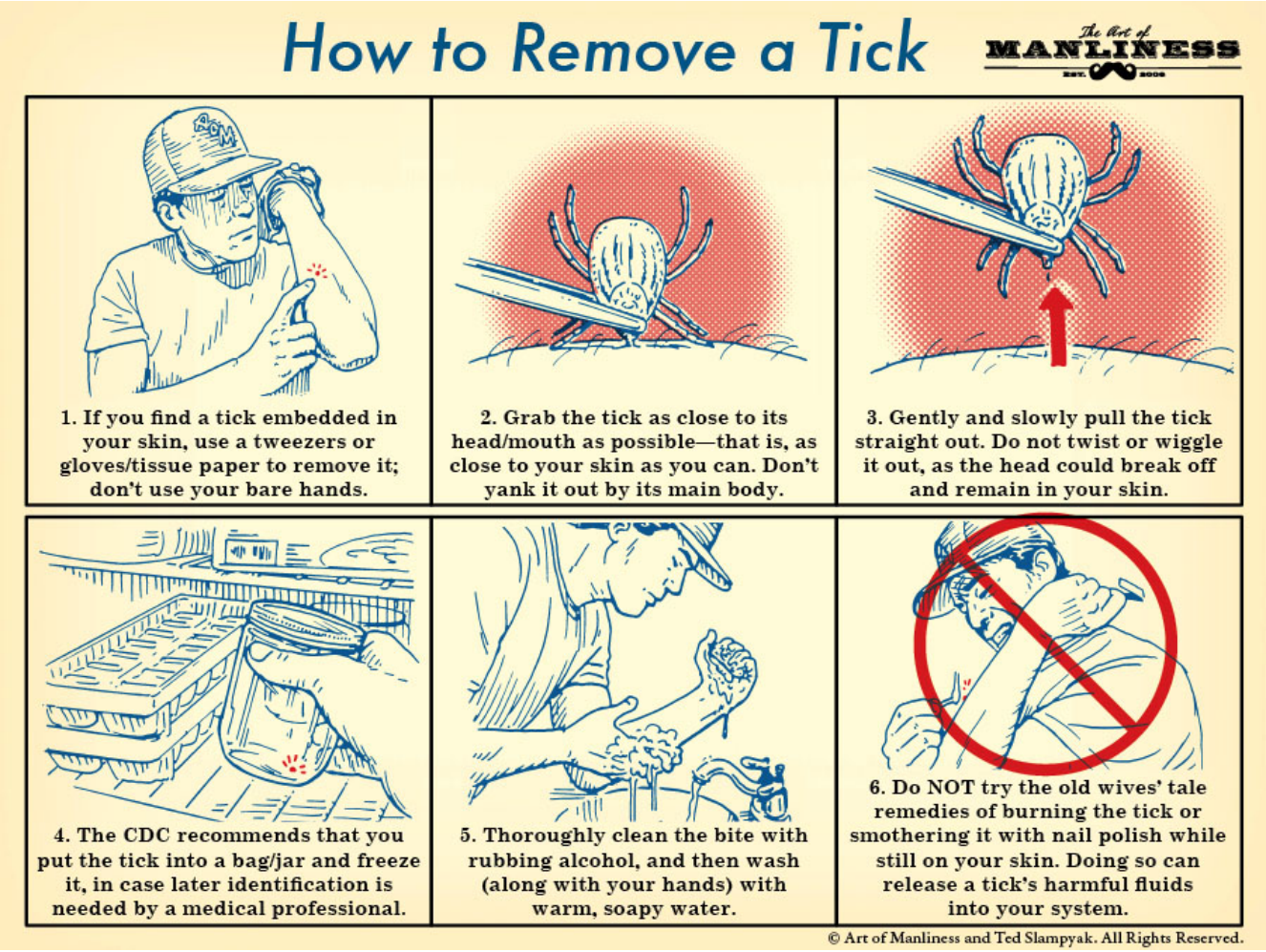
Georgia Tick Surveillance, 2022



PROPER WAY TO REMOVE A TICK

Ticks and Tick-Borne Diseases

Overview

Ticks and tick-borne diseases have been recognized as threats to the health of humans and domestic animals for more than a century in the United States. However, the nature of this threat has evolved over time in response to changes in the natural environment, tick and wild animal populations, and human land use. Another major factor in this still unfolding story is our continuously improving capacity to detect and characterize tickborne disease agents.

Currently, tick-borne infections account for more than 75% of all reported vector-borne disease cases in the United States. Progress is slowly being made to increase awareness of the public health significance of ticks and tickborne diseases, however, without immediate and sustained advances in ticks and tick-borne diseases, the alarming trend of increasing tick-borne diseases is likely to continue.

Beard, et al (2021) recently published an article on the rise of ticks and tick-borne diseases in the US (https://academic.oup.com/jme/article/58/4/1487/6255987). This was part of a special collection on the rise and fall of tick-borne diseases (https://academic.oup.com/jme/search-results?f_TocHeadingTitle=Special+Collection%3a+The+Rise+of+Ticks+and+Tick-Borne+Diseases).

Currently, tick surveillance at the Georgia Department of Public Health (GDPH) is only done in collaboration with the Georgia Department of Agriculture's (GDA) tick attach study and with DNR, checking deer and bear at check stations on Wildlife Management Areas during hunts. While this is an acceptable method of determining presence of tick species, it does not provide prevalence data. However, wildlife vertebrate hosts are integral to enzootic cycles of tick-borne pathogens, and in some cases have played key roles in the recent rise of ticks and tick-borne diseases in North America.

Public health and vector control agencies across the United States aim to predict and manage vector-borne disease threats, including those spread through tick bites. Ultimately, these efforts can reduce the incidence of tick-borne illnesses and enable response to outbreaks. However, the ability to do so is impeded by constraints on consistent funding, limited infrastructure, guidance on best practices, lack of training opportunities for personnel, and limited institutional capacity to perform these functions. The prevention and diagnosis of tick-borne diseases depend greatly on an accurate understanding by the public and healthcare providers of when and where persons are at risk for exposure to human-biting ticks and to the pathogens transmitted by these species. National maps showing the distributions of medically important ticks and the presence or prevalence of tickborne pathogens are often incomplete, outdated, or lacking entirely.

Current Goals:

- Obtain a better understanding of tick species found in Georgia
- Map potential tickborne disease risk
- Monitor for *Haemaphysalis longicornis* (East Asian or longhorned tick)

As of April 13, 2023, longhorned ticks have been found in Arkansas, Connecticut, Delaware, Georgia, Indiana, Kentucky, Maryland, Massachusetts, Missouri, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Virginia, and West Virginia.

Background

At least two surveys of ticks attached to humans have been done in Georgia since 1990. The first, which ran from 1990-1995, was a collaboration between the Medical College of Georgia and Georgia Southern University, and is published in the Journal of Parasitology, 1996. The second study was done between April 2005 and December 2006 by the Georgia Department of Public Health (GDPH). This study was not published, but information from this study is included in a paper on *Rickettsia parkeri* published in Emerging and Infectious Diseases, 2009. Data from this second survey are included in this summary.

The Georgia Department of Agriculture (GDA) has conducted an ongoing survey on ticks attached to animals since at least 2005. In 2018, the GDPH Environmental Health Section (DPH/EHS) reached an agreement with the GDA to assist with the study in exchange for access to the data. The GDA shared data from 2005 to the present. When the Vector Surveillance Coordinator program was funded, DPH provided tick collection kits and mailers to local veterinarians around the state. The ticks were sent for ID and testing to the National Veterinary Services Laboratories in Iowa. Currently, a few veterinarians continue to send in ticks, and it is hoped that DPH/EHS interns will also be able to reach out to veterinarians in their surveillance areas in order to collect ticks. Data from all sources are returned to the GDA, who send the raw data to the GDPH for analysis.

Richmond County Department of Health Mosquito Control program (RCMC) had also partnered with the State Entomologists for GDPH and the GDA to survey collected ticks from felines, canines, and other companion animals in Richmond County, GA. All veterinary clinics in Richmond County were called by the regional Entomologist to request participation and explain procedure. RCMC used the same tick collection kits, containing tick forms and vials of isopropyl alcohol, along with GDA collection forms. These were disseminated to local veterinary clinics willing to participate, as well as Augusta Animal Services. Clinics were called to check for collected ticks about once every 2 months. Ticks were picked up in vials with forms and returned to the lab to be identified, followed by shipment to GDA for verification and to be included in a state-wide survey in Georgia. This program is currently on hold.

Additional tick data were collected in collaboration with the Georgia Department of Natural Resources. Entomologists from DPH attended quota hunts at different Wildlife Management areas (BF Grant, Rum Creek, Oaky Woods, Clybel, Cedar Creek, Chattahoochee, Chestatee, Lake Russell, Warwoman, Cooper's Creek, Blue Ridge, Dawson Forest, & Swallow Creek) and other hunting sites (Fort Yargo & Tugaloo State Park) to check deer and bear brought in for tagging and biological data collection to collect ticks.

Data are put into an Excel spreadsheet for analysis. Information collected include the date the tick was collected, the tick genus and species, the life stage, the number collected from the animal host, and the county where the tick was collected. Additional information (accession number, case number, and species to which the tick was attached) are preserved in an Access database but not used in analysis.

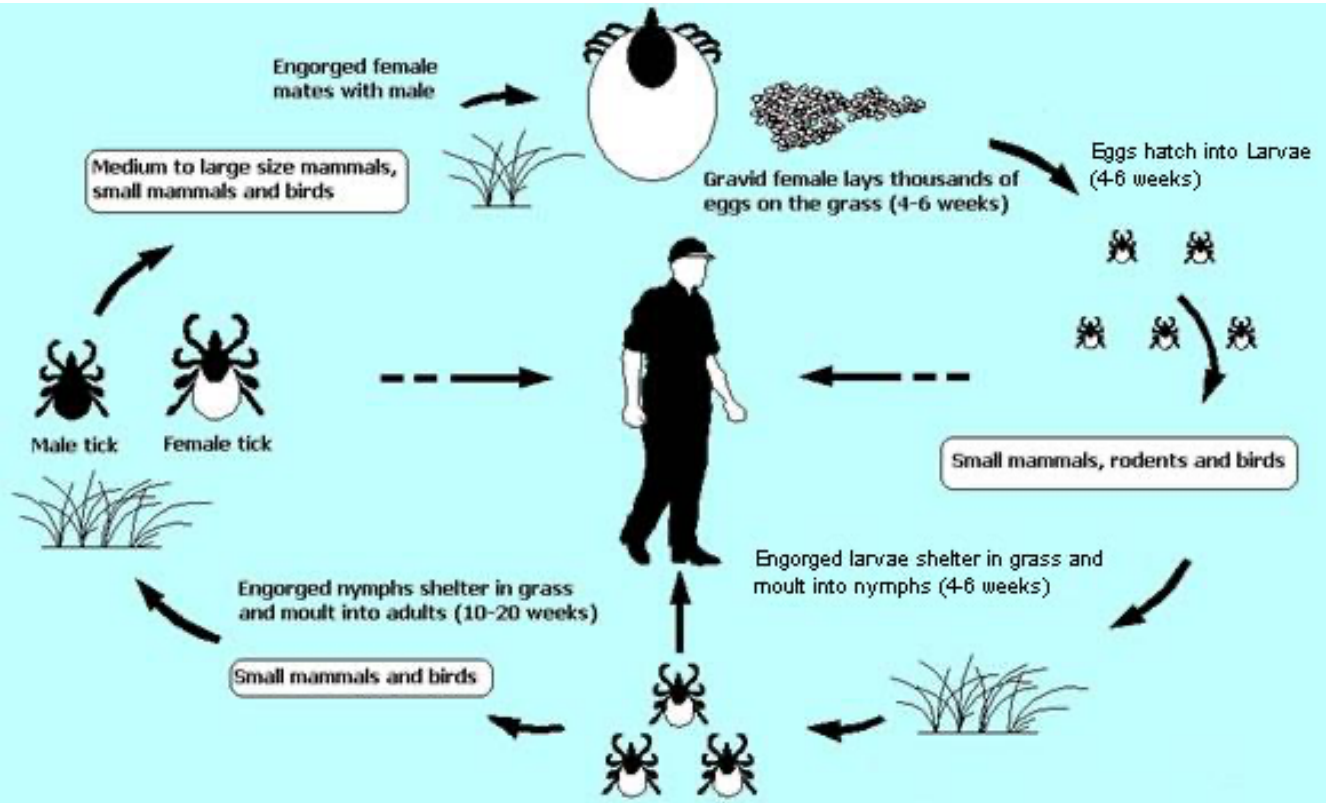
Tick Biology

Ticks are arthropods in the Class Arachnida. Along with mites, they constitute the subclass Acari. Almost all ticks belong to one of two major families, the Ixodidae or hard ticks, and the Argasidae or soft ticks. Adults have ovoid or pear-shaped bodies, which become engorged with blood when they feed, and eight legs. In addition to having a hard shield on their dorsal surfaces, hard ticks have a proboscis at the front containing the mouthparts, whereas soft ticks have their mouthparts on the underside of their bodies. Both families locate a potential host by odor or from changes in the environment.

