

Impacts of Deer on Northeast Forests and Strategies for Management



Paul D. Curtis

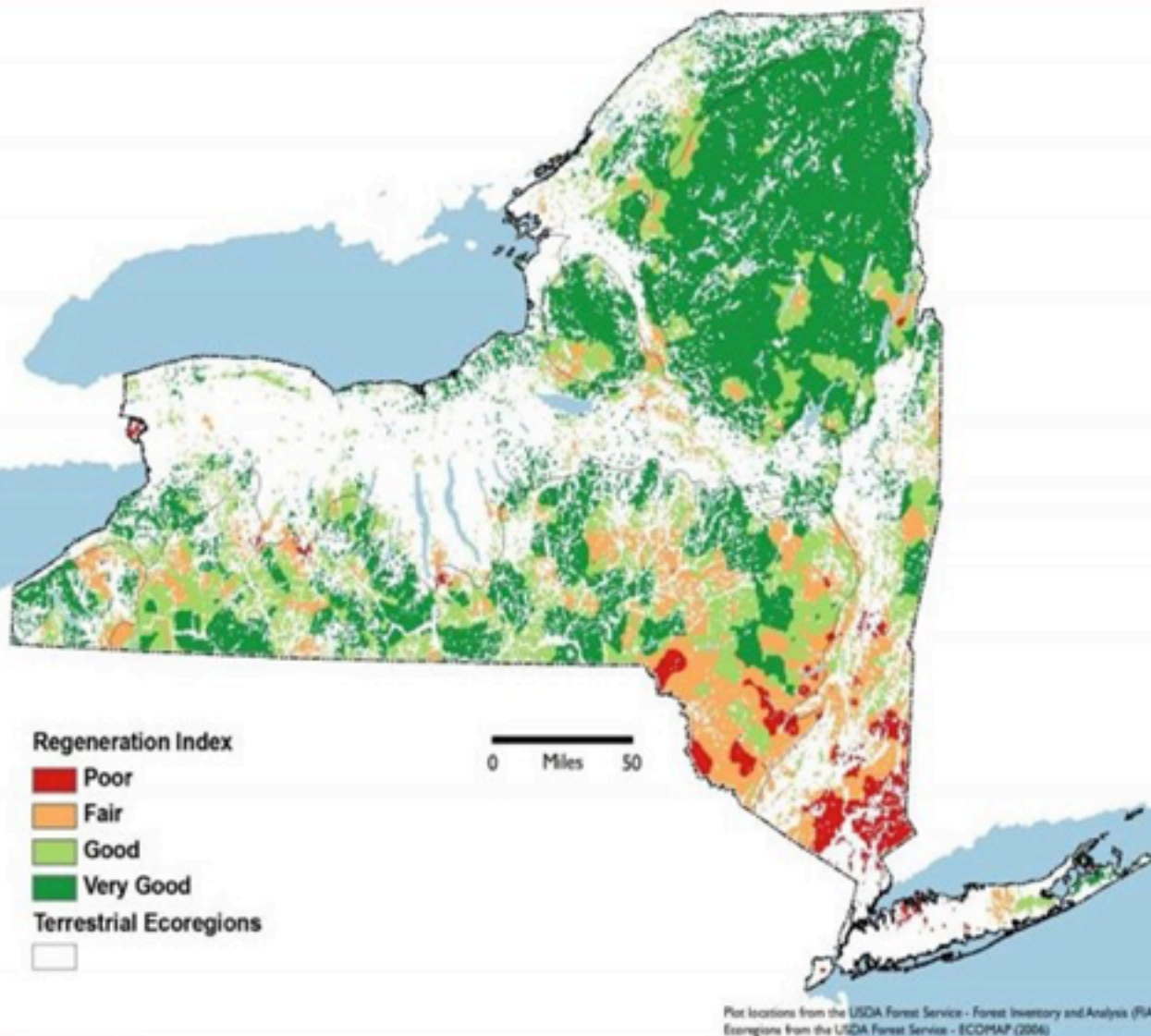
Dept. of Natural Resources, Cornell University

What makes a healthy forest?

- A variety of native plant and tree species
- Ability for a new forest to grow or “regenerate” in the case of disturbance (natural disturbance or timber harvest)



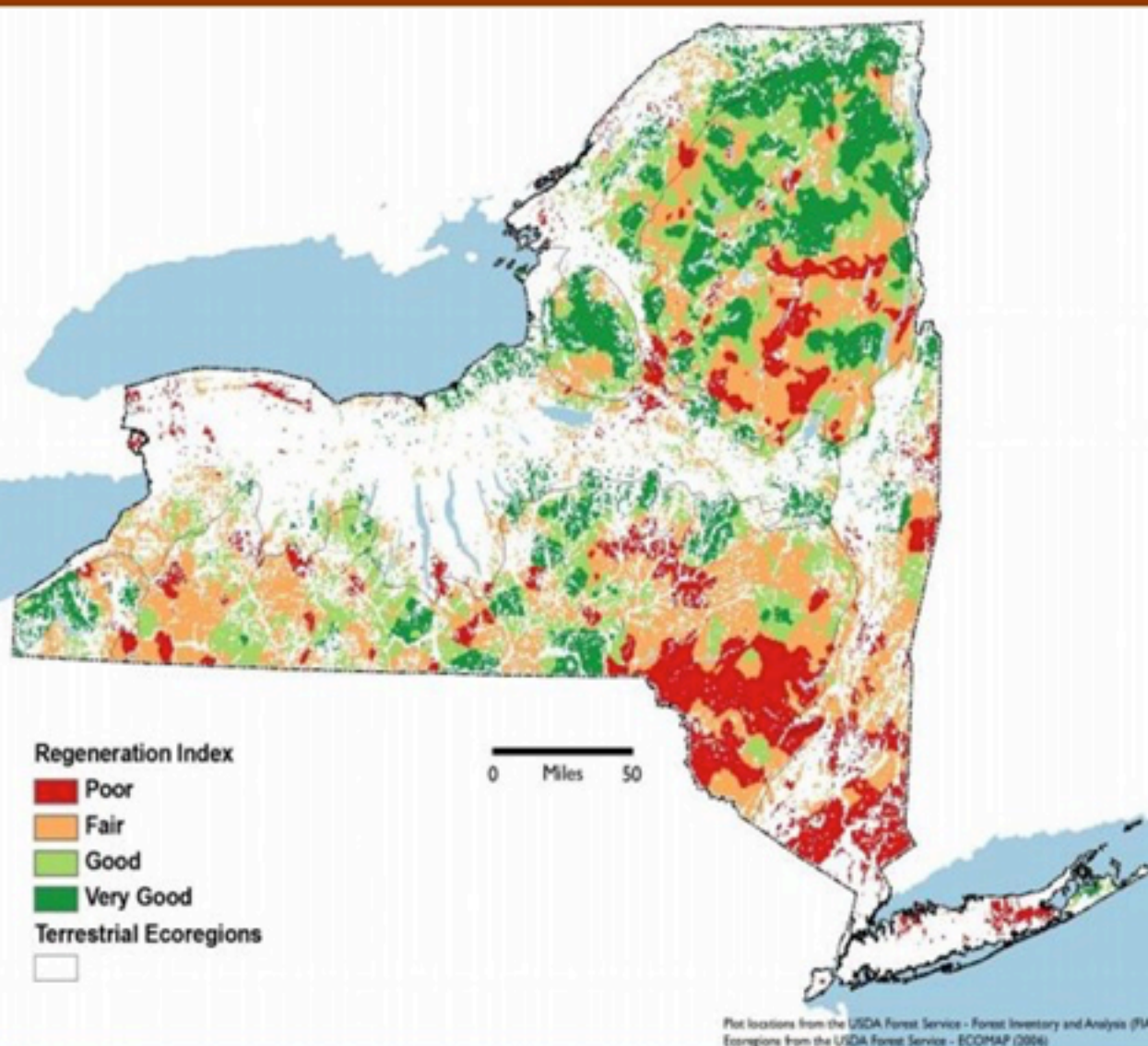
Predicted Regeneration of Native Tree Canopy Species in New York State



68% good – very good

~1/3 poor-fair

Predicted Regeneration of Desirable Timber Species in New York State



43% good – very good

> half poor-fair

Forest Regeneration Success?

Based on Cornell University 2009 Survey of Foresters
(% of forest stands)

	Statewide	Adirondacks	Southern Highlands	Other Regions
Highly successful	13	12	16	8
Moderately successful	17	31	13	16
Marginally successful	45	50	47	38
Complete failure	25	7	24	38

Reasons for Marginal or Failed Forest Regeneration?

Based on Cornell University 2009 Survey of Foresters
(% of respondents)

	Statewide	Adirondacks	Southern Highlands	Other Regions
Deer browsing	72	38	76	81
Interfering vegetation	50	42	60	39
Landowner lack of interest or knowledge	27	9	23	40
Landowner did not invest adequate \$\$	14	16	17	9
Soil or site limitation	14	14	11	19
Forest health	10	11	6	15

Forest Regeneration

Successful hardwood regeneration in the NE is dependent upon three interacting management components:

- 1) Correct silvicultural treatments of the overstory (e.g. shelterwood, clearcut)
- 2) Control of understory competition (e.g. herbicide, cutting of beech or fern)
- 3) Control of deer herbivory (e.g. fencing, hunting, slash cover)

White-tailed Deer



Keystone herbivore=
ability to change their
own habitat, and the
habitat for other species

How Do Deer Affect the Forest?

Change the Forest Structure



Missing layers of vegetation

How Do Deer Affect the Forest?



How Do Deer Affect the Forest?

