



Updates in tickborne illness in North Carolina

July Communicable Disease Webinar
July 20, 2017
Alexis M. Barbarin, PhD



Overview

1. What is the role of DHHS Communicable Disease Branch?
2. Tick biology
3. What ticks and tickborne illnesses are present in NC?
4. Current state of tickborne illness in NC
5. Understanding case definitions (Activity)
6. Recent retrospective analysis of RMSF

Who are the DHHS Vector-borne staff?



Carl Williams, DVM
State Public Health Veterinarian



Mr. Michael Doyle, MS
State PH Entomologist



Alexis M. Barbarin, PhD
State PH Entomologist



Ronna Chan, PhD
Zika Pregnancy
Registry



Autumn Locklear, MSPH
Epidemiologist



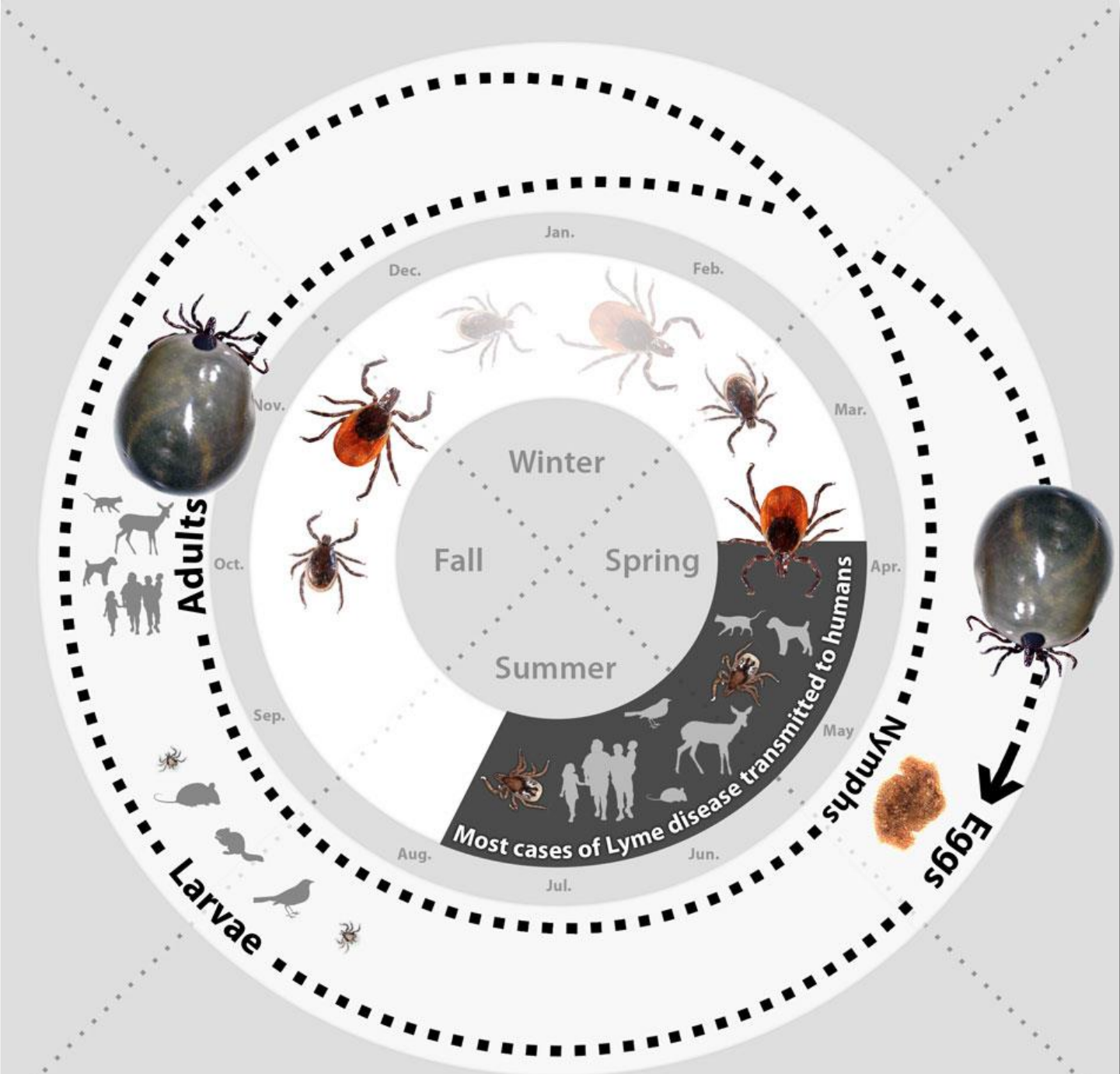
Coming August 7
Vector-borne Nurse
Consultant

What is our role in the Communicable Disease Branch?

- Human disease surveillance of vector-borne diseases (NC EDSS).
- Assist with properly classifying cases.
- Provide guidance according to CDC and CSTE guidelines.
- Provide guidance on where/when to conduct entomological surveillance.
- Report vector-borne illnesses to CDC.

Tick Biology





How tick borne illness is acquired



https://www.youtube.com/watch?v=c_Jn_HdoU3Y

Reportable tickborne illnesses in North Carolina

Anaplasmosis

- **Pathogen:** *Anaplasma phagocytophilum*
- **Vector:** Black legged ticks – *Ixodes scapularis*
- Acute, **febrile illness** resembling RMSF, but without the rash.



Female



Male

Ehrlichiosis

- **Pathogen:** *Ehrlichia chaffeensis* & *E. ewingii*
- **Vector:** Lone star tick – *Amblyomma americanum*
- **Febrile illness**, which includes chills, headache, myalgia, and arthralgia.



Female



Male

Reportable tickborne illnesses in North Carolina

Spotted fever group rickettsiosis (RMSF*)

- **Pathogen:** *Rickettsia rickettsii**, *R. parkeri*, & *R. amblyommii*
- **Vectors**
 - American dog tick – *Dermacentor variabilis*
 - Lone Star tick – *Amblyomma americanum*
 - Gulf Coast tick – *Amblyomma maculatum*
- **Febrile illness** accompanied by rash, headache, myalgia, nausea and vomiting.



Female



Male

D. variabilis



Female



Male

A. maculatum

Reportable tickborne illnesses in North Carolina

SFGR, Ehrlichiosis, and Anaplasmosis Treatment:



Centers for Disease Control and Prevention
CDC 24/7: Saving Lives. Protecting People™

Search MMWR Only

SEARCH



CDC A-Z INDEX ▾

Morbidity and Mortality Weekly Report (MMWR)

CDC > MMWR

Diagnosis and Management of Tickborne Rickettsial Diseases: Rocky Mountain Spotted Fever and Other Spotted Fever Group Rickettsioses, Ehrlichioses, and Anaplasmosis – United States

A Practical Guide for Health Care and Public Health Professionals

Recommendations and Reports / May 13, 2016 / 65(2):1–44



Format: Select One ▾

Holly M. Biggs, MD¹; Casey Barton Behravesh, DVM, DrPH¹; Kristy K. Bradley, DVM²; F. Scott Dahlgren, MSPH¹; Naomi A. Drexler, MPH¹; J.

Stephen Dumler, MD³; Scott M. Folk, MD⁴; Cecilia Y. Kato, PhD¹; R. Ryan Lash, MA¹; Michael L. Levin, PhD¹; Robert F. Massung, PhD¹; Robert B.

Nadelman, MD⁵; William L. Nicholson, PhD¹; Christopher D. Paddock, MD¹; Bobbi S. Pritt, MD⁶; Marc S. Tra

[View suggested citation](#)



News (2)
Blogs (1)
Policy documents (2)

The Clinical Assessment, Treatment, and Prevention of Lyme Disease, Human Granulocytic Anaplasmosis, and Babesiosis: Clinical Practice Guidelines by the Infectious Diseases Society of America

Gary P. Wormser,¹ Raymond J. Dattwyler,² Eugene D. Shapiro,^{2,6} John J. Halperin,^{2,4} Allen C. Steere,⁷ Mark S. Klempner,¹⁰ Peter J. Krause,¹ Johan S. Bakken,¹¹ Franc Strle,¹² Gerold Stanek,¹⁴ Linda Bockenstedt,⁷ Durland Fish,⁴ J. Stephen Dumler,¹² and Robert B. Nadelman¹

Divisions of ¹Infectious Diseases and ²Allergy, Immunology, and Rheumatology, Department of Medicine, New York Medical College, Valhalla, and ³New York University School of Medicine, New York, New York; ⁴Atlantic Neuroscience Institute, Summit, New Jersey; Departments of ⁵Pediatrics and ⁶Epidemiology and Public Health and ⁷Section of Rheumatology, Department of Medicine, Yale University School of Medicine, New Haven, and ⁸Department of Pediatrics, University of Connecticut School of Medicine and Connecticut Children's Medical Center, Hartford; ⁹Division of Rheumatology, Allergy, and Immunology, Massachusetts General Hospital, Harvard Medical School, and ¹⁰Boston University School of Medicine and Boston Medical Center, Boston, Massachusetts; ¹¹Section of Infectious Diseases, St. Luke's Hospital, Duluth, Minnesota; ¹²Division of Medical Microbiology, Department of Pathology, The Johns Hopkins Medical Institutions, Baltimore, Maryland; ¹³Department of Infectious Diseases, University Medical Center, Ljubljana, Slovenia; and ¹⁴Medical University of Vienna, Vienna, Austria

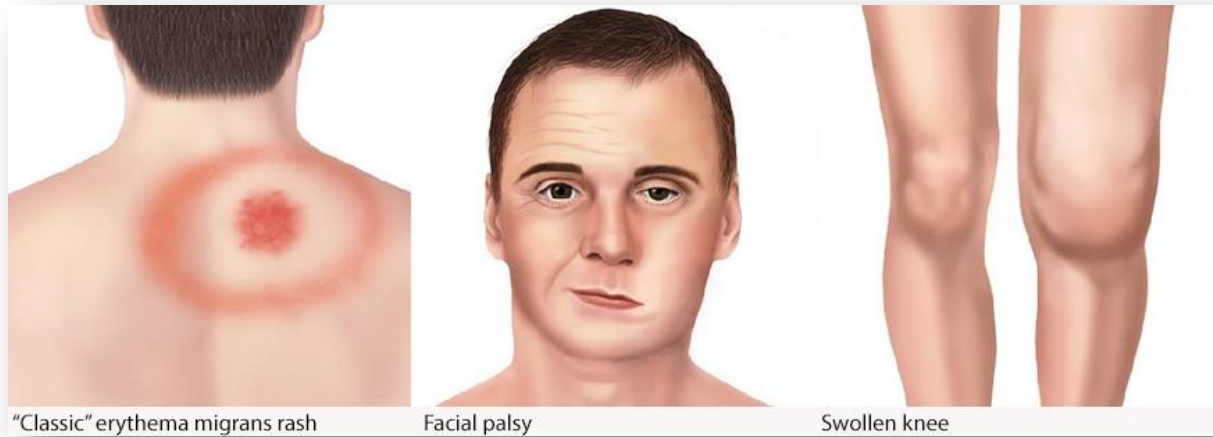
<https://academic.oup.com/cid/article/43/9/1089/422463/The-Clinical-Assessment-Treatment-and-Prevention>

<https://www.cdc.gov/mmwr/volumes/65/rr/rr6502a1.htm>

Reportable tickborne illnesses in North Carolina

Lyme disease

- **Pathogen:** *Borrelia burgdorferi*
- **Vector:** Black legged tick – *Ixodes scapularis*



