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Zoonotic Disease Updates

**Epidemiology and Laboratory
Capacity Conference – Sept. 2019**

DSHS Zoonosis Control Branch

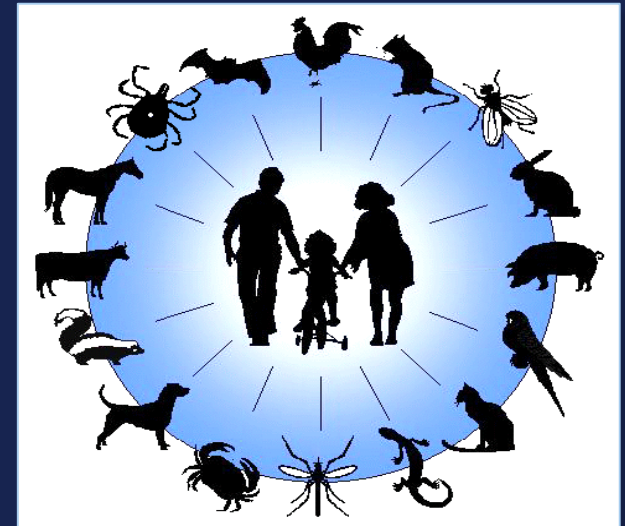
Updates and Highlights



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- Arboviral diseases
 - *Aedes*-transmitted arboviruses
 - 2018 summary
 - 2019 updates
- Anthrax
- Brucellosis
- Malaria
- Lyme disease



Aedes-transmitted Arboviruses

Zika, chikungunya, and dengue

- Commonalities: transmission, symptomology, regions of endemicity
- Zika & chikungunya: recent emergence followed by sharp downturn
- Sporadic, seasonal risk of local vector-borne transmission in South Texas
 - 2013: dengue outbreak in LRGV & across border
 - 2015: isolated chikungunya case in Cameron County
 - 2016 & 2017: sporadic Zika disease cases in Hidalgo, Cameron counties
 - 2018: isolated dengue case in Starr County



Image Source: <https://phil.cdc.gov/phil/details.asp>



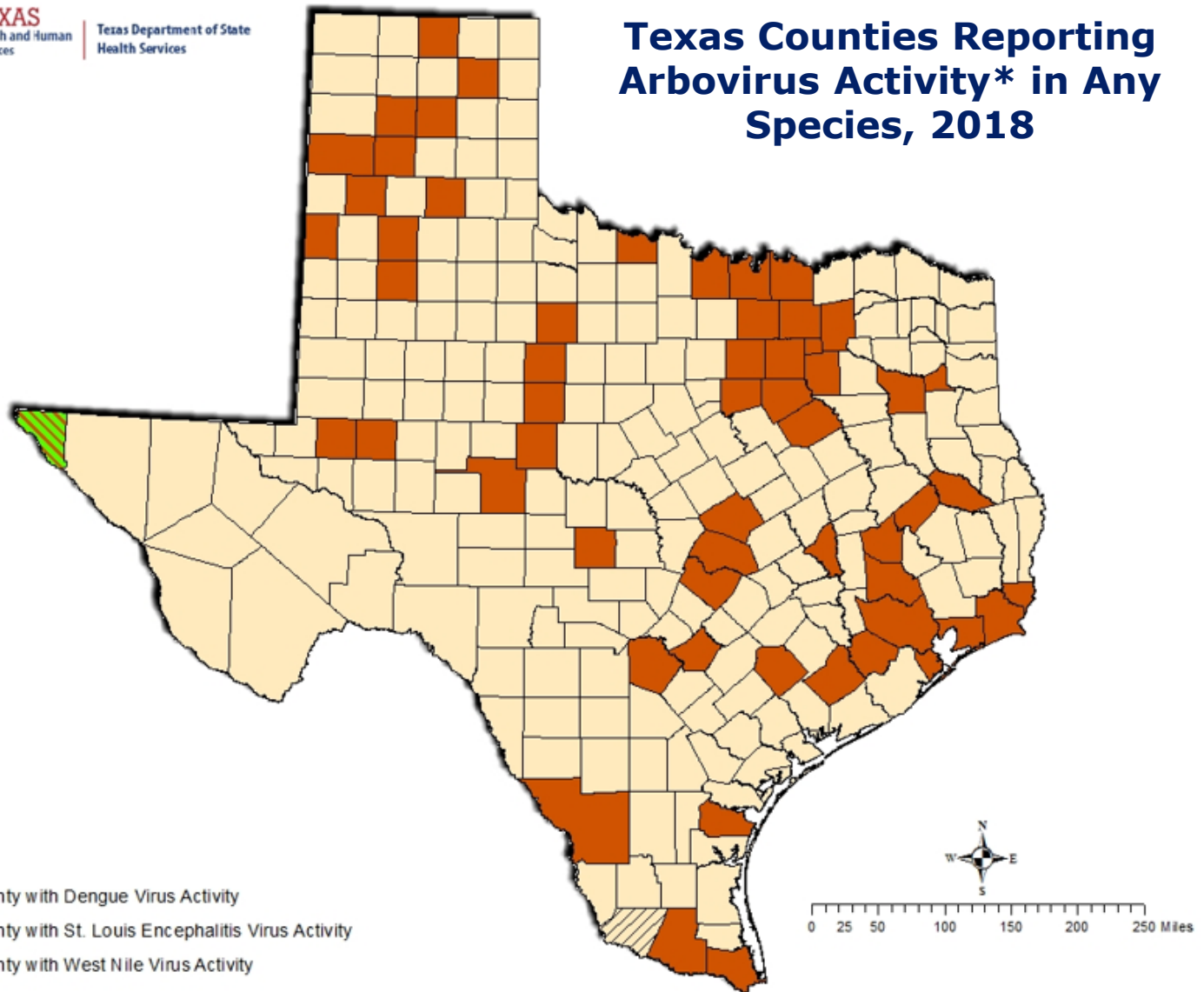
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Texas Counties Reporting Arbovirus Activity* in Any Species, 2018



* Indicated by an arbovirus-positive bird, mosquito pool, sentinel chicken, horse, or human (disease case or presumptive viremic donor). Excludes imported cases of chikungunya, dengue, Zika, and other arboviruses. Absence of reported activity from counties may be due to absence of a surveillance program for non-human cases.

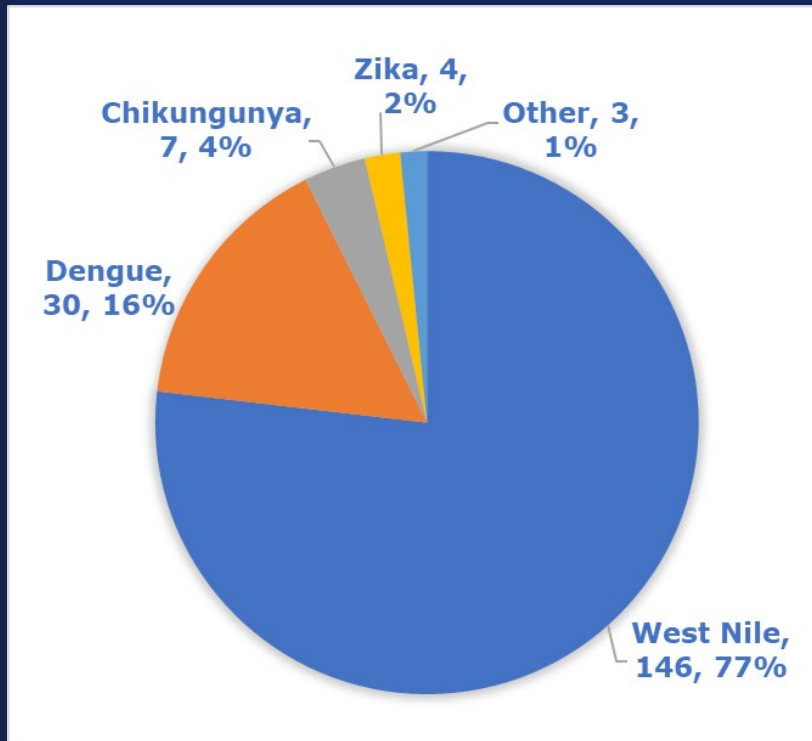


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2018 Human Arbovirus Activity

- Total human arbovirus disease cases: 180



Notably:

- One locally-acquired dengue case in Starr County during outbreak in northern Mexico
- Globally decreased Zika activity
- Trend of low West Nile disease case totals continues since large 2012 outbreak (with over 1,800 cases)



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2019 Updates (Provisional)

Dengue: 23 cases (as of 9/20/19)

- Acquisition of infection demonstrates widespread global risk
- Strong increase in dengue activity in Central America and southern Mexico

