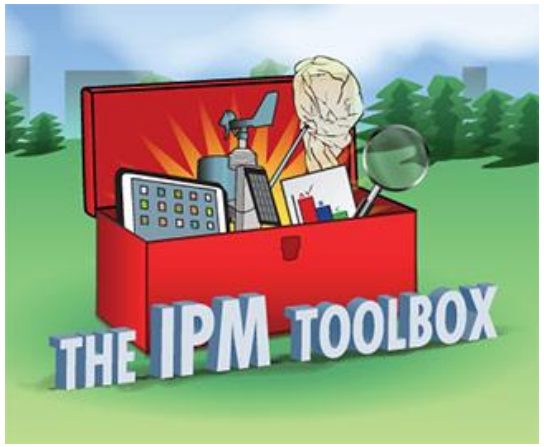
Northeastern IPM Center

Tick IPM Series

Part 3: Asian Longhorned Tick IPM

July 13, 2020



Department of Health Services, Bergen County, New Jersey

Center for Vector Biology, Rutgers

Rutgers New Jersey Agricultural Experiment Station

USDA United States Department of Agriculture National Institute of Food and Agriculture

Northeast Regional Center for Excellence in Vector-Borne Diseases

Welcome

A recording of this webinar will be available within a week at

http://www.neipmc.org/go/ipmtoolbox

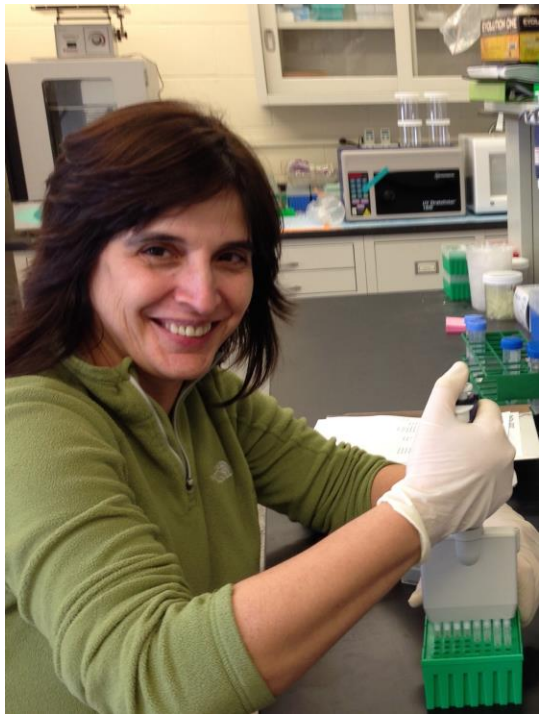
We Welcome Your Questions

- Please submit a question **at any time** using the Q&A feature to your right at any time
- If you'd like to ask a question anonymously, please indicate that at the beginning of your query.

Center for
VECTOR BIOLOGY
RUTGERS

Presenters

Dina Fonseca, PhD
Professor of Entomology, Rutgers U.
Director, Center for Vector Biology



Matt Bickerton, MS
Bergen Co. Dept of Health
& Rutgers Center for Vector Biology

RUTGERS
New Jersey Agricultural
Experiment Station

Some Questions for You

A swarming, exotic tick species is now living year round in N.J.

Updated Apr 24; Posted Apr 21

NEWS ANIMALS

This invasive tick can clone itself and suck livestock dry

In its native East Asian range, the longhorn tick spreads potentially fatal human diseases

BY LEAH ROSENBAUM 7:00AM, JUNE 29, 2018

Exotic tick species invades New Jersey and appears to be spreading

Scott Fallon, Staff Writer, @NewsFallon Published 5:33 a.m. ET May 3, 2018 | Updated 2:59 p.m. ET May 3, 2018

ENVIRONMENT

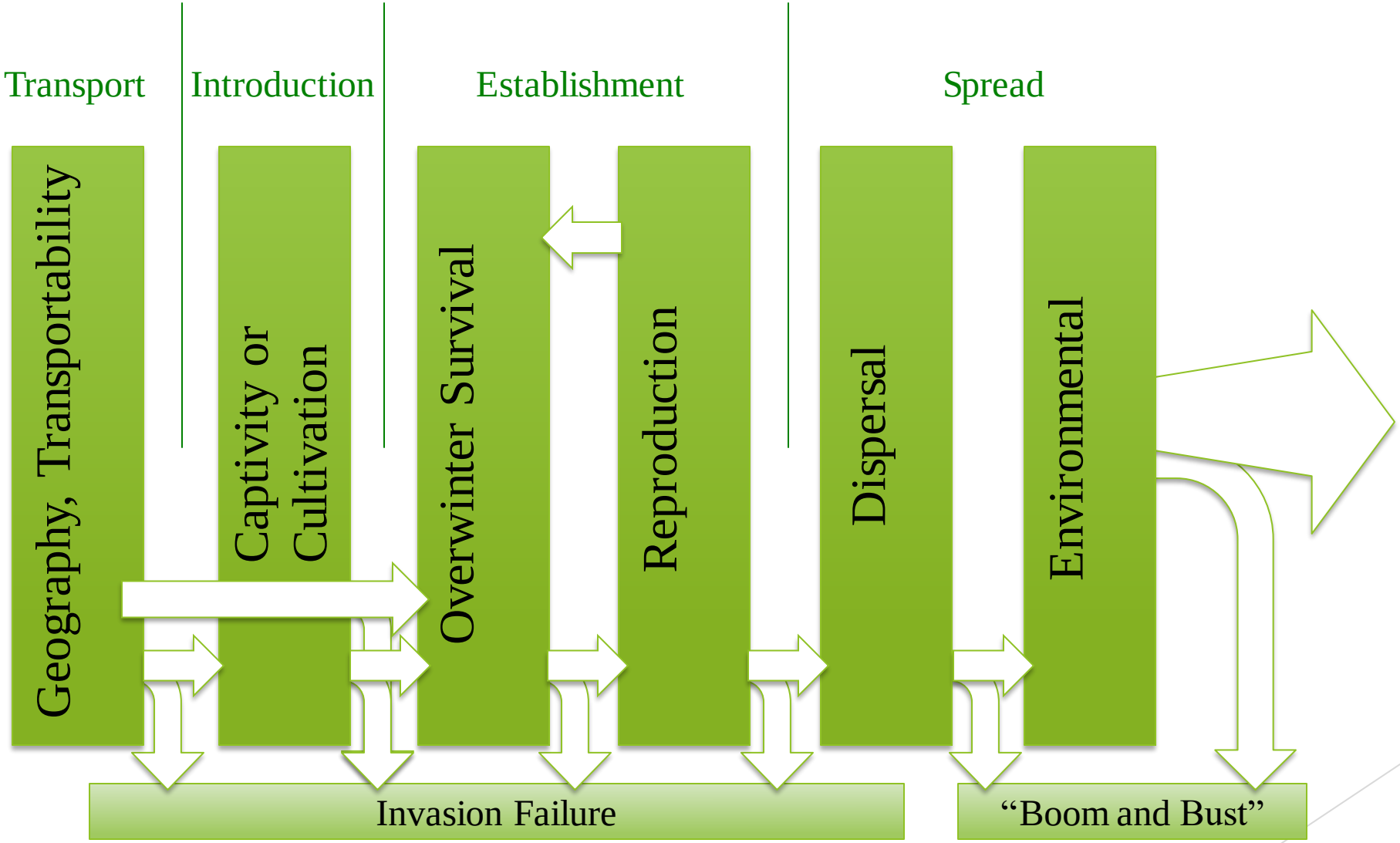
This Self-Cloning Tick is Terrorizing More States

BY JAKE ROSSEN JULY 12, 2018

Outline

- What are *invasive ticks*?
  - *Exotick* vs. native invasive
  - “An ounce of prevention is worth a pound of cure”
- The Asian longhorned tick (ALT) discovery, biology, behavior, vector potential
- ALT Management
    - Agriculture
    - Pets
    - Public Health
- Take-home messages

The invasion process



Modified from **Blackburn et al. 2011** "A proposed unified framework for biological invasions" **Trends in Ecology & Evolution** 26(7):333–9.

The “5 step” approach to assess risk

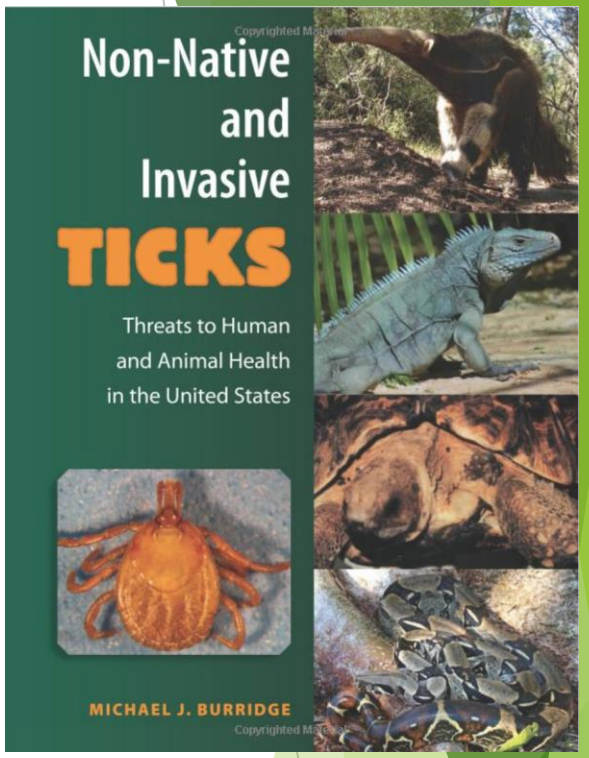
- **Step 1** – Broad host range; in particular CATTLE, HORSES, LIVESTOCK (in general), DOGS, CATS, PETS (in general)
- **Step 2** – Has spread outside the native range; adapted to ANTHROPOGENIC ENVIRONMENTS
- **Step 3** – Detected (intercepted) in the USA
- **Step** 4 – Dangerous (capable to reaching high numbers and spreading) and/or vector of damaging pathogens
- **Step 5** – Distribution in the US will depend on environmental associations (indoors? cold hardy? tropical?)

Loosely based on Heath 2013 Systematic and Applied Acarology, 18(1):1–26.

Exoticks

- In *Non-Native and Invasive Ticks*, Michael Burridge "…has provided a major resource for scientists, acarologists, and pathologists by detailing invasive ticks, the diseases they potentially vector, and the various countries from which at least **100 non-native** ticks have entered the United States in the recent past."

Review by James Nation in the Florida Entomologist 2011



Exoticks in the US

Invasive

		Native range	Step 1 - Host range?	Step 2 - Outside native range?	Step 3 - Detected in the USA?	Step 4- Dangerous? Vector?	
Rhipicephalus annulatus	cat				YES	*Babesia bigemina; Babesia bovis*	Texas/Mexico border. Lots of Insecticide Resistance (IR)
Rhipicephalus microplus	sou tick				YES	*Babesia bigemina; Babesia bovis*	Eradicated from S US, remains in Mexico. Often detected in the US.

