

Disturbance Dynamics in Driftless Forests



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Disturbance Dynamics in Driftless Forests

1. What is a disturbance?
2. What is a disturbance regime?
3. Why consider disturbance?
4. What disturbances were part of the historic disturbance regime in The Driftless Area?
5. What role did fire play in the historic disturbance regime in The Driftless Area?
6. What is the upshot?

What is a disturbance?

Any relatively distinct event in time that disrupts an ecosystem, community, or population structure that also changes available resources or the physical environment.

Examples:

- flood
- insect outbreak (EAB)
- tree disease (oak wilt)
- windstorm & windthrow
- timber harvesting
- erosion
- Etc.



What is a disturbance regime?

A disturbance regime is characterized by:

- *Disturbance pattern* (where and when)
- *Disturbance dynamics* (intensity, extent, "how often")

Disturbance regimes influence the structure and species composition of an ecosystem.



Why consider disturbance?



Forest practices which are consistent with natural ecological processes, such as local disturbance regimes, are more likely to maintain a forest's evolutionary environment and ecosystem functions.

Why consider disturbance?



Several useful indicators have been suggested as measures of differences between historic disturbance regimes and current forest conditions.

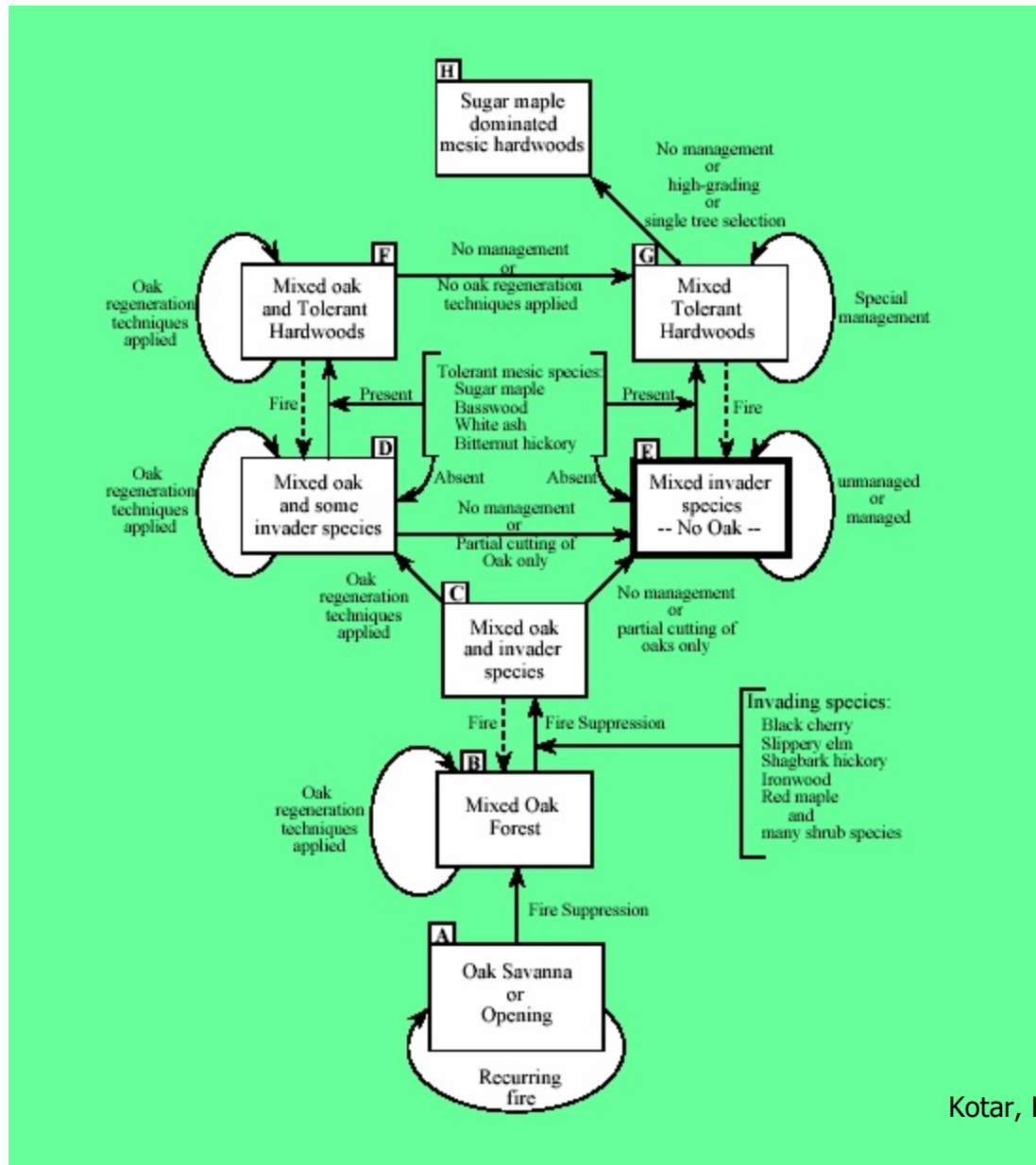
These include:

1. disturbance frequency
2. disturbance magnitude (intensity and spatial attributes)
3. the density and type of biological legacies persisting post-disturbance (structure)

What disturbances were part of the historic disturbance regime in The Driftless Area?

Driftless Disturbances	Major	Minor	Frequency	Distribution	Notes
Wind (Storm)	X	X	300-400 yr return interval	2% - 4% (landscape)	
Drought	X	X			Synergy with other disturbance agents
Insects		X			
Disease		X			
Herbivory (Deer, Elk, Bison)		X			
Passenger Pigeon	X	X			Main impact was acorn predation, canopy thinning, and understory disturbance (guano).

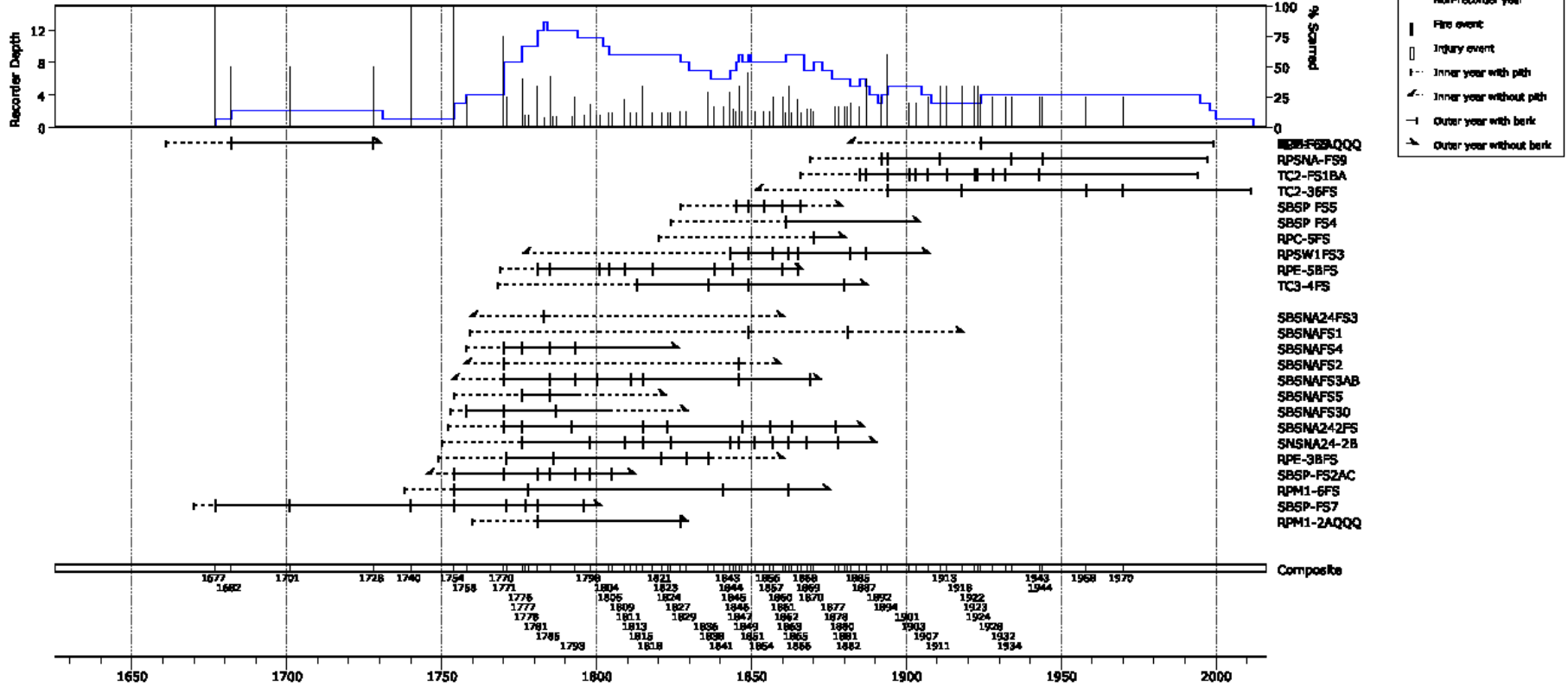
Forest Community Dynamics (with and without management) on Mesic and Dry-mesic Sites in Southern Wisconsin



What role did fire play in the historic disturbance regime in The Driftless Area?

