Georgia Tick Surveillance, 2024

Ticks and Tick-Borne Diseases

Overview

Tickborne diseases are an increasing public health threat in the United States. Prevention and diagnosis of tickborne diseases are improved by access to current and accurate information on where medically important ticks and their associated human and veterinary pathogens are present, their local abundance or prevalence, and when ticks are actively seeking hosts. The true extent of tick and tickborne pathogen expansion is poorly defined, in part because of a lack of nationally standardized tick surveillance.

Ogden, et al (2022) recently published an article on the "Possible Effects of Climate Change on Ixodid Ticks and the Pathogens They Transmit" (https://pmc.ncbi.nlm.nih.gov/articles/PMC9620468/). Ticks and tick-borne diseases (TTBDs) are inherently climate-sensitive due to the sensitivity of tick lifecycles to climate. Key direct climate and weather sensitivities include survival of individual ticks, and the duration of development and host-seeking activity of ticks. These sensitivities mean that in some regions a warming climate may increase tick survival, shorten life cycles and lengthen the duration of tick activity seasons.

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 impact the abundance and distribution of tick populations from climate effects will be difficult to assess.

Tick surveillance at the Georgia Department of Public Health (DPH) is only done in collaboration with the Georgia Department of Agriculture's (GDA) tick attach study and with the Georgia Department of Natural Resources (GA 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.

Continuing 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 August 7, 2024, longhorned ticks have been found in Arkansas, Connecticut, Delaware, Georgia, Illinois, Indiana, Kentucky, Maryland, Massachusetts, Missouri, New Jersey, New York, North Carolina, Ohio, Oklahoma, Rhode Island, South Carolina, Pennsylvania, Tennessee, Virginia, West Virginia and Washington DC.

Background

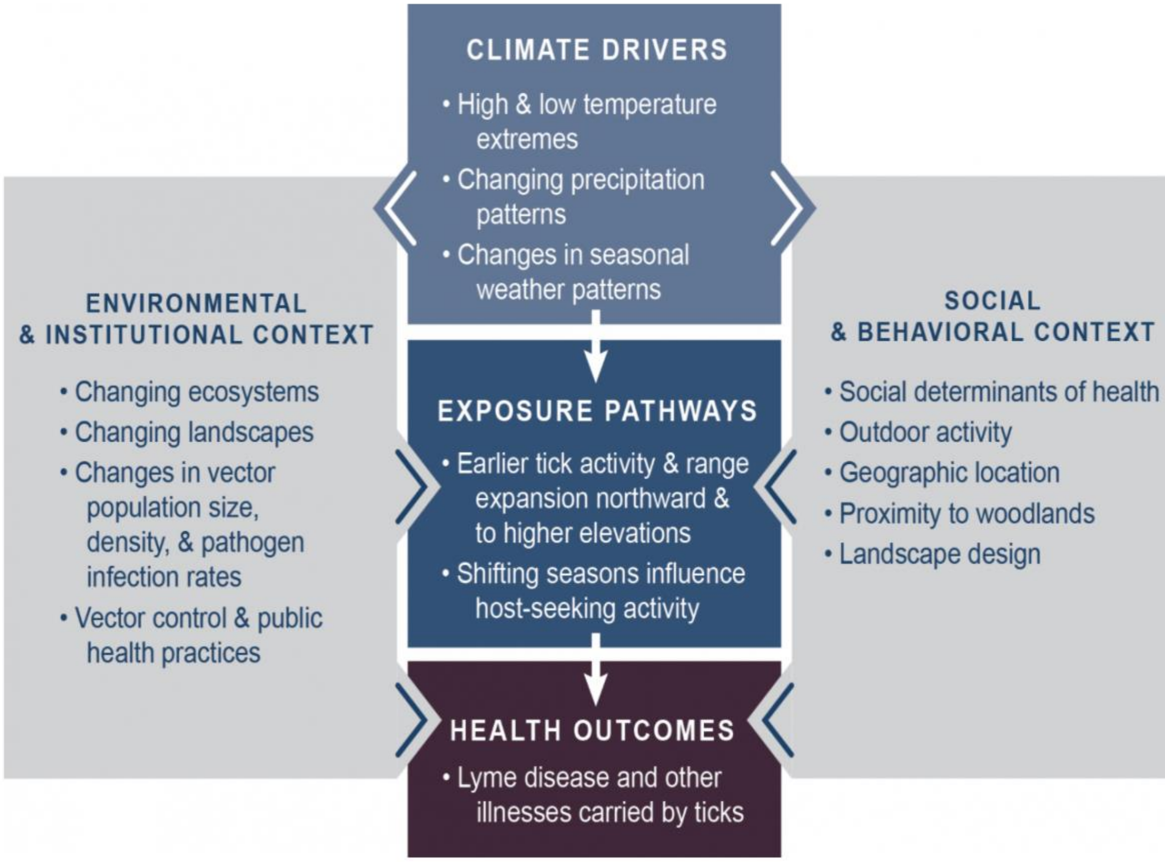
At least two surveys of ticks attached to humans have been done in Georgia since 1990. The first, which ran from 1990-1995, was a collaboration between the Medical College of Georgia and Georgia Southern University, and is published in the Journal of Parasitology, 1996. The second study was done between April 2005 and December 2006 by the Georgia Department of Public Health (DPH). 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 DPH 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 DPH for analysis.

Richmond County Department of Health Mosquito Control program (RCMC) had also partnered with the State Entomologists for DPH 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 GA DNR. Entomologists from DPH attended quota hunts at different Wildlife Management areas (Berry College, BF Grant, Big Lazer Creek, Blanton Creek, Cedar Creek, CFL Almo Tract, Clybel, Joe Kurz, Oaky Woods, Ohoopee Dunes, Paulding Forest, & Rum Creek) and other hunting sites (Chattahoochee Bend, Fort Yargo, Richard P Russell, South Chickamauga Creek & Tugaloo State Parks) 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.



Global warming is increasing the risk of tick-borne diseases by expanding tick ranges, extending their active seasons, and potentially increasing their populations. Warmer temperatures and shorter, milder winters allow ticks to survive and reproduce in areas where they previously couldn't, leading to more contact with humans and a longer period when they are actively transmitting diseases. Climate change can also impact the hosts that ticks feed on, like rodents and deer. If the ranges of these hosts expand due to climate change, they may also take ticks and the risk of tick-borne diseases with them.

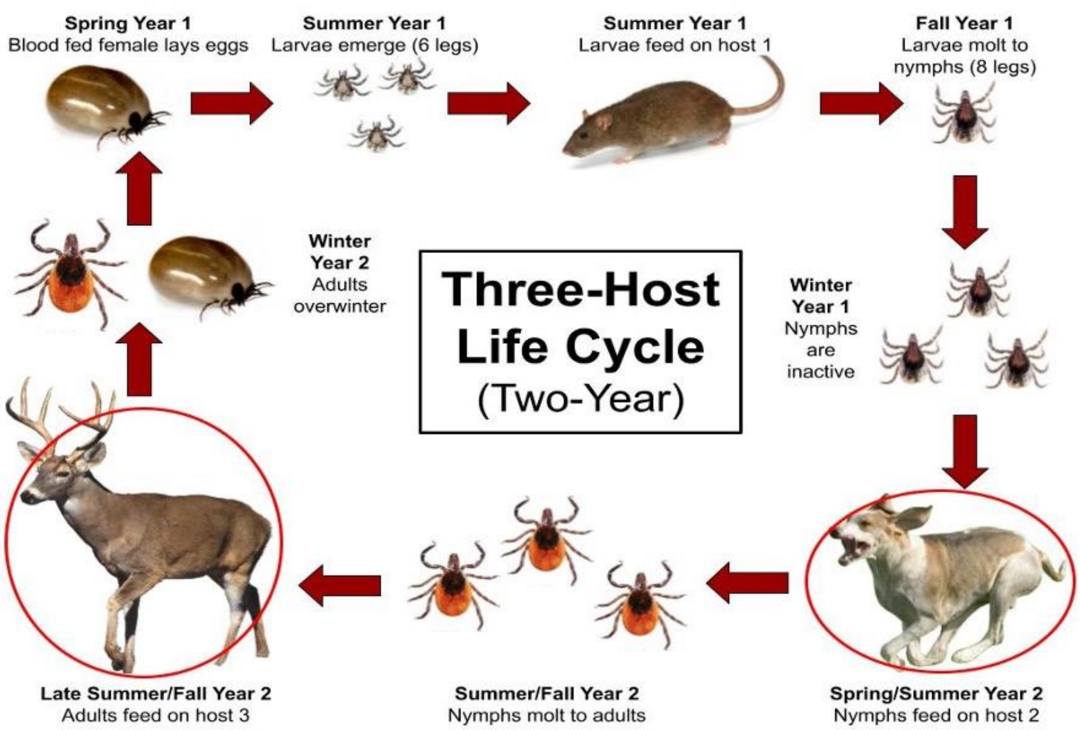
Tick Biology

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. The 3rd tick family, the Nuttalliellidae, are a monospecific family composed of only one species, *Nuttalliella namaqua*, which is limited to certain areas in South Africa and Tanzania.

Ticks have four stages to their lifecycle: egg, larva, nymph, and adult. The most common life cycle for Ixodid ticks is the 3-host life cycle, which can take up to 2 years to complete. Argasid ticks have up to seven nymphal stages (instars), each one requiring a blood meal; adults can take multiple blood meals. 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. This technique works best for *Amblyomma americanum.*

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

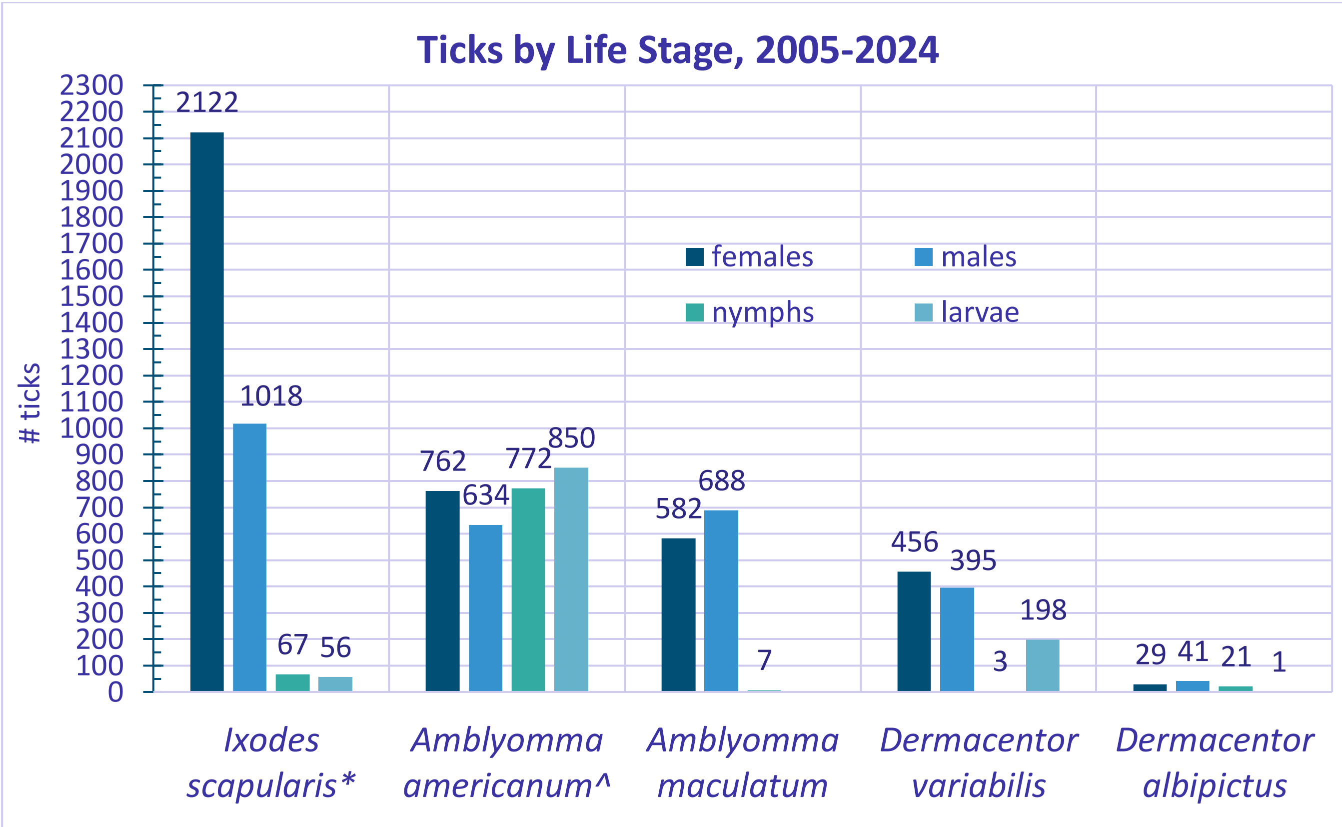
The density of host-seeking nymphal or female ticks varies spatially and temporally. To get a representative sample of the density of host-seeking nymphs or females, the sampling area should be at least 750 m of linear transects, or 50 transects of 15 m dragged with a cloth measuring 1 m wide. Distance 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.