Cattle ticks


Amblyomma variegatum

@J Occi

Amblyomma rotundatum

...sive ticks – moving North

		Native range	Step 1 - Host range?	Step 2 - Outside native range?	Step 3 - Detected in the USA?	Step 4- Dangerous? Vector?	Ad
	...illo	Patagonia to Mexico	broad host range; humans and DOGS	No?	Yes, intercepted	maybe	pre
Amblyomma cajennense s.l.	cayenne tick	species complex. *A. mixtum* may be native to TX and FL	three-host HORSES are preferred?	No?	Maybe native	maybe	Int tov
Amblyomma rotundatum	rotund toad tick	Argentina-Mexico and Caribean	two-host tick, amphibians, reptiles, birds	Yes?	yes, FL (1930's; 1979)	maybe	**pa** im inv

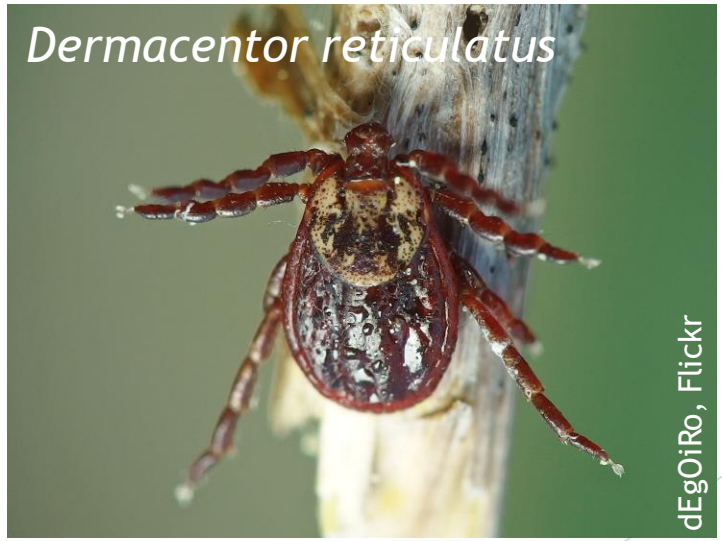
Amblyomma maculatum

@ JOcci CVB

Native invaders = native species expanding north due to climate change or adapting to human environments

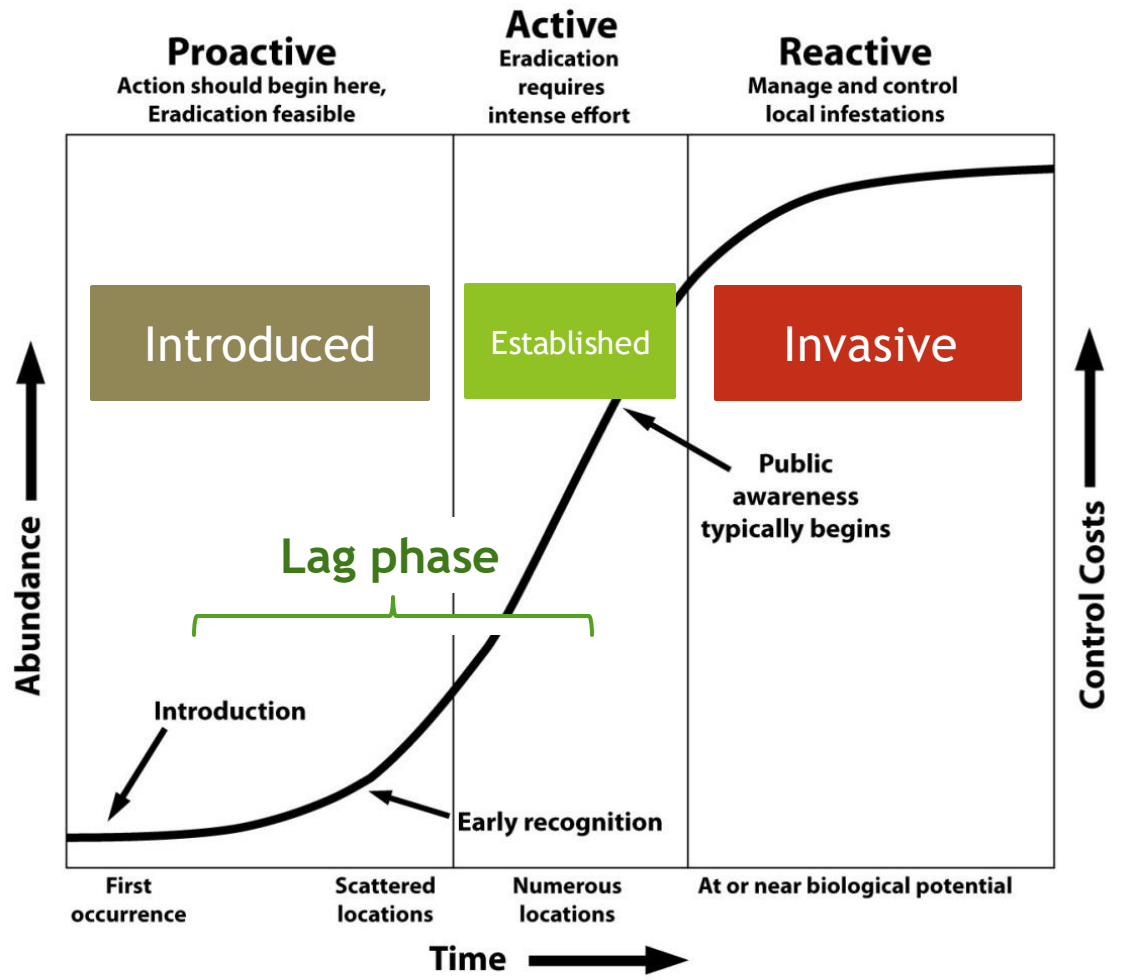
Other species to keep an eye out for

		Native range	Step 1 - Host range?	Step 2 - Outside native range?	Step 3 - Detected in the USA?	Step 4- Dangerous? Vector?	Additional characteristics
Haemaphysalis leachii leachii	yellow dog tick	Africa, Asia, Australia (invasive??)	Three-host tick; DOGS	Yes?	Intercepted in dogs	*Babesia canis*	Ectoparasite of grass-rats in Egypt (Hoogstral 1958). Possibly indoors in cold climates
Ixodes ricinus	Castor bean tick	Europe	Three-host tick; HUMANS, DOGS	No?	Intercepted in DOGS from Austria and Germany	Lyme bacterium and TBEV	**Public Health concern ADAPTED TO ANTHROPOGENIC ENVIRONMENTS - urban areas**
Dermacentor reticulatus	ornate dog tick	Eurasia	three-host tick; CATTLE, DOGS	**Yes?**	Intercepted in dogs	*Babesia canis*	**Expansion may be Climate related ADAPTED TO ANTHROPOGENIC ENVIRONMENTS - urban areas**



“An ounce of prevention is worth a pound of cure”

- Phases



Phases of Invasive Species Invasion and Control

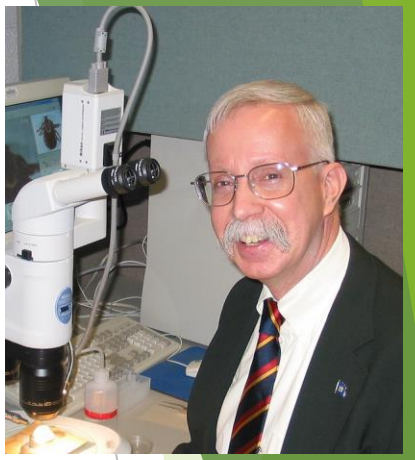
https://www.eddmaps.org/about/why_plants_invade.cfm

Questions?

In August 2017 a NJ citizen contacted the local County Health when she became infested with ticks while shearing her sheep, Hannah.

Tadhgh Rainey
Hunterdon Co. Health

Jim Occi, Rutgers CVB



Rich Robbins, AFPMB
USDA-APHIS

Alvaro Toledo
Ticks & TBD

Andrea Egizi
Monmouth Co. Tick-borne Diseases Lab @ Rutgers CVB, **Tick Genetics**

NJ DOH
CDC
NJ DA
USDA
NJ DEP

Matt Bickerton
Bergen Co. DOH
Tick Control

Julia Gonzalez
Tick dynamics

Dana Price, **Pathogen discovery**

Stephanie Aponte, **Tick phenology**

Rainey T, Occi JL, Robbins RG, Egizi A. 2018. Discovery of *Haemaphysalis longicornis* (Ixodida: Ixodidae) parasitizing a sheep in New Jersey, United States. *J Med Entomol* 55(3):757-759.

Haemaphysalis longicornis, Neumann 1901

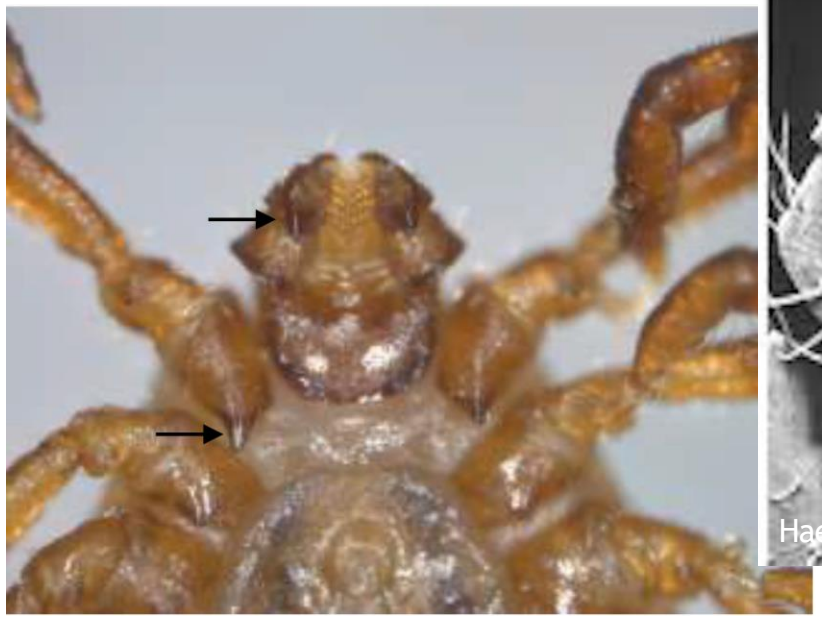
Photo by Vecchio

- Native to east Asia (China, Korea Peninsula, Japan)
- 1900's – established in Australia and the south Pacific
- 2017 - field populations first detected in NJ
- 3 host tick
- Parthenogenetic populations – no males have been found in the US
  - Very large infestations can develop from single individuals
- Broad host range (pets, livestock, wildlife, people)
- In its native range can transmit dangerous pathogens to humans

Useful links: http://vectorbio.rutgers.edu/outreach/ticknews.php
(biology, identification, fact sheets, press releases from all states 1st detections)

Proposed common name: Asian longhorned tick (ALT)

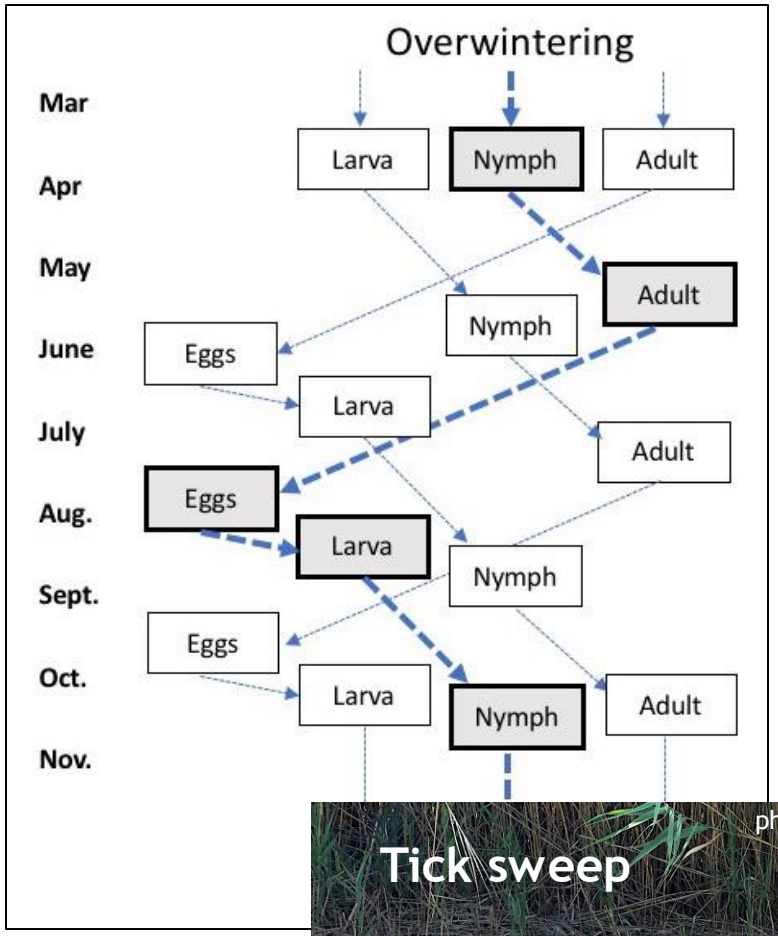
- Common name proposed by Dr. Andrea Egizi, Monmouth Co. Tick-borne Diseases Lab/Rutgers University. Approved by the ESA Committee on Common Names



