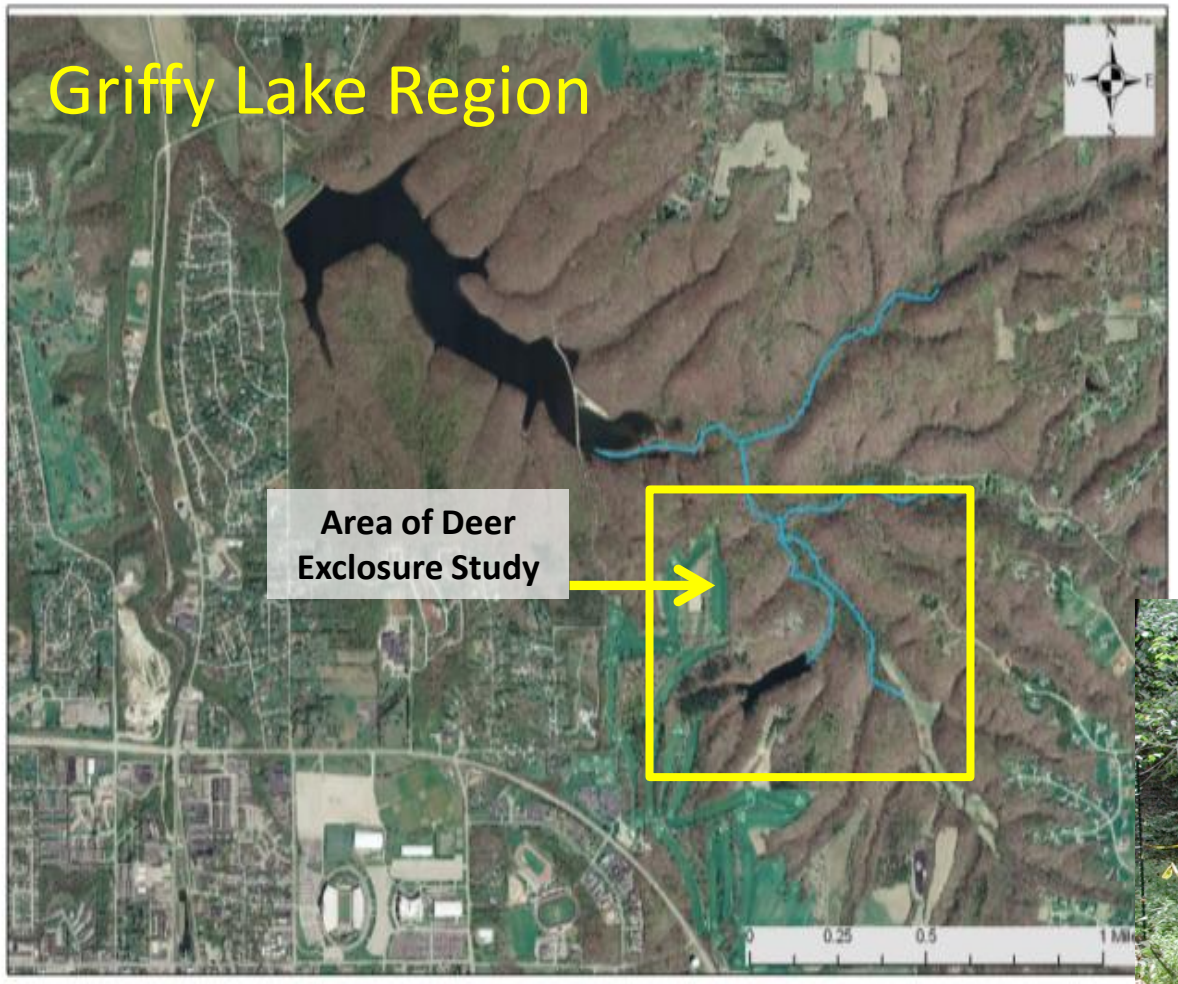
Biodiversity of Griffy Woods Region

- Over 2000 acres of natural forest
- 10 ecological community types
- 564 plant species, 82% native to Indiana
- 15 state-listed rare plant species
- 38 species of reptiles and amphibians
- 32-41 mammal species
- 157 bird species

Statistics from the 2008 Griffy Lake Nature Preserve Master Plan

Deer Exclosure Study at IU's Griffy Woods

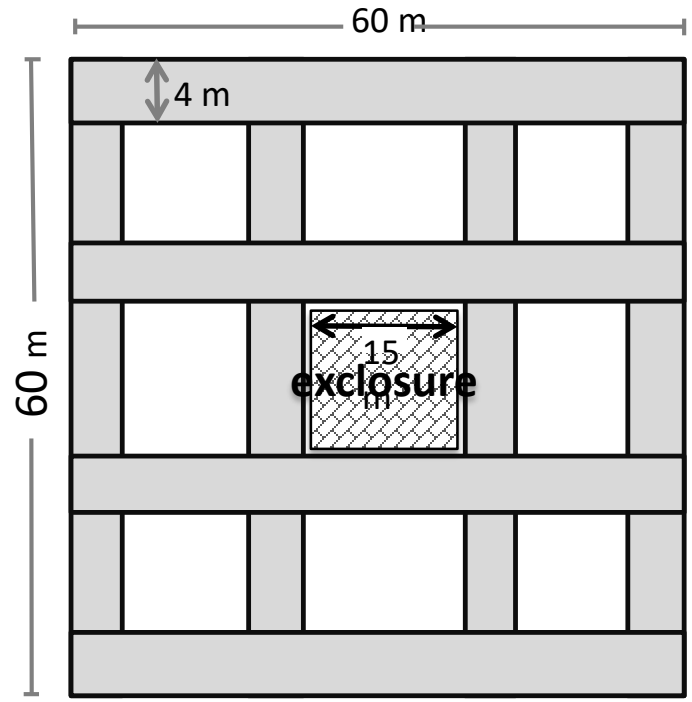


- 15 fenced exclosures and 15 unfenced controls
- Constructed 2005–2010
- 15 x 15 m each

Fences exclude deer (and probably turkeys) but other animals can pass under or through fence (e.g. raccoons, opossums, mice, rabbits)