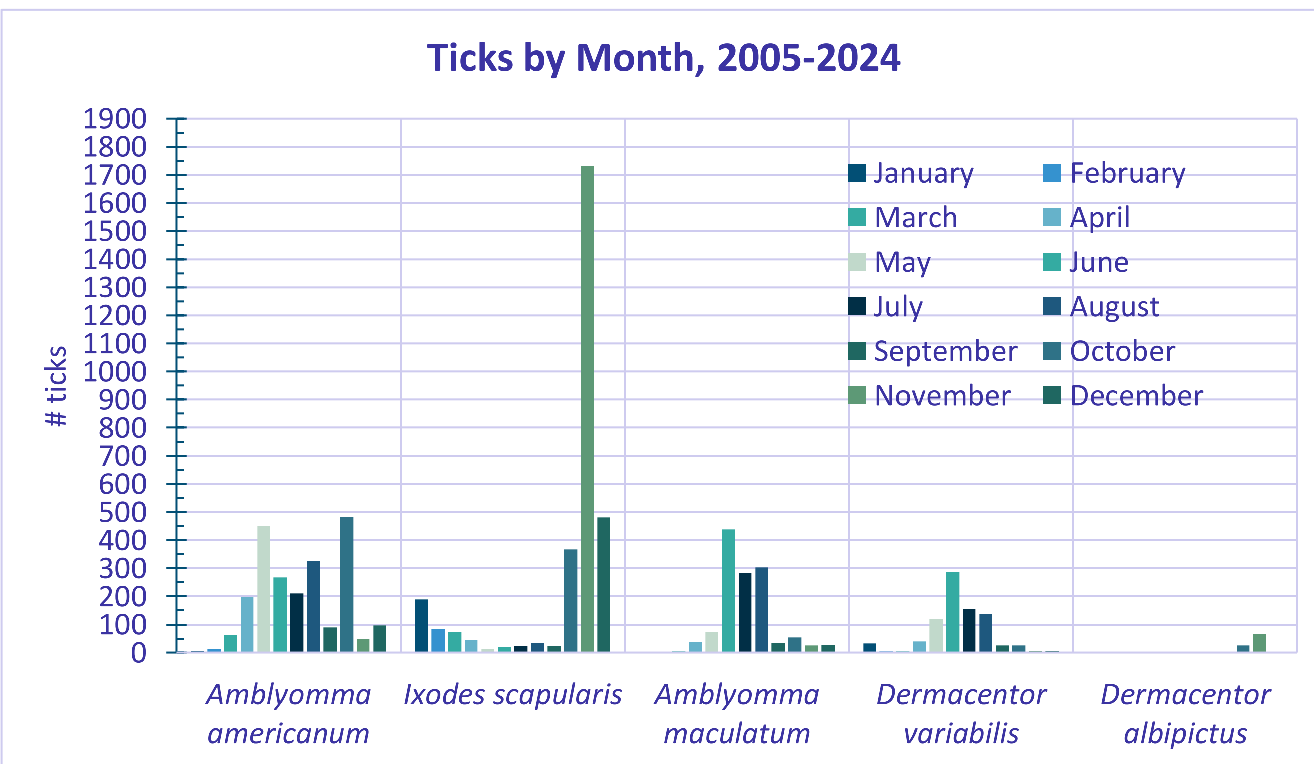
Ticks in Georgia

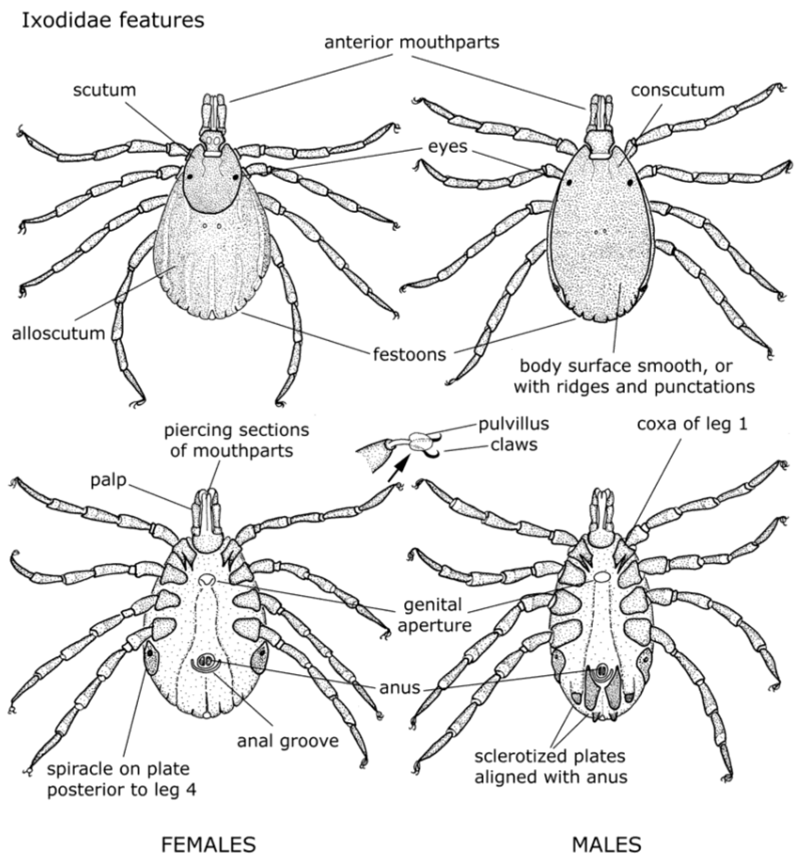
Tick Species Collected in Georgia 2005-2024

Identification	females	males	nymphs	larvae	TOTAL
Amblyomma americanum	762	634	772	4200	6368
Ixodes scapularis	2122	1018	67	2056	5263
Amblyomma maculatum	582	688	7		1277
Dermacentor variabilis	456	395	3	198	1052
Dermacentor albipictus	29	41	21	1	92
Rhipicephalus sanguineus	34	30	2		66
Ixodes affinis	28	20	1	4	53
Amblyomma spp.			22	7	29
Ixodes brunneus	5		4		9
Amblyomma hebraeum	1	4			5
Ixodes texanus			5		5
Rhipicephalus evertsi evertsi	1	3			4
Argas lahorensis			3		3
Amblyomma tuberculatum			2		2
Rhipicephalus rutilus	2				2
Amblyomma variegatum			1		1
Dermacentor spp.		1			1
Haemaphysalis leporispalustris			1		1
Haemaphysalis parva			1		1
Ixodes cookei	1				1
Ixodes minor	1				1
Rhipicephalus simus		1			1
Rhipicephalus spp.			1		1



* *Ixodes scapularis*	2012	2000 larval ticks found on one animal
^ *Amblyomma americanum*	2024	3350 larval ticks collected by flagging or dragging

