

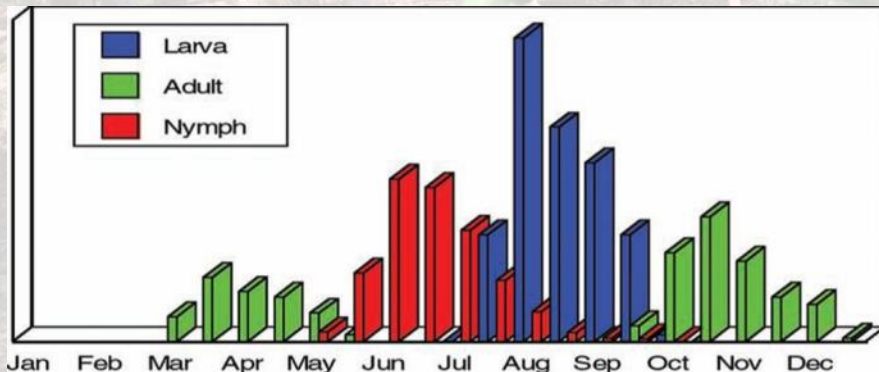
Suffolk County Tick Surveys, Management, and Control product Updates



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Laboratory Director
Division of Vector Control, Suffolk County

Deer or Blacklegged Tick (*Ixodes scapularis*)

- Found in woods, field edges, ecotones, leaf litter
 - Relatively slow movement
 - Passively quests for hosts, frequently must rehydrate in leaf litter
- **3-host tick species**
 - larvae and nymphs feed on wide variety of birds, mammals, reptiles
 - Adults prefer large hosts, very common on white-tailed deer
 - 2 year lifecycle with 1,500 - 2,000 eggs per female
- **Adult (Aug. – May) Nymph (April – Oct.)**



Stafford III, K.C. 2007. Tick Management handbook. Connecticut Agriculture Experiment Station; Centers for Disease Control and Prevention

TickEncounter Resource Center *Ixodes scapularis* (Blacklegged ticks or Deer ticks)



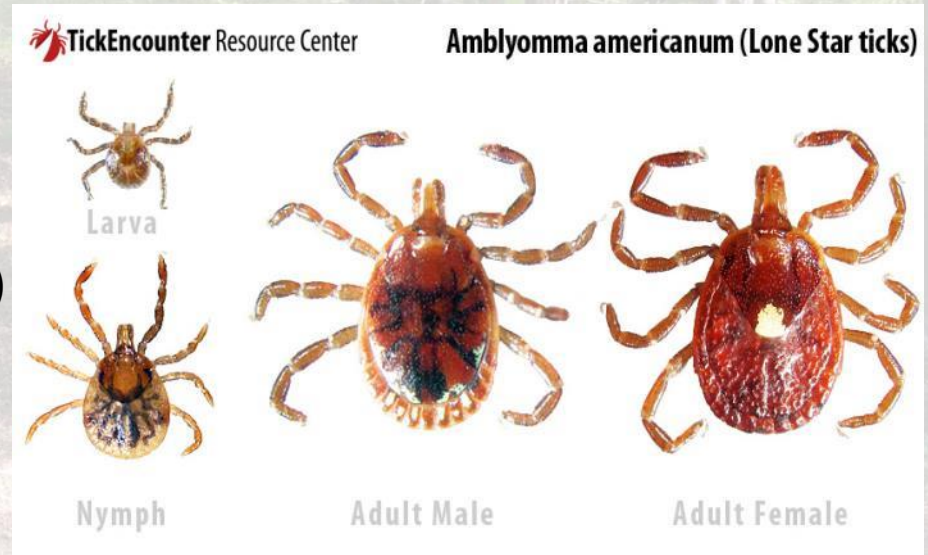






Lone Star Tick (*Amblyomma americanum*)

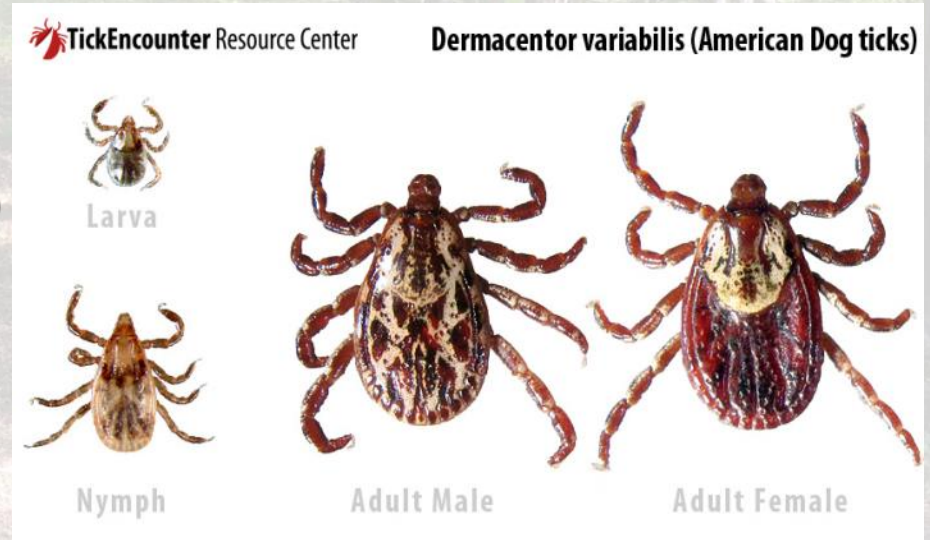
- **Found in woods, fields, beach dunes, trails, parking lots**
 - Resistant to desiccation (physiological and behavioral)
 - Quick movement and actively seeks hosts
- **3-host tick species**
 - Will feed on small animals as larvae and nymphs
 - Preference for large hosts at all stages
 - Lifecycle can take up to 2 years
 - 2,500 - 3,000 eggs per female
- **Typical active periods**
 - Adults: April to August (**Feb. – Aug.**)
 - Nymph: May to August (**Apr. - Sept.**)
 - Larvae: July to Sept. (**May - Oct**)





American Dog Tick (*Dermacentor variabilis*)

- **Typically in open areas with little tree cover**
 - Wooded areas, fields, grasslands, trails, and ecotone areas
- **3-host tick species**
 - Smaller mammals as larvae and nymphs
 - Larger animals as adults including dogs, humans, horses
 - Lifecycle can take up to 2 years
 - 4,000 - 6,500 eggs per female
- **Typical active periods**
 - Larvae: March to July
 - Adults: April to Sept. (**April – Oct.**)
 - Nymph: June to Sept.





Asian longhorned Tick (*Haemaphysalis longicornis*)

- **Found in open areas with little tree cover**
 - fields, grasslands, trails, and ecotone areas
 - After the initial find in NJ, it was found in samples collected from 2013 in NJ, and 2010 in VA.
 - Populations identified AR, CT, DE, KY, MD, NC, NJ, NY, PA, TN, VA, and WV.
- **3-host tick species**
 - Host: sheep, deer, raccoon, opossum, horse, goat, dog, cats and birds
 - More recently found on a human in NY
 - Up to 2500 eggs per female
(higher when parthenogenetic)
- **Current Efforts**
 - Increased surveillance in Suffolk
 - Seasonal activity tracking underway by NYSDOH