"Classic" erythema migrans rash

Facial palsy

Swollen knee

Reportable tickborne illnesses in North Carolina

Lyme disease

- **Pathogen:** *Borrelia burgdorferi*
- **Vector:** Black legged tick – *Ixodes scapularis*

Clinical Manifestations	Symptoms	Early (3-30 days)	Late Clinical Manifestations (30 days or more)
Dermatological	EM rash	✓	
Neurological	Lymphocytic meningitis; cranial neuritis, particularly facial palsy (may be bilateral); radiculoneuropathy; or, rarely, encephalomyelitis.		✓
Musculoskeletal	Recurrent, brief attacks (weeks or months) of objective joint swelling in one or a few joints.		✓
Cardiovascular	Second to third-degree atrioventricular conduction defects.		✓

Reportable tickborne illnesses in North Carolina

Lyme disease Treatment:

The Clinical Assessment, Treatment, and Prevention of Lyme Disease, Human Granulocytic Anaplasmosis, and Babesiosis: Clinical Practice Guidelines by the Infectious Diseases Society of America

Gary P. Wormser,¹ Raymond J. Dattwyler,² Eugene D. Shapiro,^{3,4} John J. Halperin,^{3,4} Allen C. Steere,³ Mark S. Klempner,¹⁰ Peter J. Krause,⁸ Johan S. Bakken,¹¹ Franc Strle,¹³ Gerold Stanek,¹⁴ Linda Bockenstedt,⁷ Durland Fish,⁶ J. Stephen Dumler,¹² and Robert B. Nadelman¹

Divisions of ¹Infectious Diseases and ²Allergy, Immunology, and Rheumatology, Department of Medicine, New York Medical College, Valhalla, and ³New York University School of Medicine, New York, New York; ⁴Atlantic Neuroscience Institute, Summit, New Jersey; Departments of ⁵Pediatrics and ⁶Epidemiology and Public Health and ⁷Section of Rheumatology, Department of Medicine, Yale University School of Medicine, New Haven, and ⁸Department of Pediatrics, University of Connecticut School of Medicine and Connecticut Children's Medical Center, Hartford; ⁹Division of Rheumatology, Allergy, and Immunology, Massachusetts General Hospital, Harvard Medical School, and ¹⁰Boston University School of Medicine and Boston Medical Center, Boston, Massachusetts; ¹¹Section of Infectious Diseases, St. Luke's Hospital, Duluth, Minnesota; ¹²Division of Medical Microbiology, Department of Pathology, The Johns Hopkins Medical Institutions, Baltimore, Maryland; ¹³Department of Infectious Diseases, University Medical Center, Ljubljana, Slovenia; and ¹⁴Medical University of Vienna, Vienna, Austria

Illnesses that are NOT reportable in North Carolina

STARI (Southern tick associated rash illness)

- **Pathogen:** None identified to date
- **Vector:** Lone Star tick – *Amblyomma americanum*
- **Symptoms:** Skin lesion (rash) that looks like an Lyme disease EM rash, fatigue, headache, fever, and myalgia.
- No diagnostic blood tests.
- No evidence that antibiotic treatment is necessary or beneficial.



Illnesses that are NOT reportable in North Carolina

α-gal allergy

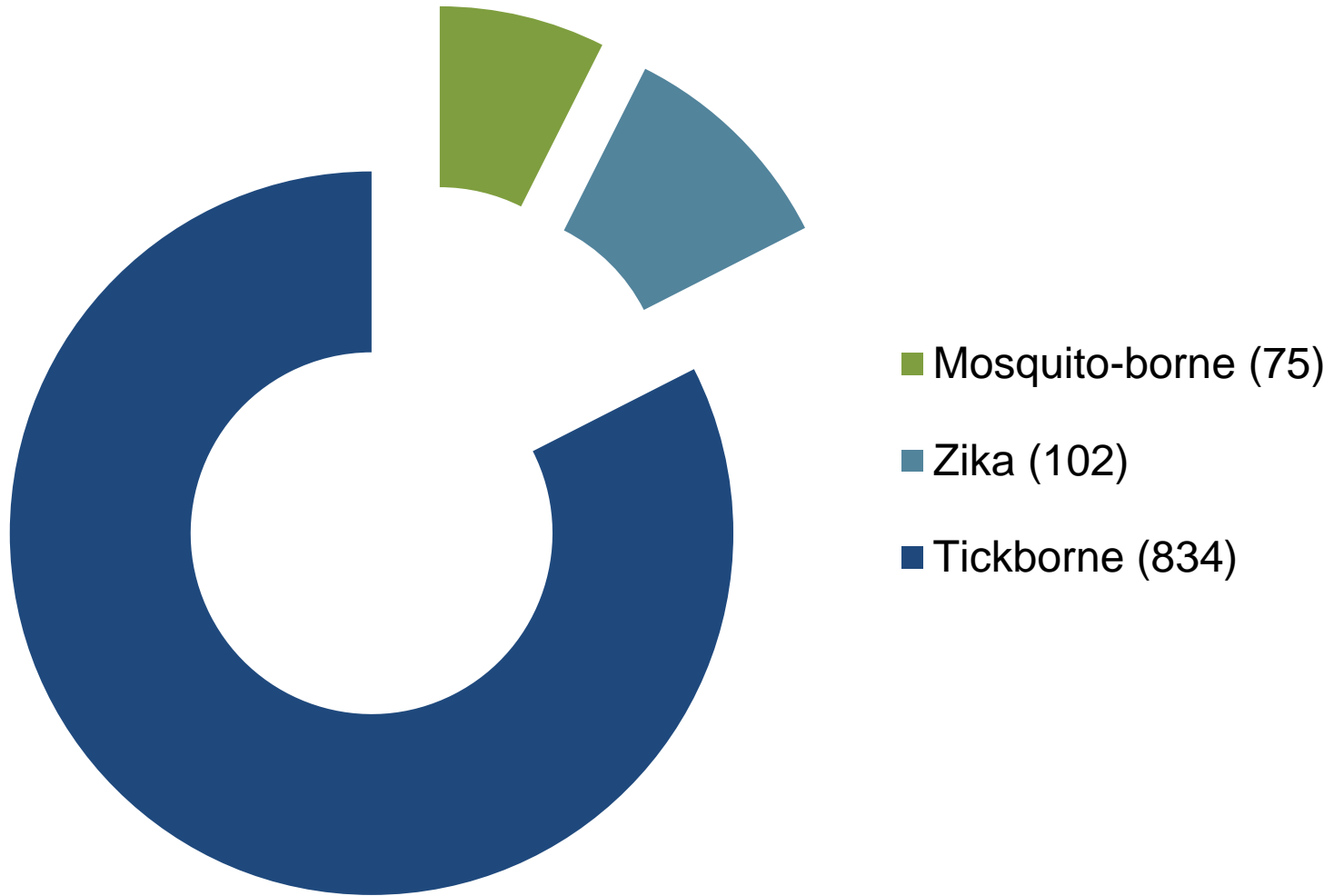
- **Pathogen:** None. It's a carbohydrate present in red meat
- **Vector:** Lone Star tick – *Amblyomma americanum*
- **Symptoms:** Onset delayed (2-8 hours following mammalian meat consumption), severe itching, hives, angioedema, GI upset, respiratory distress, and anaphylaxis.



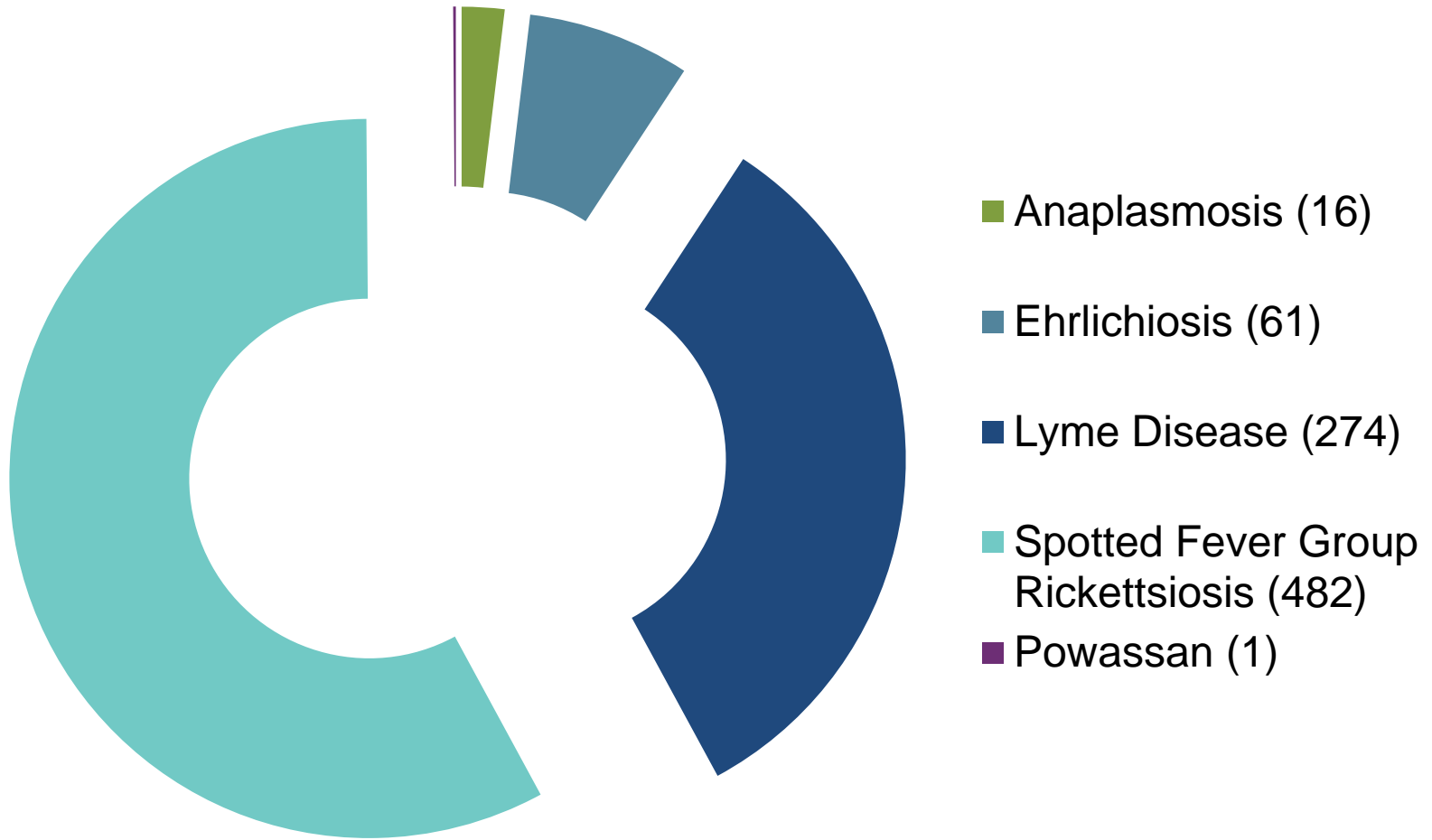
Current state of tickborne illness in North Carolina



