

2B & 2D

A) Bernadette Slawinski's section:

Relationship between mice, ticks, deer and Lyme Disease: (T. Shannon)

Lyme disease is a systemic, tick-borne disease caused by a spiral bacterium, *Borrelia burgdorferi*. Following transmission by a bite of an infected tick, Lyme disease spirochetes initially multiply and disseminate in the skin surrounding the bite. If untreated, spirochetes can invade the blood stream where they multiply and cause flu-like symptoms.

Lyme disease is transmitted to humans by the black-legged tick, *Ixodes scapularis*, aka "deer tick." Black-legged ticks are the only vectors of Lyme disease in Indiana. The black-legged tick follows a generalized life cycle that is relevant to the transmission of the disease to humans. 1) Once a female tick lays eggs on the ground, larva form; 2) Six-legged larva feeds on a white-footed mouse and then drops to the ground and molts. The larva may have acquired the Lyme disease agent in the blood meal; 3) The eight-legged nymph feeds on a small mammal, pet or human and may transmit the disease. The nymph then drops off the ground and molts; 4) The eight-legged adult feeds and mates on a deer, then drop off to the ground. Males die soon thereafter and females begin to develop eggs. Tick larvae are infected when they feed on infected white-footed mice. White-tailed deer are not reservoirs of Lyme disease because they do not support the disease in the blood at levels high enough to infect ticks. However, deer are the preferred host for adult black-legged ticks and are therefore critically important to tick reproduction

HYPERLINK "http://bloomington.in.gov/documents/viewDocument.php?document_id=5678" http://bloomington.in.gov/documents/viewDocument.php?document_id=5678

Visual Example #1 (Basic):

Visual Example #2:

Small rodents, such as mice, are reservoirs for *B. burgdorferi*. The tick becomes infected from feeding on a mouse

and remains infected as it changes to nymph and then adult. The spirochetes are transmitted by infected nymphs to other mice and to humans, which are inadvertent hosts. Deer are important hosts for adult ticks, but are not effective reservoirs for *B. burgdorferi*. (From: *Nature* 390, 553-554 (11 December 1997))

VISUAL EXAMPLE 3 (Seasonal Breakdown):

2 B Cont.) Tracking the incidence of Lyme Disease in:

Ogden Dunes (No new updates available for Ogden Dunes & Neighboring Communities since report below)

For 2011 (through 11/7/2012) Ogden Dunes has two (2) suspect, four (4) probable, and four (4) confirmed cases totaling ten (10) for an incidence of over 900 cases per 100,000

Neighboring communities

Beverly Shores has 1 confirmed for incidence of 163.1

Portage has 1 suspect for incidence of 10.4

Kouts Family Health Care Clinic, Kouts, IN claims to have treated 154 cases from across the region and state as of May 2012 (UNPROVEN with no time frame or date range given) HYPERLINK "<http://posttrib.suntimes.com/news/davich/12702706-452/jerry-davich-valpo-family-warns-of-lyme-disease-uptick.html>" <http://posttrib.suntimes.com/news/davich/12702706-452/jerry-davich-valpo-family-warns-of-lyme-disease-uptick.html>

Please see below for additional communities and data:

HYPERLINK "<http://ogdendunes.org/images/new2.pdf>" <http://ogdendunes.org/images/new2.pdf>

State:

The Journal & Courier reported that Lyme disease cases in Indiana rose from 34 in 2005 to 62 in 2009

Nationally

2010 statistics: 22,561 confirmed; 7,597 probable; 7.3 incidence (confirmed cases per 100,000 population)

2000 – 2010 breakdown per state: HYPERLINK "http://www.cdc.gov/lyme/stats/chartstables/reportedcases_statelocality.html" http://www.cdc.gov/lyme/stats/chartstables/reportedcases_statelocality.html

Available methods for controlling mice and ticks, including costs and results

Methods:

Environmental Approaches

Landscape Modification - Ticks are more likely to establish a habitat in close proximity to wooded areas as well as in areas with an abundance of groundcover vegetation, including leaf litter. They prefer dark, damp, and cool areas, especially in so called "transition areas" between the woods and the lawn.