Dengue Cases Reported in Texas, 2019,
as of 9/20/19, N=23

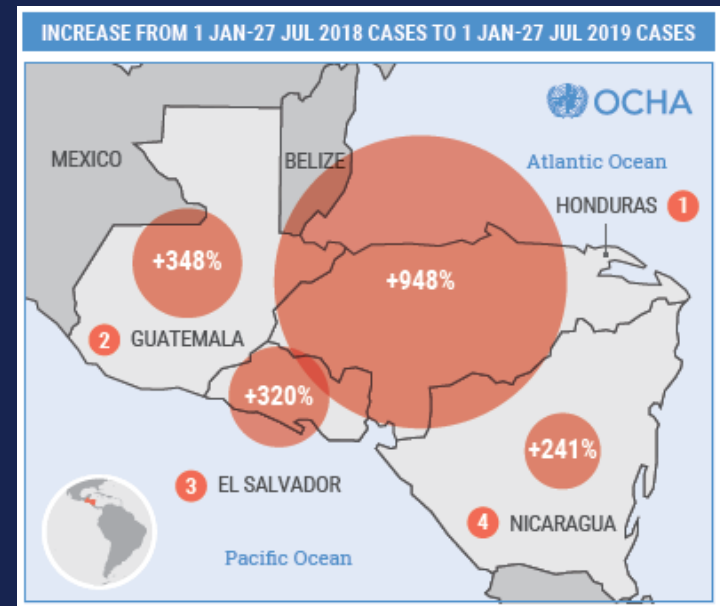
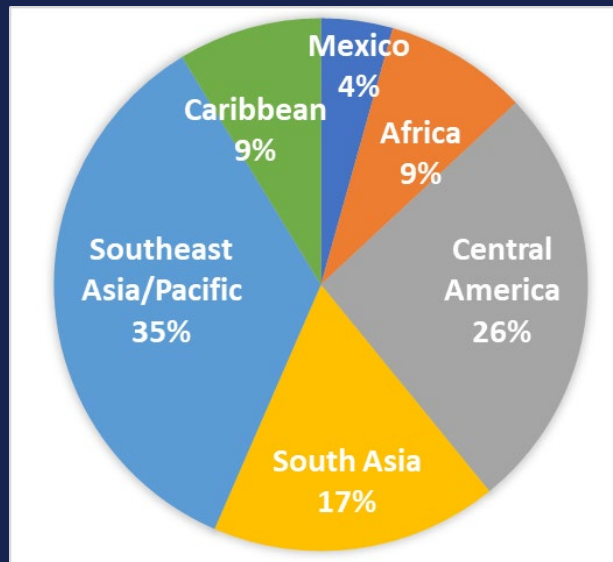


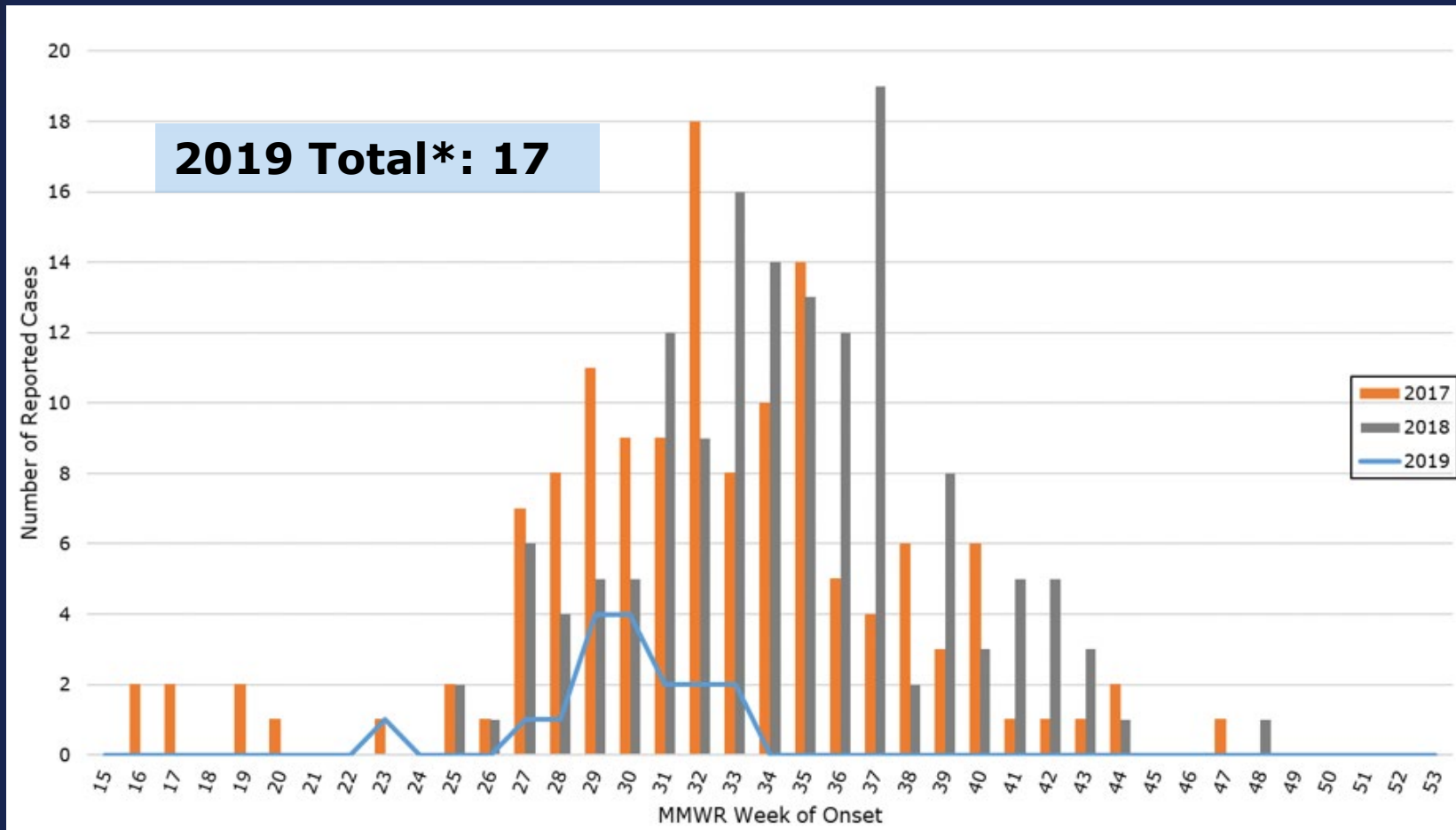
Image Source: PAHO/WHO, www.reliefweb.int

Human West Nile Disease Cases Reported in Texas, by MMWR Week of Onset, 2017-2019*



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2019 Updates (Provisional)

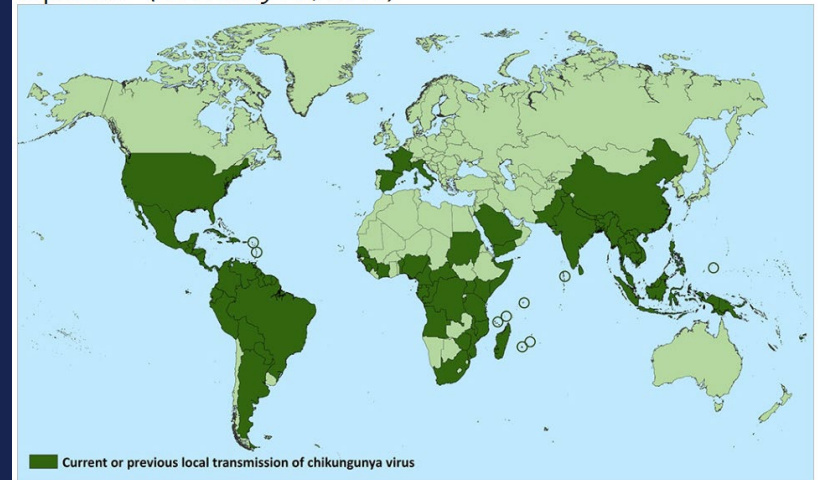
Zika Disease: 1 case

- Low transmission in Mexico, no current outbreaks worldwide; Texas case acquired in Philippines
 - 2018 Indian outbreak, South & Southeast Asia and Central Africa spread
- US Zika Infant & Pregnancy Registry ended enrollment in March 2018
- Antibody testing and cross-reactivity with dengue continues to cause issues

Chikungunya: 6 cases

- Similar global risk to dengue

Countries and territories where chikungunya cases have been reported* (as of May 29, 2018)



*Does not include countries or territories where only imported cases have been documented.



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Case Definition Updates

Yellow Fever

- Specified clinical criteria
- Epi-linkage included alongside testing and clinical criteria in probable definition
- Brought lab criteria up to date:
 - Removal of irrelevant diagnostic methods (CF, IFA, HI)
 - IgM with PRNT confirmation included
- Exclusion of those with a history of yellow fever vaccination in the 30 days prior to onset in most cases

Arbovirus (includes West Nile, others)

- More nuanced consideration of cross-reactivity in interpretation of PRNT results



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Anthrax

- Caused by *Bacillus anthracis*, a spore-forming Gram positive rod
 - *B. cereus* expressing anthrax toxins added to case definition
- Humans are infected through skin contact or inhalation
- Suspected isolates sent to LRN Labs
- ****Anthrax is reportable upon suspicion****
 - Clinical diagnosis from providers
 - Suspect samples at laboratories





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Updates to Case Definition

- Additional confirmatory laboratory testing
 - PCR positive from a LRN-validated test
 - Lethal factor testing (available at CDC)
- Probable case status, clinically compatible illness and
 - Epidemiological linkage to confirmed case or lab confirmed exposure
 - Gram stain positive rods
 - Positive result from a CLIA-accredited laboratory
- Suspect case status for those with lab tests ordered
 - Can help LHDs to request records for clinically compatible cases with no known epidemiological link to anthrax
- Addition of *B. cereus* expressing anthrax toxin to case definition
 - Historical cases among metal workers in Texas
 - Request to forward isolates from anthrax-like illness with *B. cereus* identified
 - Fully virulent *B. cereus biovar anthracis* is a Select Agent

