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Research interests

Historical ecology: disturbance by fire, ecosystems

Open forest management for wildlife

Deer as a natural disturbance

United States Department of Agriculture

Wildlife need fire (or fire surrogates) in the eastern United States

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and in the West!

Cross Station Series: Fire x Flora

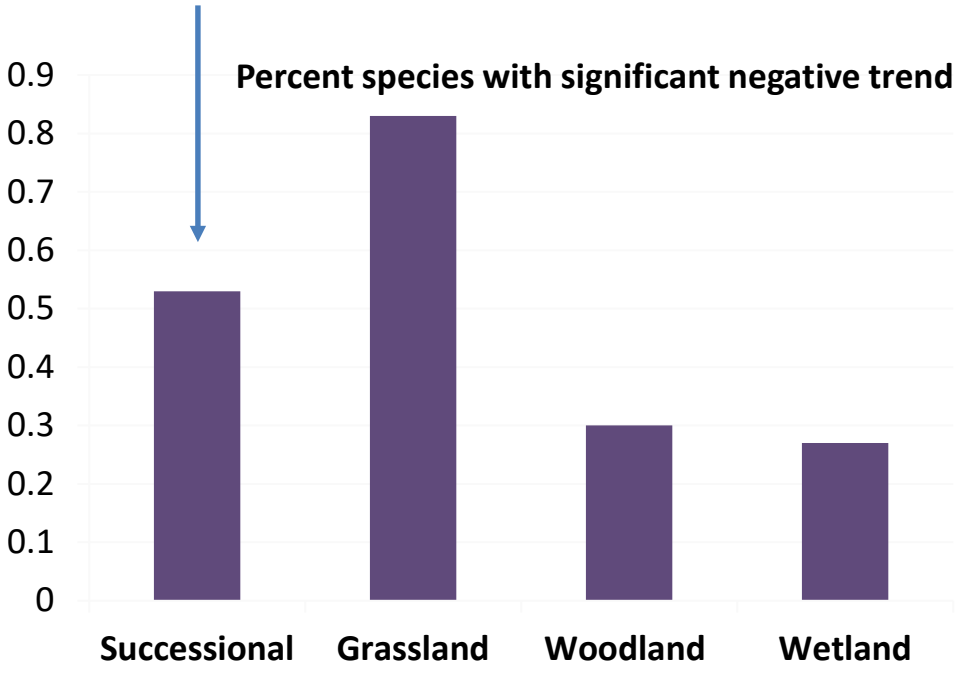
"**Open, park-like woods have been, from time immemorial, characteristic of vast areas in North America**." Raup 1937 cited in Day 1953

"On one subject, all are in accord and that is the observation that the **original forest was, in most places, extremely open and parklike,** due to the universal factor of fire, fostered by the original inhabitants to facilitate travel and hunting." Bromley 1935

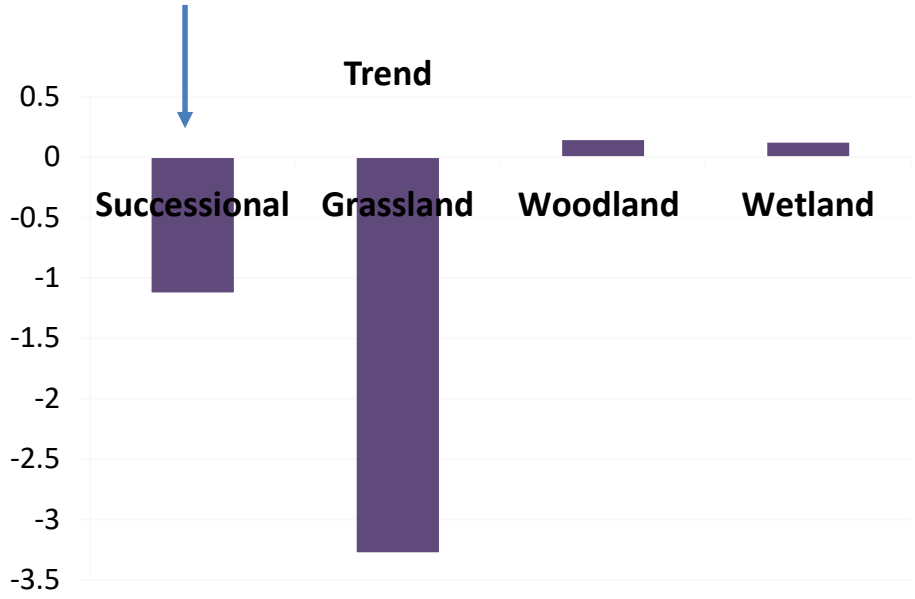
The problem

Current eastern forests are not supporting successional bird species

53% species significant negative trend
(21% non-significant negative trend)



-1.12 all successional guild



USGS North American Breeding Bird Survey 1966-2015

Bird species in successional breeding guild are declining

38 species, excludes woodland guild species

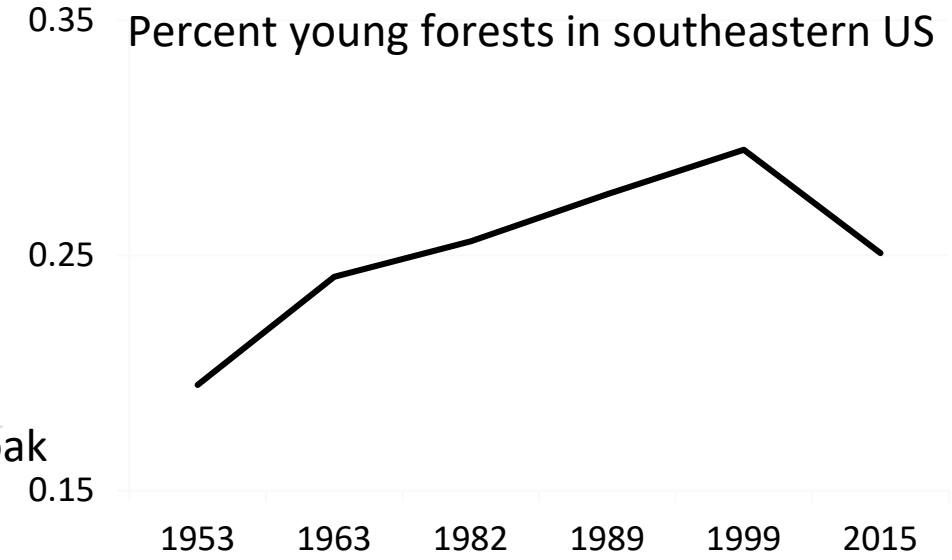
Examples: northern bobwhite, field sparrow, eastern towhee, prairie warbler, yellow-breasted chat, gray catbird, indigo bunting

Are they declining because there isn't enough early successional forest?

