

# Emerging Issues with overabundant white-tailed deer populations in Onondaga County, New York

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Thanks for inviting me to speak to you about this important issue.

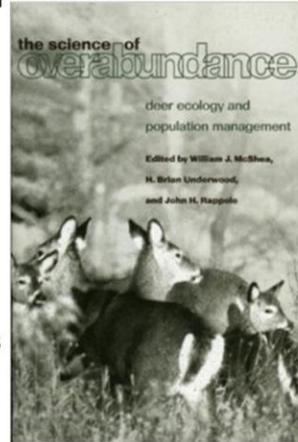
## Research Experience

- 25 years as a Research Wildlife Biologist, first with the NPS and since 1996, with the USGS Patuxent Wildlife Research Center
- BS – WVU, MS, PhD SUNY-ESF; both thesis and dissertation on population dynamics of central Adirondack deer
- Worked on deer issues in over a dozen National, State and Municipal parks including Cape Cod National Seashore, The Adirondack State Park, Green Lakes State Park, and 3 upstate municipalities
- Currently working with Fire Island National Seashore, Montezuma National Wildlife Refuge and the Town of DeWitt

I've been doing this a long time and have a lot and varied experience in a variety of federal, state and municipal jurisdictions.

## Publication Record

- I've authored or co-authored 22 papers, books or book chapters on white-tailed deer population dynamics and management including:
  - Science of Overabundance; edited book published by the Smithsonian Institution Press (1997); cited over 300 times by peers across the world
  - Contraception and Deer: The Irondequoit Report; book published by the Roosevelt Wildlife Station (2001); explores all aspects of deer fertility control for population management
  - 2 papers on the roles of deer and small mammals in the epidemiology of Lyme Disease



While my interests are broad, I have dedicated a substantial portion of my career to helping land managers deal with deer-related issues.

## Relationship with ESF

- I joined the College of Environmental Science & Forestry as adjunct faculty in 1993 and have mentored 22 graduate students (5 currently; 3 PhD, 2 MS)
- Theses or Dissertation topics dealing with deer: 15
- My expertise includes population dynamics, abundance estimation, deer management planning, fertility control, Lyme disease

Being duty-stationed at ESF allows me to remain active in the teaching and research community. I've raised two children in CNY and feel strongly about giving back to my community both civically and professionally.

## Living with Deer



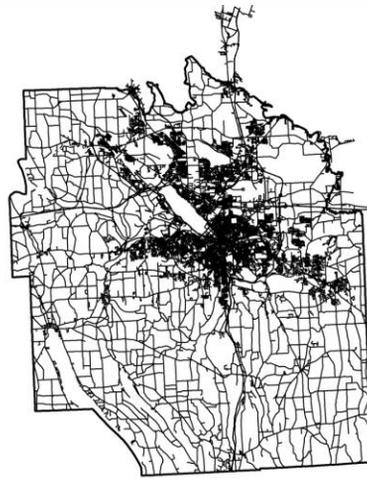
Quality of life issues associated with living with urban deer

Health and safety – Lyme disease and deer-vehicle crashes

Green infrastructure – impacts to regeneration of greenspaces

Landscape & Gardens – nuisance abatement

# Onondaga County

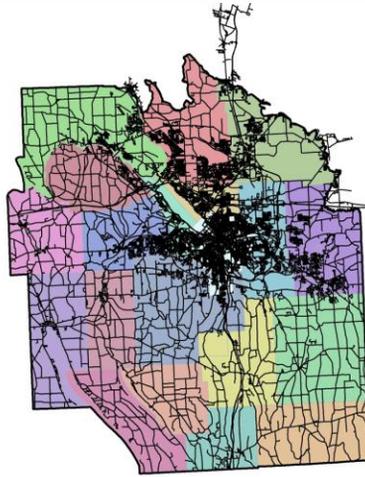


Approx. 800 square miles



Onondaga County is a big space, which at one time, was once entirely forested. Agriculture is the predominant land use outside the Syracuse Metropolitan Area.

# Onondaga County



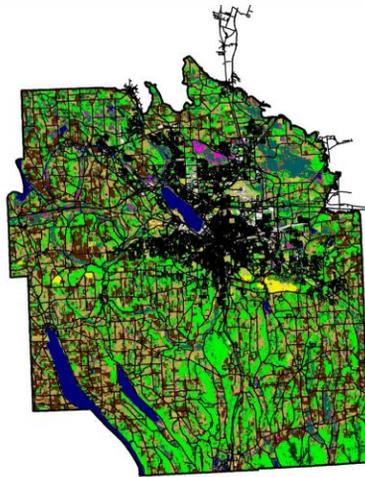
Approx. 800 square miles

19 Towns + Onon Nation

3,600 miles of roadway

Lots of jurisdictions and property ownership

# Onondaga County



Approx. 800 square miles

19 Towns + Onon Nation

3,600 miles of roadway

35% Forested



Onondaga County is a veritable deer paradise with respect to habitat. Between agricultural land uses and the forested nature of the landscape, deer populations have thrived and continue to increase where hunting pressure is not intense (e.g., within most City and Village boundaries. These areas become de-facto refuges where deer numbers can increase rapidly.