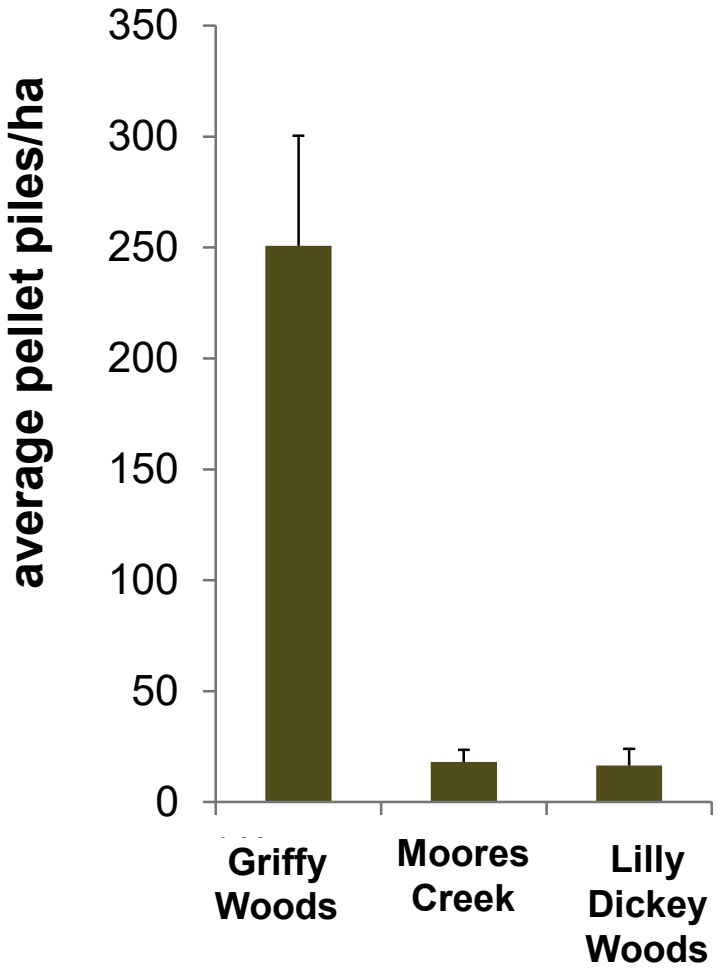
Griffy Woods Deer Density

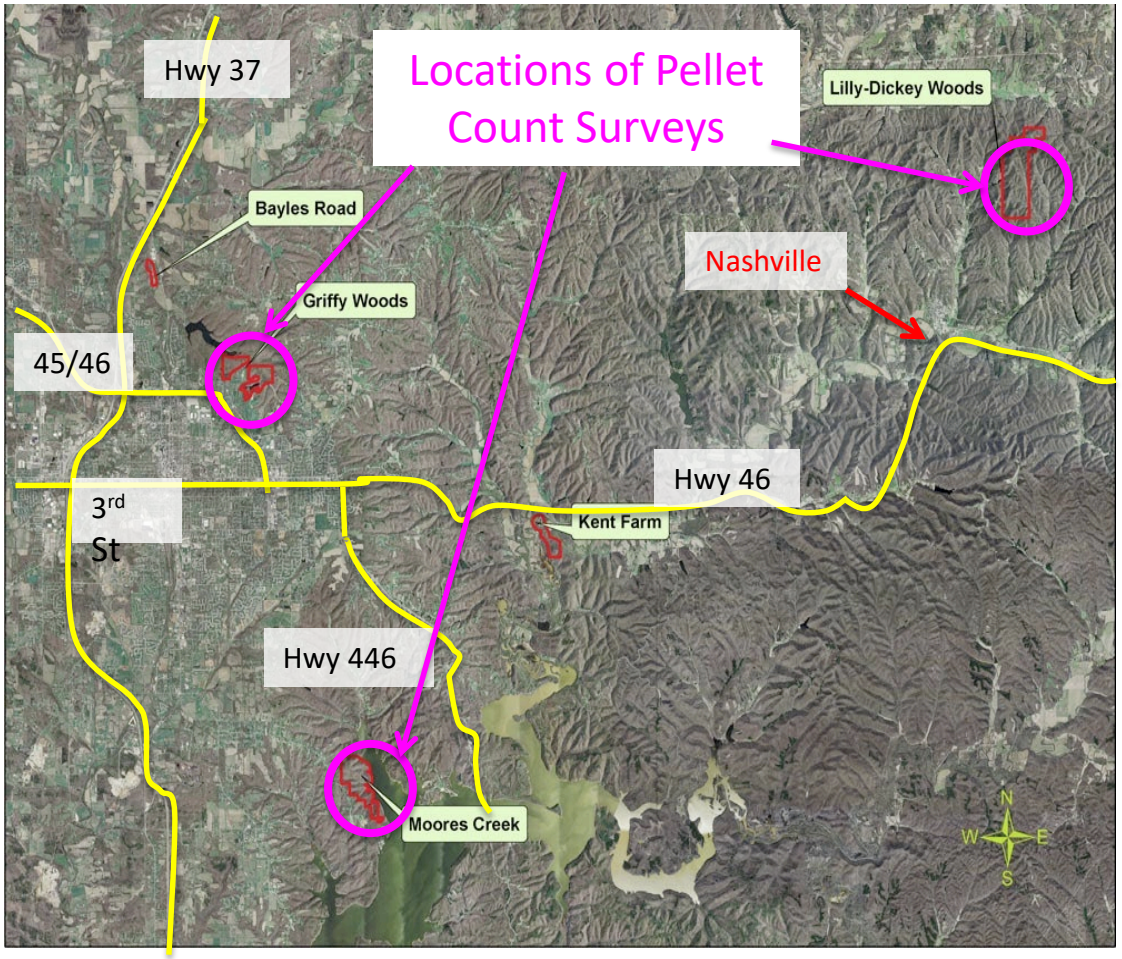
- Counted pellet piles in early spring 2011
- 15 plots at Griffy and 4 plots at each of two other sites.
- Walk transects and count all pellet piles observed



- Standard deer population survey method.
- Values vary among seasons, but are comparable within a season.

Griffy Woods Deer Density



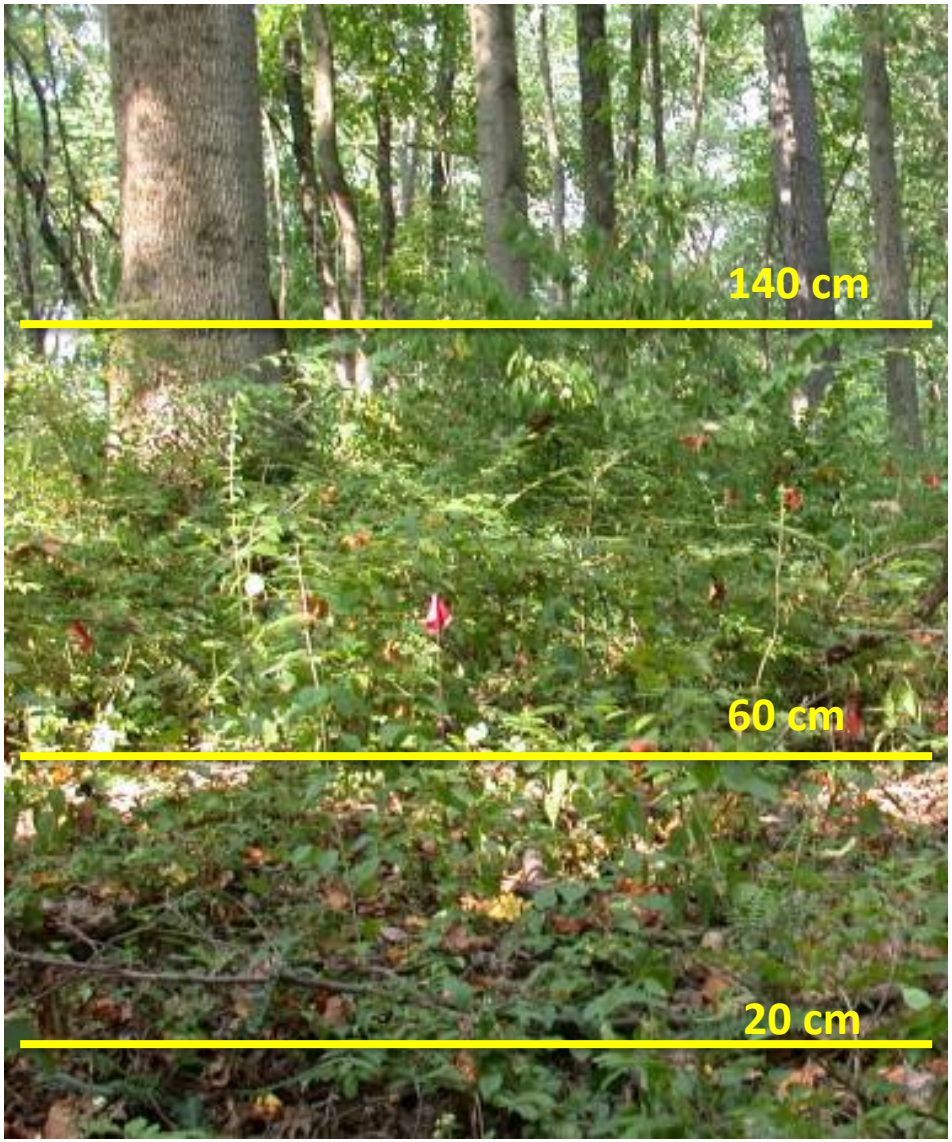


13 times more pellet piles at Griffy Woods than at 2 other nearby Preserves.