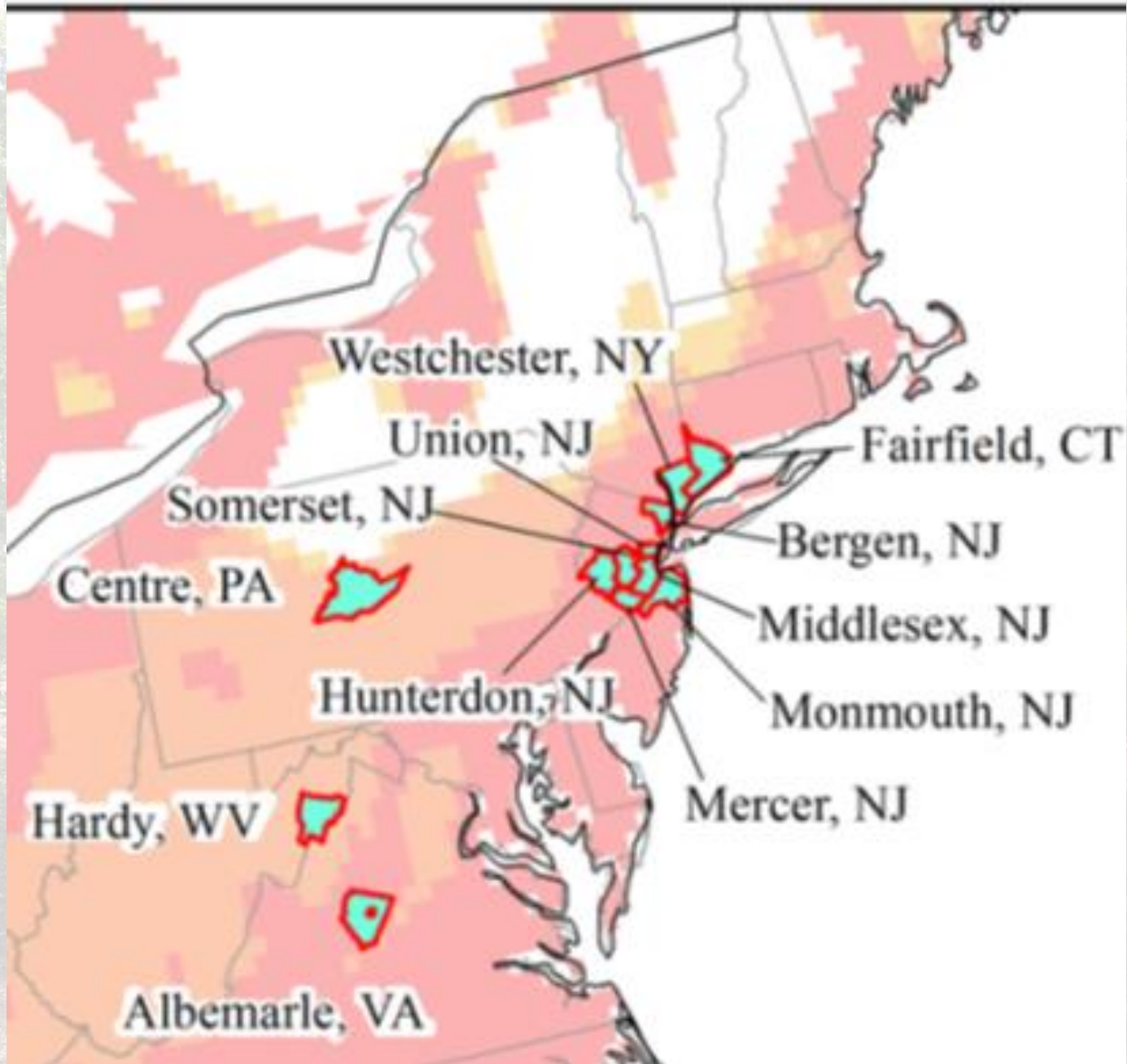
Asian Longhorned Tick in Suffolk County

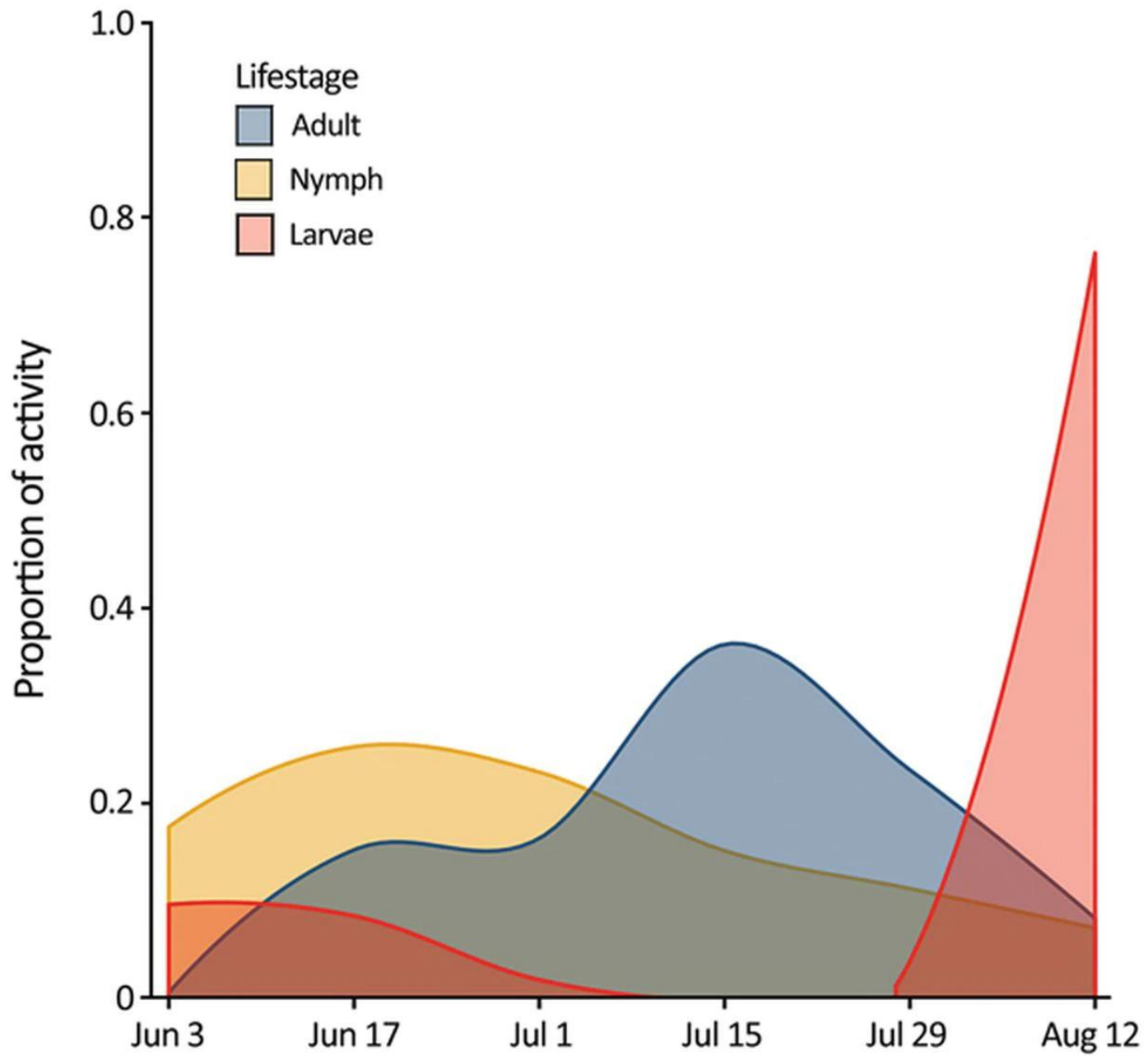
(*Haemaphysalis longicornis*)

- 2018 (Aug) First recorded sighting:
larva - Ocean Beach (ABDL), Manorville (late July)(VC)
- 2019 (Sept) First nymphs, Larva
nymphs - William Floyd Estate (NPS), Lloyd Harbor (ABDL)
Larva – Southampton (mid May)
- 2020
Larva- Northport, Manorville
Nymphs- Babylon
Adult- Shelter Island (NEVBD)
- 2021
Nymph- Northport, Babylon, Southampton
Adults- Northport, Babylon, Islip
- 2023
Found in every township, increasing
densities, more commonly encountered