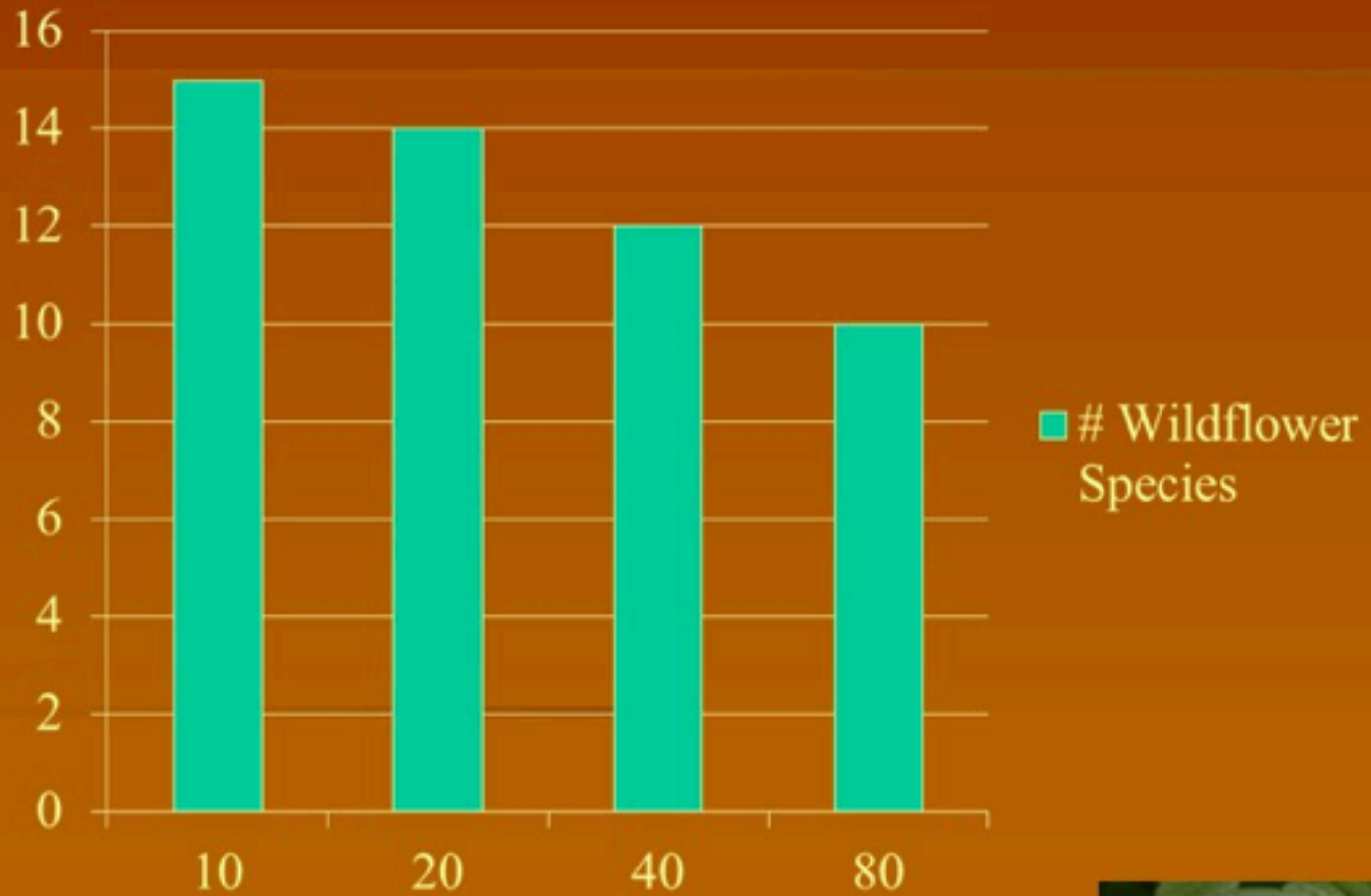
Influence the kinds of plants growing in the forest

High Preference Species	Low Preference Species
Red maple (<i>Acer rubrum</i>)	American beech (<i>Fagus grandifolia</i>)
Sugar maple (<i>Acer saccharum</i>)	Hop hornbeam (<i>Ostrya virginiana</i>)
White ash (<i>Fraxinus americana</i>)	Striped maple (<i>Acer pensylvanicum</i>)
Aspen (<i>Populus spp.</i>)	White pine (<i>Pinus strobus</i>)
Oak (<i>Quercus spp.</i>)	Red pine (<i>Pinus resinosa</i>)
Basswood (<i>Tilia americana</i>)	Spruce (<i>Picea spp.</i>)
Eastern hemlock (<i>Tsuga canadensis</i>)	American hornbeam (<i>Carpinus carolinensis</i>)
Birch (<i>Betula spp.</i>)	Black cherry (<i>Prunus serotina</i>)
Maple-leaf viburnum (<i>Viburnum acerifolium</i>)	
Red elderberry (<i>Sambucus racemosa</i>)	
Blackberry and raspberry (<i>Rubus spp.</i>)	

Deer Density vs. Wildflower Species Richness



Wildflower Species

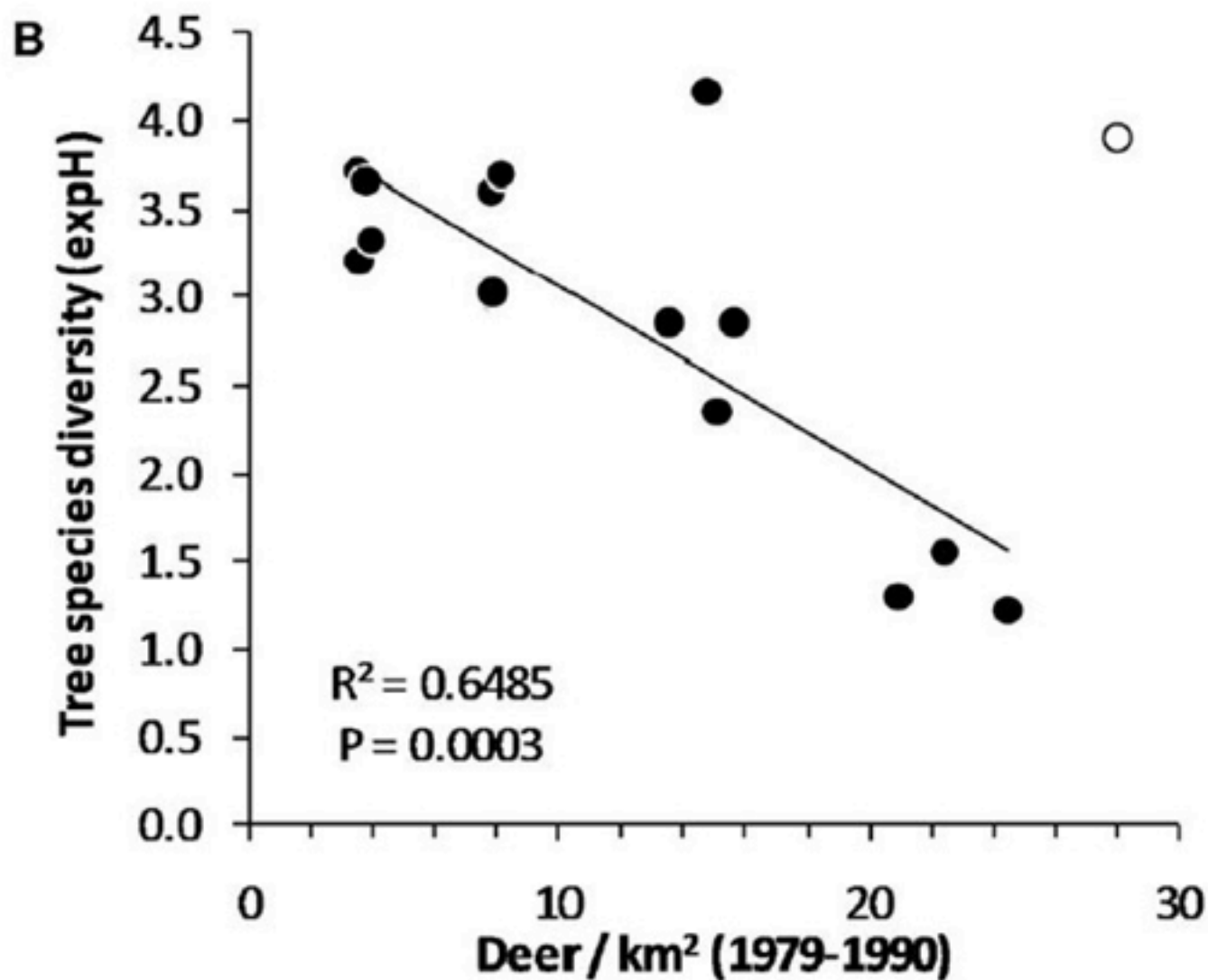


Deer Density #/Square Mile



Legacy Effect

Tree Species Diversity 2005



How Do Deer Affect the Forest?

Browsing native plants allows room for invasive plants to take over



Degraded plant community, structure favorable for black-legged ticks

Browse tolerant native plants can also take over and may require purposeful management to restore even if deer populations are reduced



How Do Deer Affect other Wildlife?

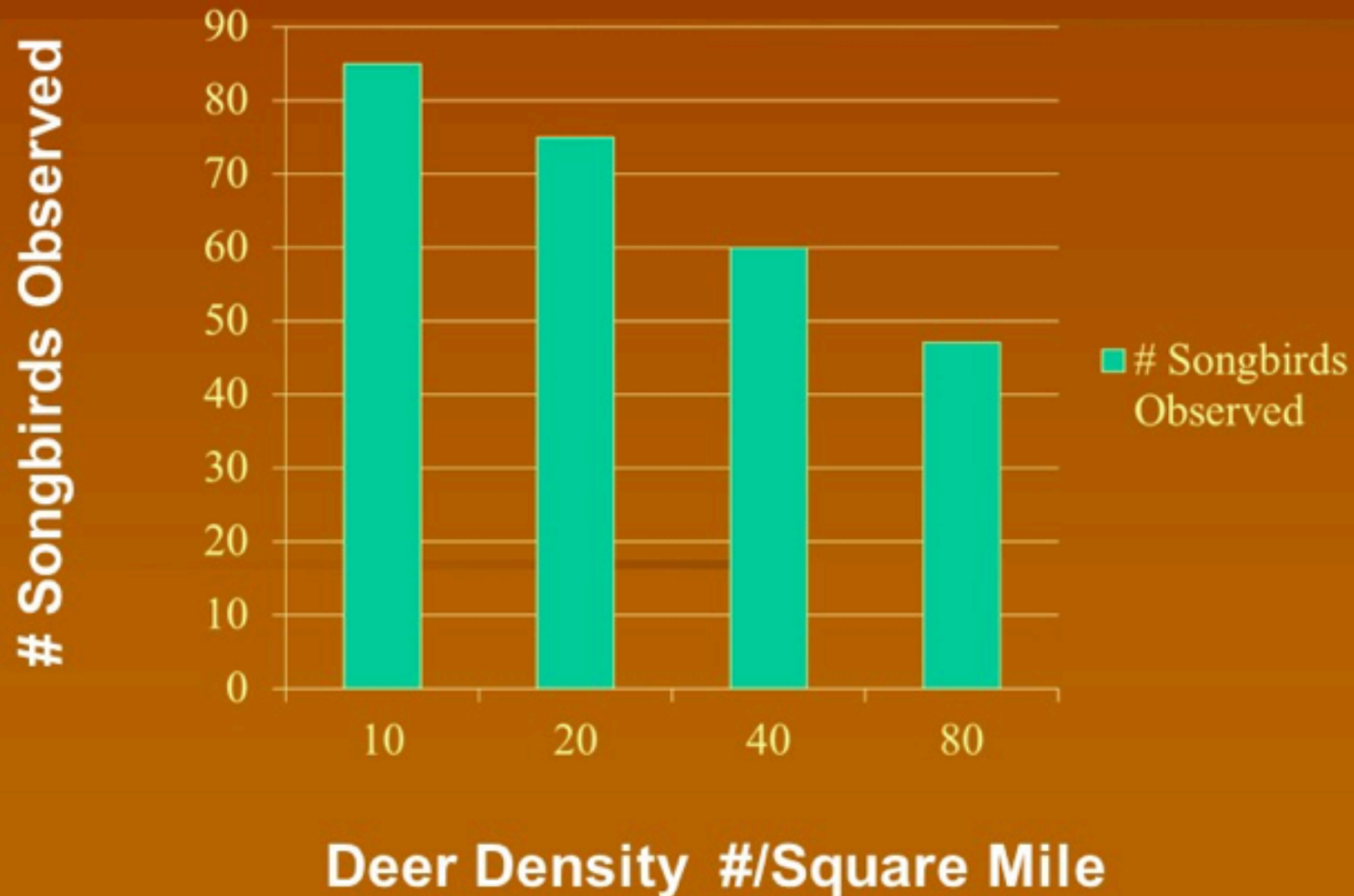
Change the Habitat Structure and Composition