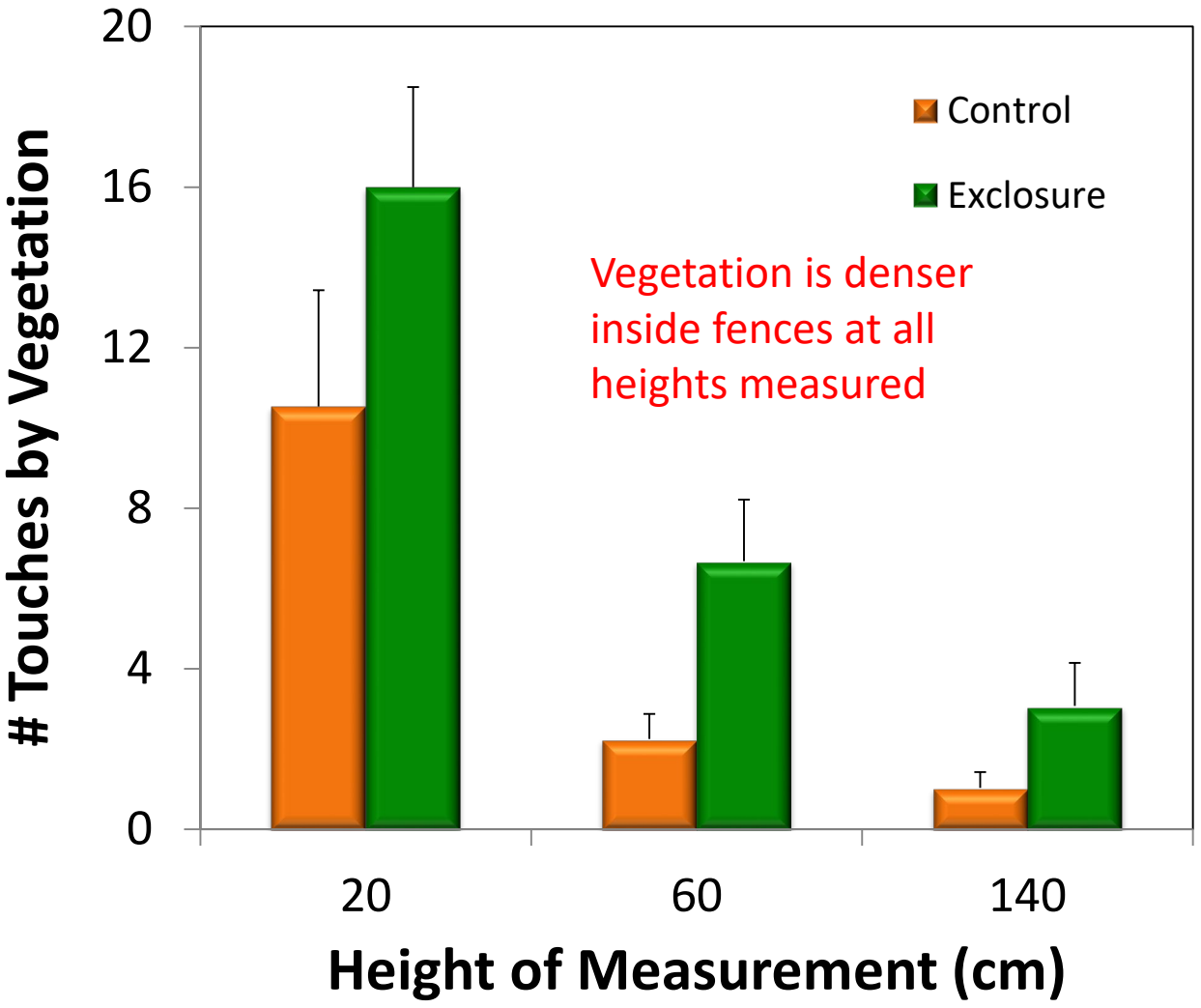
Vegetative Structure

Vegetative Structure

- Run tape at 3 heights above ground level
- Count number of times vegetation contacts tape