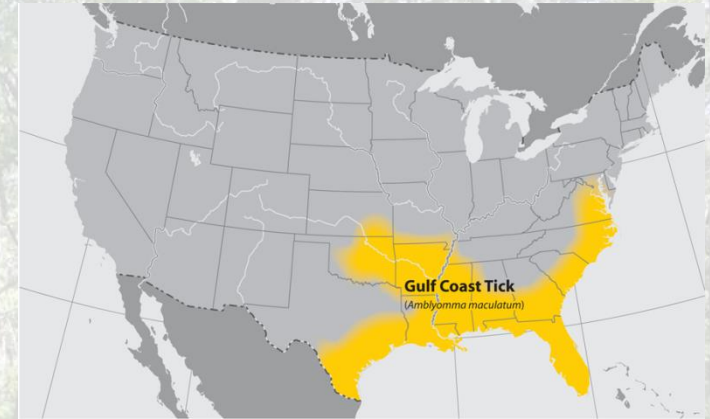




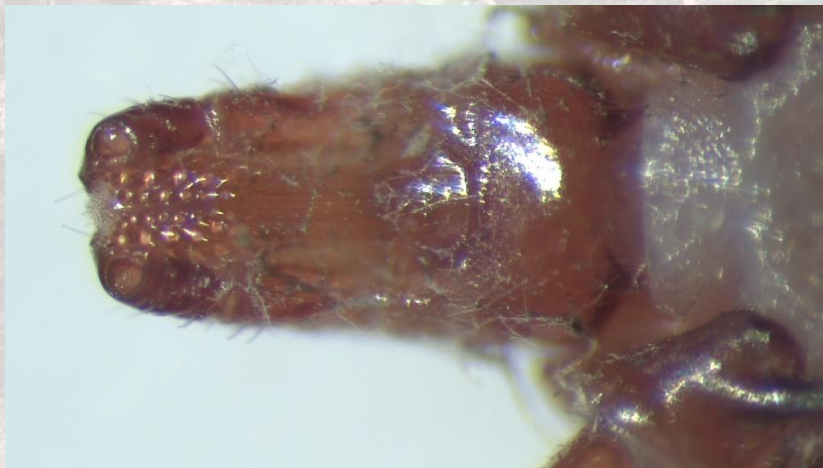


Gulf Coast Tick (*Amblyomma maculatum*)

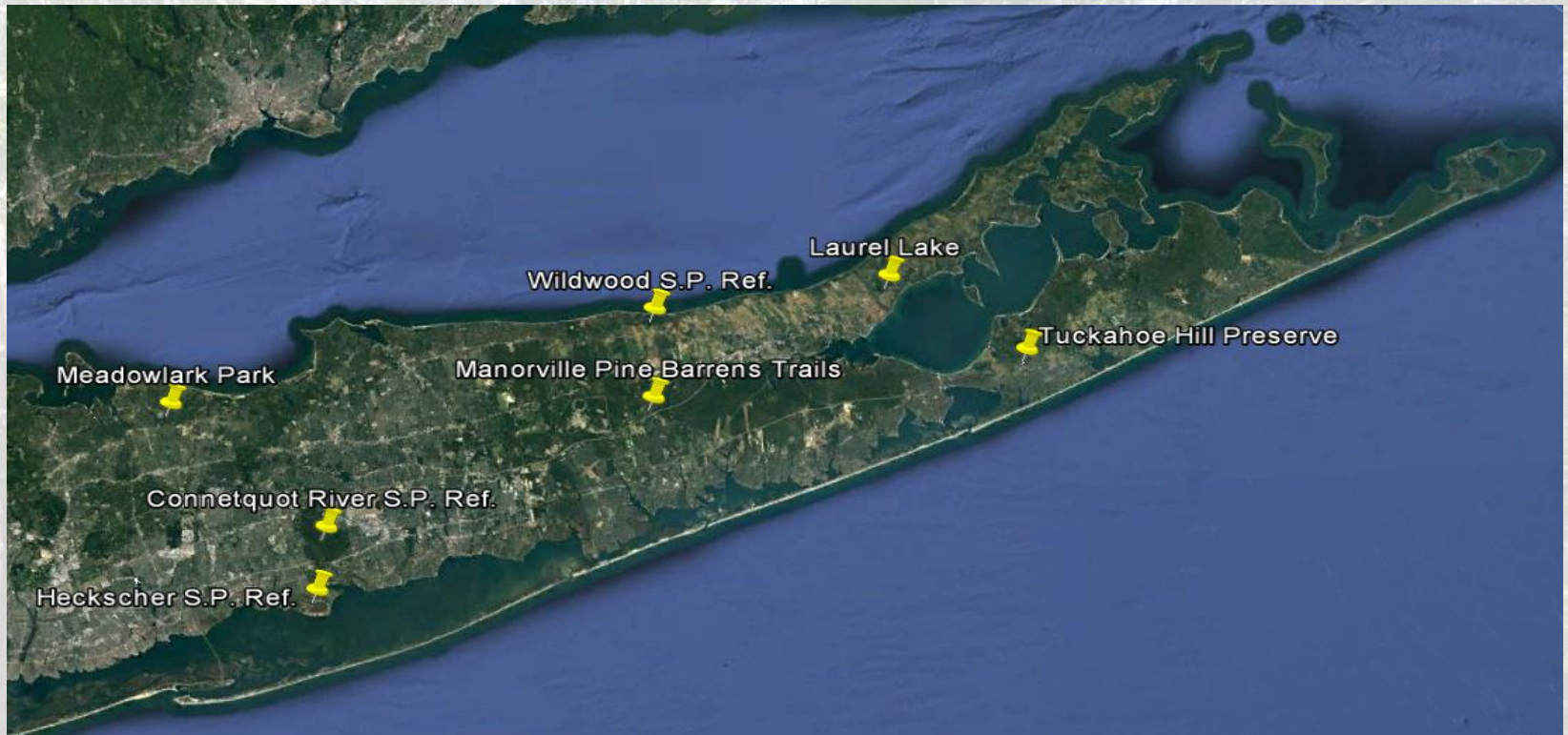
- Found in Islip July, 2021 (LIISMA)
(Long Island Invasive Species Management Area)
- Also found on Great Gull Island July, 2021
- No recorded sighting on Long Island Prior
ID validated and sent to USDA
- Established populations in Staten Island and
in NJ
- Sightings in CT and surrounding states
- 2023 specimens found by NYS Parks