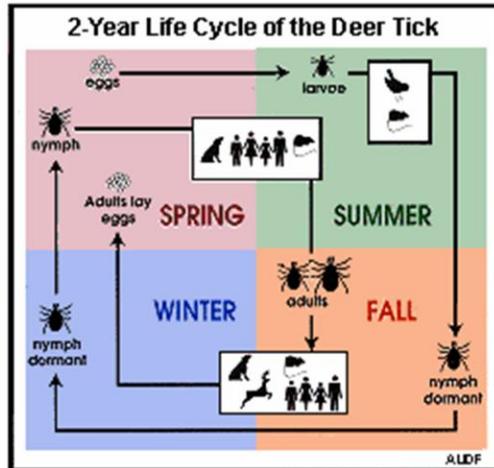
## Main Issues

- Lyme disease
- Deer-Vehicle Collisions
- Nuisance abatement

Unlike most other wildlife species, deer exert an inordinate nuisance factor by their presence in our neighborhoods. First, they eat plants to survive. That doesn't bode well for most gardeners and landscapers. Second, they run into our cars and cause about \$3500 damage per accident (usually fatal to the deer). Finally, they carry ticks that can transmit Lyme disease, the second most diagnosed illness in the eastern US.

# Lyme Disease (Lyme borreliosis)

(*Ixodes scapularis*)



(*Borrelia burgdorferi*)

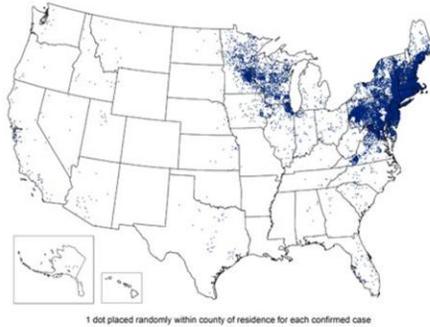
Lyme disease is a bacterial infection caused by a spirochete (*Borrelia burgdorferi*) carried in the gut of a tick. It has a two-year life-cycle and three stages of development once hatched from an egg. Larvae, which emerge in the mid-summer are essentially naïve; that is, they do not carry the LD bacterium (because they haven't yet taken a blood meal). Once larvae take a blood meal, they molt into a nymph which are the size of a poppy seed. About one-quarter of all nymphs are infected with the bacterium that causes Lyme disease. Nymphs are dangerous because they are so difficult to detect once attached to your body. After a blood meal, nymphs molt into adults, of which, most are infected, BUT are much easier to detect on your skin (you can feel them and see them).

# Lyme Disease Prevalence is Increasing

Reported Cases of Lyme Disease -- United States, 2001



Reported Cases of Lyme Disease -- United States, 2013



There are two epicenters of LD in the US. LD is spreading in part to every increasing deer populations, especially around human population centers.



Deer are INCOMPETENT reservoirs, so they cannot transmit LD to an uninfected tick

Deer move the disease around on the landscape and along with some birds, are responsible for its geographic spread.

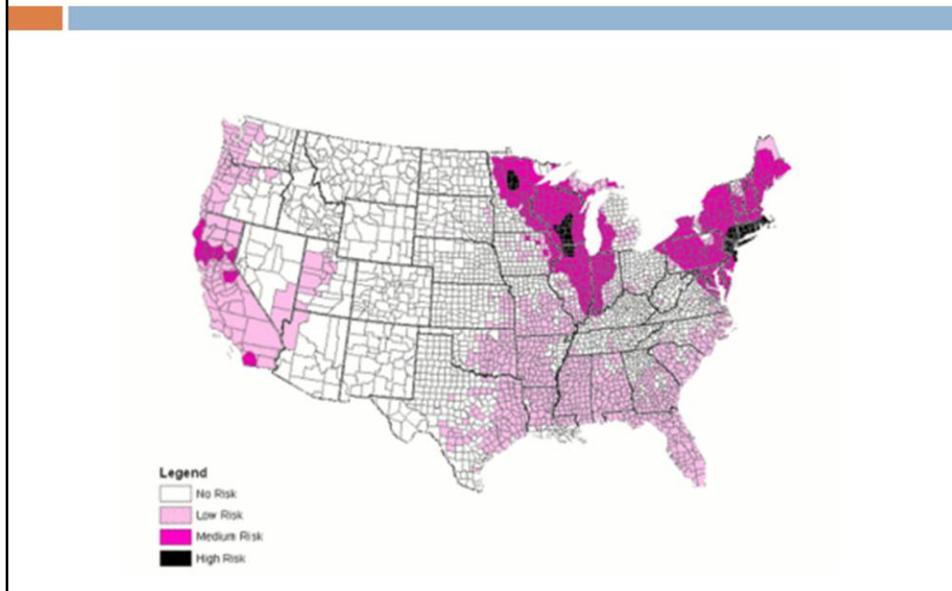
Mice are COMPETENT reservoirs, so they can transmit LD to an uninfected tick