Vegetative Structure



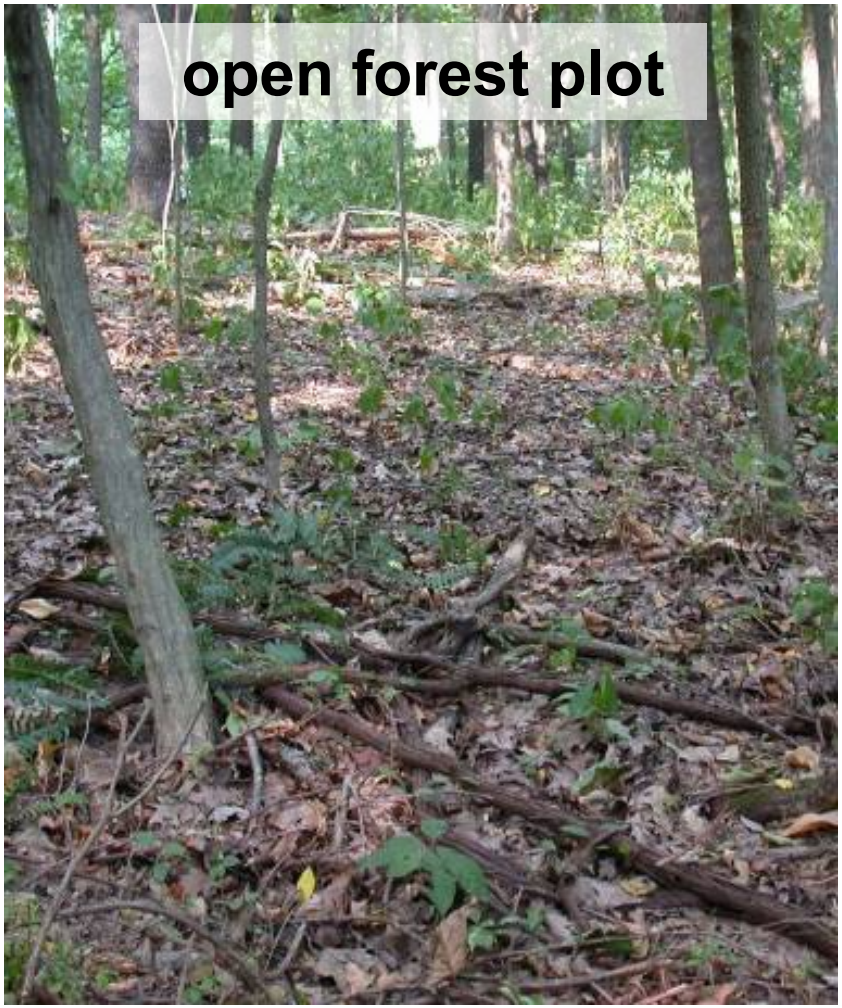
20 cm:
P < 0.0001

60 cm:
P = 0.0003

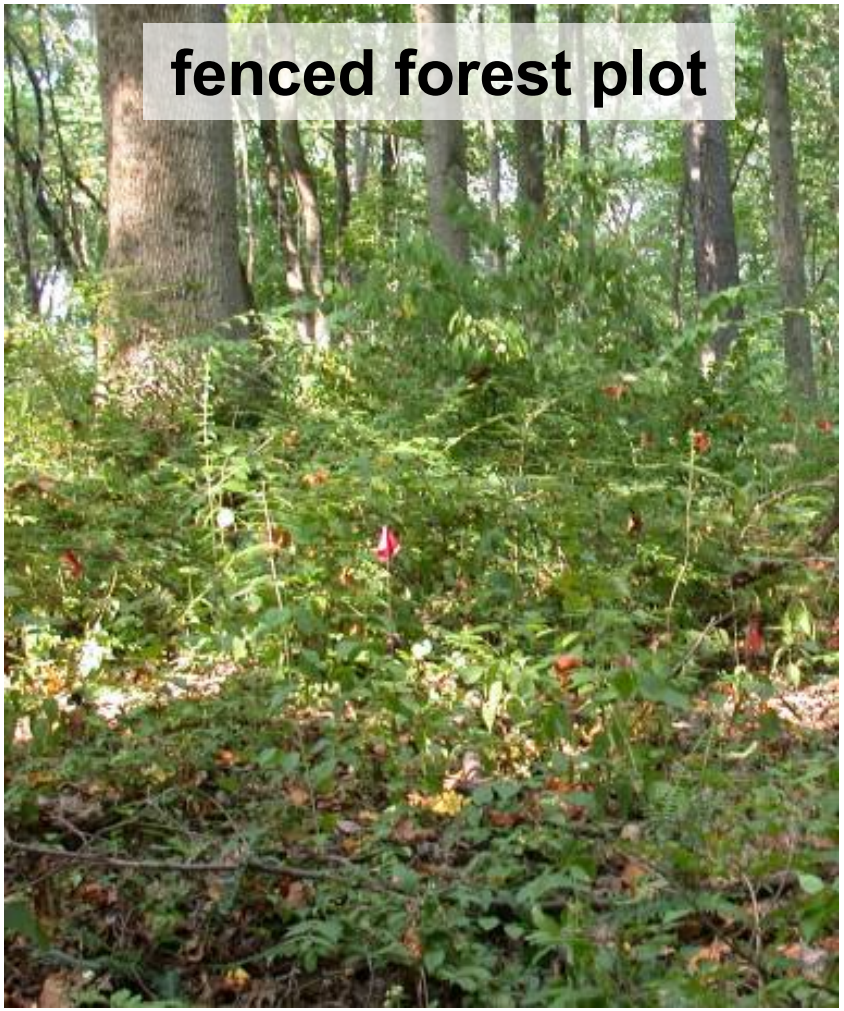
140 cm:
P = 0.0211

Graphs show means ± SE

Effects on Woody Plants

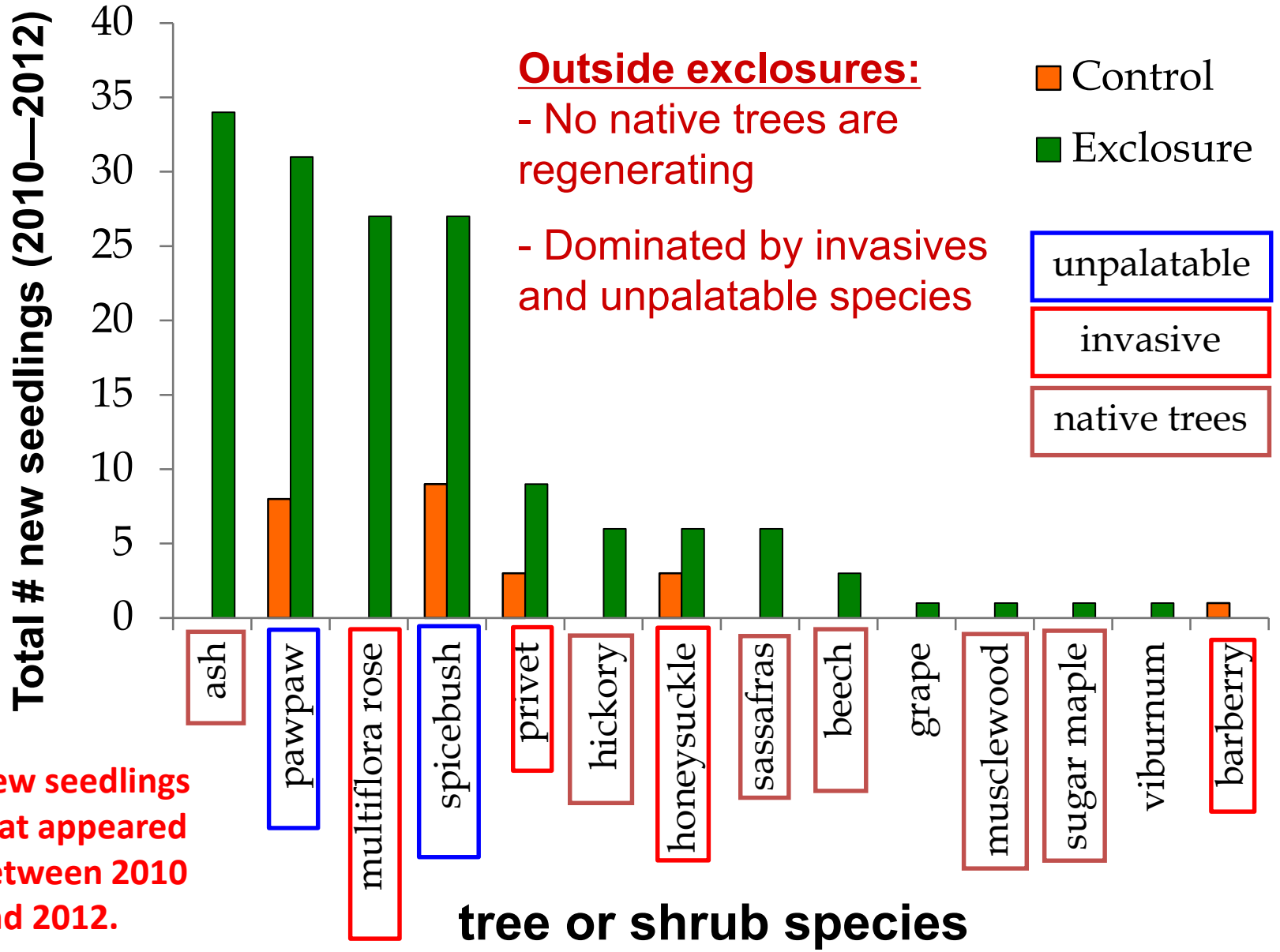


28 woody plants
7 species



204 woody plants
21 species

New Tree and Shrub Seedlings



New seedlings that appeared between 2010 and 2012.