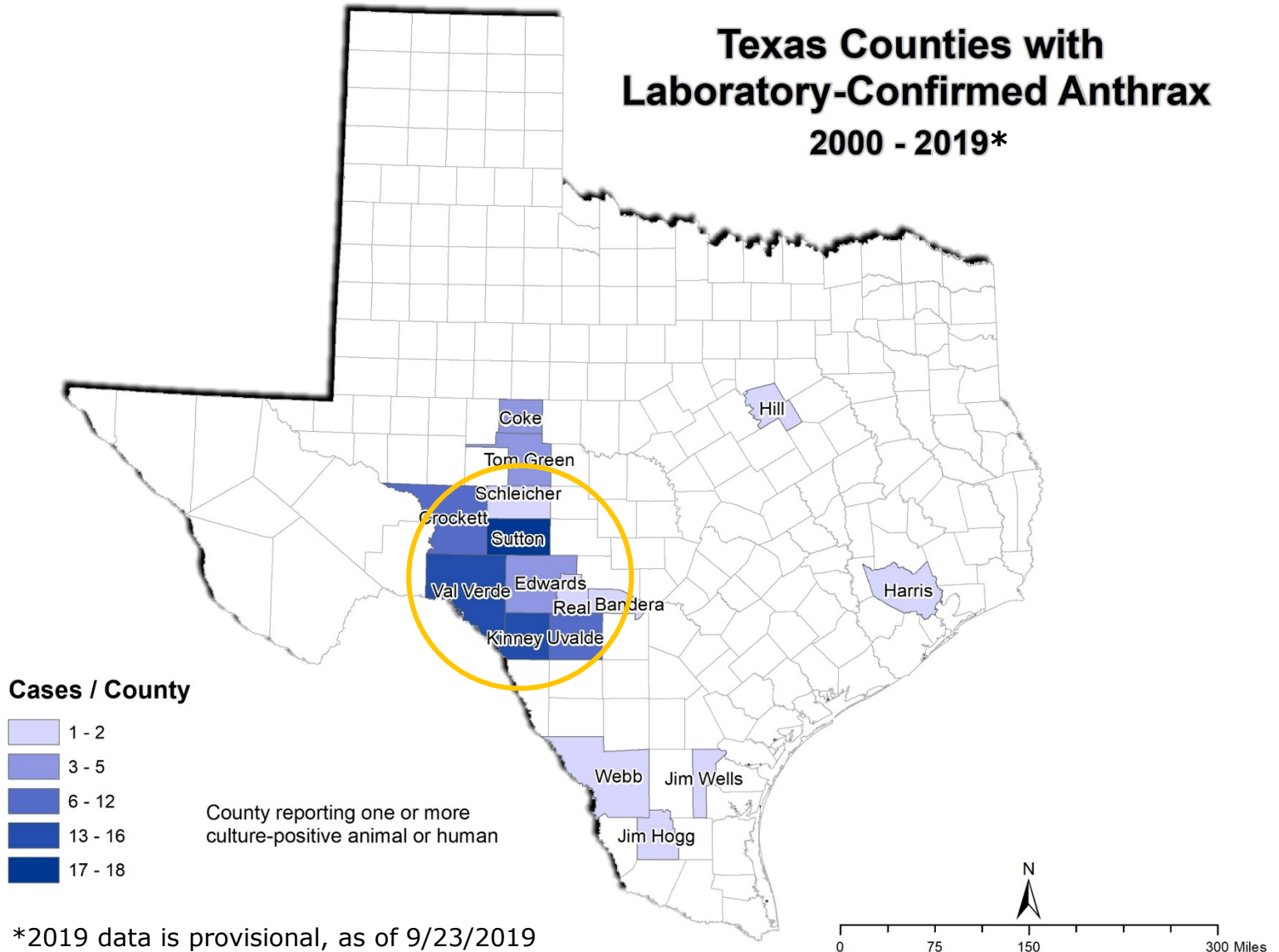


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Texas Counties with Laboratory-Confirmed Anthrax 2000 - 2019*





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2019 Animal Outbreak

- Anthrax is enzootic in area of Texas between Ozona, Eagle Pass and Uvalde
- Recent increase in positives from animals reported by Texas Veterinary Medical Diagnostic Laboratory
 - As of September 23, 2019:
 - 25 culture positives from five counties in southwestern Texas
 - Exotic, domestic, and wild animals positive
- Most reported positives since 2001
- Barriers to reporting
 - Ranchers might be hesitant to test animals due to Texas Animal Health Commission quarantine
 - Might be clinically diagnosed and not tested
 - Other positives on same ranch previously reported
 - Difficulty of getting to animals on large properties

