



Resolving Deer Issues in Galena

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Context:

- The suburban landscape is very attractive to deer and creates ideal “edge” habitat
- Deer are drawn in and can exist at high numbers where their impacts are keenly felt
- Our suburban landscaping is a virtual buffet – draws deer in

GOALS: Take critical look at:

- Some management assumptions
- Effective non-lethal deer problem mitigation methods and applications

Management Assumptions - Hunting will:

- Control the deer population
- Reduce garden damage
- Reduce the human risk of Lyme Disease
- Significantly lower deer-car accidents

#1: Can Hunting Control Deer?

- Confounding effect: Well-fed deer exhibit adaptive, physiological response to their nutritional condition:
 - Breed earlier, conceive at a younger age, can have more young, lower neonatal mortality, higher fawn survival (Verme, 1969, Woolf & Harder, 1979, Miller & Ozoga, 1997)
Result: “Rebound” effect due to compensatory reproduction mechanism

Ex; Univ. of FL study : Incidence of twinning was **14%** on un hunted site vs. **38%** on hunted site (*Labisky et al, 1985*).

Hunting can lead to “irruptive” pattern –“bounce-back” effect:

- **triggers population growth**

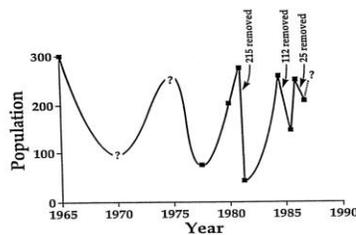


FIGURE 6.6. Population size of black-tailed deer on Angel Island. Shown is the repeated irruptive behavior and no apparent lessening of peak population sizes. Question marks represent qualitative estimates not based on data. See text for further explanation.

- in W. McShea et al, eds. *The Science of Overabundance*

The Challenge: How to sustain low deer numbers?

Deer density reduction is difficult enough, but keeping population at low level even harder!

- Up against high reproductive potential and higher survival rate of deer
- Reduction in hunter success over time - so more hunting effort is required *to take out same number of deer*
- Immigration of deer from the surrounding area –the green space surrounding Galena creates potential for other deer to fill empty niches

LYME DISEASE

Has Lyme Disease Spread?

- Ticks found in 44% more counties in the US than in 1996, spread over 43 states
- Illinois: ticks spread from 4 counties to 35
- *The disease is appearing in states where it has never been recorded before. One big reason why Lyme disease is spiking, according to the CDC report: climate change.*
 - - *Journal of Medical Entomology* (Jan 18, 2016, R. Eisen et al, CDC)

Why has Lyme Disease Spread?

- Warmer winters
 - *Long periods of harsh weather used to kill off many ticks,*
 - *Michael W. Dryden, DVM, professor of veterinary parasitology: Kansas State Univ.*
- Migratory birds that carry ticks to new areas
- Loss of predators which prey on mice and small rodents

The Role of Mice

- Ticks are not born with Lyme *spirochetes*. They pick up the bacteria when feeding on infected hosts.
- White-footed mice infect 75-95 % of larval ticks that feed on them, deer infect 1% .
- Urban sprawl and hunting has eliminated many mouse predators, allowing populations to grow-- with them comes infected ticks.

While deer get blamed for spreading tick-borne diseases, small rodents are actually the critical link.
- Dr. Richard Ostfeld, *The Ecology of Lyme Disease*

Tick Life Cycle: Refresher:

- Tick (*Ixodes scapularis*) has a 3-stage life cycle (*larvae, nymph, adult*) which takes 2 years to complete
 - 1 blood meal at each stage, prefers a progressively larger host

#2: Will Hunting Reduce Lyme Disease in People?

Problem of tackling one host in a multi-host cycle

- The black-legged tick is carried by many species of birds, lizards and mammals – i.e. is a multi-host disease
- Deer are preferred host for *adult* ticks, but not only or most important host
- *Birds* transport the tick (and Lyme disease) to new areas
- *Battaly and Fish, 1993, Keirans et al, 1996*

Can you control Lyme Disease by host reduction?

- Impractical
- Would have to target mice, squirrels, chipmunks, deer, songbirds, shrews, lizards, etc...
- Killing deer doesn't take out enough ticks!

Confounding variables:

- Regular hunting season occurs too late to affect tick reproduction or numbers
- Sept-Nov: Female engorgement / egg-laying
Nov-Jan: Regular deer hunting season. By then, a good portion of ticks have already mated/ dropped off to lay eggs :
“Deer reduction efforts carried out at the end of fall will have minimal impact on the tick population” (Falco and Daniels, 1993)
- When deer numbers are reduced, ticks may congregate in higher densities on the remaining deer or switch to other hosts.

Greater human safety risk after deer removal?