Effects on Spring Wildflowers

Declines in Wildflower Size

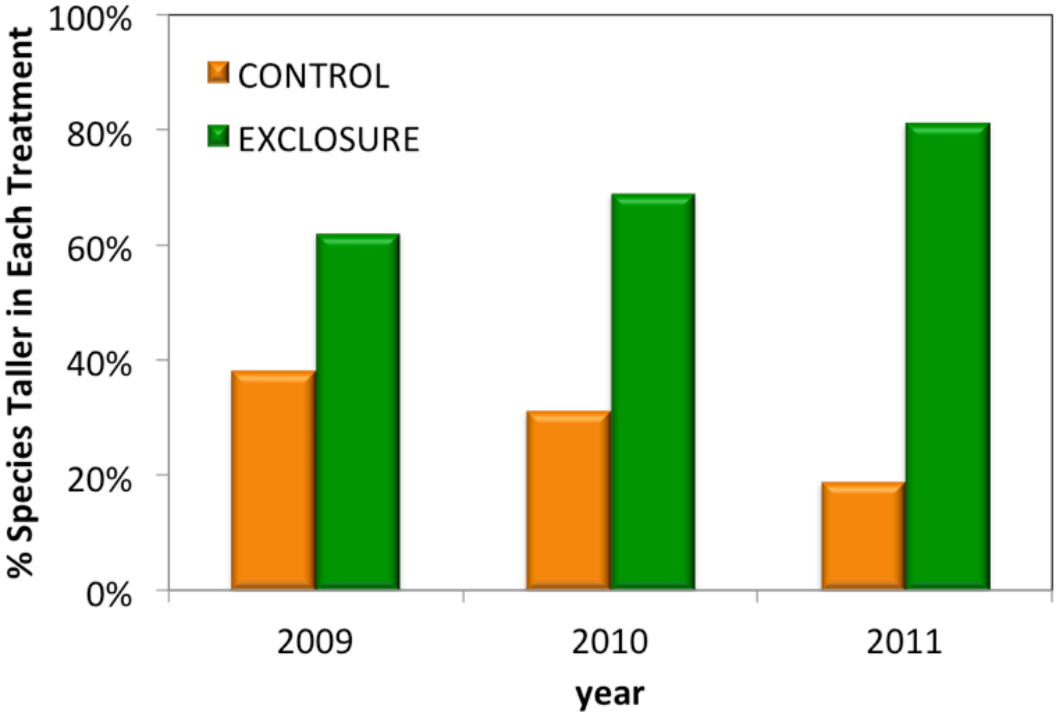
Spring wildflowers are first fresh green food for deer after winter

Have short time to complete aboveground life cycle.

When browsed, plants lose energy. Tend to be smaller in following year.

Plant size strongly related to flowering. Small plants don't flower.

May lead to delayed local extinctions.



Difference in plant height for species that occurred both inside and outside fence in the same plot.

Declines in Wildflower Size

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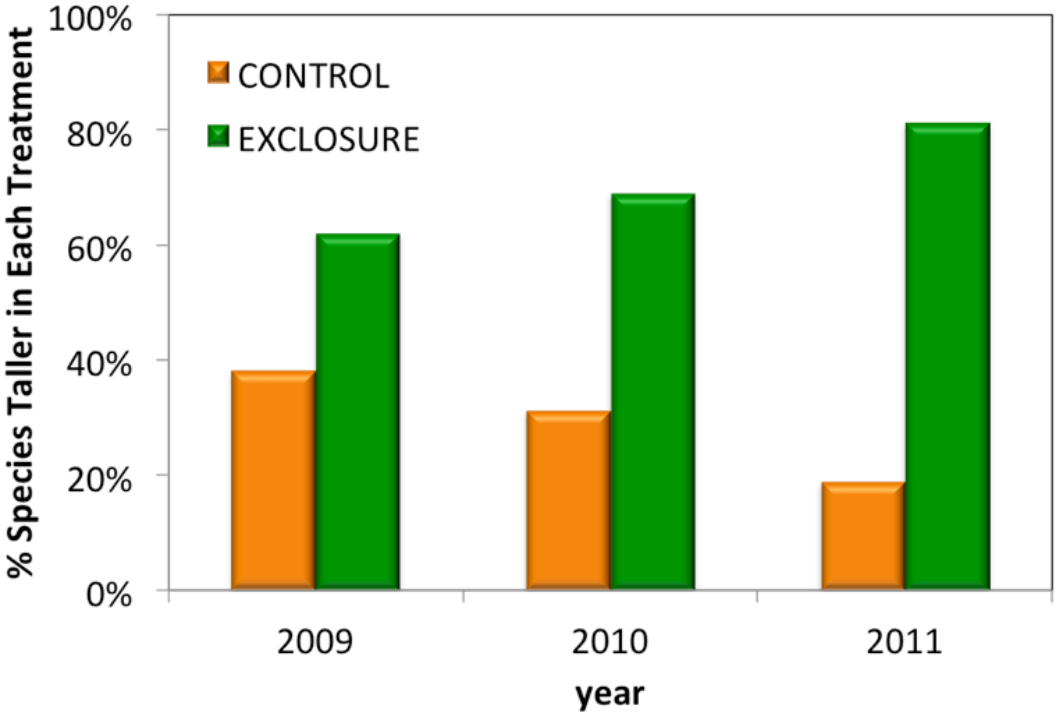


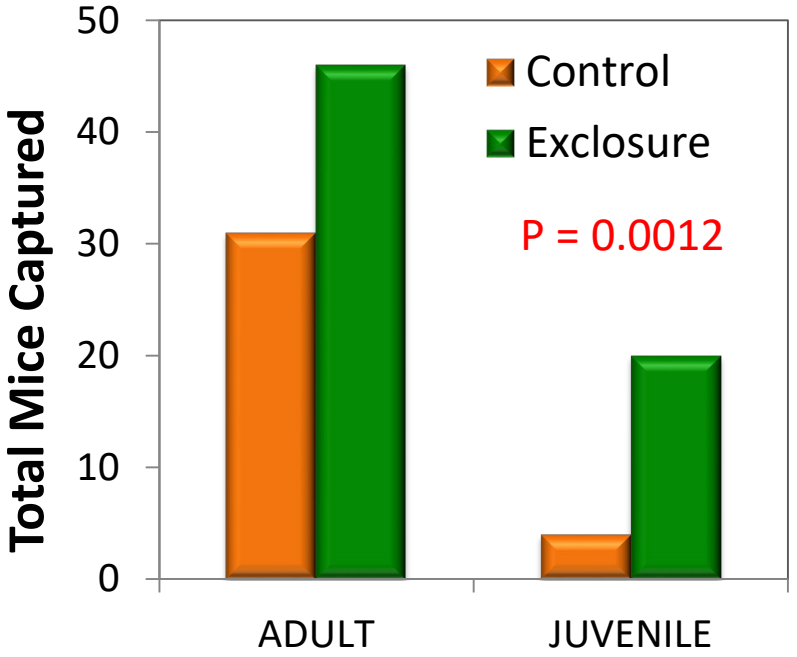
Indicator Species for Deer Impacts in Indiana*

	Avg. Height (cm)		Numbers	
	control	fenced	control	fenced
jack-in-the-pulpit	10.6	14.0	47	45
sweet cicely	0	14.7	0	5
white baneberry	10.3	20.5	4	5

* Parker & Webster 1998

Effects on Mice

- Live trapped mice and released in same location
- More mice inside deer fences.
- Juveniles found primarily in exclosures.