Haemaphysalis longicornis adult female, ventral view, collected in Middlesex Co., NJ
Photo by Andrea Egizi (2018)

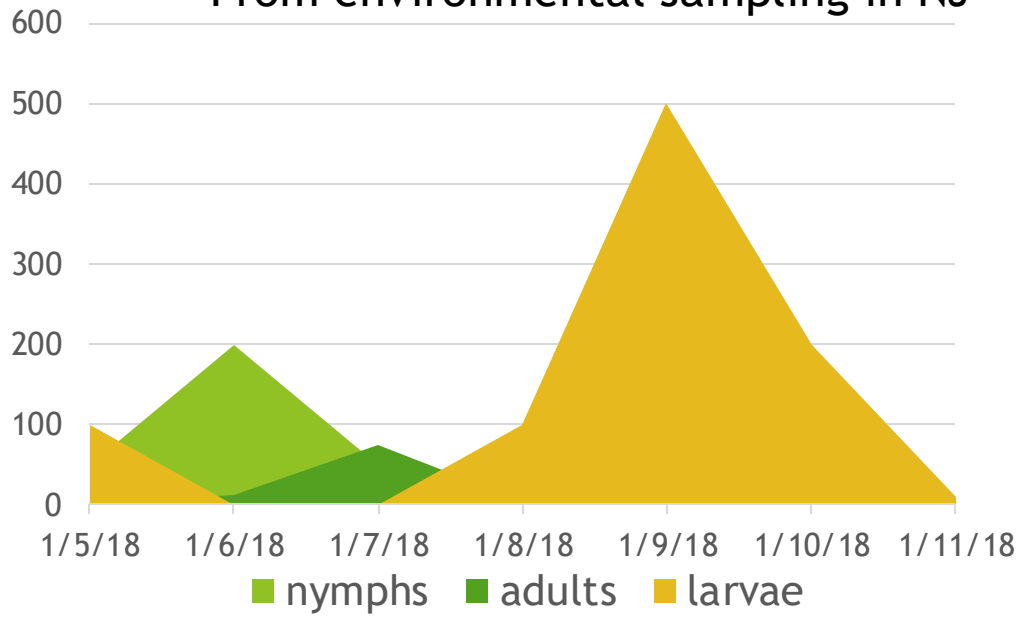
Egizi, Robbins, Beati et al. A pictorial key to differentiate the recently detected exotic *Haemaphysalis longicornis* from native congeners in the United States. **Zookeys.** doi: 10.3897/zookeys.818.30448.

Phenology



Carrol JF & Schmidtmann 1992 JME 29(2): 352-355

From environmental sampling in NJ



Predominance in forest/grassland ecotone

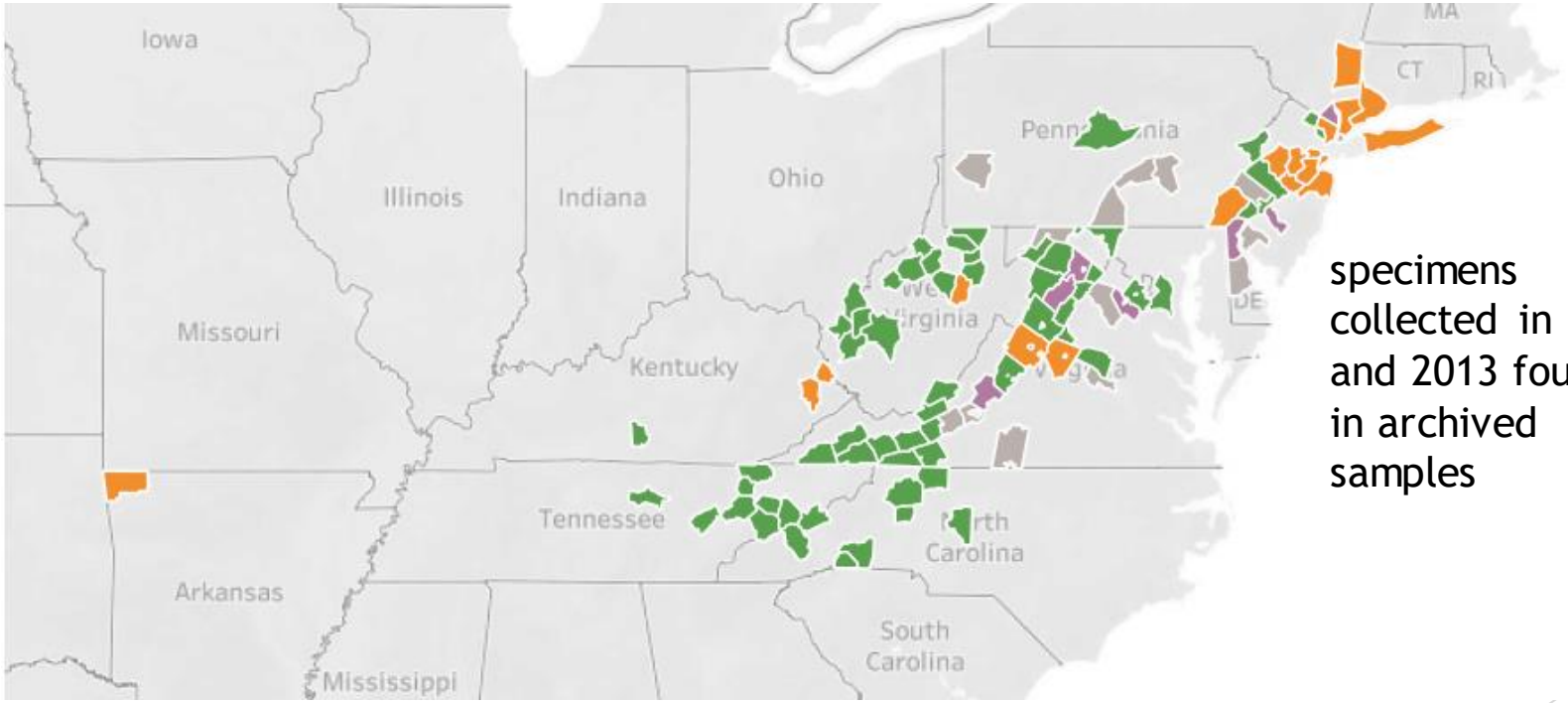
First detections in NJ
2018 – April 14
2019 – March 30
2020 – March 9

Photo by A. Toledo

questing ALT,

US Distribution

- 12 states: AR, CT, DE, KY, MD, NJ, NY, NC, PA, TN, VA, WV
- Hosts: dog, cat, coyote, gray fox, red fox, opossum, raccoon, groundhog, cow, goat, sheep, white-tailed deer, elk, horse, red-tailed hawk, Canada goose, human



specimens collected in 2010 and 2013 found in archived samples

United States Department of Agriculture
Animal and Plant Health Inspection Service

USDA Natl Situation Report (June 15, 2020)

Questions?

The good news

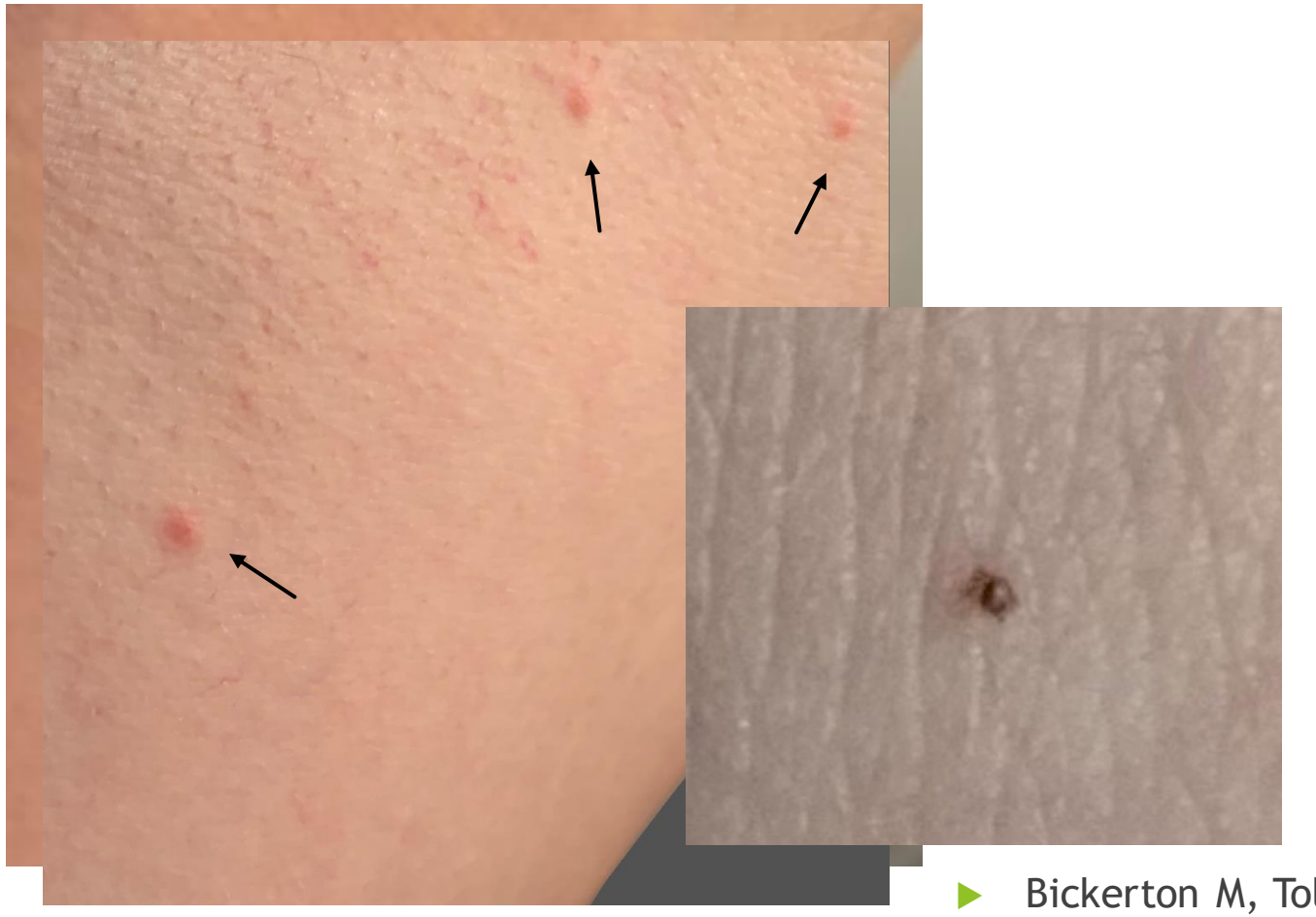
- **No human pathogens** have been detected in US populations of this tick.
- Asian longhorned ticks are **not capable** of transmitting the Lyme bacterium[1]
- Compared to local blacklegged ticks and lone-star ticks, Asian longhorned ticks seem **uninterested in humans**[2]; standard tick repellents and acaricides are **effective**[3]

Bad news

- Asian longhorned ticks infected with *Theileria orientalis* Ikeda were collected in Virginia in areas where **dead cattle** infected with this pathogen had been found[4]
- Asian longhorned ticks **are capable** of transmitting *Rickettsia rickettsii*, the agent of Rocky Mountain spotted fever, a deadly bacterial disease endemic to the US[5]
- **Larval** Asian longhorned ticks can reach extraordinarily high numbers in the Fall

[1]Breuner et al. 2020 Ticks Tick Borne Dis. 11(1):101311; [2]Tufts et al. 2019 Emerg Infect Dis. 25(4):792-796; [2]Ronai et al. 2020 Med Vet Ent (ahead of print); [3]Foster et al 2020 J Med Ent Feb (ahead of print); [4]Oakes et al 2019 Emerg Infect Dis. 25(9):1653-1659; [5]Stanley et al 2020 J Med Ent Apr (ahead of print);

Alarm signs?