- Localized deer removals can lead to tick amplification and disease *hotspots* (S. Perkins et al, 2006 in *Ecology*)

- Questing ticks looking for a large host can be more likely to end up *on people* - (Ginsberg and Zhioua, 1999) *The public is advised to be extra vigilant after deer numbers reduced.*

Most frequently cited deer hunt “success” cases are small islands and involved near elimination of deer

- Great Island, MA:
 - After 70% of the deer removed :
 - No marked reduction in tick abundance (*Wilson et al, 1984*)
 - After near elimination: Sub-adults did decline *but adult tick numbers increased in subsequent years* (*Wilson et al, 1988*)
- Mohegan Island, ME
 - Ticks did decline but deer were virtually **eliminated!**
 - Completely different host ecology:
 - No mice on island, Norway rats are substitute host for mice
 - No mid-size/lg mammal hosts – just dogs, cats, people
- *P. Rand et al, 2004*
- Crane’s Beach, Ipswich, MA:
 - After 83% deer reduction (to 27 deer/ sq ml) over 7 year period:
 - Slow decline in immature ticks –took 5-7 years
 - Adult tick density *increased* throughout study
 - In final 2 years, nymph tick numbers rose to same level as when sampling began
 - *Tick abundance on deer less but ... infected ticks remained abundant.*
- *Wilson and Deblinger, 1983*

How low do deer numbers need to go?

- Some assert that deer density <8 deer/square mile results in less disease in humans and disruption of tick reproductive cycle
- Studies which support this claim are geographically isolated tiny “islands”

Is 8 deer / square mile even low enough to control human disease?

- What about Cape Cod? Very low deer densities yet high rates of Lyme Disease

Studies which looked at effect of deer reduction on Lyme disease

- Bernard Township – NJ - Deer reduced from 17 to 9 deer/ square miles
 - Tick abundance and Lyme Disease incidence monitored for 3 seasons after incremental deer removal
 - Active and passive surveillance for disease incidence
 - Result: Cull didn’t effect questing sub-adult numbers, host-seeking ticks increased by 2nd year
 - ❖ *Lyme disease incidence in humans did not vary with deer decline*
- *R. Jordan, T. Schulze, M. Jahn, 2007- J. Medical Entomol 44(5)*

BOTTOM LINE:

- Culling doesn’t remove *enough* ticks to interrupt tick’s reproductive cycle or reduce human disease.
- There’s good reason that the CDC and health authorities DON’T recommend deer hunting to control Lyme disease!

Personal Protection Measures

- BEST STRATEGY: Doing self-body check w/in 24 hours of being outdoors
- Tucking pants in socks when outdoors, and other prevention measures prescribed by State and local Health Depts, CDC

What does control the tick?

“4-Poster” Deer Treatment Station:

- Is a device that attracts deer to corn bait, while feeding, an acaricide is applied with rollers to their neck and shoulders – will kill ticks
- USDA tested (7-yr, 5 state study)
- *Permethrin*-based, killed 95-98% of all ticks on 90%+ of the deer in a 50 acre area
 - Elimination of adults in 2nd year, all stages reduced 91-100% by 3rd year (*Solberg et al, 2003*)
- Advantages and disadvantages

Examples of products which target mice, for individual property use:

- *Damminix* – tubes with permethrin-treated cotton balls – mice use cotton for nesting which kill ticks
- *Maxforce Bait Boxes* – targets small rodents (unsure if product still available)

What Can Communities Do?

- Educate the public on disease prevention
 - Town website
 - links to CDC, health dept websites
 - Press releases, posted flyers
- Consider use of 4-poster in strategic locations

#3: Will Hunting Reduce Deer Car Collisions?

- To what extent are car collisions a function of deer density? Threshold?
- What about other factors?
 - Deer continually attracted to mowed, succulent roadside grasses and salted roads in winter
 - Continual development of habitat shifts deer movement
 - Increasing car volume / speeds
 - Even if collision numbers have increased, may be multiple reasons! Need 7-10+ years of data to assess trends.

Varied research findings...

