



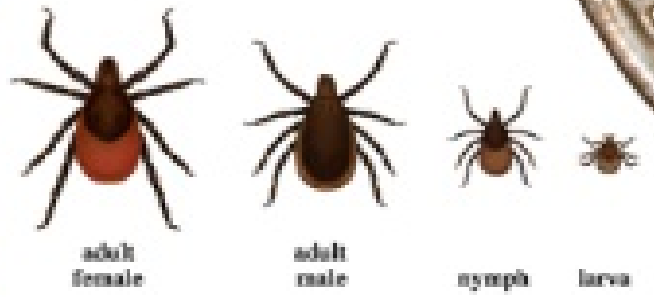
Tick-borne Illnesses of Alabama: Relationships among Hosts, Habitats, and Ticks throughout the State

Emily Merritt, Dr. Graeme Lockaby, and Dr. Derrick Mathias

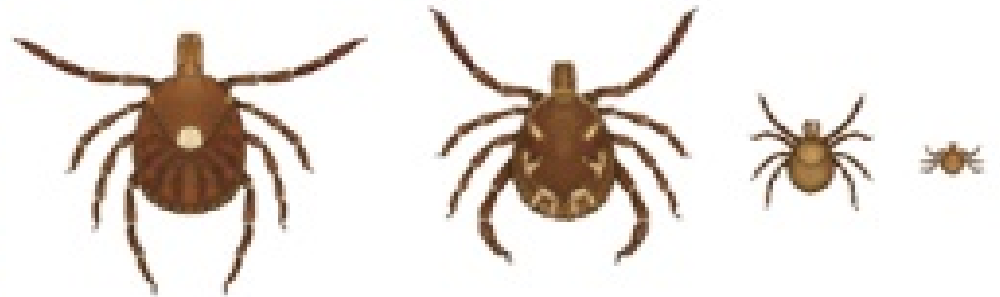
Auburn University, University of Florida

1 inch

Blacklegged Tick (*Ixodes scapularis*)



Lone Star Tick (*Amblyomma americanum*)



Dog Tick (*Dermacentor variabilis*)