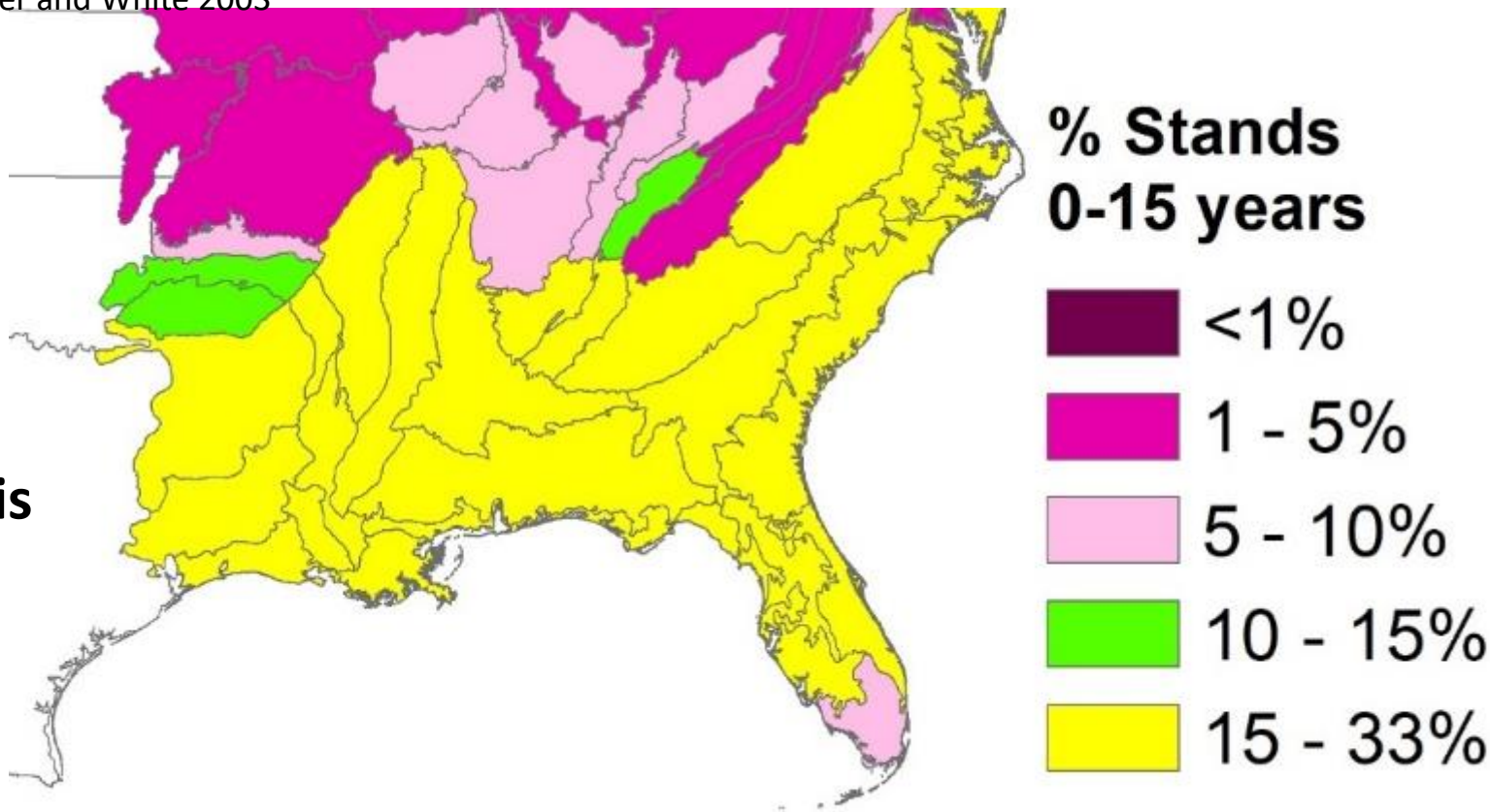
Historical (pre-settlement) early successional forests <1%-10% of landscape, depending on vegetation type