- Bickerton M, Toledo A (2020) Multiple pruritic tick bites by Asian longhorned tick larvae (*Haemaphysalis longicornis*). **International Journal of Acarology.** *accepted*

All pictures (and skin) from Matt Bickerton

Impact on Public Health IPM

- Native US tick species, blacklegged ticks (*Ixodes scapularis)*, Lone star ticks (*Amblyomma americanum*) and Americab dog tick *(Dermacentor variabilis*) – **are still the biggest source of risk to residents.**
- The **same measures that prevent tick bites from native** species should be used against *Haemaphysalis longicornis*.

but,

- **High numbers** of Asian longhorned ticks may panic residents.
- **Association with livestock** may increase biting risk.
- **Changes** in behavior associated with new environment are possible.
- Local pathogens may **evolve** to embrace a new abundant carrier.
- We need strategies for **prevention**, **early detection,** and **enlightened** control.

ALT Management

Agriculture

Livestock
- Cattle
- Sheep
- Goats
- Horses
- Pigs
- Deer

Pets

Companion animals
- Dogs
- Cats

Public Health

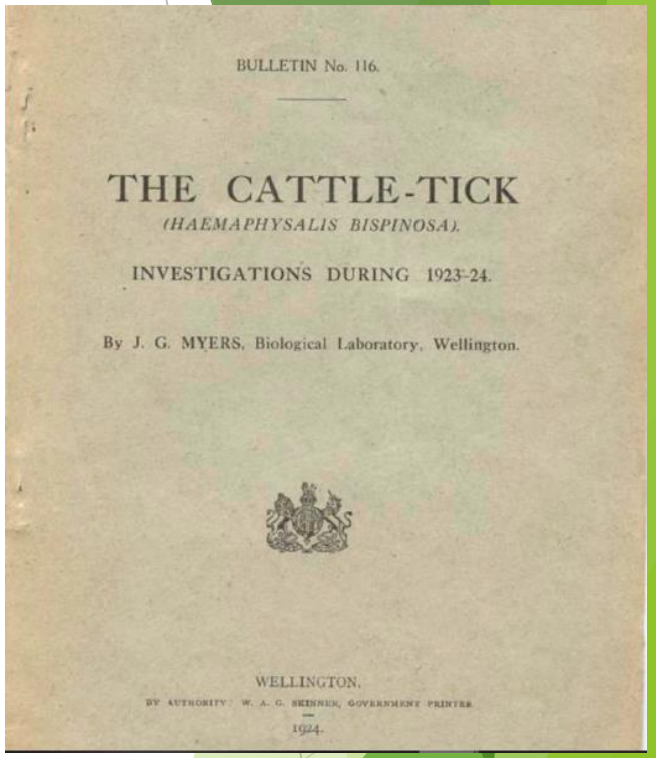
- Humans
- Environment

Acknowledgements:

- Bergen County Health Services
- Bergen County Mosquito Control
- Rutgers CVB
- Allen Heath PhD – Hopkirk Institute, NZ
- Denise Bonilla – USDA-APHIS
- Dallas Meek – USDA-APHIS
- Rebecca Trout-Fryxell – University of Tennessee
- Michael Yabsley – University of Georgia
- Andrea Egizi PhD – Monmouth County Tick Program
- Alvaro Toledo PhD – Professor Rutgers CVB

Early Control Efforts on Cattle in New Zealand

- NZ cattle tick (ALT) likely introduced to NZ via livestock imported from Japan ca 1894.
- Concerns over cattle fever (*Babesia bigemina*) and further spread prompted Ag Ministry to mandate arsenic cattle dips as early as 1921.
- 400 gallon "swim dip" mixed with 7 lbs arsenious oxide repeated every 3 weeks
- Required before transporting the animal outside of quarantine areas and performed immediately prior to auction.
- Good pasture management implemented: plowing, burning, topdressing, and keeping the pasture free of "roughage"(rushes- *Juncaceae*).


BULLETIN No. 116.

THE CATTLE-TICK

(*HAEMAPHYSALIS BISPINOSA*).

INVESTIGATIONS DURING 1923-24.

By J. G. MYERS, Biological Laboratory, Wellington.

WELLINGTON.

BY AUTHORITY: W. A. G. SKINNER, GOVERNMENT PRINTER

1924.

Heath, A.C.G. 2020. New Zealand Journal of Zoology. DOI: 10.1080/03014223.2020.1772326
Myers, J.G. Bulletin of the New Zealand Department of Agriculture 116, 105 pp.

TICK CONTROL - FARM CALENDAR

(for use with AgFacts sheet "TICKS")

Month	Status of tick	Control measure
July	First few nymphs on stock.	Start season's control programme by spraying stock in late July to control overwintered stages.
August	Nymphal peak.	Dipping not practicable during lambing but dip all other stock where possible.
September	Many nymphs still about.	Spray docked lambs. Keep grass growth down. Cut down rushes and remove debris.
October	Nymphs on the wane. Adult ticks appearing.	Spray or graze new rush growth. Keep rank grass down.
November	Adults in large numbers.	Dip all stock to kill adult ticks before eggs are laid.
December	Adult peak.	
January	Larvae appearing.	Dip all stock, preferably in January. Keep pasture short.
February	Larval peak.	
March	Last few larvae on stock.	Graze out rough feed in pastures.
April	Nymphs and some adults.	Cut down rushes and remove or burn debris.
May	Quiescent on pasture.	Pasture management if practicable.
June	(Overwintering period).	Pasture management if practicable.

USA: Agricultural Management of ALT

- No published strategies to control ALT in USA and no products specifically labeled for Asian longhorned ticks.
- Types of acaricide treatments for ticks
  - EPA registered pesticides (topical)
  - FDA registered veterinary drugs (topical, oral, injections)
- Products labeled for livestock vary by animal type:
  - Pyrethroids (Permethrin)
  - Pyrethrins
  - Organophosphates
  - Avermectins
    - Don't necessarily kill the ticks outright, but reduce molting success & oviposition[1]
    - Resulted in 3 fold decrease in *Theileria orientalis* infection rate in cattle[2]

To see what is available for use in your state: https://www.veterinaryentomology.org/vetpestx

To learn specific ways to check livestock for ticks: https://www.tnticks.org/videos

Photo credit: Matt Newman Monmouth County 4-H

1) H.T.T. Doan et al. 2013. Veterinary Parasitology 198 406–409

2) Park et al. 2019. BMC Veterinary Research 15:297

Modes of Application for Control on Livestock

Pour-ons /sprays

Parasitipedia.net

Impregnated Ear Tags

Tri-Zap™ ear tag

Dips/Baths

Wikipedia Commons

Theileria orientalis Ikeda in Virginia Cattle

RESEARCH

Theileria orientalis Ikeda Genotype in Cattle, Virginia, USA

Vanessa J. Oakes, Michael J. Yabsley, Diana Schwartz, Tanya LeRoith, Carolynn Bissett, Charles Broaddus, Jack L. Schlater, S. Michelle Todd, Katie M. Boes, Meghan Brookhart, Kevin K. Lahmers

Theileria orientalis Ikeda in host-seeking *Haemaphysalis longicornis* in Virginia, U.S.A.

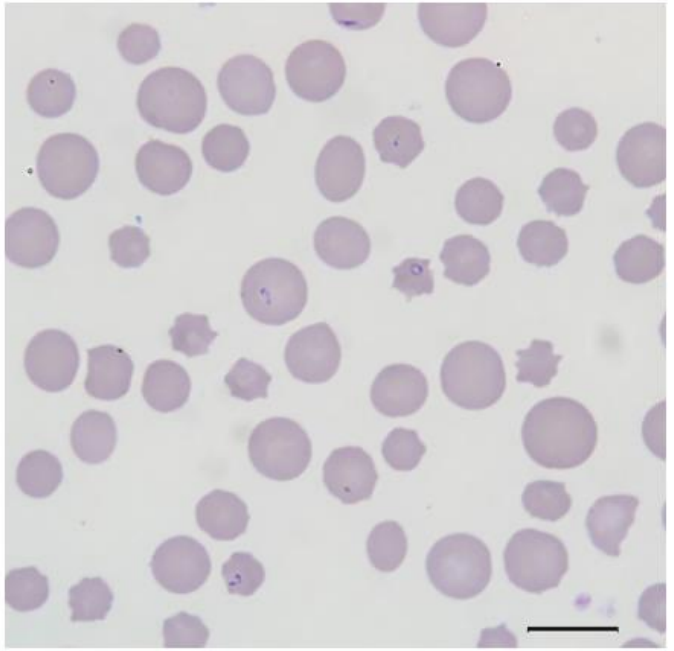
Alec T. Thompson [a, b], Seth White [f], David Shaw [a], Andrea Egizi [c, d], Kevin Lahmers [e], Mark G. Ruder [a], Michael J. Yabsley [a, b, f]

- Cattle mortalities associated with *T. orientalis* in 2017[1]
- ALT found on the premises -13% infected with *T. orientalis* [2]

Cattle treated with

- **Gamma-cyhalothrin** (Standguard® pour-on)
  Labeled for lice and horn flies on beef cattle only

- **Duramectin** (Dectomax® injectable)
  Labeled for internal and external parasites



Blood smear of an animal from a farm in Albemarle County, Virginia, USA, that was infected with *Theileria orientalis* Ikeda genotype. There is evidence of a regenerative response to anemia (anisocytosis and polychromasia) and intracellular piroplasms within erythrocytes. Scale bar indicates 10 µm.

Oakes, V. J., et al. 2019. Emerging Infectious Diseases 25: 1653–59.
Thompson, A.T., et al. 2020. Ticks & Tick-Borne Diseases 11: 101450
Dallas Meek (USDA-APHIS) *Personal communication*

Tick Management for Pets

- Isoxazolines (e.g. fluralaner)– ca. 2013
  - Broad-spectrum 12 wk of systemic activity
  - Orally administered (chewable)
  - Controlled 90% of ALT on dogs after 114 days[1]
- Pyrethroids
  - Mostly for dogs
- Fipronil (Phenylpyrazole)
  - Topical
- Amitraz
  - Topical or collar– mostly used for mange

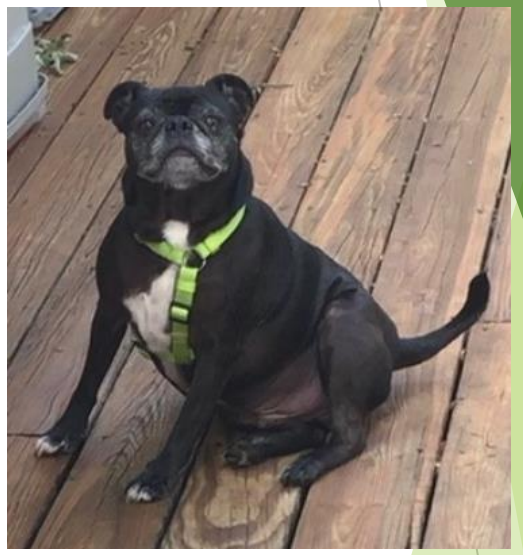
Companion Animal Parasite Council:

https://capcvet.org/parasite-product-applications/

1)Toyota et al, 2019. Parasites & Vectors. 12:43

Efficacy of orally administered fluralaner in dogs against laboratory challenge with *Haemaphysalis longicornis* ticks

Masanori Toyota[1], Kyoko Hirama[1], Tatsumi Suzuki[2*], Rob Armstrong[3*] and Tatsuyuki Okinaga[2]



Products Labeled for Ticks

	NATIONAL - United States														INTERNATIONAL - Australia/New Zealand								
	Fluralaner[1]	Lotilaner[2]	Afoxolaner[3]	Sarolaner[4]	Fipronil[5]	Flumethrin[6]	Deltamethrin[7]	Permethrin	Amitraz	Coumaphos	B - cyfluthrin	Diazinon	Tetrachlorvinphos	Phosmet	Flumethrin	Fluralaner	Afoxolaner	Pyriprole	Permethrin	Amitraz	Cypermethrin	Deltamethrin
Canine (Dog)	X	X	X	X	X		X	X	X						X	X	X	X	X				
Feline (Cat)	X			X	X	X										X							
Lactating Dairy								X			X		X		X					X			
Nonlact. Dairy								X		X	X	X	X	X	X						X	X	X
Bovine (Beef)								X		X	X	X	X	X	X						X	X	X
Equine (Horse)								X		X					X							X	
Caprine (Goat)								X														X	
Ovine (Sheep)								X															
Porcine (Pig)														X									
Cervid (Deer)															X							X	

1. Products containing fluralaner as an active ingredient include Bravecto
2. Products containing lotilaner as an active ingredient include Credelio
3. Products containing afoxolaner as an active ingredient include Nexgard
4. Products containing sarolaner as an active ingredient include Simparica and Revolution Plus
5. Products containing fipronil as an active ingredient include Catego, Effipro/Effipro Plus, Frontline Plus, Effitix/Effitix Plus, and Parastar/Parastar Plus
6. Products containing flumetrhin as an active ingredient include Seresto Collars
7. Products containing deltamethrin as an active ingredient include Activyl Collars

Credit: Dene' Vann and Rebecca Trout-Fryxell- University of Tennessee

Acaricide Resistance

- In New Zealand, where only one compound (flumethrin pour-on) is registered for use on dairy cattle and deer against ALT, no resistance has been detected yet[1]

- Resistance appears to have been detected in Korea, 7-fold increase in effective doses of cypermethrin were necessary to achieve control of ALT[2]

1. Heath & Levot, 2015. New Zealand Veterinary Journal. 63:199-210.
2. You, et al., 2014. Korean J Vet Res. 54:117-120.

Questions?