Manage the mice and manage the disease risk



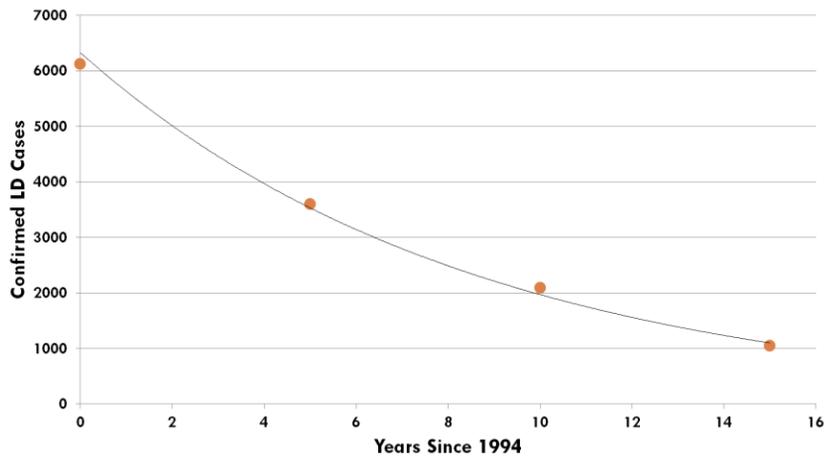
Adult black-legged ticks exhibit host specificity toward white-tailed deer. An uninfected tick cannot get LD from a deer, nor can a deer transmit LD to any other organism including humans. Deer, however, through their daily and seasonal movements, transport ticks great distances where the disease might spread.

## Lyme Disease Risk



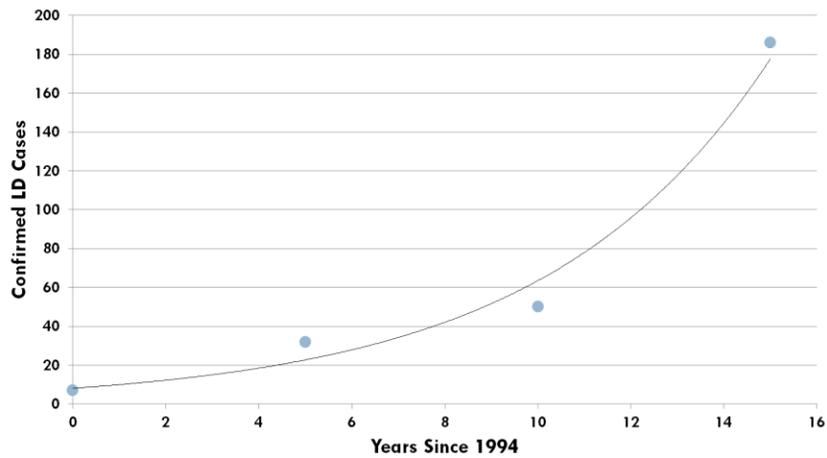
LD is concentrated in essentially a single reservoir (white-footed mouse) in the Upper Midwest and the Northeast. Due to the presence of multiple competent reservoirs in the Southeast, risk is attenuated through a dilution effect.

## Suffolk County



CDC data have a large reporting bias associated with them. That is, early in the epidemic, reporting rates are high due to heightened awareness and concern for the disease. Over time, as medical professional become accustomed to dealing with the disease, reporting rates decline just like those observed in Suffolk County, NY, where LD has been endemic for >30 years.