https://www.cdc.gov/ticks/maps/gulf_coast_tick.html

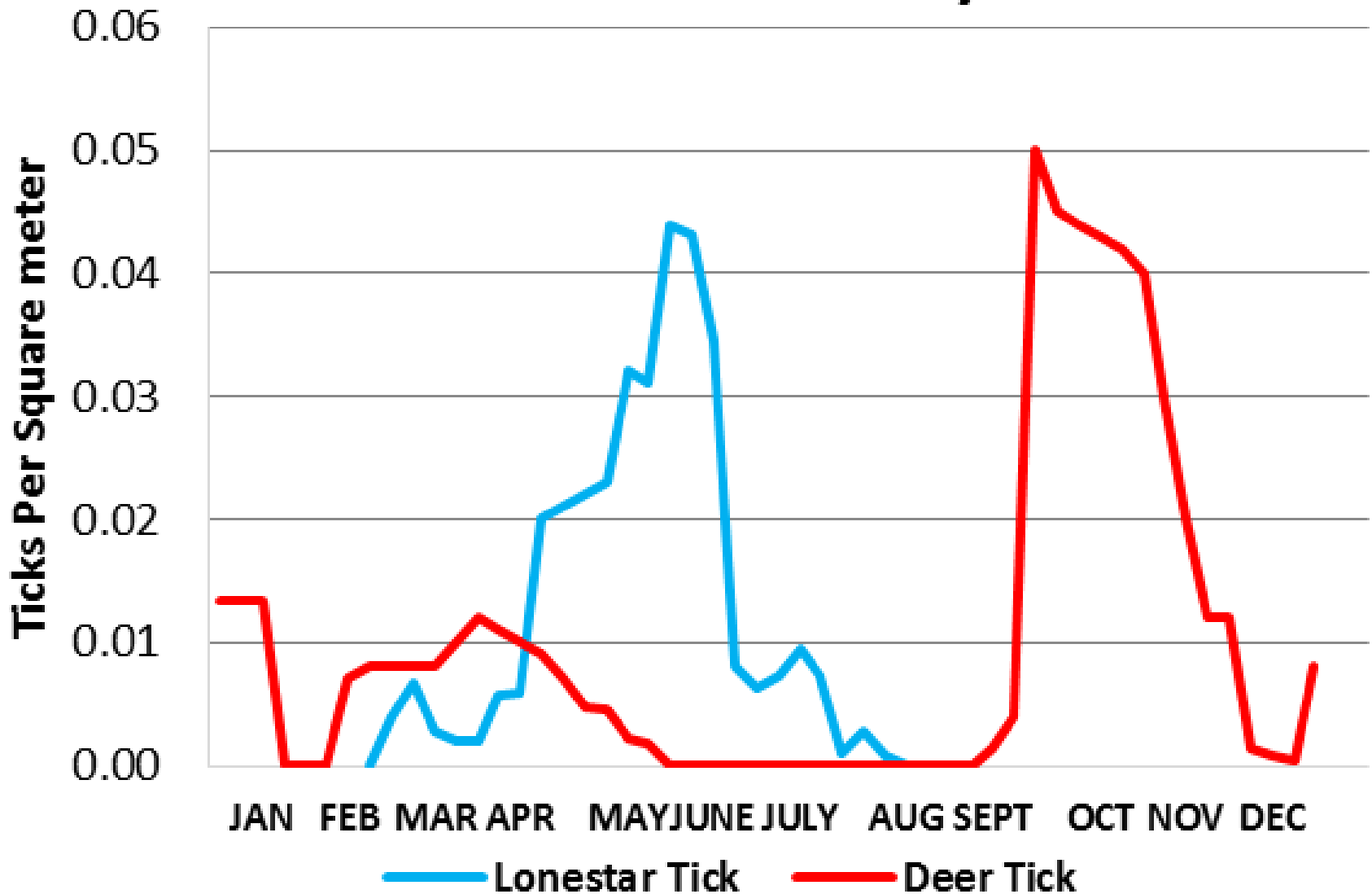


2018-Current Surveillance Sites

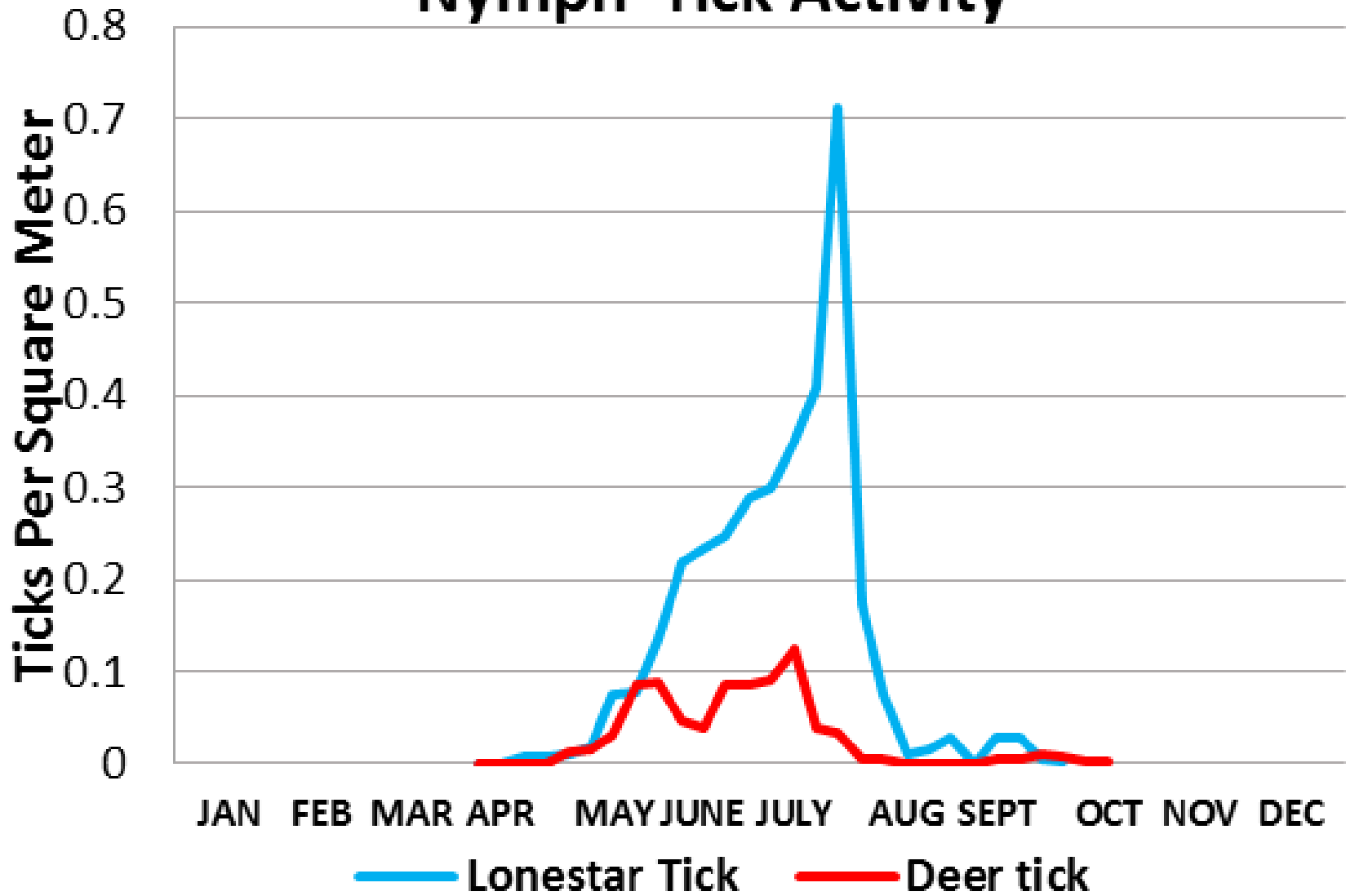


- Cooperatively expanded surveillance grids with NYS Parks in 2018
- Enhanced resolution for seasonal activity and tick population densities
- Bi-weekly grids: Higher resolution local standard to compare with other seasonal sampling sites and programs

Adult Tick Activity



Nymph Tick Activity





Arthropod Recovery and Non-target Assessment (ARENA) Strategy Based Acaricide Trials

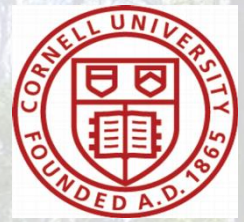
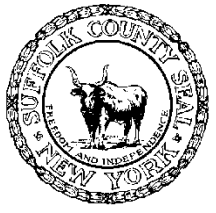
- Improved tick recovery across all tick species and stages
- Measurable environmental and sampling based artifacts
- Allows direct comparison between products, application methods, etc.
- High resolution tick allows field assessment of repellency and control