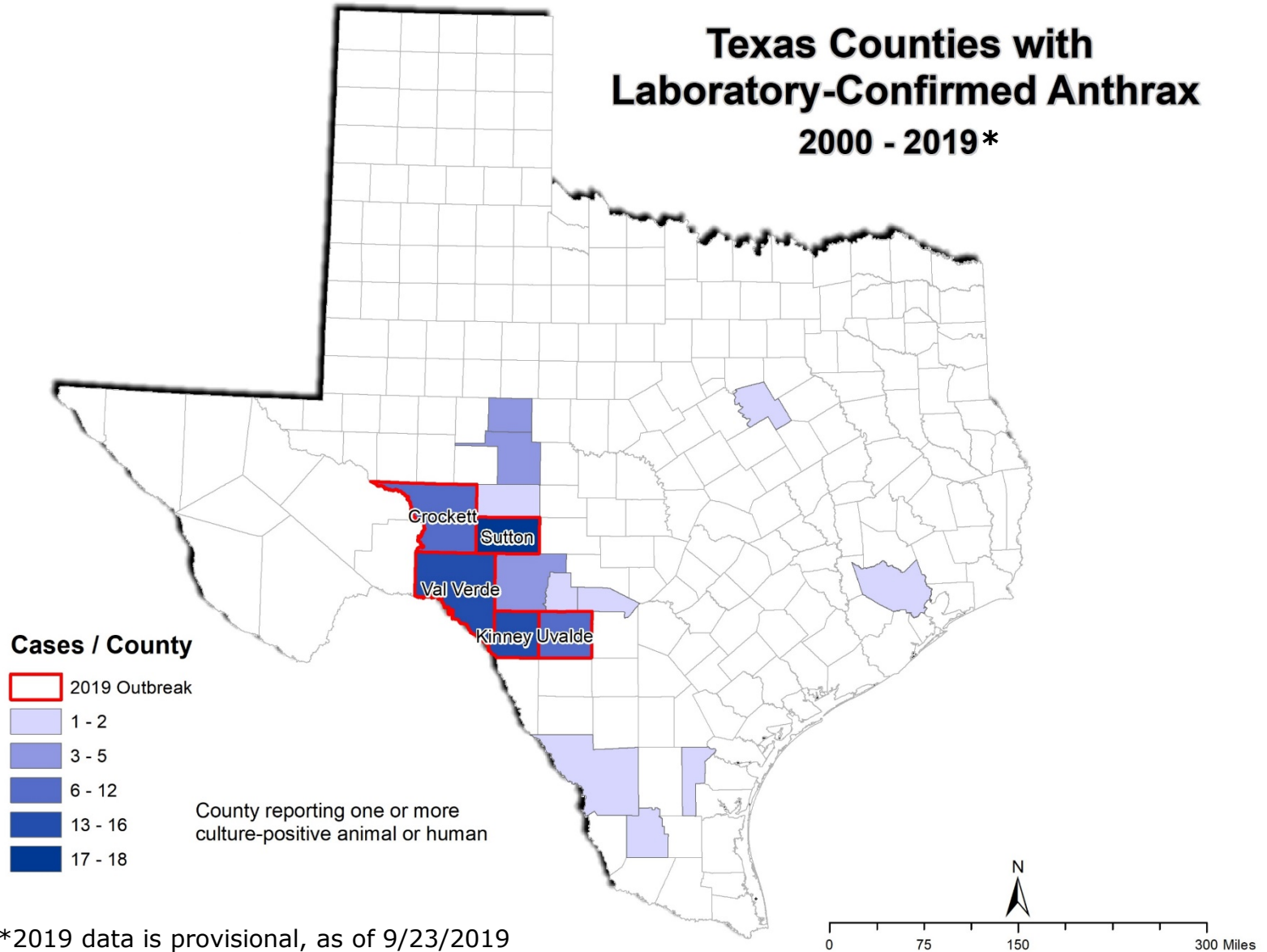


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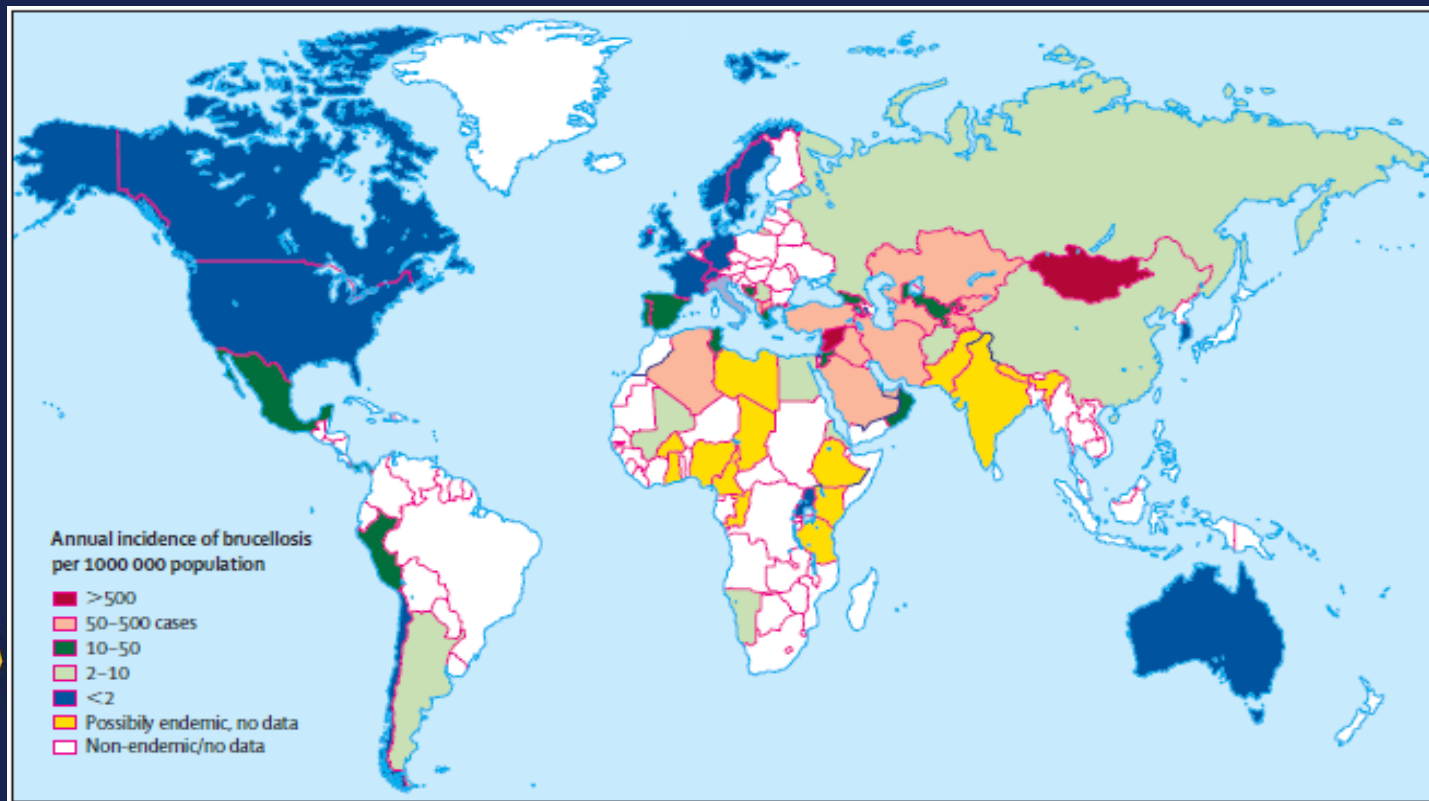
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Texas Counties with Laboratory-Confirmed Anthrax 2000 - 2019*



Brucellosis: Worldwide Distribution



Source: Pappas, G., et al. (2006) The new global map of human brucellosis. Lancet Infect Dis, 6, 91-99.



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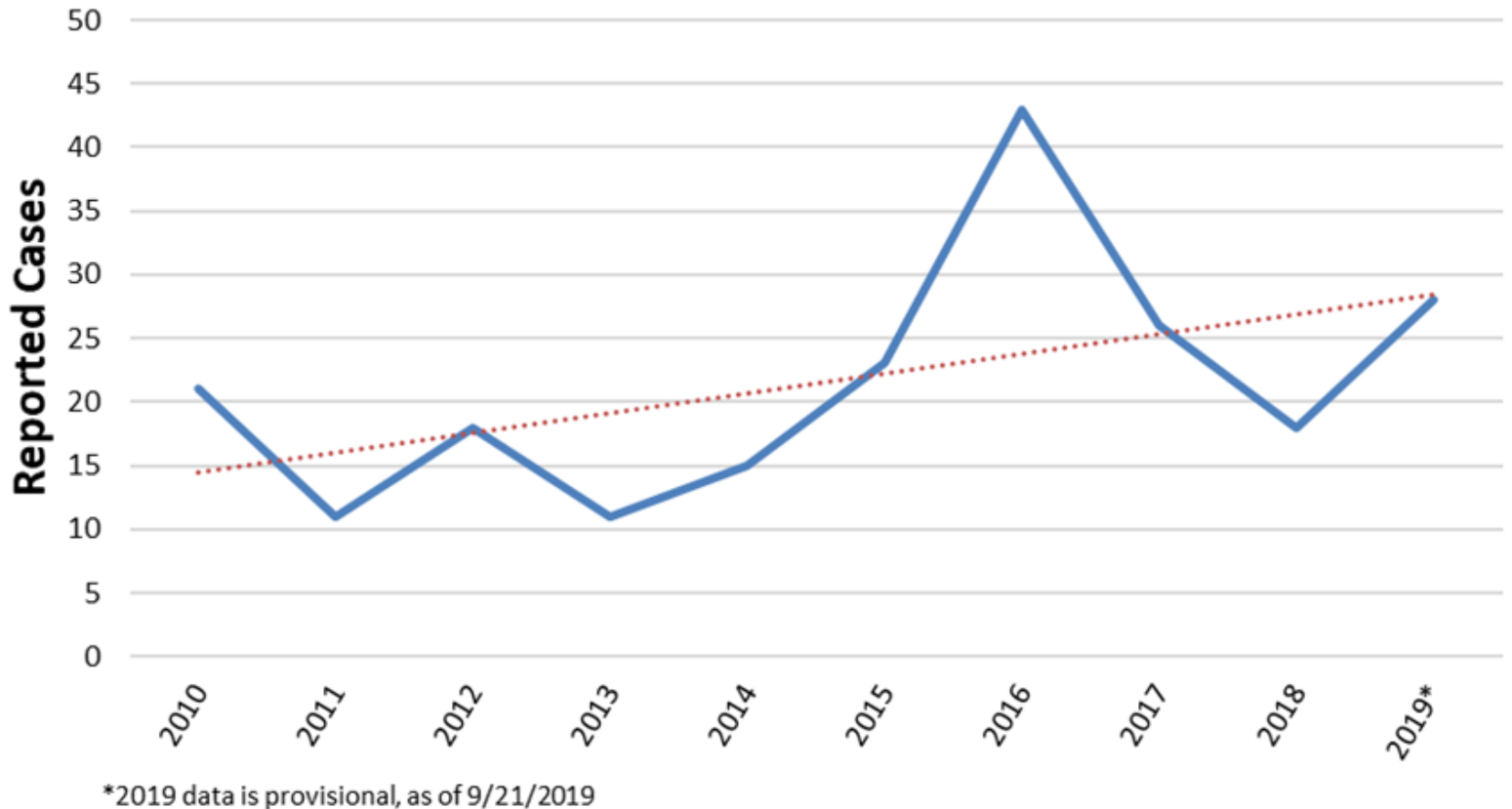
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Reported Cases of Brucellosis in Texas, 2010-2019* (n=214)