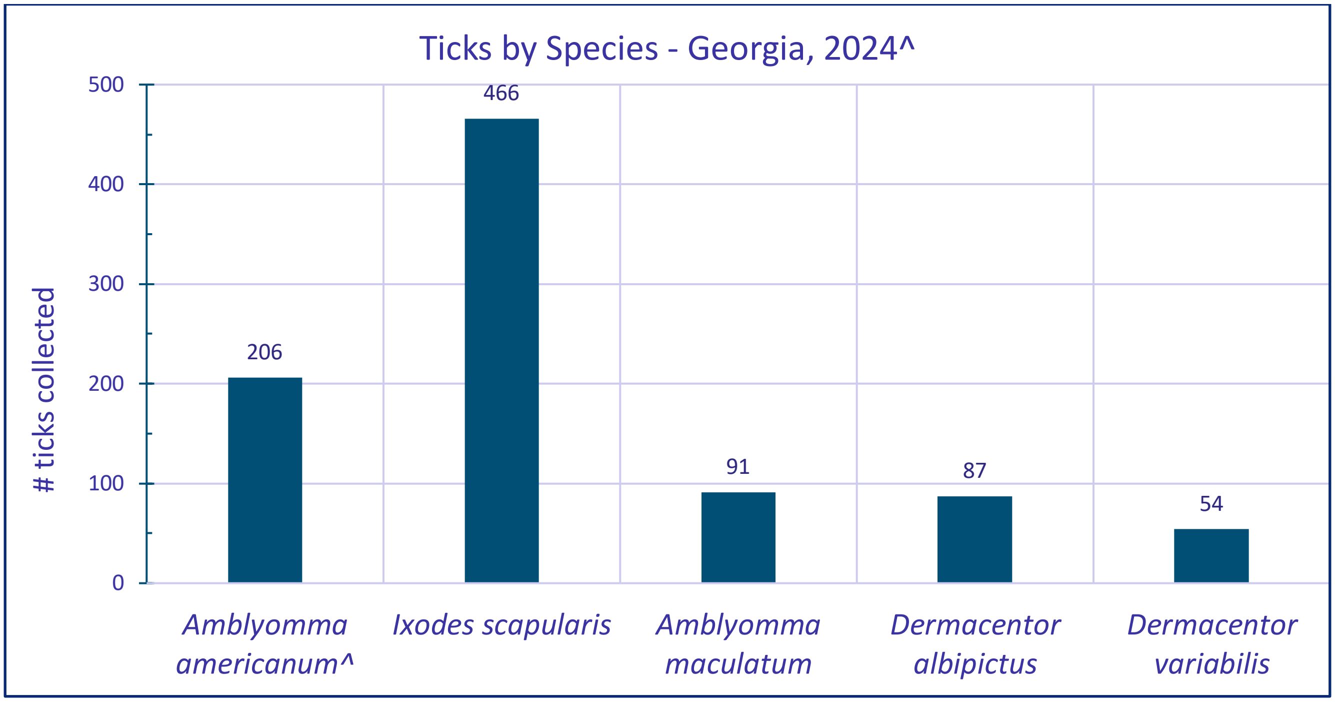


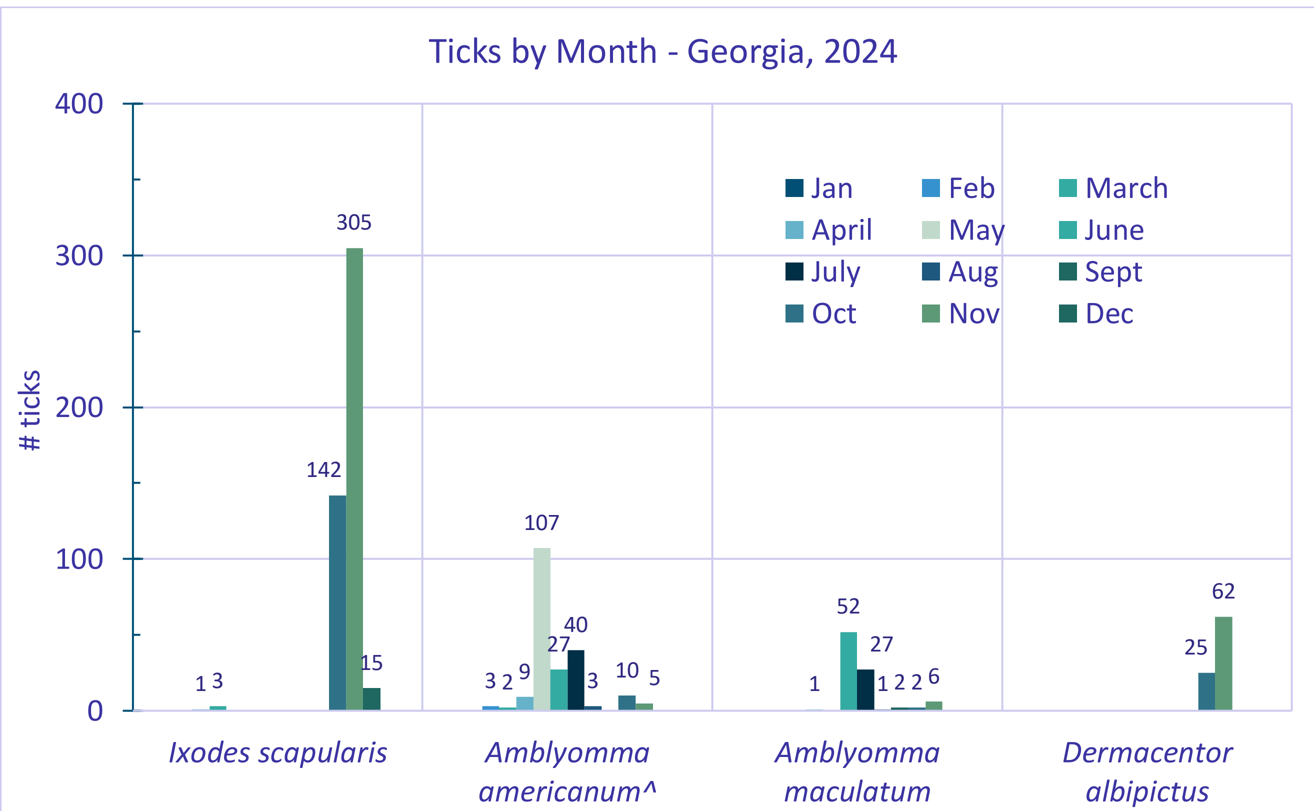


species	2005	2006	2008	2009	2010	2011	2012	2013	2014
Amblyomma americanum	451	90	184	56	596	278	117	117	37
Ixodes scapularis	362	4	50	1	56	204	2086	82	13
Dermacentor variabilis	113	23		4	64	248	103	103	62
Amblyomma maculatum	22	24	5	3	17	45	42	122	159
Rhipicephalus sanguineus	7				29	17			

species	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Amblyomma americanum	17	18	81	32	271	270	101	48	49	3556
Ixodes scapularis	97	111	75	67	170	507	316	354	258	466
Dermacentor variabilis	12	22	56	58	69	10	49	9	137	54
Amblyomma maculatum	110	149	74	54	90	29	7	61	30	91
Rhipicephalus sanguineus				2	1	10	4			
Dermacentor albipictus										87

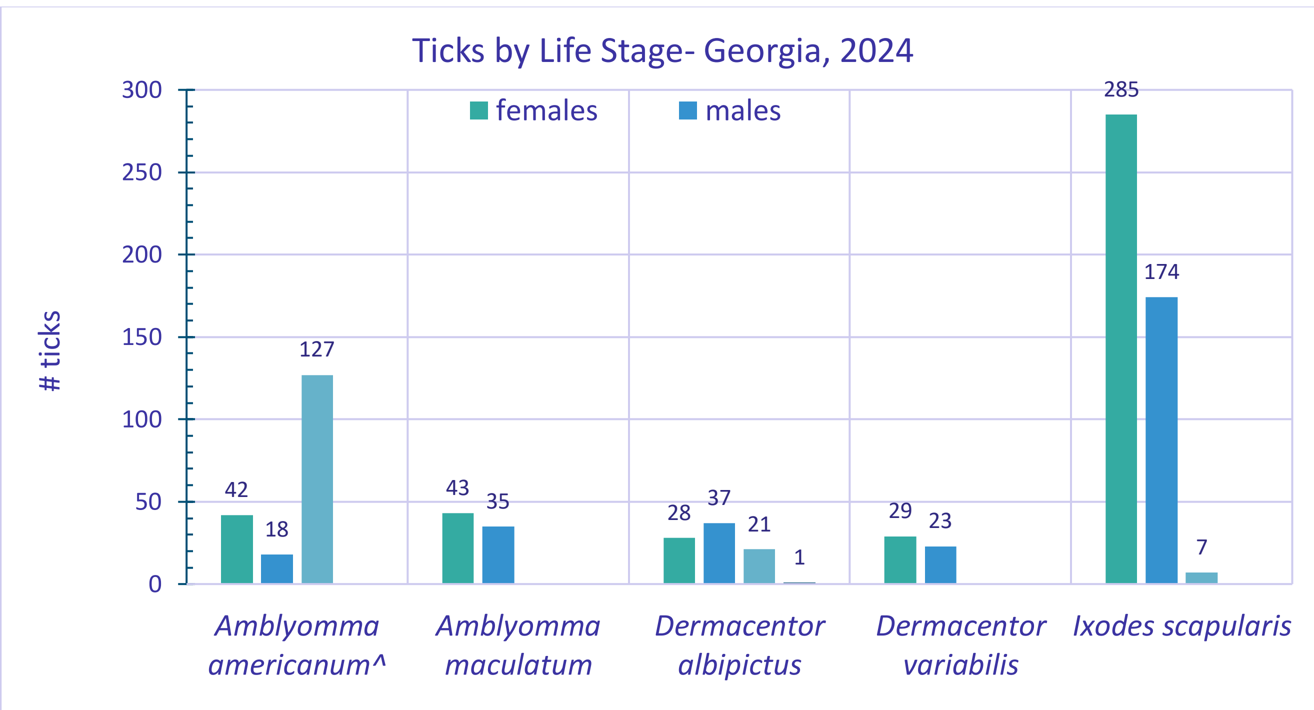
Ticks Collected in 2024





^ *Amblyomma americanum* 2024 3350 larval ticks collected by flagging or dragging in July

collection month	*Amblyomma americanum^*	*Amblyomma maculatum*	*Dermacentor albipictus*	*Dermacentor variabilis*	*Ixodes scapularis*
Jan					
Feb	3				1
March	2				3
April	9	1			
May	107			4	
June	27	52		41	
July	3390	27		9	
Aug	3	1			
Sept		2			
Oct	10	2	25		142
Nov	5	6	62		305
Dec					15



Life Stage	*Amblyomma americanum*	*Amblyomma maculatum*	*Dermacentor albipictus*	*Dermacentor variabilis*	*Ixodes scapularis*
adults	1	8		1	
females	42	43	28	29	285
males	18	35	37	23	174
nymphs	127		21		7
larvae	3350		1		

Tick Hosts, 2024

Host Animal	*Amblyomma americanum*	*Amblyomma maculatum*	*Dermacentor albipictus*	*Ixodes scapularis*	*Rhipicephalus rutilus*
Odocoileus virginianus	10	6	23	57	1
Grand Total	**97**				

Dermacentor variabilis vs *D albipictus*

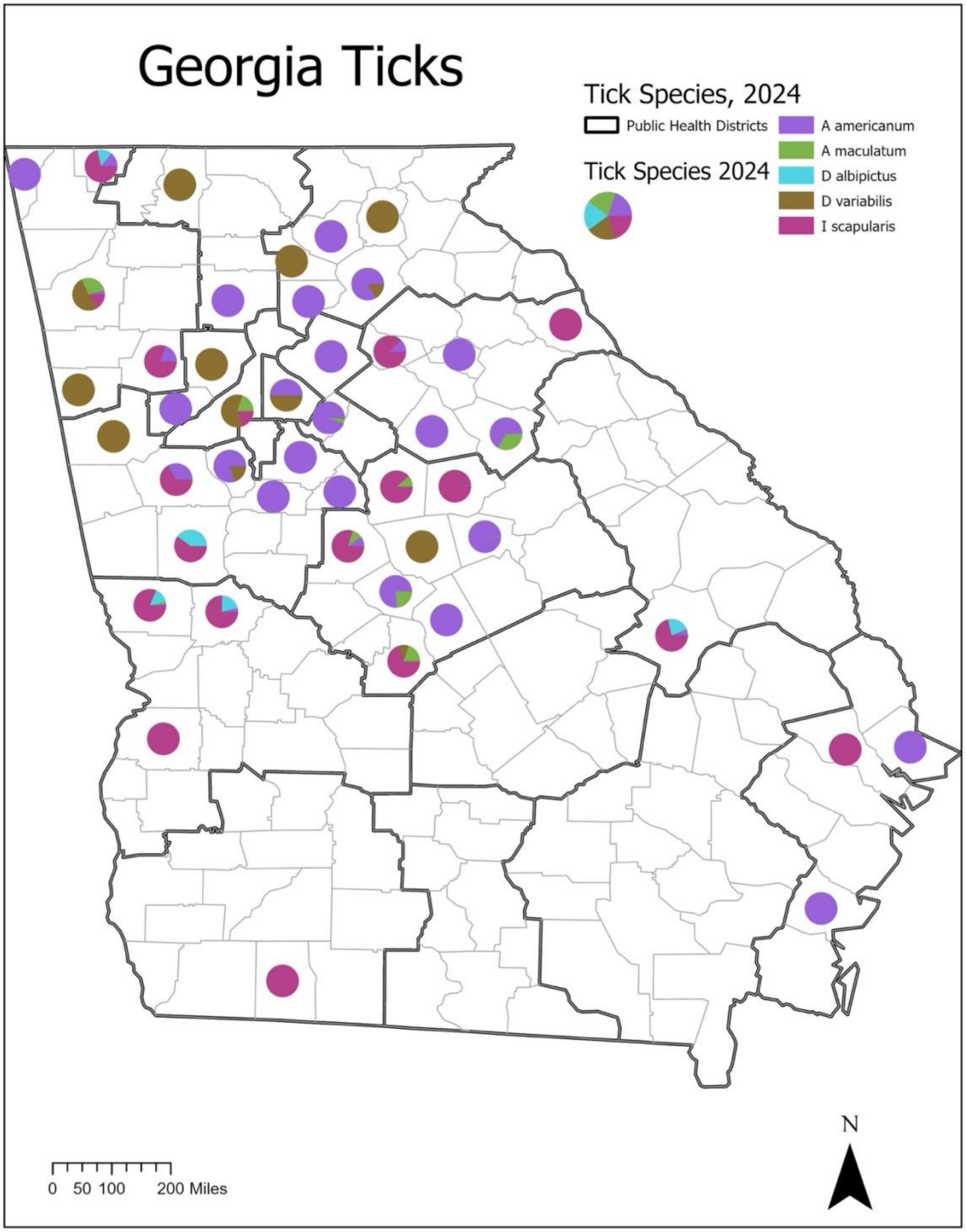
We collected a new tick species in 2024, from deer in 5 counties in Georgia. *Dermacentor albipictus*, the winter tick, is found primarily on moose, deer, and elk. It is well known from northern states where it causes death in moose. Deer and other ungulates seem to easily remove the ticks during grooming. Moose, however, are not as successful at tick grooming and can become host to over 100,000 winter ticks. Heavy infestations on an individual can result in severe anemia, skin irritation, hair loss, and distraction from feeding. The total effect from heavy infestations can ultimately result in death of the individual.