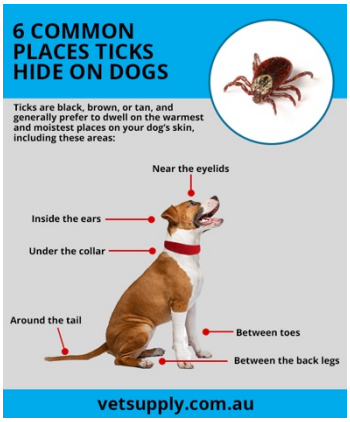
Ticks have four stages to their lifecycle: egg, larva, nymph, and adult. Ixodid ticks have three hosts, taking at least a year to complete their lifecycle. Argasid ticks have up to seven nymphal stages (instars), each one requiring a blood meal. Because of their habit of ingesting blood, ticks are vectors of many diseases that affect humans and other animals.

Larval ticks hatch with six legs, acquiring the other two after a blood meal and molting into the nymph stage. In the nymphal and adult stages, ticks have eight legs.

While adults are the most commonly found stage of the tick because of their size, immature stages are also important to the disease transmission cycle. Typically, the larval tick picks up a disease organism while feeding. The disease organism stays with the tick during the molt and can now be transmitted to the next host. Nymphs are most implicated in disease transmission, although the disease organism does stay with the tick into the adult stage.



Tick Collection from Companion Animals



Pets, especially dogs, can be important sentinels for the detection of pathogen activity in the vicinity of humans. Individual pets or pets coming to veterinary clinics or shelters provide convenient sites for tick surveillance. Many public health entities have established citizen science programs whereby ticks are submitted for identification or testing. When accompanied by appropriate training in specimen requirements and accurate data collection, these programs can be very informative.

Identification of ticks collected from people or companion animals can be a useful means of assessing human- or pet- tick encounters. However, because people and their pets often travel varying distances, ticks collected from these hosts should only be included in assessments of county status when travel history is available and considered. Specifically, because ticks can remain attached to a host for 7-10 days, samples obtained from persons or pets who traveled outside the county of residence within 10 days of tick encounter should be excluded. Free-roaming or stray animals may provide some information on host-tick interaction, but their unknown travel history render them uninformative for mapping specific occurrence.

Testing of ticks from people is sometimes requested. Because it provides little actionable information, CDC does not recommend testing ticks from people for human clinical diagnostic purposes or for making a treatment decision. Positive results from a tick do not necessarily mean that a person has been infected with that same pathogen and negative results can cause false assurance.

Acceptable to use to address the following key surveillance objectives:

- Classifying county status for each tick species (if travel history is considered)
- Identifying presence but not prevalence of pathogens in ticks (all active life stages, if travel history is considered)

Tick Collection from Deer

White-tailed deer serve as important hosts for adult *Amblyomma americanum*, *A. maculatum*, and *Haemaphysalis longicornis* ticks. They also serve as important hosts for adult *Ixodes scapularis* ticks. Inspection of hunter-killed deer brought into check stations is a cost- effective means of detecting changes in the distribution of these tick species, particularly in areas where the tick is emerging. This may have to be specially arranged in states that have moved to telephone or digital reporting. However, owing to the home range of deer, it is spatially non-specific and may not correlate well with estimates of host-seeking tick densities obtained from drag sampling. Additionally, *A. americanum* nymphs and adults are not active during the fall and early winter deer hunting season (adults are usually collected from deer from February to late winter). Based on known *H. longicornis* phenology, this species might also be dormant during the fall/winter hunting season.

Tick collection from deer is acceptable to use to address the following key surveillance objectives:

- Classifying county status for each tick species
- Identifying presence but not prevalence of pathogens in ticks (all active life stages)

Types of Sampling

Drag/Flag Sampling

Many adult ixodid ticks can be collected while questing for hosts from the vegetation. Dragging or flagging is done with a 1 m^2 piece of white cotton flannel attached to a 1.5 m wooden dowel. Dragging is more effective in more open areas, where a greater surface area of material would contact the tick environment. Flagging, where the flannel is waved back and forth under, in, and around vegetation or leaf litter works better in heavy vegetation. These data can be used to determine tick densities.

Carbon Dioxide Trapping

To construct a CO^2 trap, simply place some dry ice in a vented, insulated container and set the container in the center of a sheet or board on the ground. If the trap will not be monitored, tape can be attached, sticky side out, on the perimeter to capture attracted ticks. A half-pound of dry ice will last about 2 hours at 80°F in an insulated container.

Live/Dead Host Collection

This is a passive method of tick collection that can provide useful information on the presence and abundance of ticks. Ticks collected from hosts should only be included in assessments of county status when travel history is considered.

Estimating Density of Host-Seeking Ticks

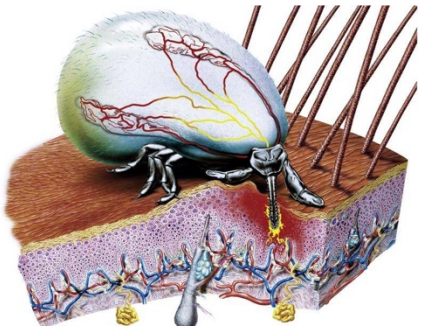
The density of host-seeking nymphal or female ticks varies spatially and temporally. To get a representative sample of the density of host-seeking nymphs or females, the sampling area should be at least 750 m of linear transects, or 50 transects of 15 m dragged with a cloth measuring 1 m wide. Distance sampled can be assessed using several methods including: (1) setting fixed sampling grids where flags, stakes or other objects are used to mark the start and end points of each measured length of the transect; (2) using a measured rope or cable and dragging or flagging its full length; or (3) measuring the collector's stride length and walking a fixed number of strides prior to checking the flag or drag. Because ticks can drop off from the drag or flag easily, inspecting the cloth at regular intervals is important, typically between 10-20 m; adults detach more readily than nymphs and therefore the drag or flag should be checked minimally every 10-15 m. Sampling should NOT be conducted when it is raining, when the vegetation is wet enough to saturate the tick drag, or when it is unseasonably cold or extremely windy.

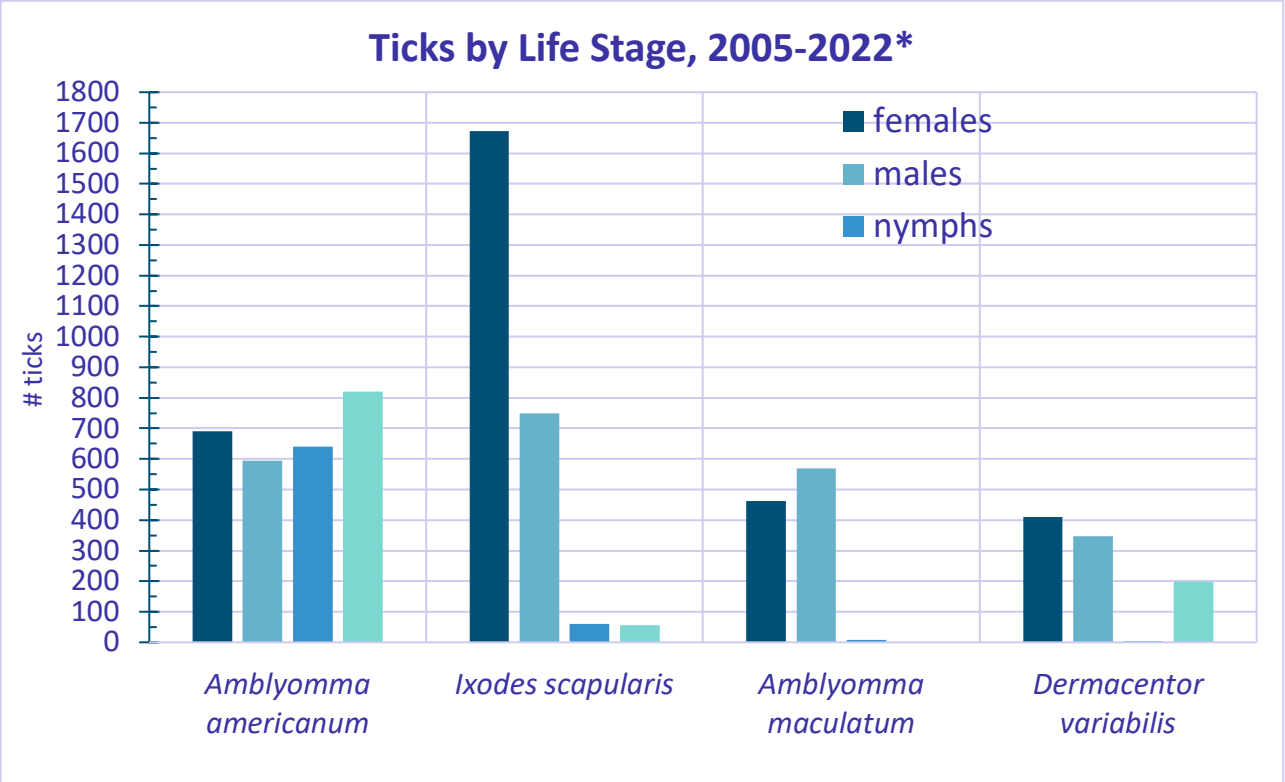
Density of host-seeking nymphs (DON) is estimated as the total number of nymphs collected per total area sampled. DON can be scaled per 100 m^2 by multiplying the total number of nymphs collected per sampling session by 100 m^2, then dividing the product by the total area sampled. Density of host-seeking females (DOF) is estimated as the total number of females collected per total area sampled. DOF can be scaled per 100 m^2 by multiplying the total number of females collected per sampling session by 100 m^2, then dividing the product by the total area sampled.