Public Health Control of ALT


Vector Control, Pest Management, Resistance, Repellents

Preliminary Evaluation of Human Personal Protective Measures Against the Nymphal Stage of the Asian Longhorned Tick (Acari: Ixodidae)

Erik Foster,[1] Amy C. Fleshman,[1] Shelby L. Ford,[2] Michael L. Levin,[2] Mark J. Delorey,[1] Rebecca J. Eisen,[1] and Lars Eisen[1,3]

Use Insect Repellent

Use Environmental Protection Agency (EPA)-registered insect repellents with one of the active ingredients below. When used as directed, EPA-registered insect repellents are proven safe and effective, even for pregnant and breastfeeding women.

- DEET
- Picaridin (known as KBR 3023 and icaridin outside the US)
- IR3535
- Oil of lemon eucalyptus (OLE)
- Para-menthane-diol (PMD)
- 2-undecanone

- All products showed 93-97% repellency to ALT over 30 minutes
- Permethrin fabric repelled 96% of ALT in 3 minutes

Foster et al. 2020 Journal of Medical Entomology. 57:1141–1148

Wild Host-Targeted Control

> Med Vet Entomol. 2020 Apr 6. doi: 10.1111/mve.12441. Online ahead of print.

Aversion of the Invasive Asian Longhorned Tick to the White-Footed Mouse, the Dominant Reservoir of Tick-Borne Pathogens in the U.S.A

I Ronai [1], D M Tufts [1], M A Diuk-Wasser [1]

- Rodent tubes/boxes probably won't work because they are not particularly interested in small rodents
- 4-poster stations might provide control but research is lacking

Wideopenspaces.com

Ronai et al. 2020. Med Vet Entomol. https://doi.org/10.1111/mve.12441

ALT Management in Public Spaces

[Med. Entomol. Zool. Vol. 66 No. 1 p. 7–12 2015]
DOI: 10.7601/mez.66.7

野外に生息するマダニ類に対する数種殺虫製剤の防除効果

橋本知幸*,1) 數間 亨1) 武藤敦彦1) 皆川恵子1) 永廣香菜1)
當山啓介2) 足立雅也3) 池田文明3) 駒形 修4)
冨田隆史4) 森川 茂5) 澤邉京子4)

1) 一般財団法人日本環境衛生センター環境生物部（〒210–0828 川崎市川崎区四谷上町10–6）
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Field evaluation of suppression effect of acaricide formulations against ticks

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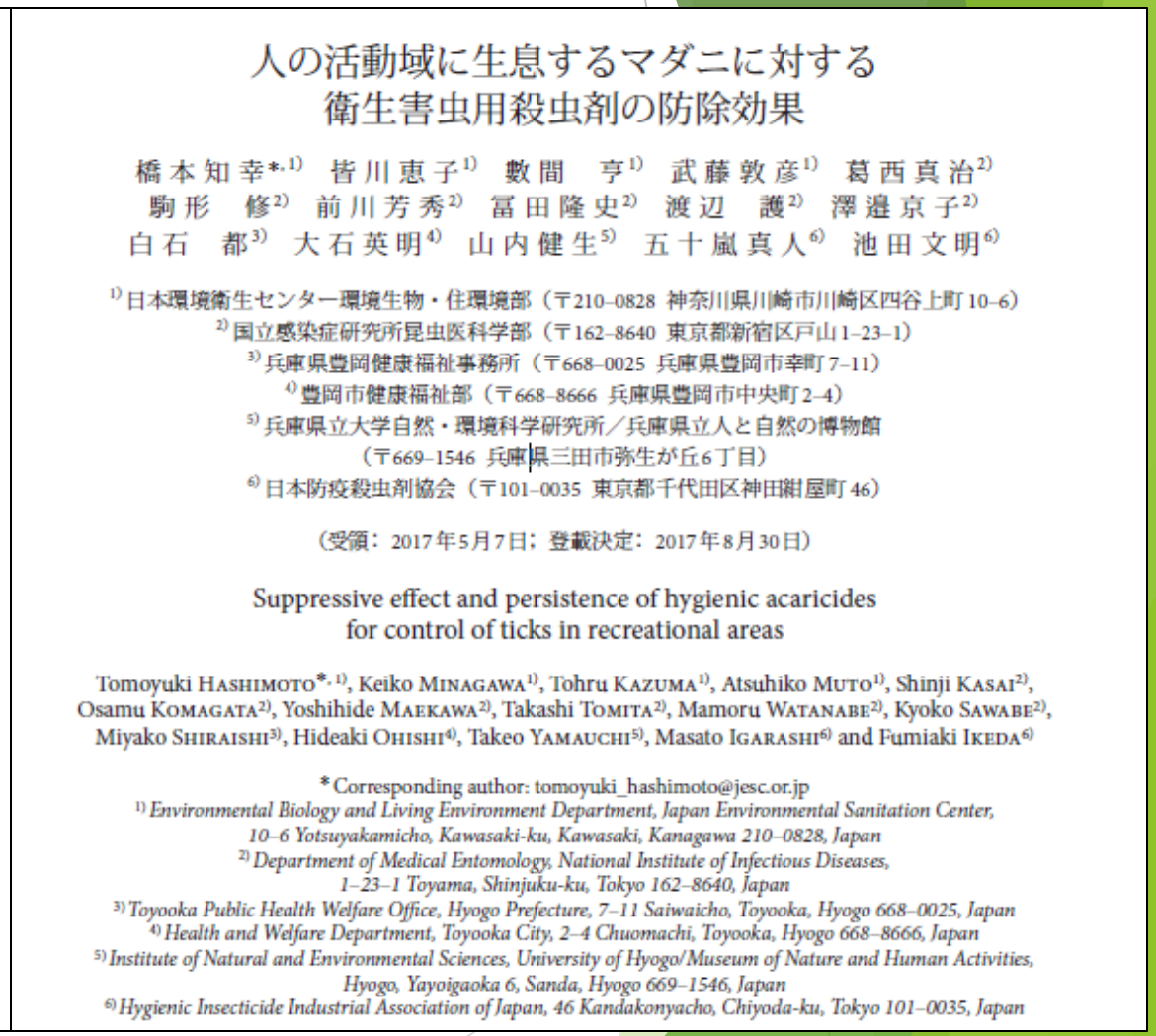

人の活動域に生息するマダニに対する
衛生害虫用殺虫剤の防除効果

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駒形 修2) 前川芳秀2) 冨田隆史2) 渡辺 護2) 澤邉京子2)
白石 都3) 大石英明4) 山内健生5) 五十嵐真人6) 池田文明6)

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Suppressive effect and persistence of hygienic acaricides
for control of ticks in recreational areas

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Osamu Komagata2), Yoshihide Maekawa2), Takashi Tomita2), Mamoru Watanabe2), Kyoko Sawabe2),
Miyako Shiraishi3), Hideaki Ohishi4), Takeo Yamauchi5), Masato Igarashi6) and Fumiaki Ikeda6)

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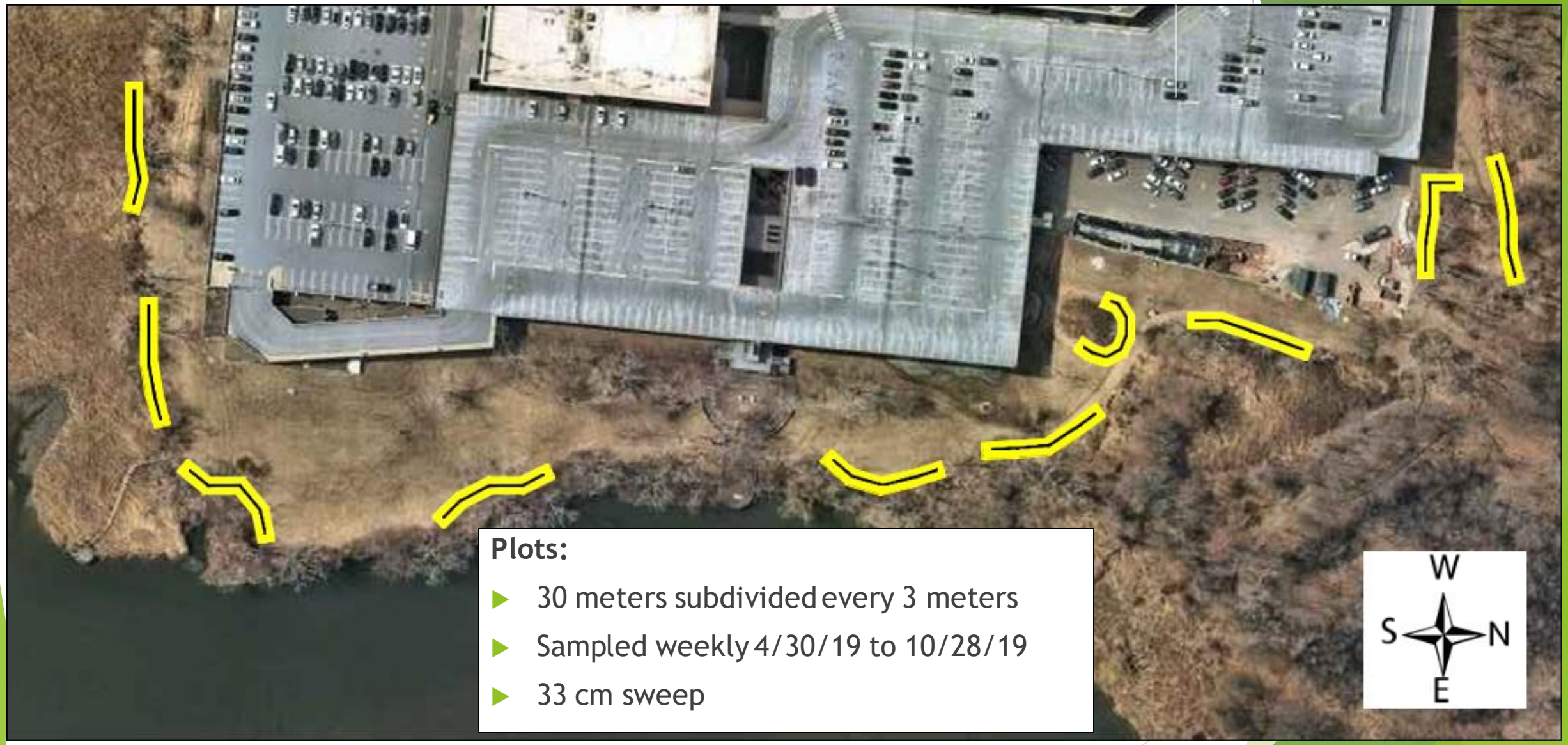
6) *Hygienic Insecticide Industrial Association of Japan, 46 Kandakonyacho, Chiyoda-ku, Tokyo 101–0035, Japan*

Hashimoto, T., et al. 2015. Med. Entomol. Zool. 66, 7–12.