# Onondaga County

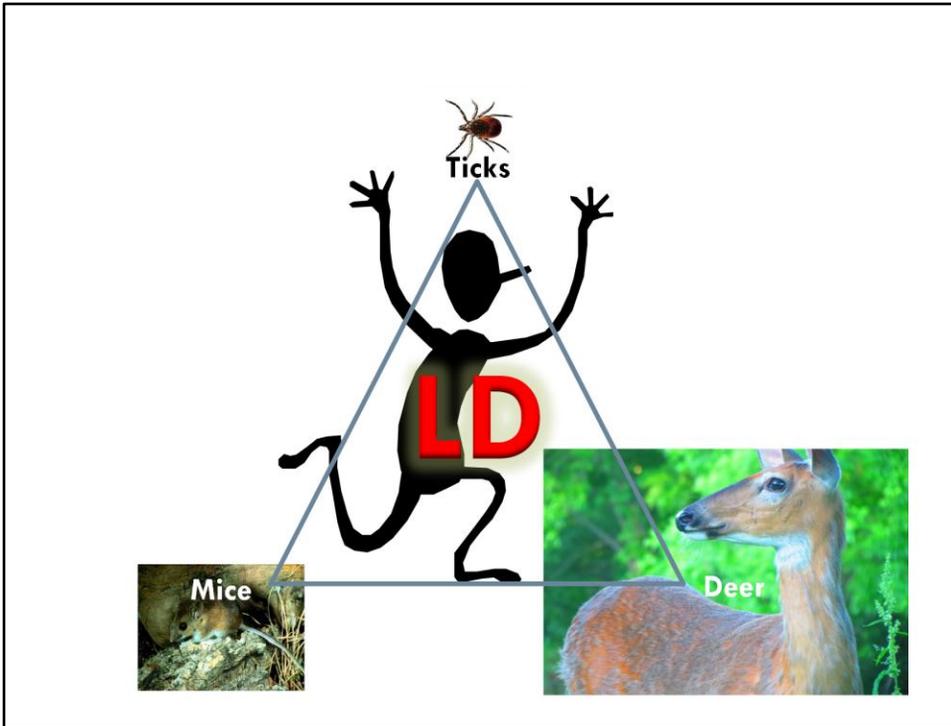


We see the reverse situation in Onondaga County where the epidemic is now initiating. Onondaga County is now considered an endemic area for Lyme disease (put that on your vacation/tourism flyers!).

## Why Now?

- Deer populations have been expanding in Onondaga County
- Winter conditions have been favorable for tick & deer survival
- Familiarity with the disease and its proper treatment has a latency period

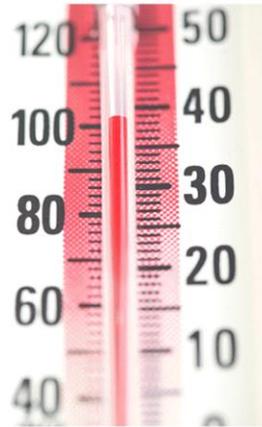
Deer have always been an important species in Central New York, and deer have been observed within the city limits for over two decades. In the past 15 years, however, deer numbers have steadily increased in pockets of habitat where hunting is not permitted (generally within the limits of cities and some municipalities). In addition to being an important part of the LD transmission pathway, deer can be a nuisance to homeowners and gardeners. Warmer winters with less snow accumulation are conducive to high overwinter survival of both deer and ticks. In the face of putative climate warming, more deer and more ticks are likely in our futures. Finally, the medical community is often slow to react to the emergence of an unfamiliar disease. It takes some time for doctors to become familiar with the proper diagnosis and treatment of LD in emerging areas.



To summarize, LD transmission is a complicated interplay between ticks, mice and deer. A comprehensive approach to the management of LD requires that we deal with all three in some manner.

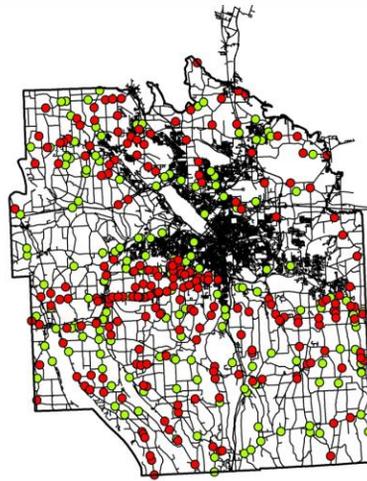
## What to do?

- **Manage our risk**
  - Reduce our exposure
- **Manage the vector**
  - Reduce tick populations
- **Manage the reservoir**
  - Reduce mouse populations
- **Manage the host**
  - Reduce deer populations



First and foremost, you can reduce your personal risk of contracting LD by following some simple, but effective, hygiene rules. This is your first and best line of defense against LD. You can treat your landscape with a pesticide to kill ticks in your yard and gardens. There is much advice online on how to do that intelligently and sensitively. You can manage your home landscape in such a way as to discourage mice from calling your backyard home. You can provide treated nesting materials to mice that will kill ticks on contact (but does not rid your property of mice). Finally, you can adopt lethal or non-lethal means of reducing deer in your neighborhoods. While reducing deer abundance helps, it will not eliminate LD from the environment. I encourage an IPM (Integrated Pest Management) approach that targets specific actions to specific circumstances, and when combined with similar measures elsewhere, deals an effective treatment against the transmission of LD in your neighborhoods.

# Deer-Vehicle Collisions



Mapped DVCs in 2005 & 2006

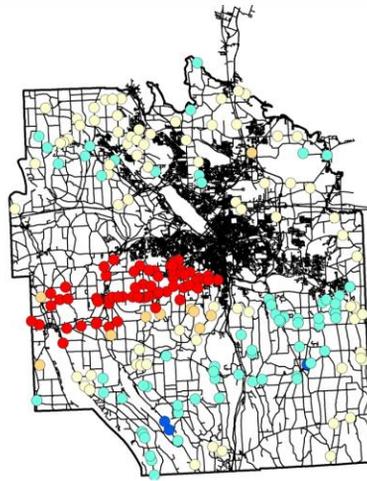
Approx. 300 per year

Measured characteristics of the roadside at each location

Performed statistical analyses

One of my former graduate students and I conducted a study of deer-vehicle crashes in Onondaga County. Our primary database was from the Onondaga County Sheriff's Office. We visited nearly 600 crash sites in two years (nearly 1 per day), and we know there were many more that we missed. Nevertheless, we feel we achieved a good picture of both the severity and spatial nature of the issue.