Dermacentor albipictus and *D variabilis* can be distinguished morphologically. Adult *D albipictus* lack a dorsal prolongation on their spiracular plates and have fewer but larger goblets within the spiracular plates than *D variabilis*. *Dermacentor albipictus* may incidentally be found feeding on people, however it is not known to transmit agents that may cause disease in people.

Dermacentor variabilis

Dermacentor albipictus

Location of Ticks Collected in 2024



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.

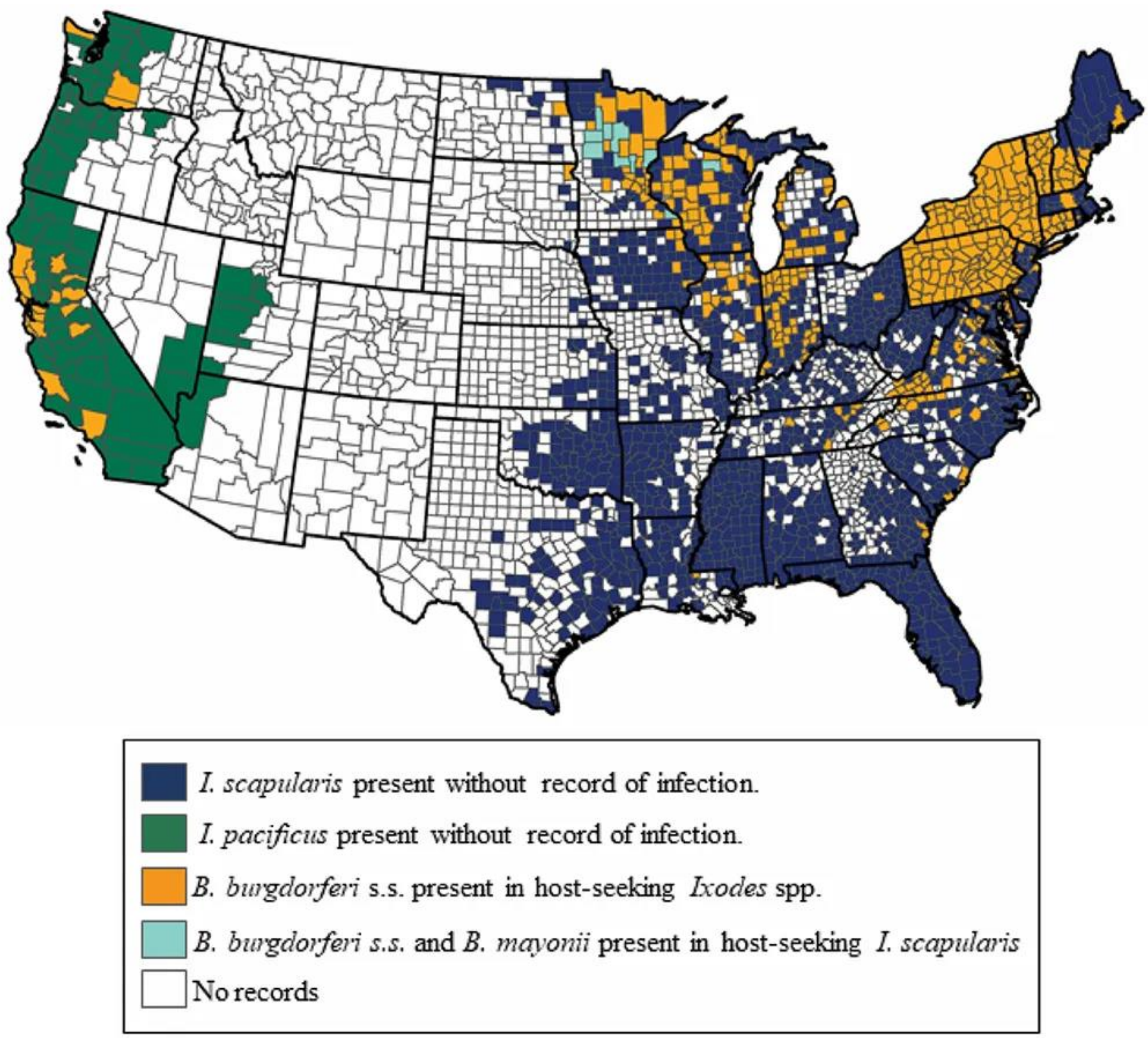
Ehrlichiosis is the general name used to describe diseases caused by the bacteria *Ehrlichia chaffeensis*, *E. ewingii*, or *E. muris eauclairensis* in the United States. These bacteria are spread to people primarily through the bite of infected ticks including the lone star tick (*Amblyomma americanum*) 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.



DISEASE, 2024	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	Grand Total
ANAPLASMOSIS	1								1
EHRLICHIOSIS				1	2	2			5
LYME	1		2	1	3	1	1	3	12
RMSF		3		1	6	4	3		17
Grand Total	2	3	2	3	11	7	4	3	35

Emerging Tickborne Diseases

Summary of Tickborne Viral Diseases

Virus	Tick vector	Geographic range	Common clinical features	Diagnostic tests for acute phase samples
Powassan	*Ixodes species*	Upper Midwest and Northeast	Neuroinvasive disease	IgM, PRNT
Colorado tick fever	*Dermacentor andersoni*	Western mountain areas	Biphasic fever	RT-PCR
Heartland	*Amblyomma americanum*	Midwest and Southern	Leukopenia, thrombocytopenia	RT-PCR, IgM, PRNT
Bourbon	*Amblyomma americanum* (suspected)	Midwest and Southern	Leukopenai, thrombocytopenia	RT-PCR, PRNT

Pathogens transmitted by ticks are responsible for the majority of the vector-borne diseases in temperate North America, Europe and Asia. In the USA, ticks are responsible for over 95 % of vector-borne disease cases [1]. Lyme disease is, by far, the most prevalent tick-borne disease in the northern hemisphere. According to two studies, approximately 300 000 cases of Lyme disease are diagnosed annually in the USA alone, about 10-fold higher than the number of reported cases [2, 3]. Based on these estimates, Lyme disease may be among the most common infectious diseases in the USA. Additionally, around 10 000 cases of other tick-borne diseases are reported annually [1], although the actual number of cases is probably significantly higher [4, 5].

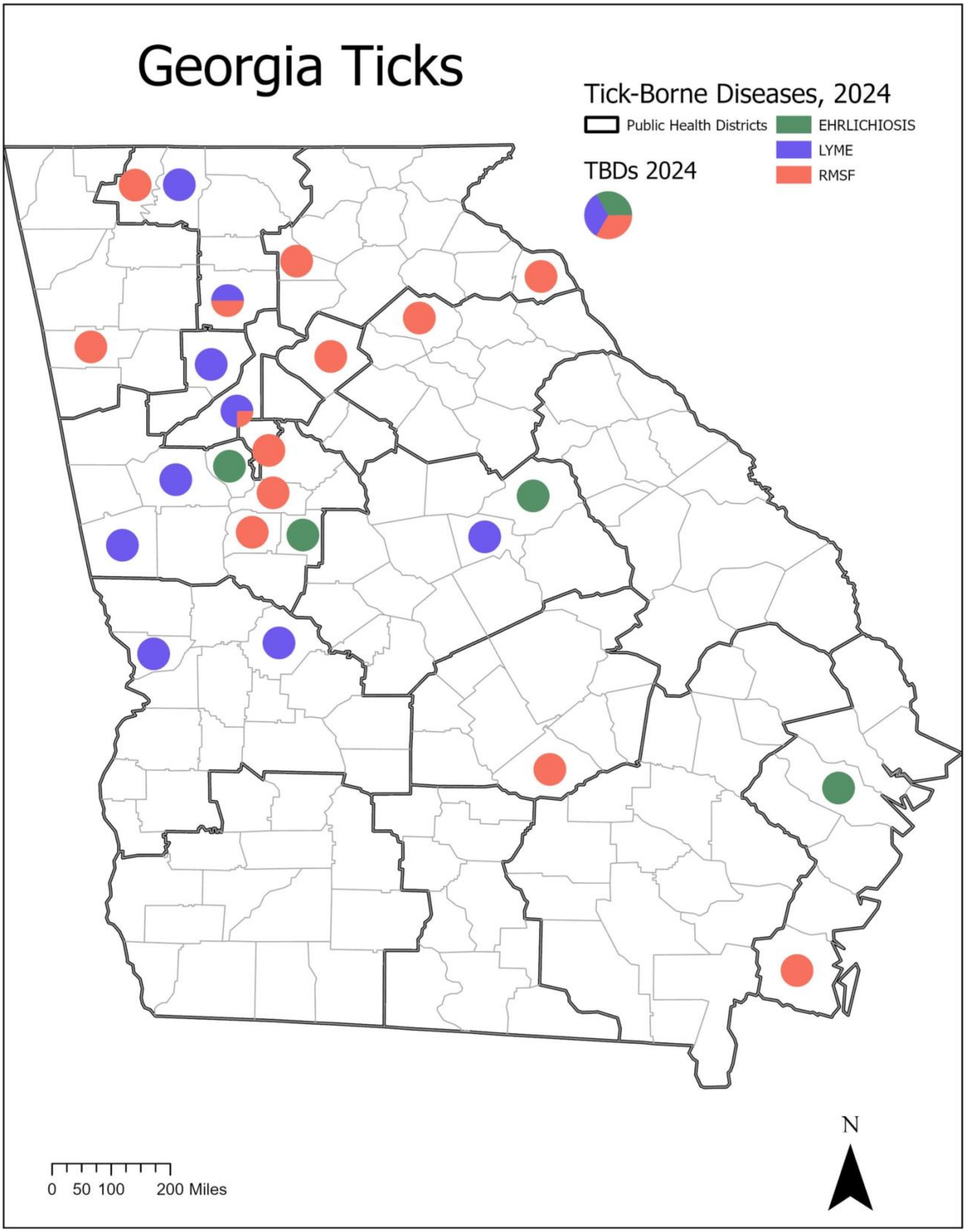
The economic impact of tick-borne diseases is significant and increases every year. In the USA, the reported cost per patient diagnosed with Lyme disease totaled USD $8172 in 2002 [6], equal to USD $11 838 in 2019 (CPI inflation calculator, https://data.bls.gov/cgi-bin/cpicalc.pl). A conservative approximation based on 42 743 cases reported to the Centers for Disease Control and Prevention (CDC) in 2017 would result in a cost estimate of over USD $500 million annually. These costs might be even higher for patients with post-treatment Lyme disease syndrome [7]. The societal burden of Lyme disease can be very considerable, with one-quarter of the patients receiving public support or disability benefits [8]. Additional economic costs that are substantial, but difficult to quantify, are imposed on the hospitality and tourism industry in the endemic areas [9]. Public health burdens due to Lyme disease are not unique to the USA. A recent comprehensive review found Lyme disease-associated expenditures of tens of millions of euros in several European countries [10]. The combined public health impact of all tick-borne diseases remains mostly unquantified.

https://pmc.ncbi.nlm.nih.gov/articles/PMC7451033/

Ticks, pathogens, disease, and distributions in the U.S. and Canada[2]