Vector-borne diseases reported in 2016

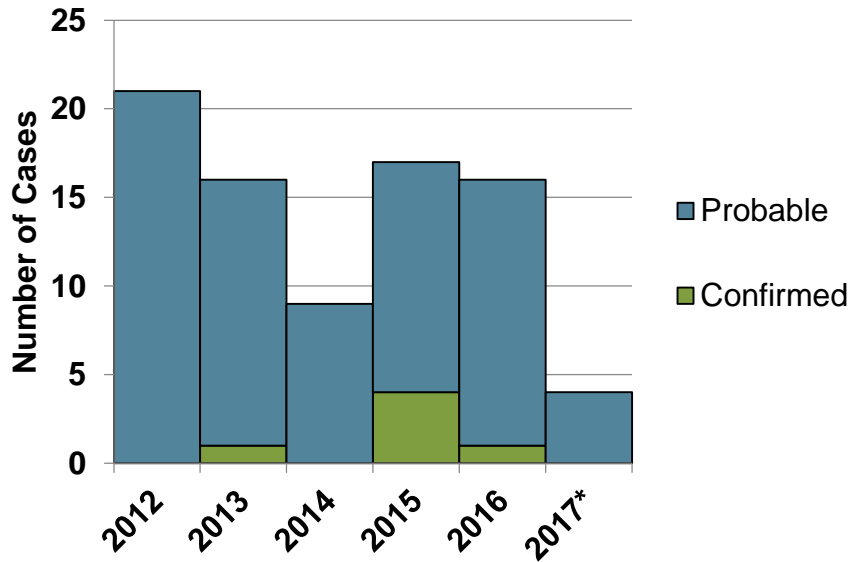


Tickborne diseases reported in 2016

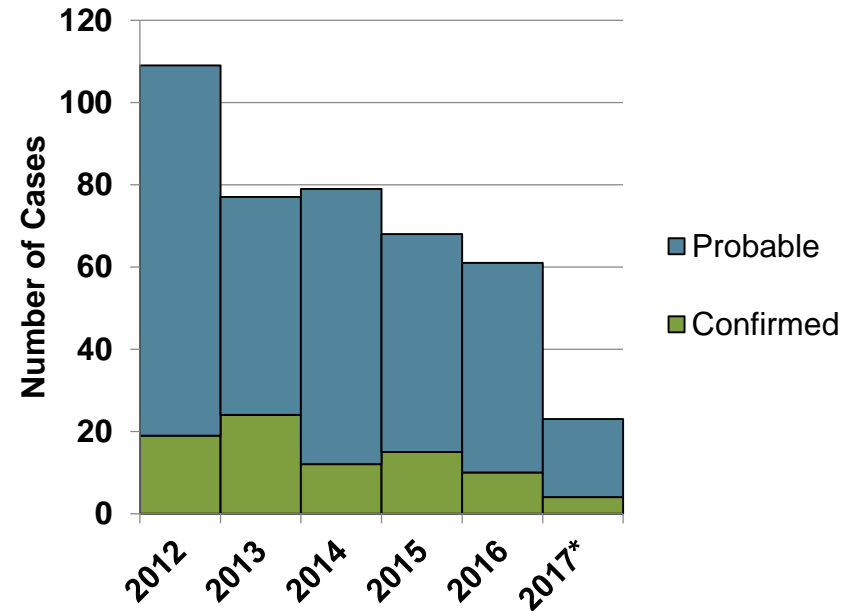


Anaplasmosis and Ehrlichiosis disease burden in North Carolina is minor.

Anaplasmosis in North Carolina

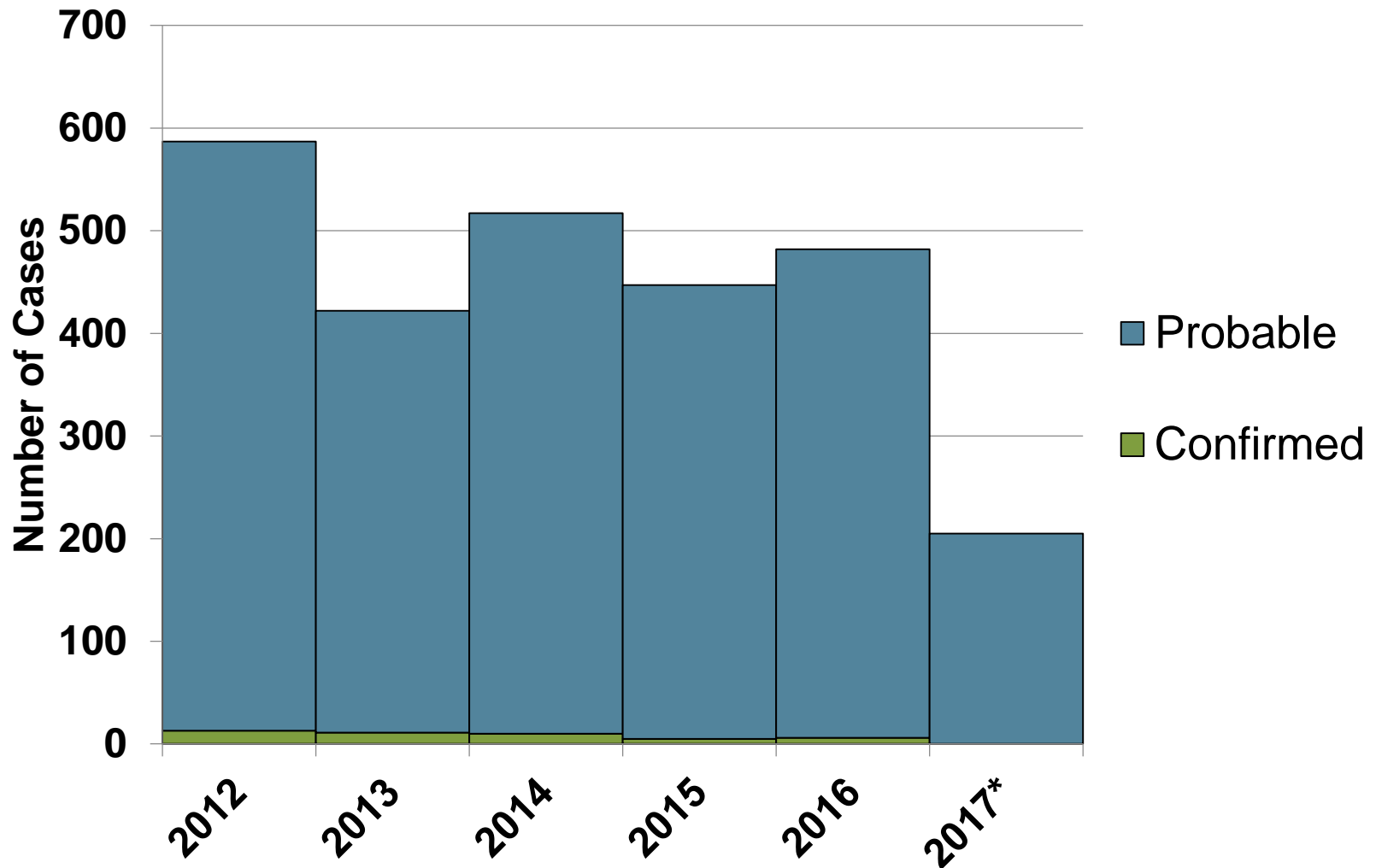


Ehrlichiosis in North Carolina



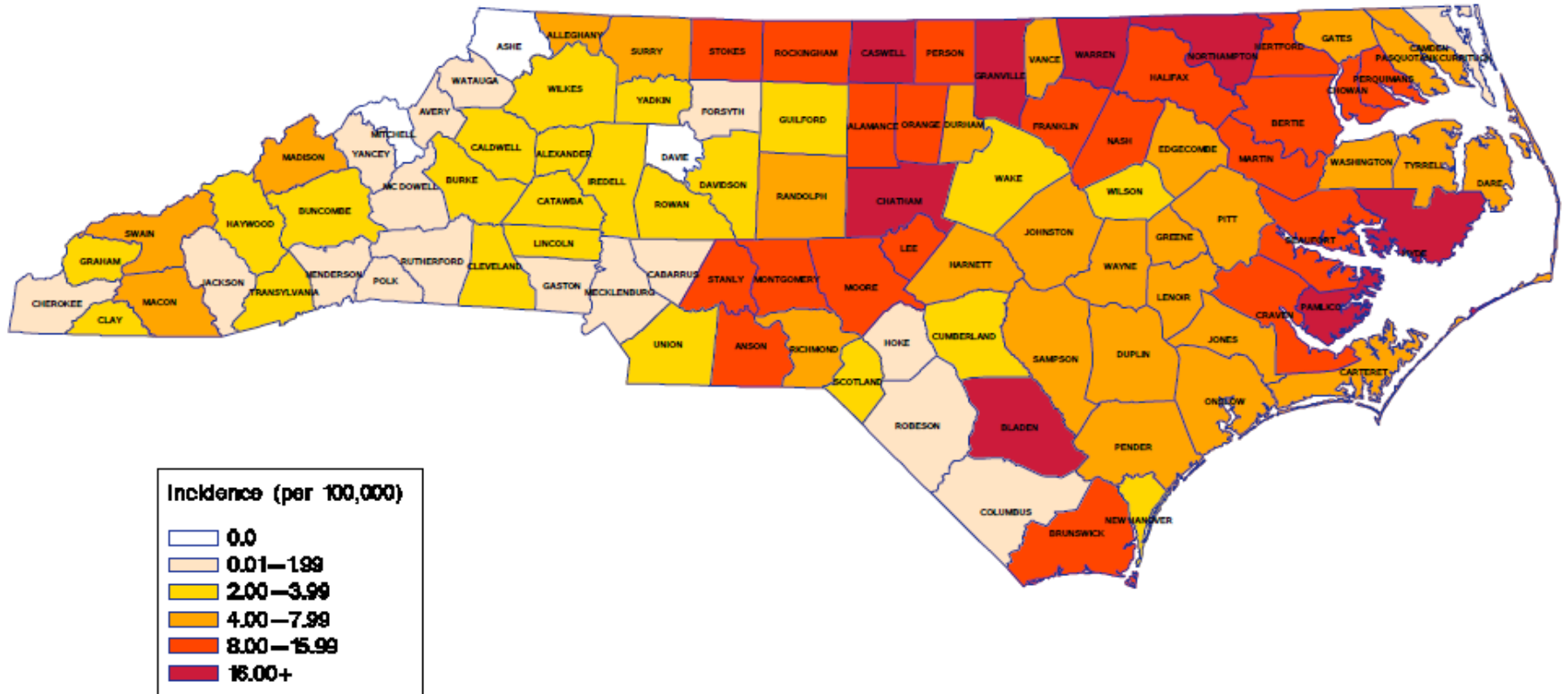
** Note 2017 data are preliminary, as of June 30, 2017.*

Rickettsiosis accounts for the majority of tickborne disease burden in North Carolina.