Early successional forests 1-3% landscape in oak and northern hardwood forests

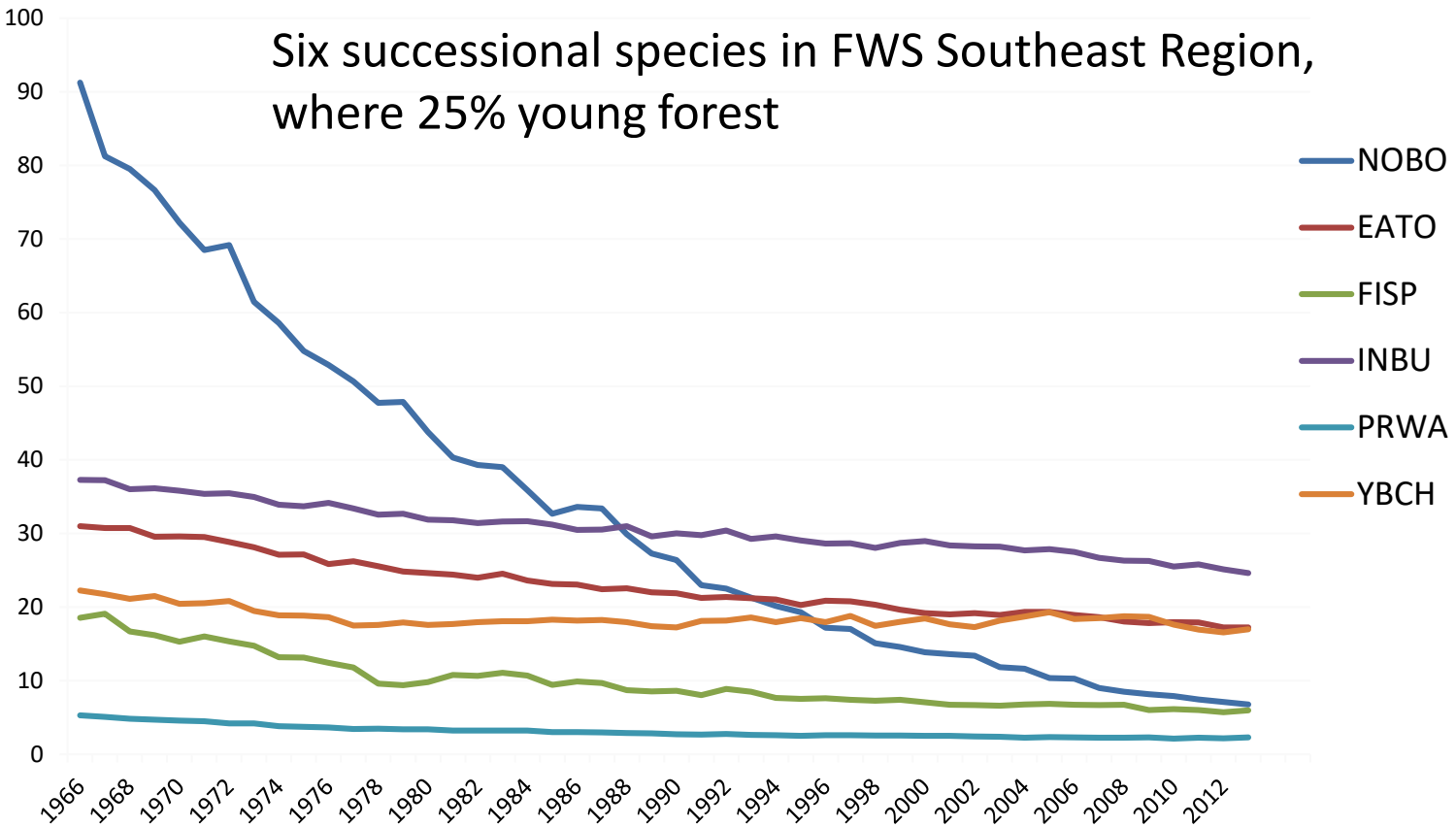
Lorimer 2001, Lorimer and White 2003



But the Southeast is 25% young forest! So maybe…

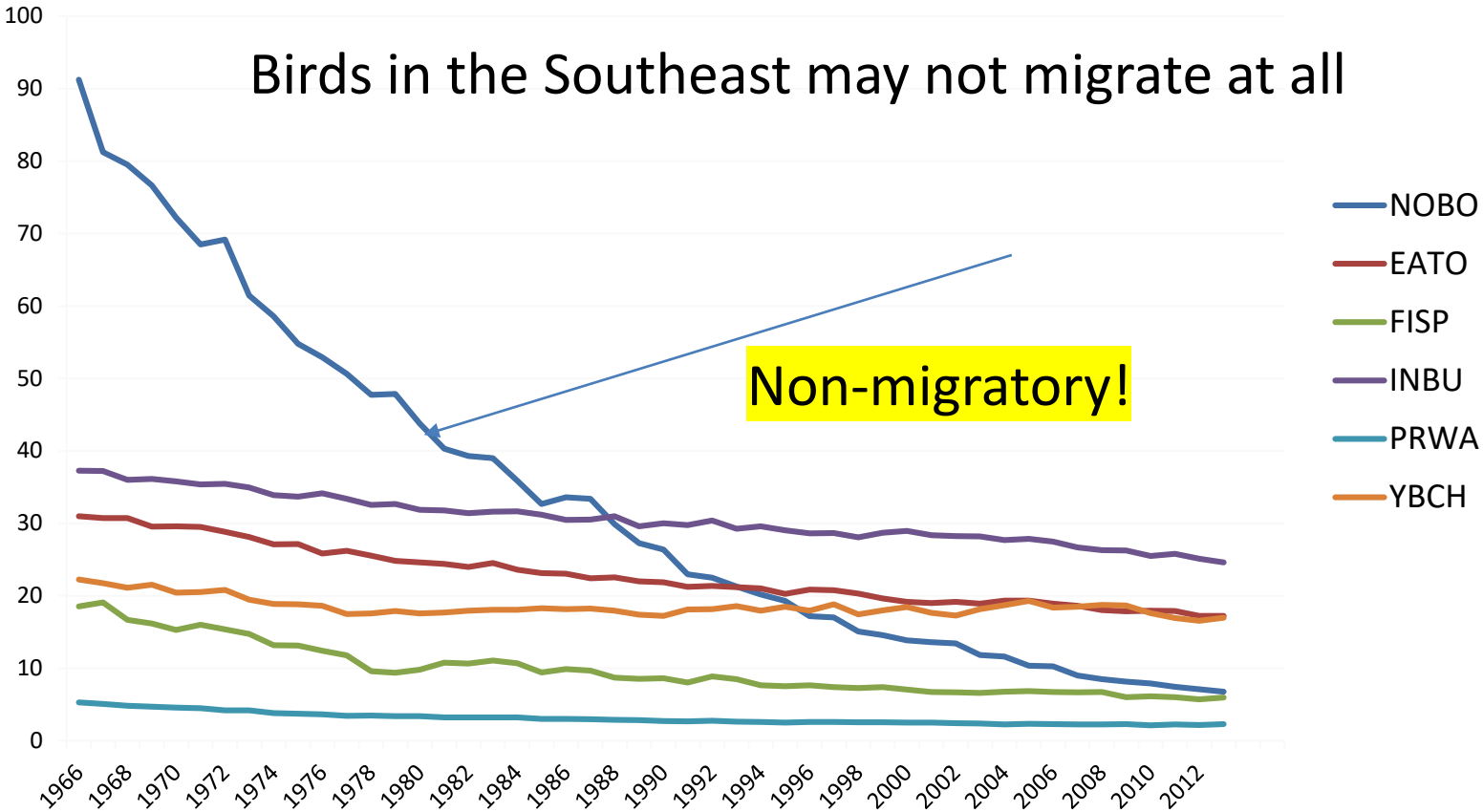


Trends in the Southeast are negative too



25% young forests in southeastern US (timberlands)