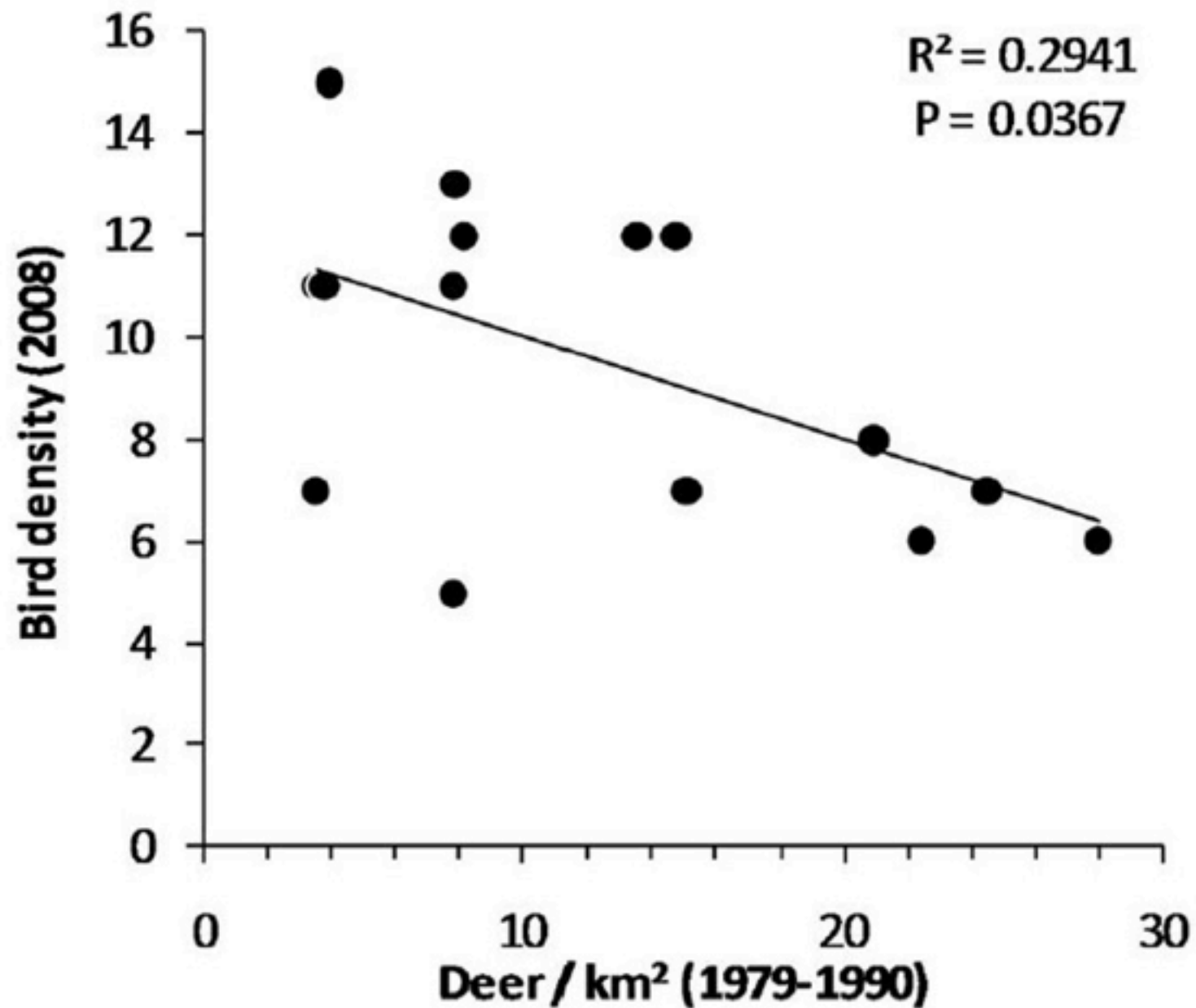
VS



Deer Density and Songbird Abundance



Legacy Effect on Bird Density - 2008



Forest breeding bird species trends 1980-2005

Mid-story, shrub, and ground nesters ↓



Photo credit: Cheep shot



Photo credit: Andy Reago & Chrissy McClarren



Photo credit: Andy Reago & Chrissy McClarren

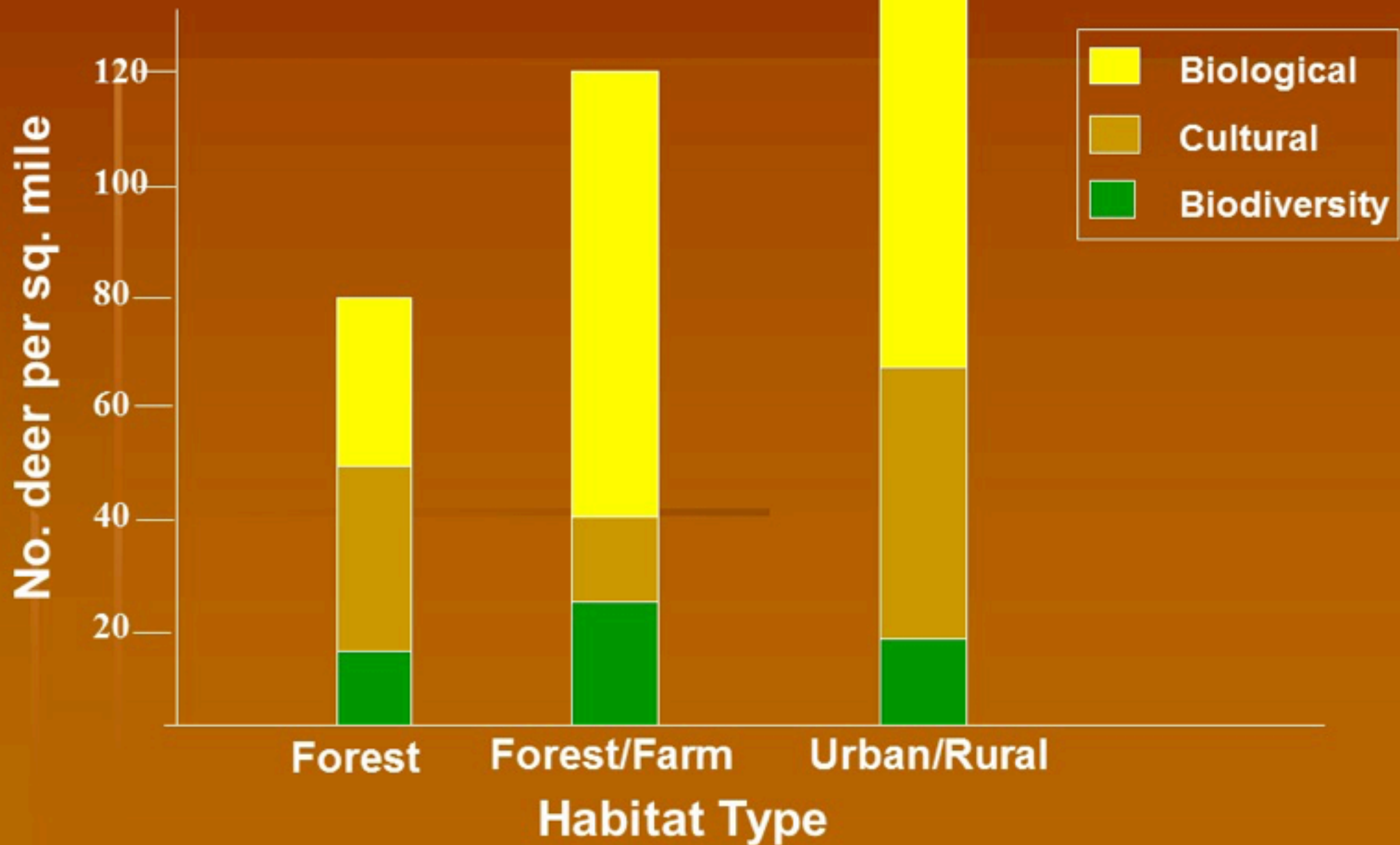
Canopy nesters ↑ or stable



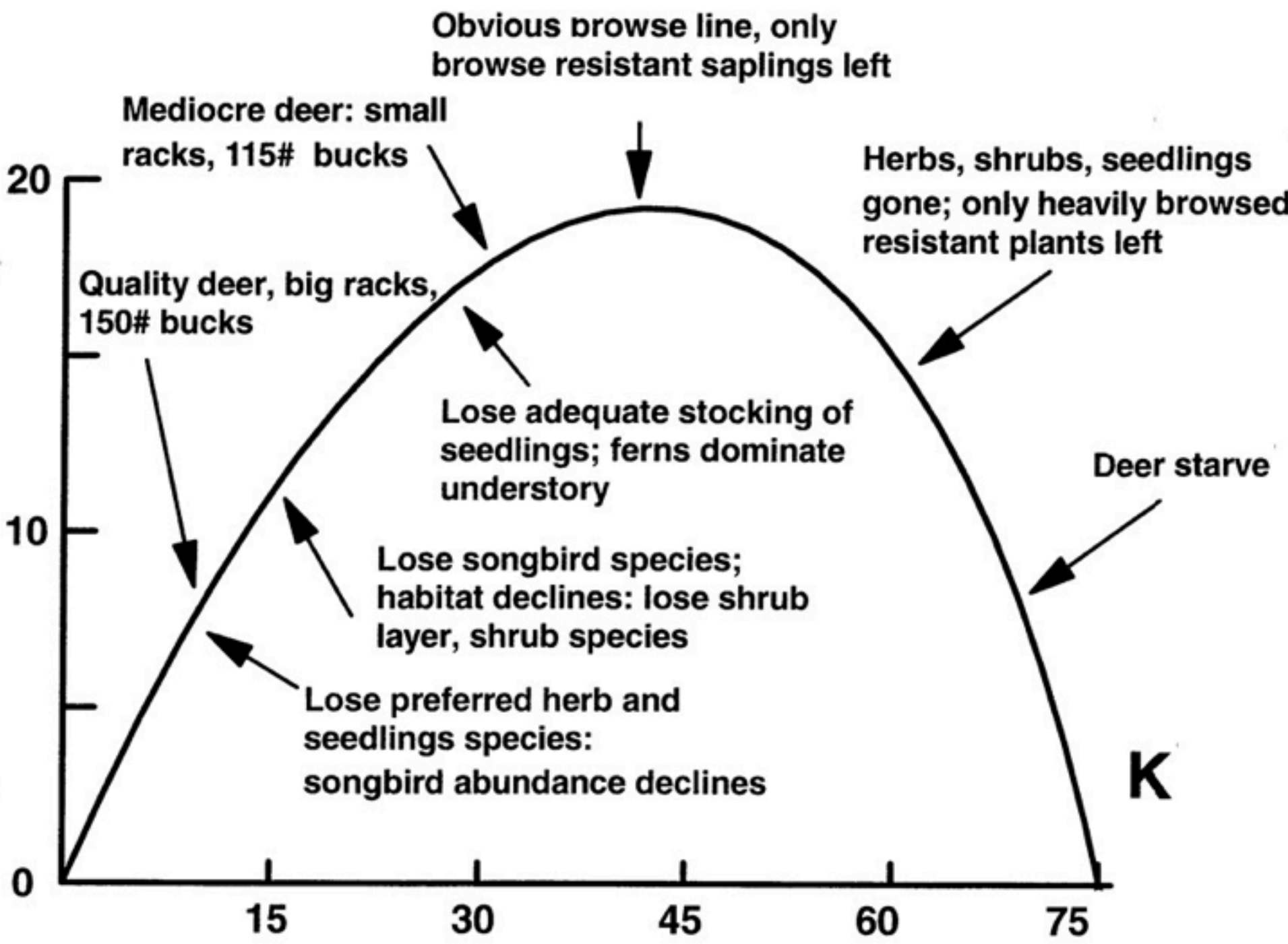