2



Credit Sam Morris



<http://www.agriculture.utk.edu/news/releases/2011/images/10-TickFemaleWeb.jpg>



http://www.billhubick.com/images/onestar_tick_wi_md_20070727.jpg

Some Ticks in the Southeast

Lone star tick

Amblyomma americanum



Black-legged tick

Ixodes scapularis



American dog tick

Dermacentor variabilis



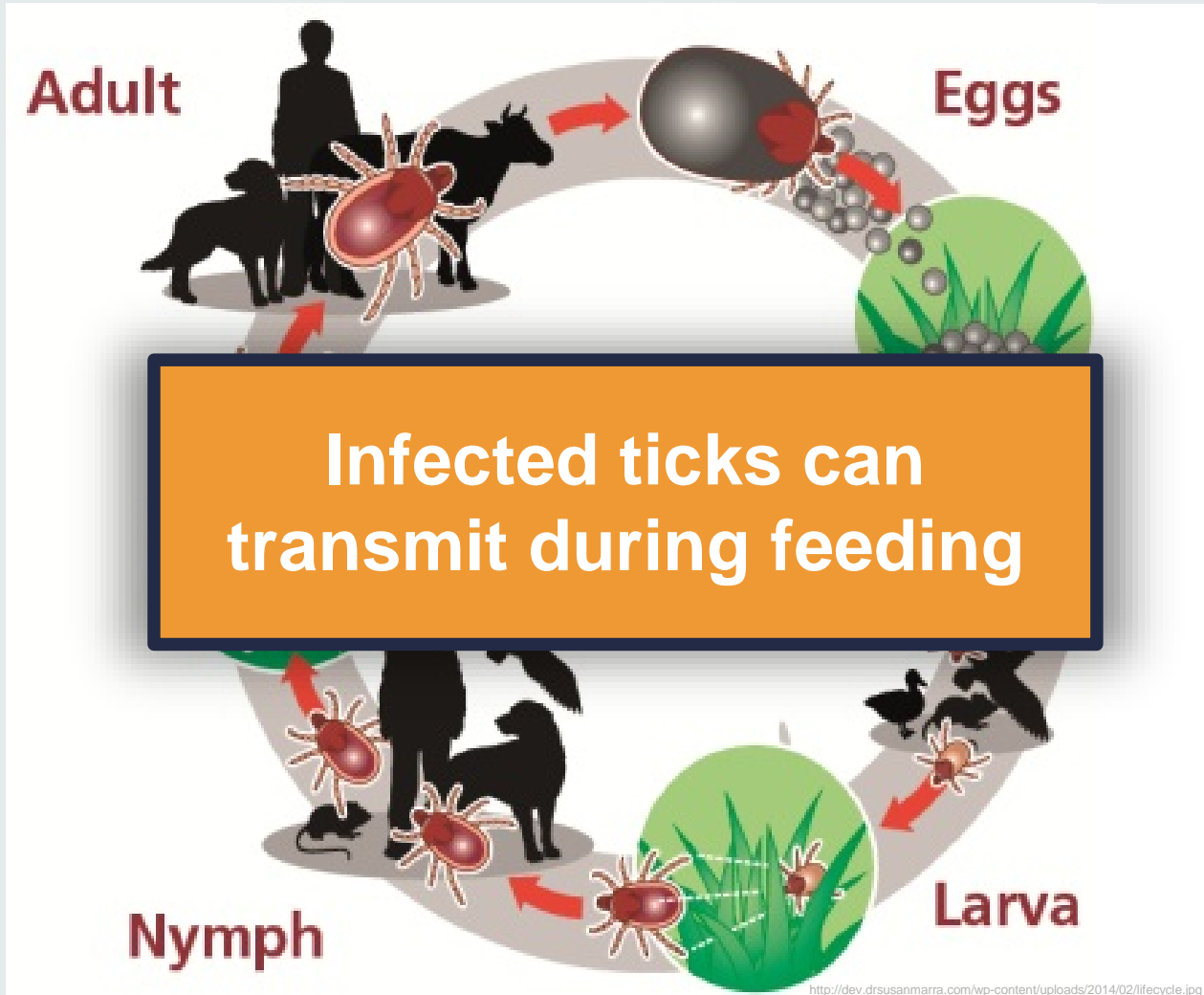
Gulf Coast tick

Amblyomma maculatum



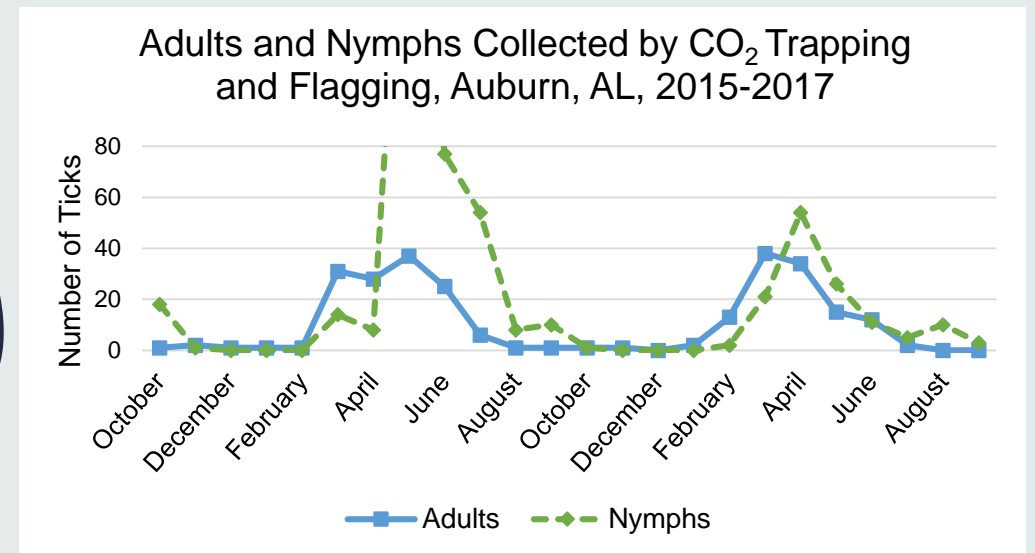
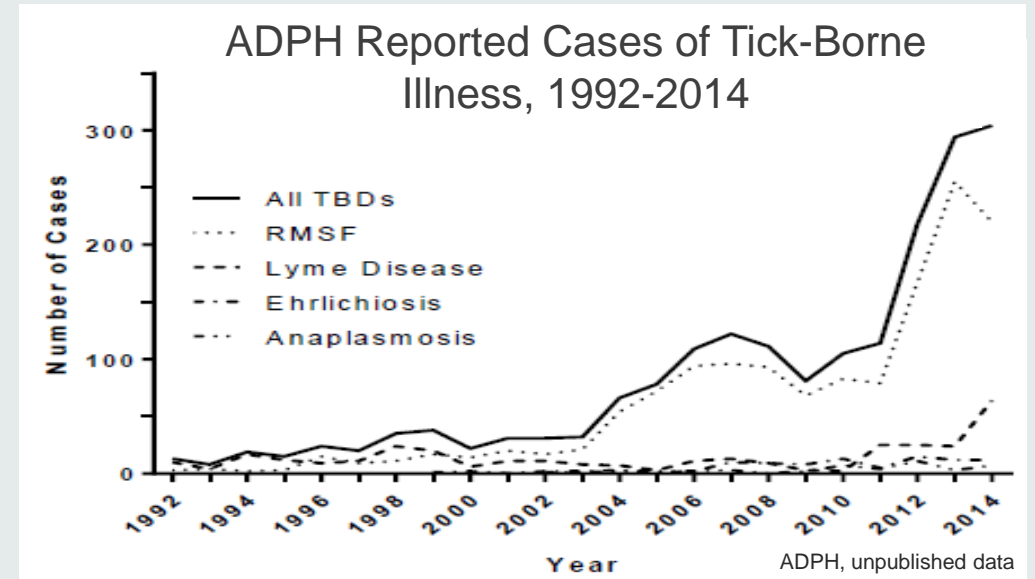
Some Tick-borne Illnesses

- Rocky Mountain Spotted Fever, etc.
- Lyme disease, STARI
- Tularemia
- Ehrlichiosis
- Anaplasmosis
- Babesiosis
- Tick paralysis
- Alpha-gal/red meat allergy
- Powassan virus
- More...