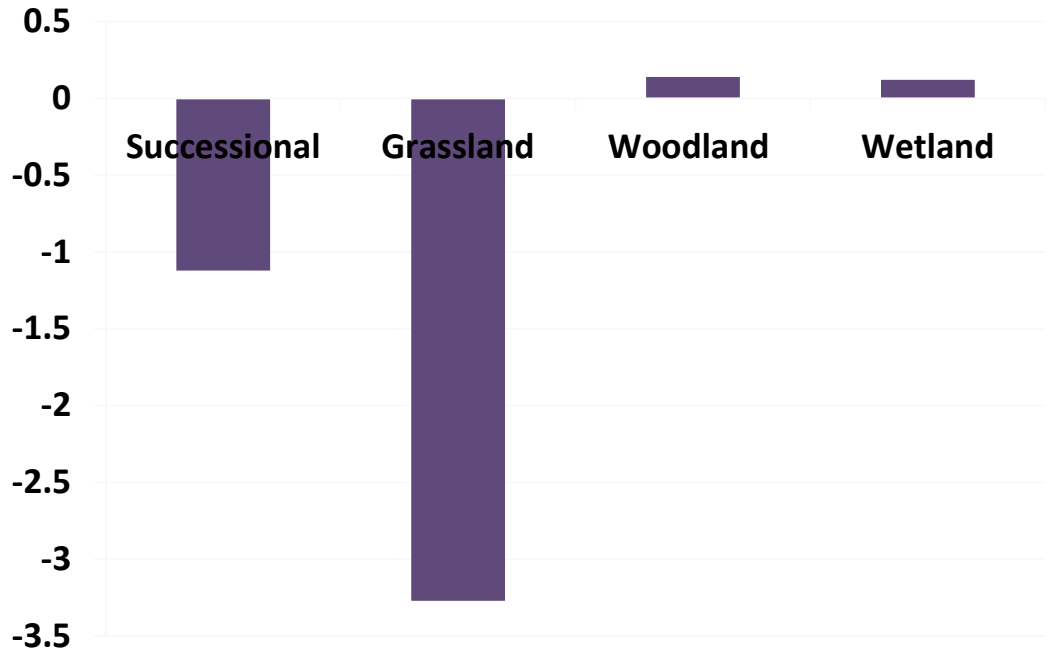
Is it because of conditions outside of eastern forests?



25% young forests in southeastern US (timberlands)

Is it because of alternative factors?

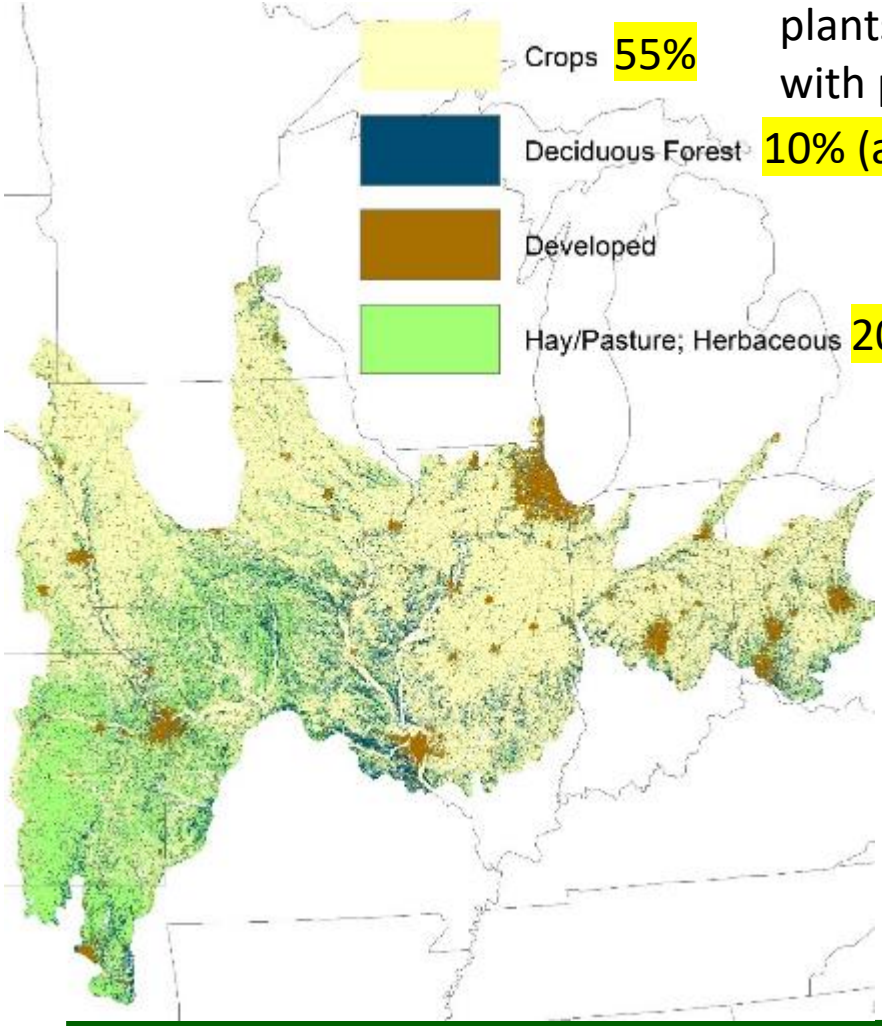
Woodland (90 species) and wetland (79 species) guilds slight increasing trends