SCIENTIFIC NAME	COMMON NAME	TICK-BORNE PATHOGENS	TICK-BORNE DISEASE CONCERNS	TICK DISTRIBUTION
Ixodes scapularis	Deer or Eastern blacklegged	*Borrelia burgdorferi, Anaplasma phagocytophilum, Ehrlichia muris*-like agent	Lyme disease, anaplasmosis, tick paralysis**	Atlantic coast to plains of U.S. and Canada
Ixodes pacificU.S.	Deer or Western blacklegged	*Borrelia burgdorferi, Anaplasma phagocytophilum*	Lyme disease, anaplasmosis	Pacific coast region of U.S. and Canada
Dermacentor variabilis	American dog	*Rickettsia rickettsia, Francisella tularensis, Ehrlichia canis, Cytauxzoon felis*	Rocky Mountain spotted fever (RMSF), ehrlichiosis, tularemia, cytauxzoonosis,* tick paralysis**	Atlantic coast to plains of U.S. and Canada Pacific coast of U.S. and Canada
Dermacentor andersoni	Rocky Mountain wood	*Rickettsia rickettsia, Francisella tularensis*	RMSF, tularemia, tick paralysis**	Pacific coast region of U.S. and Canada
Amblyomma americanum***	Lone Star tick	*Ehrlichia chaffeensis, Ehrlichia ewingii, Rickettsia rickettsia, Francisella tularensis, Cytauxzoon felis*	RMSF, tularemia, ehrlichiosis, cytauxzoonosis*	U.S. states include: TX to FL NY, NJ, and Maine, west to MI, KS, OK
Amblyomma maculatum***	Gulf Coast tick	*Hepatozoon americanum*	Canine hepatozoonosis, tick paralysis**	U.S. states and regions include: Gulf Coast and north to OK, KS, AR, MD and DE
RhipicephalU.S. sanguineU.S.***	Brown dog	*Rickettsia rickettsia, Ehrlichia canis, Babesia canis, Babesia gibsoni, Anaplasma platys,*	RMSF, ehrlichiosis, babesiosis, anaplasmosis,	U.S. and Hawaii
Haemaphysalis longicornis***	Cattle, brU.S.h, or Scrub	*Babesia gibsoni, Anaplasma phagocytophilum*	Babesiosis, anaplasmosis	Scattered regions of the U.S.*

*Feline specific disease concern
** Tick paralysis is associated with tick bite and saliva
***Considered adventitial (i.e. not established) in Canada at the time of writing

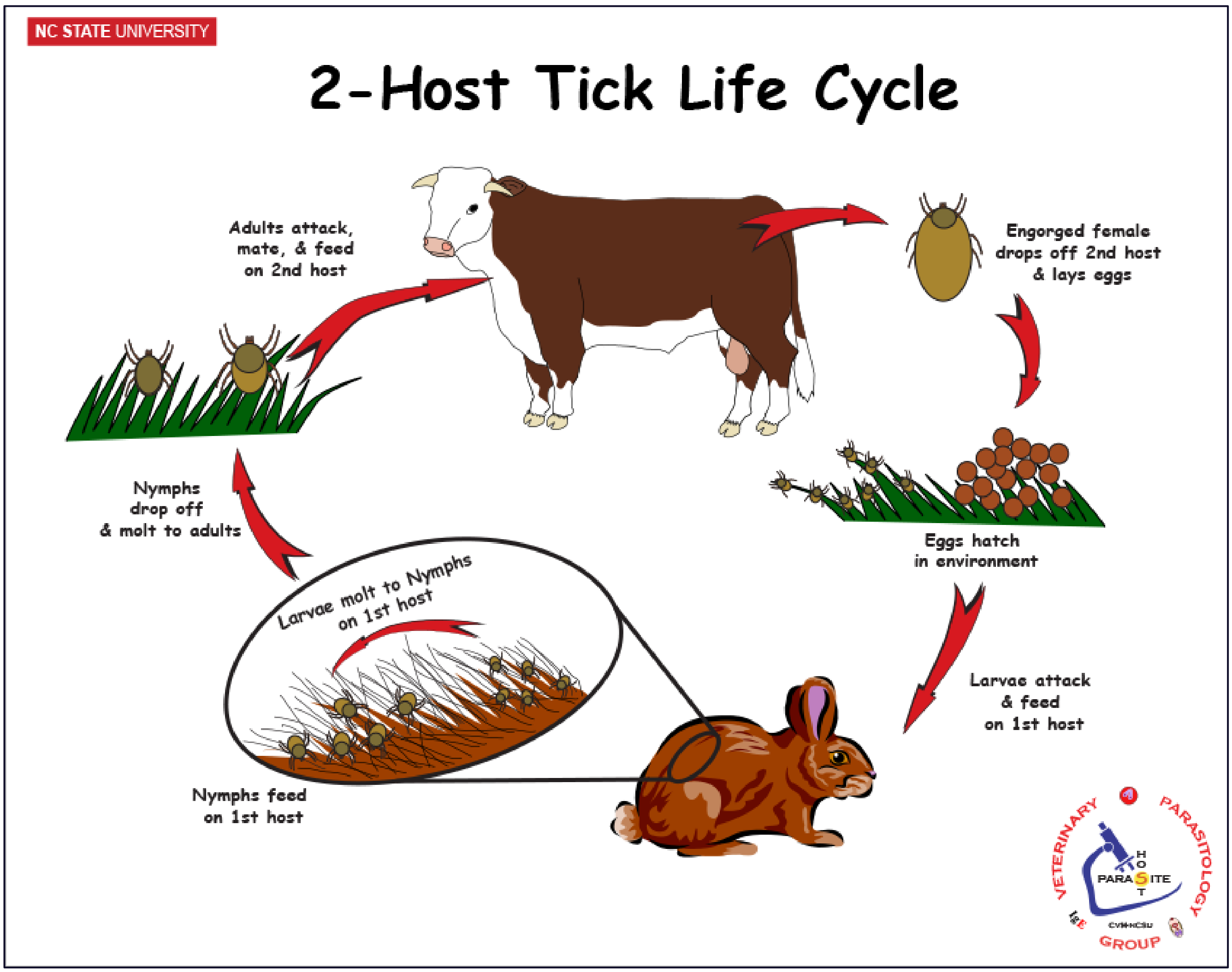


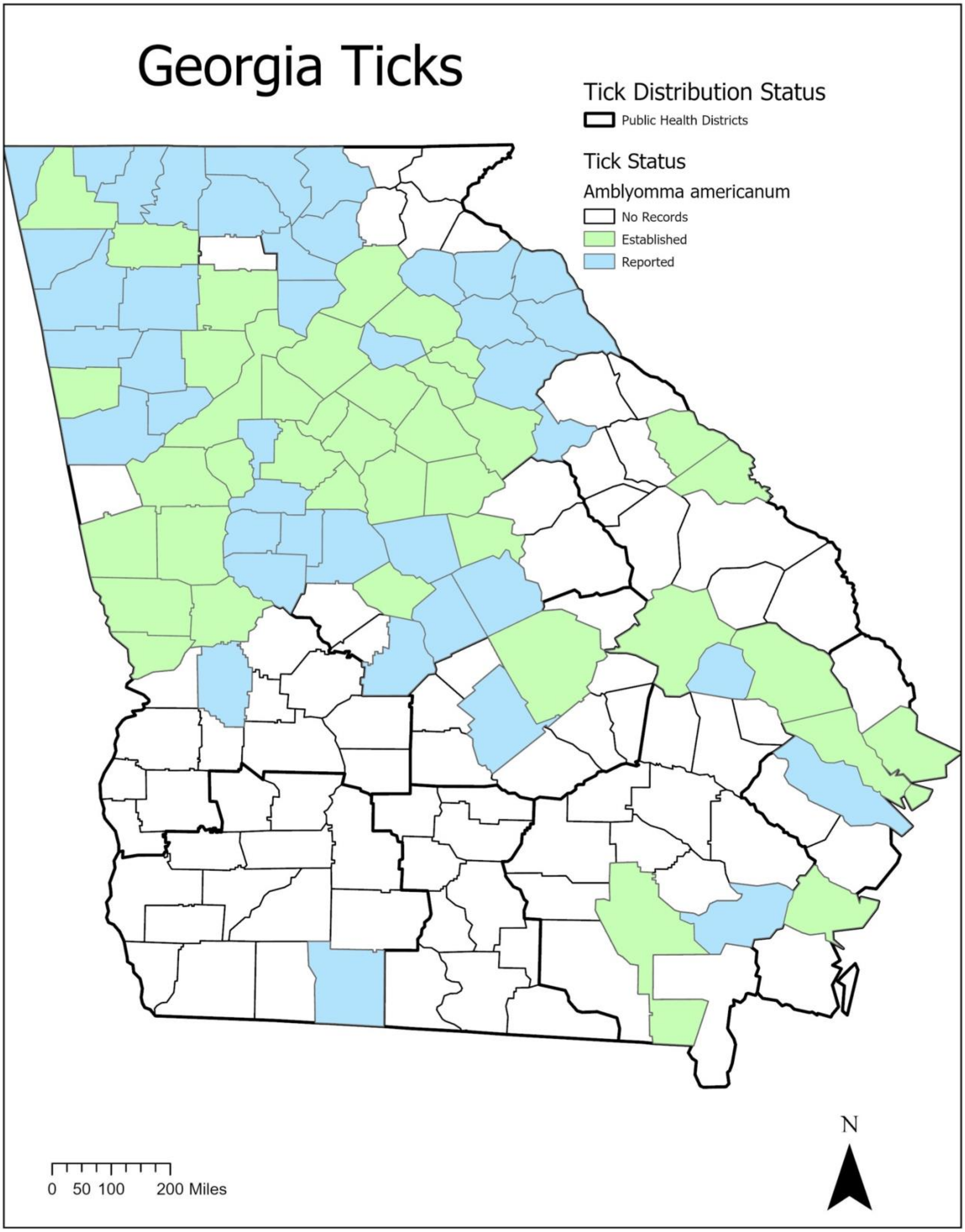
Georgia Ticks
Tick-Borne Diseases, 2024
Public Health Districts
EHRLICHIOSIS
LYME
RMSF
TBDs 2024
N
0 50 100 200 Miles

Tick Distribution Status, 2005-2023

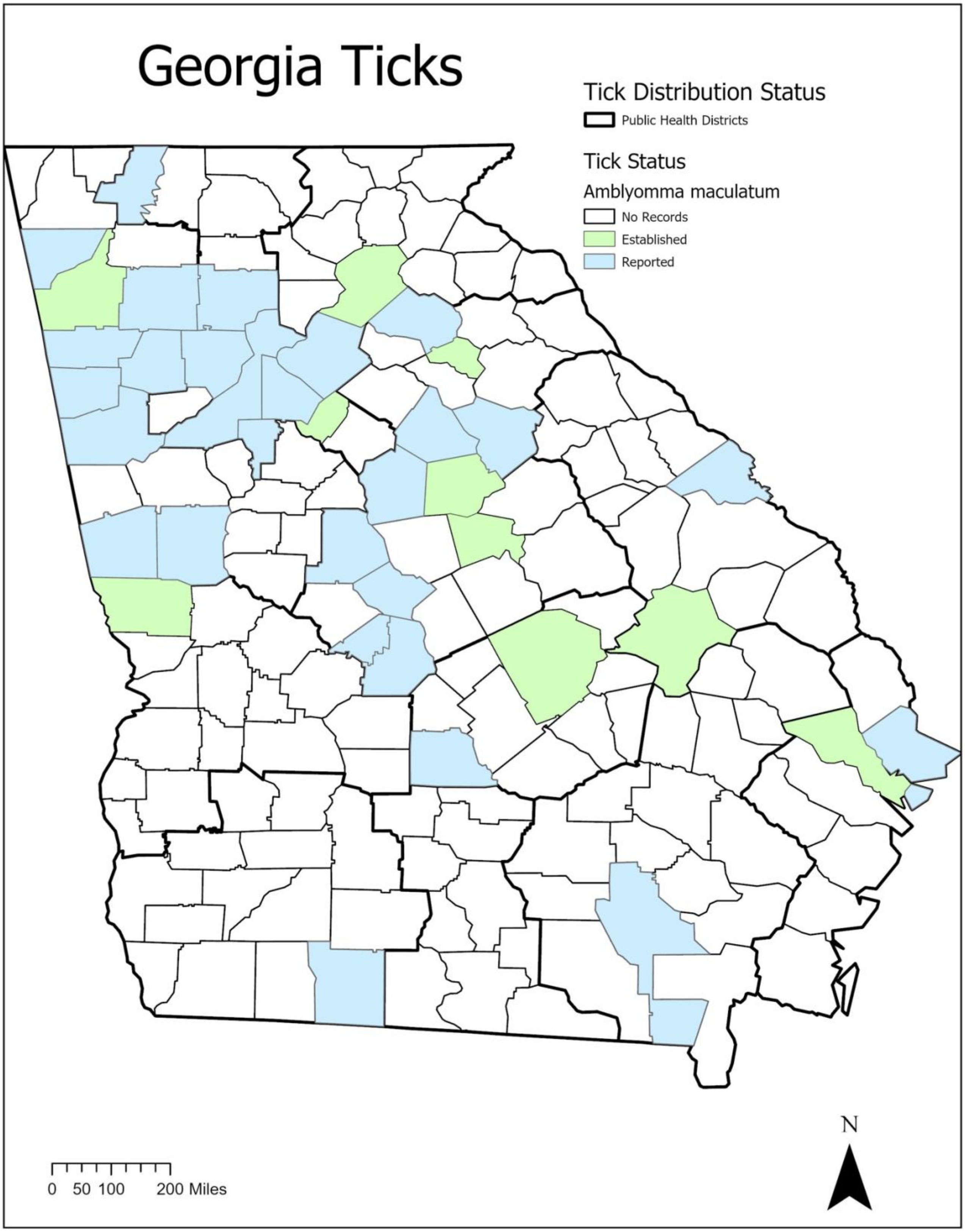
Tick surveillance is intended to monitor changes in the distribution and abundance of ticks and to assess the presence and prevalence of tickborne pathogens to provide actionable, evidence-based information on infection risk to clinicians, the public, and policy makers (https://www.cdc.gov/ticks/index.html).

