



Mosquito Surveillance/Control in Texas

Infectious Disease Taskforce

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Objectives

- Mosquito surveillance and control
- DSHS surveillance for arboviral diseases
- Zika virus vectors: Plans for improving distribution maps for *Aedes aegypti* and *Ae. albopictus* (*Stegomyia*)
- Recommendations to support vector control activities
- Arbovirus outbreak response triggers
- Entering private property for vector control
- Arbovirus outbreak response

Mosquito Surveillance and Control Infrastructure

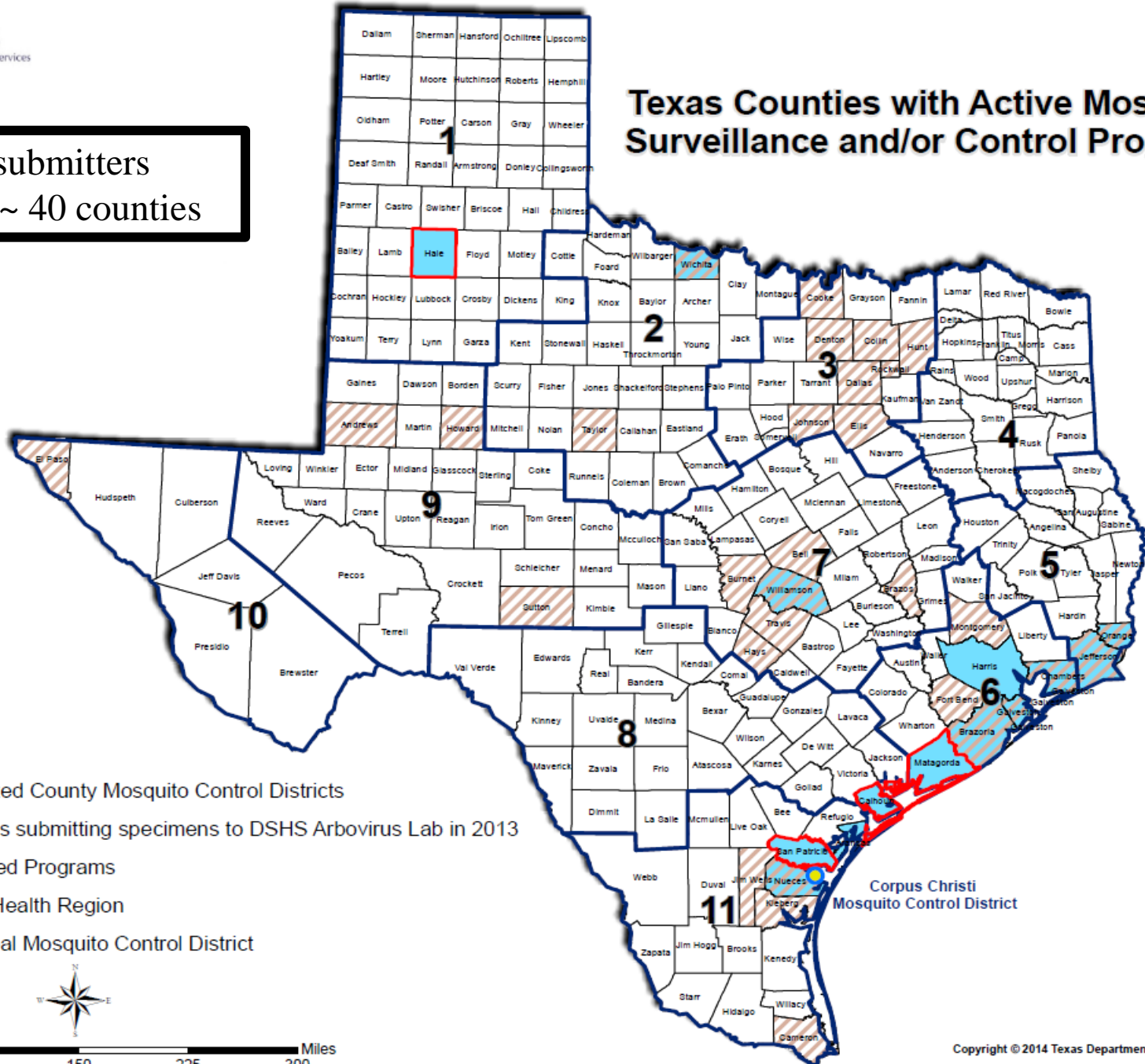
- Local capacity
 - Range of services
 - No capacity
 - Surveillance activities only
 - Control activities only
 - Comprehensive surveillance and control activities
- State role limited to technical consultation, limited financial support, and laboratory services

Mosquito Surveillance and Control Infrastructure

- Mosquito Control Districts
 - 15 listed by the Texas Mosquito Control Association
 - 14 county-level
 - 1 city-level
- Other entities may also conduct mosquito surveillance and/or control activities
 - Environmental health agencies
 - Local health departments
 - County precincts, public works departments, etc.