Current Status

- Reports have increased in US and Southeast
 - Greater awareness, better testing
 - May continue with climate, habitat change → hosts, ticks, TBIs
- Southeast: Warm winters → Ticks year round → TBIs a constant concern
 - Winter hunting, early springs, mild summers → humans active → more tick encounters



What Auburn Is Doing

- Little known about tick/TBI distribution or relationship to wildlife/climate
 - Objective: Identify land use, climatic, and wildlife effects on tick/TBI distribution and risk in Alabama → broad- and fine-scales
 - 3.5 year project...1 year left
 - Sample state, university, private lands:
 - Ticks from deer: winters + summers
 - Tick CO₂ trapping, flagging: monthly, 1 yr
- PCR testing for:
Rickettsia spp. Lyme
Ehrlichia spp. STARI
- Temperature, humidity at forest floor: hourly
 - Trail camera photos of hosts: motion activated
 - Landscape/vegetation survey, foliar and soil analysis: summer '16

Many Thanks To...

Alabama Department
of Conservation and
Natural Resources



U.S. Forest Service



Alabama Agricultural
Experiment Station



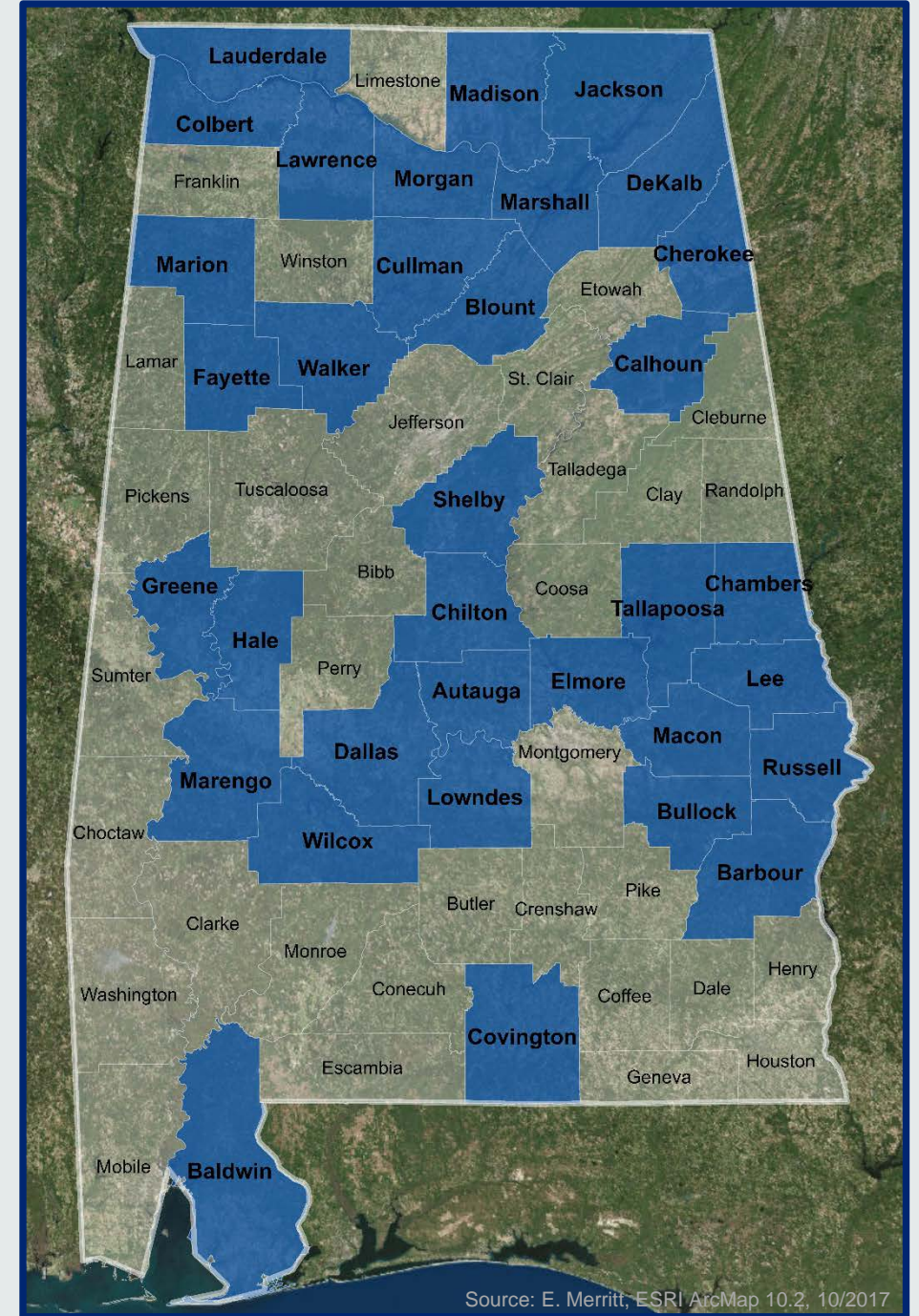
Center for
Environmental Studies
at the Urban-Rural
Interface