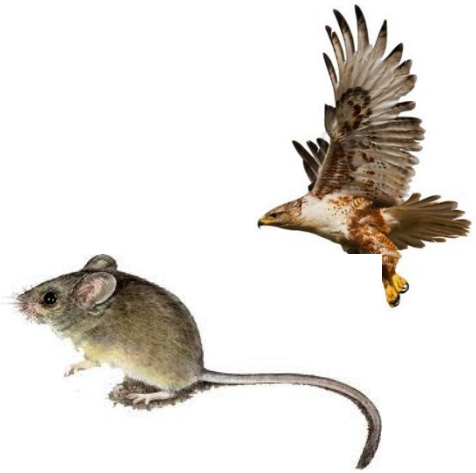


image: http://www.cedarcreek.umn.edu/mammals/cricetidae.html

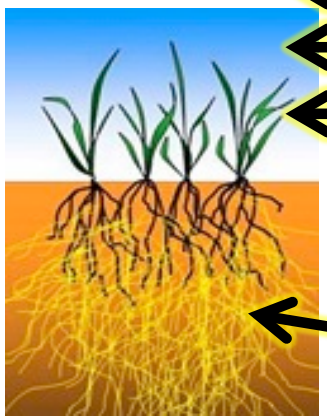
How are deer affecting the Griffy Woods ecosystem?

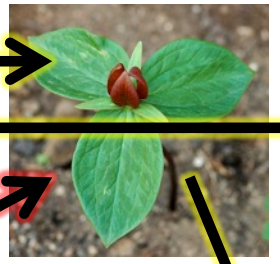
- Vegetation
  - spring wildflowers
  - woody plants
  - density and abundance
- Soils & Mycorrhizae
  - nutrients, compaction, moisture
  - mycorrhizal abundance & diversity
- Animal Surveys
  - mice, salamanders, ticks, earthworms

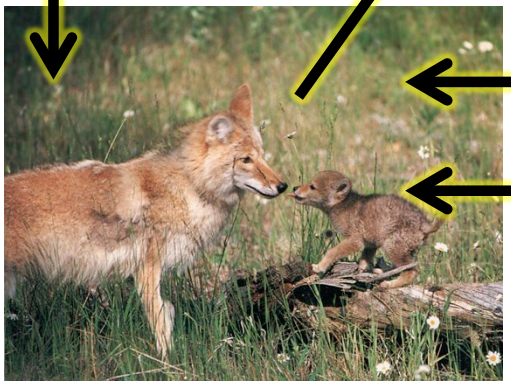
Red = significant negative effects measured at Griffy
Black = no significant effects

Direct Effect of Deer

Indirect Effect of Deer







Deer as Keystone Species is Not a New Idea

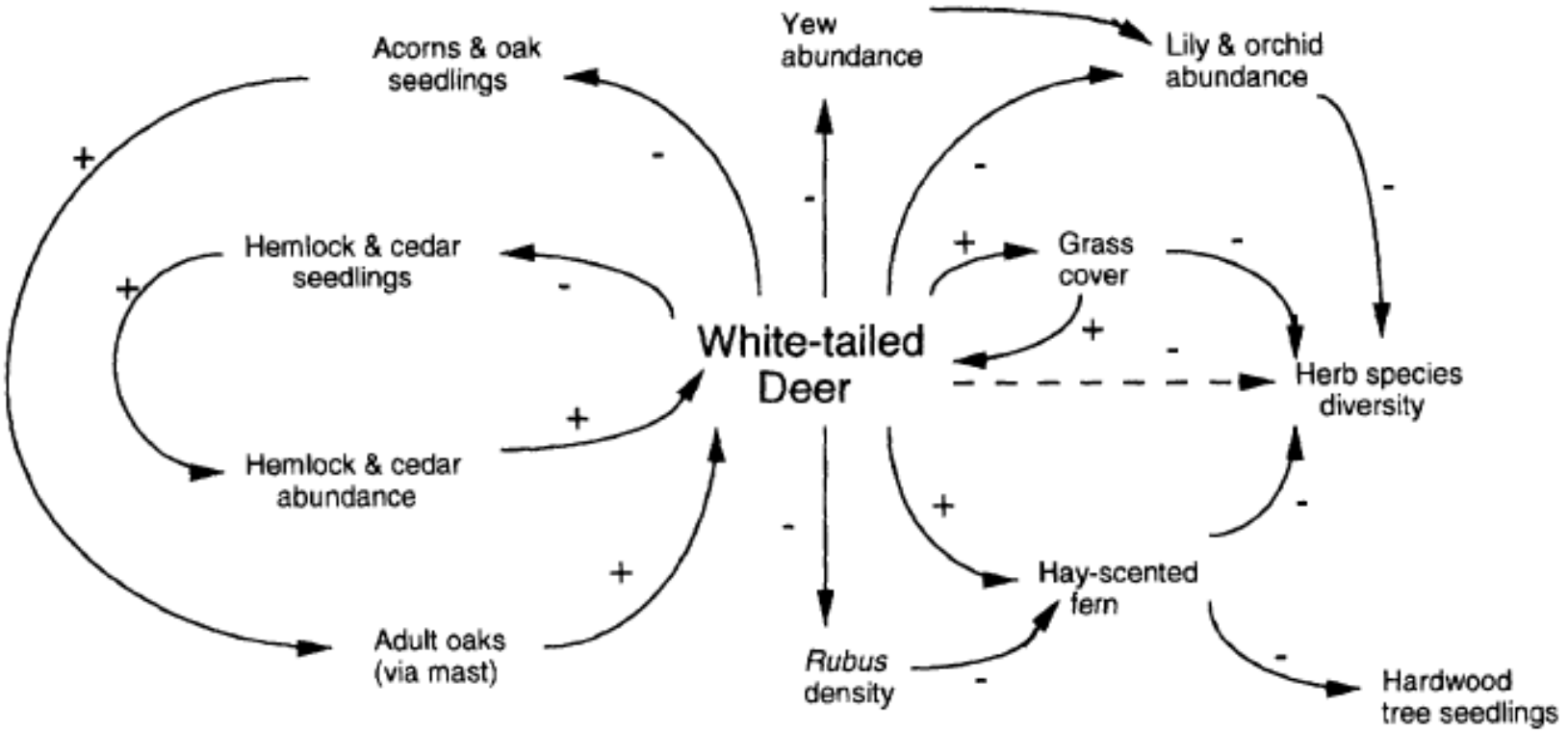
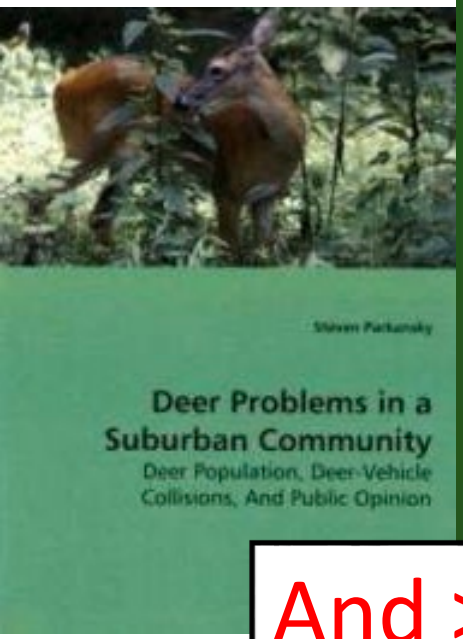
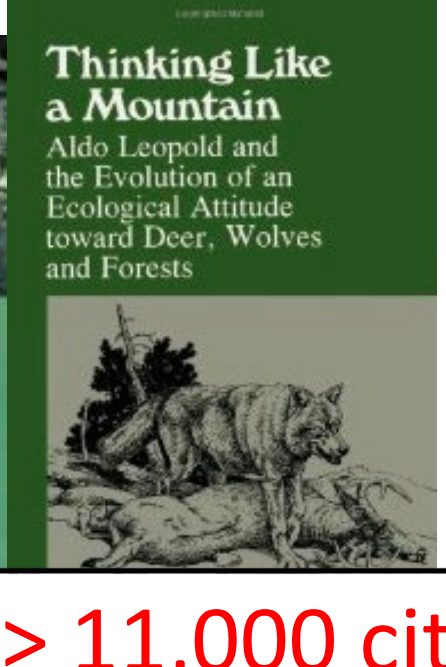
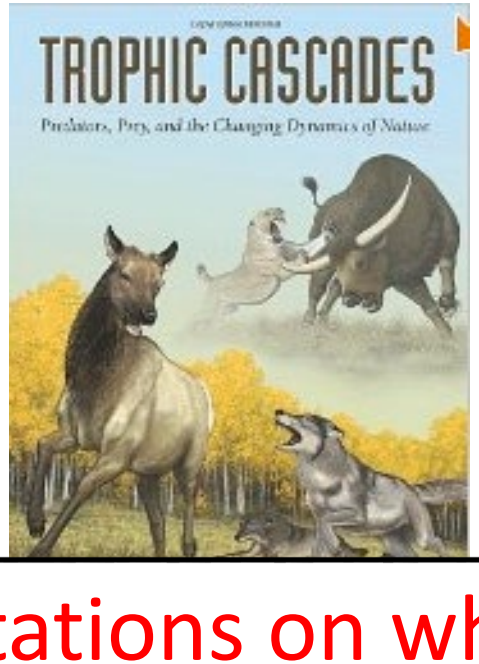