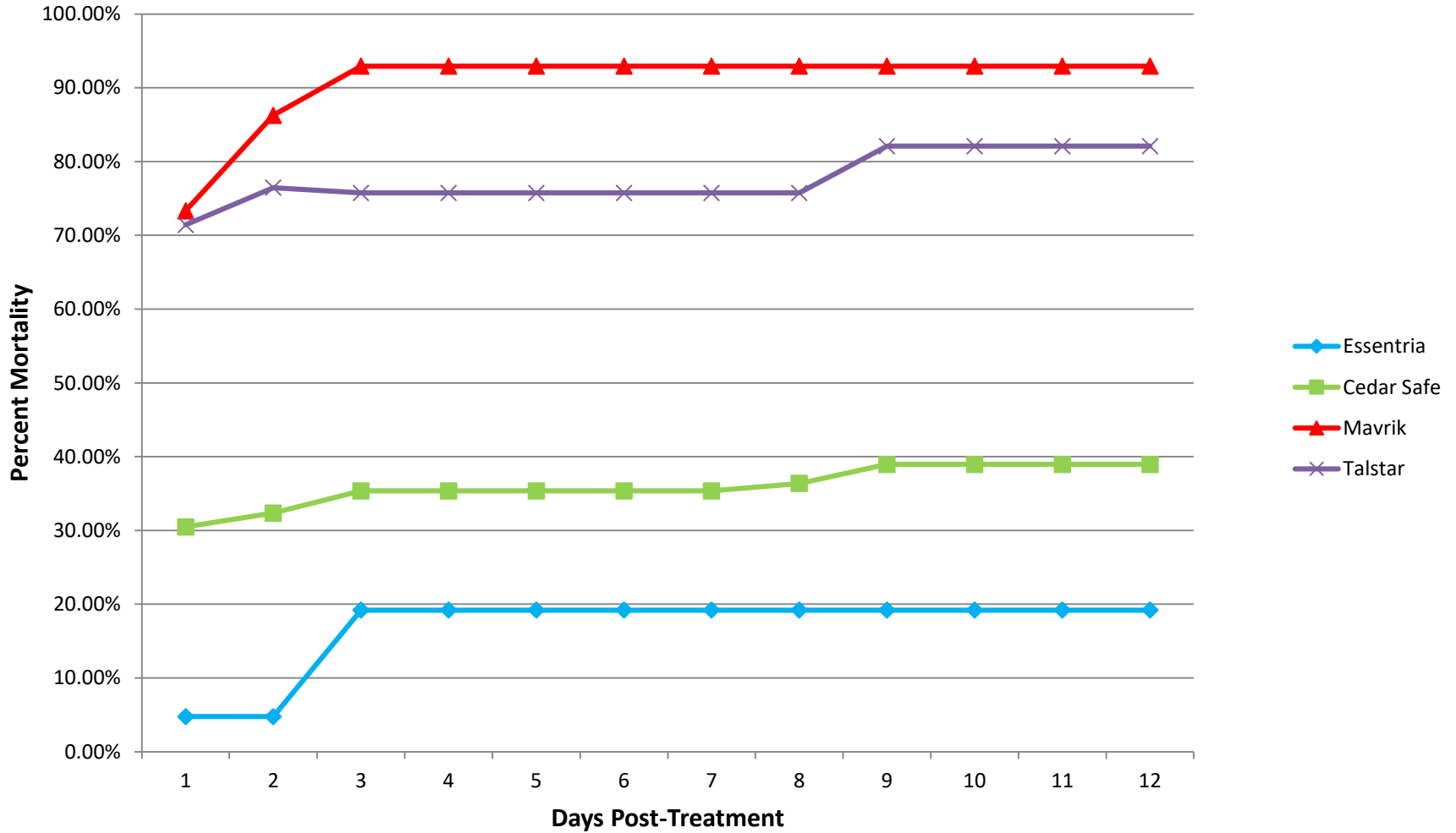
Enhanced Tick Recovery

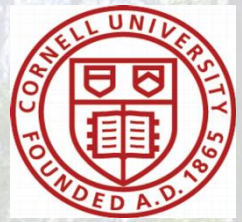
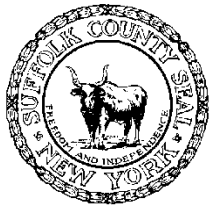