Texas Counties with Active Mosquito Surveillance and/or Control Programs

~ 60 submitters
from ~ 40 counties



Mosquito Collection and Submission



Laboratory Testing

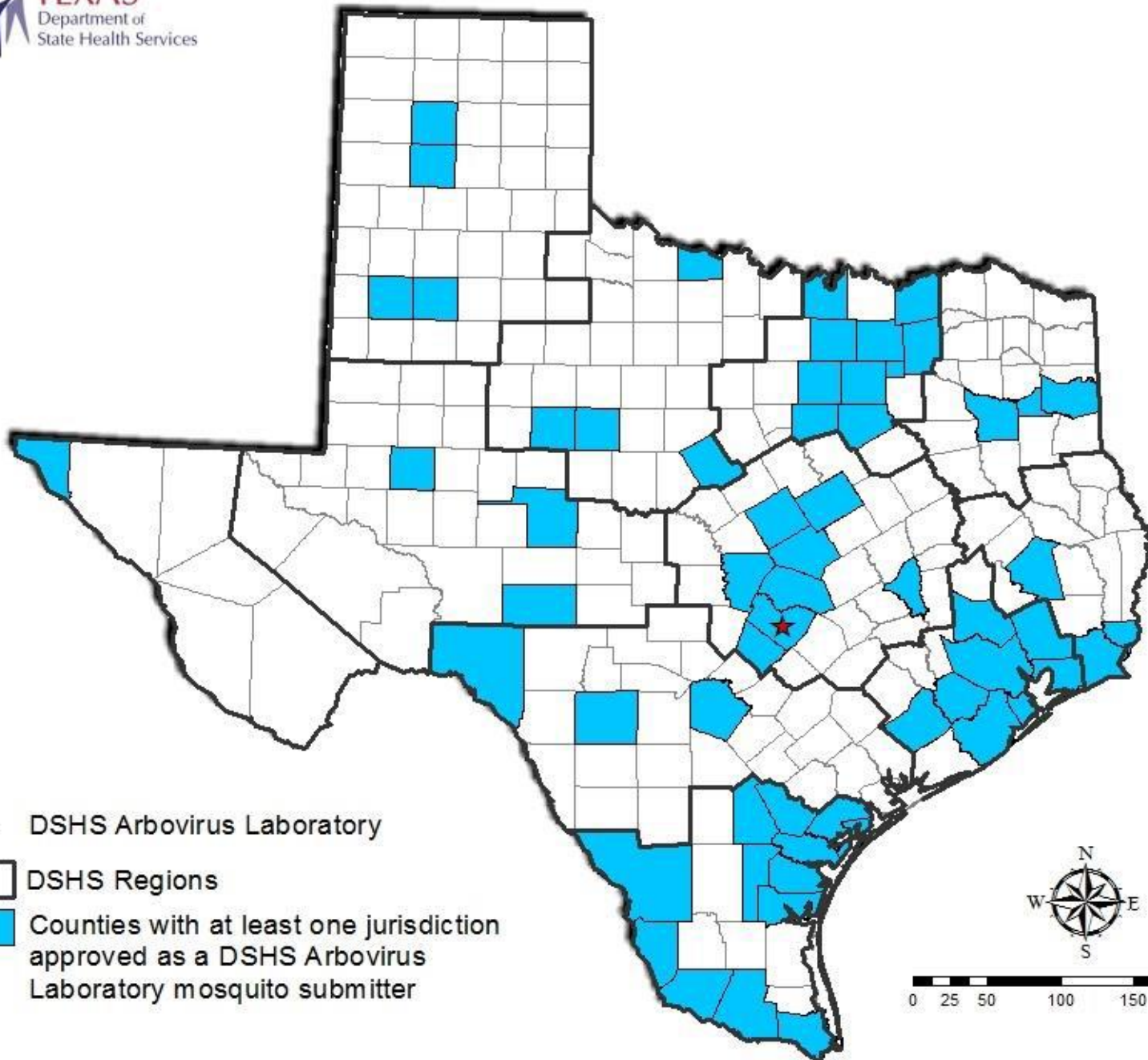
- DSHS laboratory; certain local health department and private laboratories
 - Identify mosquitos by species
 - test for medically-important arboviruses in vector species
- Various data sets are not centrally compiled at DSHS
 - comprehensive, statewide data difficult to obtain

Medically Important Arboviruses in Texas

- West Nile virus (WNV)
- St. Louis encephalitis virus (SLE)
- Dengue
- Western equine encephalitis virus (WEE)
- Eastern equine encephalitis virus (EEE)
- Venezuelan equine encephalitis virus (VEE)
- California group viruses (CAL)
- Tensaw (TEN)
- Highlands J virus (HJ)
- Travel-associated cases of other arboviruses, such as chikungunya and Zika