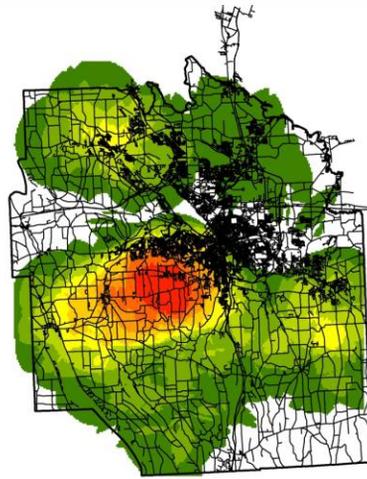
# Deer-Vehicle Collisions



Hotspot Analysis indicated a high risk area in a broad swath between the Howlett Hill Road and West Seneca Tpk corridor

We digitized the roadside locations of deer-vehicle crash sites and measured many variable along the road and from the GIS to explore factors that might contribute to hotspots we observed by analyzing the spatial characteristics of crash sites.

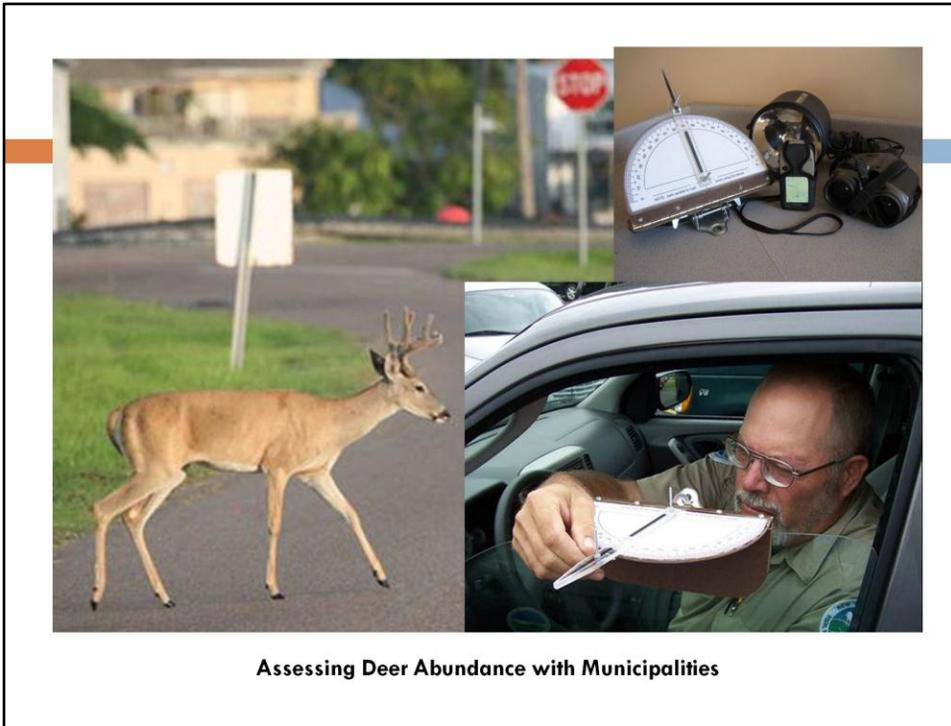
# Deer-Vehicle Collisions



Hotspot Analysis indicated a high risk area in a broad swath between the Howlett Hill Road and West Seneca Tpk corridor

Separate analysis confirmed this finding and indicated 2 additional areas of concern

What we found was one major hotspot in the western corridor between the City of Syracuse and western Onondaga County, and two areas bearing special watching. One in the northwestern portion and one in the southeastern portion of the County. We found many factors along the roadside that contributed to the frequency of crashes at specific locations. Recent interest has led us to pick up this research where we left off and address a few more questions.