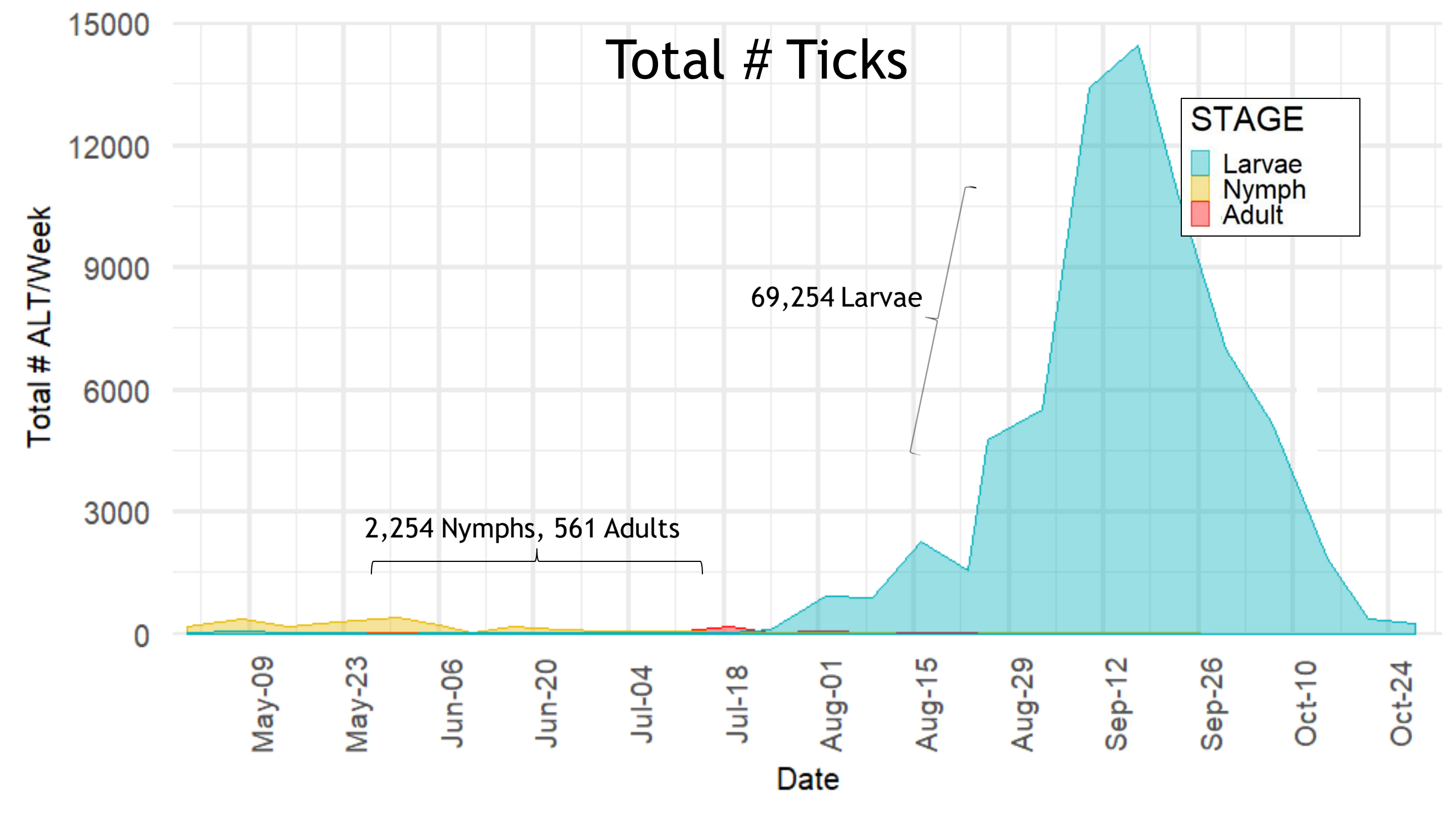
Hashimoto, T., et al. 2017. Med. Entomol. Zool. 68, 101–108.


N
W
E
S
Hackensack
River Park
Shopping
Mall
Hackensack River

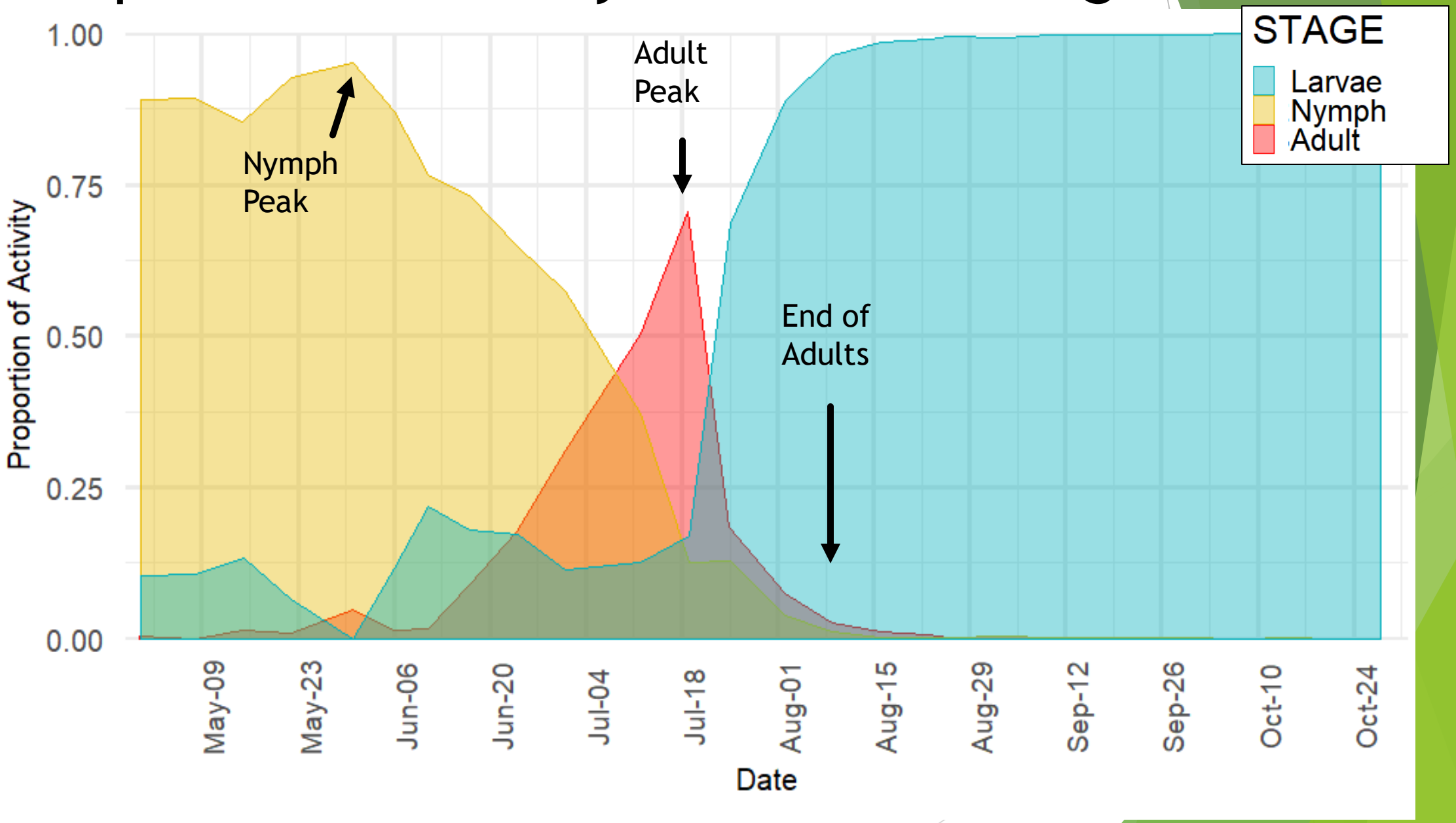
Sampling Areas



Sampling Areas

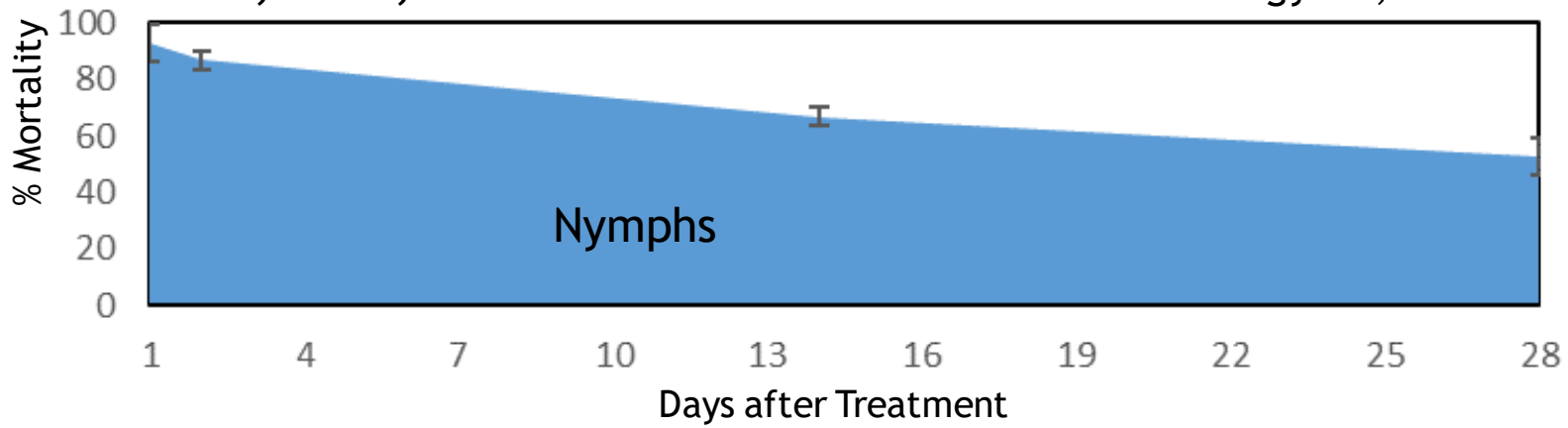

Total # Ticks
STAGE
Larvae
Nymph
Adult
69,254 Larvae
2,254 Nymphs, 561 Adults
Total # ALT/Week
15000
12000
9000
6000
3000
0
May-09
May-23
Jun-06
Jun-20
Jul-04
Jul-18
Aug-01
Aug-15
Aug-29
Sep-12
Sep-26
Oct-10
Oct-24
Date

Proportion of Activity of Each Life Stage

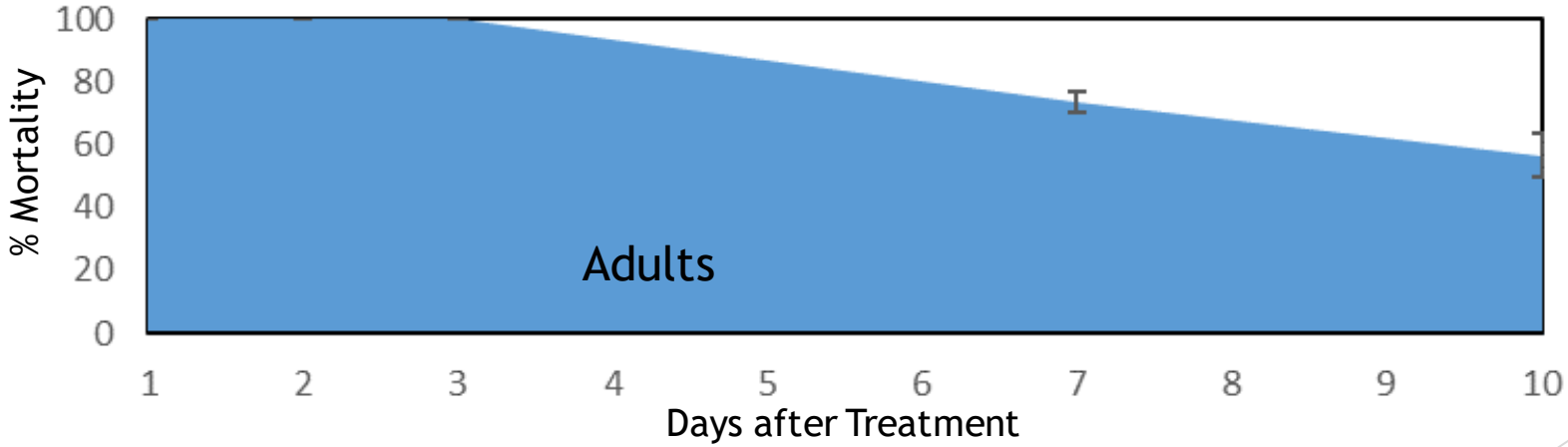


Lambda-Cyhalothrin

Lee, D.-W., et al. 2015. Journal of Asia-Pacific Entomology 18, 715–718.