Photo credit: Bonnie Gruenberg



Carrying Capacity of Deer Habitat



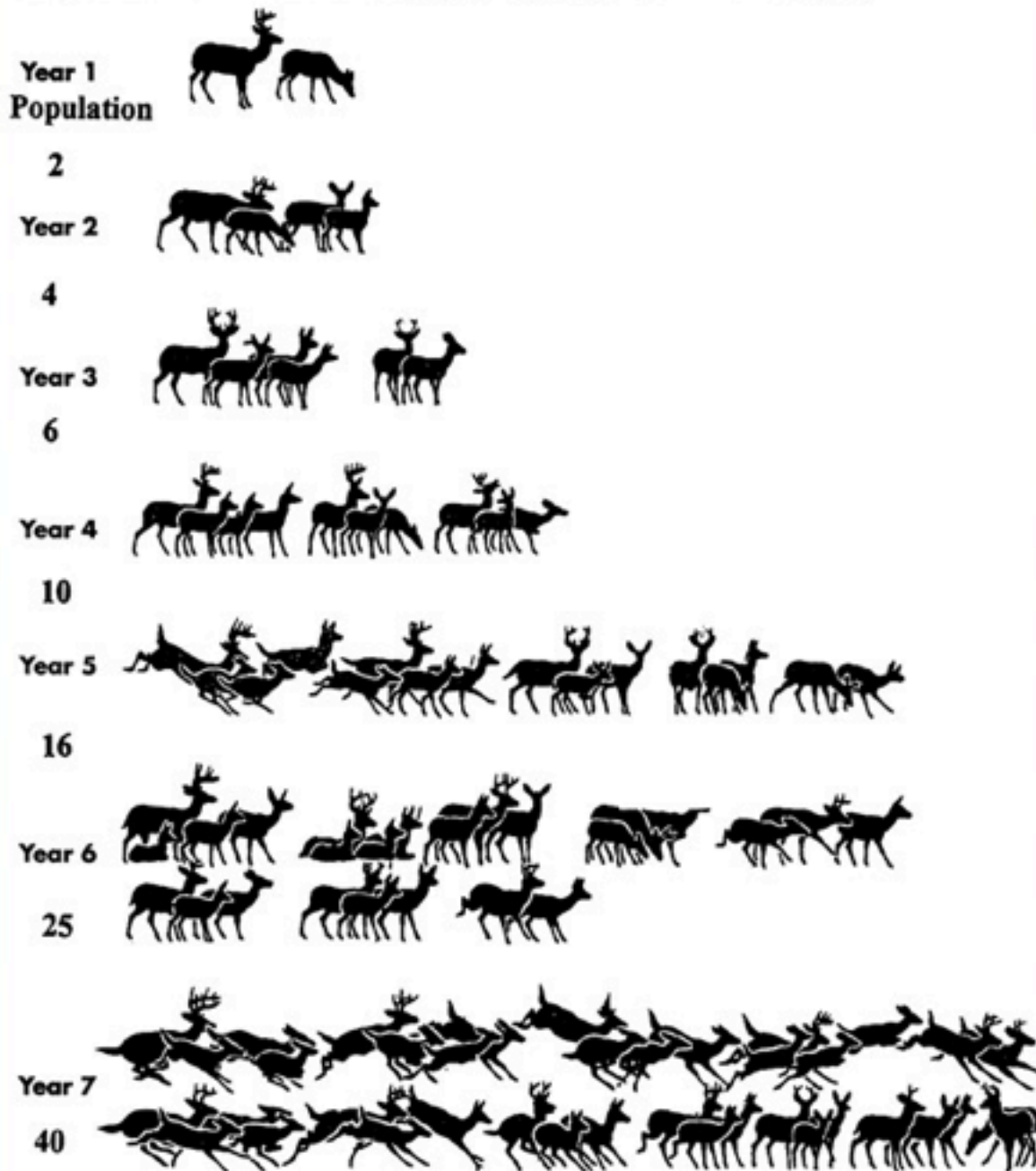
NET PRODUCTIVITY
(DEER PER SQUARE MILE)



Deer Per Square Mile



POPULATION DYNAMICS OF WHITE-TAILED DEER



Under conditions of NO immigration, emigration, mortality, or population growth limitation

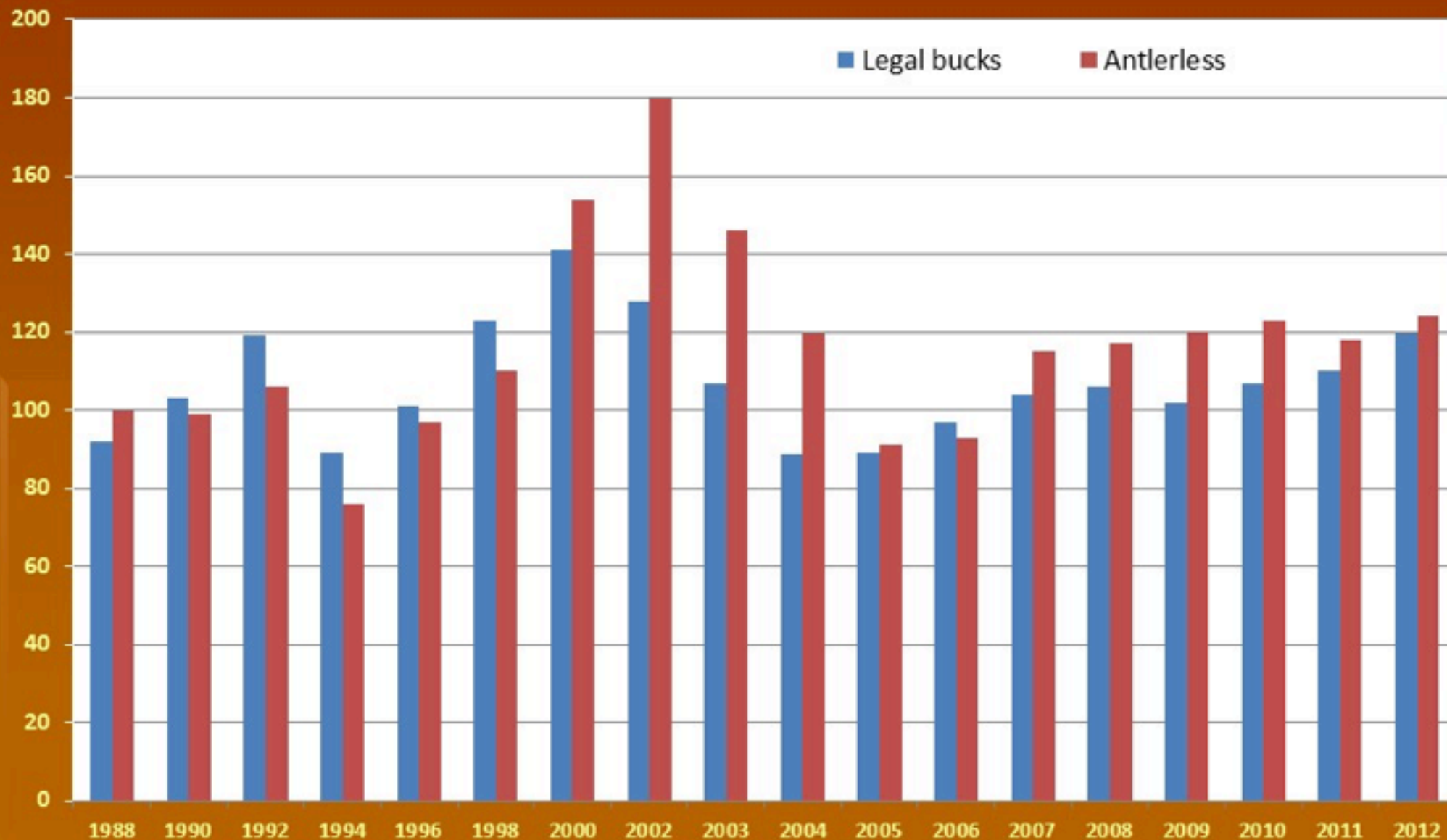
That's a 19-fold increase in 7 years, with a 1:1 sex ratio

Bottom line:

Over 40% of the herd must die or go elsewhere **annually** to stabilize herd

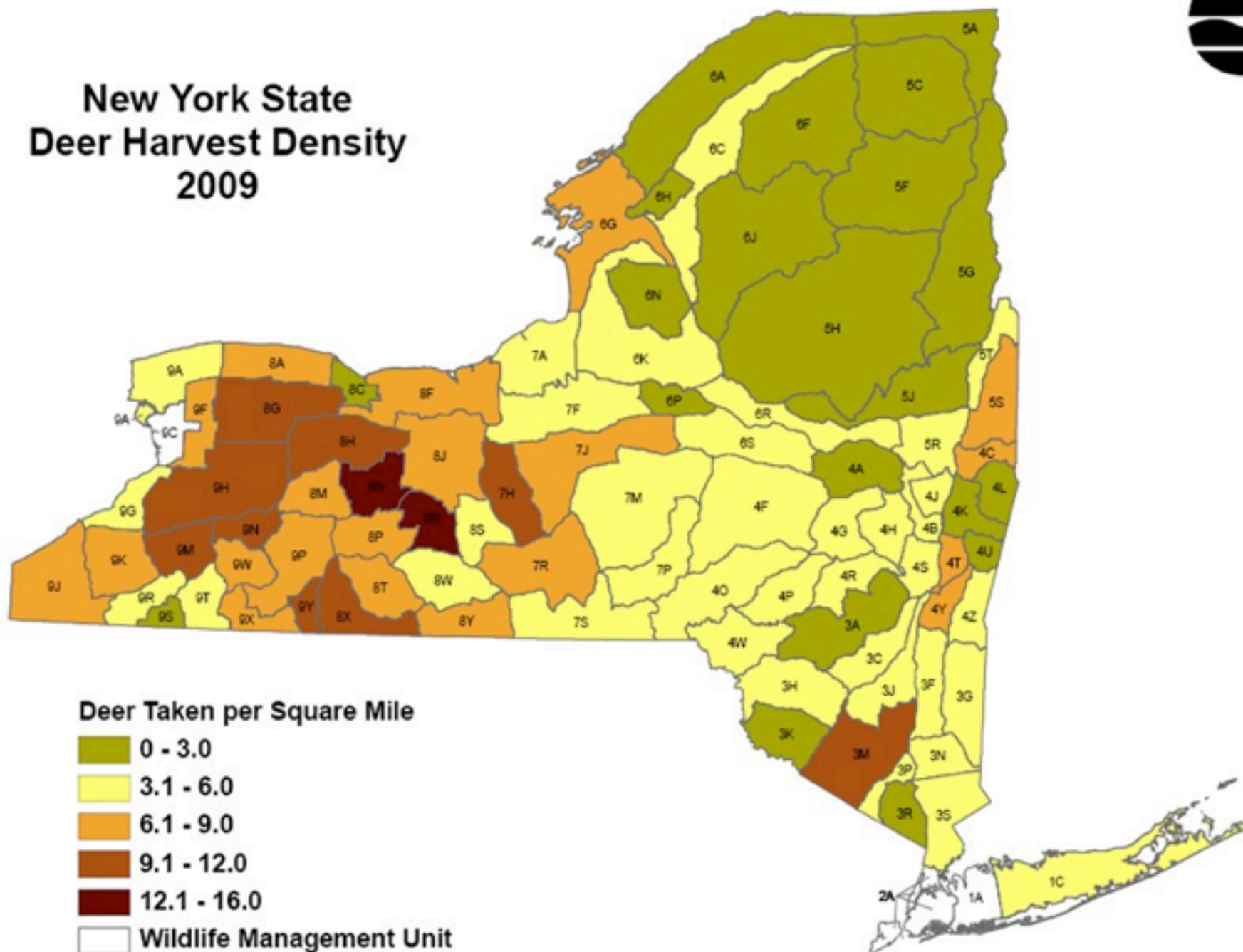
NYS Deer Harvest

Thousands





New York State Deer Harvest Density 2009



Problems Caused by Deer Overpopulation



Deer Management Toolbox

No Population Control

- Hands-off
- Damage control
repellents
fencing
- Feeding illegal

Population Control

Lethal methods

- Predator introduction
- Capture and kill
- Bait and shoot
- Traditional hunting
- Controlled hunting
- Commercial hunting??

Non-lethal methods

- Habitat alteration
- Capture and relocation
- Fertility control
transient
permanent

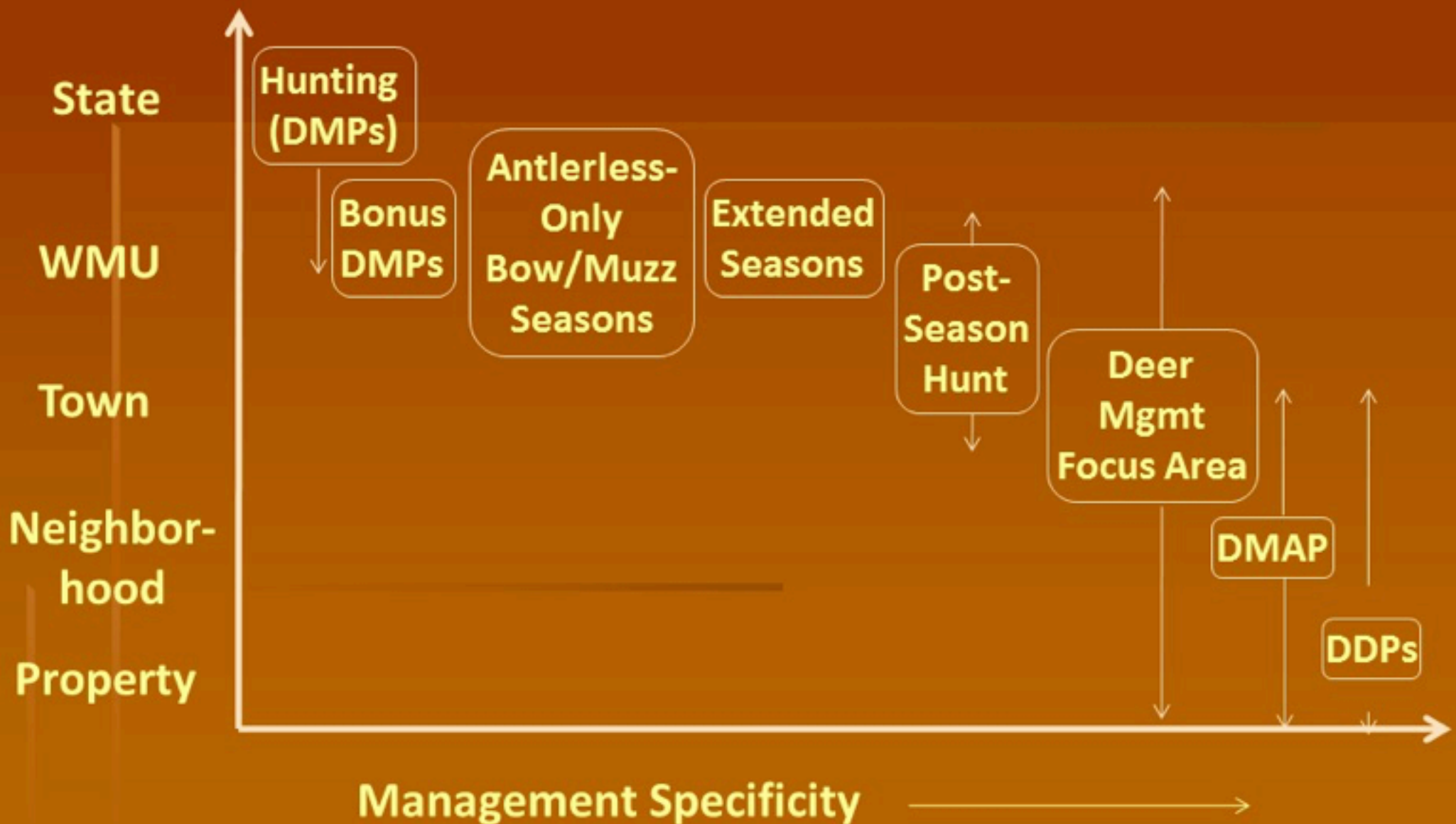


Scales for Deer Management

- Individual property
- Community
- Landscape

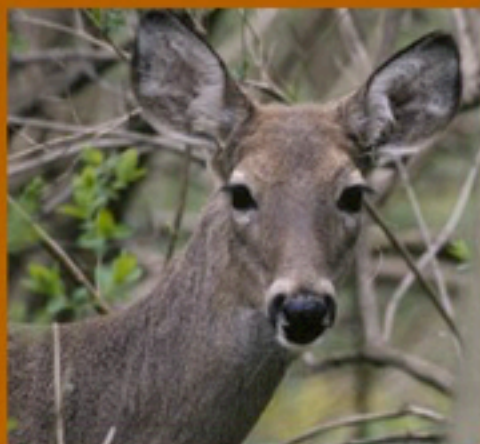


Various Scales of Deer Management in NY

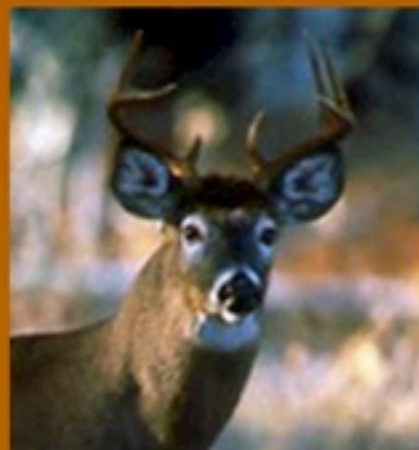


As A Landowner, You Have Control Of Hunting On Your Property

- Tailored to meet your local needs
- Restrictions on who, when, where & how
- Sex, age, and number of deer to be taken
- Marksmanship requirements
- Must check local Town and Village discharge ordinances



OR



Deer Exclusion Alternatives

- 8-foot barrier fences
- Individual tree protection
- Electric fences
- Dogs and invisible fences
- Slash





Seedlings protected by slash

Commercial Deer Repellents

- BGR Deer-Away
- Hinder
- Deer-Off
- Chew-Not
- Bonide Rabbit/Deer Repellent
- Hot Sauce Repellent
- Tree Guard
- Spotrete-F