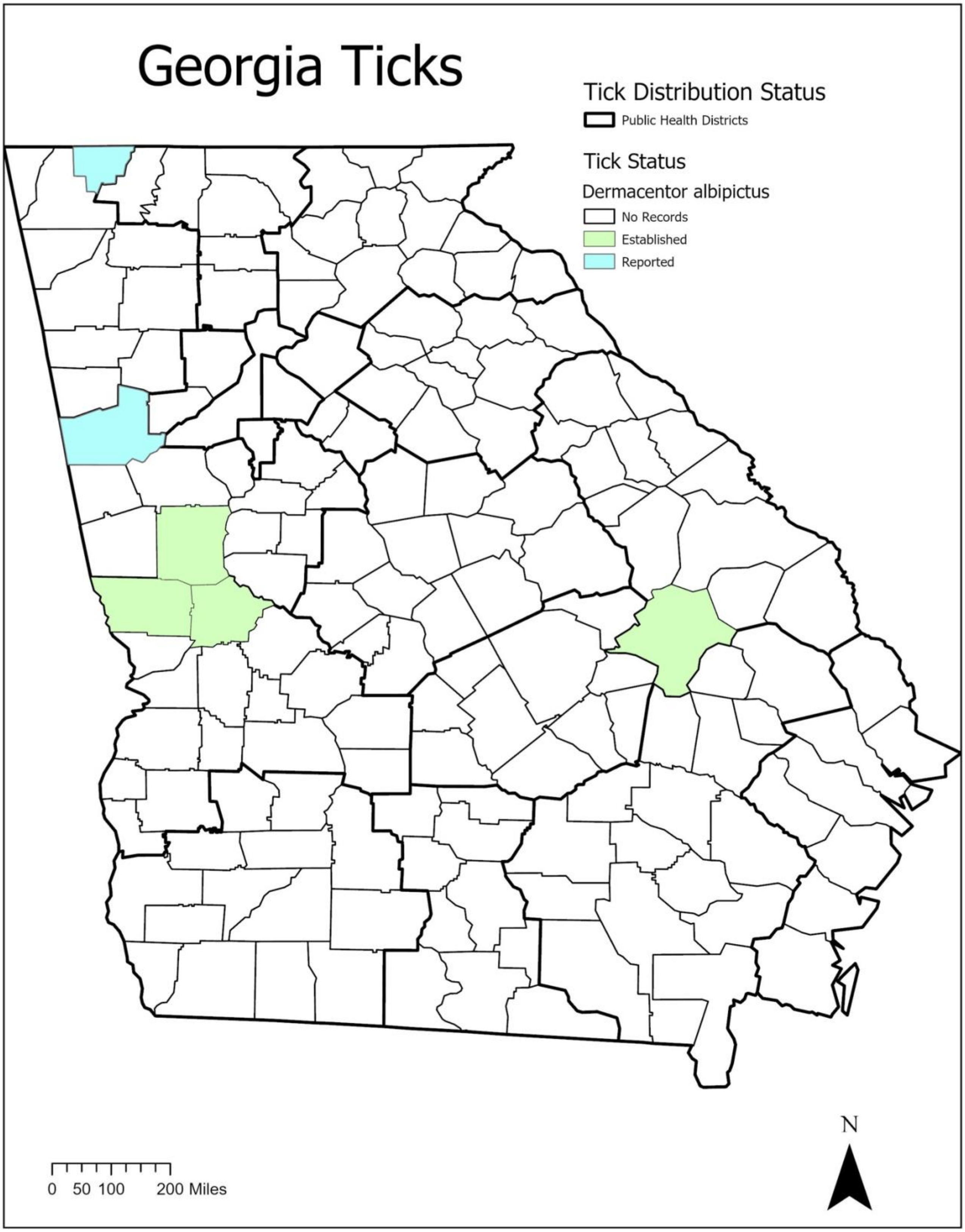
- Counties classified as "established" are those where six or more ticks of a single life stage or more than one life stage of the tick were collected in the county within a 12-month period.
- Counties classified as "reported" are those where less than six ticks of a single life stage were collected 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.

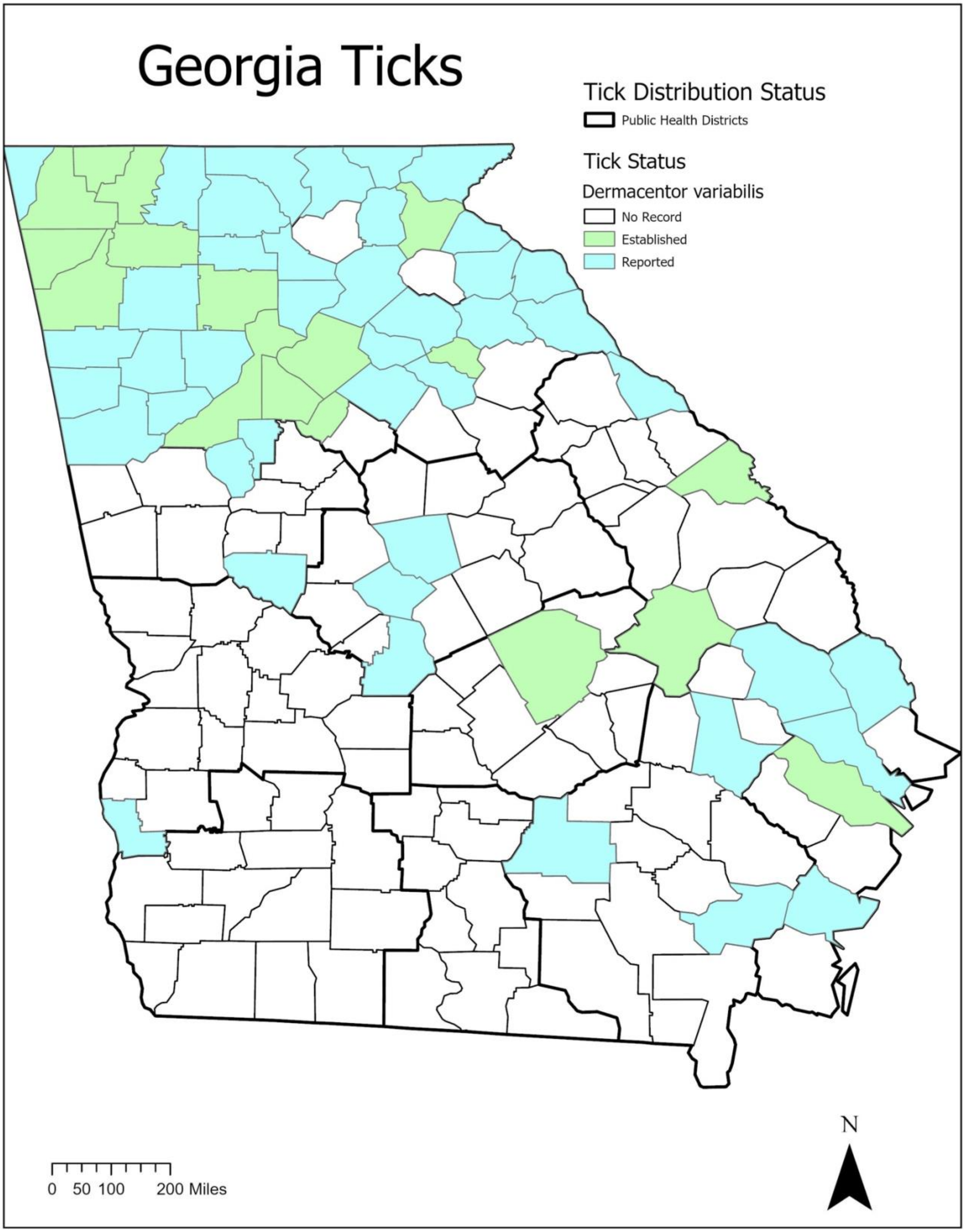




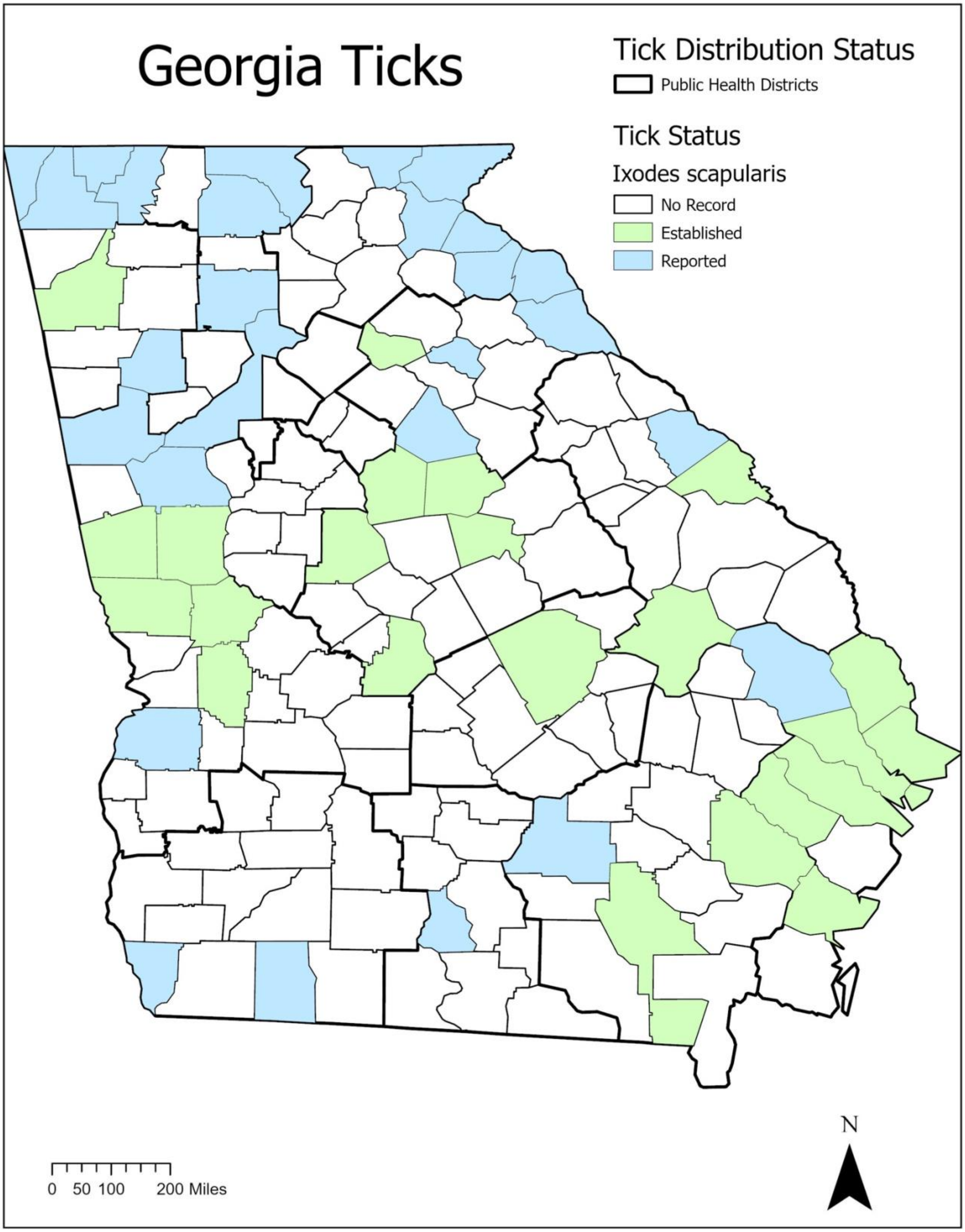
Georgia Ticks
Tick Distribution Status
Public Health Districts
Tick Status
Amblyomma americanum
No Records
Established
Reported
0 50 100 200 Miles
N