Keeping grass short and free of debris will make the environment less suitable for ticks to survive on

Removing brush and wood piles from property

Keep property free of leaf litter

Trim vegetation to allow air flow and light

Adding a 3 foot wide landscape border consisting of mulch or crushed stone around the perimeter of the areas you use

Controlled burns (community sponsored)

Costs: \$0. None, except for a little sweat equity, possibly some assistance from neighbors and free mulch from the town

Results: Scientific evidence is difficult to gather but anecdotal information states landscape modification to be a powerful weapon to eliminate ticks from your yard.

Chemical Pesticide and Acaricides Application:

HYPERLINK "<http://www.fairfaxcounty.gov/hd/westnile/permethrin.htm>"
Permethrin is an insecticide that is effective in both killing and repelling ticks in your yard. The best time to apply permethrin to your yard for ticks is between late March and early May.

A pesticide designed to kill ticks is sometimes called an acaricide. Acaricides can be very effective in reducing tick populations. If properly timed, a single application at the end of May or beginning of June can reduce tick populations by 68-100%.

Costs: \$35 per quart and will last about 30 days. Ace Hardware also has a product labeled as "Flea & Tick Killer for Pet and Home". Estimate \$25 per gallon bottle

Results: Not for sale in all states (still available over the internet for Indiana). Anecdotal comments and reviews have been favorable. Product is apparently not as strong or concentrated as before but most reviews I've read have experienced a decrease in yard insects, including ticks.

Management of Deer Populations - Deer do not get infected with the bacterium that causes Lyme disease. However, deer are a main source of the blood adult ticks need to reproduce. Some have proposed that culling deer populations through increased hunting will reduce the incidence of Lyme disease. The impact of deer reduction on tick abundance or Lyme disease has been examined in several studies with mixed results.

Costs (Vary dramatically based on scope of cull, town size, available resources, etc.):

Recent Examples - PA: The second component is professional culling. The township will enter into a contract with the USDA to hire sharpshooters. The culling plan entails 10 nights of deer-culling at a cost not to exceed \$50,000. The price tag includes removing and preparing the deer carcasses and delivering them to a processor for butchering. HYPERLINK "http://mainlinemedianews.com/articles/2012/06/20/main_line_suburban_life/news/doc4fe1f1ac888bb617102325.txt" http://mainlinemedianews.com/articles/2012/06/20/main_line_suburban_life/news/doc4fe1f1ac888bb617102325.txt

Costs about \$516 per animal (British Columbia) HYPERLINK "<http://www.dailytownsman.com/article/20120424/CRANBROOK0101/304249997/-1/CRANBROOK/deer-cull-20>" <http://www.dailytownsman.com/article/20120424/CRANBROOK0101/304249997/-1/CRANBROOK/deer-cull-20>

Cleveland Area – OH. Roughly \$300-\$500 per deer. Had overseen the city's earlier deer management program, beginning in 2005, when White Buffalo culled 602 deer at a total cost of about \$208,000, followed by 400 in 2006, costing the city about \$192,000. HYPERLINK "http://www.cleveland.com/solon/index.ssf/2012/03/solon_deer_culling_nearing_go.html" http://www.cleveland.com/solon/index.ssf/2012/03/solon_deer_culling_nearing_go.html

Results (Similar to costs, results vary dramatically due to a very complex ecosystem

and very different opinions. Also, it appears that both sides appear to somewhat agree that deer populations under 8-15 deer per square mile for multiple years will eventually decrease tick populations. Therefore the debate might need to be, whether communities can realistically keep deer populations at those numbers and if not, will tick populations decrease at all?)