Ellis Hollow

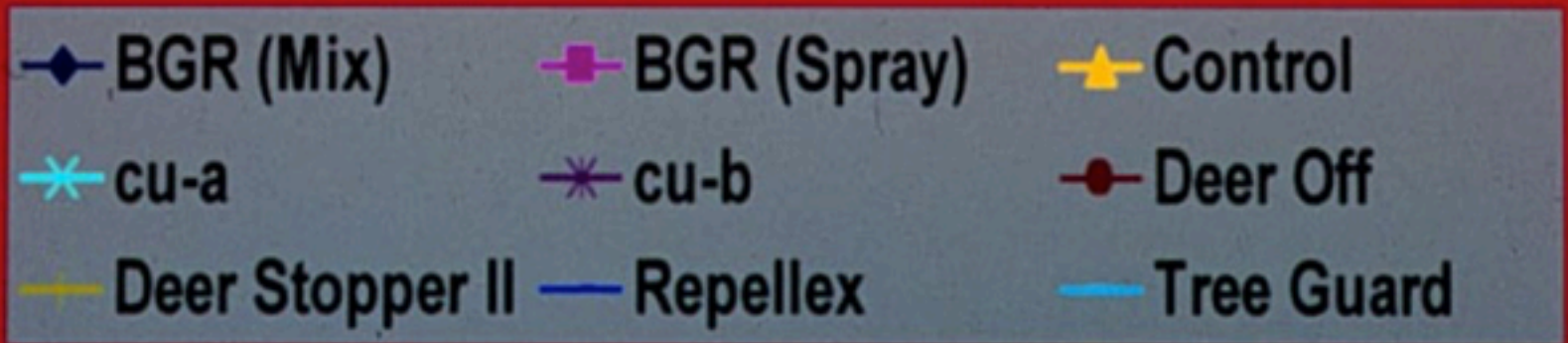
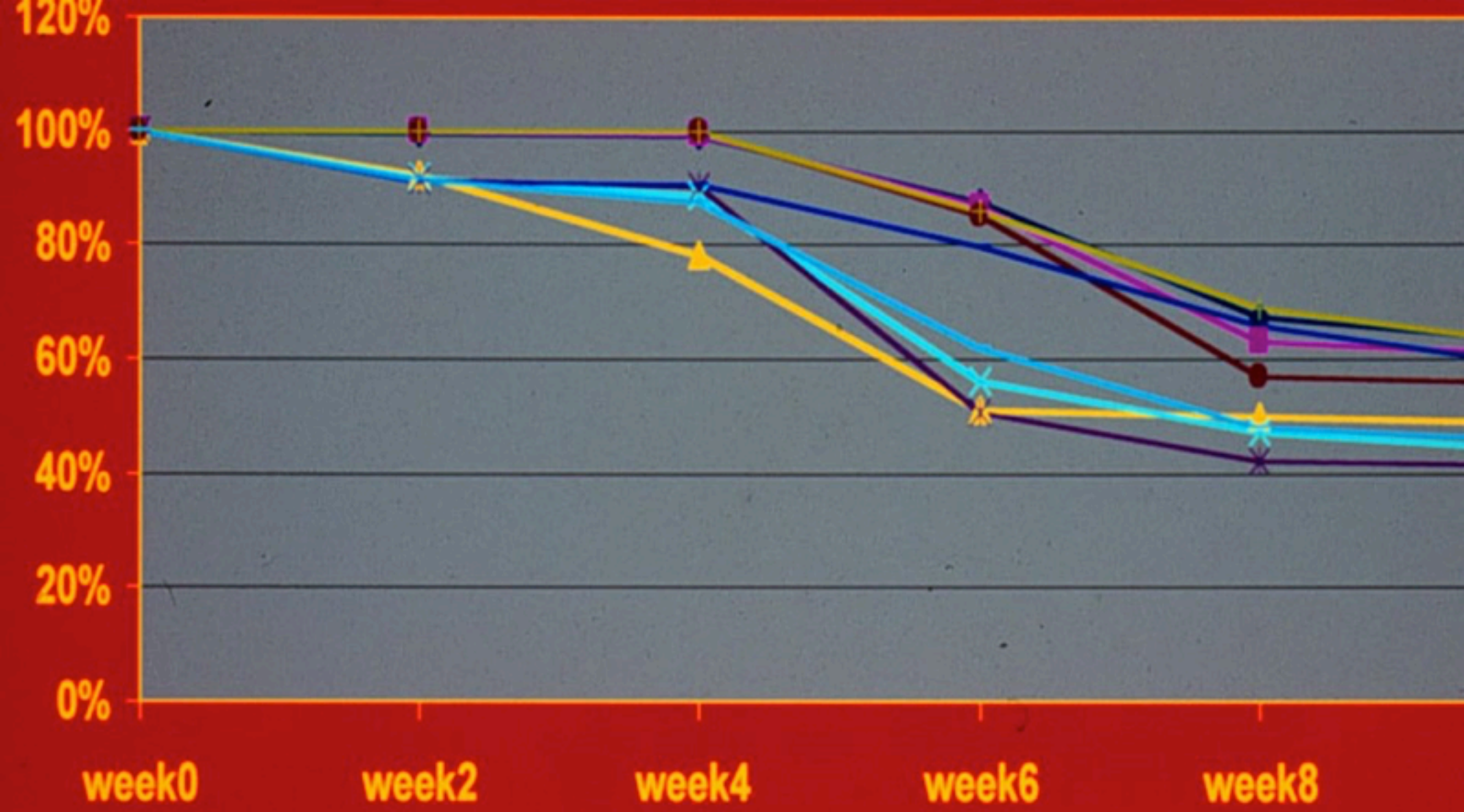
Site 1

Deer Stopper II

Block 2

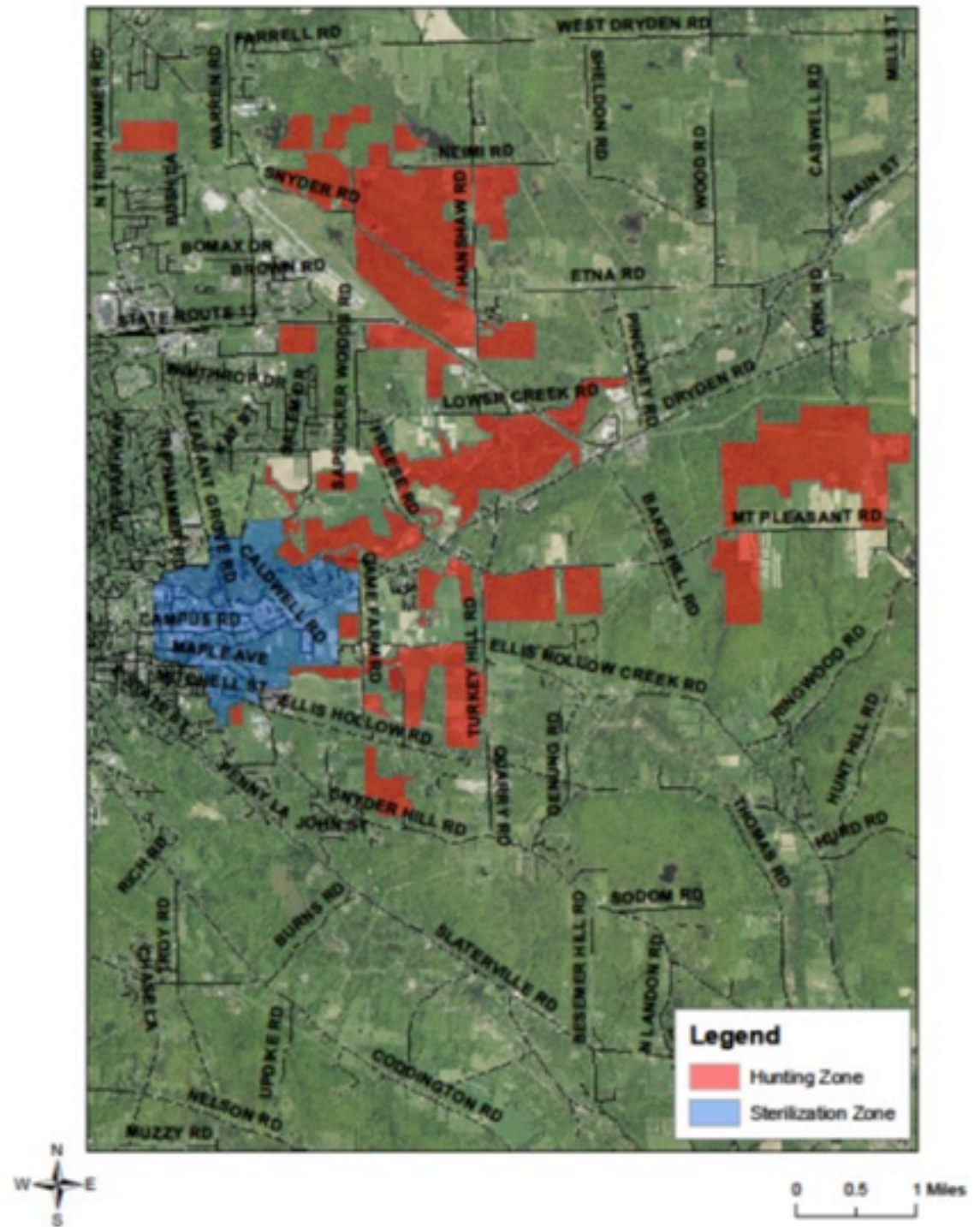






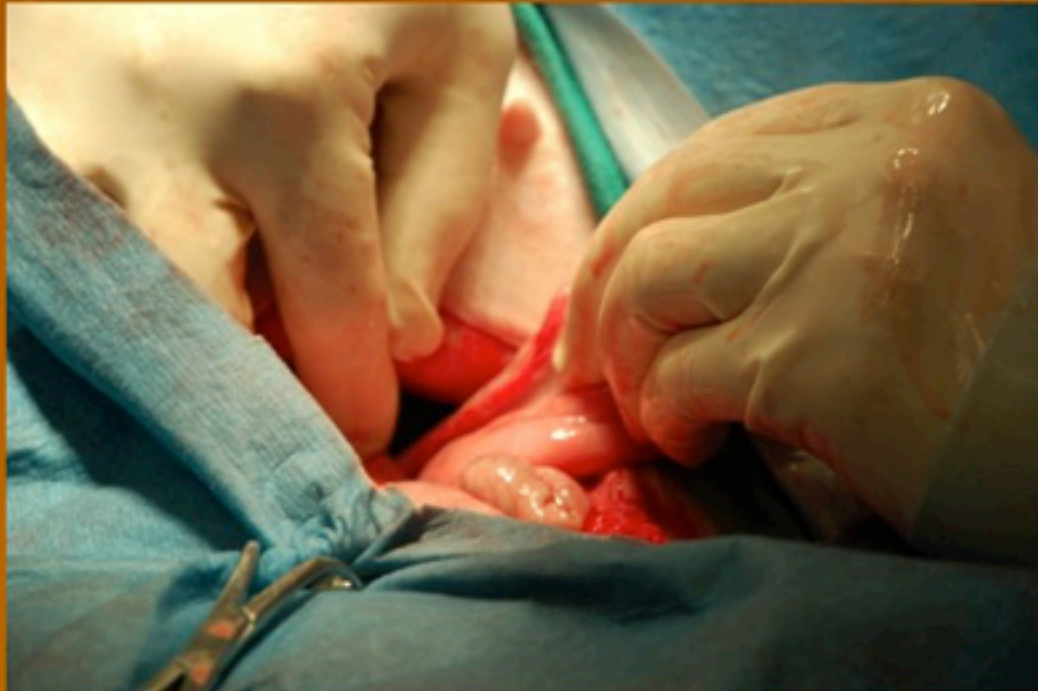
Cornell's Novel Approach:

- Surgical sterilization combined with controlled hunting
- 10-year program



Core Campus 446 ha (1,103 acres)

- Fertility control research
- Fencing for sensitive plots
- Goal: 75% reduction in deer abundance and associated impacts within 5 years