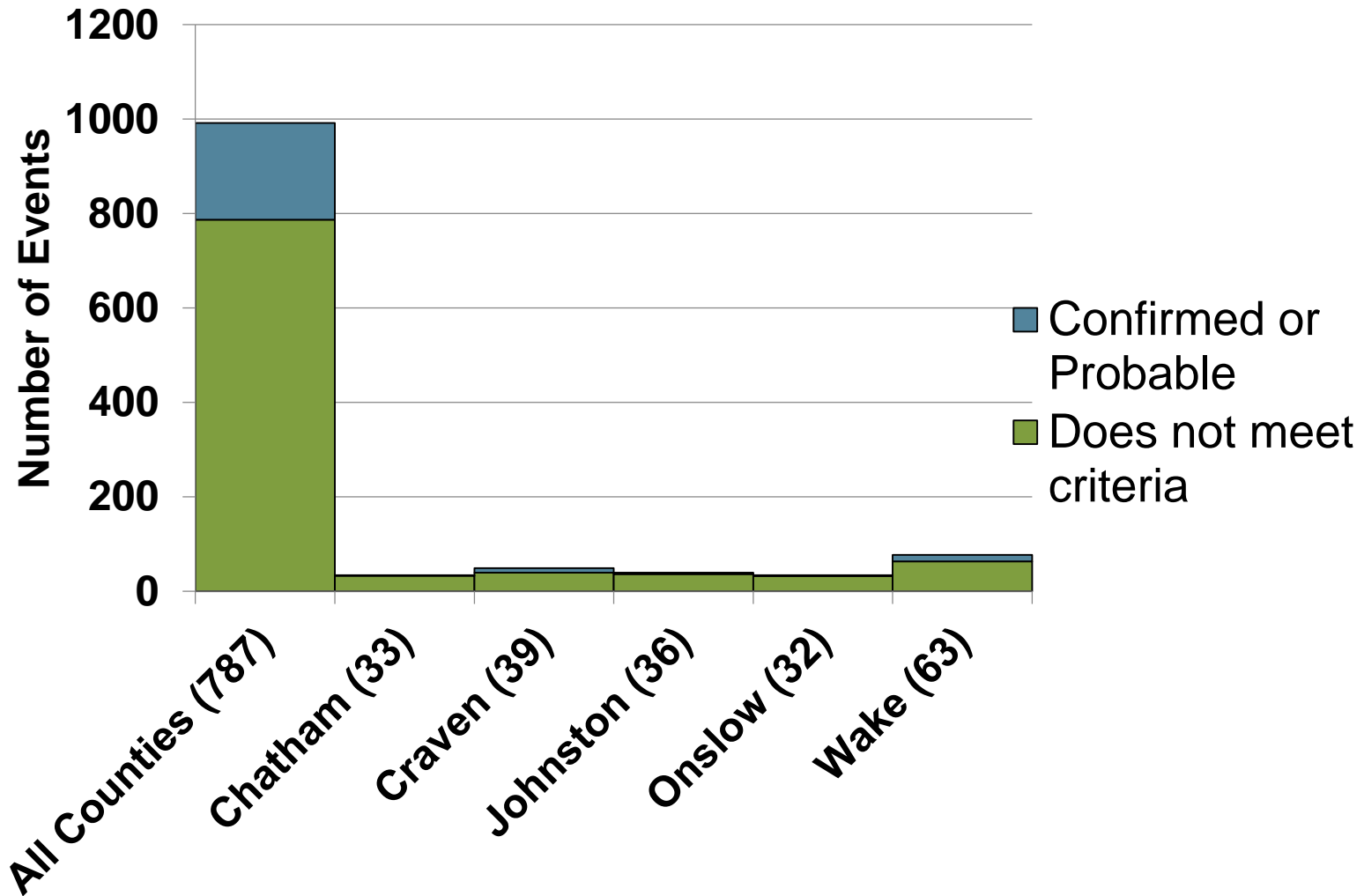


* Note 2017 data are preliminary, as of June 30, 2017.

Average Annual Incidence of Confirmed and Probable SFGR in North Carolina (2011-15); N=2310

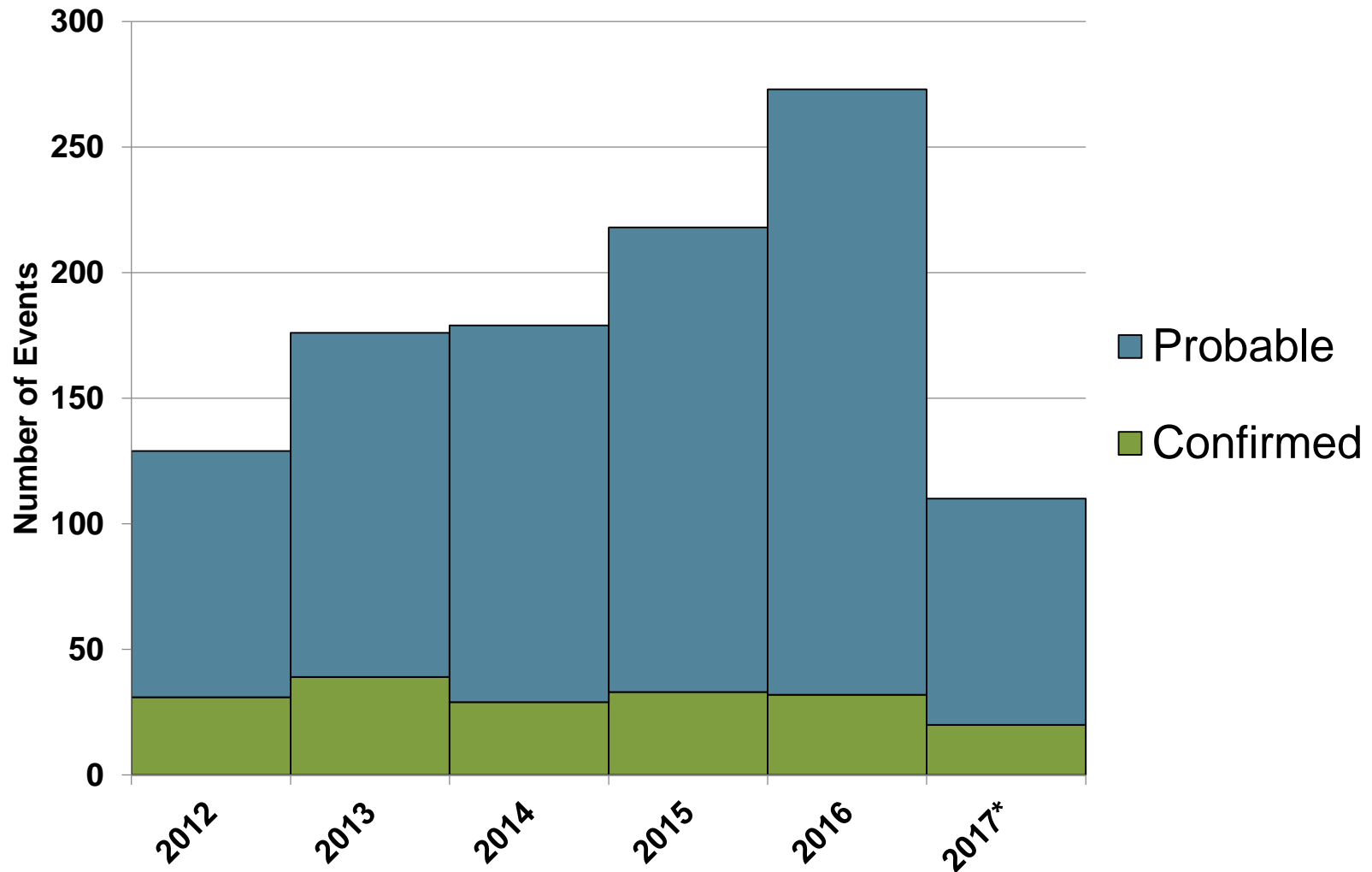


Thank you for your hard work!



**Note: these numbers are preliminary as of July 19, 2017.*

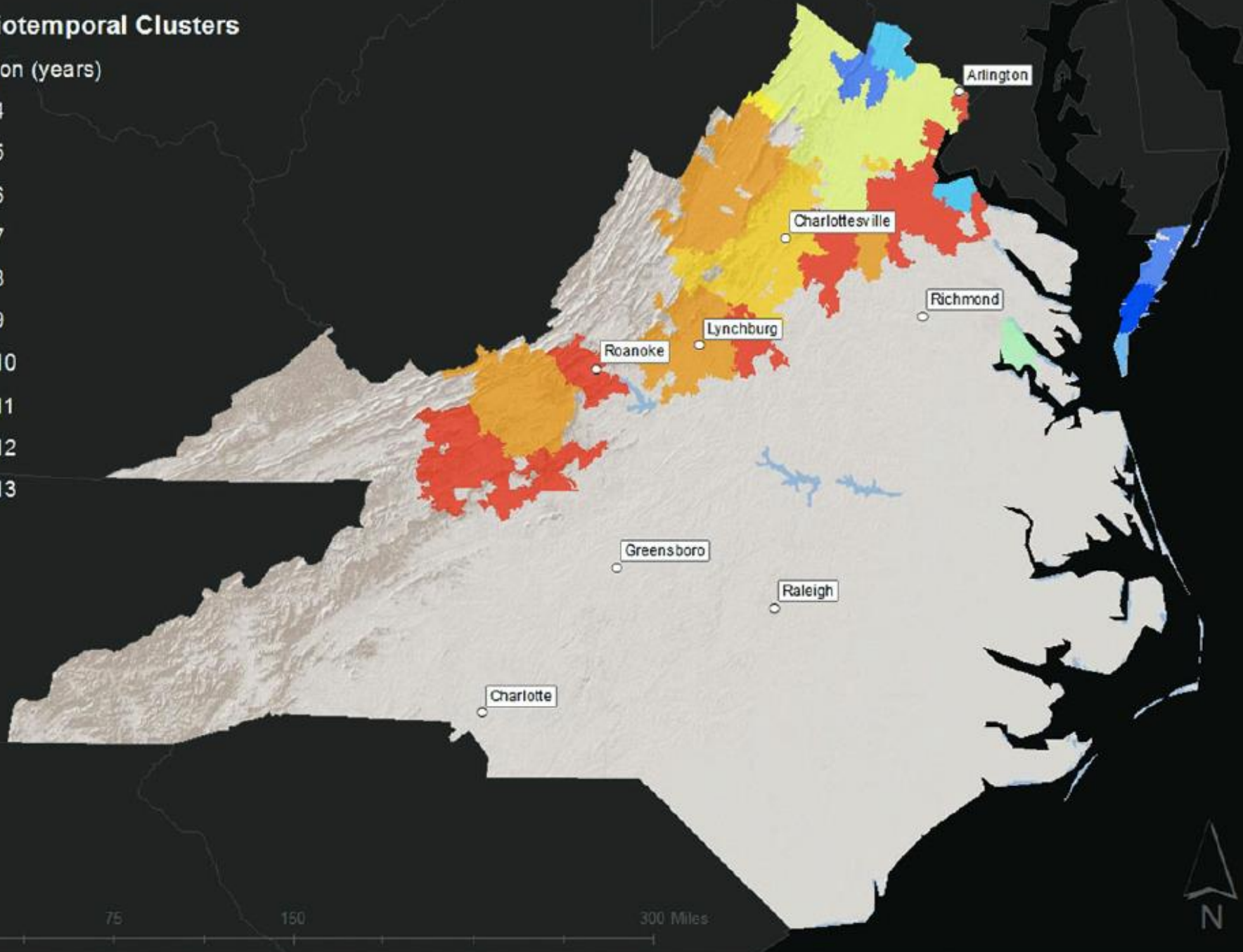
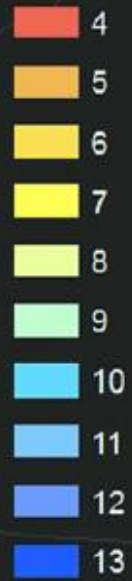
Probable cases of Lyme are increasing; confirmed cases are stable.