VA DOT study:

- Geo-located all deer /vehicle collisions in Clarke County VA between Aug-Dec 2005-2006
- 228 road segments – each 250 m in length
- Assessed what factors correlate with collisions: hunting pressure, deer density, amount forest and housing, presence of crops/corridors, speed limit/ car volume

Findings:

- “Little evidence that increased deer harvest reduced deer/vehicle collisions”
– *William McShea et al, Smithsonian National Zoological Park – from a paper given at the SE Deer Cooperative Annual Meeting in MD, 2007*

VERSUS:

Sharpshooting of deer -- reductions of 54%-76% of the deer population in 3 communities led to linear reductions in deer-vehicle collisions

- *Denicola and Williams, 2008. Human-Wildlife Conflicts 2(1)*

Model Program in Rochester Hills, Michigan

- Initiated “Don’t Veer for Deer” Campaign - Coordinated by City Administration & Council
- *Program Components:*
 - Moveable changeable message boards put at hotspots
 - Reduction of roadway sightline barriers
 - Big public education component : Deer –resistant gardening and defensive driving information on city website – also educational workshops and public outreach done on regular

Collision Data Collected

- Type accident
- Exact location
- Month, day of week
- Time period
- Road conditions
- If traffic device involved
- Light conditions
- Weather
- Injury severity, etc

Aerial Survey done each year (to assess deer density)

Results – Rochester Hills Program:

- Deer-car collisions declined 25% after program began – *despite 34% increase in deer herd size*
- Accidents remain at consistent level
- Task force meets regularly to monitor program and do regular aerial deer counts
- Ongoing cost of program: @ \$5000+ a year

Other Mitigation Measures:

- Slower speed limits (< 45 mph)
- More bumps, turns, fencing
- Driver awareness: need for driver education!!
- Also: warning and reflector systems:
 - o *Streiter Lites, Deer Deter* systems – can work but need to be maintained

What Can Communities Do?

- Collect good accident data
 - Identify hotspots, establish baseline
- Develop deer-collision reduction plan:
 - Moveable changeable message boards put at hotspots
 - Reduction of roadway sightline barriers and speeds
 - Public education:
 - Defensive driving information on community website
 - Public outreach via media
 - Driver education programs (new, elderly)

#4: Reducing Backyard Deer Problems:

- Deer numbers are a function of their food source reduce their numbers/ presence *by limiting food availability*

Deer-resistant plant species

- Encourage the planting of flowers/ ornamentals that deer don't like (ex: daffodils versus tulips)
- Long list of alternative options:
 - *Limiting Deer Browse Damage to Landscape Plants* by Jeff Ward, CT Agricultural Station (Bulletin 968)
 - Local Cooperative Extension Service
 - <http://www.deerresistantplants.com>
 - www.easywildflowers.com – great native flower resource
 - Cornell Univ Gardening Resources: *Deer Defenses*
 - <http://wildlifehotline.org/deer.html>
 - www.humanesociety.org/deer
 - Local garden stores

Exclusion Methods

- Woven-wire fence (8-10 feet) – *the best!*
- Plastic “bird netting”
- Tree shelters, etc
- Other mesh barriers

Repellents:

- Effectiveness based on:
 - Alternate food availability
 - Type of repellent
 - Concentration of active ingredient*
 - Re-application schedule, repellent durability
 - Deer density, hunger, habits
 - Weather
- **Don’t let feeding patterns get established!**
 - Apply *before* bud-break
 - Reapply frequently (every 2 weeks), after heavy rains
- **Most effective are repellents that emit sulphurous (rotten egg) odors**
 - Predator association? Spoiled food?
 - Ex: *Liquid Fence* – very effective

Scare Devices:

- Can provide temporary relief
- Motion-activated “*Scarecrow*” – attaches to hose, has motion sensor, blasts deer with water pulse (solar powered versions available)
- *Electronic Deer Repeller* (stakes for garden, baited, give deer a mild zap)
- *Deer Shield* –uses deer distress vocalizations

What Can Communities Do?

- EDUCATE RESIDENTS!
- Put educational information on website re: deer-resistant gardening
- Sponsor deer-proof gardening workshops
- Partner with local garden stores on deer products *discount* days, etc...
- Feeding bans
- Reduce food sources in community!
 - Work with garden clubs/ beautification committees to reduce attractants in roadside flower beds/floral islands in roadways, have diplomatic sit-downs with deer feeders, etc

Concerns with Lethal Methods

- Effectiveness
- Bounce back effect
- Social acceptability

Pivotal point

- You may want something done to address deer complaints
- But make sure the something that’s done *actually achieves your goal!*

Case Study: Weston MA

- Archers killed 18 deer over 6-week hunt, declared a “success” for controlling deer numbers
- 25 deer per square mile = 425 deer
- Removal of 18 deer = 4% of the deer herd
- Removing 4% of the deer will have an insignificant impact on deer numbers

Will hunting control deer? Particularly in suburban areas?

The conditions in cities and suburbs are not conducive for controlling deer populations by hunting:

- Extremely high densities of deer and people
- Rich deer habitat
- Safety-mandated hunting restrictions
- Unattractiveness of hunting conditions *for hunters*
- Negative PR potential

Key questions:

- Even if deer only hunted on town green space:
 - Will that even impact backyard deer problems elsewhere?
 - Will it significantly reduce deer numbers?
 - Will other recreation be impeded?
 - Direct and indirect costs?