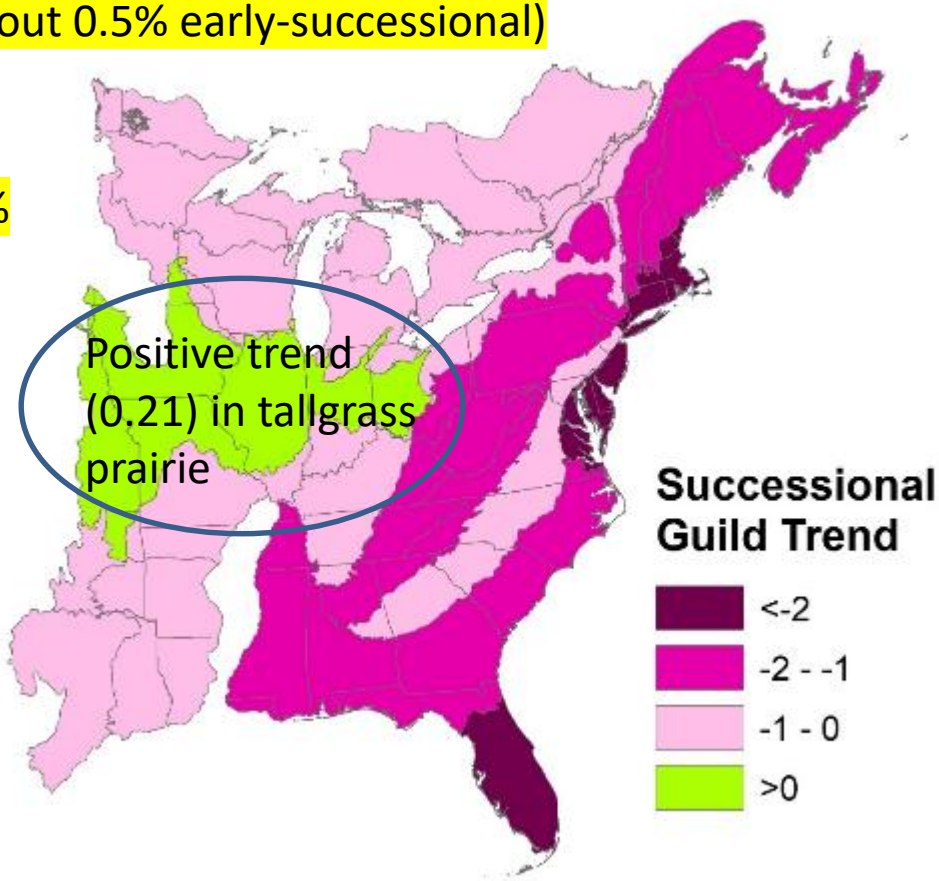


USGS North American Breeding Bird Survey 1966-2015

Is it because of forest conversion to other land uses?

Looks like this landscape should be a sink with 55% crops and 20% pasture with 55% invasive plants (NRCS 2013-2016) but the only landscape with positive trends





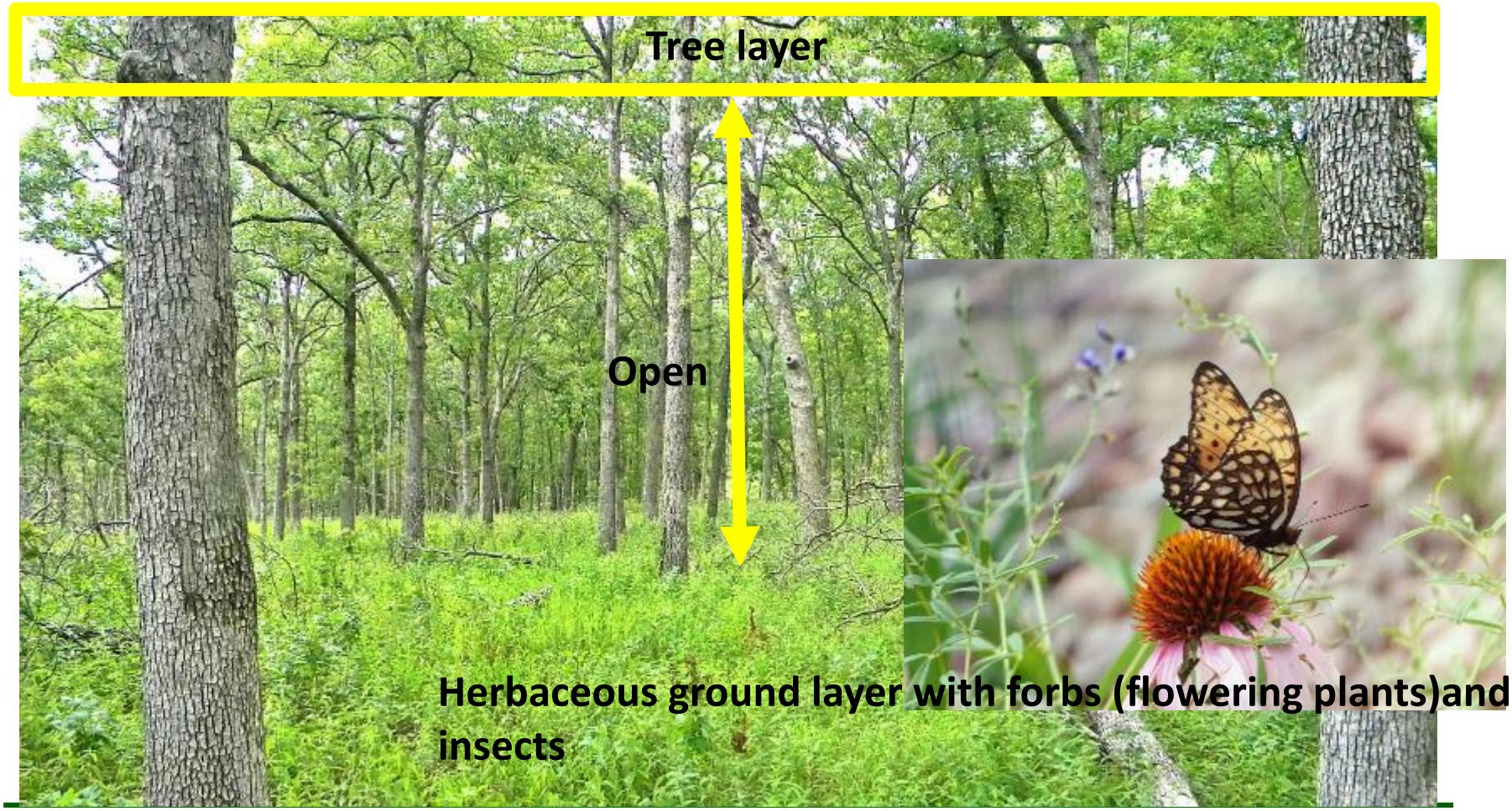
Is it because early successional birds are mis-defined as early successional?