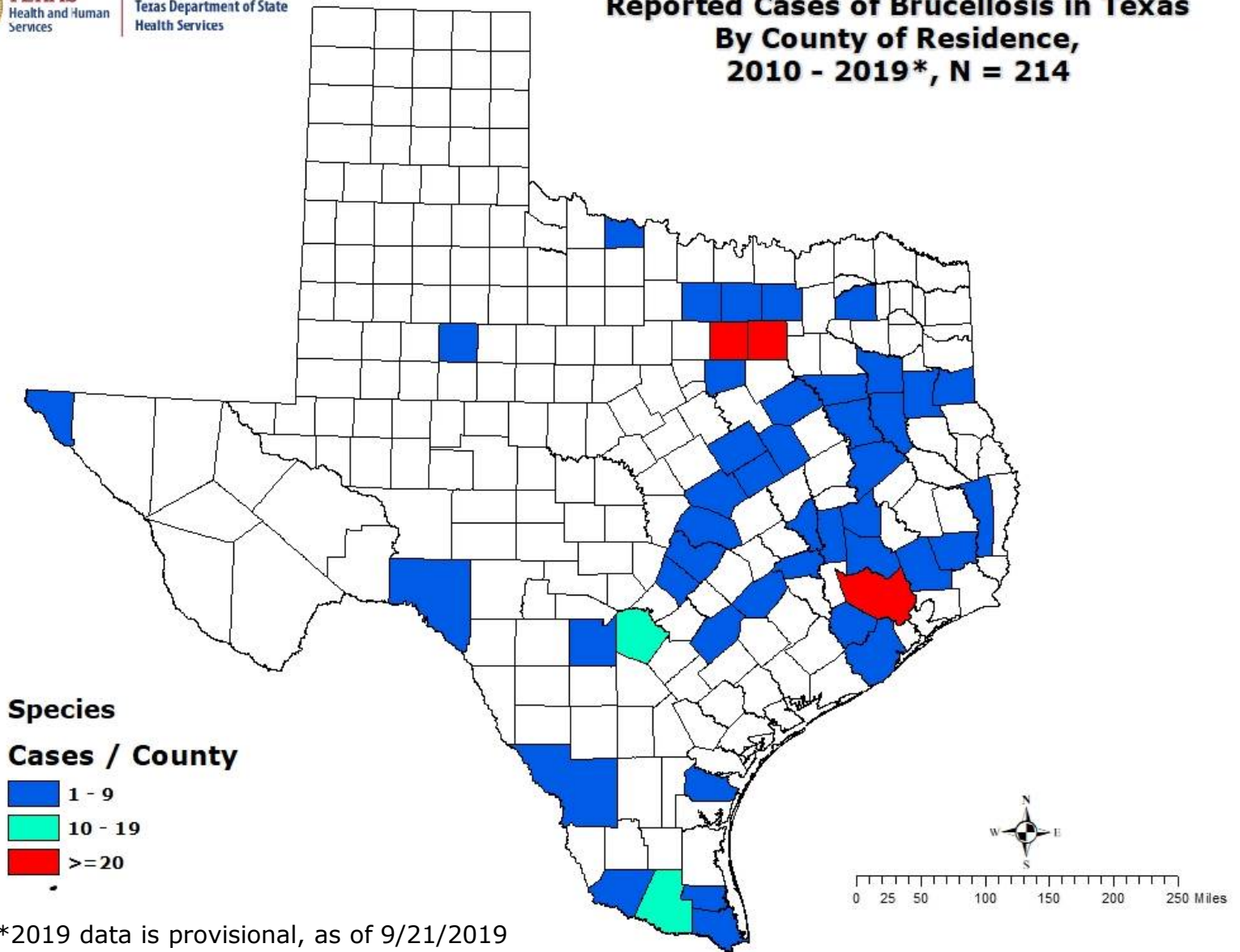
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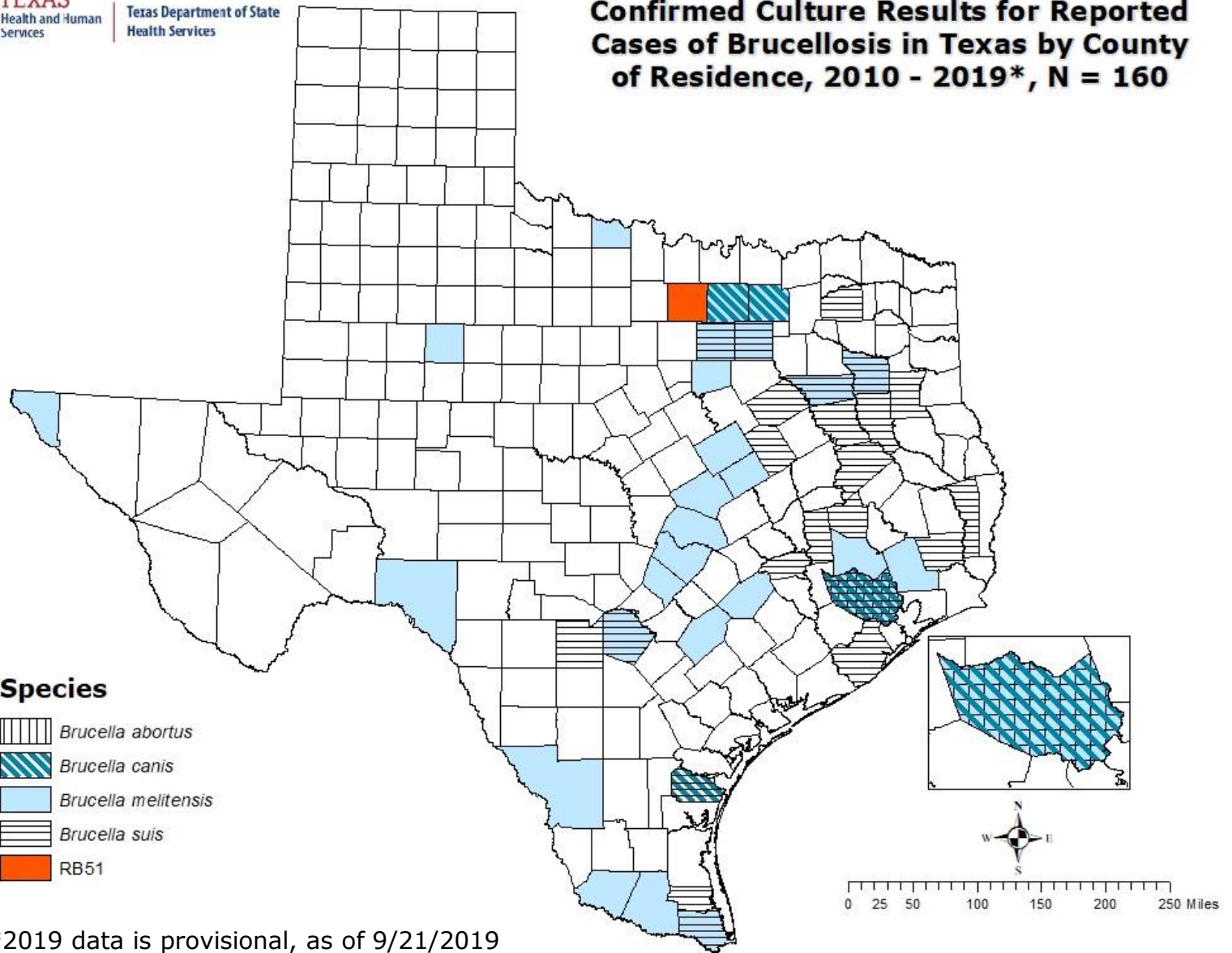


Reported Cases of Brucellosis in Texas By County of Residence, 2010 - 2019*, N = 214





Confirmed Culture Results for Reported Cases of Brucellosis in Texas by County of Residence, 2010 - 2019*, N = 160



*2019 data is provisional, as of 9/21/2019

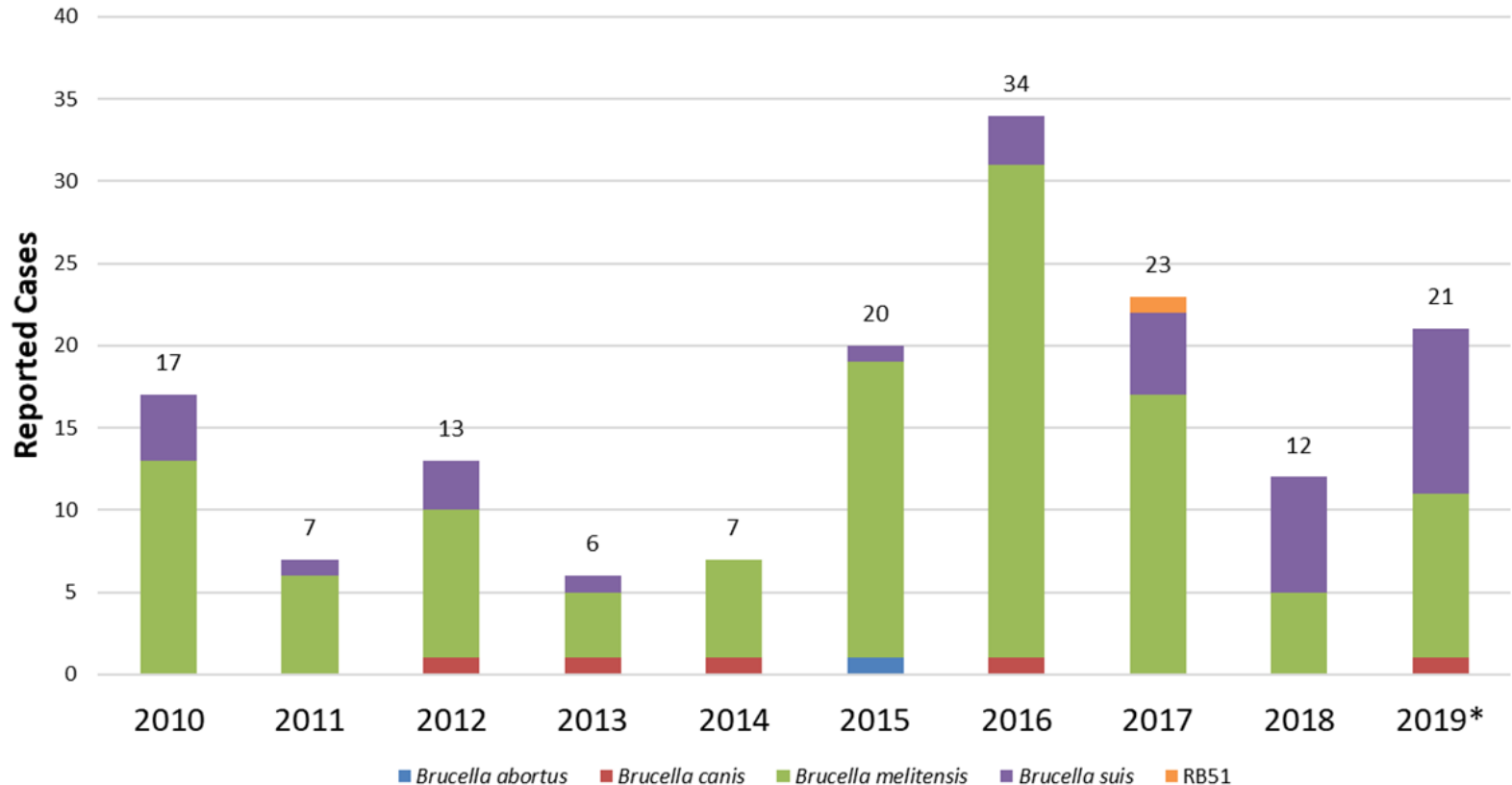
Brucella Species Identified in Confirmed Cases by Year, Texas, 2010-2019* (n=160)



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*2019 data is provisional, as of 9/21/2019

Investigating Laboratory Exposures

- Brucellosis is most common laboratory-associated bacterial infection
 - Easily aerosolized, low infectious dose
 - Laboratorians not always aware when *Brucella* is suspected
 - Though *B. canis* is not a Select Agent, still a risk for lab acquisition
- Follow up for those with high risk exposure
 - Fever/symptom watch for 24 weeks
 - Serologic testing at every six weeks after last exposure for 24 weeks
 - Serology not available for *B. canis* or RB51
 - Doxycycline and rifampin for three weeks
 - RB51 resistant to rifampin



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Preventing Aerosolization

Aerosolization

Aerosolization can occur during any procedure which imparts energy into a microbial suspension, producing aerosols or droplets which may contain infectious organisms. Aerosols are very small particles that may remain suspended in the air and can be inhaled and retained in the lungs. Droplets are larger particles which can settle onto surfaces and gloves due to gravity. Droplets may also come into contact with the mucous membranes of the person performing the procedure.