Overview

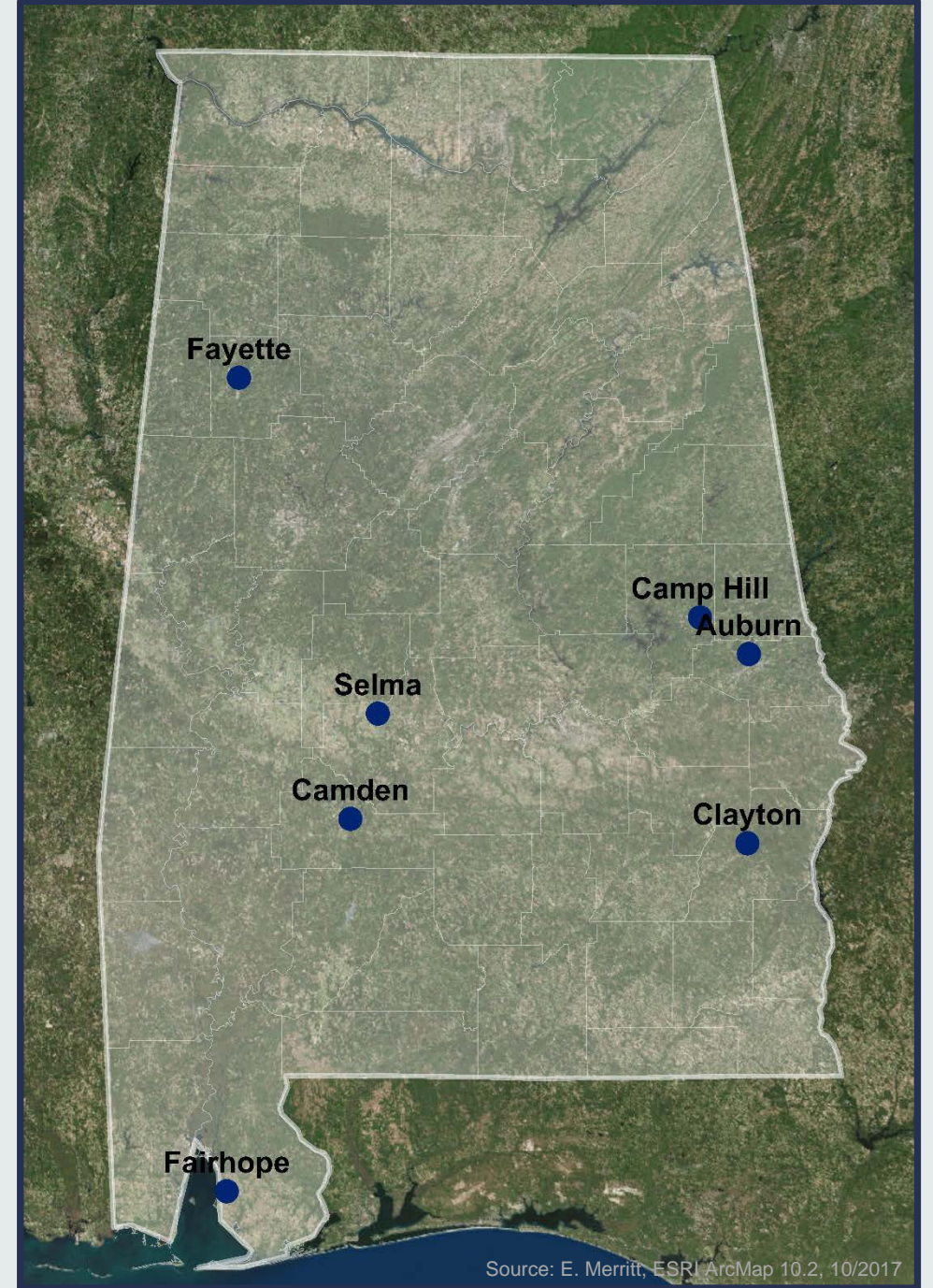
From summer 2015 - 2017(ongoing):

- 9,786 ticks, CO₂ trap & wildlife
 - 1,248 traps
 - 745 white-tailed deer
 - 51 raccoons
 - 19 feral hogs
- 34 AL counties (51%)