The problem: Early successional birds are declining in the eastern US despite up to 25% early successional forest

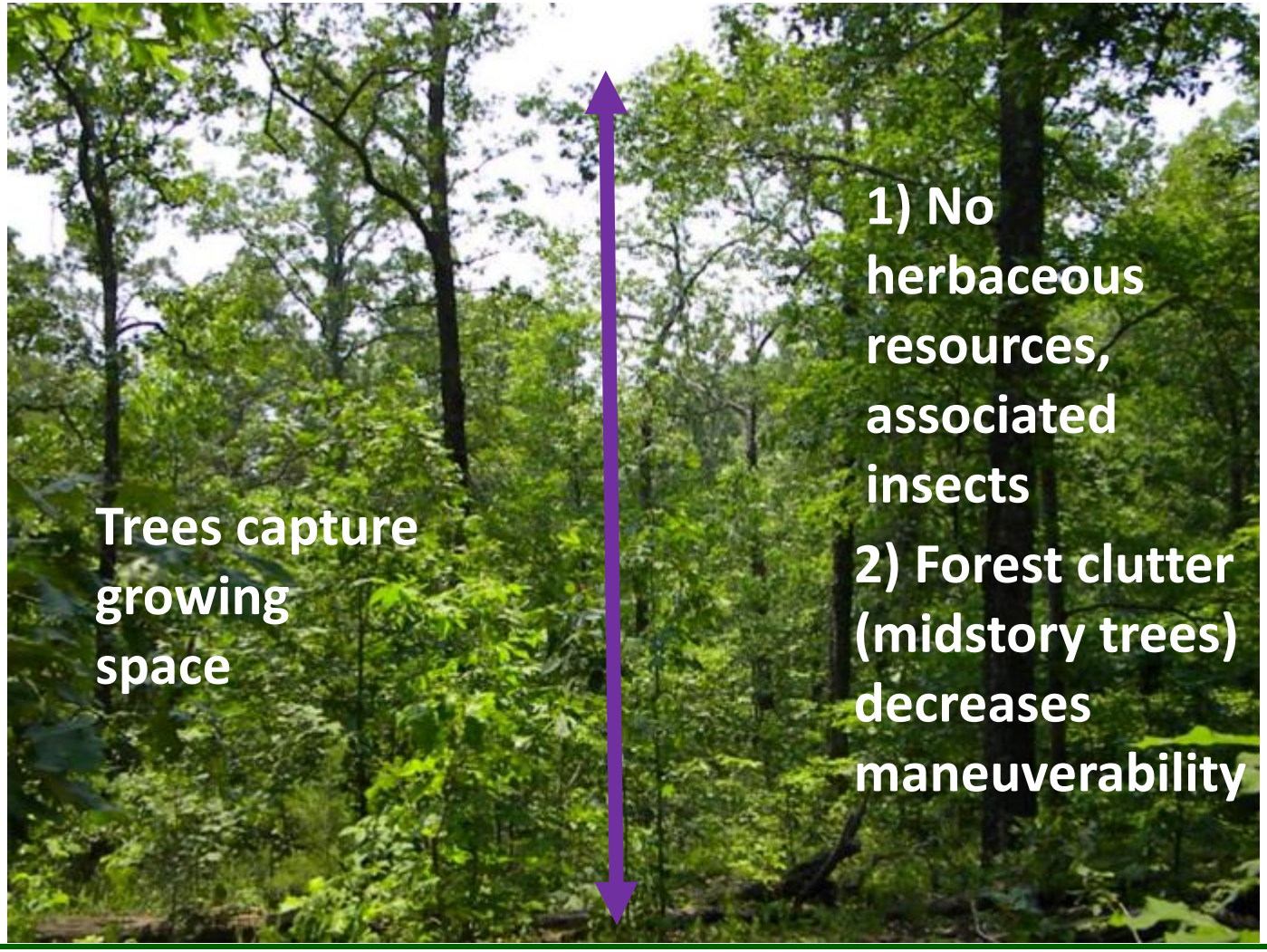
The tallgrass prairie landscape of crop and pasture is supporting this guild better than eastern forests

The alternative: We propose that early successional birds declining due to loss of historical open forest ecosystems of savannas and woodlands (Hanberry and Thompson 2019)

Open forests = Overstory layer of oak and/or pine, open midstory, grasslands ground layer



Eastern forests are closed = closed midstory of trees, no herbaceous layer



Missouri, control; C. Kinkead

Clearcut= young early successional forests
Small diameter trees

Fire for open forests– Coastal Plain

Longleaf pine woodlands

Fire removed small diameter trees in understory

Historical fire return intervals typically were about 2 to 5 years

Eastern oaks – similar structure

Missouri oak woodland– with burn

Missouri closed forest – without burn

FIG. 3. Oak-hickory woodland, Stamford, Connecticut, subject to annual fires, resulting in an open stand free from underbrush.
(Photo by Dr. R. P. Marshall)

Connecticut oak woodland, subject to annual fires resulting in an open forest

Bromley 1935

FIG. 5. Oak-hickory woodland, Stamford, Connecticut, not subject to frequent fires. The large trees stand far apart but there is a dense undergrowth. The black oak in the foreground is 114 feet in height.
(Photo by Dr. R. P. Marshall)

Dense undergrowth without fire, CT

Bromley 1935

The Indigenous peoples "are accustomed, to set fire of the Country…and to burne it, twize a yeare, at the Springe, and the fall of the leafe. The reason …is because it would other wise be so overgrowne with underweedes, that it would be all a copice wood, and the people would not be able in any wise to passe through the Country. . .For when the fire is once kindled, it dilates and spreads it selfe …burning continually night and day, untill a shower of raine falls to quench it. **And this custome of firing the Country is the meanes to make it passable**, and by the meanes the trees growe here, and there as in our parks". Morton 1632 cited in Day 1953

NH oak woodland – treatment unknown

NH dense forest

Why is surface fire an important process?

Understory disturbance!