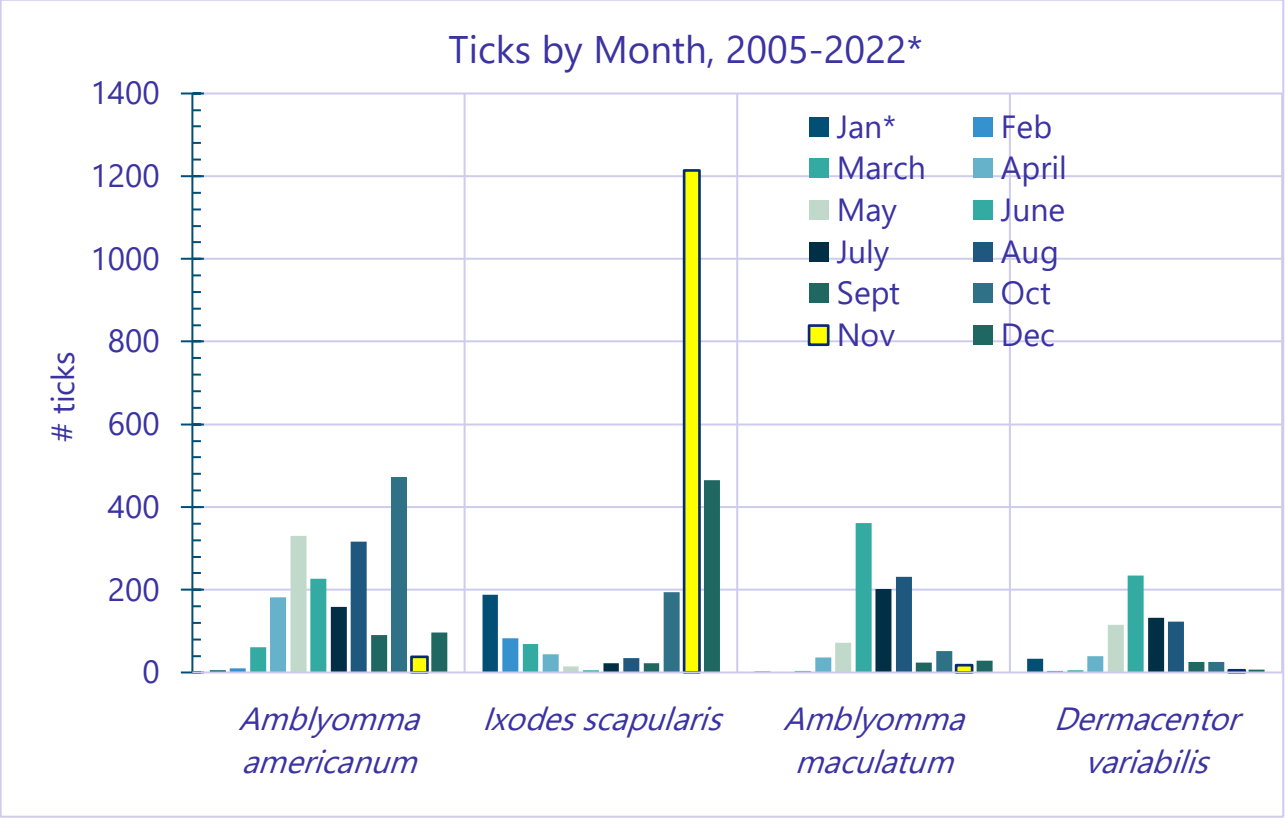
Ticks in Georgia

Tick Species Collected in Georgia 2005-2022

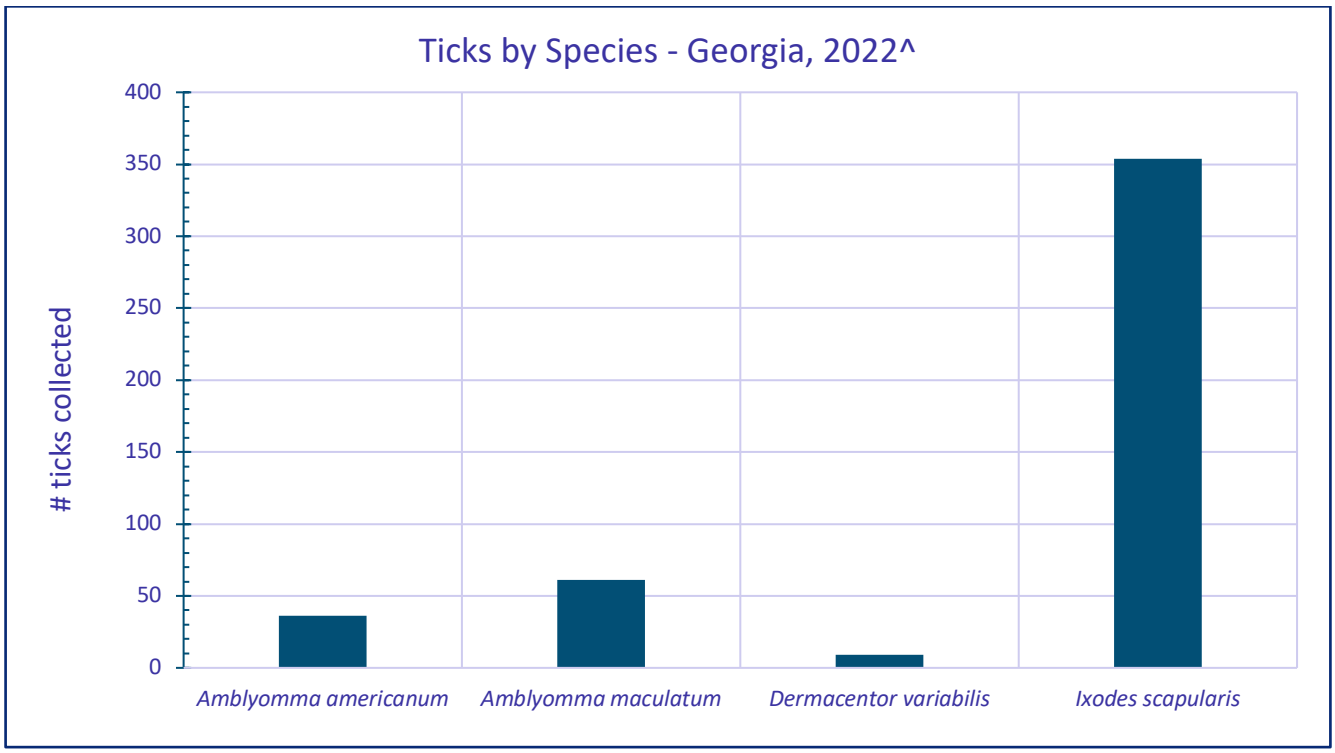
Species	females	males	nymphs	larvae	unknown	Grand Total
Amblyomma americanum	691	594	640	820	14	2759
Ixodes scapularis	1673	749	60	56	23	2561
Amblyomma maculatum	462	569	7			1038
Dermacentor variabilis	409	348	3	198	48	1006
Rhipicephalus sanguineus	34	30	2		4	70
Ixodes affinis	25	18	1	4		48
Amblyomma spp.			22	7	1	30
Ixodes brunneus	5		4			9
Amblyomma hebraeum	1	4				5
Dermacentor albipictus	1	4				5
Ixodes texanus			5			5
Rhipicephalus evertsi evertsi	1	3				4
Argas lahorensis			3			3
Amblyomma tuberculatum			2			2
Amblyomma variegatum			1			1
Haemaphysalis leporispalustris			1			1
Haemaphysalis parva			1			1
Ixodes cookei	1					1
Ixodes minor	1					1
Ixodes spp.					1	1
Rhipicephalus simus		1				1
Rhipicephalus spp.			1			1
Grand Total	**3304**	**2320**	**753**	**1085**	**91**	**9252**




Ticks by Life Stage, 2005-2022*
ticks
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
females
males
nymphs
Amblyomma americanum
Ixodes scapularis
Amblyomma maculatum
Dermacentor variabilis


Ticks by Month, 2005-2022*
ticks
1400
1200
1000
800
600
400
200
0
Jan*
Feb
March
April
May
June
July
Aug
Sept
Oct
Nov
Dec
Amblyomma americanum
Ixodes scapularis
Amblyomma maculatum
Dermacentor variabilis

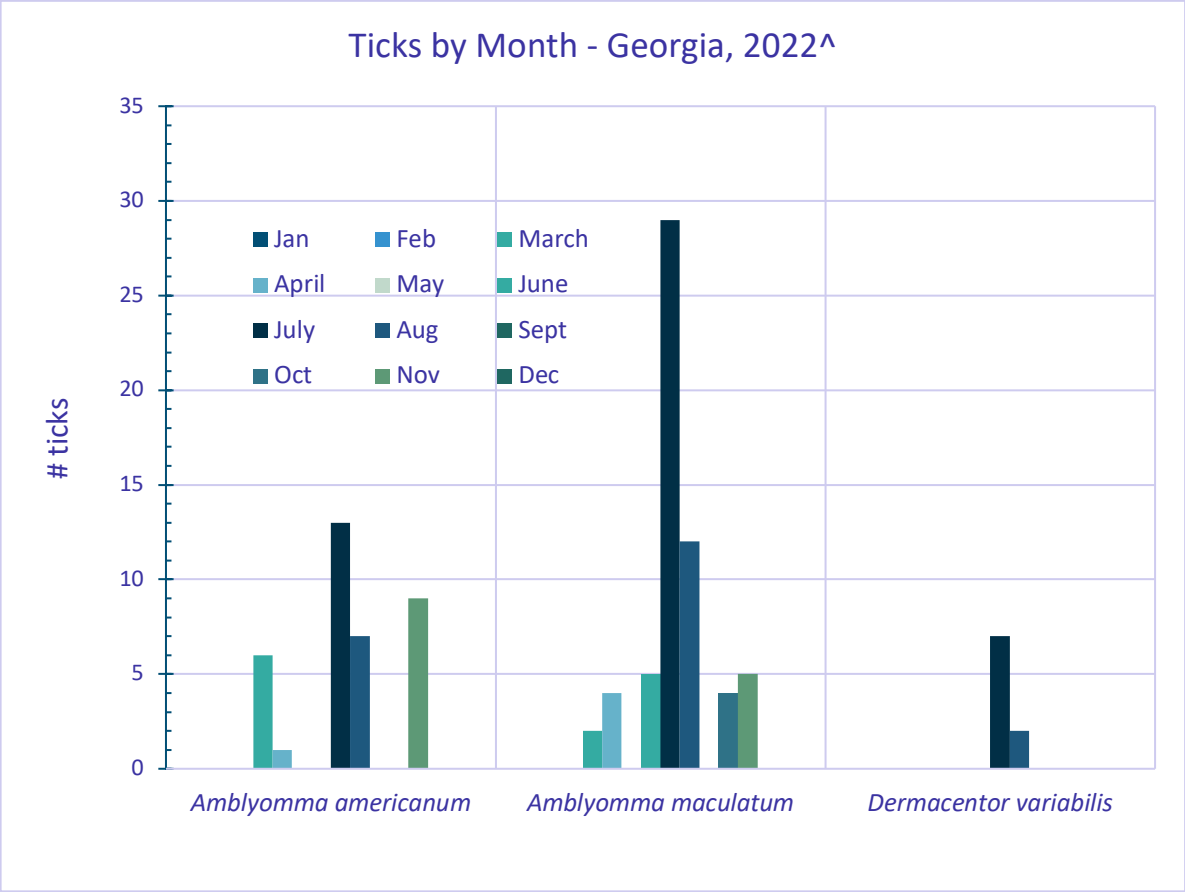
Ticks Collected in 2022

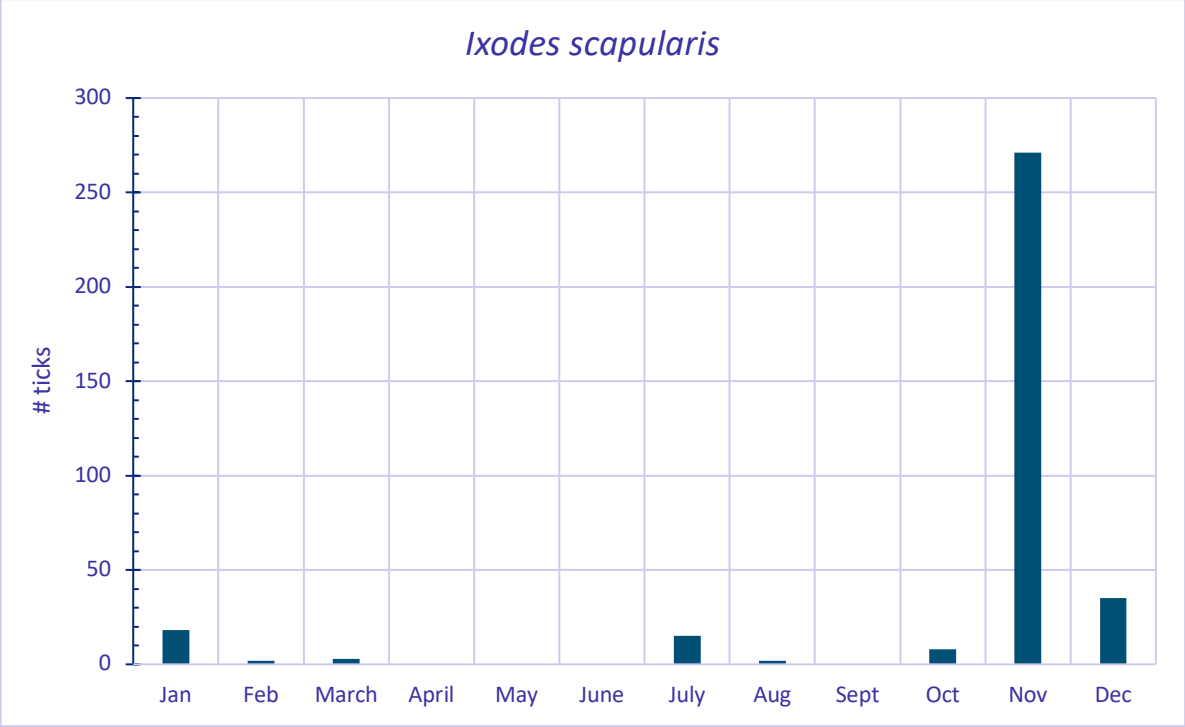


species	2005	2006	2008	2009	2010	2011	2012	2013
Amblyomma americanum	451	90	184	56	596	278	117	117
*Ixodes scapularis**	362	4	50	1	56	204	86	82
Dermacentor variabilis	113	23		4	64	248	103	103
Amblyomma maculatum	22	24	5	3	17	45	42	122
Rhipicephalus sanguineus	7				29	17		

species	2014	2015	2016	2017	2018	2019	2020	2021	2022
Amblyomma americanum	37	17	18	81	32	271	270	101	36
*Ixodes scapularis**	13	97	111	75	67	170	507	316	354
Dermacentor variabilis	62	12	22	56	58	69	10	49	9
Amblyomma maculatum	159	110	149	74	54	90	29	7	61