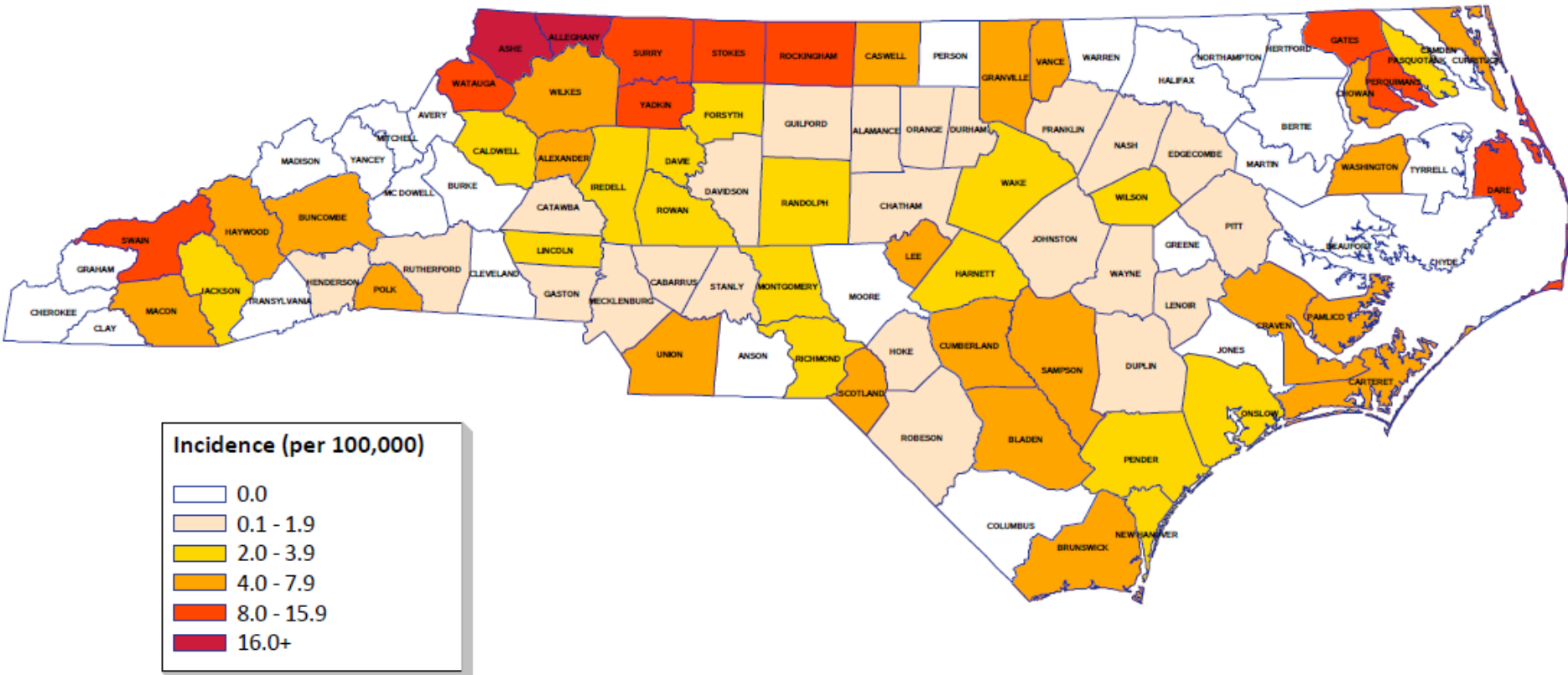
** Note 2017 data are preliminary, as of June 30, 2017.*

Spatiotemporal Clusters

Duration (years)



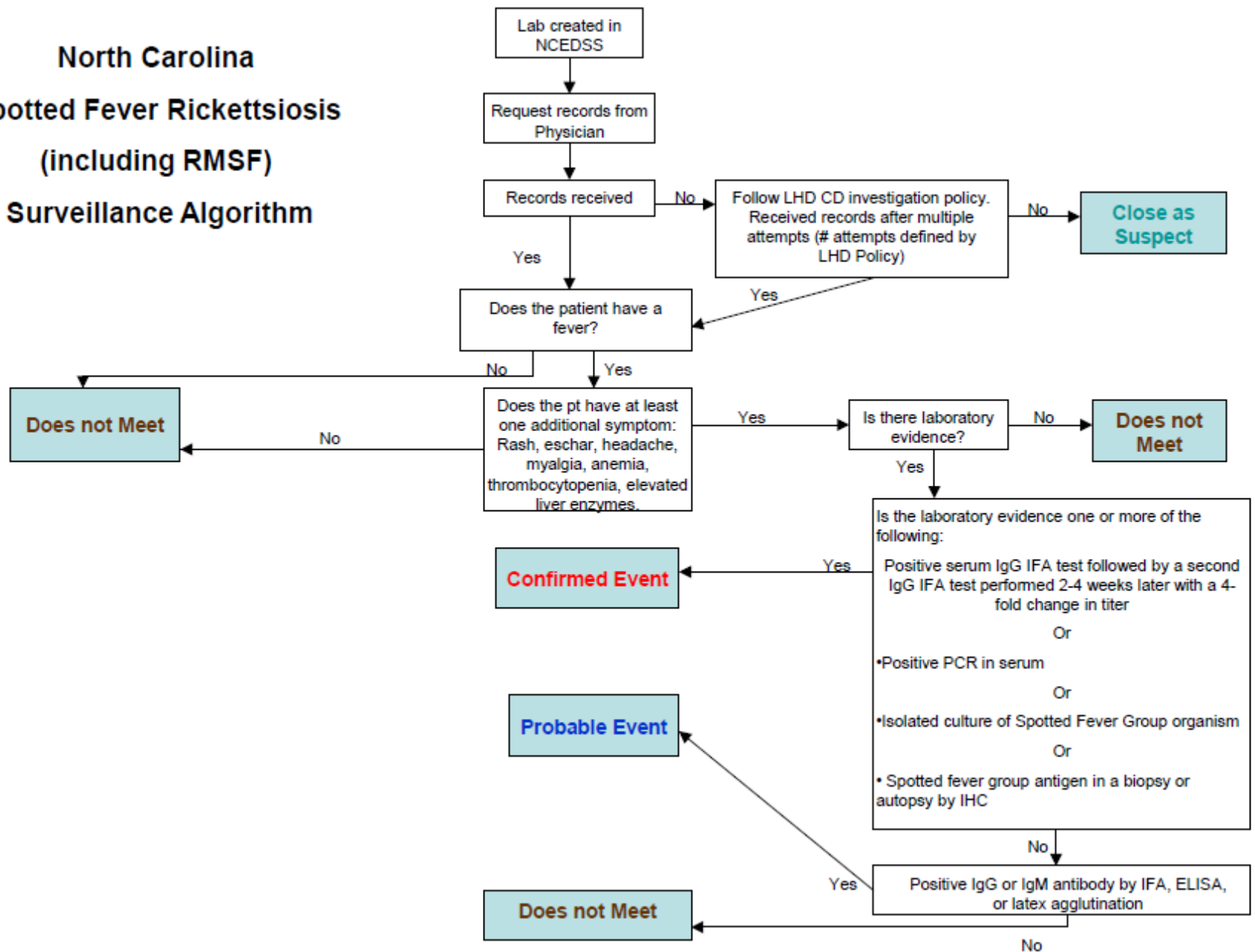
Incidence of Confirmed and Probable Cases Lyme in North Carolina (2016); N=273



Understanding Case Definitions



North Carolina Spotted Fever Rickettsiosis (including RMSF) Surveillance Algorithm



RMSF – Does Not Meet Criteria

North Carolina Electronic Disease Surveillance System Enter Case ID Search Alexis Barbann

3. Clinical - Rocky Mountain Spotted Fever (35) [Jump To...] Save Save & Stay Cancel

[Expand Details](#)

Period of Interest Timeframe	
FROM (14 DAYS PRIOR TO SYMPTOM ONSET): <input type="text"/>	UNTIL (SYMPTOM ONSET): <input type="text"/>
06/01/2017	06/15/2017

General Diagnostic Information

Is / was patient symptomatic for this disease?	<input type="text" value="No"/>
Date that best reflects the earliest date of illness identification	<input type="text" value="06/15/2017"/>
Illness identification date represents:	<input type="text" value="Date of laboratory testing"/>

Clinical Findings (including signs, symptoms, diagnostic tests, and complications)

Indicate each of the clinical findings that the patient had associated with this illness.

Fever	<input type="text" value="No"/>
Headache	<input type="text" value="No"/>
Muscle aches / pains (myalgias)	<input type="text" value="No"/>
Skin rash	<input type="text" value="No"/>
Acute Respiratory Distress Syndrome (ARDS)	<input type="text" value="No"/>
Elevated liver enzymes	<input type="text" value="No"/>
Acute renal failure	<input type="text"/>
Disseminated intravascular coagulation (DIC)	<input type="text"/>
Thrombocytopenia	<input type="text"/>
Leukopenia	<input type="text"/>
Anemia	<input type="text"/>
Was an IFA-IgG serologic test done?	<input type="text" value="Yes"/>
Was a IFA-IgM serologic test done?	<input type="text" value="No"/>
Other symptoms, signs, clinical findings, or complications consistent with this illness	<input type="text" value="No"/>

Please enter comments about signs, symptoms, and clinical findings only in this section.

<input type="text"/>	<input type="text" value="Pt. presented to clinic with symptoms of upper respiratory infection and feeling off balance."/>
----------------------	--

Clinical Notes as written on Part II form

Does not meet criteria

RMSF – Probable



Enter Case ID

Search

Alexis Barbarin

3. Clinical -

- Rocky Mountain Spotted Fever (35)

[Jump To...]

Save

Save & Stay

Cancel

[Expand Details](#)

Period of Interest Timeframe

FROM (14 DAYS PRIOR TO SYMPTOM ONSET):

06/26/2017

UNTIL (SYMPTOM ONSET):

07/10/2017

General Diagnostic Information

Is / was patient symptomatic for this disease?

Yes

Date that best reflects the earliest date of illness identification

07/10/2017

Illness identification date represents:

Date symptoms began

Clinical Findings (including signs, symptoms, diagnostic tests, and complications)

Indicate each of the clinical findings that the patient had associated with this illness.