Safety Precautions

Laboratory exposures can be decreased by working in a BSC using BSL-3 practices and appropriate BSL-3 PPE when a biothreat agent is suspected. Identified aerosol-generating procedure risks should be mitigated.

Your facility may identify additional aerosol generating procedures based on the laboratory's risk assessments.

Examples of Aerosol Producing Procedures

- Opening culture plate, sniffing plates (Examining colony morphology/growth)
- Heat fixing a slide
- Dispensing pipette tips
- Centrifuge setup/run/unloading
- Vortexing
- Spills or splashes of liquid media
- Subculturing positive blood culture bottles
- Inoculation of media (plate or tube)
- Preparing samples for automated ID systems
- Open flames, sterilizing loops
- Sonicating
- Pipetting
- Catalase test
- Using automated and manual identification systems (e.g., MALDI-TOF, Vitek, API 20 NE, Bactec)

Investigating Laboratory Exposures



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- Collect information on type of exposure:
 - Manipulation of specimen
 - What was done with the isolate
 - Proximity to isolate being manipulated
 - Safety precautions
 - Biosafety cabinet
 - Personal protective equipment
 - Immune status of exposed person
- Assist with risk classification:
 - Minimal
 - Low
 - High
- Provide post-exposure prophylaxis and testing recommendations

Individual's Name: _____ Date of Birth: ____/____/____

Lab Activities					
Please check all of the activities that were performed on the isolate and where these were performed.					
Type of Manipulation	Worked with...		Did not work with but was...		Unknown
	In hood	Out of hood	≤5 ft away	≥5 ft away	
Antibiotic resistance test	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Blood culture bottle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Broke container of <i>Brucella</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Catalase test*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Centrifuge setup or run*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Examined growth on media	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flaming loop	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gram stain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inoculation of media	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Liquid suspension	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mouth pipette	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Opened a plate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oxidase test	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sniffed plate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sonication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Spilled media with culture*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Splashed media with culture*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Subculture isolate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Urea test	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vortexing*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

* Manipulation classified as an aerosol generating procedure. Centrifuging is considered an aerosol generating event when performed without sealed carriers. Manipulations like automated pipetting of a suspension containing the organisms, grinding, blending, or shaking the specimen, or procedures for suspension in liquid to produce standard concentration for identification may require further investigation. From Traxler et al. 2013 <http://jcm.asm.org/content/51/9/3132>

Risk Assessment
Use the information obtained in the interview and the "Laboratory Exposure Risk Assessment and Recommendations" table below to properly assign a risk classification to the exposed individual. Follow-up/monitoring should be conducted accordingly. Please contact your regional or local health department for assistance determining an exposed individual's level of risk.

Risk Level: High Risk Low Risk Minimal (but not zero) Risk Unsure/Don't Know

Laboratory Exposure Risk Assessment and Post-exposure prophylaxis (PEP) Recommendations

Exposure scenario	PEP recommendations	Follow-up/ monitoring
Person who manipulates <i>Brucella</i> isolate outside of a certified Class II biosafety cabinet (BSC) or within BSC without appropriate personal protective equipment (i.e. gloves, gown, eye protection). All persons present during the occurrence of aerosol-generating events (e.g., centrifuging without sealed carriers, vortexing, sonication, spillage/splashes) with manipulation of <i>Brucella</i> isolate on an open bench.	Doxycycline 100mg twice daily, and rifampin 600 mg once daily, for three weeks. For patients with contraindications to doxycycline or rifampin, TMP-SMZ, in addition to another appropriate antimicrobial, should be considered. Two antimicrobials effective against <i>Brucella</i> should be given. Pregnant women should consult their obstetrician. Note: RB51 is resistant to rifampin <i>in vitro</i> , and therefore this drug should not be used for PEP or treatment courses.	Regular symptom watch (e.g., weekly) and daily self-fever checks through 24 weeks post-exposure, after last known exposure. Sequential serological monitoring at 0 (baseline), 6, 12, 18, and 24 weeks post-exposure, after last known exposure. Note: No serological monitoring is currently available for RB51 and <i>B. canis</i> exposures in humans.

DSHS Brucellosis Laboratory Exposure Questionnaire Page 2 of 4 Revised February 2016

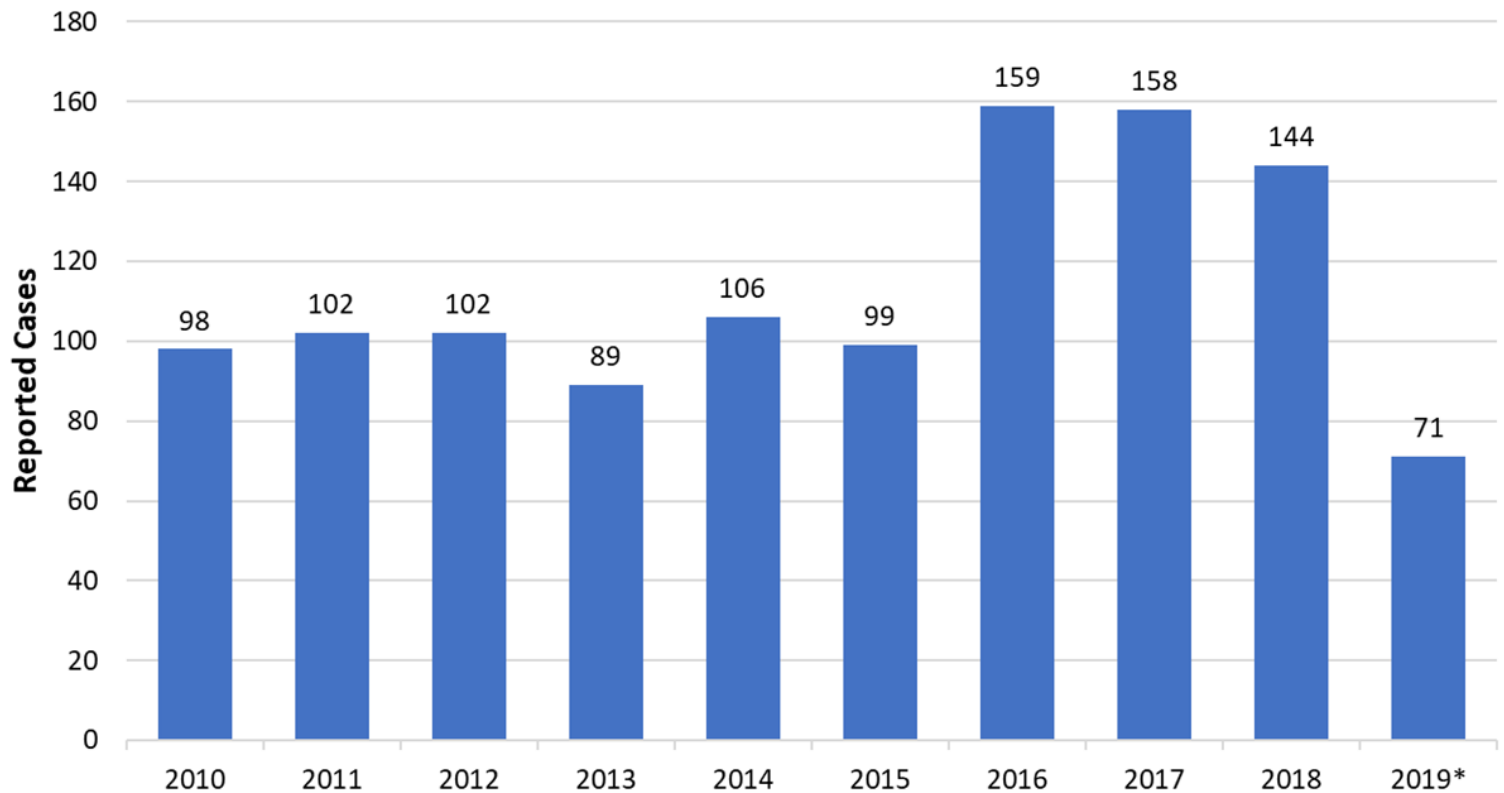


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Malaria

Reported Cases of Malaria in Texas, 2010 - 2019* (N=1,145)