Driftless Disturbances	Major	Minor	Avg. Fire Interval (yrs)	Rotation Interval (yrs)	% of Landscape Disturbed
Historic Fire	X	X	5-25	20-1000	1-25

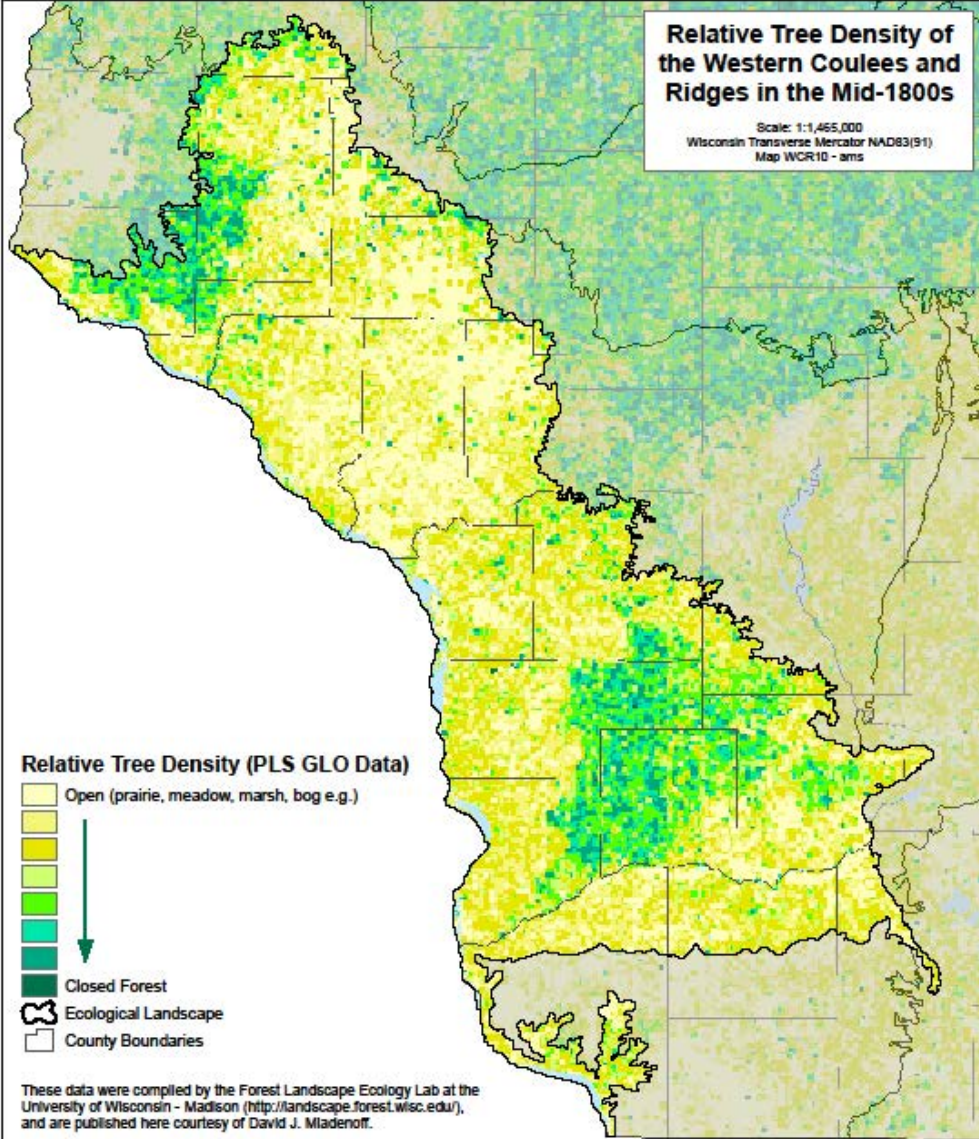
Southwest WI Fire History










Fire Return Interval: 2-6 yrs. (121 fires from 1677-1970)

Relative Tree Density of the Western Coulees and Ridges in the Mid-1800s

Scale: 1:1,455,000
Wisconsin Transverse Mercator NAD83(91)
Map WCR10 - ams



Relative Tree Density (PLS GLO Data)

-  Open (prairie, meadow, marsh, bog e.g.)
- 
- 
- 
-  Closed Forest
-  Ecological Landscape
-  County Boundaries

These data were compiled by the Forest Landscape Ecology Lab at the University of Wisconsin - Madison (<http://landscape.forest.wisc.edu/>), and are published here courtesy of David J. Mladenoff.