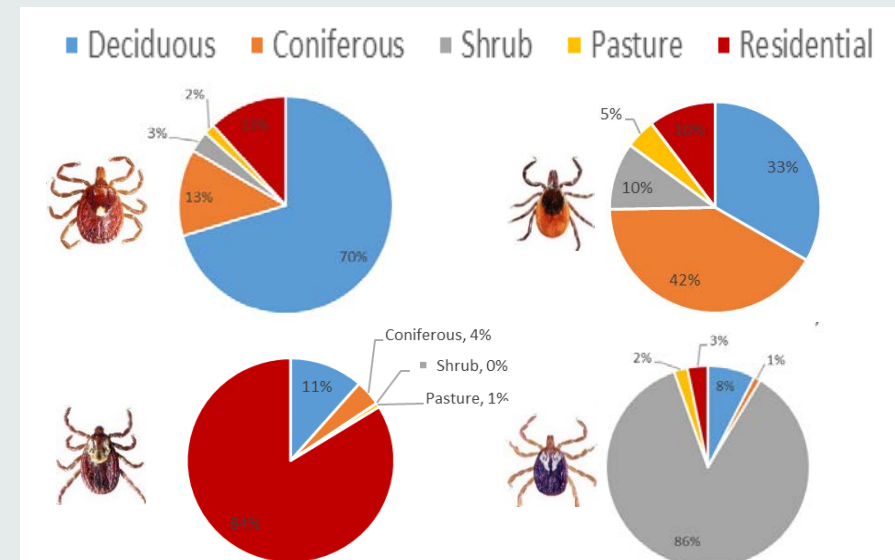
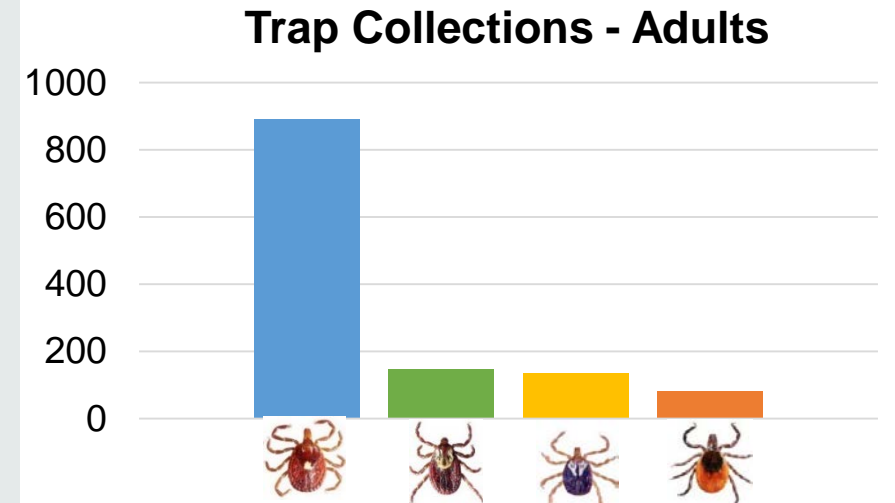
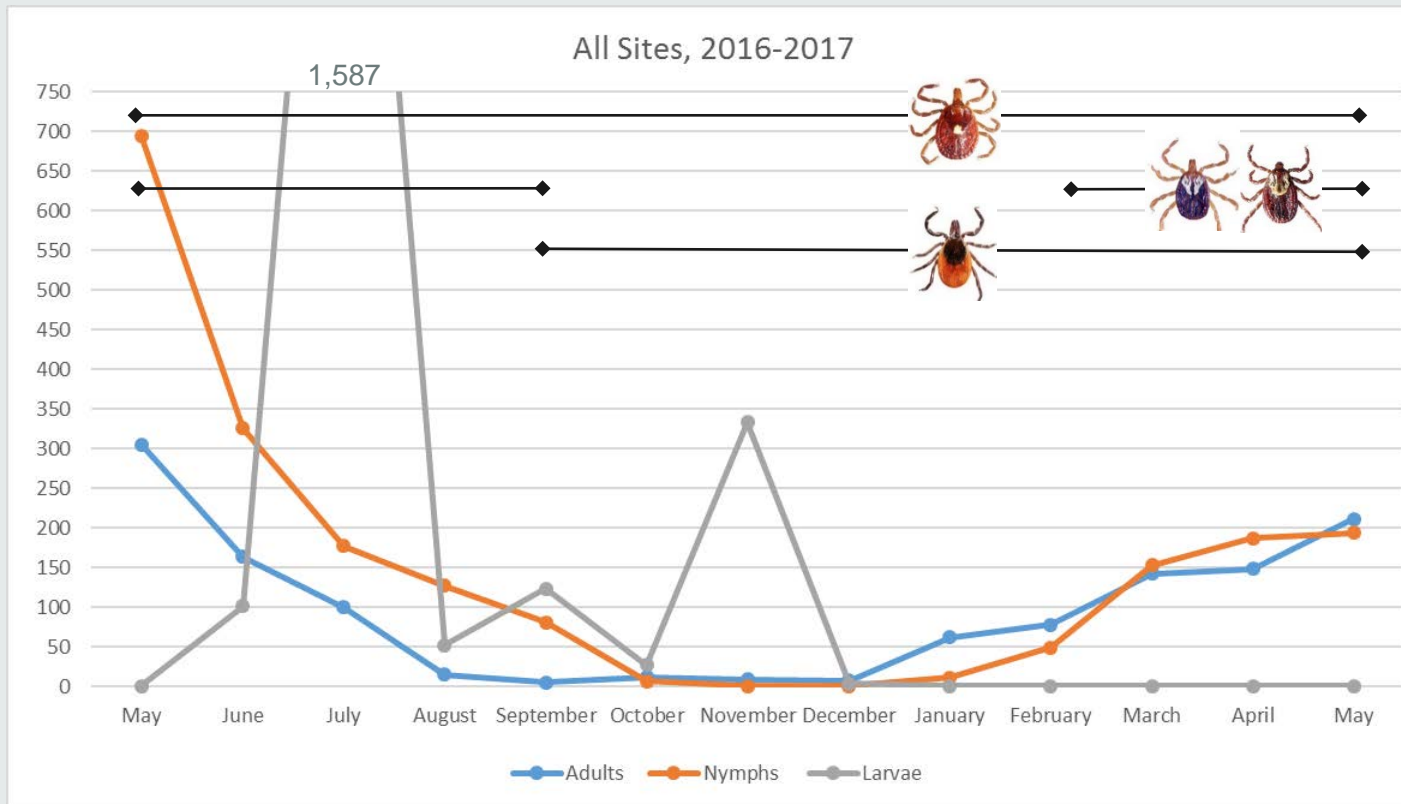
Monthly Tick Trapping