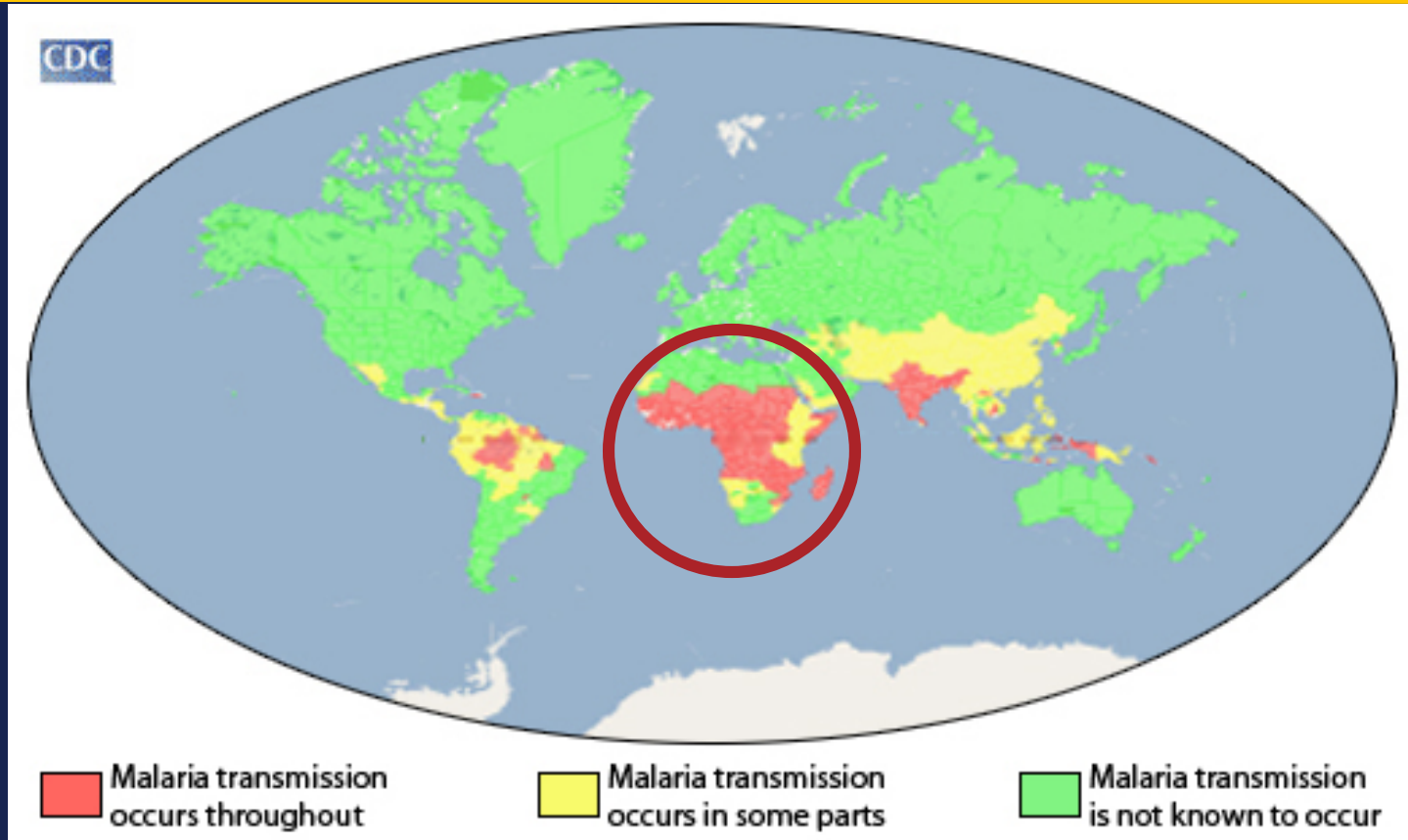
*2019 data is provisional



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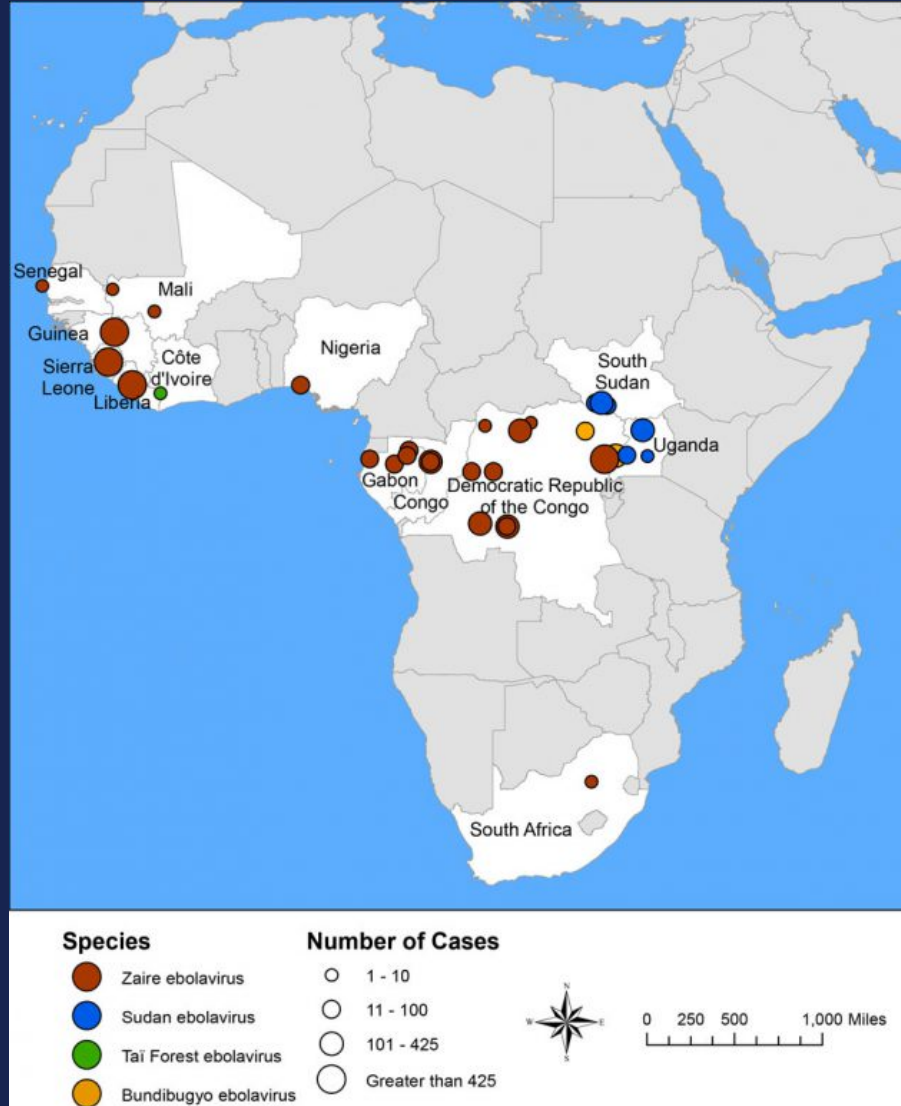
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Malaria



Approximation of the parts of the world where malaria transmission occurs
<https://www.cdc.gov/malaria/about/distribution.html>

Ebola Virus Outbreaks by Species and Size, Since 1976



<https://www.cdc.gov/vhf/ebola/history/distribution-map.html>



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Malaria Reporting Guidelines

Texas Residents

For malaria cases who reside in Texas, but are diagnosed in another Texas jurisdiction, please **report by the case patient's residence**.

Out of Country Residents

For malaria cases who reside in another country, but are diagnosed in Texas, please **report by the location where the patient was diagnosed**.

Out of State Residents

For malaria cases who reside in another state, but are diagnosed in Texas, please **communicate with the Regional ZC office** so we can work with the other state to determine which state will count it as a case to prevent dual reporting.



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Malaria

- **Treatment changes – April 2019**
 - Quinidine no longer available in the U.S.
 - Intravenous artesunate for treatment of severe malaria available through CDC Quarantine Stations
 - Clinicians must call CDC's Malaria Hotline (770-488-7788)
- **Guidelines for treatment in United States**
 - https://www.cdc.gov/malaria/diagnosis_treatment/treatment.html
- **Malaria travel information and prophylaxis**
 - https://www.cdc.gov/malaria/travelers/country_table/a.html
- **General information**
 - <https://www.cdc.gov/parasites/malaria/index.html>

Lyme Disease

Erythema Migrans (EM)

Confirmed:

A case with physician-diagnosed **EM \geq 5 cm in size** with an **exposure** in a **high-incidence** state or country*,
OR a case of physician-diagnosed **EM \geq 5 cm in size** with **laboratory confirmation** with an **exposure** in a **low-incidence** state or country*,
OR a case with **at least one late manifestation** that has **laboratory confirmation**.

EM rash:

- Occurs in approximately 70 to 80 percent of infected persons
- Begins at the site of a tick bite after a delay of 3 to 30 days (ave. ~7 days)
- Expands gradually over several days
- May reach 12" (30 cm) or more across
- May feel warm to the touch but is rarely itchy or painful
- Sometimes clears as it enlarges, resulting in a target or "bull's-eye" appearance
- May appear on any area of the body



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Lyme Disease High & Low Incidence Areas

Confirmed:

A case with physician-diagnosed **EM ≥ 5 cm** in size **with an exposure in a high-incidence state or country***,
OR a case of physician-diagnosed **EM ≥ 5 cm** in size with **laboratory confirmation with an exposure in a low-incidence state or country***,
OR a case with **at least one late manifestation** that has **laboratory confirmation**.

***Exposure** is defined as having been (≤ 30 days before onset of EM) in wooded, brushy, or grassy areas (i.e., potential tick habitats).

- A **high-incidence state** is a state with an average Lyme disease incidence of at least **10 confirmed cases/100,000 persons for the previous three reporting years**.
- A **low-incidence state** is defined as a state with disease incidence of **<10 confirmed cases/100,000 persons for the previous three reporting years**.

www.cdc.gov/lyme/stats/tables.html



Texas is considered a low-incidence state for Lyme disease!