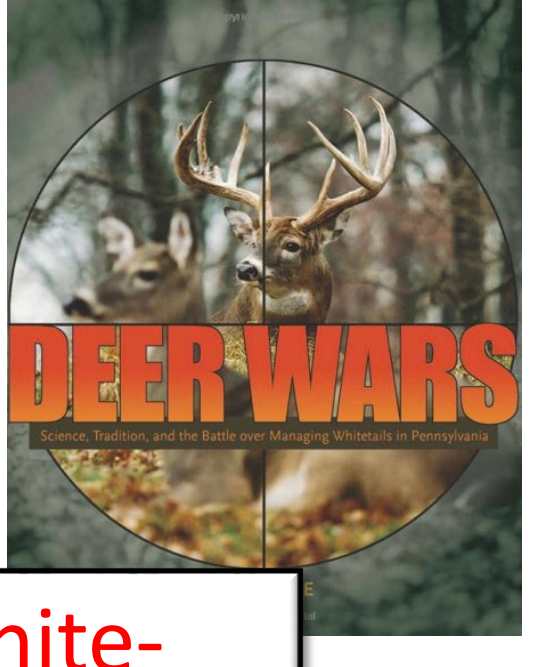
Fig. 3. Documented and inferred interactions of white-tailed deer with various plant species in forests of the northeastern and midwestern United States. Further interactions with species on other trophic levels are not shown (but see Ostfeld et al. 1996). For sources, see text.

Waller & Alverson. 1997. Wildlife Society Bulletin 25:2): 217-226.