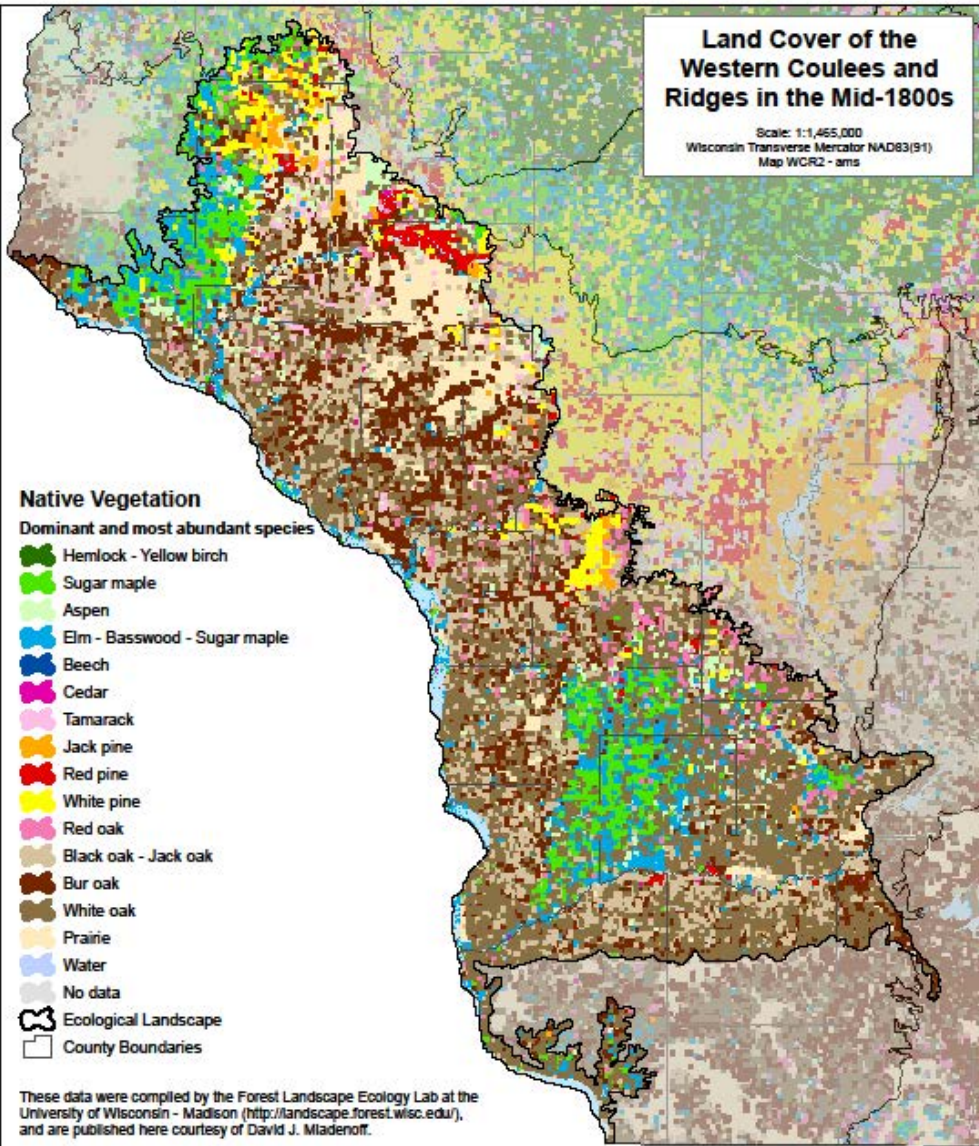
For more information about the General Land Office Public Land Survey, see Schulte L.A. and D.J. Mladenoff 2001. The original Public Land Survey records: their use and limitations in reconstructing presettlement vegetation. *J. Forestry* 99(10) 5-10.



https://dnr.wi.gov/topic/landscapes/documents/ELMaps/WCR2_GLO_Landcover.pdf

Land Cover of the Western Coulees and Ridges in the Mid-1800s

Scale: 1:1,465,000
 Wisconsin Transverse Mercator NAD83(S1)
 Map WCR2 - ams



Native Vegetation

Dominant and most abundant species

- Hemlock - Yellow birch
- Sugar maple
- Aspen
- Elm - Basswood - Sugar maple
- Beech
- Cedar
- Tamarack
- Jack pine
- Red pine
- White pine
- Red oak
- Black oak - Jack oak
- Bur oak
- White oak
- Prairie
- Water
- No data
- Ecological Landscape
- County Boundaries