PRO CULL/DEER MANAGEMENT:

Some areas of Connecticut, where Lyme disease had reached epidemic proportions, virtually eliminated the disease by reducing the deer population from 30 per square mile to 3 per square mile. Controlling the deer population is one of the keys to reducing the cases of Lyme disease on Cape Cod. HYPERLINK "http://www.best-of-cape-cod.com/lyme-disease-on-cape-cod.html" <http://www.best-of-cape-cod.com/lyme-disease-on-cape-cod.html>

The deer do not infect the ticks but the blood meal is necessary for successful reproduction. "There have been a number of studies done on reducing deer," Dr Stafford said. "Here in Connecticut, they did it at two locations, at Bluff Point in Groton and at another private residential community in Bridgeport, a fenced property where they had 200 deer per square mile and lots of ticks. They brought the levels down to 30 deer per square mile and the number of ticks dropped about ten-fold "... we did see a dramatic reduction in the tick population," he said. "The number of ticks dropped from twelve nymph deer ticks per square meter to approximately one tick. If we reduce the number of ticks below a certain threshold, it will break the disease transmission process." HYPERLINK "http://www.eradicatelymedisease.org/" <http://www.eradicatelymedisease.org/>

AGAINST CULL/DEER MANAGEMENT: Tamara Awerbuch, instructor – Harvard School of Public Health

Because the ecology of Lyme disease is so complex, it is very hard to look at deer and tick, mouse and tick, one by one. You have to link all the factors together in a way that lends itself to mathematical analysis.

The deer do not carry the bacteria. They are needed to continue the life cycle of the tick, but they are not infected. So as you killed deer, you would simply have more ticks per deer because the surface area of each is enough to support many ticks. Just killing deer won't do the job.

Our research showed that if you leave fewer than eight deer for the whole Crane Beach area, the tick population will start to decrease, but it will take many, many years. Another important thing I found is that the tick population oscillates, which is part of the insect's natural life cycle. Sometimes people go to the same site in different years and see a reduction in ticks and think, oh, we don't have to do anything. But it's the natural dynamic and their numbers increase again within a few years.

Discourage Deer: A relationship exists between the abundance of deer and the

abundance of ticks. Tick populations do not decrease substantially unless deer are eradicated or considerably reduced. Constructing physical barriers and removing food, such as spilled bird seed, from your yard will discourage deer from entering your yard. In addition, removing plants that attract deer and constructing physical barriers may help discourage tick-infested deer from coming near homes. Lists of deer-resistant plantings are available from garden centers, nurseries, or local extension agents.

Costs: Depends on each person's property and interest in fencing, plant interests, etc.

Results: Fencing has proven to be effective. Also, deer-resistant plants, shrubs and trees have been effective as well. During cold, snowy winters, deer will eat deer resistant plants but they would much rather consume other, more favorable food sources.

Chemically Targeting Reservoirs with Insecticides

4-poster bait station can be used to passively apply insecticide to the neck and head of the deer in order to decrease the number of ticks attached to the deer.

Costs: Sells for about \$800 and services between 50 and 100 acres

Results: 90% of feeding adult ticks are attached. Through grooming, the deer also transfer the tickicide to other parts of the body. Studies (see below) have shown that use of '4-Poster' technology has resulted in the control of 92 to 98% of free-living tick populations in areas around the devices after three years of use. Depending on deer population, density a single feeder effectively covers 40-70 acres. (More studies available by clicking on link below) [HYPERLINK "http://www.aldf.com/FourPosterDeerTreatmentBaitStation.htm"](http://www.aldf.com/FourPosterDeerTreatmentBaitStation.htm) <http://www.aldf.com/FourPosterDeerTreatmentBaitStation.htm>

INCLUDEPICTURE "http://www.aldf.com/images/img-TickDeerEars%20.jpg" * MERGEFORMATINET

Before Treatment:

INCLUDEPICTURE "http://www.aldf.com/images/img-DeerEars.jpg" * MERGEFORMATINET

After Treatment:

HYPERLINK "http://www.aldf.com/
FourPosterDeerTreatmentBaitStation.htm" [http://
www.aldf.com/
FourPosterDeerTreatmentBaitStation.htm](http://www.aldf.com/FourPosterDeerTreatmentBaitStation.htm)

Damminix Tick Tube - Mice can be given easy access to "Tick tubes," which contain Permethrin-treated cotton, to use for their nest, thus killing ticks on them and their babies.