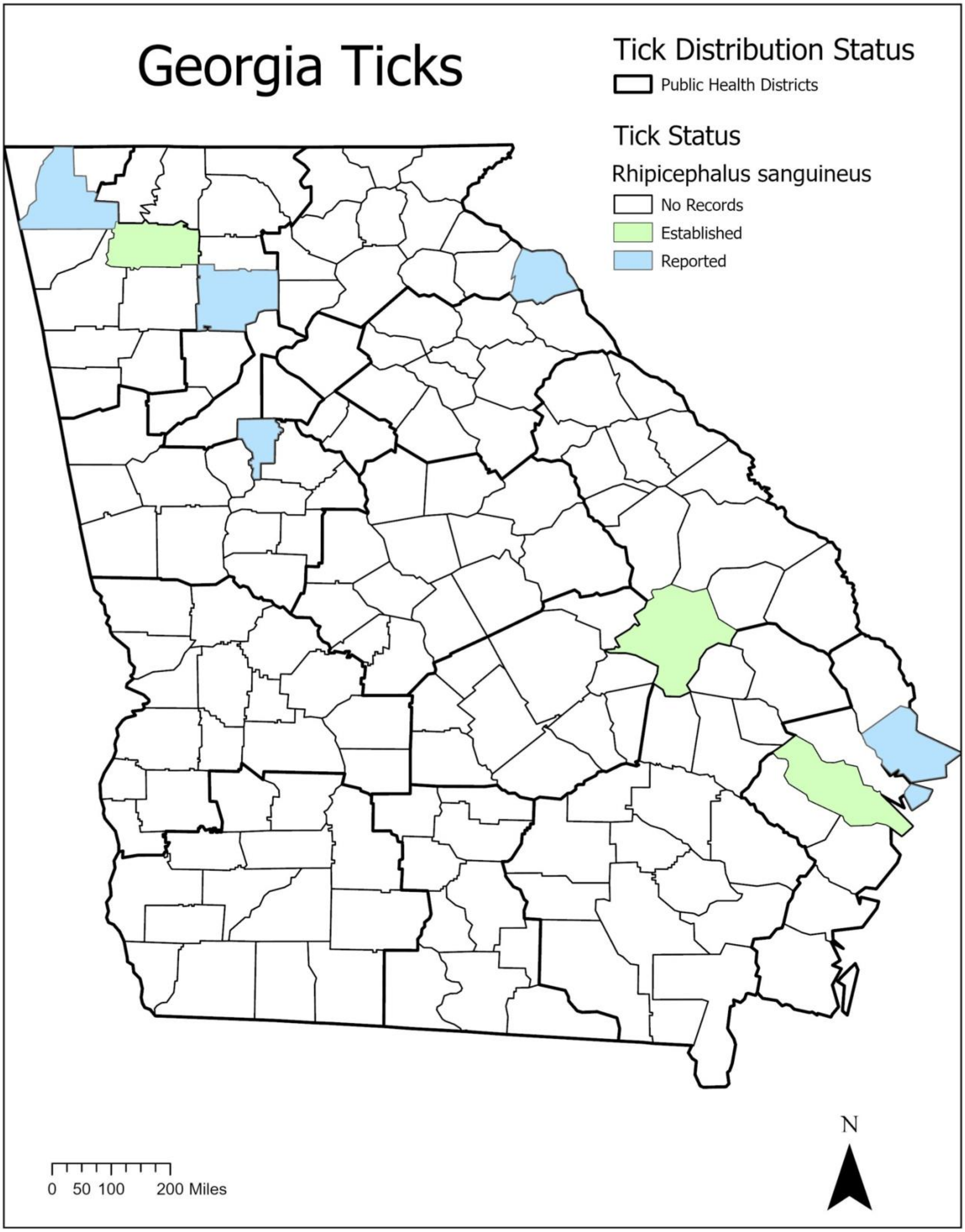

Georgia Ticks
Tick Distribution Status
Public Health Districts
Tick Status
Amblyomma maculatum
No Records
Established
Reported
N
0 50 100 200 Miles


Georgia Ticks
Tick Distribution Status
Public Health Districts
Tick Status
Dermacentor albipictus
No Records
Established
Reported
N
0 50 100 200 Miles

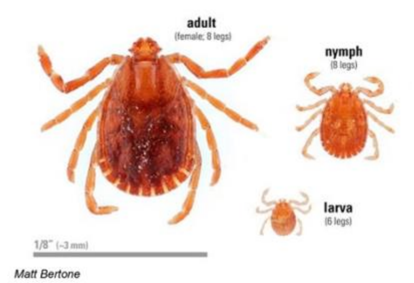


Georgia Ticks
Tick Distribution Status
Public Health Districts
Tick Status
Dermacentor variabilis
No Record
Established
Reported
0 50 100 200 Miles
N

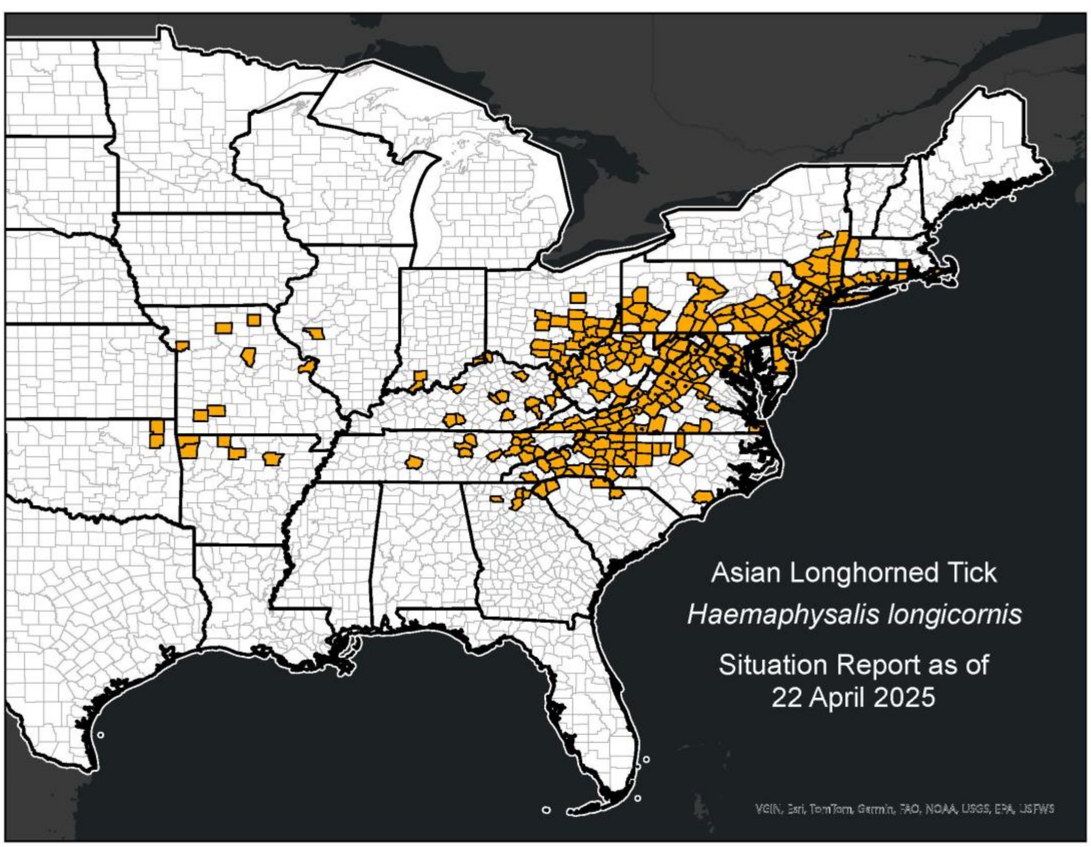

Georgia Ticks
Tick Distribution Status
Public Health Districts
Tick Status
Ixodes scapularis
No Record
Established
Reported
0 50 100 200 Miles
N


Georgia Ticks
Tick Distribution Status
Public Health Districts
Tick Status
Rhipicephalus sanguineus
No Records
Established
Reported
N
0 50 100 200 Miles

Asian Longhorned Tick



The Asian longhorned tick (*Haemaphysalis longicornis*) is an invasive species that was first confirmed in the US in New Jersey in 2013, with subsequent confirmations in 2017. Since these initial finds, *H longicornis* has spread to multiple other states. It is native to East Asia, including the nations of China, Japan, and Korea. This tick species reproduces through parthenogenesis, where the female can produce offspring on her own. This can result in thousands of ticks being found on animals. The Asian longhorned tick is considered a competent vector for the cattle disease Theileria, more specifically *Theileria orientalis* Ikeda. Theileria is a protozoon that can infect red and white blood cells in pregnant heifers and calves. The symptoms include anemia, jaundice, weakness, and increased abortions. Theileria is often mistaken for anaplasmosis. Mortality rates from Theileria can vary wildly from herd to herd, but infected individuals that survive can suffer relapses and become lifelong carriers of the pathogen. So far, the Asian longhorned tick has been confirmed on 25 different animal hosts, including but not limited to turkeys, squirrels, rabbits, raccoons, elk, deer, and bear. Domesticated animals such as cattle, sheep, and horses are also frequent hosts. There have been confirmed bites on humans, but the CDC indicates that there is less attraction to humans than to other animals. The global distributional potential of *H longicornis* is increasing daily due to several factors such as climate change, global livestock trades, birds' migration, and urbanization. Migratory birds are important hosts of *H longicornis* and are thought to be responsible for its unexpected invasion and introduction into new areas worldwide.