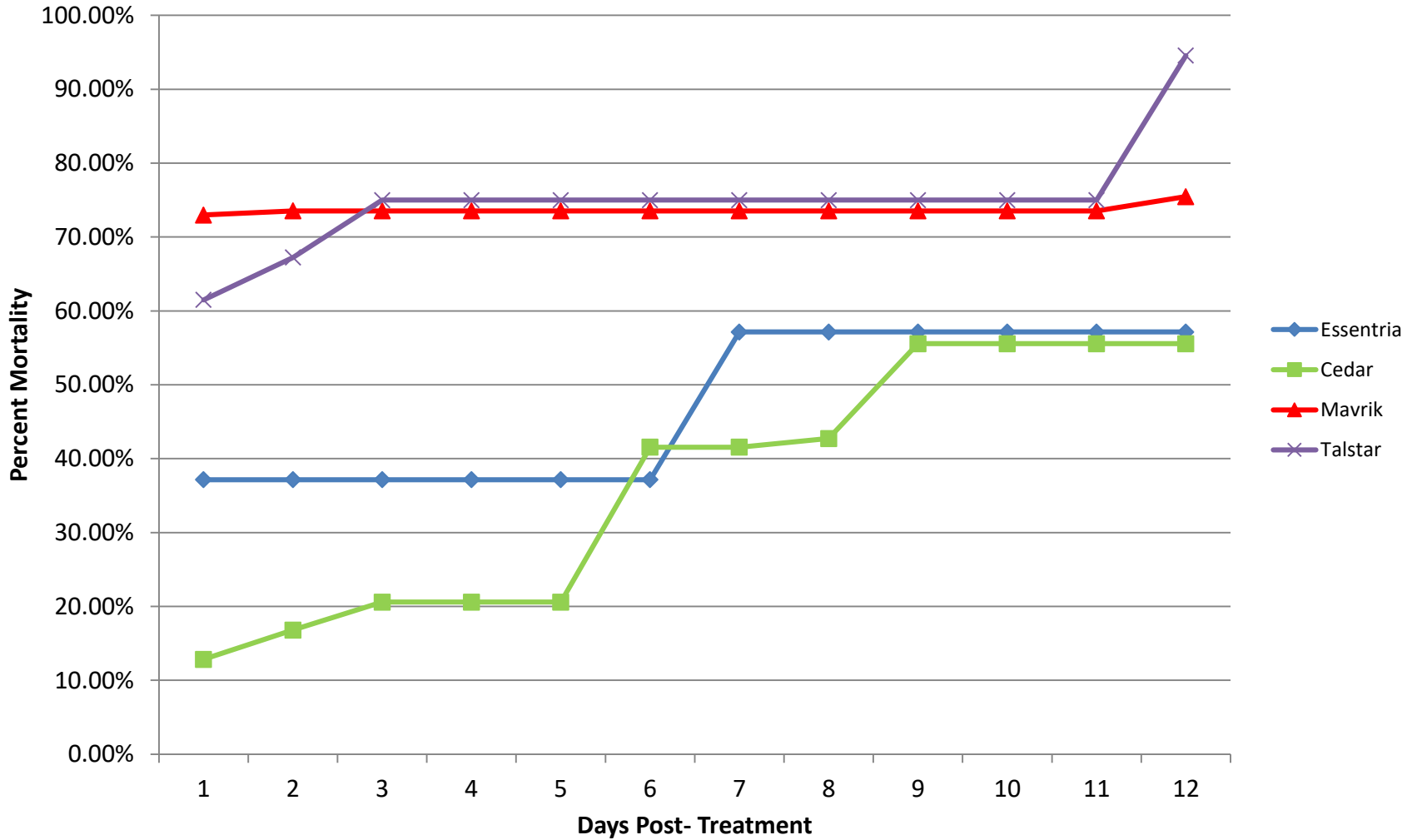


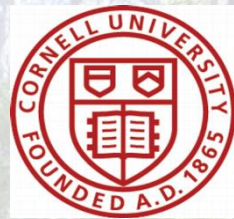
Deer Tick Adults



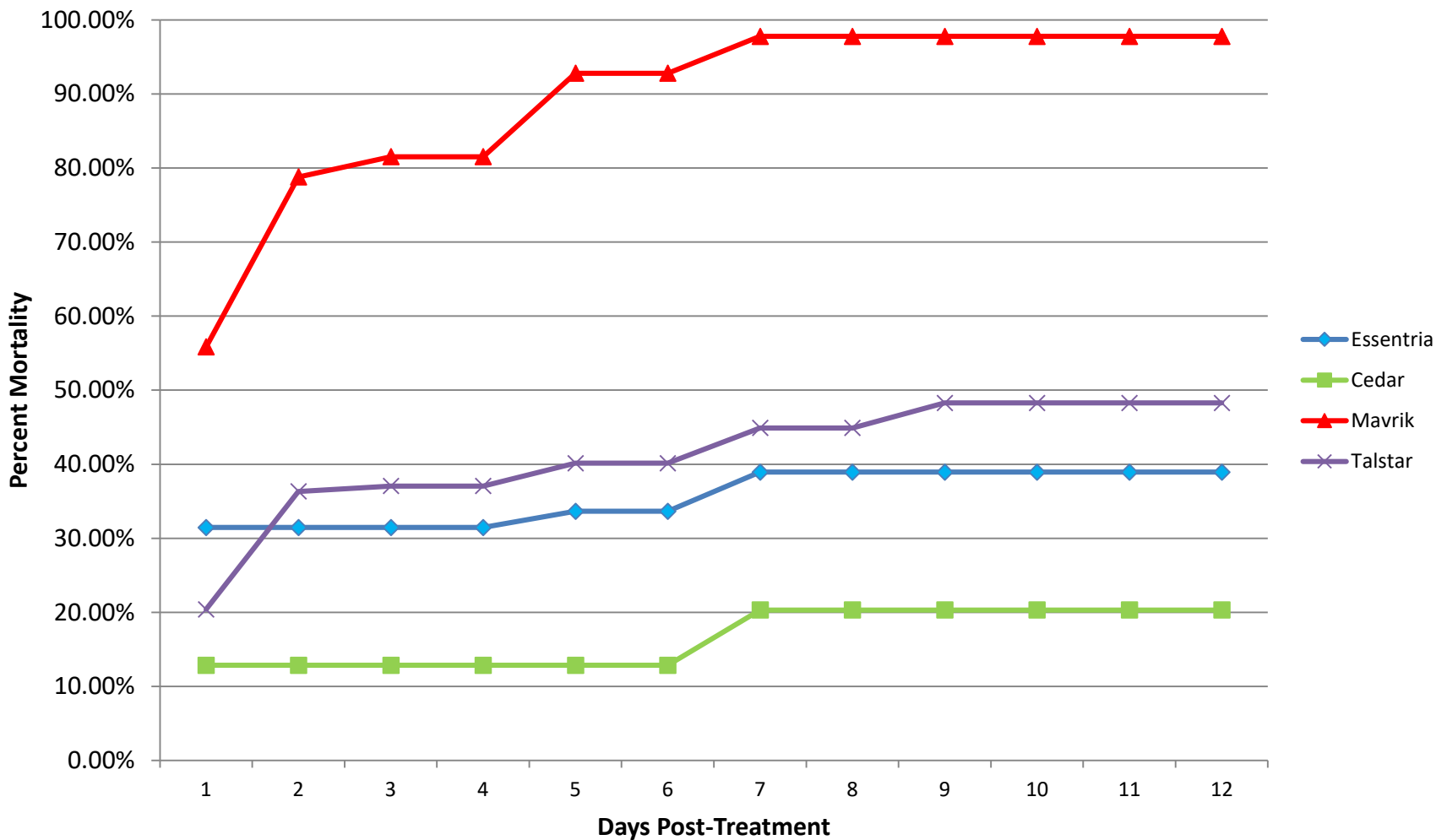


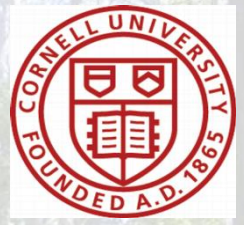
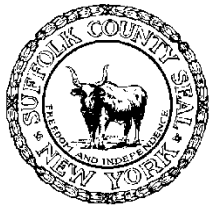
Deer Tick Nymphs



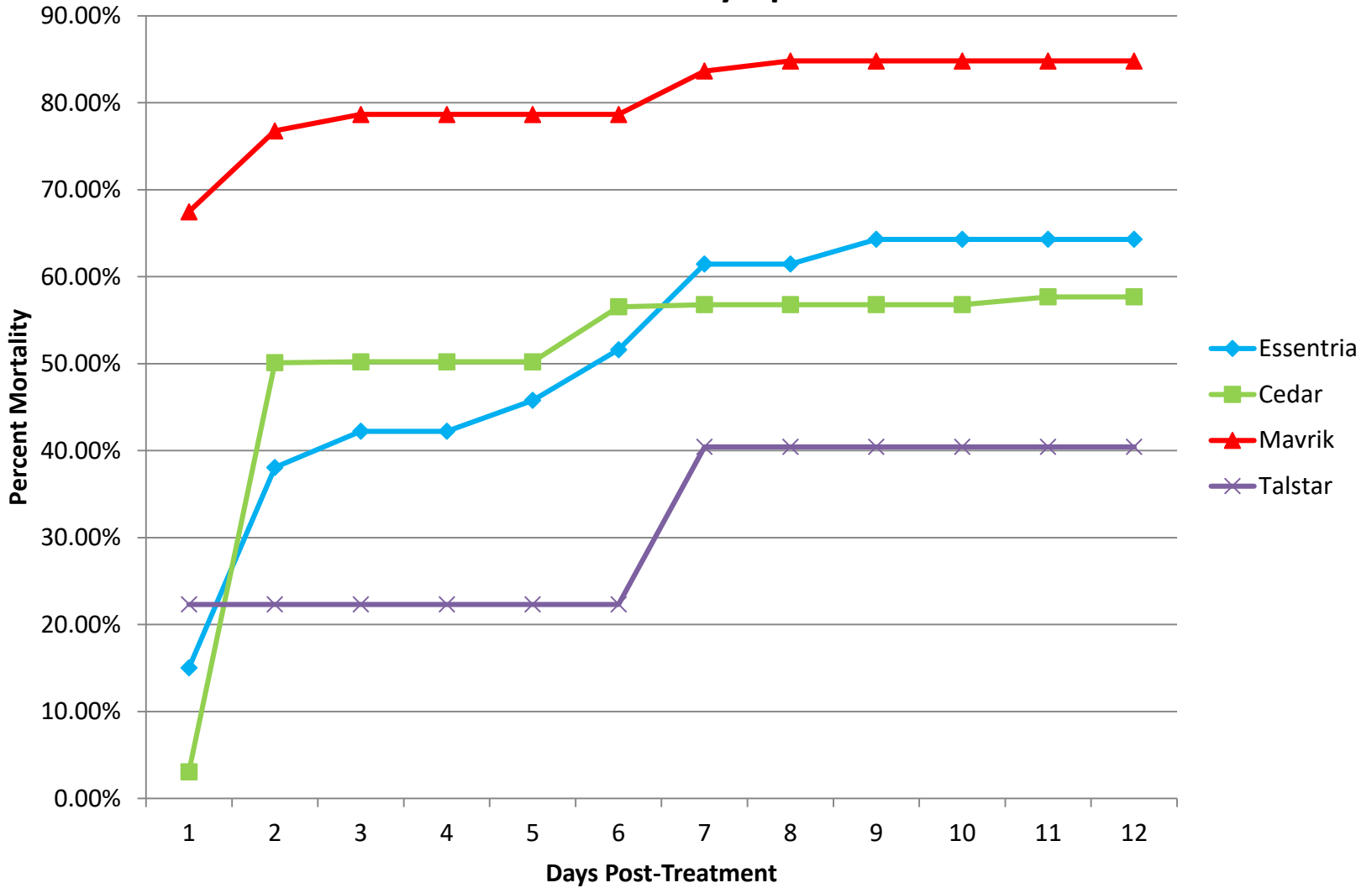


Lone Star Adults





Lone Star Nymphs



White-tailed Deer (*Odocoileus virginianus*)



Photo by: Debbi Ann

Local Deer Species and Variation



<https://nature.mdc.mo.gov/discover-nature/field-guide/white-tailed-deer>



Sika Deer

Photo By: Robert Boscarino



Mel Diotte Photography



White-tailed Deer (*Odocoileus virginianus*)