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Lyme Disease High Incidence Areas



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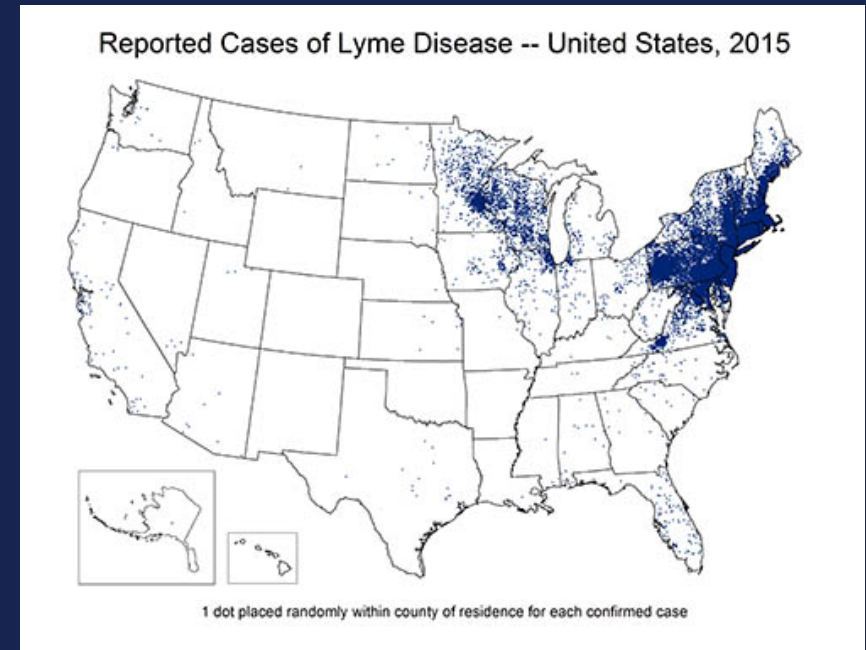
- Most commonly reported vector-borne illness in the United States
- Does **not** occur nationwide and is concentrated heavily in the northeast and upper Midwest

High Incidence States:

Connecticut, Delaware, Maine, Maryland, Massachusetts, Minnesota, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, Wisconsin

Outside of the US, Lyme disease is common in some forested areas in Europe. Countries with highest reported incidence include **Germany, Austria, Slovenia, and Sweden.**

Infectious Disease Clinics of North America, Vol. 22/Ed. 2, Fish AE, Pride YB, Pinto DS, Lyme carditis, 275-288



www.cdc.gov/lyme/stats/index.html

Lyme Disease

Late Manifestation

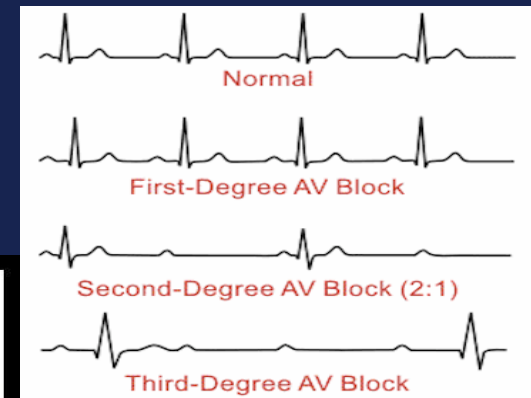
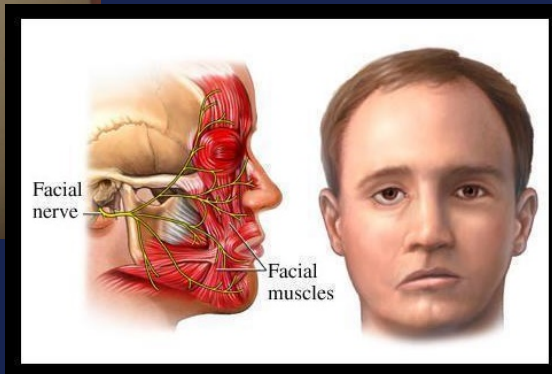


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Confirmed:

A case with physician-diagnosed **EM \geq 5 cm** in size with an **exposure** in a **high-incidence** state or country,
OR a case of physician-diagnosed **EM \geq 5 cm** in size with **laboratory confirmation** with an **exposure** in a **low-incidence** state or country,
OR a case with **at least one late manifestation*** that has **laboratory confirmation**.



Lyme Disease Late Manifestations: Alternate Explanations



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- * For purposes of surveillance, **late manifestations include any of the following when an alternate explanation is not found:**
 - **Musculoskeletal system:** recurrent, brief attacks (weeks or months) of objective joint swelling in one or a few joints, sometimes followed by chronic arthritis in one or a few joints.
 - **NOT:** *chronic progressive arthritis not preceded by brief attacks; chronic symmetrical polyarthritis or arthralgia, myalgia, or fibromyalgia syndromes alone*
 - **Nervous system:** any of the following, alone or in combination: lymphocytic meningitis; cranial neuritis, particularly facial palsy (can be bilateral); radiculoneuropathy; or, rarely, encephalomyelitis.
 - **NOT:** *headache, fatigue, paresthesia, or mildly stiff neck alone*
 - **Cardiovascular system:** acute onset of high-grade (2nd or 3rd-degree) atrioventricular conduction defects that resolve in days to weeks and are sometimes associated with myocarditis.
 - **NOT:** *palpitations, bradycardia, bundle branch block, or myocarditis alone*

wwwn.cdc.gov/nndss/conditions/lyme-disease/case-definition/2017/

Lyme Disease

Probable & Suspect Cases



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Probable:

Any other clinically compatible* case of physician-diagnosed Lyme disease that has laboratory confirmation and absence of a more likely clinical explanation

**fever, chills, headache, fatigue, muscle & joint aches, swollen lymph nodes, EM rash*

Suspect:

A case of EM with no known exposure and no laboratory evidence of infection,

OR a case with laboratory evidence of infection but no clinical information available

Note: Lyme disease reports will not be considered cases if the medical provider specifically states this is not a case of Lyme disease, or the only symptom listed is "tick bite" or "insect bite."

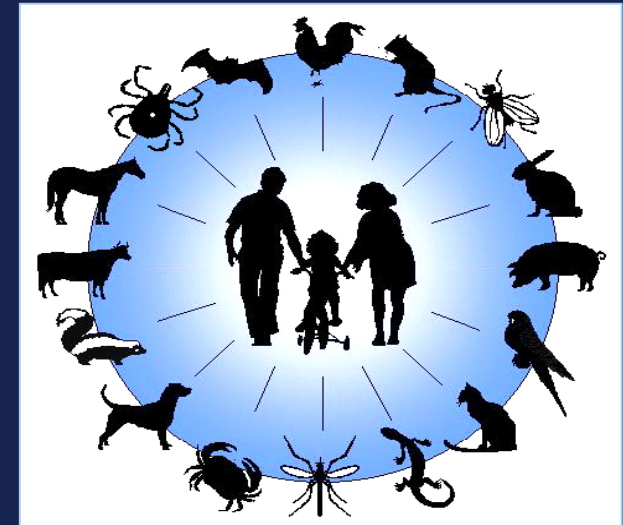
More on Zoonoses



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- Thursday Breakout Session
 - Zoonotic Disease Investigations
10:15 am
- Regional Zoonosis Control Offices
<http://www.dshs.texas.gov/idcu/health/zoonosis/contact/>





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Public Health Region 1
Kimberly Hencken, DVM
Lubbock, TX

Public Health Region 2
Nick Ferguson
Abilene, TX

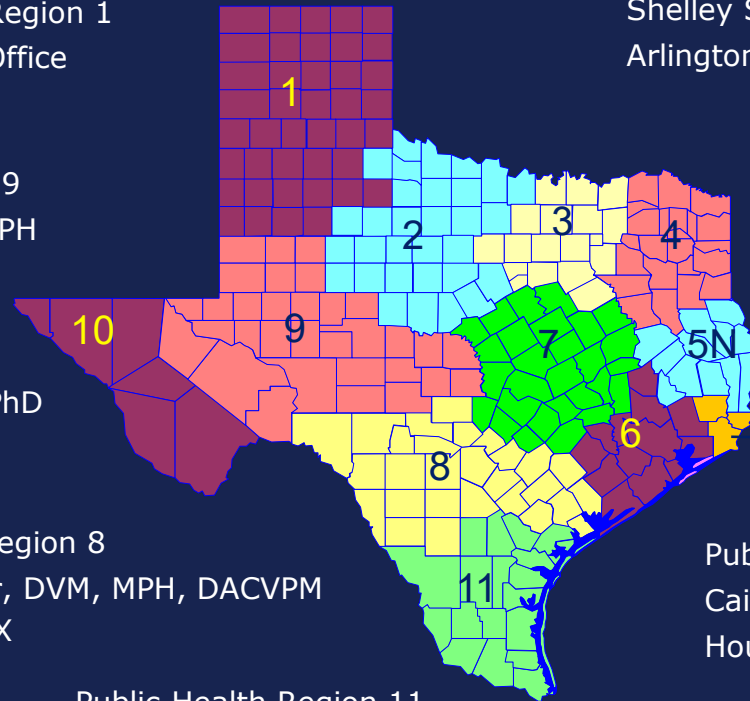
Public Health Region 2/3
Shelley Stonecipher, DVM, MPH
Arlington, TX

Public Health Region 1
Amarillo Sub-Office
Tonya Finch

Public Health Region 9
Amanda Kammen, MPH
Midland, TX

Public Health Region 4/5N
Samantha Puttick
Tyler, TX

Public Health Region 9/10
Kenneth Waldrup, DVM, PhD
El Paso, TX



Public Health Region 7
David Smonko, DVM
Temple, TX

Public Health Region 8
Amanda Kieffer, DVM, MPH, DACVPM
San Antonio, TX

Public Health Region 6/5S
Caitlin Cotter, DVM, MPH
Houston, TX

Public Health Region 11
Ronald Tyler, DVM, MS
Harlingen, TX

Department of State Health Services
Zoonosis Control Branch
Austin, TX 78756
(512) 776-7255
www.TexasZoonosis.org
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Thank you

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