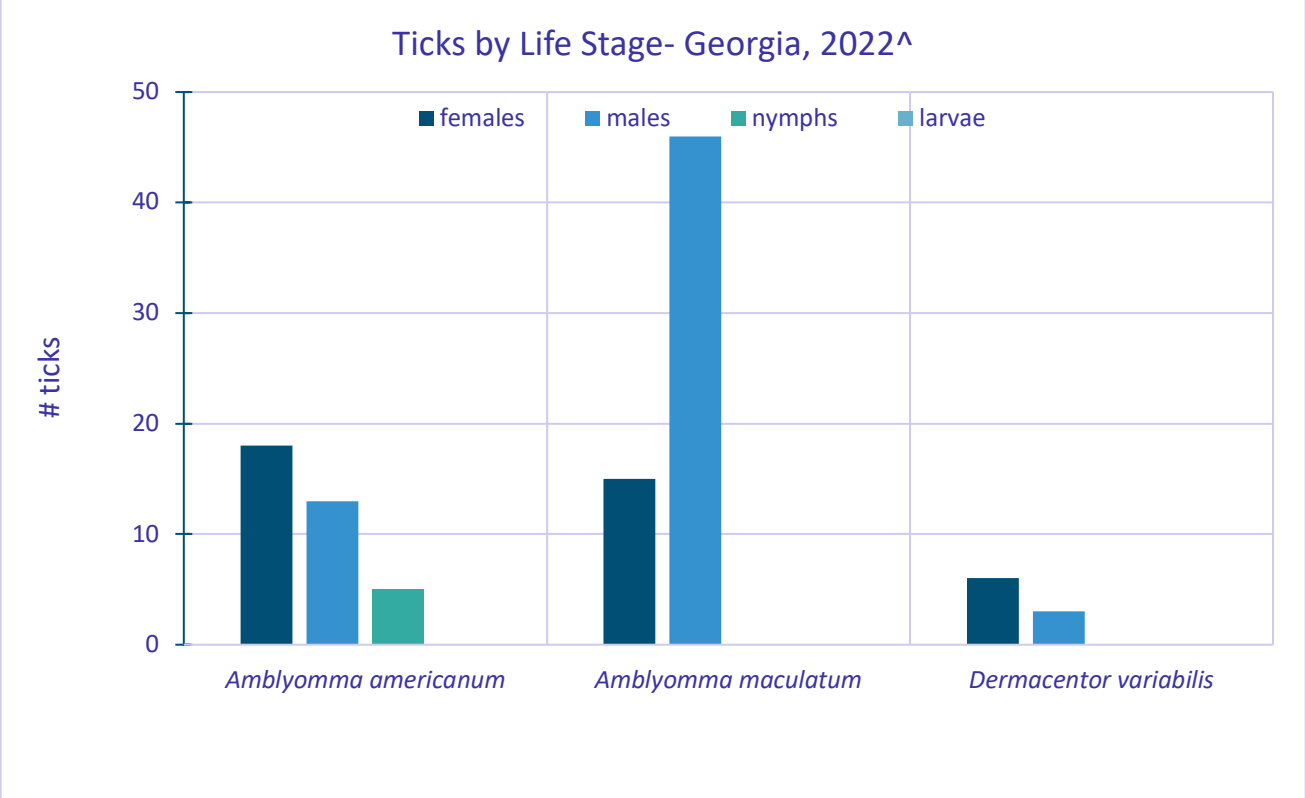
BY MONTH

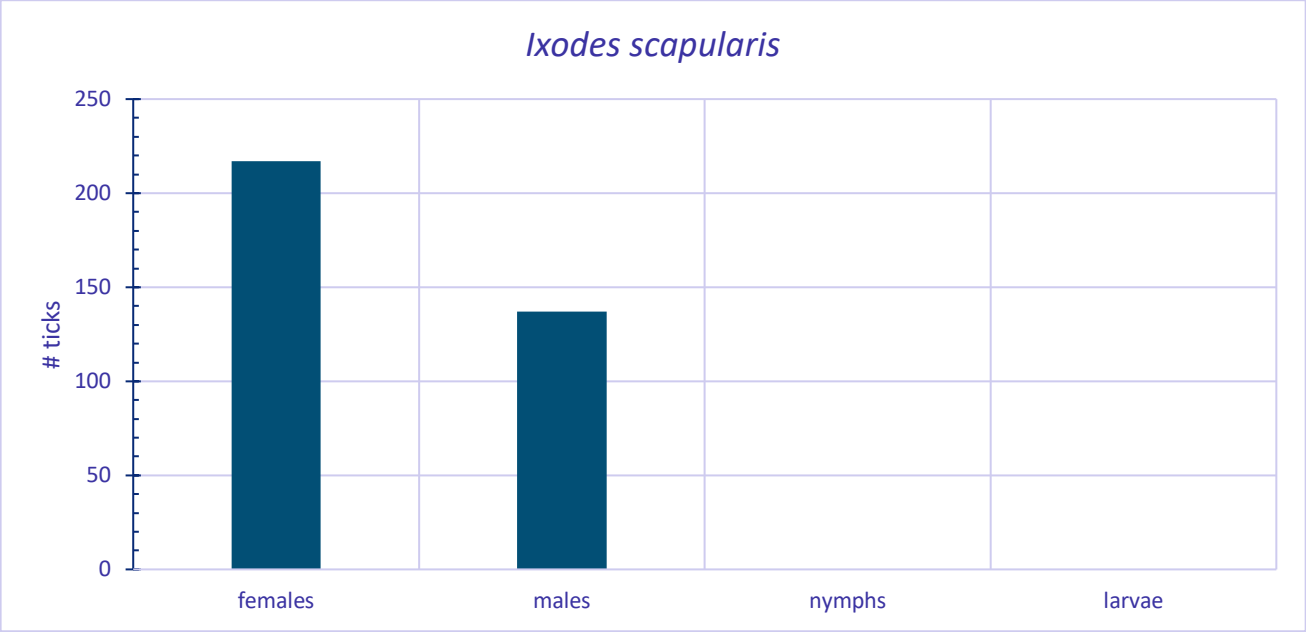

Ticks by Month - Georgia, 2022^
ticks
35
30
25
20
15
10
5
0
Jan
Feb
March
April
May
June
July
Aug
Sept
Oct
Nov
Dec
Amblyomma americanum
Amblyomma maculatum
Dermacentor variabilis


Ixodes scapularis
ticks
300
250
200
150
100
50
0
Jan
Feb
March
April
May
June
July
Aug
Sept
Oct
Nov
Dec

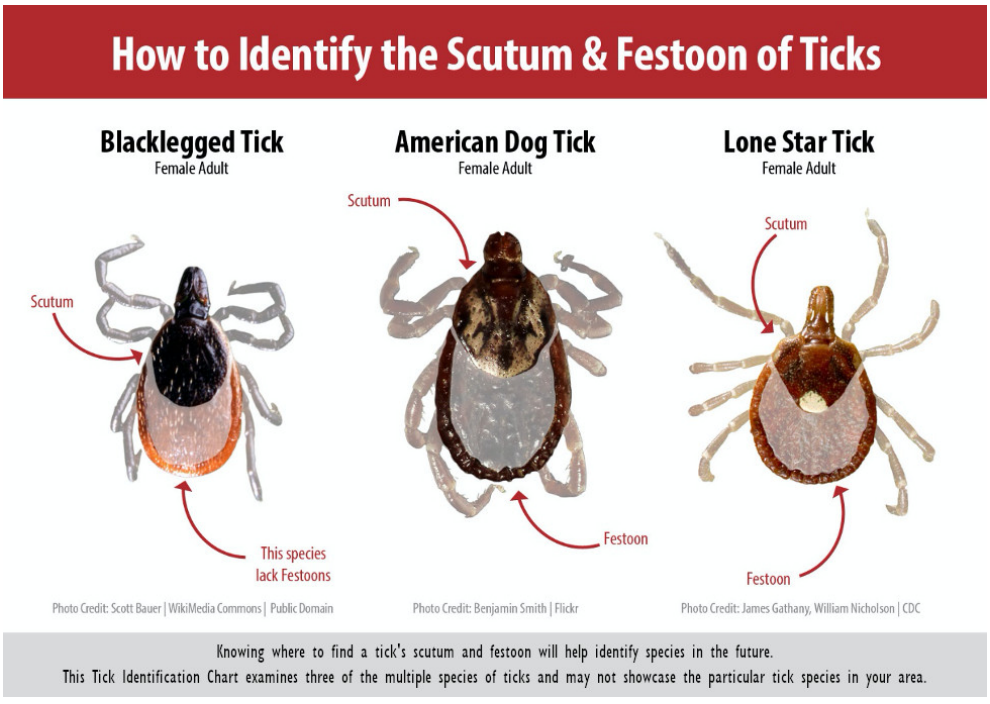
Month	*Amblyomma americanum*	*Amblyomma maculatum*	*Dermacentor variabilis*	*Ixodes scapularis*
Jan				18
Feb				2
March	6	2		3
April	1	4		
May				
June		5		
July	13	29	7	15
Aug	7	12	2	2
Sept				
Oct		4		8
Nov	9	5		271
Dec				35

BY LIFE STAGES





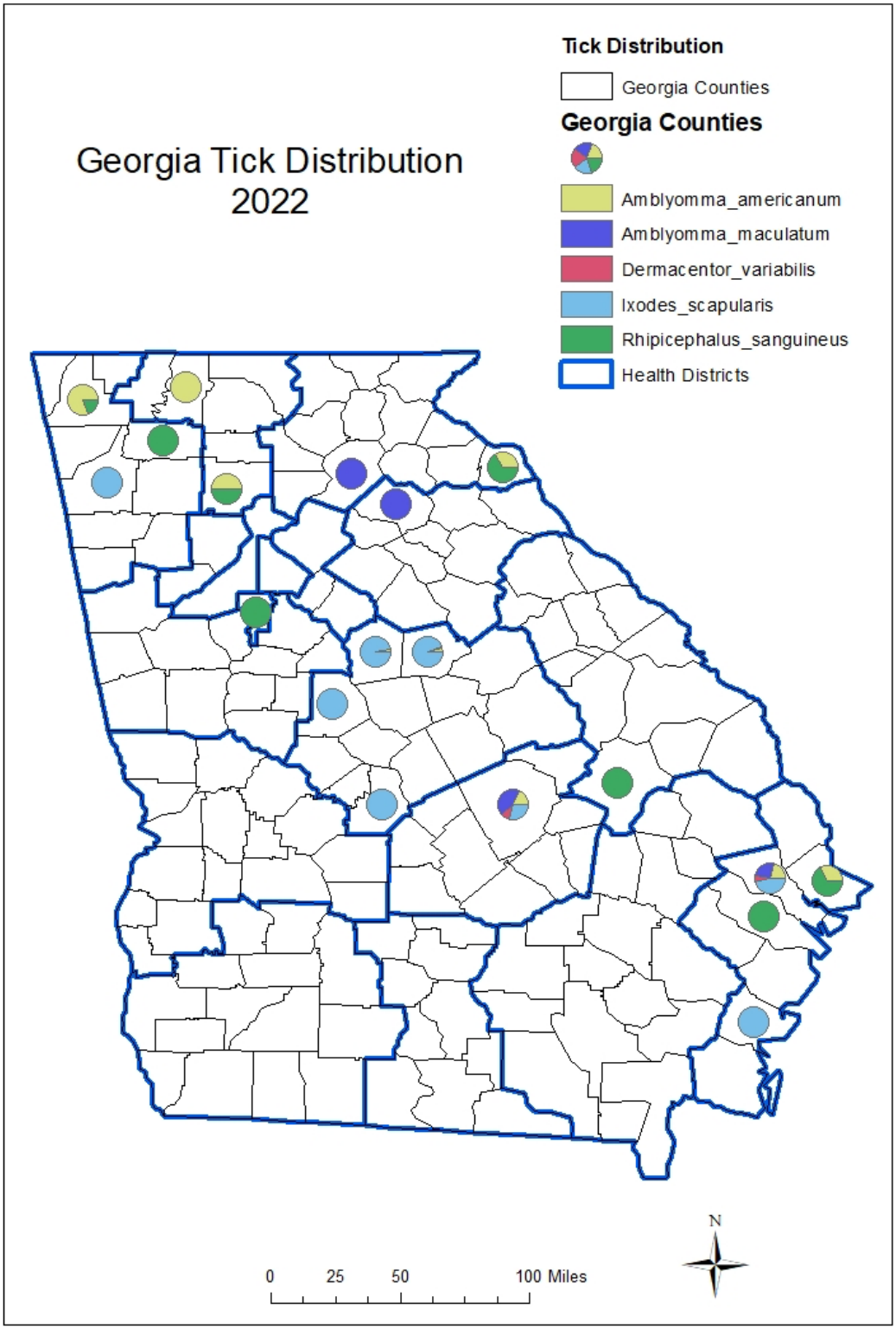
Species	females	males	nymphs	larvae	unknown	Grand Total
Amblyomma americanum	18	13	5			**36**
Amblyomma maculatum	15	46				**61**
Dermacentor variabilis	6	3				**9**
Ixodes scapularis	217	137				**354**
Grand Total	**256**	**199**	**5**			**460**