Costs: REGISTERED AND AVAILABLE ONLY IN MA, MD, ME, PA, NY, RI, CT, NH, NJ, and VA. 6 tube box sells for about \$25 to cover ½ - 1 acre of coverage

Results: In field tests with 10-yard grid spacing, 100% sampled mice had permethrin on their fur.

HYPERLINK "http://www.ticktubes.com/faq.html" [http://www.ticktubes.com/
faq.html](http://www.ticktubes.com/faq.html)

Biological and Natural control - Use of fungal pathogens and plants as biological control agents have been proposed to control tick populations. One area of research has focused on using the natural enemies of ticks native to the same areas. By increasing the numbers of these fungi found in the area, tick abundance would decrease through the process of "augmentative bio control." The use of natural enemies could potentially provide a more environmentally friendly and effective way to control the spread of pathogens. Further research on this and other methods of biological control are currently in progress. HYPERLINK "http://ecostudies.org/people_sci_ostfeld_augmentative_biocontrol.html" [http://ecostudies.org/
people_sci_ostfeld_augmentative_biocontrol.html](http://ecostudies.org/people_sci_ostfeld_augmentative_biocontrol.html)

More fox, less coyotes? (one of many new theories being studied): more coyotes equals fewer foxes, which means fewer predators, which means more small animals are running around that could be carrying the bacteria for Lyme disease. More bacteria is therefore transmitted to more ticks, which then transmit the bacteria to humans. It's complicated. HYPERLINK "http://green.blogs.nytimes.com/2012/06/18/predators-prey-and-lyme-disease/" [http://green.blogs.nytimes.com/
2012/06/18/predators-prey-and-lyme-disease/](http://green.blogs.nytimes.com/2012/06/18/predators-prey-and-lyme-disease/)

Conclusion:

Similar to other communities before us in NW Indiana, the Midwest and especially East Coast, I've been asked to research, document and hopefully explain at a high level, the very complex relationship between mice, ticks, deer and Lyme Disease. In discussing this topic, I quickly and often mention the word "complex" because this ecosystem has been studied for many years, has had millions of dollars spent researching and attempting to figure it out and yet today, we're still left with a highly debatable topic/problem that draws many different opinions, points of view and emotions. This problem is obviously not just an Ogden Dunes problem and does not include a "silver bullet solution" so in the sections above, my intent was not to sway your opinion but to lay out the relationships, summarize the data and give The Town of Ogden Dunes several methods for controlling mice and tick populations.

To add a few personal thoughts, based on the graphs and data shown above, I think we're seeing a "tick problem" that is not going away on its own, anytime soon. It is my personal opinion that decreasing the tick population and lowering the risk of Lyme Disease needs to be a multi-year, multi-method approach involving many, if not all of the available methods mentioned above. I believe The Town of Ogden Dunes could/should build a "community wide plan" that involves multiple methods, education, transparency and ongoing analysis and I also hope the Town Council will highly encourage citizens to develop, invest and execute on their own "personal/property plans" as well. Lastly, the information above is simply a "snapshot" in time so whatever comprehensive plan is selected, needs to include annual dollars, time and resources invested on a consistent basis. Many studies, articles and companies have acknowledged ticks and Lyme Disease as being a "big problem" and the nation, DNR appear to have momentum, dollars and the science community on board to solve it. If we as citizens of Ogden Dunes stay committed, stay invested, keep our minds open to new information and let the results and future findings drive our actions, we should be on the forefront of finding solutions that work.