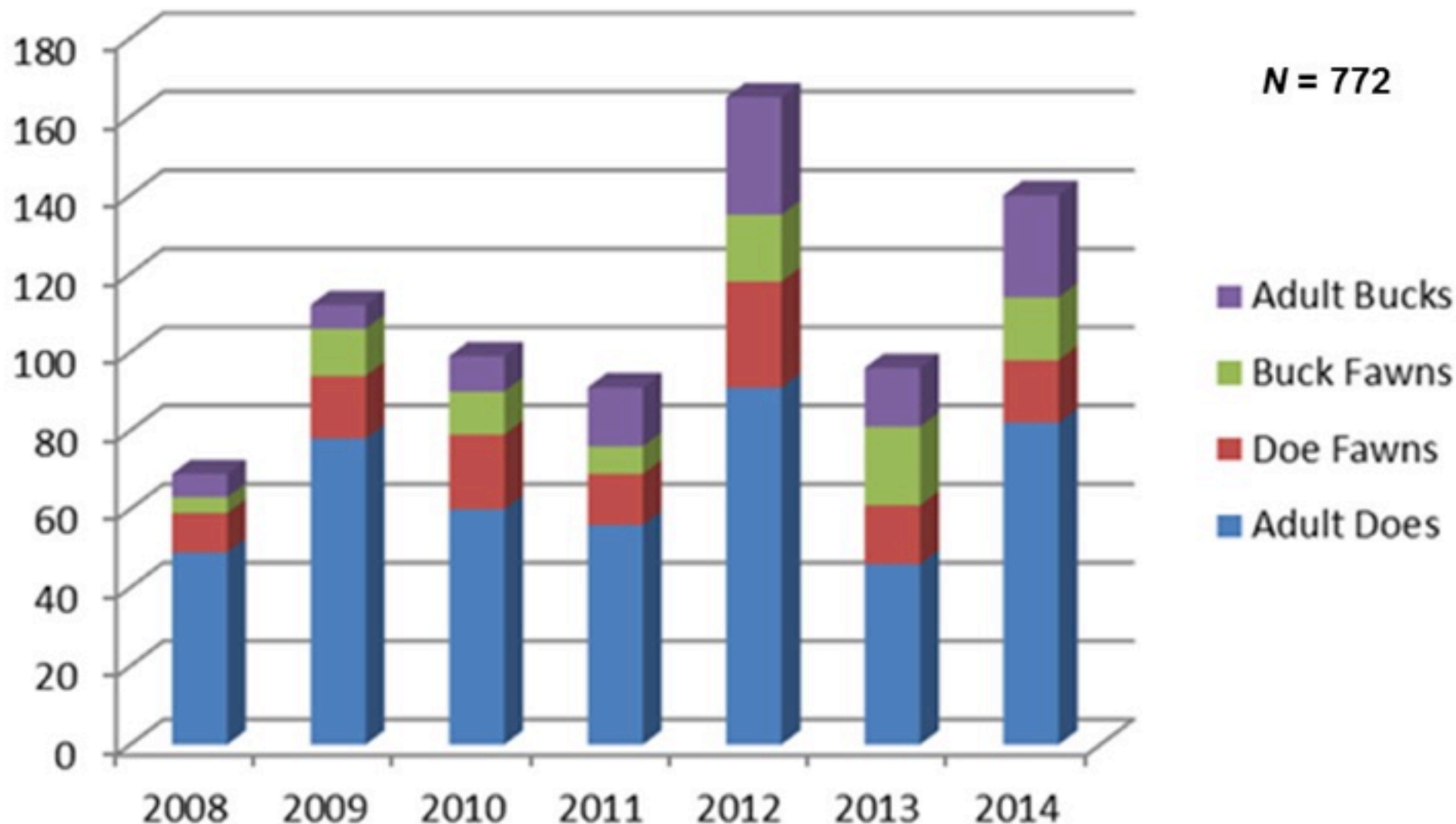
2007–2013 Surgery Results

- 93 surgeries (90-95%; 77 adults & 16 fawns)
- 26 marked, unsterilized control does
- Mortality ($n = 82$)
 - ┌ 32 motor vehicle
 - ┌ 36 hunter harvest
 - ┌ 6 other
 - ┌ 4 capture-related
 - ┌ 4 unknown
- ┌ 31 deer still alive



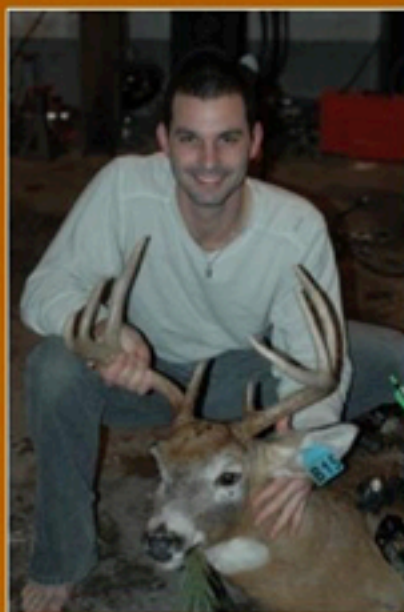
Deer Harvest Results

Number of Deer



Deer Harvest Results

	2008	2009	2010	2011	2012*	2013*	2014*
Active hunters	97	187	198	195	538	405	581
Bucks harvested	6	5	9	15	30	15	26
Avg. hours hunted per deer	49	61	51	64	85	88	82
% of successful hunters	38%	25%	27%	28%	18%	19%	17%



Population Estimation

- **Sterilization Zone**
 - Mark-recapture camera survey
 - Baited stations
 - Infrared-triggered cameras

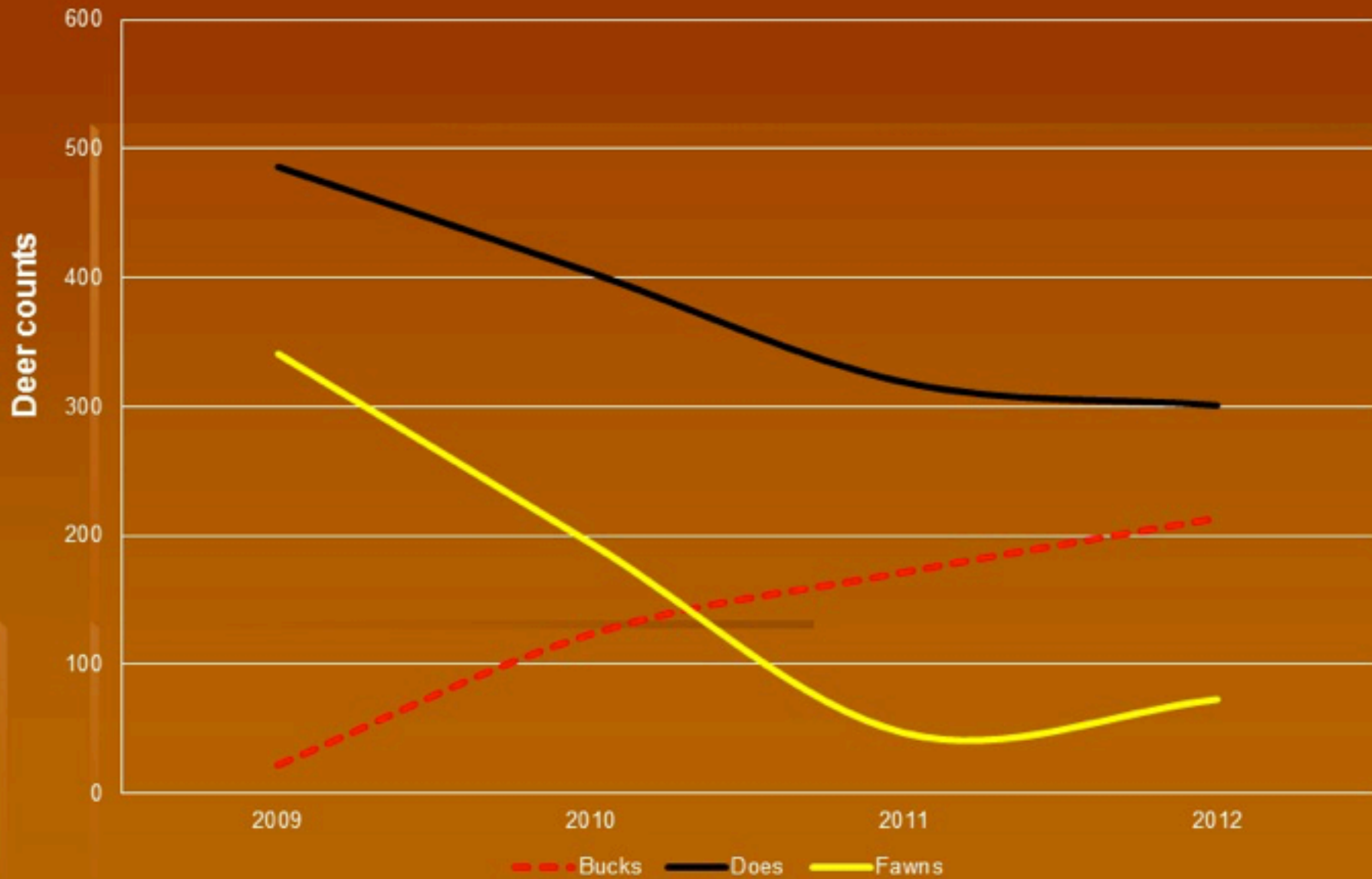


Camera Survey

<u>Year</u>	<u>Bucks</u>	<u>Does</u>	<u>Fawns</u>
2009	22	486	341
2010	124	404	194
2011	172	319	47
2012	214	301	73