Tick Hosts, 2022

HOST	*Amblyomma americanum*	*Amblyomma maculatum*	*Dermacentor variabilis*	*Ixodes scapularis*	Grand Total
bear				17	17
cat	1			1	2
cow	1	4			5
deer	13	5		294	312
dog	19	48	9	39	115
horse	1			2	3
human		4			4
pig				1	1
unknown	1				1
Grand Total	**36**	**61**	**9**	**354**	**460**

Location of Ticks Collected in 2022



Tickborne Diseases

Ticks collected in Georgia during this period of surveillance are known transmitters of disease to humans and animals. Common tick-borne diseases in Georgia include Lyme disease, Rocky Mountain spotted fever, anaplasmosis, ehrlichiosis, and Southern tick-associated rash illness. Infected ticks spread disease once they've bitten a host, allowing the pathogens in their saliva and mouth get into the host's skin and blood. Tick bites are typically painless, but the site of the bite may later itch, burn, turn red, and feel painful. Individuals allergic to tick bites may develop a rash, swelling, shortness of breath, numbness, or paralysis. Tick bite treatment involves cleaning the area with soap and water and monitoring the site of the bite.

Anaplasmosis is a disease caused by the bacterium *Anaplasma phagocytophilum*. These bacteria are spread to people by tick bites primarily from the blacklegged tick (*Ixodes scapularis*) in Georgia. People with anaplasmosis will often have fever, headache, chills, and muscle aches. Doxycycline is the drug of choice for adults and children of all ages with anaplasmosis.

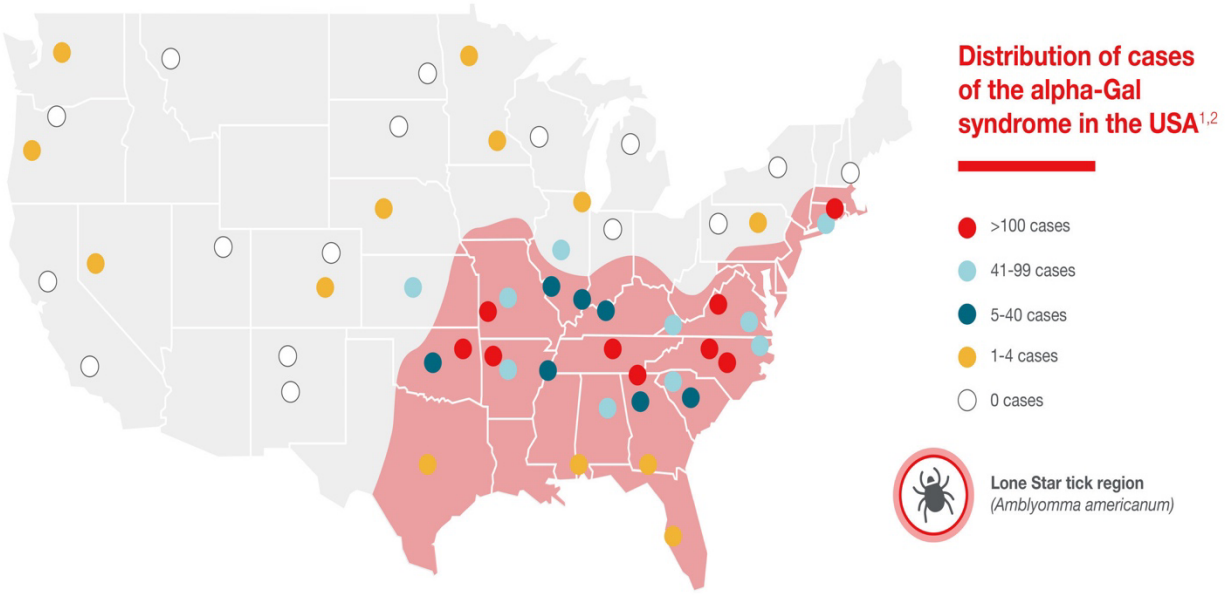
Ehrlichiosis is the general name used to describe diseases caused by the bacteria *Ehrlichia chaffeensis*, *E. ewingii*, or *E. muris eauclairensis* in the United States. These bacteria are spread to people primarily through the bite of infected ticks including the lone star tick (*Amblyomma americanum*) and the blacklegged tick (*Ixodes scapularis*). People with ehrlichiosis will often have fever, chills, headache, muscle aches, and sometimes upset stomach. Doxycycline is the treatment of choice for adults and children of all ages with ehrlichiosis.

Lyme disease is the most common vector-borne disease in the United States. Lyme disease is caused by the bacterium *Borrelia burgdorferi* and rarely, *Borrelia mayonii*. It is transmitted to humans through the bite of infected blacklegged ticks. Typical symptoms include fever, headache, fatigue, and a characteristic skin rash called erythema migrans. If left untreated, infection can spread to joints, the heart, and the nervous system.

Spotted fever rickettsioses are a group of tickborne infections caused by some members of the genus *Rickettsia*. Rocky Mountain spotted fever (RMSF) is an illness caused by *Rickettsia rickettsii*, a bacterial pathogen transmitted to humans through contact with ticks. *Dermacentor* species of ticks are most associated with infection, including *Dermacentor variabilis* (the American dog tick) and *Dermacentor andersoni* (the Rocky Mountain wood tick). More recently, *Rhipicephalus sanguineus* (the brown dog tick), has been implicated in spreading RMSF in the Southwestern US, along the US-Mexico border. Symptoms include acute onset of fever, headache, and a macular or maculopapular rash, often present on the palms and soles. In addition to RMSF, human illness associated with other spotted fever group *Rickettsia* species, including infection with *Rickettsia parkeri* (associated with *Amblyomma maculatum* ticks), has also been reported.

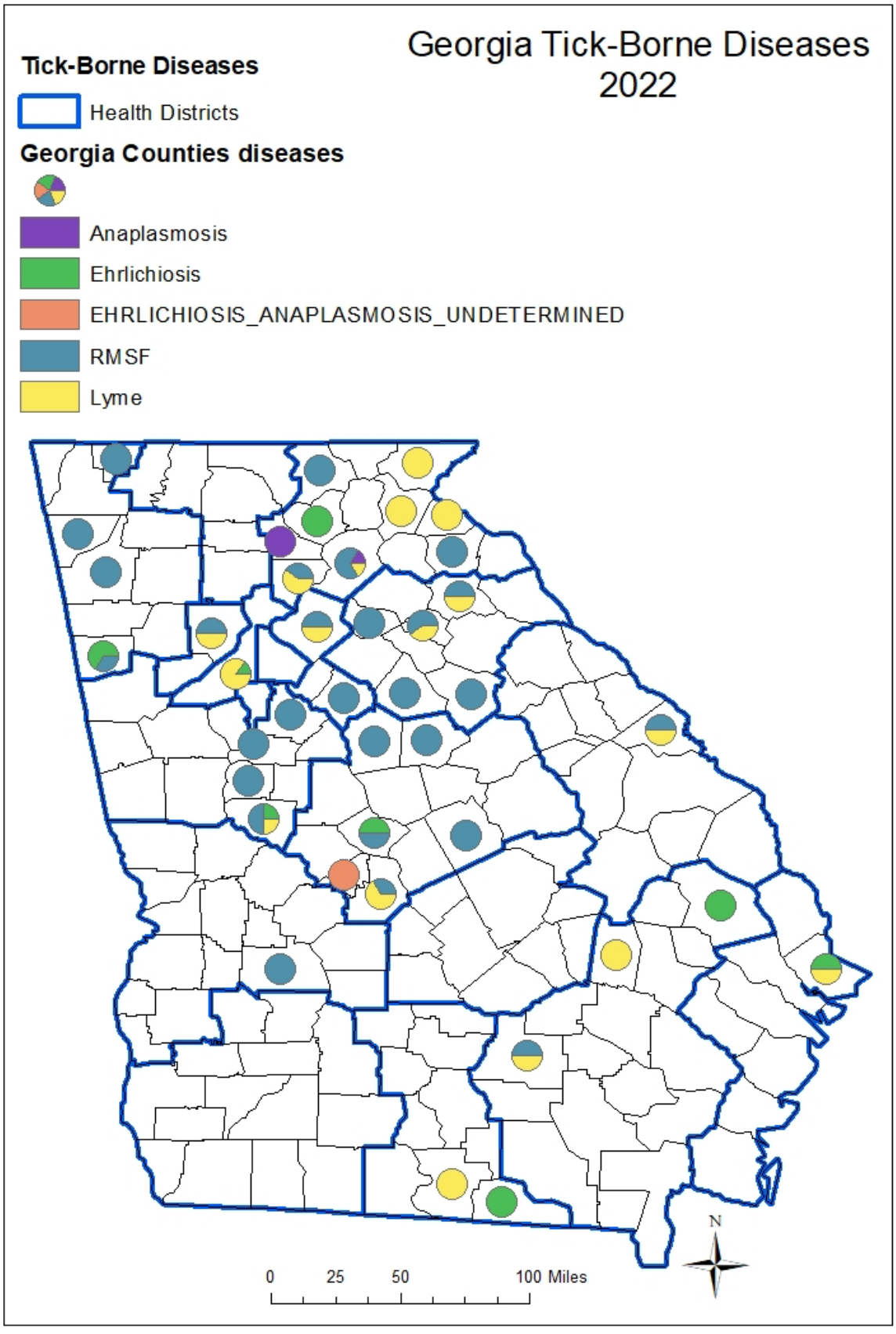
Tick paralysis, or toxicosis, is an acute, ascending, flaccid motor paralysis that can be confused with Guillain-Barre syndrome, botulism, and myasthenia gravis. In the US, tick paralysis is associated with *Dermacentor andersoni* (Rocky Mountain wood tick), *D variabilis* (American dog tick), *Amblyomma americanum* (Lone Star tick), *A maculatum* (Gulf Coast tick), *Ixodes scapularis* (black-legged tick), and *I pacificus* (western black-legged tick). Onset of symptoms usually occurs after a tick has fed for several days. If unrecognized, tick paralysis can progress to respiratory failure and may be fatal in approximately 10% of cases. Prompt removal of the feeding tick usually is followed by complete recovery.

A recently discovered reaction to the bite from the Lone Star tick is that it can cause people to develop an allergy to red meat, including beef and pork. This specific allergy is related to a carbohydrate called alpha-gal and is best diagnosed with a blood test. Although reactions to foods typically occur immediately, in the instance of allergic reactions to alpha-gal, symptoms often take several hours to develop. Owing to the significant delay between eating red meat and the appearance of an allergic reaction, it can be a challenge to connect the culprit foods to symptoms. Therefore, an expert evaluation from an allergist familiar with the condition is recommended. The Lone Star tick has been implicated in initiating the red meat allergy in the US, and this tick is found predominantly in the Southeast, from Texas to Iowa and into New England.