Removes small diameter trees

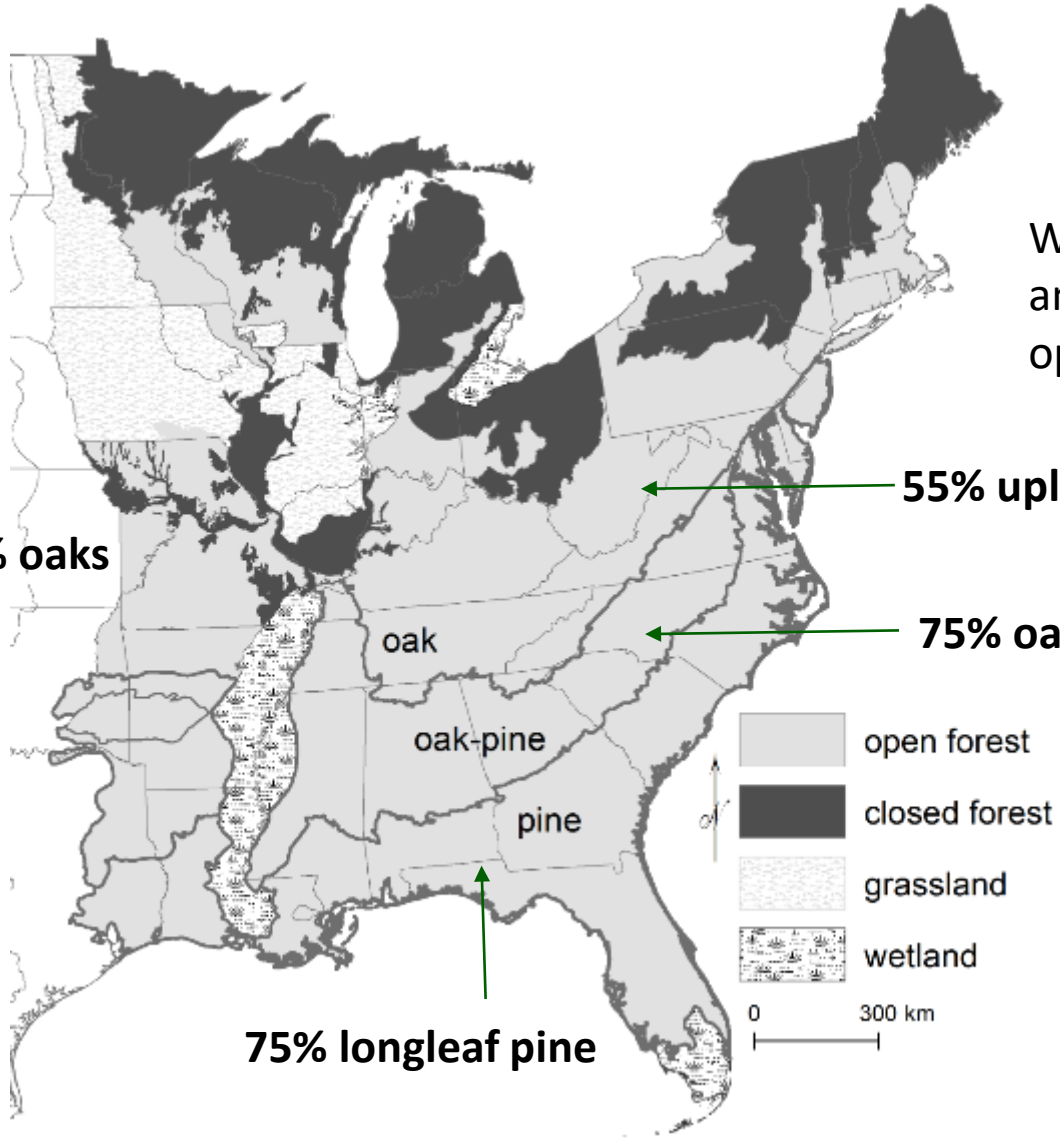
- Favors fire-tolerant pine and oak species

Allows herbaceous vegetation to be competitive

Creates pine or oak open forests of woodlands or savannas

- Stable, limited overstory disturbance
- Single stratum of overstory trees with an herbaceous layer
  - Ecological continuity between grasslands and forests
  - "One can not see the grassland for the trees" (Komarek 1965)

Historical tree surveys (ca. 1620-1900)



Where fire-tolerant oaks and pines dominant = open forest structure

55% upland oaks

65% oaks

75% oaks and shortleaf pine

75% longleaf pine

Hanberry and Nowacki 2016, Hanberry and Thompson 2019

State transition from open forests of fire-tolerant species to closed forests of fire-sensitive species

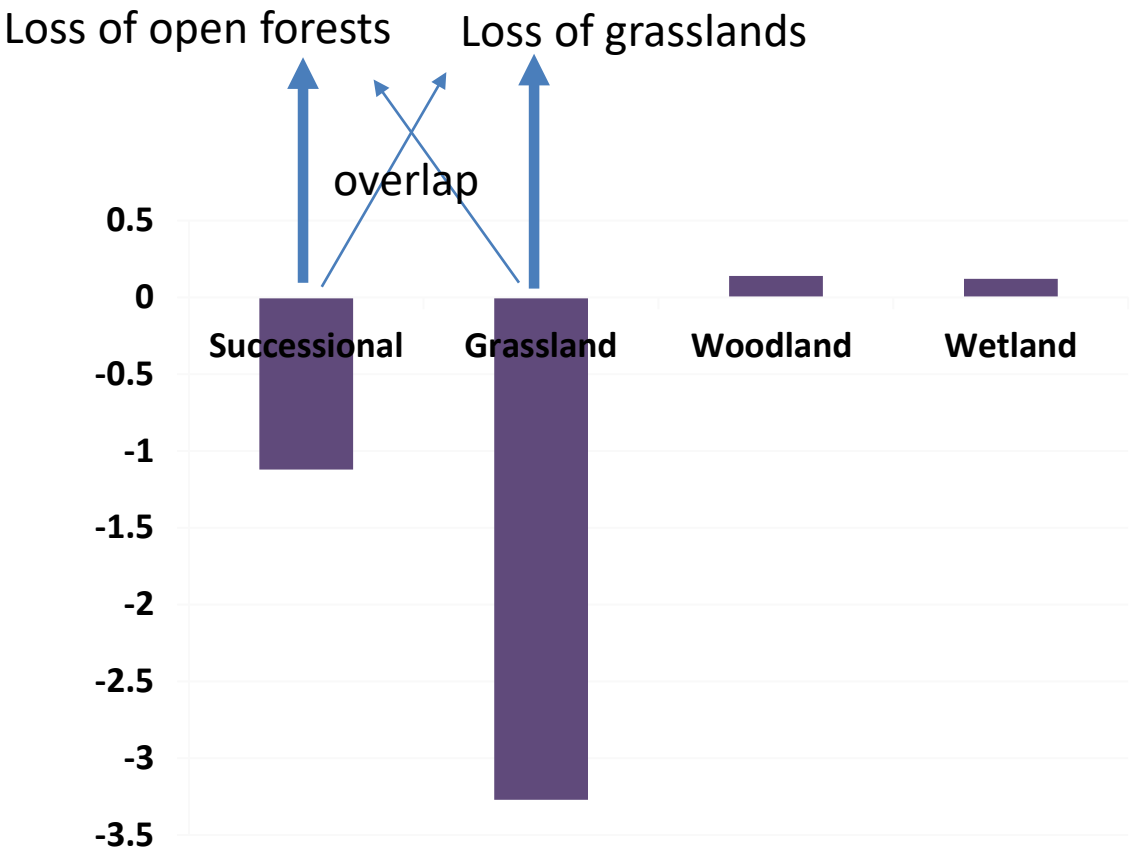
Open Ecosystems → Closed forests

no surface fire = no disturbance to remove understory trees

Increase in fire-sensitive tree species and tree diversity
Increase in tree density and complexity of internal stand structure