Biology

- Widespread, adaptable and will habituate to humans when fed or routinely encountered.
- Prefer patchy habitats with ecotone or edge areas where grass and forest zones meet.
 - Eat a wide variety of plants, ornamentals
 - Will feed on less preferred plants when population densities increase or alternative food sources are scarce
- Females will breed at 1 year and routinely have 2 fawns per year
 - Can live up to 20 years (in part due to lack of predators)
 - Populations on LI have been aged between 6 months up to 8 years
 - Populations will double every 2-3 years due to minimal mortality levels
 - Highest impact on populations currently is deer vehicle collisions in our area

Adaptability



PM 3:17 JAN/ 3/2013

Overabundance: Causes

- Historically, White-tailed deer populations reached critically low populations due to over hunting
 - Current controls (hunting, DVC, fawn predators) have not proven adequate
- >70,000 estimated deer-vehicle collisions in New York
 - East Hampton have recorded over 475 DVC in 2017
 - Deer densities in some areas area > 100 deer/square mile



Photo by: Debbi Ann

Overabundance: Symptoms

- Dominant plant species in overpopulated forests
 - Herbaceous: Ferns, grasses
 - Shrubs: Blueberry, Mountain Laurel, Sweet Fern, Spicebush
 - Trees: Beech, Striped maple, Ironwood
- Removal or stunted growth of preferred species



Deer and Ticks

- White-tailed deer are the primary hosts for adult deer ticks and all stages of Lone star ticks
 - 93% of adult deer tick populations found on white-tailed deer in Seatuck National Wildlife Refuge (Wilson et al. 1990)
 - Male white-tailed deer were found to host three times as many feeding adult deer ticks than female deer (Wilson et al. 1990)
- Deer and other animals aide in the spread and re-introduction of ticks into treated areas
 - Cats were found to host 3.8% of adult deer ticks (Wilson et al. 1990)
- Deer are a host of Ehrlichia which is vectored by lone star ticks
- In Connecticut, a 76% reduction in tick abundance took place after reducing deer density to 13.2 deer/ mile² (Killpatrick, Labonte and Stafford III. 2014)

Killpatrick, Labonte and Stafford, III. 2014. The Relationship Between Deer Density Tick Abundance and Human Cases of Lyme Disease in a Residential Community


Wilson et al. 1990. Host-Dependent Differences in Feeding and Reproduction of I. dammini

Deer: Population Density and Ecological Effects


Too Many Deer 20+ mi²

-  Ticks
-  Invasive plants
-  Understory
-  Birds and other organisms

Just Enough Deer 15-20 mi²

- Native plant regrowth
-  spread of invasive
- Normal tick success rate

Too Few Deer 10 or less mi²

- Overabundance of some native plants
-  Success of invasive plants
- Ticks may shift to other hosts if available

(USFS)

Western Suffolk County: estimated density 27-39 deer per sq. mile (USDA)

Town of East Hampton: estimated density 51 deer per sq. mile (Verret)

USDA-APHIS-WS. 2014. Long Island White-Tailed Deer Damage Management Demonstration Project Report.

USFS. 2012. Deer can be too many, too few or just enough for healthy forests. Northern Research Station - Research Review no. 16.

Verret, F. 2006. White-tailed deer population estimates in the Town of east Hampton, New York. Wildlife Biometrics report. Berkshire, NY.

Deer Exclusion

- .26 mi² after 3 years 60% reduction in lone star nymph and adults, larvae were eliminated (USDA. 1989. Management of the Long Star Tick in Recreation Areas)
- Minimize tick re-entry into area via deer hosts

Limitations:

- High initial costs, visibly obtrusive
- Will not stop smaller animals
- May increase populations of smaller animals



Deer Exclusion



- Electric Fencing
 - flag with tin foil strips with an attractant
 - must have additional flagging so deer can see the wire
 - May not be legal in your area – check local codes/laws

<http://www.finegardening.com/article/deer-proof-electric-fence>

Vegetation Management

- Mowing and controlled burns
- Widening and trimming trails, use of boardwalks
- Canopy thinning to increase light penetration
- Understory brush and leaf litter removal
- Mulch or gravel edge barriers
- Selective implementation in optimum tick habitat (USDA. 1989)



<https://wanderingaroundtheblock.wordpress.com/2014/04/26/william-floyd-estate/>



Stafford, K.C. 2007. Tick Management handbook. Connecticut Agriculture Experiment Station; Centers for Disease Control and prevention

Vegetation Management

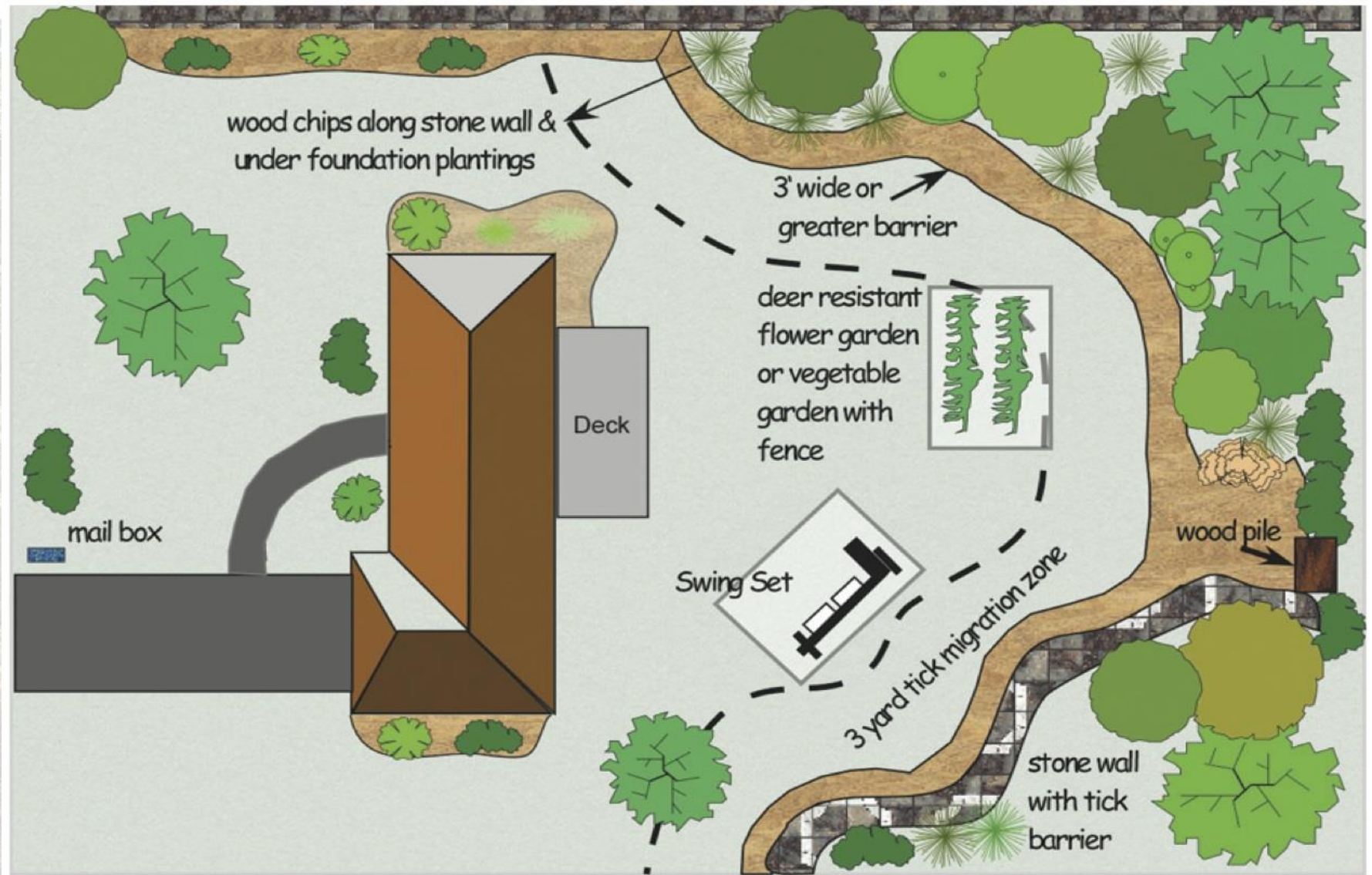


Japanese Barberry (*Berberis thunbergii*)