1. Adapted from Platts-Mills T. The Alpha-gal Syndrome: IgE responses to galactose alpha-1,3-galactose induced by bites from lone star ticks. Presentation presented at AAAI; 2019.
2. Geographic distribution of ticks that bite humans | CDC [Internet]. Centers for Disease Control and Prevention. 2020 [cited 2020 Jul 7]. Available from: https://www.cdc.gov/ticks/geographic_distribution.html

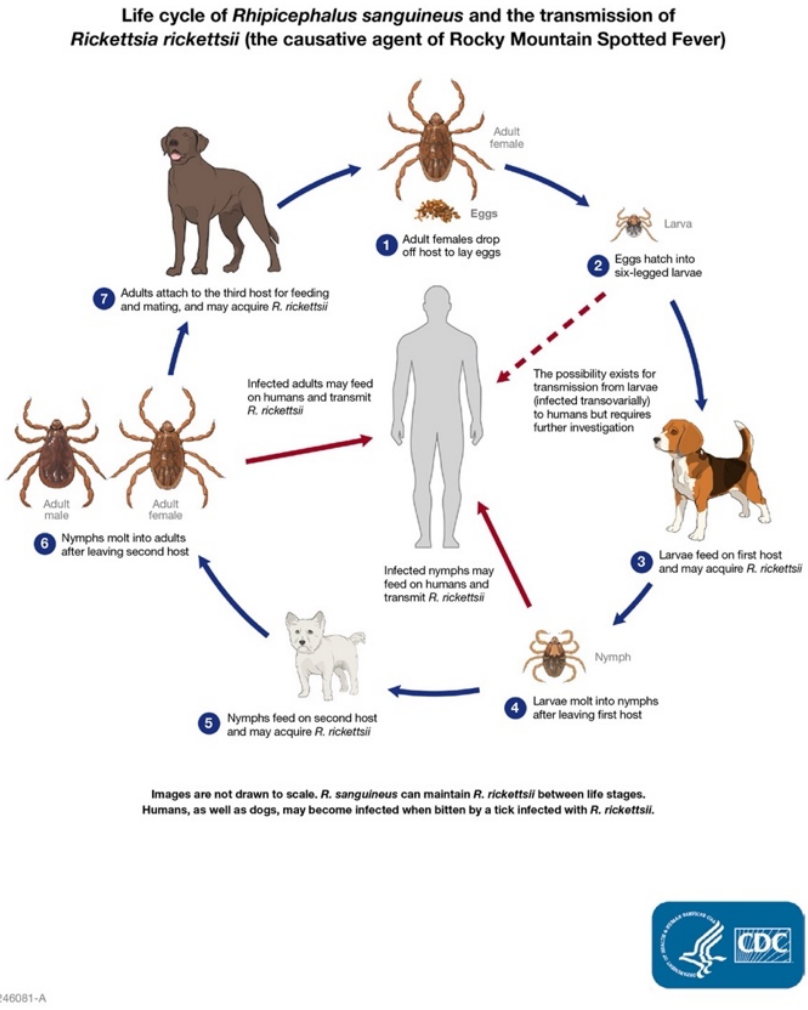
Disease, 2022	JAN	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	Grand Total
ANAPLASMA PHAGOCYTOPHILUM	1			1							2
EHRLICHIA CHAFFEENSIS		1	1	5	1	1		2			11
EHRLICHIOSIS/ANAPLASMOSIS, UNDETERMINED			1								1
LYME DISEASE		2	2	1	9	5	6	3	1	2	31
ROCKY MOUNTAIN SPOTTED FEVER	3	1	3	11	4	8	3	4	1	2	40
Grand Total	**4**	**4**	**7**	**18**	**14**	**14**	**9**	**9**	**2**	**4**	**85**

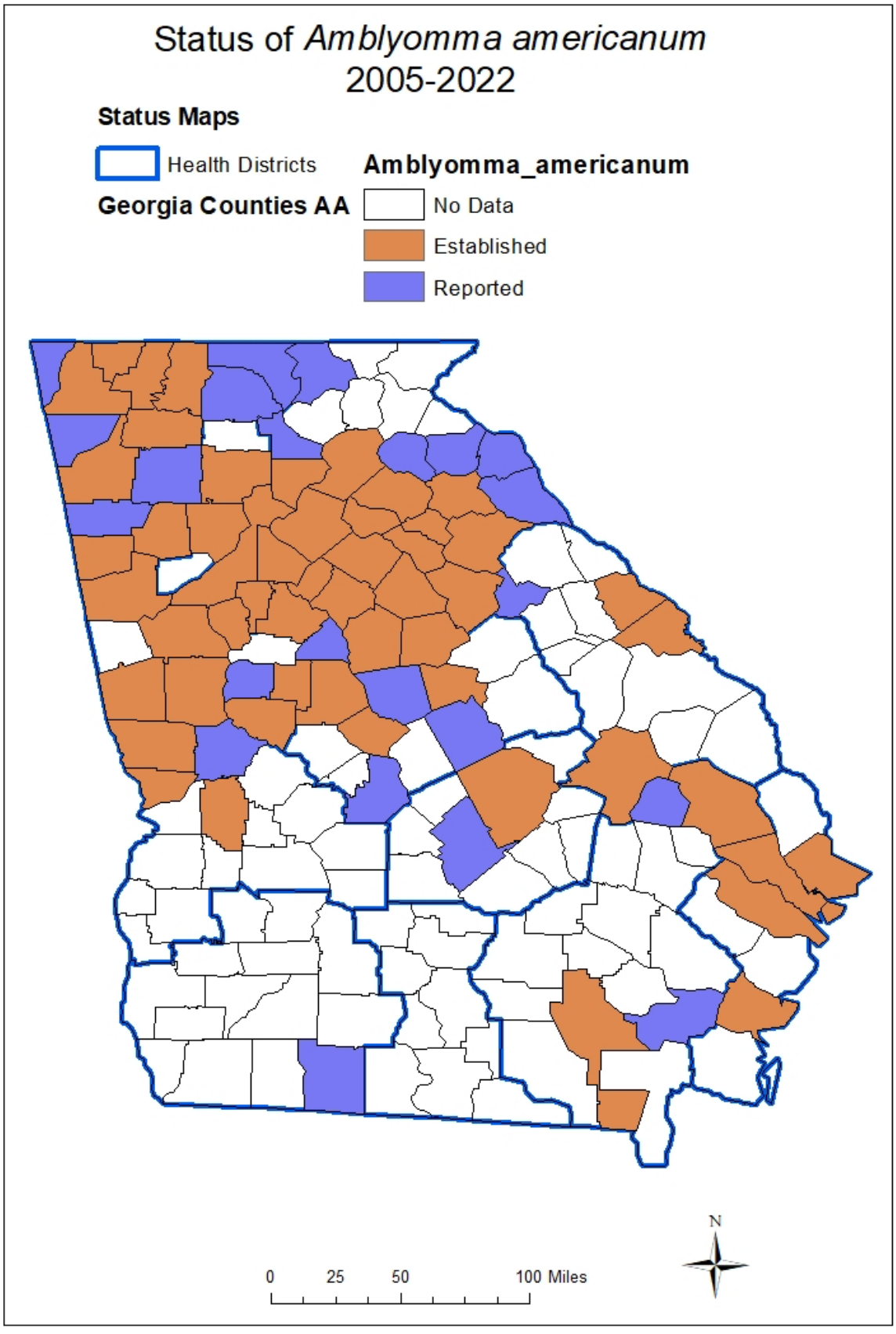

Georgia Tick-Borne Diseases
2022
Tick-Borne Diseases
Health Districts
Georgia Counties diseases
Anaplasmosis
Ehrlichiosis
EHRLICHIOSIS_ANAPLASMOSIS_UNDETERMINED
RMSF
Lyme
N
0
25
50
100 Miles