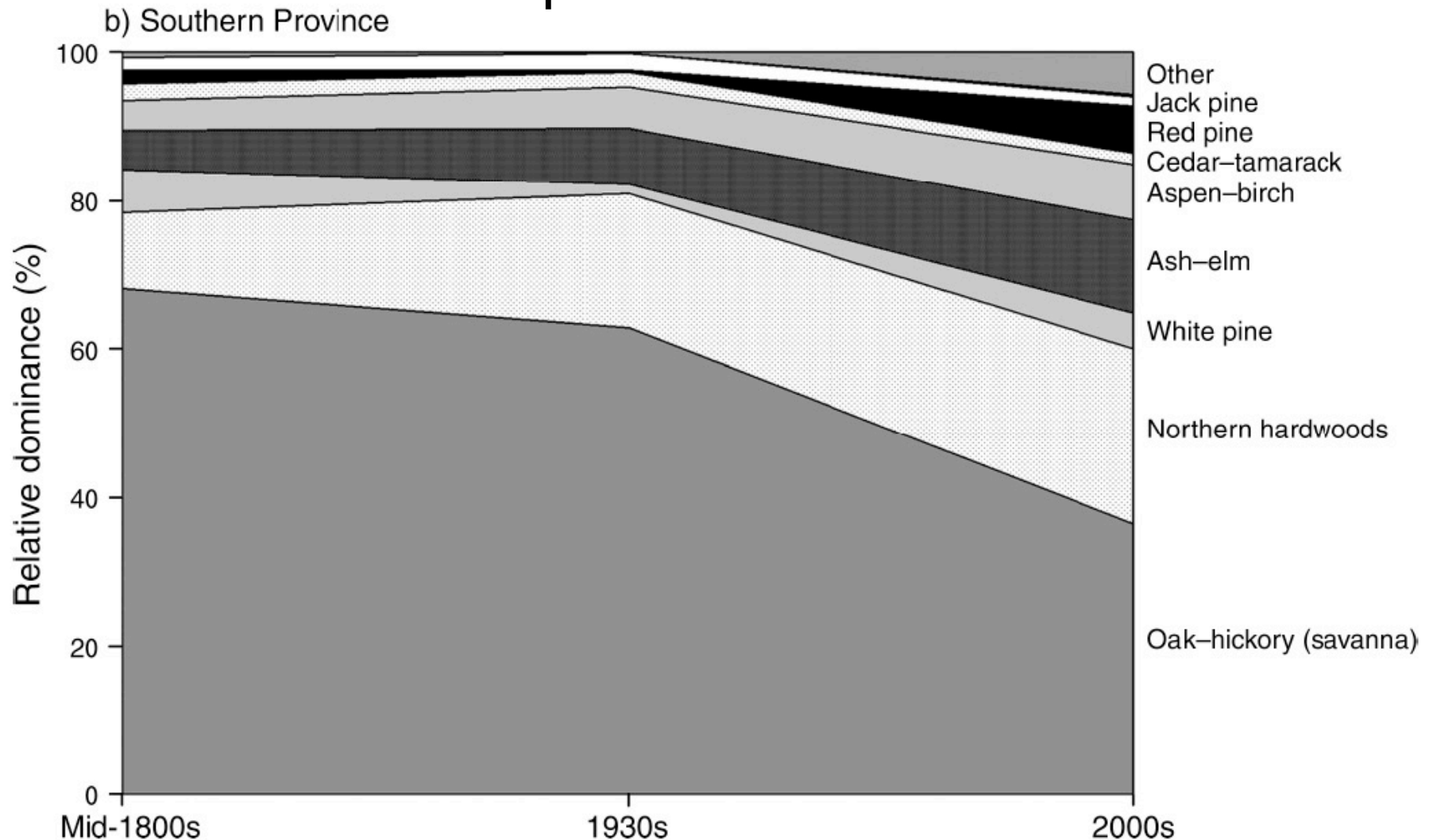
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https://dnr.wi.gov/topic/landscapes/documents/ELMaps/WC_R2_GLO_Landcover.pdf

Southern Wisconsin Forest Change since European Settlement



The Upshot

- Historic disturbances were diverse. They resulted in primarily open forest conditions.
- Driftless Area forest composition was driven mainly by resistance & resilience to fire.
- Historic disturbance intensity varied based on disturbance agent.
- The current disturbance regime is not similar to the historic disturbance regime.