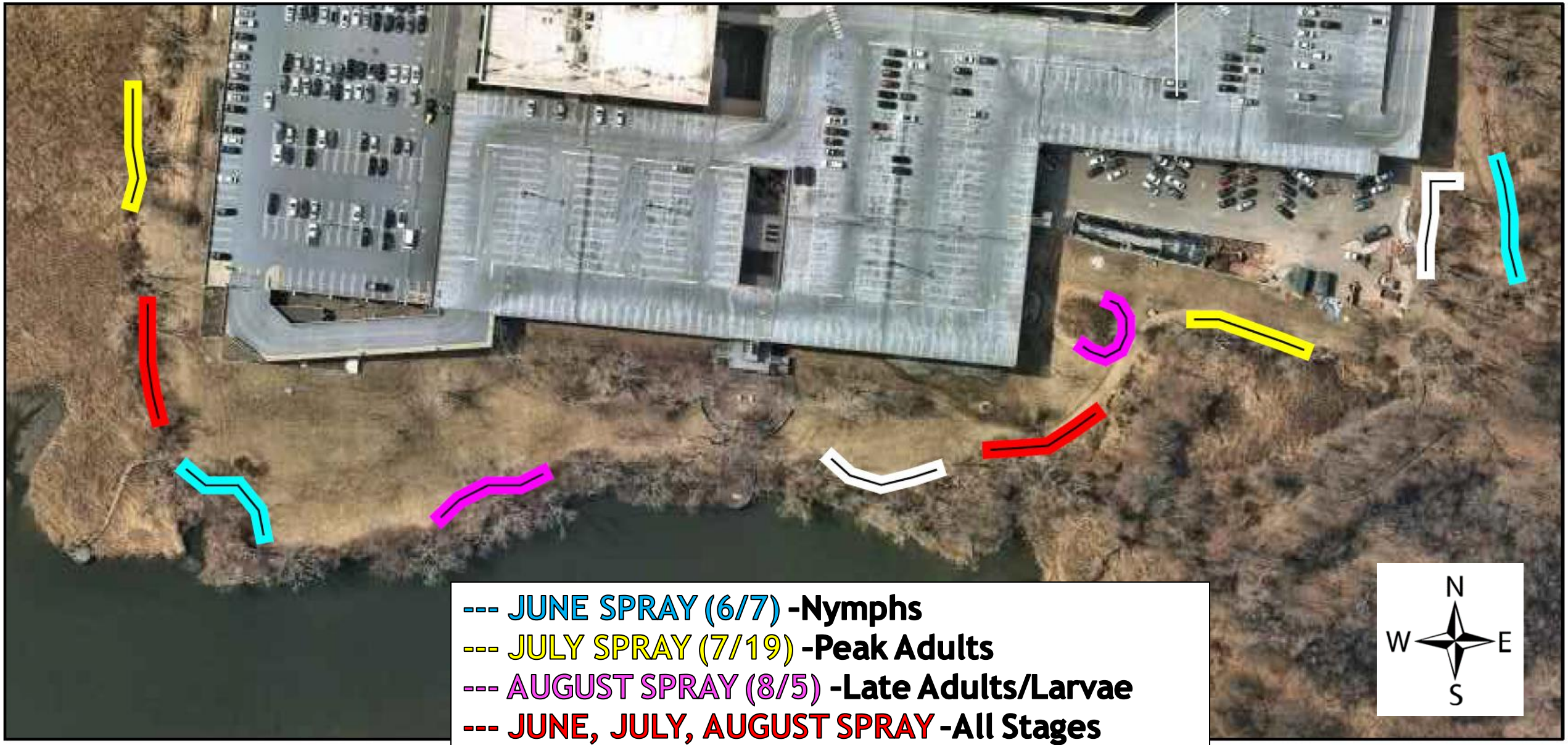


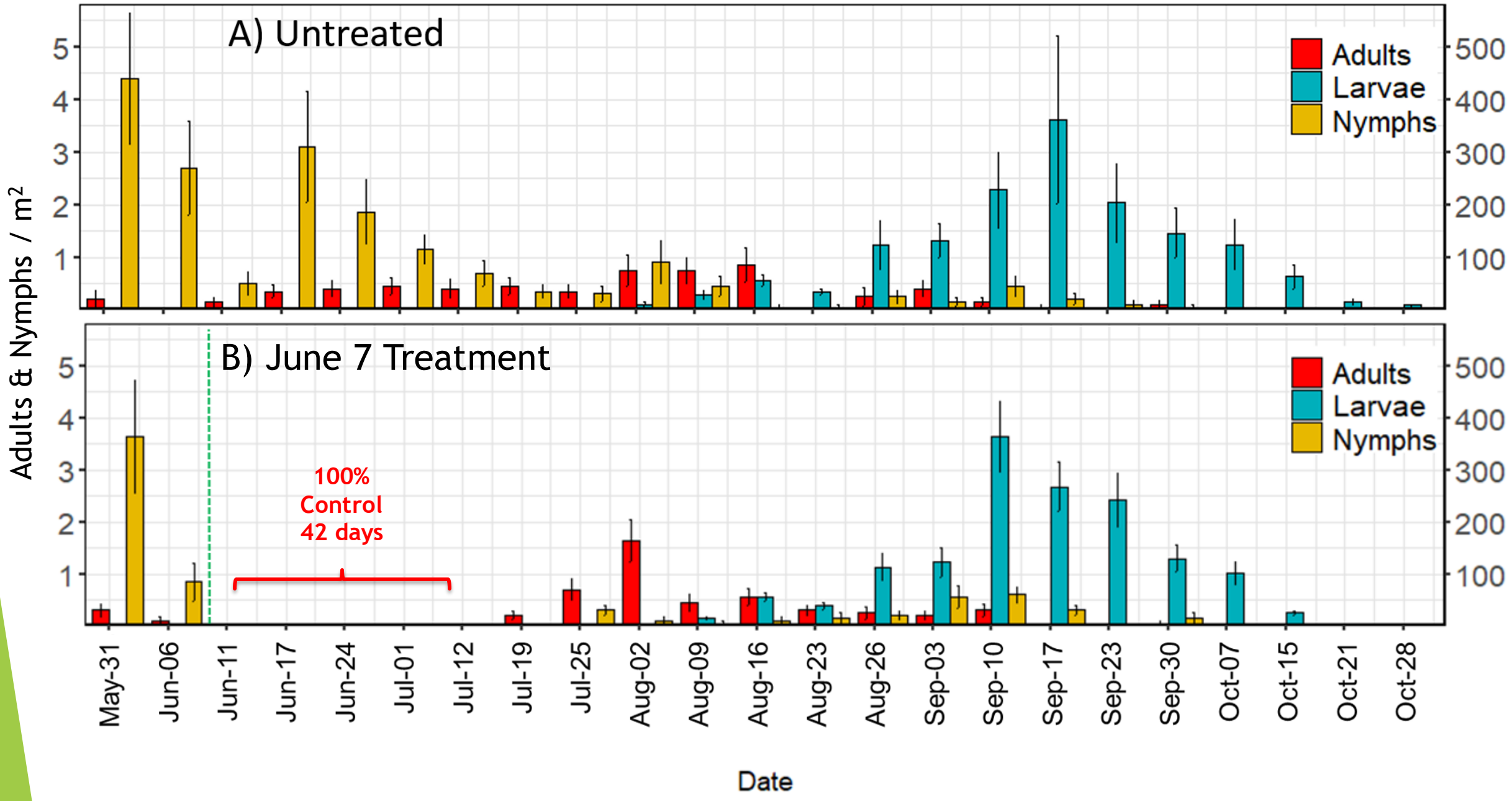
Park, G., et al. 2019. Entomological Research 49, 330–336.