**Assessing Deer Abundance with Municipalities**

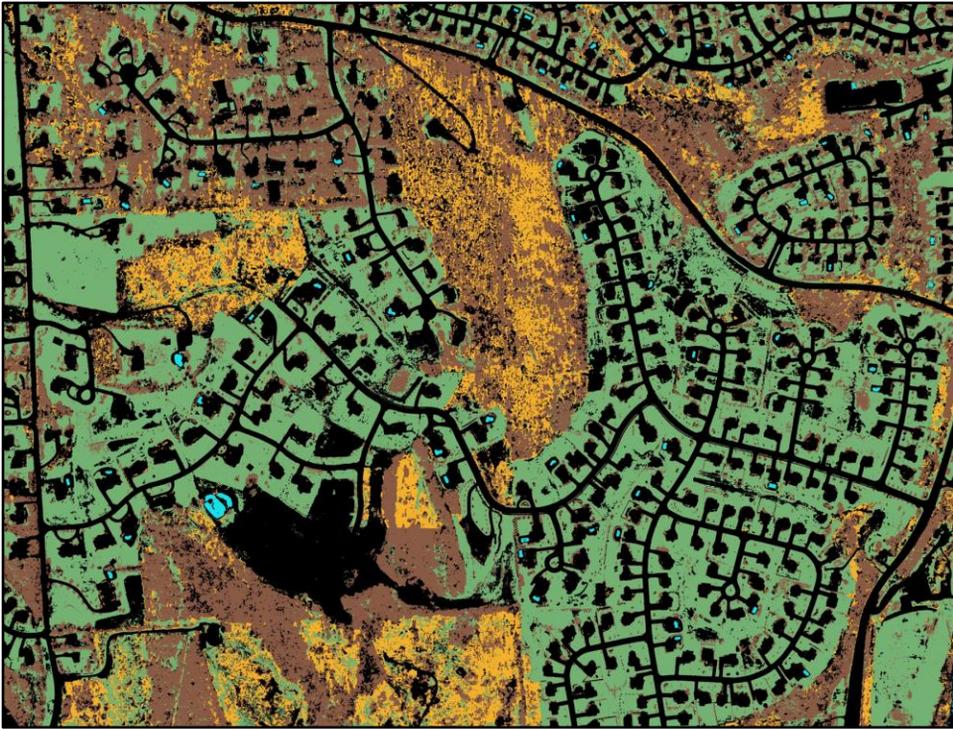
We have been counting deer in several location in the County, including the City of Syracuse. We conducted counts of deer at sunrise from May through October. The precise location of each cluster of deer was mapped in a Geographical Information System. We conducted 21 counts by driving random road segments separated in space to prevent double counting the same group of deer.



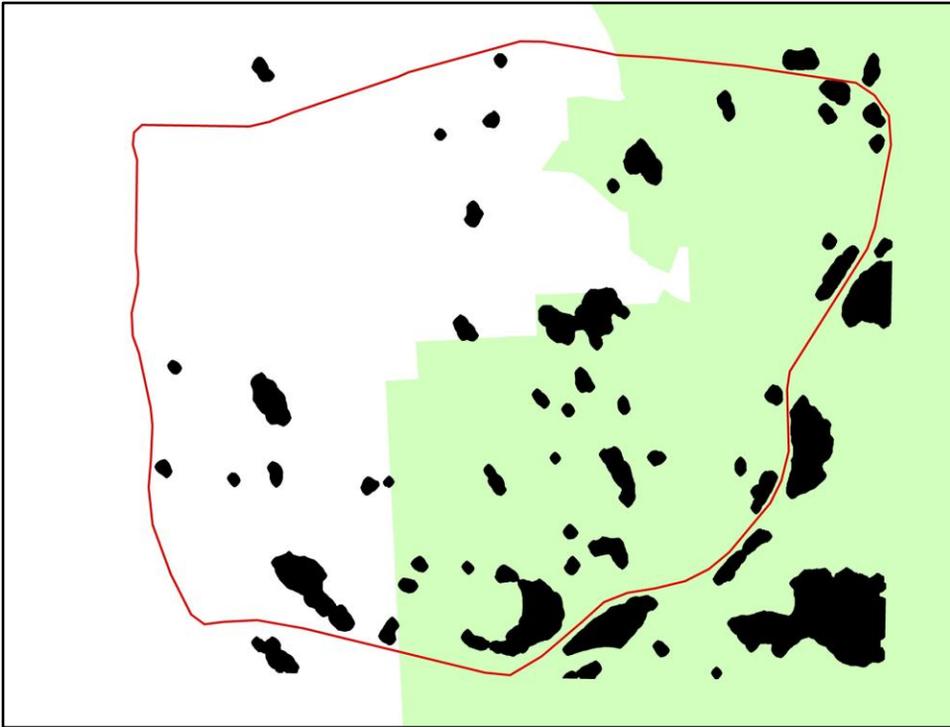
We have also successfully counted deer tracks over freshly fallen snow during winter. At locations where deer tracks intersected transects, a GPS location was recorded along with other pertinent information.