Fever	Yes - measured
Headache	Yes
Muscle aches / pains (myalgias)	Yes
Skin rash	Yes
Acute Respiratory Distress Syndrome (ARDS)	No
Elevated liver enzymes	No
Acute renal failure	No
Disseminated intravascular coagulation (DIC)	No
Thrombocytopenia	Yes
Leukopenia	No
Anemia	No
Was an IFA-IgG serologic test done?	No
Was a IFA-IgM serologic test done?	No
Other symptoms, signs, clinical findings, or complications consistent with this illness	Yes

1. Fever

2. Additional Symptoms

3. Laboratory Evidence



Event Summary x

Basic Information	
Event ID:	101294434
Disease:	Rocky Mountain Spotted Fever (35)
Person:	Birth Date: Phone:
Type:	Batch
Investigation Status:	Open
Linked Events/Contacts:	0 linked event(s)/contact(s) View
Attachments:	0 attachment(s) Add
Notifications:	Classification: Probable County of residence: Craven County Event is in workflows View List

Notes [\(Add/Edit | Show My Notes\)](#)

-
-
-
-
-
-
-

Labs								
Lab No.	Specimen Date	Specimen Number	Specimen Type	Result	Result Status	Result Value	Test	Last Update
▶ 1	07/11/2017	19382432230			Final Results	1:512	R rickettsi IgG Titr Ser IF...	07/15/2017
1	07/11/2017	19382432230		Positive	Final Results		R rickettsi IgG Ser Cl EIA ...	07/15/2017

Probable case

Details	
Last Update:	07/15/2017
Updated By:	Automated Feeds
Specimen Info	
Specimen Date:	07/11/2017
Specimen Number:	19382432230
Specimen Received Date:	07/12/2017
Report Status:	Final
Report Change Date:	07/14/2017
Tests	
Test:	R rickettsi IgG Titr Ser IF Rickettsia rickettsii Ab.IgG: IF
Result Value:	1:512
Ref Range:	Neg <1:64
Test Local Desc:	RMSF, IgG, IFA
Test Local Code:	016174
Result Status:	Final Results

RMSF – Confirmed Case

North Carolina Electronic Disease Surveillance System



Enter Case ID

Search

Alexis Barbarin



Event Summary

Basic Information

Event ID:	101167044		
Disease:	Rocky Mountain Spotted Fever (35)		
Person:	Birth Date:	Phone:	
Type:	Batch		
Investigation Status:	Closed		
Linked Events/Contacts:	0 linked event(s)/contact(s) View		
Attachments:	0 attachment(s)		
Notifications:	Classification: Confirmed		
	County of residence: Wake County		

Notes (Show My Notes)

Edit Event Properties

Copy Event

Event Data

Lab Results

Concerns

Persons

Tasks

Event Properties

Event History

Labs

Lab No.	Specimen Date	Specimen Number	Specimen Type	Result	Result Status	Result Value	Test	Last Update
1	09/16/2016	26088450780			Final Results	1:256	Rickettsi IgG Titr Ser IF...	09/21/2016
1	09/16/2016	26088450780		Positive	Final Results		Rickettsi IgG Ser QI EIA ...	09/21/2016
2	09/26/2016	27088450230			Final Results	1:64	Rickettsi IgG Titr Ser IF...	09/29/2016
2	09/26/2016	27088450230		Positive	Final Results		Rickettsi IgG Ser QI EIA ...	09/29/2016

Add Lab Result

Update Lab Result

Delete Lab Result

Confirmed Case

Details

Last Update:	09/21/2016
Updated By:	Automated Feeds
Specimen Info	
Specimen Date:	09/16/2016
Specimen Number:	26088450780
Specimen Received Date:	09/16/2016
Report Status:	Final
Report Change Date:	09/20/2016
Tests	
Test:	Rickettsia rickettsii Ab.IgG: IF Rickettsia rickettsii Ab.IgG: IF
Result Value:	1:256
Ref Range:	Neg <1:64
Test Local Desc:	RMSF, IgG, IFA
Test Local Code:	016174
Result Status:	Final Results

Blank Clinical Tabs Make Me Cry

North Carolina Electronic Disease Surveillance System 🏠 ? Enter Case ID Search Alexis Barbarin ▾

3. Clinical - **- Rocky Mountain Spotted Fever (35)** [Jump To...] Save Save & Stay Cancel

[+ Expand Details](#)

Period of Interest Timeframe

FROM (14 DAYS PRIOR TO SYMPTOM ONSET): ⓘ UNTIL (SYMPTOM ONSET): ⓘ

General Diagnostic Information

Is / was patient symptomatic for this disease?


Date that best reflects the earliest date of illness identification ⓘ

Illness identification date represents:

Clinical Findings (including signs, symptoms, diagnostic tests, and complications)

Indicate each of the clinical findings that the patient had associated with this illness.

Fever	<input type="text"/>
Headache	<input type="text"/>
Muscle aches / pains (myalgias)	<input type="text"/>
Skin rash	<input type="text"/>
Acute Respiratory Distress Syndrome (ARDS)	<input type="text"/>
Elevated liver enzymes	<input type="text"/>
Acute renal failure	<input type="text"/>
Disseminated intravascular coagulation (DIC)	<input type="text"/>
Thrombocytopenia	<input type="text"/>
Leukopenia	<input type="text"/>
Anemia	<input type="text"/>
Was an IFA-IgG serologic test done?	<input type="text"/>
Was a IFA-IgM serologic test done?	<input type="text"/>
Other symptoms, signs, clinical findings, or complications consistent with this illness	<input type="text"/>
Please enter comments about signs, symptoms, and clinical findings only in this section.	<input type="text"/>



Why we need this information

North Carolina Electronic Disease Surveillance System Enter Case ID [Search](#) Alexis Barbarin ▾

1. Administrative - **- Rocky Mountain Spotted Fever (35)** [Jump To...]

Date identified as contact


NC County of Residence for the Event

If a different county is investigating this event, the county of residence must share this event.
If patient is not a NC resident, enter the NC investigating county here.

NC County of Residence for the Event

Investigation Trail: Add a new entry for each group to which the event transfers during the investigation

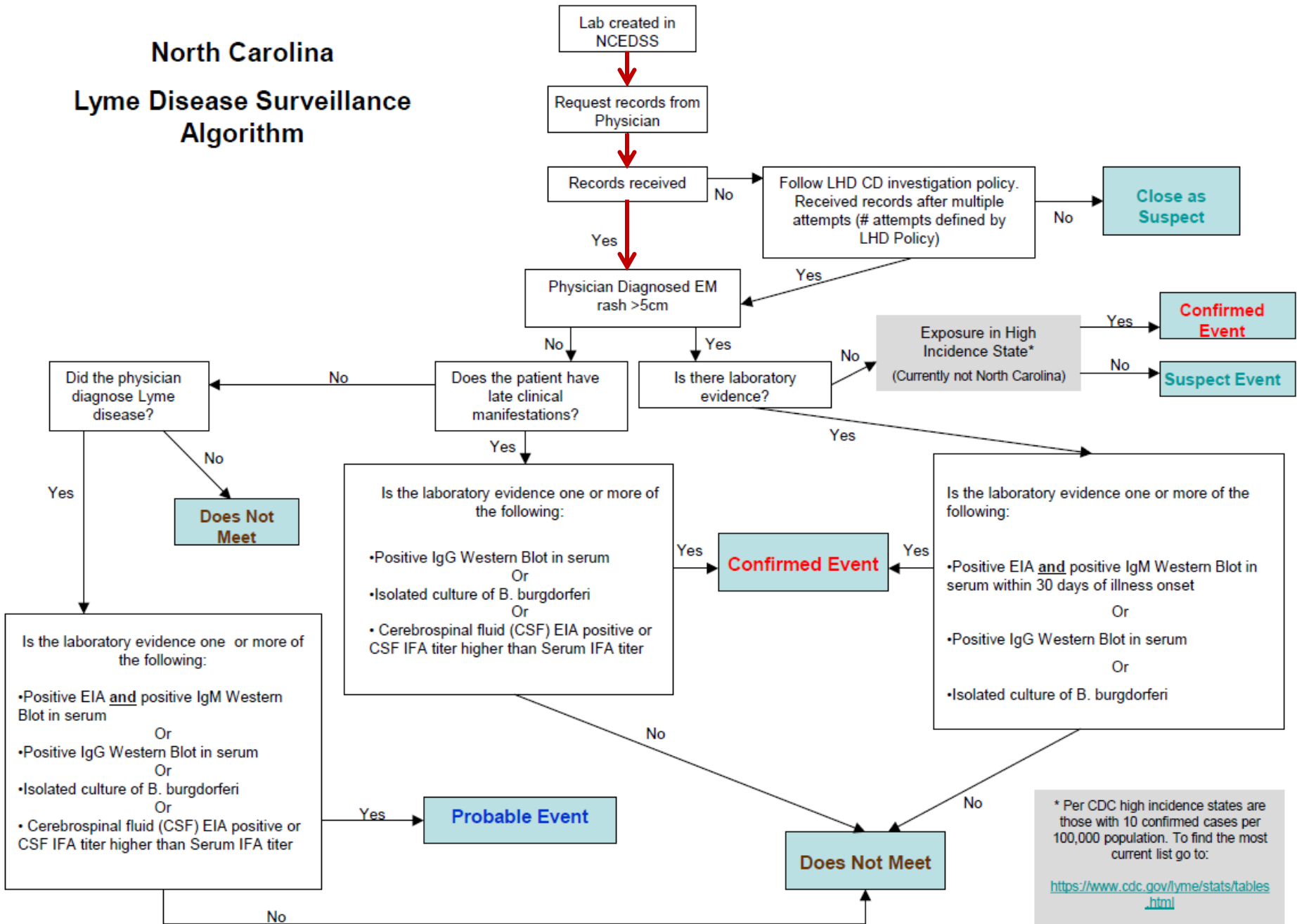
Date Assigned-Reassigned <input type="button" value="⊞"/>	05/10/2017 <input type="button" value="⊞"/>	
Group: (You cannot change your group selection unless you clear this entry by erasing the Date Assigned)	<input type="text"/>	Local patient identifier <input type="text"/>
* Select the reason for the assignment/reassignment	Original/Initial Assignment ▾	
Authorized Reporter	<input type="text"/>	Phone number <input type="text"/>
Classification status	Does not meet criteria ▾	
Notes	<input type="text"/>	

Date Assigned-Reassigned <input type="button" value="⊞"/>	07/12/2017 <input type="button" value="⊞"/> Add New	
Group: (You cannot change your group selection unless you clear this entry by erasing the Date Assigned)	State Disease Registrar	Local patient identifier <input type="text"/>
* Select the reason for the assignment/reassignment	Assign to State ▾	
Authorized Reporter	Alexis M Barbarin	Phone number (919) 546-1623
Classification status	Unspecified ▾	
Notes	<p>Hi</p> <p style="text-align: center;"></p> <p>Can you please take a moment to complete the clinical tab? We would like everyone to get into the habit of completing the clinical tab so that in the event that we conduct a retrospective analysis on vector-borne diseases, we have these data. Thank you for all your hard work!</p> <p>Alexis</p>	
Remove this event from my group's review and approval workflow?	No ▾	

CDC Reporting Information

Additional Date for a Reporting Date Basis (includes both Contacts and Cases) <input type="button" value="i"/>	05/05/2017 <input type="button" value="⊞"/>	
Is this event the responsibility of another state or country to report?	No ▾	
Report to CDC	No ▾	
Projected/Actual First CDC event date sent. <input type="button" value="i"/>	05/05/2017 <input type="button" value="⊞"/>	Date type <input type="text" value="Date of Laboratory Testing"/> ▾
CDC Event Date sent in the last transmission <input type="button" value="i"/>	<input type="text"/>	Date Type <input type="text"/>
CDC Event Date next send if recomputed <input type="button" value="i"/>	05/05/2017 <input type="button" value="⊞"/>	Date Type <input type="text" value="Date of Laboratory Testing"/> ▾

North Carolina Lyme Disease Surveillance Algorithm



* Per CDC high incidence states are those with 10 confirmed cases per 100,000 population. To find the most current list go to:
<https://www.cdc.gov/lyme/stats/tables.html>

Lyme Disease – Does not meet criteria

North Carolina Electronic Disease Surveillance System

3. Clinical - Lyme Disease (51)

Period of Interest Timeframe
FROM (32 DAYS PRIOR TO SYMPTOM ONSET): 06/09/2017 UNTIL (SYMPTOM ONSET): 07/11/2017

General Diagnostic Information

Is / was patient symptomatic for this disease? Yes

Date that best reflects the earliest date of illness identification 07/11/2017

Illness identification date represents: Date of laboratory testing

Did medical provider diagnosis Lyme Disease? No

Clinical Findings (including signs, symptoms, diagnostic tests, and complications)

Indicate each of the clinical findings that the patient had associated with this illness.