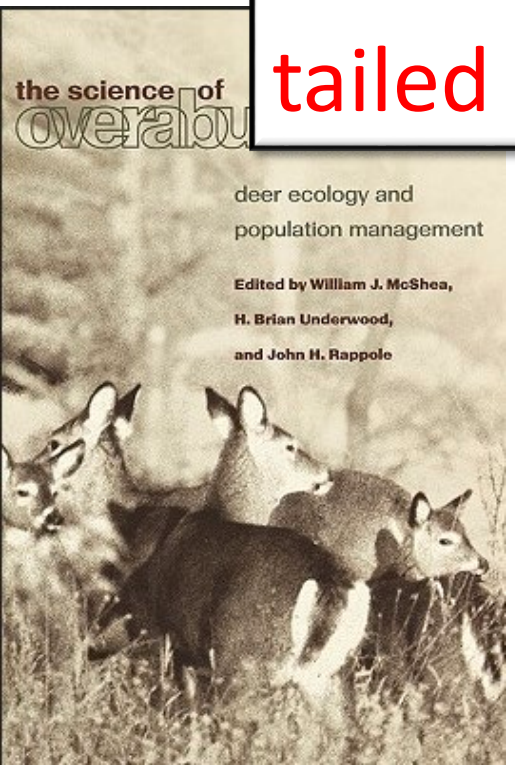


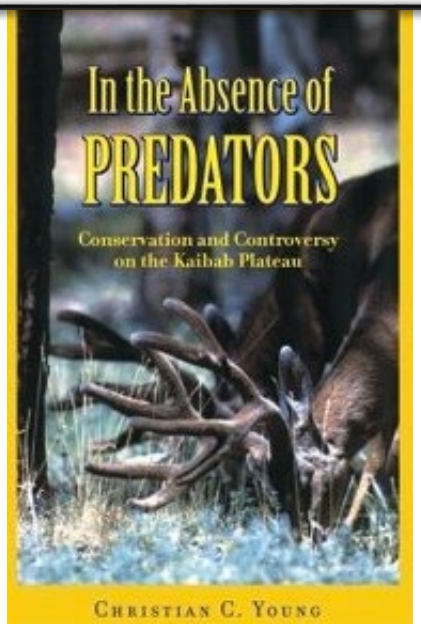


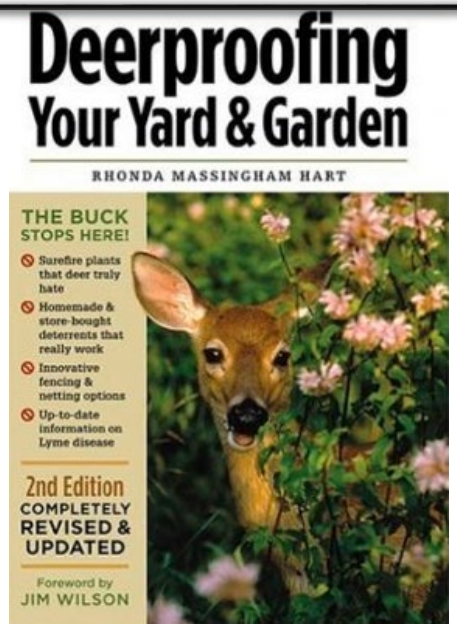


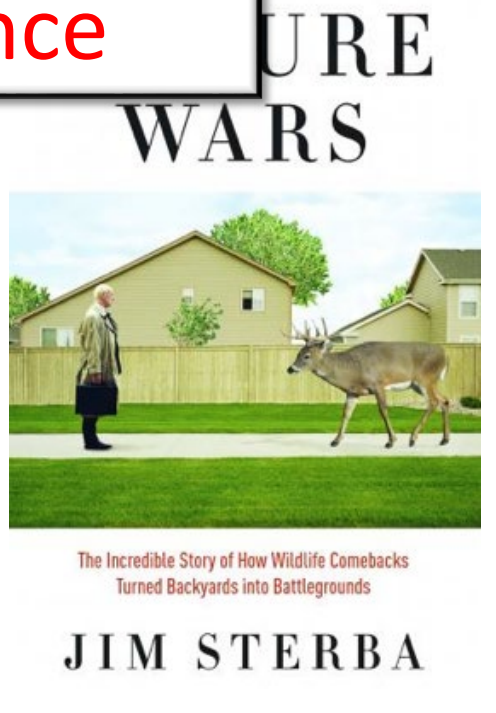


And > 11,000 citations on white-tailed deer in ISI Web of Science



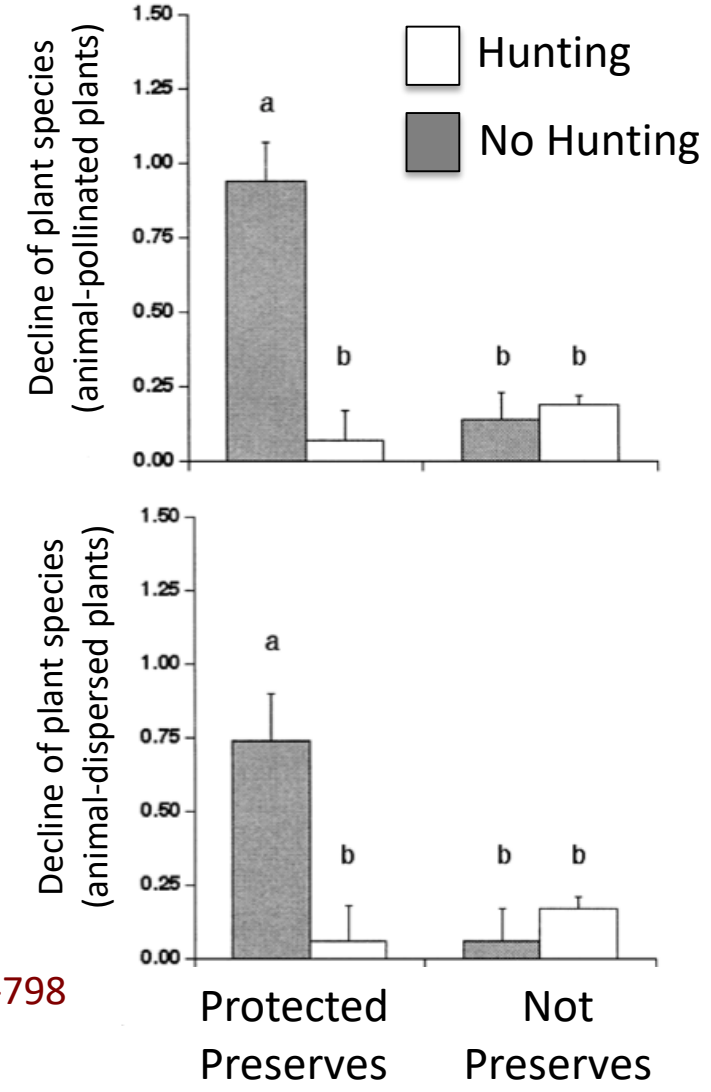






Preserves May Not Preserve Species Without Management

- Compared recent plant survey of 63 sites in Wisconsin with surveys from 50 years earlier.
- Species declines were greatest in protected areas (e.g. State Parks) that were not hunted.
- Sites without hunting lost > 60% of plant species. Hunted sites lost 16% of plant species.



Rooney, T.P, et al. 2004. *Conservation Biology* 18(3): 787-798

Effects of Deer on Ecological Communities

Study of Effects of Deer on Indiana State Parks by George Parker and Chris Webster in 1996

- Unhunted state parks had
  - fewer tree seedlings and shrubs
  - lower % cover of herbaceous species
  - higher cover of unpalatable species
- Since state park hunts began, there has been a dramatic increase in understory forest diversity and plant coverage
- In Wisconsin, three state parks without hunting lost over 50% of plant species

Griffy Woods Deer Exclosure
2 years after fencing

McCormick's Creek State
Park Deer Exclosure
~ 15 years after hunting

2012 Annual Report of the Environmental Resources Advisory Council (ERAC)

2012 ERAC Members:

Angie Shelton (Chair; IU Biology)
Melissa Clark (Vice-Chair; IU SPEA)
Cem Basman (IU; SPH)
Jeff Ehman (env. consultant and USB)
William Jones (IU SPEA)
Mike Litwin (US FWS)
Cathy Meyer (Monroe Co. Parks)
Barbara Restle (retired rancher)

Dave Rollo (City Council Rep)

<u>Parks Staff:</u>

Steve Cotter
Elizabeth Tomkins
Kriste Lindberg

2012 ERAC Initiatives

- Deer Task Force
- Griffy Dam Repairs
- Ferguson Dog Park
- Switchyard Master Plan
- Trail Development

Deer Task Force

- Angie Shelton presented data on effects of deer in Griffy Woods to ERAC and City Council, and met with reps from USDA Wildlife Services
- Angie Shelton, Mike Litwin, Barbara Restle, and Cem Basman attended DTF meetings and City Council meetings on deer
- Shelton and Restle wrote outreach articles on ecological and health issues related to deer for the Herald Times
- BPR Staff recently constructed deer exclosure for demonstration/education near Boathouse trails.
- ERAC wrote and unanimously approved letter to City Council recommending approval of DTF Report
- ERAC recommends:
  - reduction of deer population in Griffy Woods area within next two years
  - increased public education and outreach on ecological effects of deer
  - passive control methods in City (e.g. feeding ban, increase in fence height limits)
- ERAC considers deer the most significant environmental issue affecting City Parks.

Griffy Dam Repairs

- ERAC has kept updated on dam repair process
- Focused on
  - sediment removal
  - fish populations
  - amphibians and reptiles
  - invasive aquatic plants
- Recommended construction of temporary wetland for turtles and amphibians
- Drawdown may help reduce nuisance goose problem
- Sedimentation
  - $96K LARE grant
  - As much sediment as possible should be removed during drawdown because of lower costs
  - Potential sediment uses include fill and fertilizer (Switchyard Park?)
  - Raking areas where sediment cannot be removed could reduce aquatic invasive plants

Ferguson Dog Park

- New dog park should help shoreline erosion and sedimentation in Griffy Lake
- ERAC recommended opening new dog park before old area was closed for dam repairs
- New park includes native vegetation and rain gardens
- Waste is a problem at the Park. ERAC recommends forming a “Friends of the Dog Park” group
- Currently only one area is fenced. Priority should be given to fencing of a secondary area for rotated use.

Switchyard Master Plan

- ERAC held one meeting at Switchyard Park to view property.
- Shelton served as ERAC rep to Switchyard Steering Committee
- Environmental Issues
  - bioremediation or relocation of contaminated soil
  - creek remediation, restoration, daylighting
  - updating of floodplain maps
  - retention of trees on streambank
  - invasive species removal
- Completed Master Plan includes stream rehabilitation and balance of active and passive use that would retain natural areas
- Potential to use dredged silt from Griffy as fill at Switchyard Park, but would likely require revision of floodplain maps
- Current Recommendations:
  - Try to find funding for phased development of Park
  - Efforts to increase safety in park and along this segment of B-Line Trail.

Trail Development

- Cascades Trail completed from Lower Cascades Park to Old SR 37.
- HAWK signal installed for pedestrians at connection of B-Line and Rail Trail. Total 7.5 mile trail.
- Funding from Redevelopment Commission to improve trails at Wapehani Park
- Similar funding needed for trail upgrades at Griffy Lake Park as well as Trail Master Plan

Environmental Education

- ERAC impressed by BPR environmental education programs, esp new environmental summer program at Banneker Center and Naturalist at the Market, Adopt-A-Trail
- Several members have assisted in Parks Education Programs (Leonard Springs Nature Days-6th graders, Griffy Lake Nature Days-4th graders)
- Cathy Meyer involved in numerous education outreach programs and Riverwatch and Green Spots programs
- ERAC recommends increased education and outreach on
  - deer population
  - Griffy Lake drawdown
  - dog impacts at Griffy and the dog park

2013 ERAC Initiatives

- Deer Management at Griffy Woods
- Griffy Dam Repairs
- Ferguson Dog Park
- Switchyard Master Plan
- Trail Development