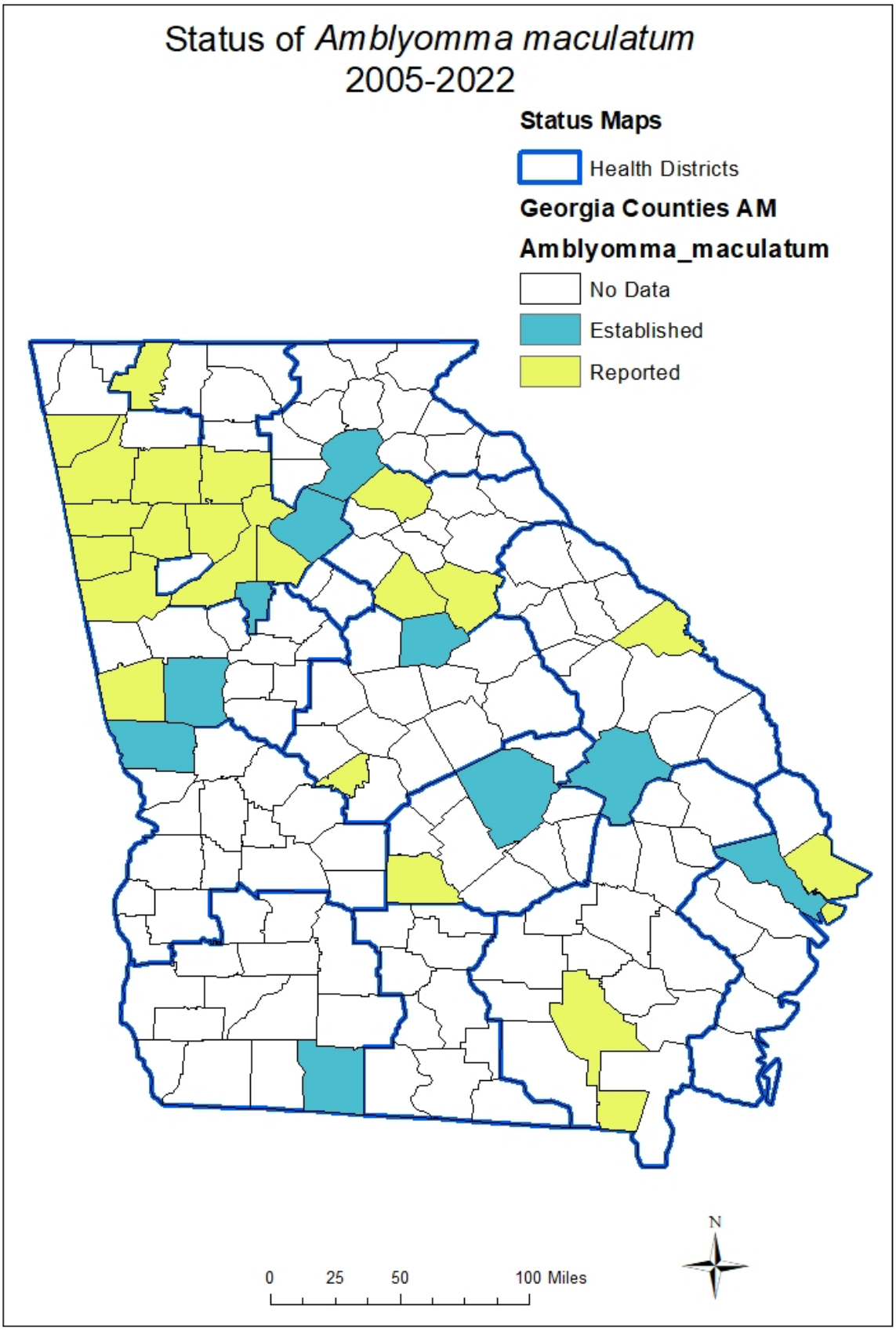
Tick Distribution Status, 2005-2022

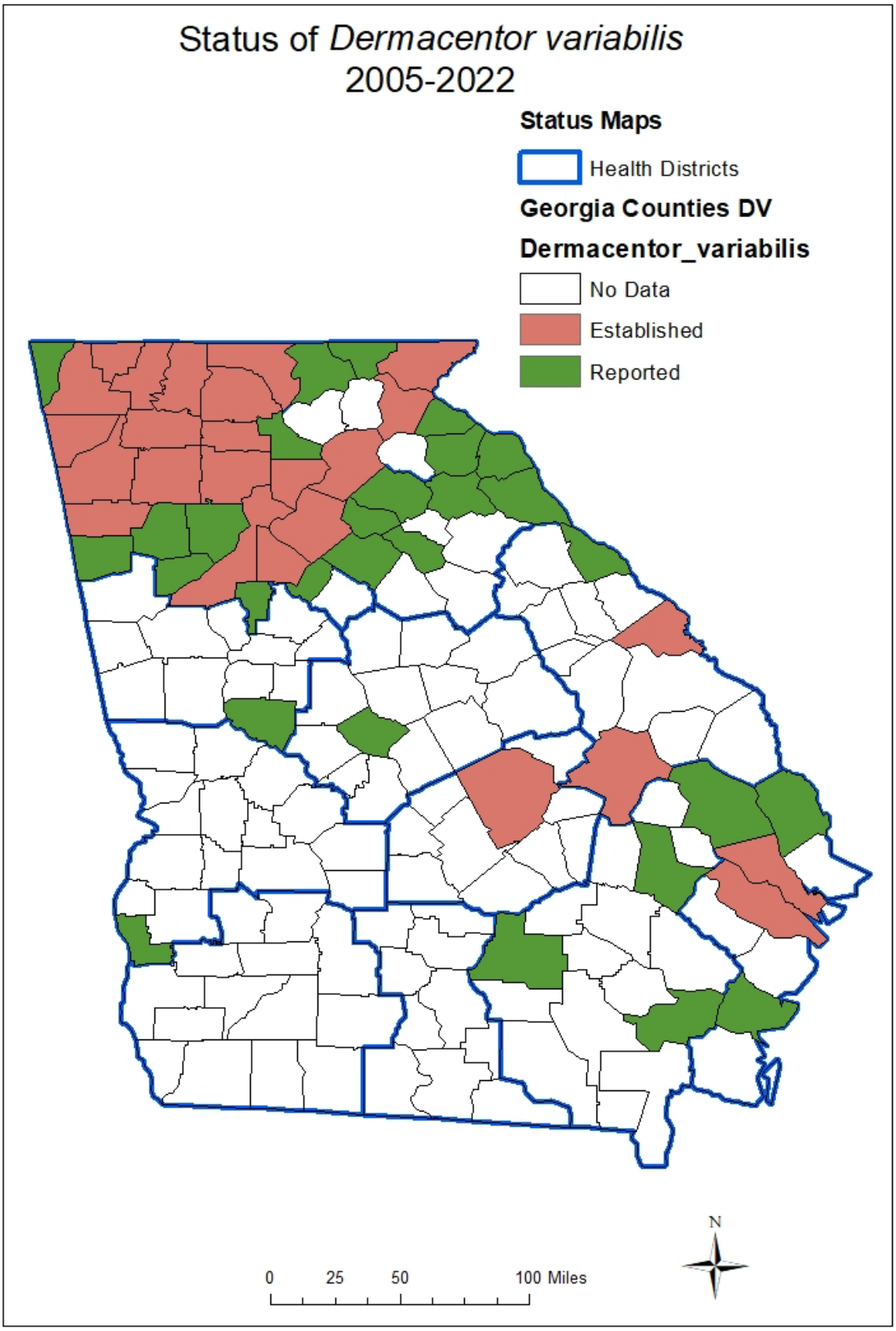
Tick surveillance is intended to monitor changes in the distribution and abundance of ticks and to assess the presence and prevalence of tickborne pathogens to provide actionable, evidence-based information on infection risk to clinicians, the public, and policy makers (https://www.cdc.gov/ticks/index.html).

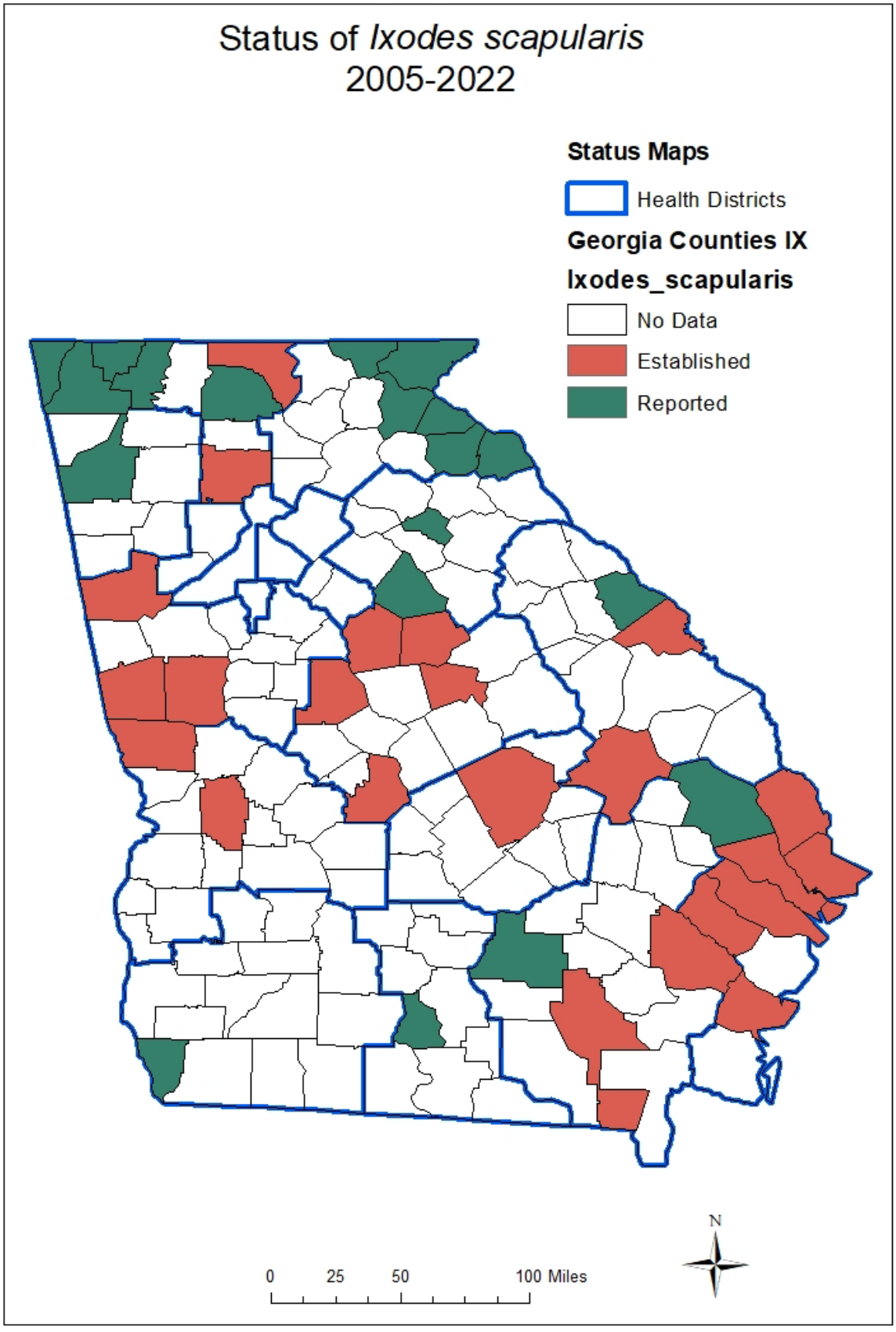
- Counties classified as “established” are those where six or more ticks of a single life stage or more than one life stage of the tick were collected in the county within a 12-month period.
- Counties classified as “reported” are those where less than six ticks of a single life stage were collected in the county within a 12-month period.
- Counties classified as “no records” should not be interpreted as the tick being absent. No records could arise either from a lack of sampling efforts, lack of tick collection during sampling efforts, or lack of reporting or publishing the results of sampling efforts.

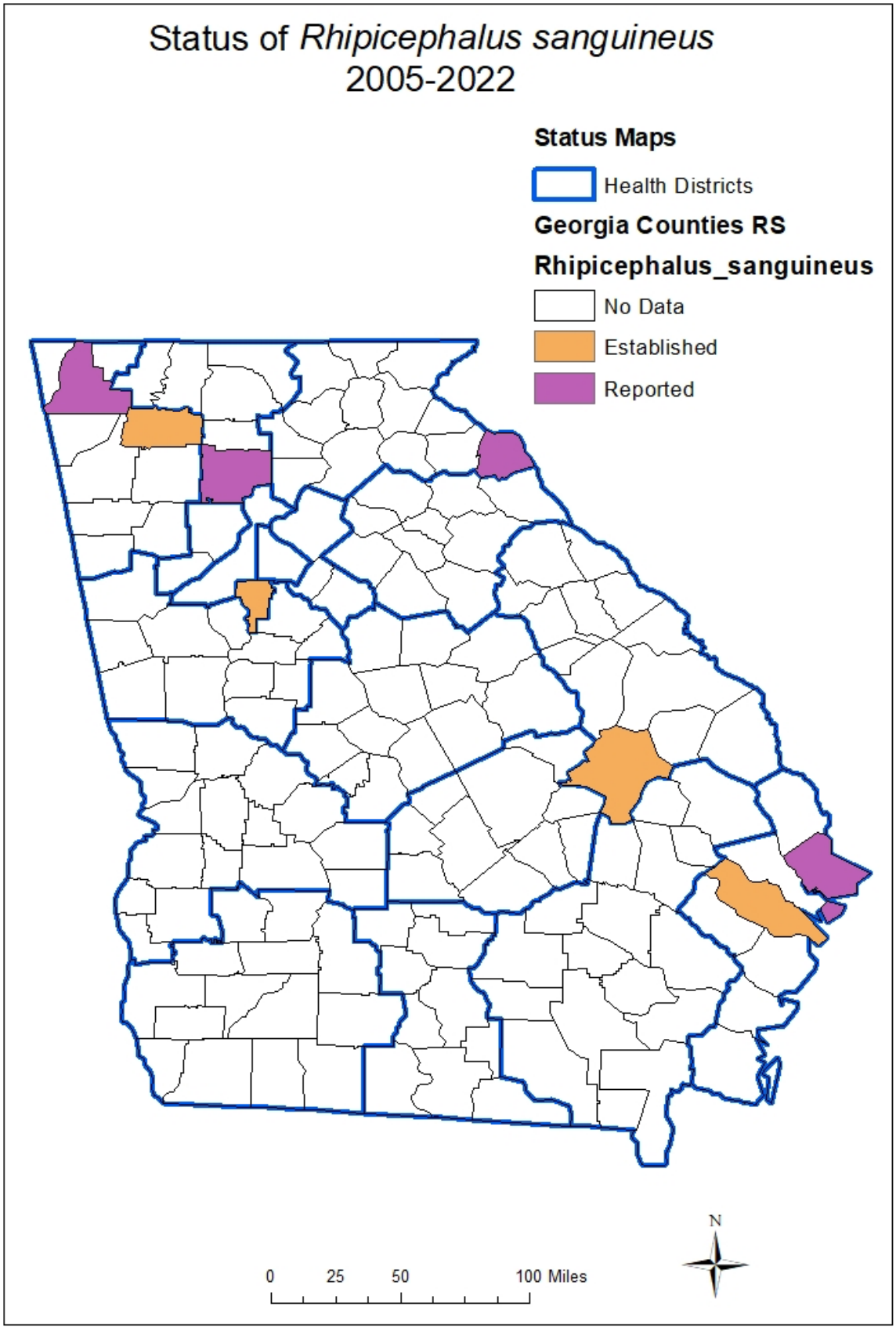



Status of Amblyomma americanum
2005-2022
Status Maps
Health Districts
Georgia Counties AA
Amblyomma_americanum
No Data
Established
Reported
0
25
50
100 Miles
N

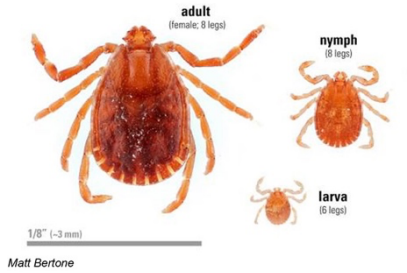

Status of Amblyomma maculatum
2005-2022
Status Maps
Health Districts
Georgia Counties AM
Amblyomma_maculatum
No Data
Established
Reported
0
25
50
100 Miles
N


Status of Dermacentor variabilis
2005-2022
Status Maps
Health Districts
Georgia Counties DV
Dermacentor_variabilis
No Data
Established
Reported
0
25
50
100 Miles
N


Status of Ixodes scapularis
2005-2022
Status Maps
Health Districts
Georgia Counties IX
Ixodes_scapularis
No Data
Established
Reported
N
0
25
50
100 Miles