Key considerations: bow hunting

- Bow-hunting not a quick kill method
- Following the blood trail is big part of bow-hunting
 - What happens when deer go off the huntable parcel?
 - Will trespass permission be sought from all adjoining landowners?

Crippling losses

- Bow-hunting can incur crippling rates ranging as high as 30%-50%
 - *Gregory 2005, Nixon et. al 2001, Moen 1989, Cada 1988, Boydston and Gore 1987, Langenau 1986, Lohfield, 1980; McPhillips et al, 1985; Gladfelter 1983, Stormer et. al, 1979, Downing 1971 .*
- With modern equipment (crossbow or compound bow), proficiency testing, trackers: 18% crippling rate
 - *Pedersen et al, 2008, Wounding rates of white-tailed deer with modern archery equipment, Conf Proc of SE Assoc Fish and Wildlife Agencies*

Sharpshooting

- More efficient
- Expensive
- Needs to be repeated on continuing basis to counter bounce –back
- Can be controversial

What about Newer Approaches like Deer-Fertility Control?

- Immuno-contraceptive vaccines induce an immune response to reproduction
- PZP (porcine zona pellucida) vaccination causes a female mammal to produce antibodies that bind to her egg coating (ZP) and block sperm attachment.
- PZP is available under an experimental-use permit, not yet EPA-registered – GonaCon is registered.

Does PZP work in Deer?

- HSUS done 3 pilot studies (Fire Island, NY, Fripp Island (SC), National Institute of Standards in Technology (MD))
- All demonstrated a population lowering effect
- On Fripp Island (SC) there was a 50% decline in the population over 6 years time (2005-2011)
– *Rutberg et al, Wildlife Research, 40: 281-288*
- Hastings on Hudson – new project testing use of PZP in “open” environment

What's Next: technical:

- Remote delivery of one-shot PZP vaccine
- Vaccine cost reduction
 - Testing a \$100 version (vs. \$230 version) of 2-3 yr vaccine

Surgical Sterilization - Ovariectomies:

- Surgical sterilization: removes the ovaries
- Less invasive than typical spay surgeries for domestic dogs and cats.
- Does captured via dart tranquilizers
- Transported to a surgical bay. Preparation and surgery take @ 20 minutes
- Deer transported back to capture site, reversal agent administered. Deer monitored.
- Surgical sterilization 100 % effective -- mortality rates extremely low (less than 1%)

Some Current Study Sites

- Cayuga Heights, NY: researchers sterilized 95% of the female deer population (i.e. 149 does) in two years and observed a 30% decline after year one.
- San Jose, CA: over 90% of the female deer (i.e. 115 does) were sterilized in two years and researchers observed a 20% decline after year one.
- Other projects ongoing in Town & Country, MS, Baltimore County, MD and Fairfax City, VA.

Fertility Control Options

- May be expensive but provide long lasting effect, prevents “bounce-back” in numbers
- Require that wildlife state agency sign off on experimental use permit for PXP
- Site evaluation required to determine if site viable for fertility control project

Urge Galena Community Leaders to:

- Focus on reducing deer *conflicts*, NOT try to manage overall deer *numbers*
- Create deer CONFLICT management plan

Designing a Deer Problem Mitigation Plan

- Collect local data to indicate scope of problem
- Set clear, achievable and measurable goals
- Choose mitigation measures *likely to achieve goals*
- Make sure methods *socially acceptable*
- Create ongoing monitoring program
- Clearly spell out the long term-costs and time-line

What We See in Most Communities:

- Hunting is often proposed as the best way to manage deer problems, yet:
- Valid baseline data are not collected – so you have no starting point
- Overly-broad, non-measurable goals are set
- A solid monitoring system is not put in place
- RESULT: No idea what cull/hunt has achieved, success measured by anecdote and “eyeballing” the landscape – insufficient and misleading!

My Recommendation:

- Develop comprehensive deer problem mitigation plan:
 - Use results from (objective) residents survey and deer collision data to design plan
 - Educate residents about ways to mitigate garden conflicts, prevent collisions and Lyme disease– put information on city website
 - Use Rochester Hills model– go to website for program details on how garden & collision issues handled
 - Focus outreach efforts on how to reduce Lyme disease risks
 - Consider use of 4-Posters at strategic locations
 - Set up solid complaint and monitoring system – to better define problems and assess success of mitigation
 - Consider range of non-lethal options for site-specific application

—
Austin: A Successful Policy Model

- Created a humane, non-lethal city-wide deer conflict management plan
- Big public education component
- Goal: *teach public to co-exist with deer and other wildlife*

Contact information:

- Lsimon@hsus.org

Solving deer problems:

- www.humanesociety.org/deer
- www.wildlifehotline.org