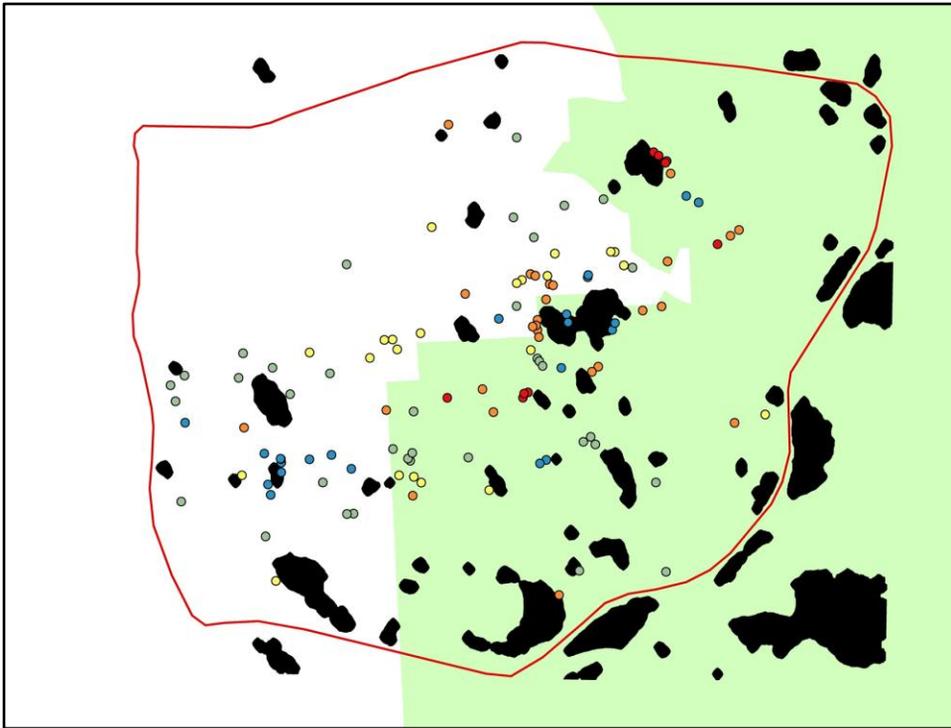
We encountered much deer sign in nearly every location we searched. Here, four deer bedded down under the protection of a grove of cedar trees in a local cemetery.



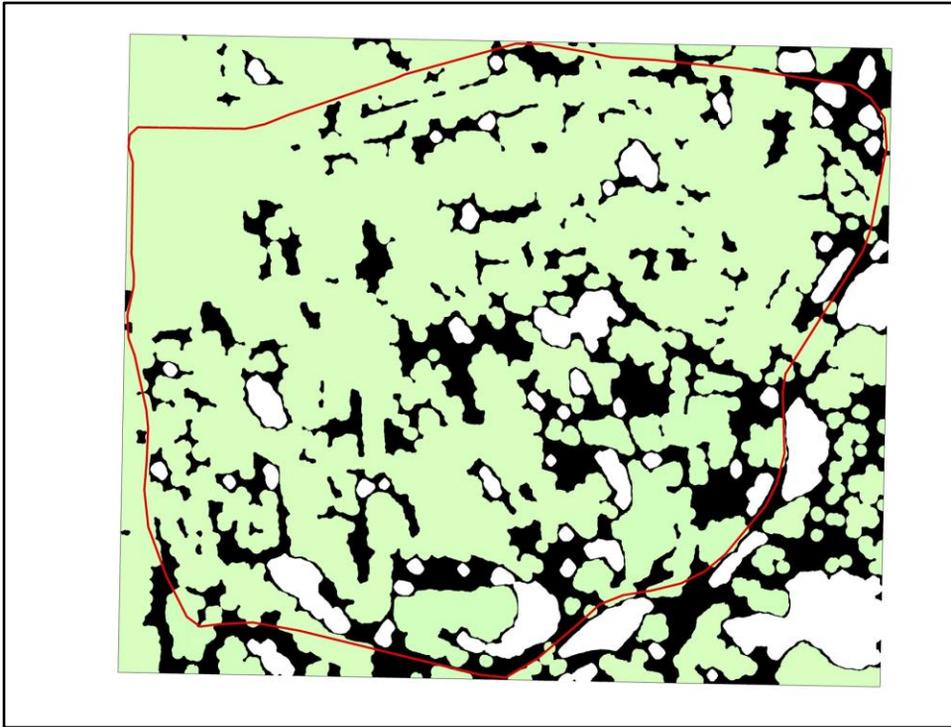
To get a better picture of deer habitat within a heterogeneous landscape, we classified high-resolution ortho-imagery. A close up inspection reveals the detailed nature of the image's content. Houses, roads, swimming pools and even individual trees can be readily distinguished in the classified image. We learned two primary lessons from the analysis of this image. First....(next slide)



In the eastside communities of the City of Syracuse and the Town of DeWitt, we identified approximately 50 patches of forested cover, ranging between 2 and 250 acres, capable of supporting deer.