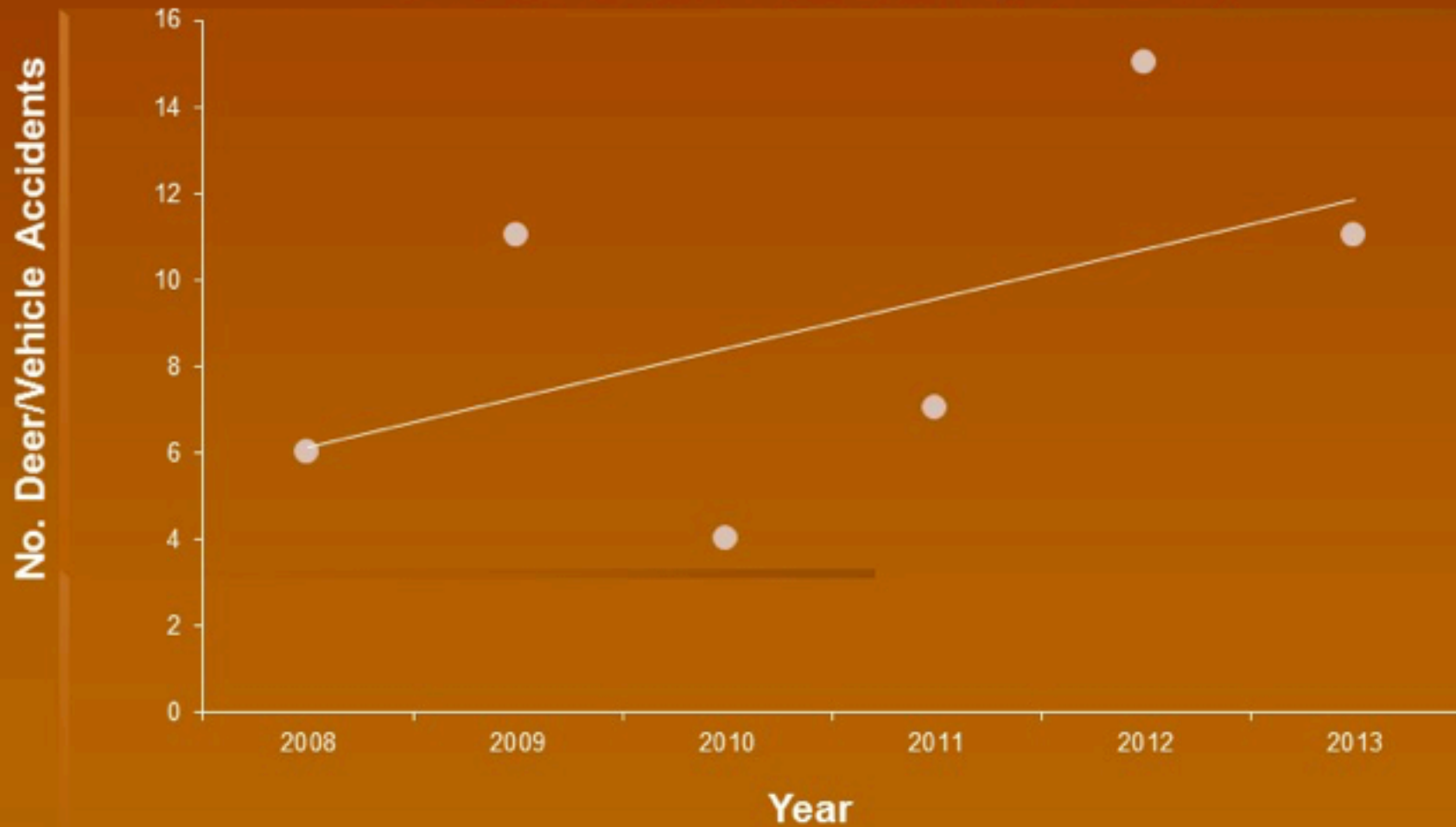


Collateral Impacts



Impact Assessment

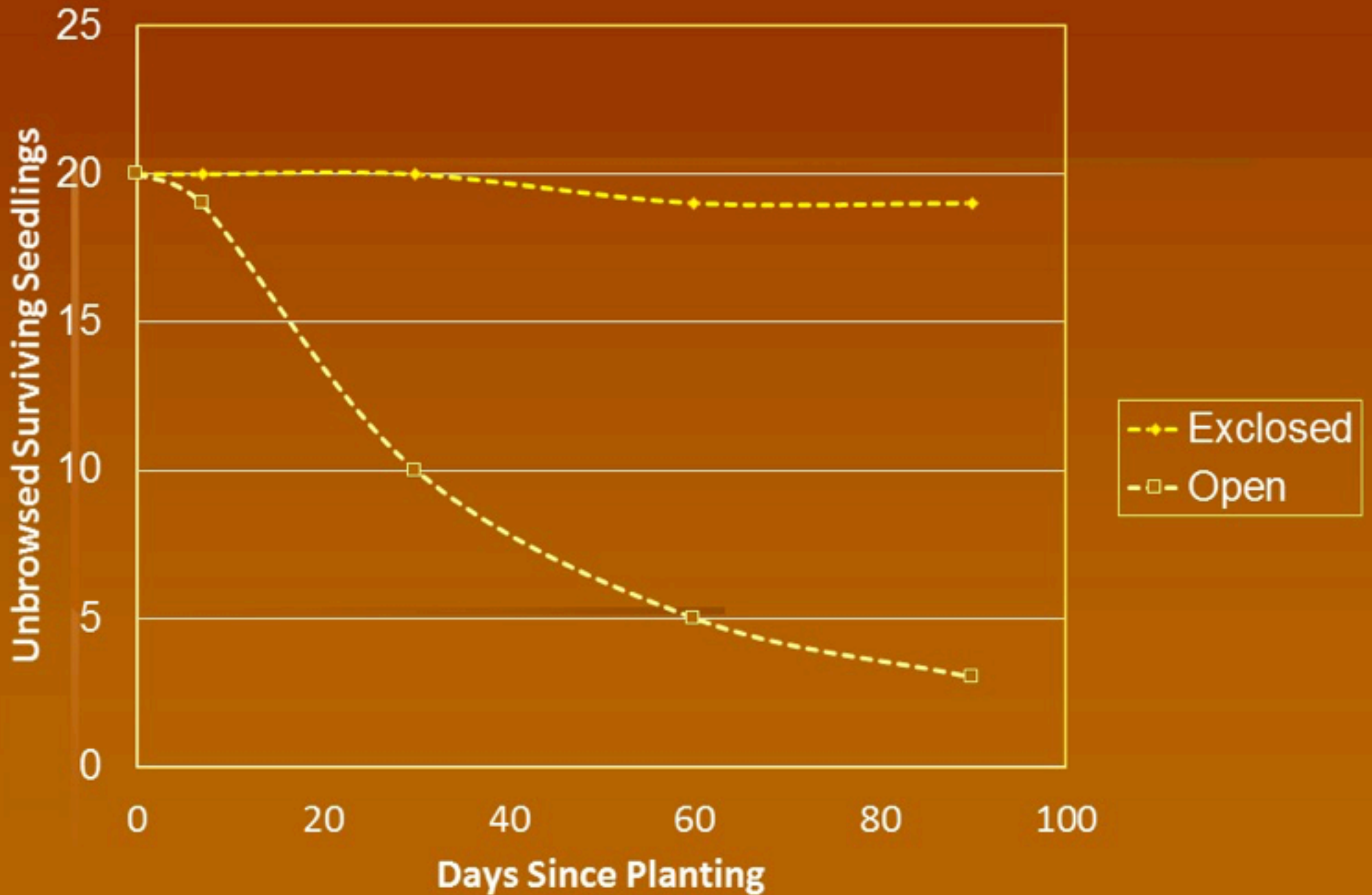
CU Deer-vehicle Accidents (2007-2013)



Herbivory and Oak Seedling Survival



Cornell Golf Course

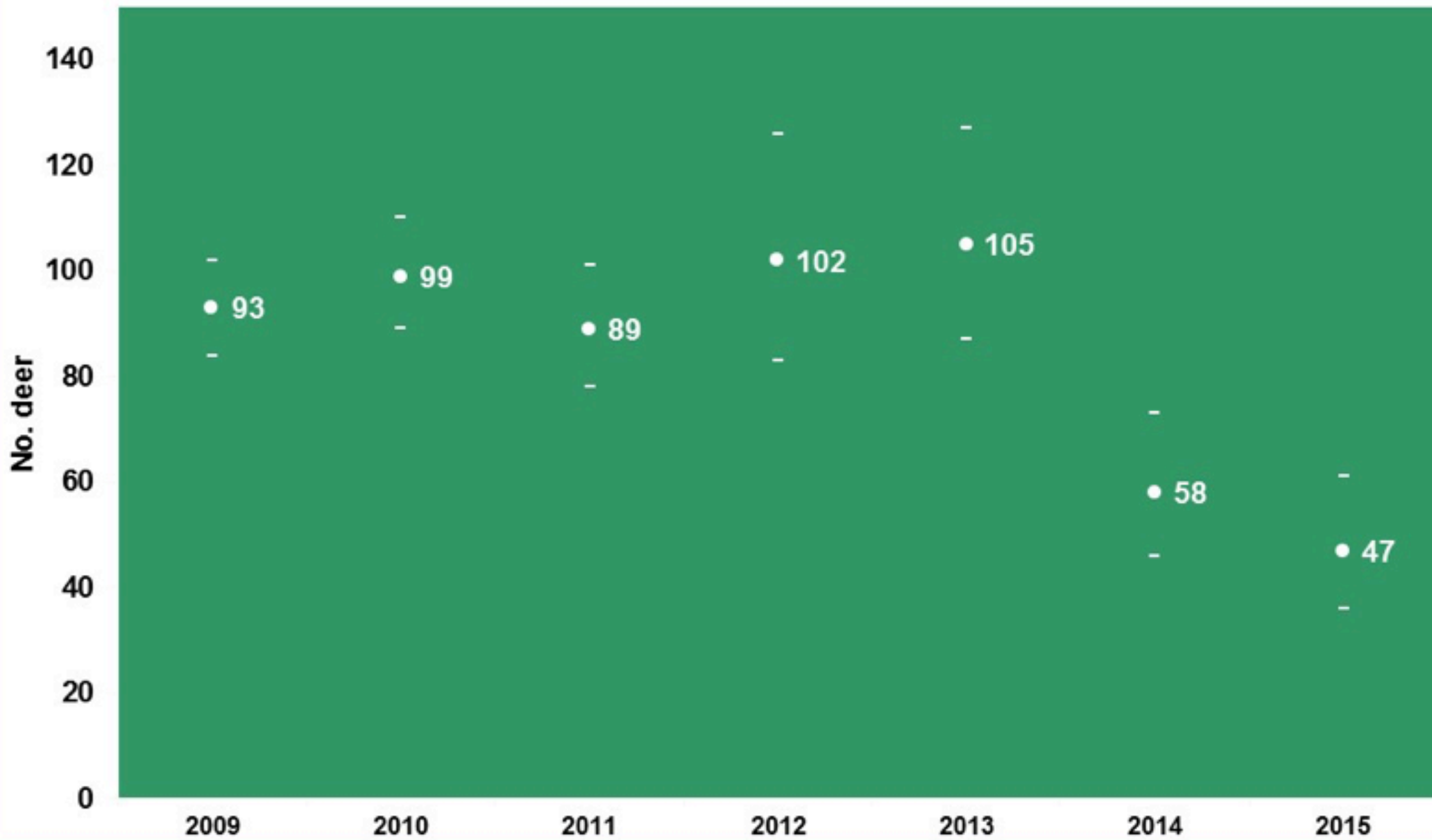


DEC Deer Damage Permit

- Provides access to deer in non-hunting areas
- Shooter screening and selection
- Antlerless deer only
- Used bait to attract deer
- Used lights for shooting until 11 PM
- Used bows and crossbows on campus
- ECL-mandated discharge distance
- Limit based on number of tags issued
- Report to NYSDEC
- Took 34 deer in 2013-14, most at night
- Took 37 deer in 2014-15



Sterilization Zone Deer Population Estimates

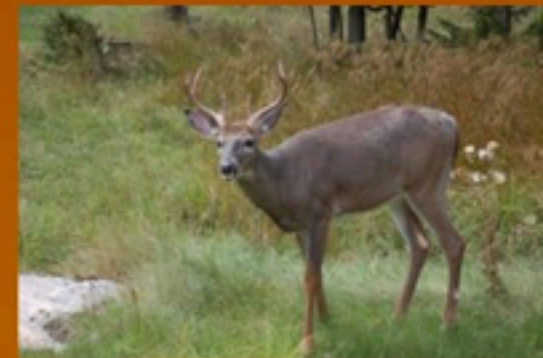


Community Recommendations

- **Develop assessments so the effectiveness of management approaches can be validated.**
- **Avoid nonlethal methods, as they have shown little promise in areas where deer can move freely.**
- **Develop local expertise on deer management.**
- **Community support for the program will be essential.**
- **Once started, some form of deer management will need to be maintained for the foreseeable future.**

Deer-Forest Impacts Project

- CCE will be conducting workshops to aid landowners with identifying and reducing deer impacts to regeneration
- Collaborating with DEC, ESF and the Univ. of Georgia faculty on app development
- Developing paper data forms and photo bank during summer 2015; field test the phone app in 2016
- <http://wp.wildlifecontrol.info/research/deer-forest-impacts-project/>



AVID

Assessing Vegetation Impacts from Deer



*A Rapid Assessment Method for Evaluating
Deer Impacts to Forest Vegetation*