● CO₂ trap sites, 105 plots







Preliminary Results – Tick Trapping

	Adults	Nymphs	Larvae	Total
Number of Ticks	1,257	2,006	2,226	5,489



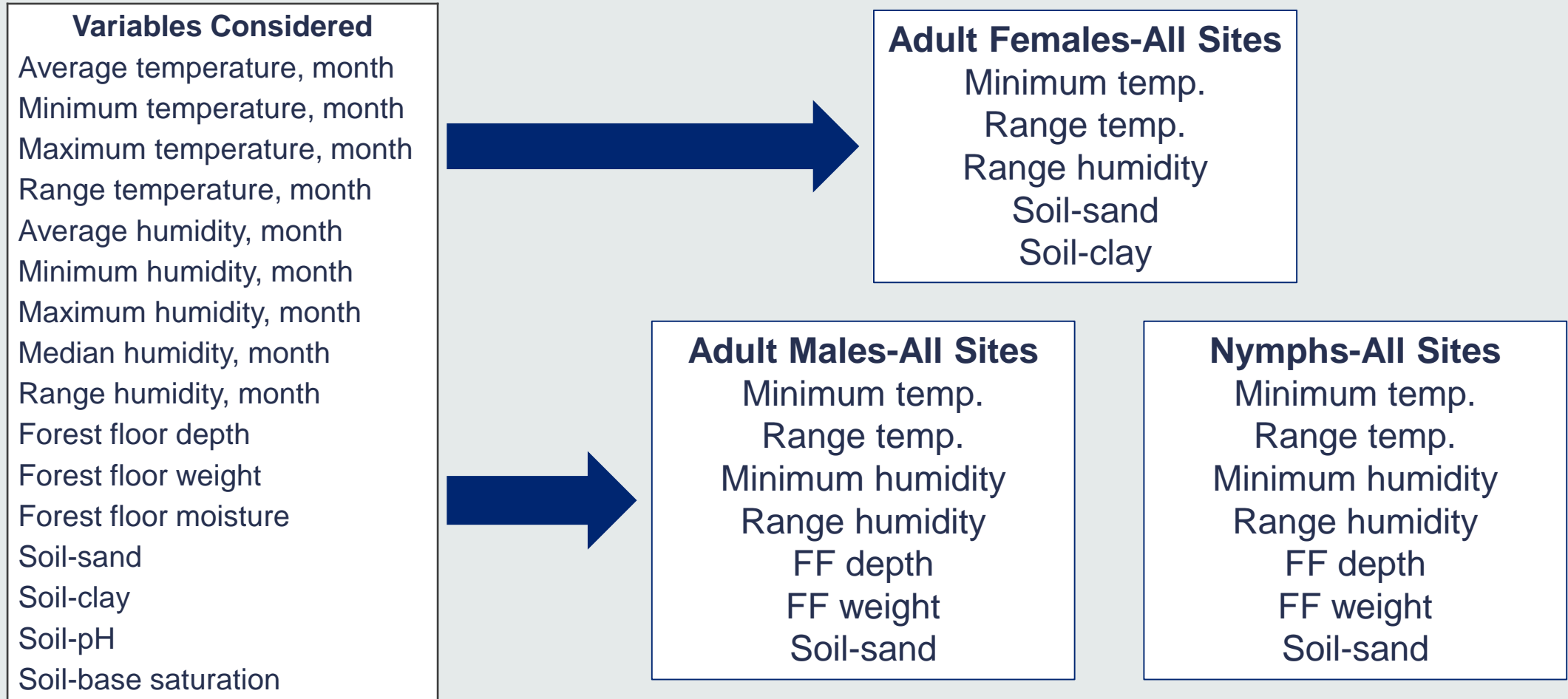
Preliminary Results – Pathogen Screening

- ~75% tested up to December '16, Lyme and remainders in progress
- Currently, nothing in American dog () or blacklegged () ticks
- Minimum infection rates (# pos. indivs or pools ÷ total tested), all sites:

Tick	<i>E. chaffeensis</i>	<i>E. ewingii</i>	<i>R. parkeri</i>	<i>R. amblyommii</i>
Lone star 	0.61% (0–2.56%)	0.36% (0–1.71%)		26.06% (16.53–48.72%)
Gulf coast 			18.07% (0–35.71%)	7.72% (0–33.33%)