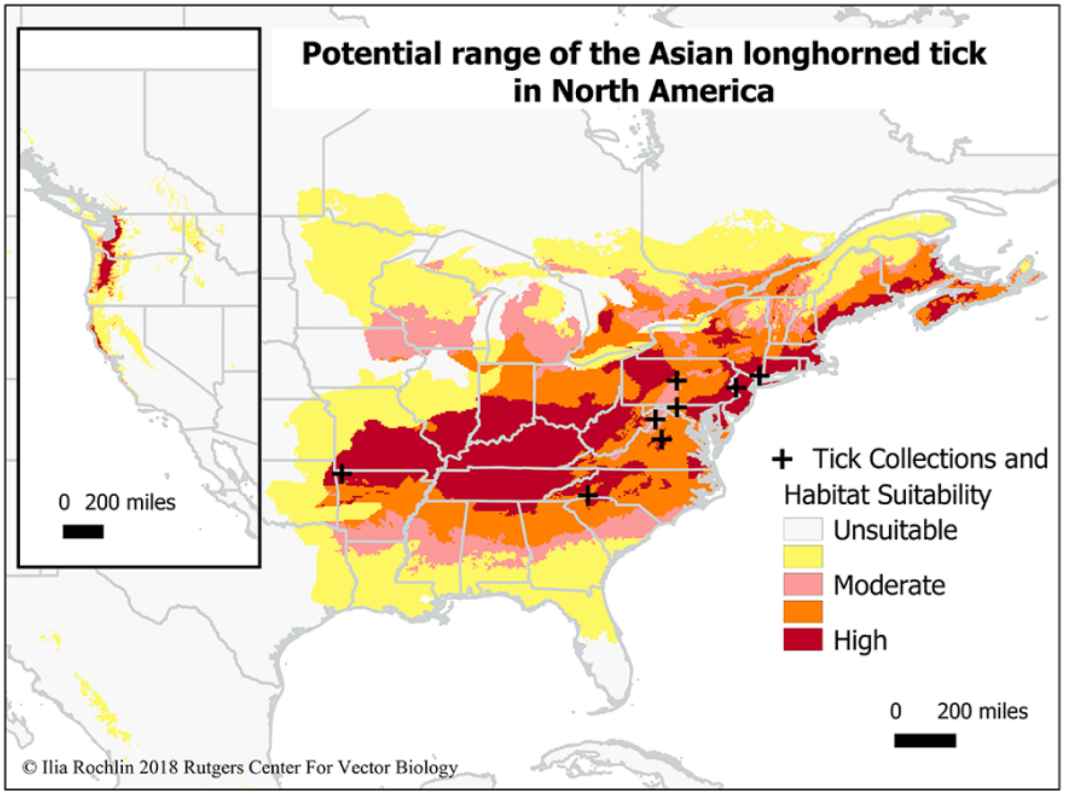

Status of *Rhipicephalus sanguineus*
2005-2022
Status Maps
Health Districts
Georgia Counties RS
Rhipicephalus_sanguineus
No Data
Established
Reported
N
0
25
50
100 Miles

Asian Longhorned Tick

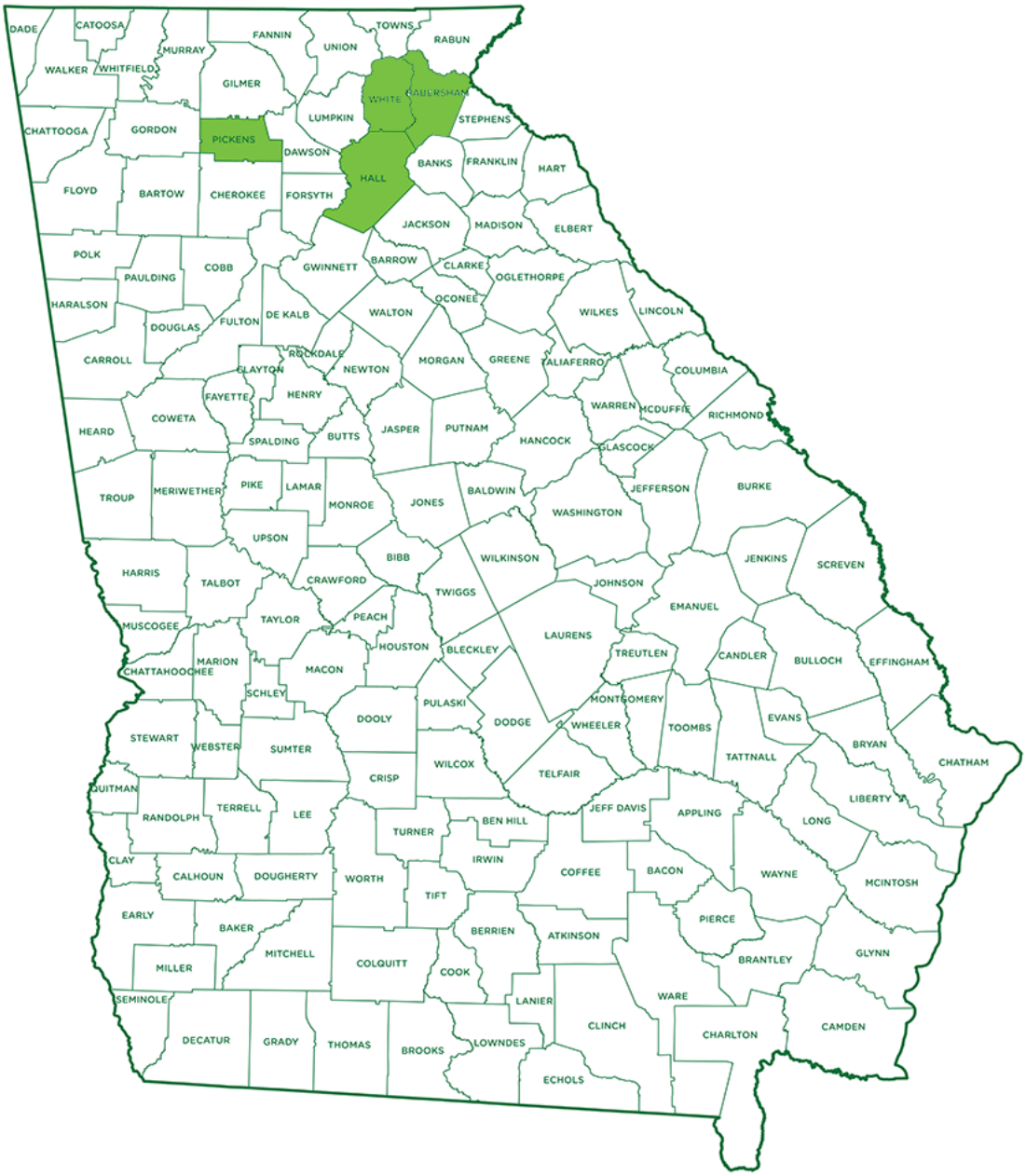


Asian longhorned ticks were reported for the first time in the United States in 2017. Asian longhorned ticks have been found on pets, livestock, wildlife, and people. One reason this tick is so successful is that the female ticks can lay eggs and reproduce without mating. Asian Longhorned ticks are mainly a pest of concern in livestock. This tick often forms large infestations on one animal, causing great stress and reducing growth and production. A severe infestation can even kill the animal due to blood loss. However, in countries where this tick is normally found, they have been found to transmit disease to both people and animals. One recent experimental study found that this tick is not likely to contribute to the spread of Lyme disease bacteria in the United States. Another laboratory study found that this tick can carry and spread the bacteria that cause Rocky Mountain spotted fever (*Rickettsia rickettsii*). However, the bacteria that cause Rocky Mountain spotted fever have not yet been found in these ticks in nature.

Research is ongoing.



Georgia counties that have confirmed presence of the Asian Longhorned Tick



https://www.agr.georgia.gov/asian-longhorned-tick.aspx

Want to get your tick identified? Go to https://arcg.is/1XSuSD

Before You Go Outdoors

- **Know where to expect ticks.** Ticks live in grassy, brushy, or wooded areas, or even on animals. Spending time outside walking your dog, camping, gardening, or hunting could bring you in close contact with ticks. Many people get ticks in their own yard or neighborhood.
- **Treat clothing and gear** with products containing 0.5% permethrin. Permethrin can be used to treat boots, clothing and camping gear and remain protective through several washings. Alternatively, you can buy permethrin-treated clothing and gear.
- **Use** EPA-registered repellents containing DEET, picaridin, IR3535, Oil of Lemon Eucalyptus (OLE), para-menthane-diol (PMD), or 2-undecanone. Always follow product instructions. Do not use products containing OLE or PMD on children under 3 years old.
- **Avoid Contact with Ticks**
    - Avoid wooded and brushy areas with high grass and leaf litter.
    - Walk in the center of trails.

After You Come Indoors

Check your clothing for ticks. Ticks may be carried into the house on clothing. Any ticks that are found should be removed. Tumble dry clothes in a dryer on high heat for 10 minutes to kill ticks on dry clothing after you come indoors. If the clothes are damp, additional time may be needed. If the clothes require washing first, hot water is recommended. Cold and medium temperature water will not kill ticks.

Examine gear and pets. Ticks can ride into the home on clothing and pets, then attach to a person later, so carefully examine pets, coats, and daypacks.

Shower soon after being outdoors. Showering within two hours of coming indoors has been shown to reduce your risk of getting Lyme disease and may be effective in reducing the risk of other tickborne diseases. Showering may help wash off unattached ticks and it is a good opportunity to do a tick check.

Check your body for ticks after being outdoors. Conduct a full body check upon return from potentially tick-infested areas, including your own backyard. Use a hand-held or full-length mirror to view all parts of your body. Check these parts of your body and your child's body for ticks:

- Under the arms
- In and around the ears
- Inside belly button
- Back of the knees
- In and around the hair
- Between the legs
- Around the waist

Resources

https://dph.georgia.gov/tick-borne-diseases

https://www.slideshare.net/AllergyChula/alpha-gal-allergy-red-meat-allergy

https://www.cdc.gov/ticks/longhorned-tick/index.html

https://www.cdc.gov/ticks/pdfs/Tick_surveillance-P.pdf

https://www.cdc.gov/ticks/resources/TickSurveillance_Iscapularis-P.pdf

https://www.contagionlive.com/news/rutgers-investigators-create-pictorial-key-for-accurate-identification-of-asian-longhorned-tick

https://zookeys.pensoft.net/article/30448/

https://www.cdc.gov/mmwr/preview/mmwrhtml/00040975.htm

https://scwds.shinyapps.io/haemaphysalis/

https://www.aphis.usda.gov/aphis/maps/animal-health/asian-longhorned-tick

Pictorial Key to the Adults of Hard Ticks, Family Ixodidae (Ixodida: Ixodoidea), East of the Mississippi River. JAMES E. KEIRANS AND TAINA R. LITWAK. J. Med. Entomol. 26(5): 435-448 (1989)

Ticks Parasitizing Humans in Georgia and South Carolina, Michael W. Felz, Lance A. Durden, James H. Oliver and Jr. The Journal of Parasitology, Vol. 82, No. 3 (June 1996), pp. 505-508


GEORGIA
DADE
CATOOSA
WHITFIELD
FANNIN
TOWNS
RABUN
WALKER
MURRAY
UNION
GILMER
WHITE
HABERSHAM
CHATTOOGA
GORDON
LUMPKIN
STEPHENS
PICKENS
DAWSON
HALL
BANKS
FRANKLIN
HART
FLOYD
BARTOW
CHEROKEE
FORSYTH
JACKSON
MADISON
ELBERT
POLK
COBB
BARROW
CLARKE
OGLETHORPE
PAULDING
GWINNETT
OCONEE
HARALSON
WALTON
WILKES
LINCOLN
DOUGLAS
FULTON
DEKALB
ROCKDALE
CARROLL
CLAYTON
NEWTON
MORGAN
GREENE
TALIAFERRO
McDUFFIE
COLUMBIA
FAYETTE
HENRY
HEARD
COWETA
JASPER
PUTNAM
WARREN
RICHMOND
SPALDING
BUTTS
HANCOCK
GLASCOCK
TROUP
MERIWETHER
PIKE
LAMAR
MONROE
JONES
BALDWIN
JEFFERSON
BURKE
UPSON
WASHINGTON
HARRIS
TALBOT
BIBB
WILKINSON
JENKINS
SCREVEN
CRAWFORD
TWIGGS
JOHNSON
MUSCOGEE
TAYLOR
PEACH
EMANUEL
CHATTA-HOOCHEE
MARION
MACON
HOUSTON
BLECKLEY
LAURENS
TREUTLEN
CANDLER
BULLOCH
EFFINGHAM
SCHLEY
DOOLY
PULASKI
DODGE
WHEELER
MONTGOMERY
TOOMBS
EVANS
STEWART
WEBSTER
SUMTER
WILCOX
TATTNALL
BRYAN
CHATHAM
QUITMAN
CRISP
TELFAIR
LIBERTY
TERRELL
JEFF DAVIS
APPLING
RANDOLPH
LEE
TURNER
BEN HILL
LONG
CLAY
CALHOUN
DOUGHERTY
WORTH
IRWIN
COFFEE
BACON
WAYNE
McINTOSH
EARLY
BAKER
TIFT
PIERCE
BERRIEN
ATKINSON
GLYNN
MILLER
MITCHELL
COLQUITT
COOK
WARE
BRANTLEY
SEMINOLE
DECATUR
GRADY
THOMAS
BROOKS
LOWNDES
LANIER
CLINCH
CHARLTON
CAMDEN
ECHOLS
Carl Vinson Institute of Government
University of Georgia

District Map