Meningitis	No
Encephalitis	No
Encephalomyelitis / meningoencephalitis	No
Radiculoneuropathy	No
Cranial neuritis, including Bell's Palsy	No
Recurrent brief attacks (weeks or months) of objective joint swelling in one or a few joints	No
Arthritis	No
Erythema migrans (bull's-eye skin lesion)	No
Myocarditis	No
EKG obtained	No
High degree (2nd or 3rd degree) heart block	No
Did patient have a reactive non-treponemal test for syphilis (i.e. VDRL, TRUST, RPR)? (Add new for additional tests)	No
Did the patient have CSF-VDRL?	No
Other symptoms, signs, clinical findings, or complications consistent with this illness	No

No physician's diagnosis, no clinical = Does not meet criteria

Lyme Disease - Suspect

North Carolina Electronic Disease Surveillance System

Enter Case ID Search Alexis Barbarn

Event Summary

Basic Information			
Event ID:	101278966		
Disease:	Lyme Disease (51)		
Person:	Birth Date:	Phone:	
Type:	Interactive		
Investigation Status:	Closed		
Linked Events/Contacts:	0 linked event(s)/contact(s) View		
Attachments:	0 attachment(s)		
Notifications:	Classification: Suspect County of residence: Vance County Event is in workflows View List		

[Edit Event Properties](#) [Copy Event](#)

Notes (Show My Notes)	
07/11/2017 01:46 PM (Generic) - Paulette Adams	Unable to receive clinical notes after phone calls and fax. Sent to State unable to verify.
06/26/2017 07:46 PM (Generic) - Paulette Adams	Third request to provider for clinical information
06/20/2017 10:26 AM (Generic) - Paulette Adams	Second request to provider to fax clinical information to CD nurse at VCHD.
06/14/2017 11:18 AM (Generic) - Paulette Adams	Called provider and requested clinical notes.

Repeated attempts

Event Data Lab Results Concerns Persons Tasks Event Properties Event History

Labs								
Lab No.	Specimen Date	Specimen Number	Specimen Type	Result	Result Status	Result Value	Test	Last Update
1	06/05/2017	1706052075		Positive			B burgdor IgG Titr Ser IF ...	06/12/2017
1	06/05/2017	1706052075		Negative			B burgdor IgM Titr Ser IF ...	06/12/2017

[Add Lab Result](#) [Update Lab Result](#) [Delete Lab Result](#)

Suspected case: a case with **no clinical information**, but has laboratory results that would otherwise make the case probable or confirmed.

Lyme Disease – Probable

North Carolina Electronic Disease Surveillance System

3. Clinical - Lyme Disease (51)

Enter Case ID [] Search Alexis Barbarin

[Jump To...] Save Save & Stay Cancel

Expand Details

Period of Interest Timeframe

FROM (32 DAYS PRIOR TO SYMPTOM ONSET): 05/18/2017 UNTIL (SYMPTOM ONSET): 06/19/2017

General Diagnostic Information

Is / was patient symptomatic for this disease? Yes

Date that best reflects the earliest date of illness identification 06/19/2017

Illness identification date represents: Date of laboratory testing

Did medical provider diagnosis Lyme Disease? Yes

Clinical findings (including signs, symptoms, diagnostic tests, and complications)

Indicate each of the clinical findings that the patient had associated with this illness.

Meningitis	No
Encephalitis	No
Encephalomyelitis / meningoencephalitis	No
Radiculoneuropathy	No
Cranial neuritis, including Bell's Palsy	No
Recurrent brief attacks (weeks or months) of objective joint swelling in one or a few joints	No
Arthritis	No
Erythema migrans (bull's-eye skin lesion)	No
Myocarditis	No
EKG obtained	No
High degree (2nd or 3rd degree) heart block	No
Did patient have a reactive non-treponemal test for syphilis (i.e. VDRL, TRUST, RPR)? (Add new for additional tests)	No
Did the patient have CSF-VDRL?	No
Other symptoms, signs, clinical findings, or complications consistent with this illness	Yes

Event Data Lab Results Concerns Persons Tasks Event Properties Event History

Lab No.	Specimen Date	Specimen Number	Specimen Type	Result	Result Status	Result Value	Test	Last Update
1	06/19/2017	17049627890		Negative	Final Results		B burgdor IgG Patrn Ser IB-...	06/23/2017
1	06/19/2017	17049627890	→	Positive	Final Results		B burgdor IgM Patrn Ser IB-...	06/23/2017
1	06/19/2017	17049627890			Final Results	<0.91	B burgdor IgG+IgM Ser-aCnc ...	06/23/2017
1	06/19/2017	17049627890	→		Final Results	0.97	B burgdor IgM Ser EIA-aCnc	06/23/2017

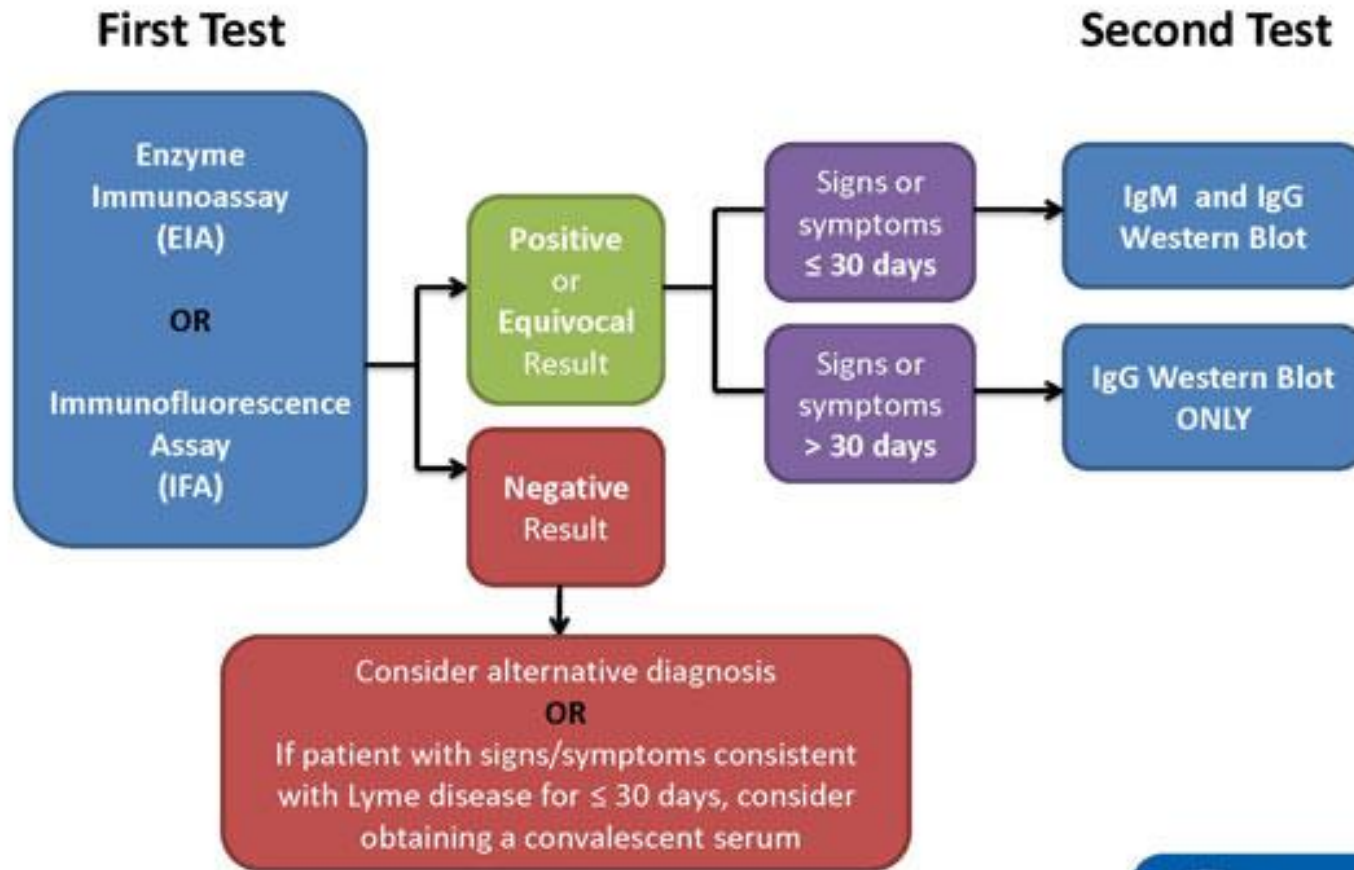
Add Lab Result Update Lab Result Delete Lab Result

Probable requires IgG (Pos) or IgM (Pos) and EIA (Equivocal or Pos)

Changes in Lyme disease case definition

- **January 2017** – CDC amended the previous definition of exposure criteria from “endemic counties” to high and low-incidence states.
 - **High incidence states** - ≥ 10 confirmed cases of LD per 100,000 residents over the past 3 reporting years
 - **Low incidence states** - < 10 confirmed cases per 100,000 residents over the past 3 reporting years
- Cases of Erythema Migrans (EM) alone with exposure to tick habitat in a high-incidence state are classified as **confirmed**.
- All cases of LD with late manifestations or EM in a low-incidence state must be accompanied by lab tests to meet case definition of a confirmed case.
- **As of January 2017, North Carolina is a low-incidence state.**

Two-Tiered Testing for Lyme Disease



National Center for Emerging and Zoonotic Infectious Diseases
Division of Vector Borne Diseases | Bacterial Diseases Branch



Lyme - Confirmed

- **Several ways to reach a confirmed case:**
 - EM rash >5cm + travel to “high incidence state”
 - EM rash >5cm + lab evidence
 - Late clinical manifestations + lab evidence
- **Lab evidence**
 - **Before 30 days:**
 - +EIA and +IgM Western Blot
 - +IgG Western Blot
 - Isolated culture of *B. burgdorferi*
 - **After 30 days:**
 - IgM no longer valid – patient should have seroconverted
 - +IgG Western Blot
 - Isolate culture of *B. burgdorferi*
 - CSF EIA positive or CSF IFA titer higher than Serum IFA titer

Lyme Disease - Confirmed

North Carolina Electronic Disease Surveillance System



Enter Case ID

Search

Alexis Barbarin

3. Clinical -

- Lyme Disease (51)

[Jump To...]

Save

Save & Stay

Cancel

Expand Details

Period of Interest Timeframe	
FROM (32 DAYS PRIOR TO SYMPTOM ONSET):	05/11/2017
UNTIL (SYMPTOM ONSET):	06/12/2017
General Diagnostic Information	
Is / was patient symptomatic for this disease?	Yes
Date that best reflects the earliest date of illness identification	06/12/2017
Illness identification date represents:	Date symptoms began
Did medical provider diagnosis Lyme Disease?	Yes
Clinical Findings (including signs, symptoms, diagnostic tests, and complications)	
Indicate each of the clinical findings that the patient had associated with this illness.	
Meningitis	No
Encephalitis	No
Encephalomyelitis / meningoencephalitis	No
Radiculoneuropathy	Yes
Onset date	06/12/2017
Cranial neuritis, including Bell's Palsy	Yes
Recurrent brief attacks (weeks or months) of objective joint swelling in one or a few joints	No
Arthritis	No
Erythema migrans (bull's-eye skin lesion)	No
Myocarditis	No
EKG obtained	Unknown
High degree (2nd or 3rd degree) heart block	No
Did patient have a reactive non-treponemal test for syphilis (i.e. VDRL, TRUST, RPR)? (Add new for additional tests)	Unknown Add New
Did the patient have CSF-VDRL?	No
Other symptoms, signs, or complications consistent with this illness	Yes
Please specify	Patient said she noticed what appeared to be bug bite on left lateral chest wall 5-9-2017. The small red, round area at bite site grew to be about 2" X 5" in a week, then faded. She experienced mild nausea, body aches and feeling feverish 2 nights within the next week and then on 6-12-2017 started developing the facial weakness on the right side accompanied by right ear pain. She went to MD on 6-19-2017 when the facial palsy became bilateral.
Please enter comments about signs, symptoms, and clinical findings only in this section.	