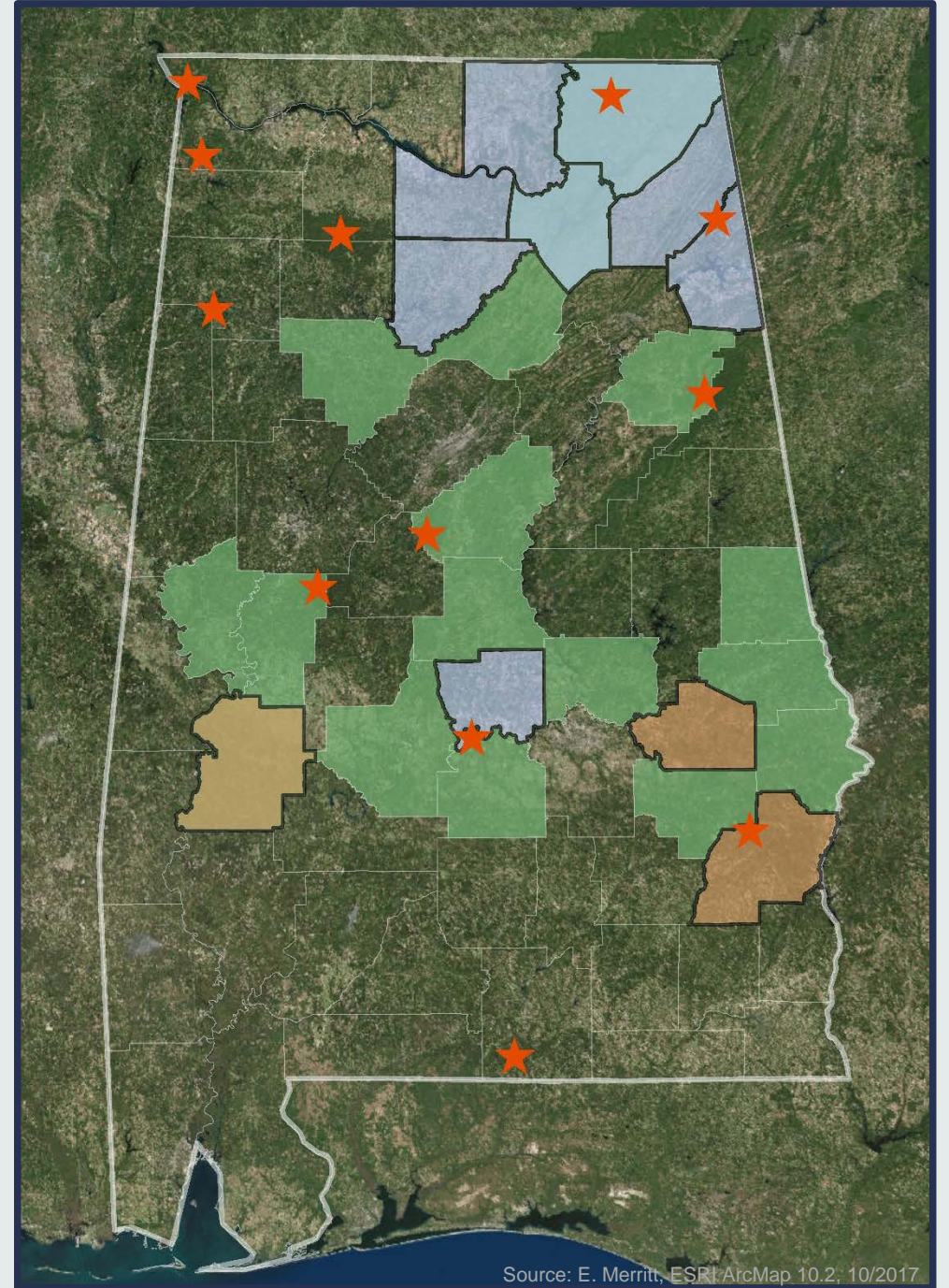
Preliminary Results – Habitat Analysis

- Negative binomial regression with zero-inflated model, all sites



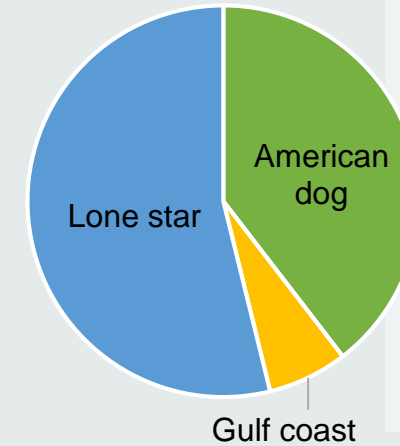
Wildlife Sampling

- ★ WMA hunter check stations, 12
- Deer reproductive study co's, 17
- Raccoon collection co's, 8
- Feral hog collection co's, 3



Preliminary Results – Wildlife Sampling

ADCNR Collections	Summers '15, '16, '17	Winters '15/'16, '16/'17
Deer	119	626
Ticks	744	3,302
Counties/WMA*s*	6, 9, 11	11*, 12*
Infestation	~6 per deer	~5 per deer