Decrease in abundance and diversity of herbaceous vegetation
Decrease in diversity of forest structure type
Decrease in associated wildlife species – pollinators, 'early successional' birds

Successional species decreasing because of habitat loss

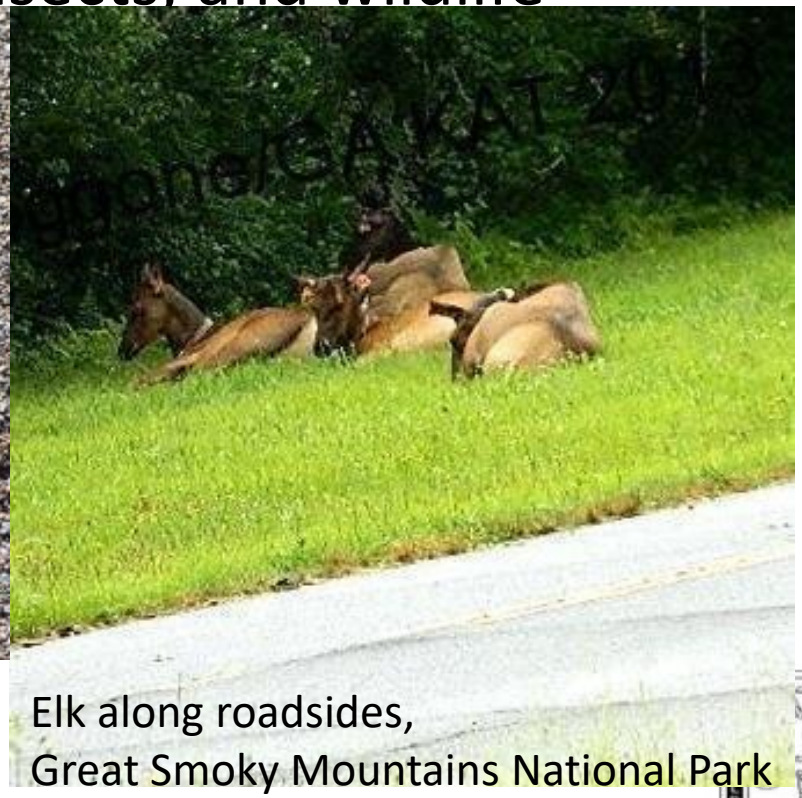


USGS North American Breeding Bird Survey 1966-2015

Too many trees is a problem

herbaceous plants, insects, and wildlife

Wildlife Society Bulletin; DOI: 10.1002/wsb.957



In My Opinion

Open Forest Management for Early Successional Birds

BRICE B. HANBERRY,[1] *U.S. Department of Agriculture Forest Service, Rocky Mountain Research Station, 8221 Mt. Rushmore Road, Rapid City, SD 57702, USA*

FRANK R. THOMPSON, III, *U.S. Department of Agriculture Forest Service, Northern Research Station, 202 ABNR Building, University Missouri, Columbia, MO 65211, USA*

Management

Creation of transient clearcuts to regenerate young forests appears to be ineffective in supporting successional species

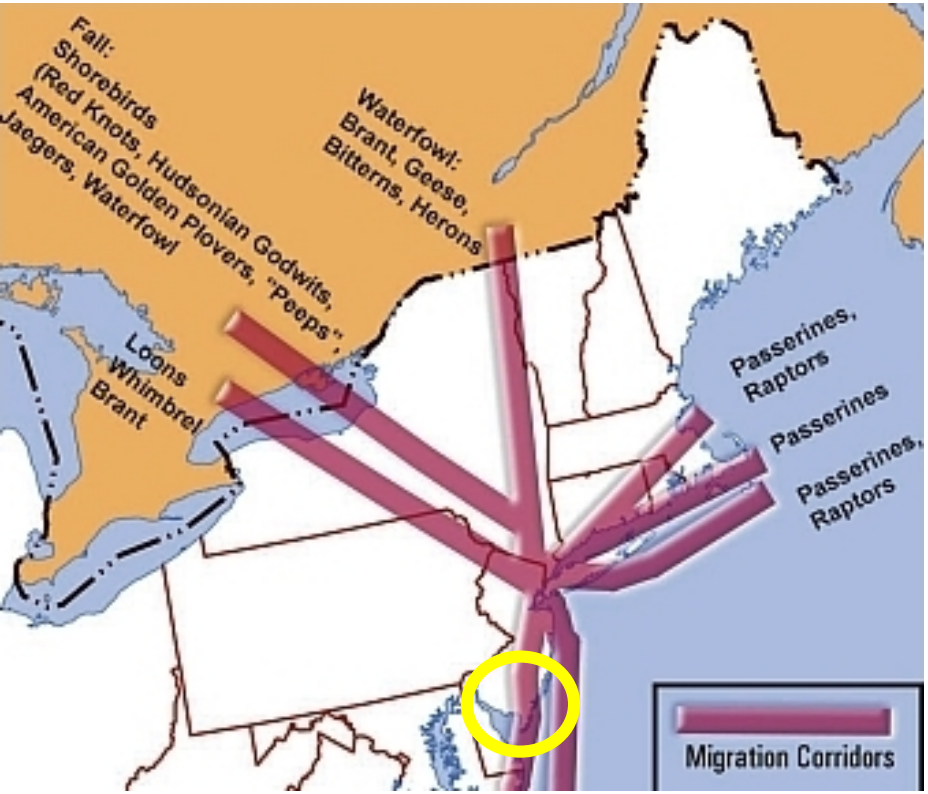
Recommend tree retention and open forest restoration

- Mechanical and chemical treatments, but fire for full diversity (asteraceae, fabaceae, geraniaceae)

Multifunctional savannas and woodlands

- Support wildlife and biodiversity (plants, insects, birds, fungi)
- Increase landscape aesthetics with tree retention
- Prepare for uncertain future by management of alternative state of open forests – thousands of years

Example: opposite of fire management for birds



Cape May, NJ

A pine barrens!

Fire-sensitive species protected from deer with collars at Cape May

Questions? Comments? Discussion?

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ABSTRACT Wildlife biologists classify some bird species as early successional because of apparent