Georgia counties that have confirmed presence of the Asian Longhorned Tick

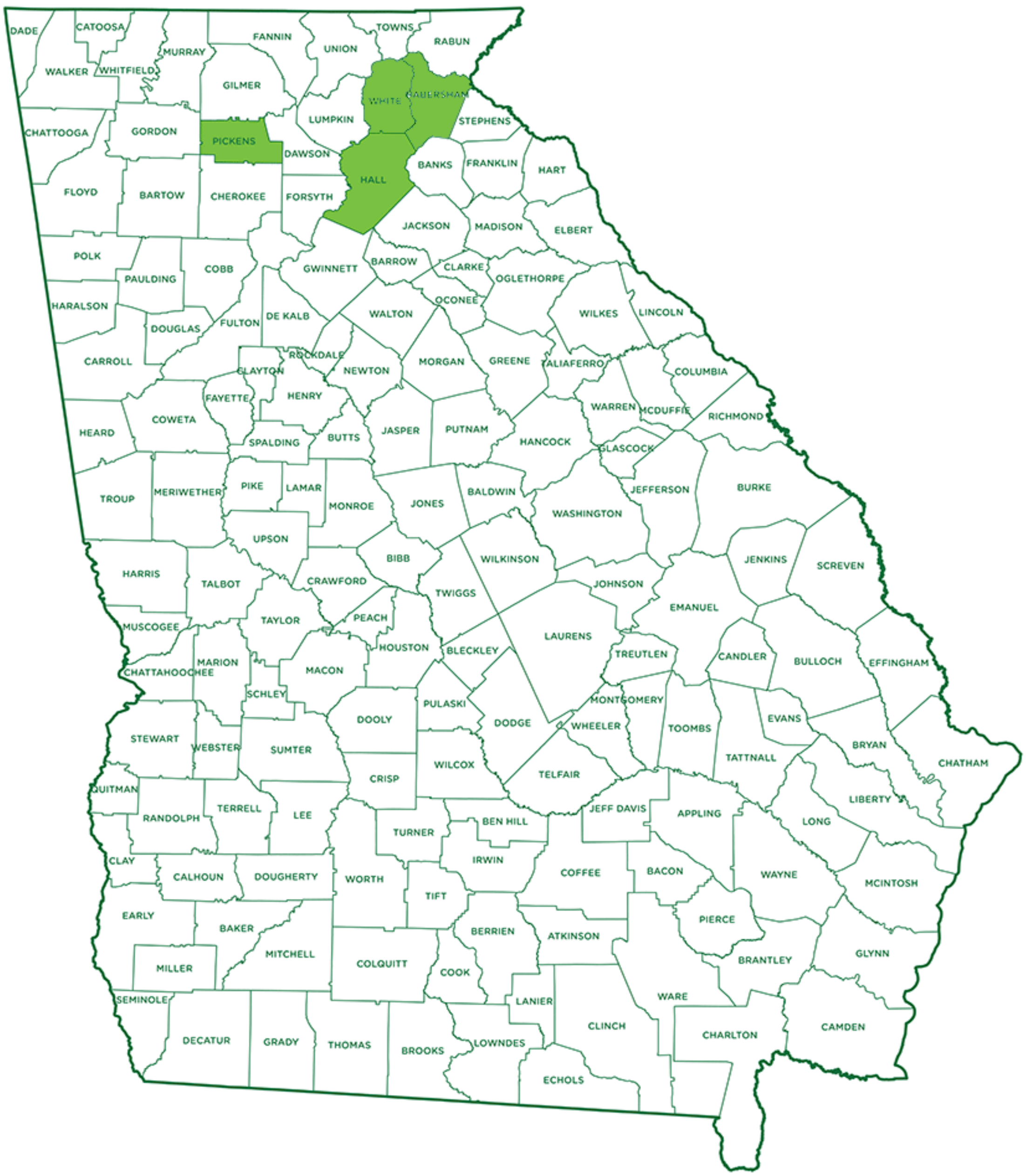
<u>COUNTY (# found) – date found</u>

Pickens (3) - 2021

Hall (2) - 2022

White (3) - 2022

Habersham (1) - 2023



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

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

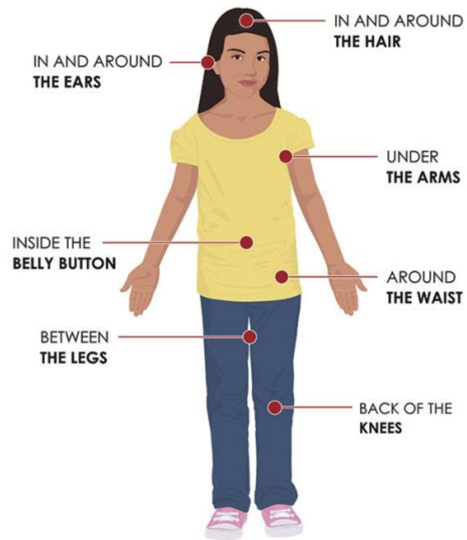
Check your clothing for ticks. Ticks may be carried into the house on clothing. Any ticks that are found should be removed. Tumble dry clothes in a dryer on high heat for 10 minutes to kill ticks on dry clothing after you come indoors. If the clothes are damp, additional time may be needed. If the clothes 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/

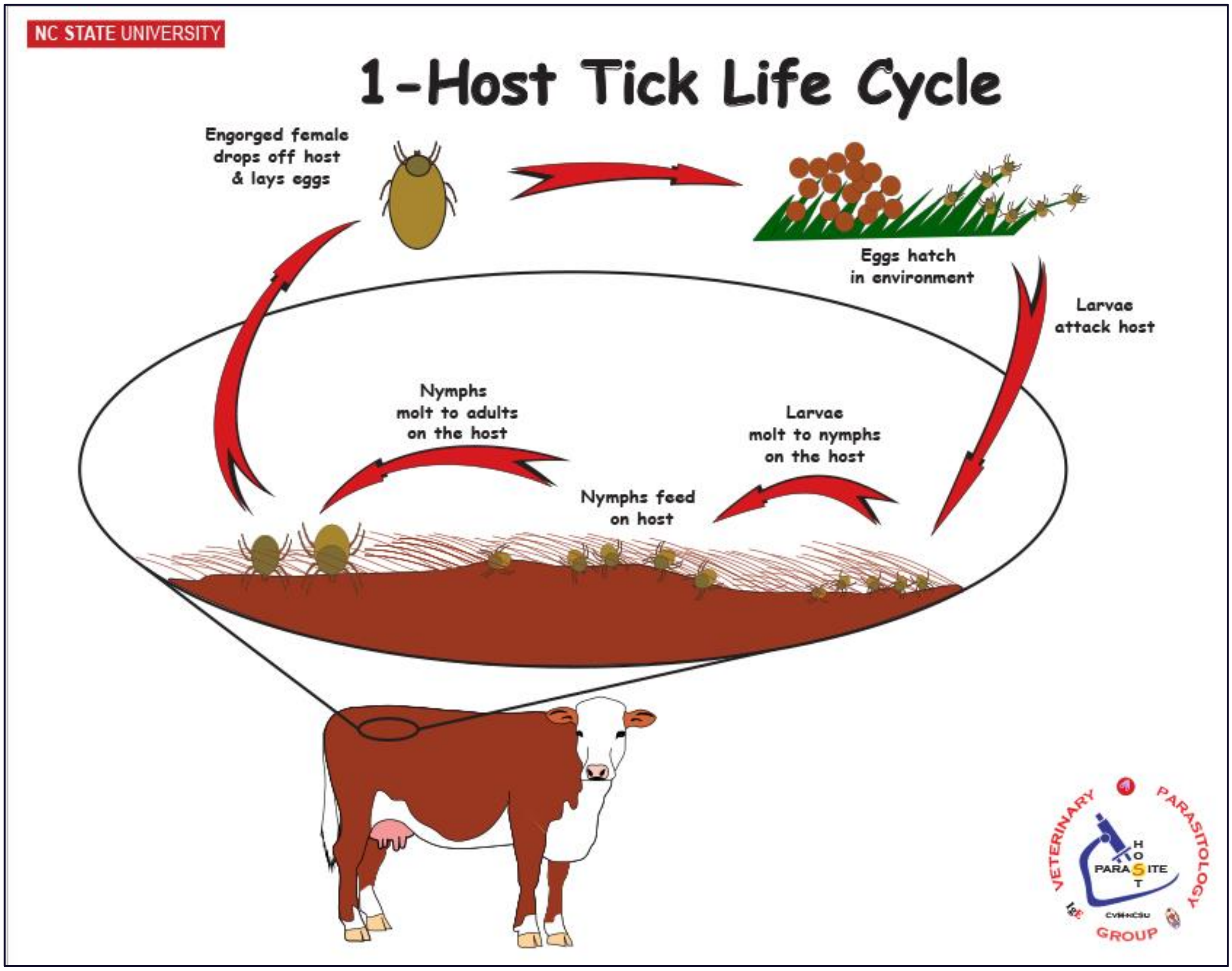
https://www.cdc.gov/mmwr/preview/mmwrhtml/00040975.htm

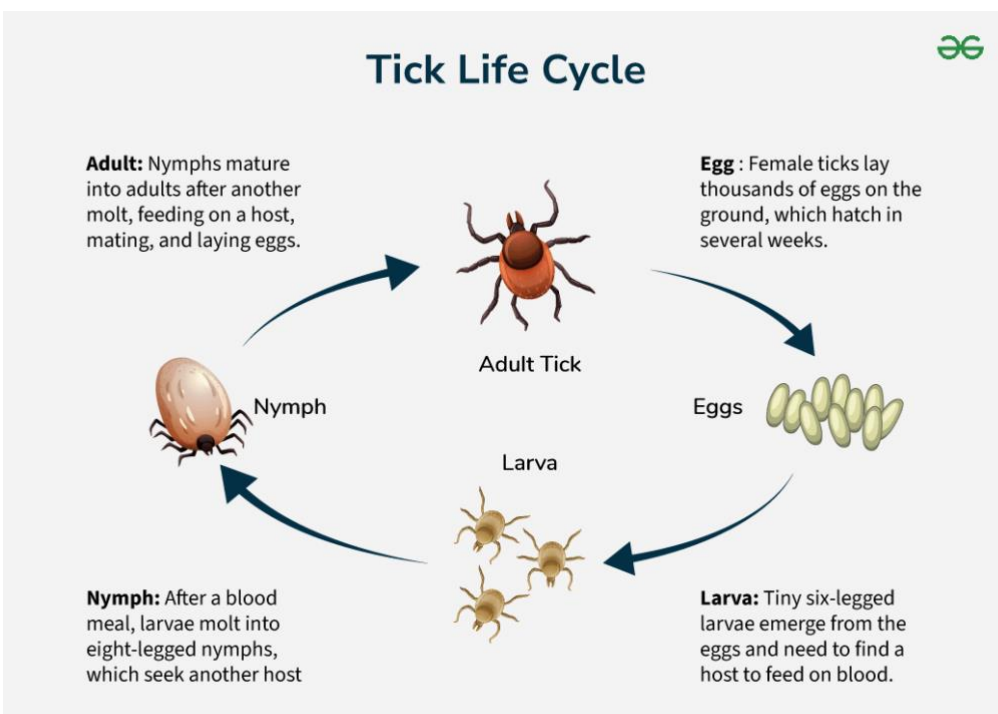
https://scwds.shinyapps.io/haemaphysalis/

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


NC STATE UNIVERSITY
1-Host Tick Life Cycle
Engorged female drops off host & lays eggs
Eggs hatch in environment
Larvae attack host
Larvae molt to nymphs on the host
Nymphs feed on host
Nymphs molt to adults on the host
VETERINARY PARASITOLOGY GROUP


Tick Life Cycle
Adult: Nymphs mature into adults after another molt, feeding on a host, mating, and laying eggs.
Egg : Female ticks lay thousands of eggs on the ground, which hatch in several weeks.
Adult Tick
Nymph
Eggs
Larva
Nymph: After a blood meal, larvae molt into eight-legged nymphs, which seek another host
Larva: Tiny six-legged larvae emerge from the eggs and need to find a host to feed on blood.

Carl Vinson Institute of Government
University of Georgia

District Map