- Due to high rates of transpiration average relative humidity is higher around individual plants and increases with density
- Barberry fruit, dense growth and thorns provide excellent cover and a source of food for small mammal hosts.
- Removal of barberry significantly reduces relative humidity and can lead to a decline of tick abundances
- Currently this is a prohibited species and banned from sale as of 2015 in NY
- PRISM Priority Tier 4 – Local Control
- Removal from Suffolk Parks as part of tick control pilot program



Vegetation Management, Barrier Treatment Overview



Targeted Host Applications: White-Footed Mice (Damminix)



<http://www.ticktubes.com/index.html>

- **Targets ticks/stages that are present on mice, mostly deer tick larvae + some nymphs**
- **Field studies inconclusive, spotty record**
 - After three weeks virtually all mice in treatment areas tick free (Dablinger and Rimmer. 1991.)
 - No significant reduction of questing ticks after 2 years (Daniels, Fish and Falco. 1991.)
- **Efficacy in general**
 - ON MICE 37% decrease in 1989 and 91.5% decrease in 1990 of ticks
 - No reductions in questing tick populations or *B. burgdorferi* infection rate of nymph or adult *I. scapularis* (Stafford III K.C. 1991.)
 - 16.3% of white-footed mice infested VS. 66.9% in untreated areas
 - No reductions in questing tick populations or *B. burgdorferi* infection rate of nymph or adult *I. scapularis* (Stafford III K.C. 1992.)
 - 27% and 20% reduction in questing nymphs on year 1 and 2 respectively (Jordan and Schulze 2019.)
- **Limitation : targets the most abundant stage/host**
- **Does not target lone star ticks!**



(Lymediseaseguide.org)

Jordan and Schulze. 2019. Ability of two commercially available host-targeted technologies to reduce abundance of *I. scapularis* in a residential landscape.

Dablinger and Rimmer. 1991. Efficacy of a Permethrin-Based Acaricide To Reduce the Abundance of *Ixodes dammini* (Acari : Ixodidae).

Daniels, Fish and Falco. 1991. Evaluation of Host- Targeted Acaricide for Reducing Risk of Lyme Disease in Southern New York State)

Stafford III K.C. 1991. Effectiveness of Host-Targeted Permethrin in the Control of *Ixodes dammini* (Acari : Ixodidae)

Stafford III K.C. 1992. Third-Year Evaluation of Host-Targeted Permethrin for the Control of *Ixodes dammini* (Acari : Ixodidae) in Southeastern Connecticut

<http://lymediseaseguide.org/wp-content/uploads/2014/02/white-footed-mouse-oral-bait-vaccine-lyme-disease.jpg>

Select Tick Control System

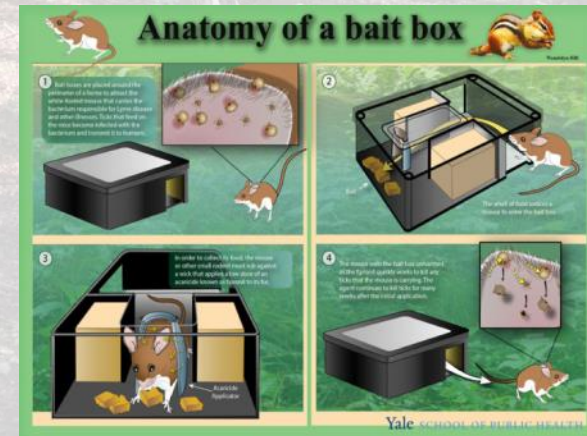


- **Targets ticks stages present on mice AND chipmunks**
 - mostly deer tick larvae, nymphs
- **Originally marketed as Maxforce Tick Management System**
 - On mice and Chipmunks 92% and 95% control of nymph and larvae burdens and eastern chipmunks after one year
 - Pulled from market in 2006 due to eastern squirrel compromising box housing
- **Back on market in 2012 as Select Tick Control Systems (TCS)**
 - Improved fipronil treated wick and 2 piece protective metal covering
 - 87% and 97% control of host seeking nymphs on year one and two respectively
 - Metal covering eliminated non-target wildlife damage to the bait box.

(Schulze et al. 2016. Evaluation of the SELECT Tick Control System (TCS) a Host-Targeted bait Box, to Reduce Exposure to I. scapularis in a Lyme Disease Endemic Area of New Jersey.)

- *84% and 79% control on questing nymphs*
(Jordan and Schulze 2019)

- **Limitations : targets the most abundant tick stages**
 - Numerous other hosts available
 - Unknown control levels for adult deer ticks,
- **Does not target lone star ticks!**



4 –Poster Deer Treatment System

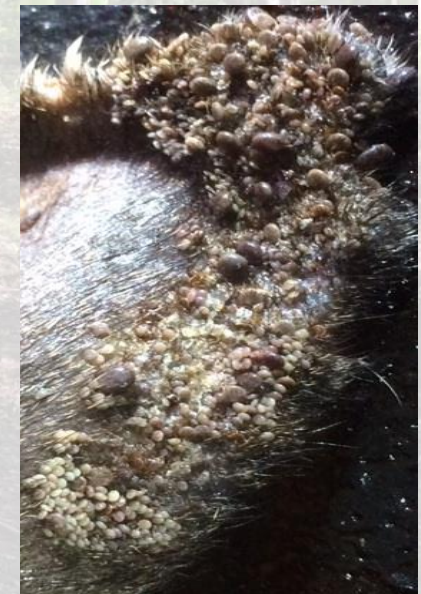


4 –Poster Deer Treatment System

Accumulated control results from 4-Poster Literature

State	No. of Units	T. Sites	Ref. Sites	Study length	Notes	I. scapularis Control			A. americanum Control			Source
						larvae	nymph	adult	larvae	nymph	adult	
Texas	1	1	1	5 mon	Amitraz, Initial Trial	not present			92-97% red. on deer			Pound et al. 2000.
Texas	2	2	1	4yrs	Amitraz,	not present			X	91%	93%	Pound, Miller and George. 2000.
Maryland*	25	3	3	4yrs	Amitraz, prelim, NE Study	X	69-80%		X	95-99%		Carroll et al. 2002.
Maryland	4	1	1	3yrs	Permethrin	91-100%			not present			Solberg et al. 2003.
New Jersey*	25	1	1	5yrs	Amitraz, NE Study	82%	77%	94%	99%	89%	96%	Schulze et al. 2009.
New Jersey	7	1	2	2yrs	Amitraz, After prior IPM efforts	89%	85%		not present			Schulze et al. 2008.
Maryland*	25	3	3	5yrs	Amitraz, final, NE Study	X	69-80%		X	95-99%		Carroll et al. 2009.
Connecticut*	21 - 24	1	1	5yrs	Amitraz, 98-02 active, NE Study	X	64-70%		not present			Stafford et al. 2009.
New York*	24	1	1	5yrs	Amitraz, 97-02 active, NE Study		63-80%		not present			Daniels et al. 2009.
MD(3), NJ(1), NY(1), CT(1), RI(1)	168	7	7	7yrs	Amirtaz, NE Study Final		60-81%			90-99%		Pound et al. 2009.
Massachusetts	42	7	7	5yrs	40% of labeled 4-poster unit density	X	8.40%		not present			Grear et al. 2014.
Virginia	20	2	2	5yrs	elec. fencing, bears, Co2 tick collection	little to no control on deer or			Co2 trap			fairfax Co. 4-Poster Report. 2016.

- *I. scapularis* *A. americanum*
60 - 81.7% 90.9 - 99.5%
- Biggest problems: Low density of 4-poster units and minimal maintenance schedule
 - 5 years, 8.4% reduced abundance using 1-2 stations/ km² vs. 4-5 stations/ km²



Grear et al. 2014. The Effectiveness of Permethrin-Treated Deer Stations for Control of the Lyme Disease Vector *I. scapularis* on Cape Cod and the Islands a Five-Year Experiment

Questions?

