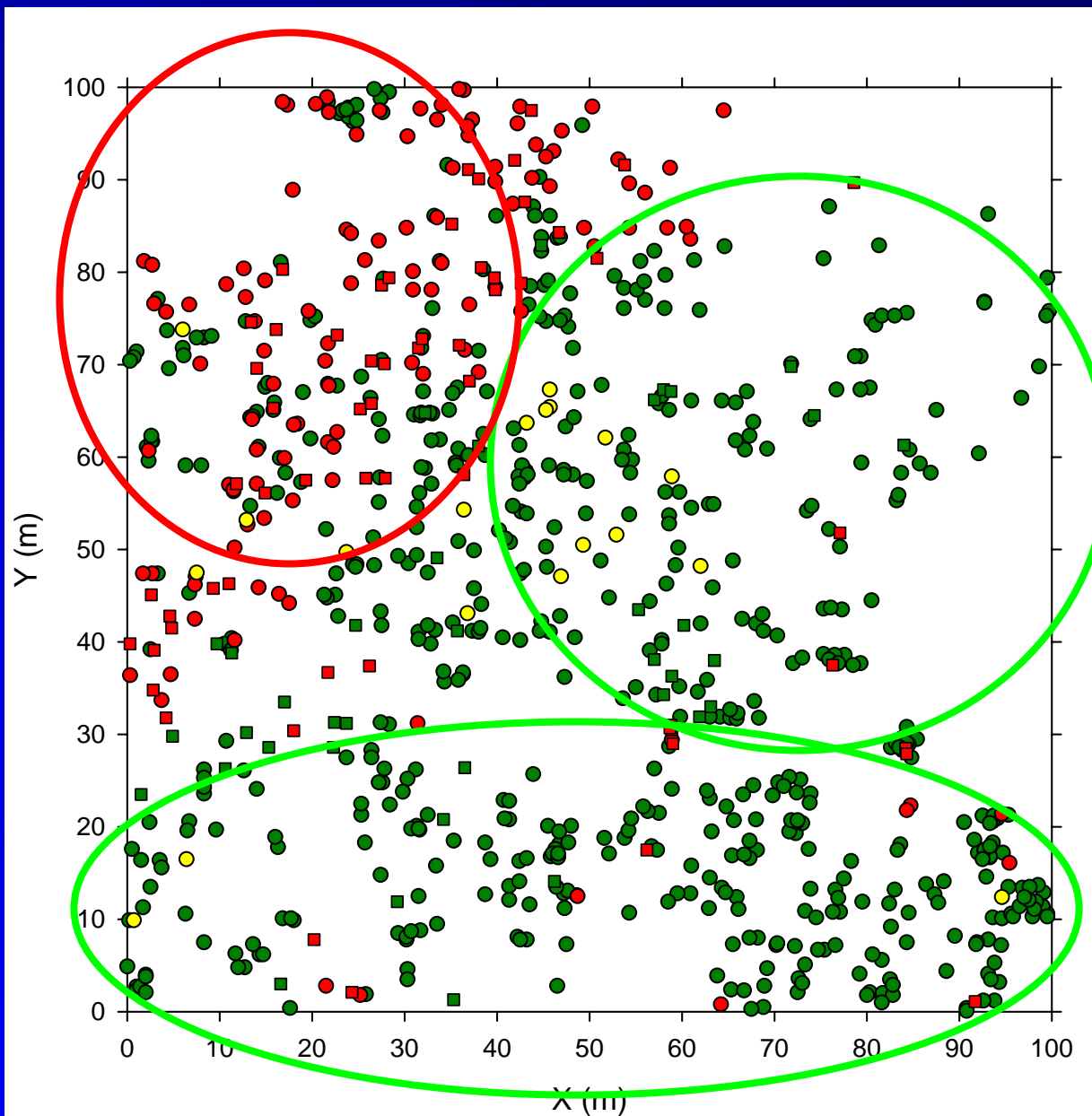
Plot 3

• 1954



Plot 3

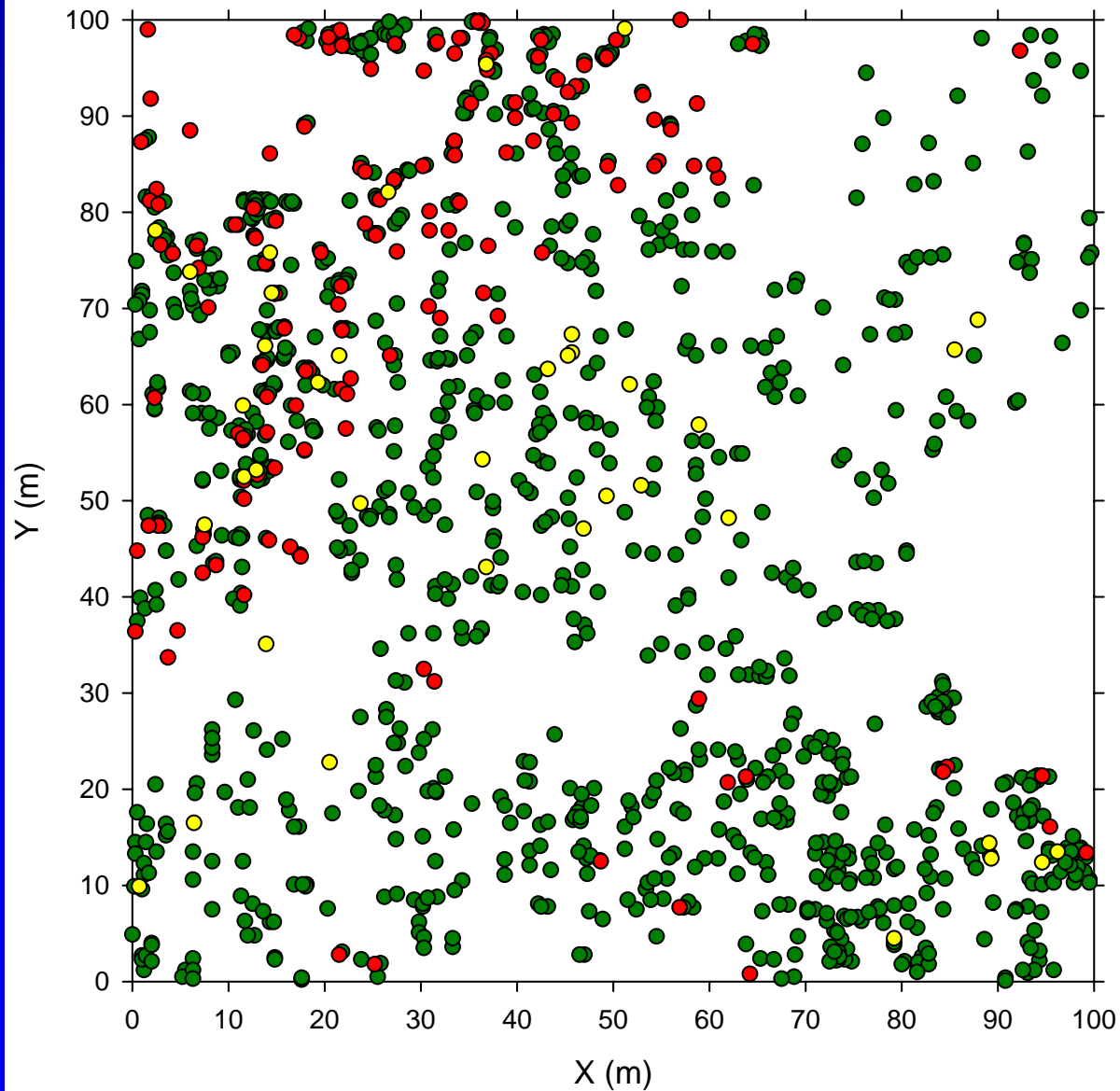
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Plot 3

- 2004



- Grand fir
- Lodgepole pine
- Other species

Lodgepole Establishment



Lodgepole – Grand Fir Facilitation



Lodgepole – Grand Fir Facilitation



Temporal patterns and potential causes

- Two periods of conifer establishment
 - 1825-1904
 - 1915-1984
- Climate, Grazing
 - Secondary influences
- Native American burning?
 - Encroachment coincides with changes in Native American activity

Spatial patterns

- Spatially and temporally complex
 - Initial establishment of lodgepole
 - Facilitation of grand fir – tree islands
- Ongoing research
 - Spatially explicit analysis
 - Vegetation responses to encroachment

- Joint Fire Sciences Program, HJ Andrews LTER
- Fred Swanson and John Cissel
- Jim Mayo, Sam Swetland, Cheryl Friesen, Mei Lin Lantz, Monty Wilson
 - McKenzie River Ranger District
- Joe Antos, Don Mckenzie
 - Committee Members
- Nicki Lang, Jim Lutz, Kyle Smith, Janine Rice, Halpern lab group and BG field crews