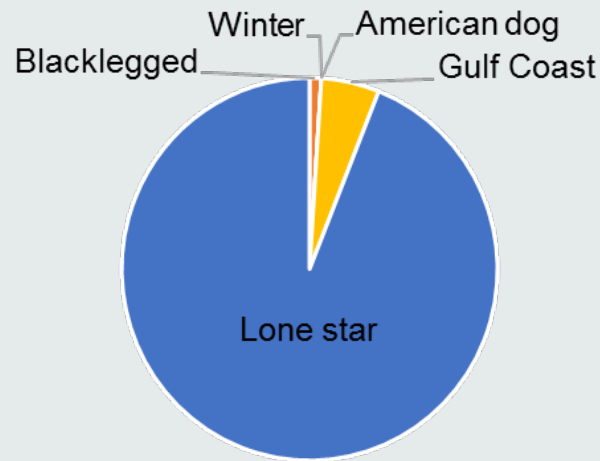


Summer '16

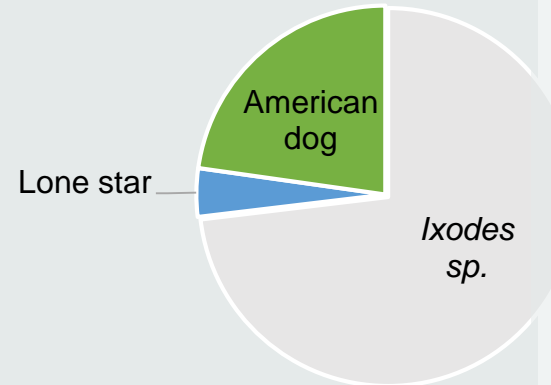
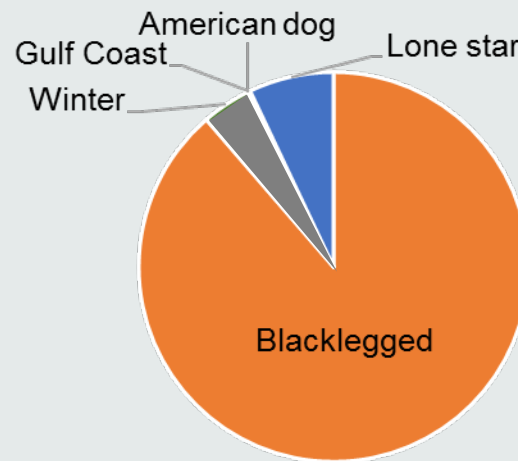


19 hogs
91 ticks
~5 each

Summer Collections



Winter Collections



Winter '16/'17



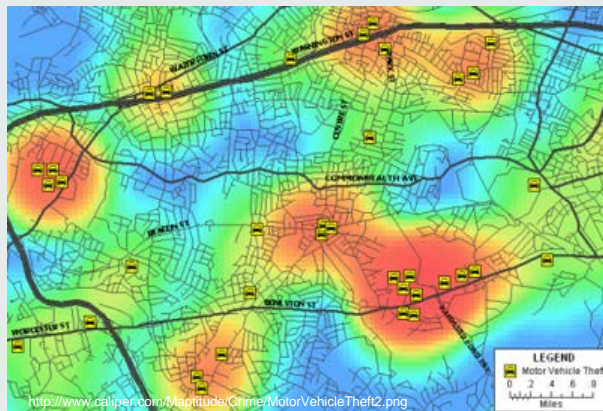
51 raccoons
145 ticks
~3 each

Next Steps

- Evaluation of tick infestation ~ deer health, age, weight, sex
- In-depth game camera data analysis → host associations
- Further pathogen testing → distribution, risk, host effects
- In-depth tick data analysis
 - By physiographic region, land use type, within sites
 - Foliar, vegetation structure, weekly temp/humidity, TBI data
- Tick/TBI distribution mapping, predictive modeling

Products

- Factors affecting distribution and risk ~ environment, wildlife, humans
- Hotspot maps → locations, densities of ticks/TBIs
- Predictive model: disease risk ~ hosts, physiographic region, short-term climate, extent/distribution of forests, etc.
- Identify outreach need, estimate TBI economic impact in State
- Public outreach → seminars, radio shows, publications



The image features six adult female ticks of various species, including the Lone Star tick (Amblyomma americanum), arranged around the central text. The ticks are shown in various orientations, highlighting their eight legs and segmented bodies. The text "Thank You!" is written in a large, bold, dark blue font, centered on the white background.

Thank You!



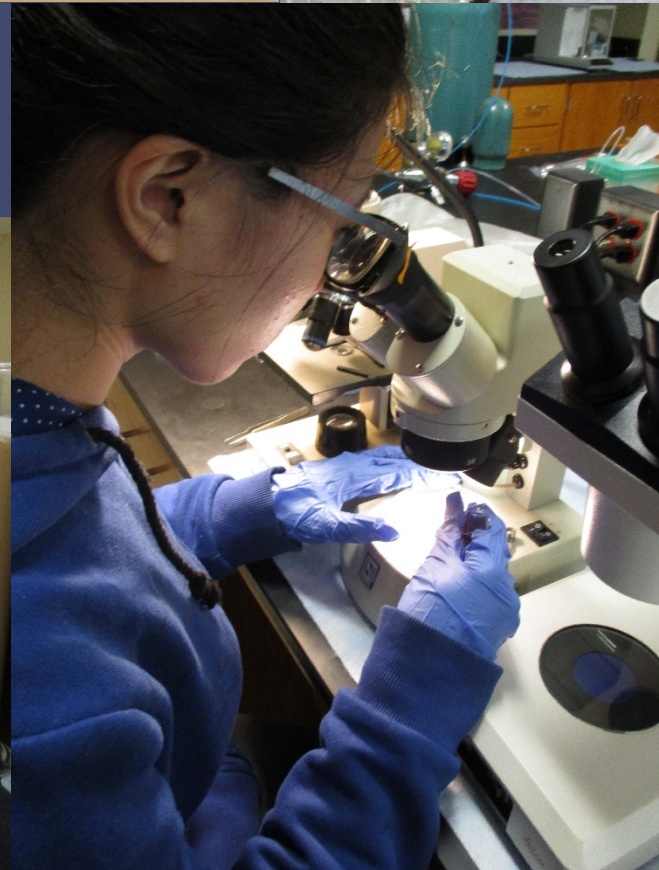


Photo source:
Emily Merritt