Event Summary

Basic Information

Event ID:	101285984
Disease:	Lyme Disease (51)
Person:	
Type:	Batch
Investigation Status:	Open
Linked Events/Contacts:	0 linked event(s)/contact(s) View
Attachments:	1 attachment(s) Add View
Notifications:	Classification: Unspecified County of residence: Union County Event is in workflows View List

Notes [\(Add/Edit\)](#) [Show My Notes](#)

06/27/2017 04:04 PM (Generic) - Ashley Burts
Mom interviewed. Records attached.

[Edit Event Properties](#)

[Copy Event](#)

[Event Data](#)

[Lab Results](#)

[Concerns](#)


[Persons](#)

[Tasks](#)

[Event Properties](#)

[Event History](#)

Labs

Lab No.	Specimen Date	Specimen Number	Specimen Type	Result	Result Status	Result Value	Test	Last Update
▶ 1	06/22/2017	17307613360		Positive	Final Results		B burgdor IgG Patrn Ser IB-...	06/27/2017
1	06/22/2017	17307613360		Positive	Final Results		B burgdor IgM Patrn Ser IB-...	06/27/2017
1	06/22/2017	17307613360			Final Results	2.60	B burgdor IgG+IgM Ser-aCnc ...	06/27/2017
1	06/22/2017	17307613360			Final Results	2.45	B burgdor IgM Ser EIA-aCnc	06/27/2017

[Add Lab Result](#)

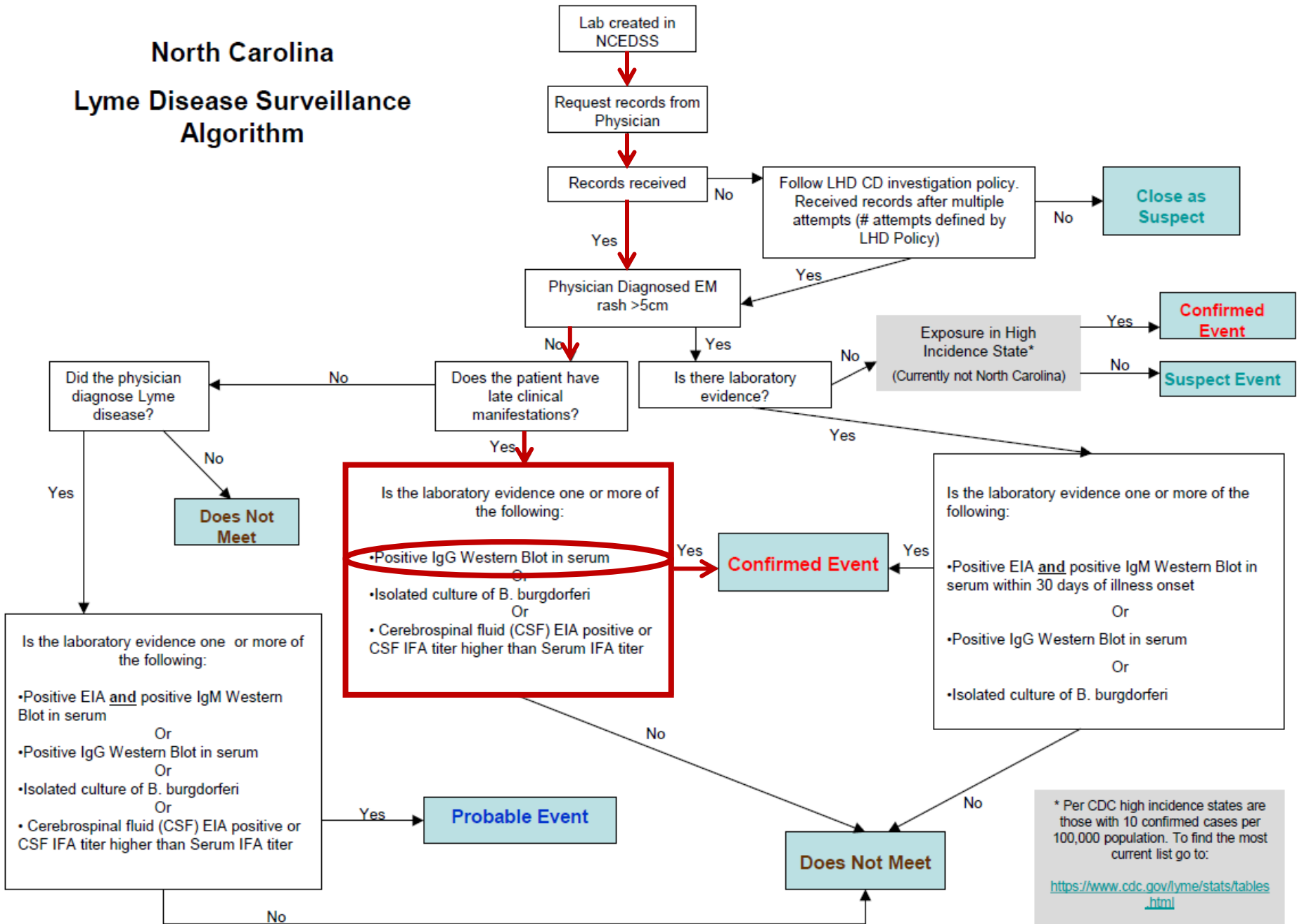
[Update Lab Result](#)

[Delete Lab Result](#)

Details

Last Update:	06/27/2017
Updated By:	Automated Feeds
Specimen Info	
Specimen Date:	06/22/2017
Specimen Number:	17307613360
Specimen Received Date:	06/22/2017
Report Status:	Final
Report Change Date:	06/26/2017
Tests	
Test:	B burgdor IgG Patrn Ser IB-imp Borrelia burgdorferi Ab.IgG band pattern: IB
Result:	Positive
Ref Range:	Positive: 5 of the following

North Carolina Lyme Disease Surveillance Algorithm



* Per CDC high incidence states are those with 10 confirmed cases per 100,000 population. To find the most current list go to:
<https://www.cdc.gov/lyme/stats/tables.html>

A retrospective analysis of RMSF in North Carolina 2008-2016



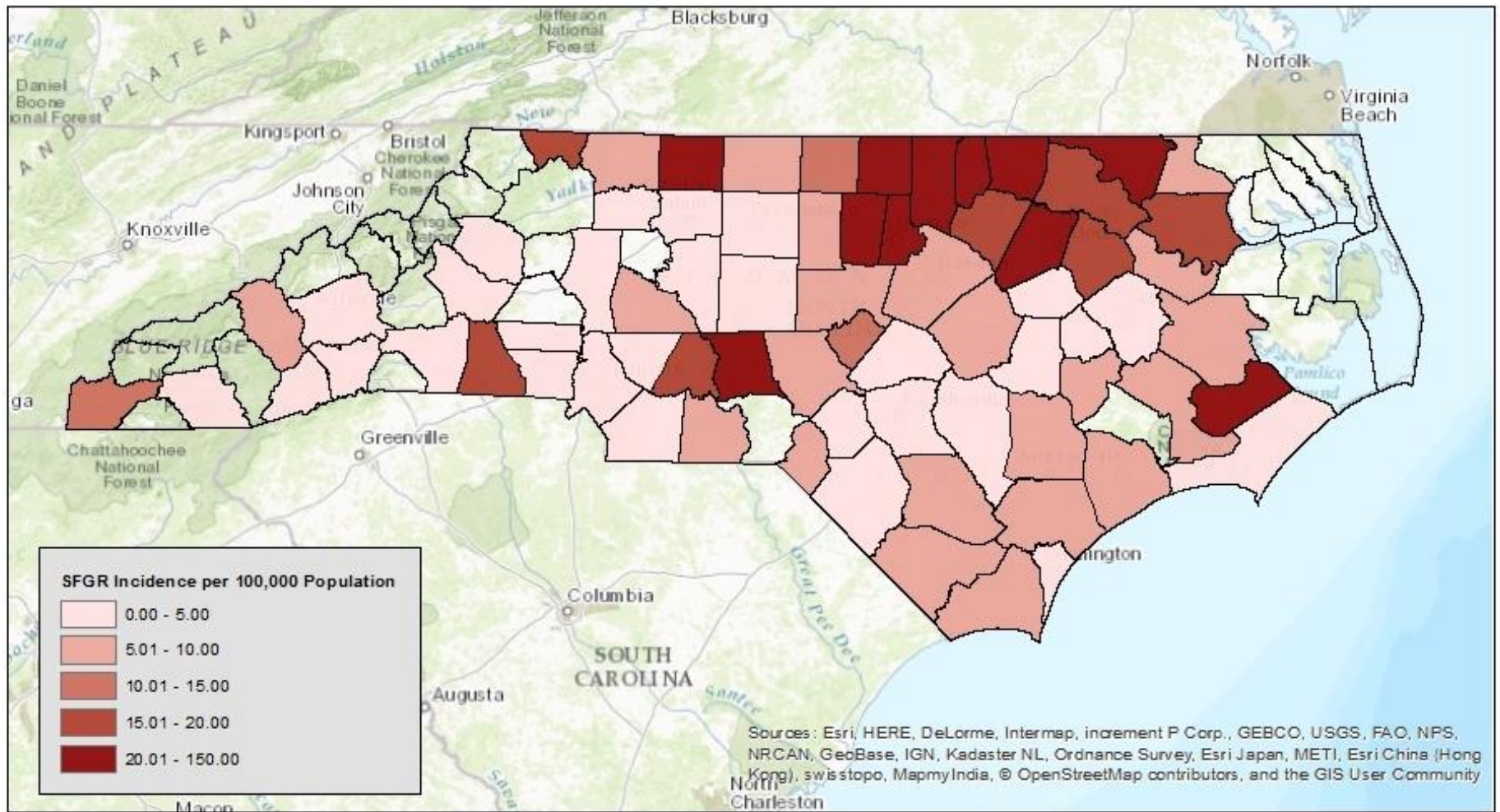
Surveillance summary of SFGR 2008-2016



Kelsey Sumner, UNC

- Which risk factors indicate whether a probable case of SFGR is actually a confirmed case?
- Which risk factors are associated with hospitalization?
- Starting data set: N=3881
- Actual data set: N=619

Spotted Fever Group Rickettsiosis Incidence 2008 to 2016 N=619



Questions?

Alexis M. Barbarin, PhD

Public Health Entomologist

Alexis.Barbarin@dhhs.nc.gov

(919) 546-1623

Carl Williams, DVM

State Public Health Veterinarian

Carl.Williams@dhhs.nc.gov

(919) 546-1660

Ronna Chan, PhD.

Zika Registry Coordinator

Ronna.Chan@dhhs.nc.gov

(919) 546-1638

Michael Doyle, MS

Public Health Entomologist

Michael.doyle@dhhs.nc.gov

(919) 546-1637

Autumn Locklear, MPH

Zika Screening Coordinator

Autumn.Locklear@dhhs.nc.gov

(919) 546-1614