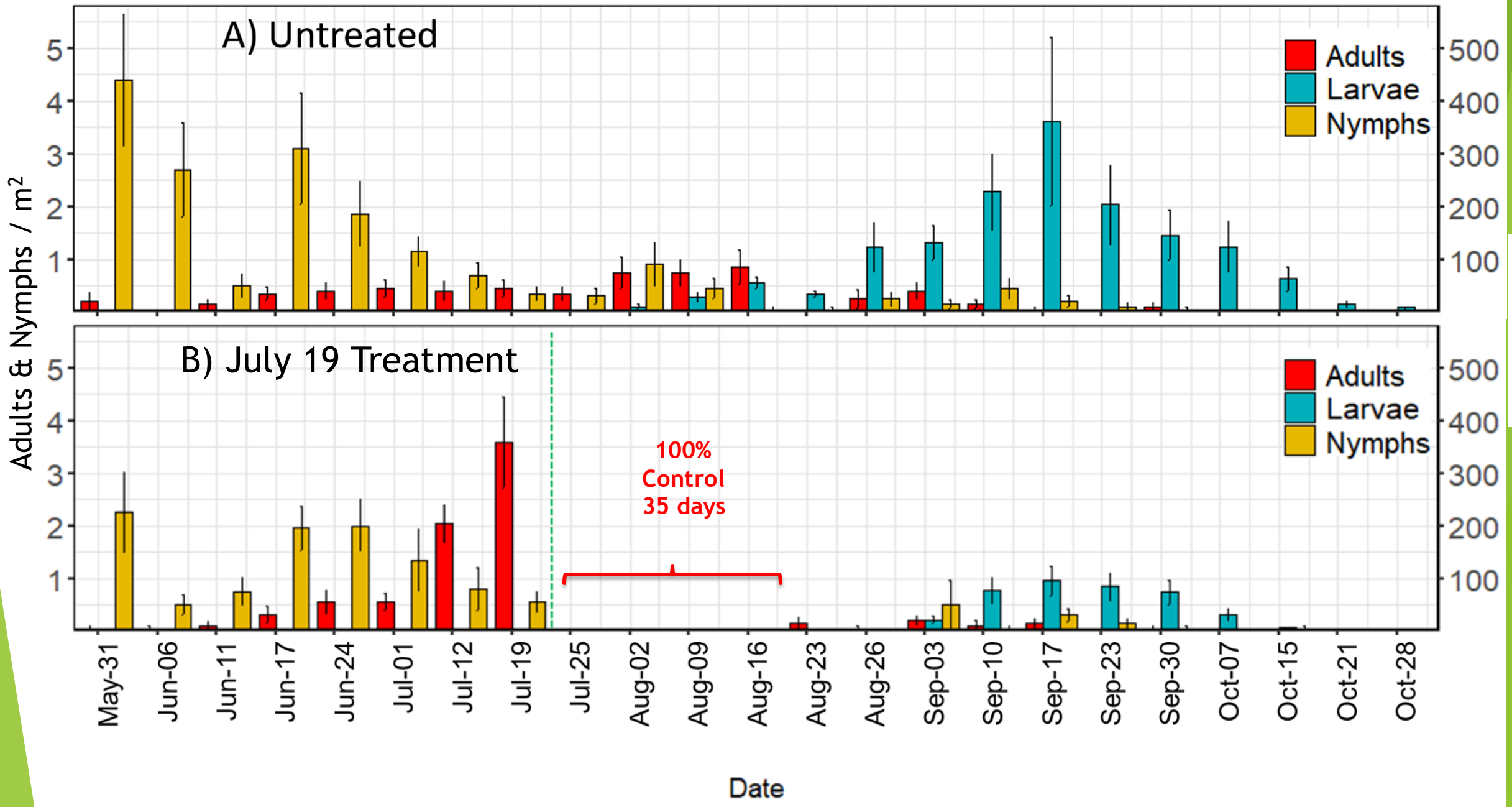


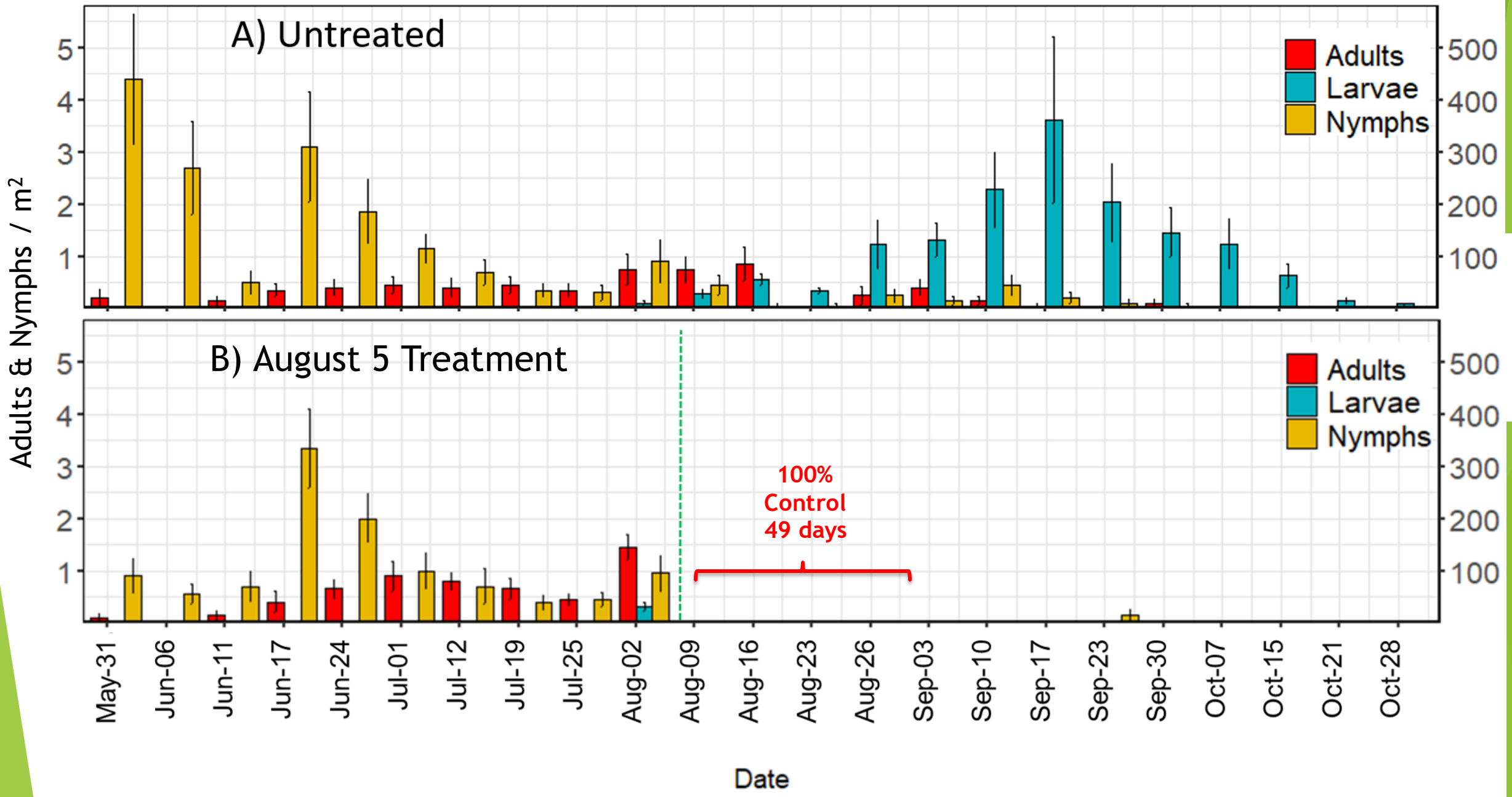
Lambda-cyhalothrin 9.7%
Rate: 7 mL / 1000 ft^2

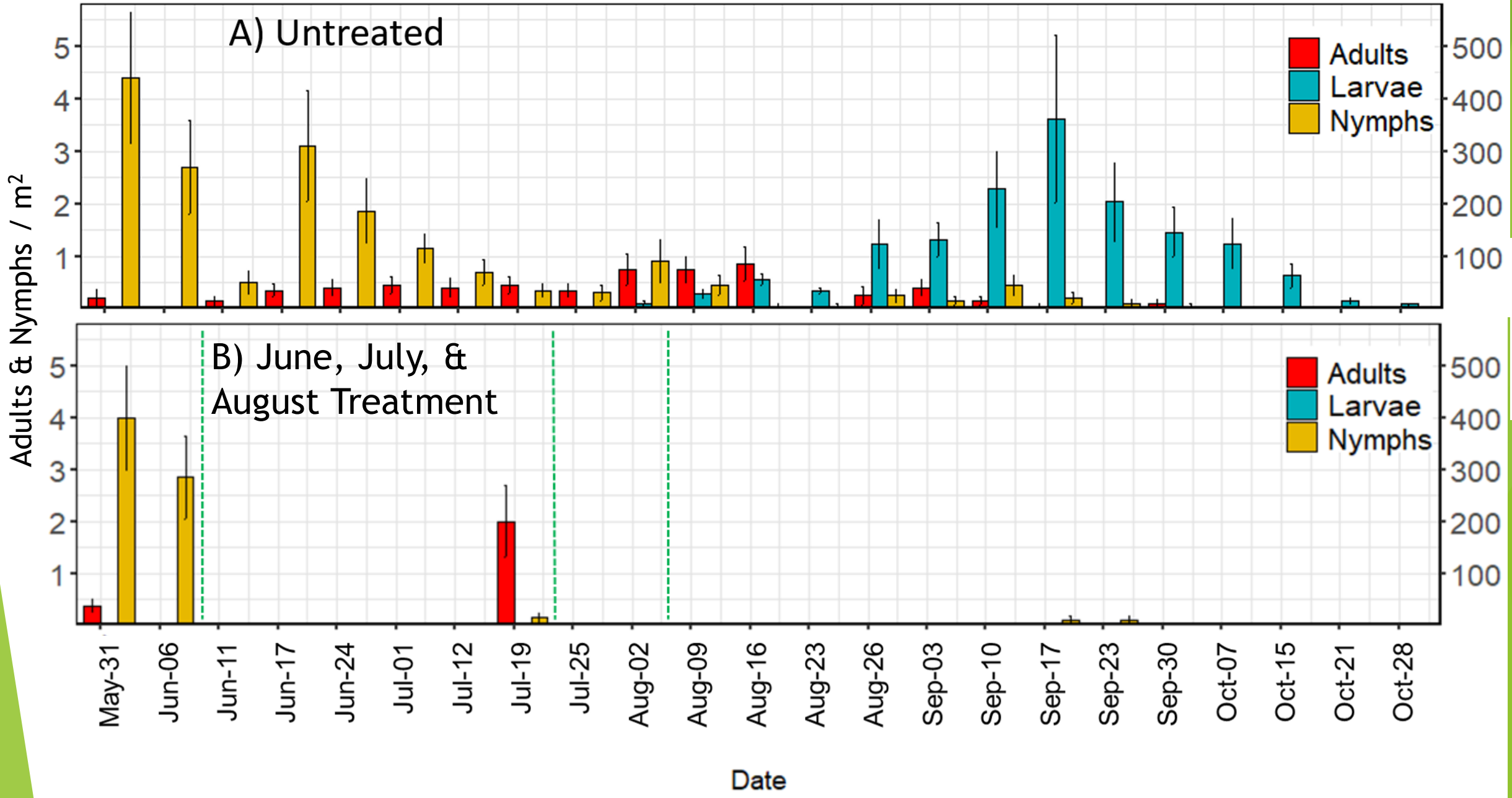
2019 Treatments




A) Untreated
B) June 7 Treatment
Adults
Larvae
Nymphs
100%
Control
42 days
Adults & Nymphs / m²
Larvae/ m²
Date
May-31
Jun-06
Jun-11
Jun-17
Jun-24
Jul-01
Jul-12
Jul-19
Jul-25
Aug-02
Aug-09
Aug-16
Aug-23
Aug-26
Sep-03
Sep-10
Sep-17
Sep-23
Sep-30
Oct-07
Oct-15
Oct-21
Oct-28


A) Untreated
B) July 19 Treatment
Adults
Larvae
Nymphs
100%
Control
35 days
Adults & Nymphs / m²
Larvae/ m²
Date
May-31
Jun-06
Jun-11
Jun-17
Jun-24
Jul-01
Jul-12
Jul-19
Jul-25
Aug-02
Aug-09
Aug-16
Aug-23
Aug-26
Sep-03
Sep-10
Sep-17
Sep-23
Sep-30
Oct-07
Oct-15
Oct-21
Oct-28


A) Untreated
B) August 5 Treatment
Adults
Larvae
Nymphs
100%
Control
49 days
Adults & Nymphs / m²
Larvae/ m²
Date
May-31
Jun-06
Jun-11
Jun-17
Jun-24
Jul-01
Jul-12
Jul-19
Jul-25
Aug-02
Aug-09
Aug-16
Aug-23
Aug-26
Sep-03
Sep-10
Sep-17
Sep-23
Sep-30
Oct-07
Oct-15
Oct-21
Oct-28


A) Untreated
B) June, July, & August Treatment
Adults
Larvae
Nymphs
Adults & Nymphs / m²
Larvae/ m²
Date
May-31
Jun-06
Jun-11
Jun-17
Jun-24
Jul-01
Jul-12
Jul-19
Jul-25
Aug-02
Aug-09
Aug-16
Aug-23
Aug-26
Sep-03
Sep-10
Sep-17
Sep-23
Sep-30
Oct-07
Oct-15
Oct-21
Oct-28

Conclusions

- Lambda-cyhalothrin was highly effective against ALT in the field
- Foliar applications of lambda-cyhalothrin can control 100% of ALT for up to 7 weeks in the environment*
  - June Application provided control of nymphal stage, but no effect on subsequent adult and larval populations
  - July application provided 75% control of the fall larval population
  - August application reduced all stages of ALT by 99.8% from August to October
  - 3 applications (June, July, and August) reduced ALT population by 99.9%

*ticks are likely re-introduced from wildlife

Bickerton and Toledo. 2020. A life-stage targeted acaricide application approach for the control of *Haemaphysalis longicornis* **Ticks & Tick-borne Diseases** *re-submitted after revision*

THIS SEASON

Additional Chemistries

- **Pyrethroids:** Bifenthrin/Tau fluvalinate
- **Carbamates:** Carbaryl
- **IGR's:** Novaluron/Pyriproxyfen

Formulations

- Liquid/Granular

Questions?

5 main takeaways

- **Preventing invasive ticks** is critical.
- **Risk to agriculture is real. Agricultural IPM** for ALT is being developed. Products need to be evaluated and ALT needs to be included on labels.
- Products for **IPM on pets** exist. Specific testing on US's ALT may be a good idea.
- **Current Public Health risk** from Asian longhorned ticks is **minimal** compared to endemic species such as the blacklegged tick.
- **Risk of this tick's presence upsetting existing IPM messaging is real.**

A tick "summit"

Photo by A. Egizi

Some Questions for You

Find a Colleague

- To post a profile about yourself and your work:
- http://neipmc.org/go/APra
- “Find a Colleague” site
- http://neipmc.org/go/colleagues

Upcoming Webinars

- **Tick IPM #4: Habitat Management for Vector-borne Diseases**

  Allison Gardner, University of Maine, August 10, 2020. 11:00 a.m.

- **Tick IPM #5: Pathogens Found in Ticks Collected on School Grounds and Public Parks**

  Drs. Jody Gangloff-Kaufmann, Joellen Lampman, Matt Frye, NYS IPM Program. Dr. Laura Goodman, College of Veterinary Medicine, Cornell University. September 14, 2020, 1:00 p.m.

- **Tick IPM #6: Host-Targeted Tick Control – What Works, What Doesn't, and What's New**

  Dr. Andrew Li , Research Entomologist, USDA-ARS Invasive Insects Biocontrol and Behavior Laboratory, Beltsville, MD. September 30, 2020, 11:00 am

- **Tick IPM #7: Leaf Litter/Snow Removal for Tick Reduction**

  Dr. Kirby C. Stafford III, Connecticut Agricultural Experiment Station, October 7, 2020 – 11:00 a.m.

For Updates: https://www.northeastipm.org/ipm-in-action/the-ipm-toolbox/

Recording of Tick IPM Webinar Series

- Past recordings and today's Webinar will be available to view **on demand** in a few business days.
- http://www.neipmc.org/go/ipmtoolbox
- You can watch as often as you like.

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