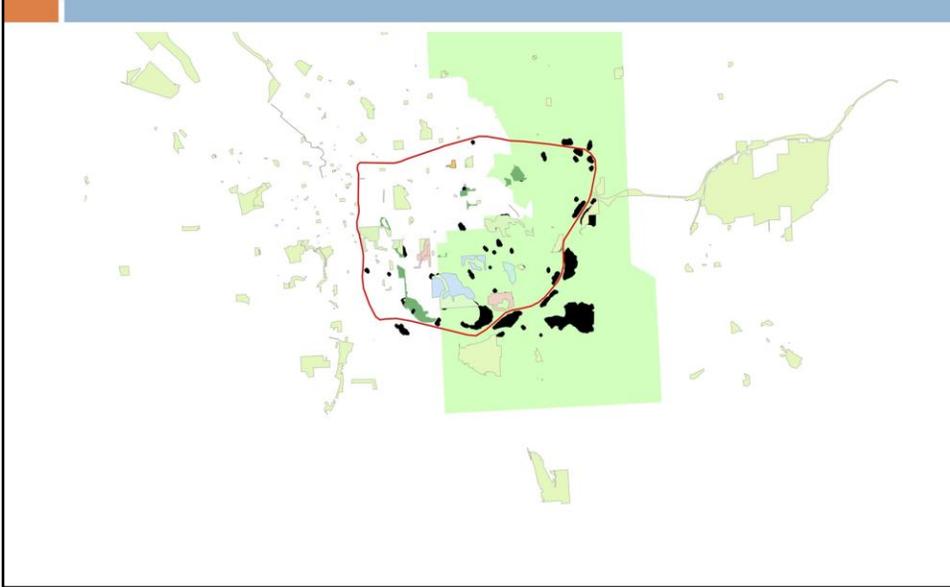


Deer clusters mapped during roadside counts were closely associated with these primary patches of trees. Secondly....(next slide)



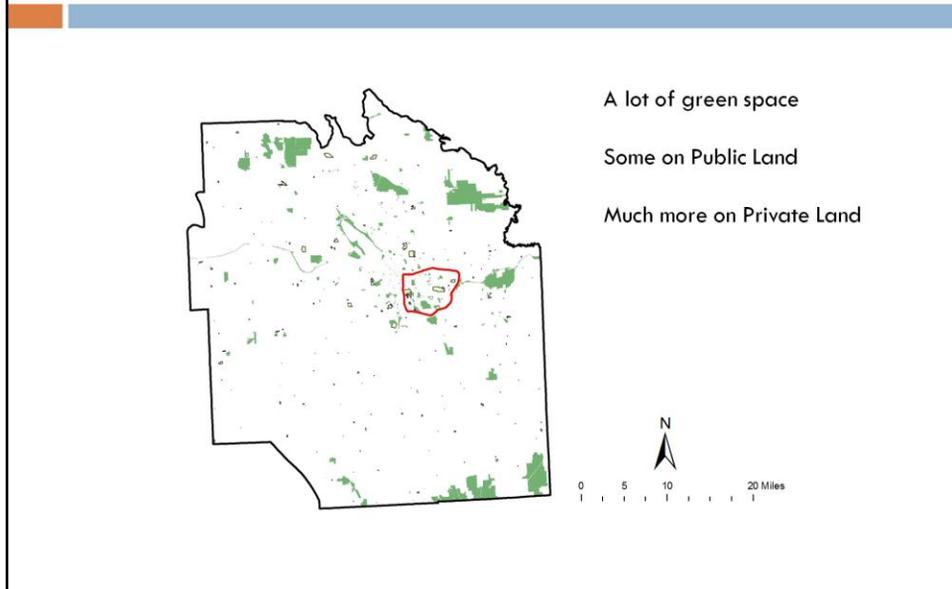
We were able to discern a high degree of connectivity (shown in black) among these primary patches (now shown in white). We are just now completing a county-wide analysis of these important patches and their connectivity to identify areas of potential deer-human conflicts.

## It's a regional issue...



The primary land use in Central New York is agriculture in a predominantly forested landscape. Deer thrive in this environment. Urban areas serve as de-facto refuges from hunting. Low regional deer densities on rural lands are maintained by harvesting about 40% of the females and 80% of the males from the deer population every year! In the absence of hunting, deer numbers will grow to a level where birth and death rates are equilibrated by some combination of other mortality factors (e.g., vehicles, coyotes, diseases, etc.). Consequently, green space management will necessarily require a close look at deer abundance to avoid future land management conflicts.

# Green Spaces



This draft map show the spatial distribution of green space in Onondaga County and includes County Parks, State Parks, DEC lands, Natural Areas, cemeteries and other green areas. While some areas are accessible to hunters during the regular big game season, many are not, which allows local deer populations to increase. This is a regional issue and many municipalities across the country are managing deer abundance on their lands. In many instances, leadership often comes from the County level of government due to the extensive nature of administration.

## Management Planning 101

- Contains pertinent information about the deer population (i.e., abundance & distribution)
- Explores alternative management scenarios in a spatially explicit context
- Includes a realistic cost analysis
- Exhibits high buy-in potential from all constituents

A first step in the consideration of the place for deer in protected area management is the development of a comprehensive plan. Elements of that plan should include all pertinent information about the deer population (especially abundance and distribution), explore all reasonable alternatives for managing deer impacts, include realistic costs and benefits accrued by adoption a specific alternative, and should exhibit appealing qualities to a majority of constituents living in the affected areas.

All players need to be at the table, however, and a plan of sufficient scope and detail needs to be developed. There are hundreds of successful examples of cooperative management of the myriad issues caused by overabundant deer.

Please feel free to contact me for additional assistance.