DSHS Arbovirus Laboratory Testing

- Year round mosquito identification
- Cell culture for broad based surveillance
 - Detects a wider variety of arboviruses
- PCR testing will be available for Zika virus
 - Likelihood of detection in mosquitoes very low
 - Use will be limited based on consultations between local jurisdiction, Region, and DSHS Central Office
- DSHS began testing mosquitoes for arboviruses during the first full week of May



- ★ DSHS Arbovirus Laboratory
- DSHS Regions
- Counties with at least one jurisdiction approved as a DSHS Arbovirus Laboratory mosquito submitter



0 25 50 100 150 200 Miles

Yellow fever mosquito *Aedes aegypti*

Asian tiger mosquito *Aedes albopictus*

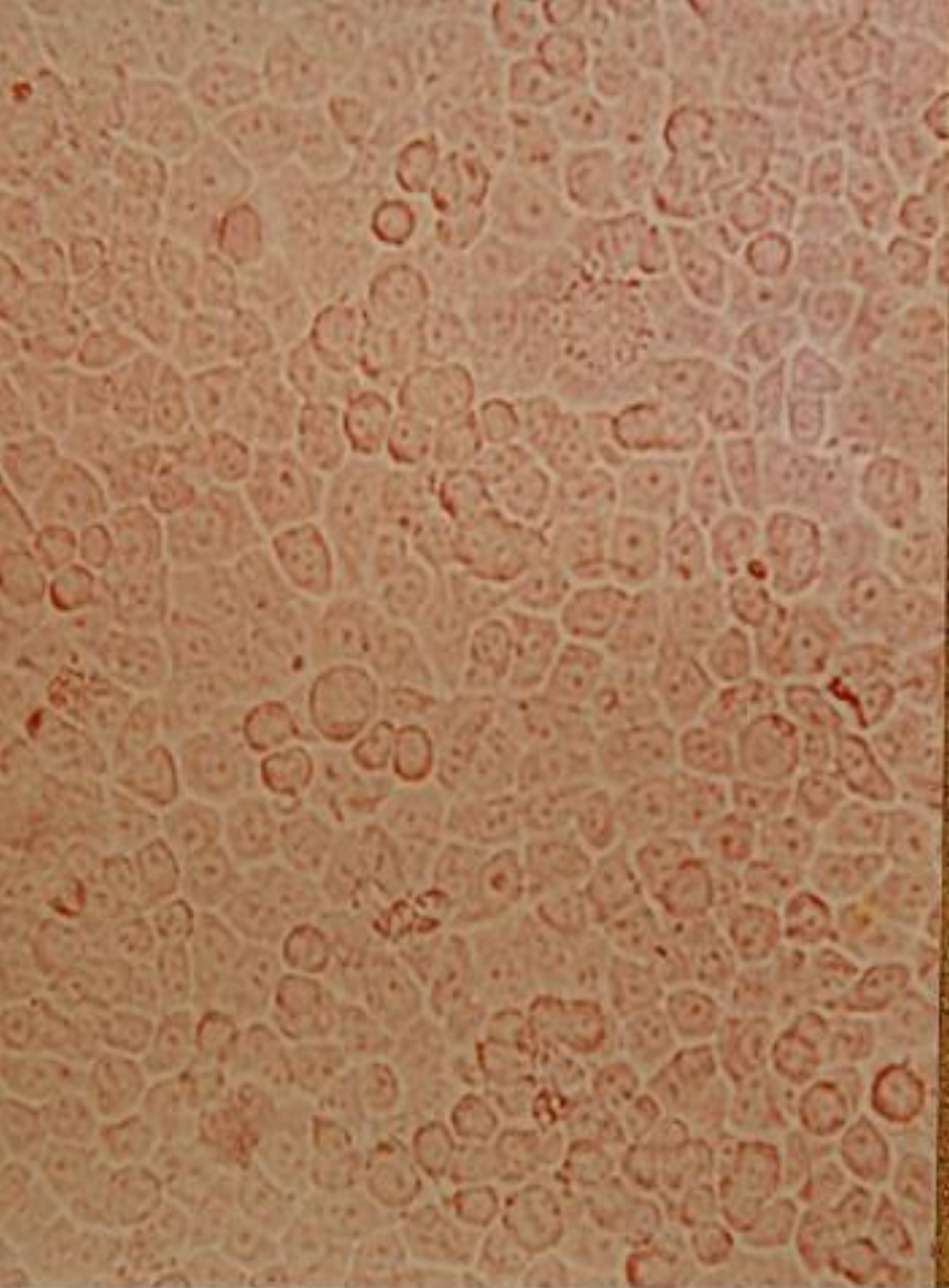


Photo from: <http://fmel.ifas.ufl.edu/research/exotic.shtml>

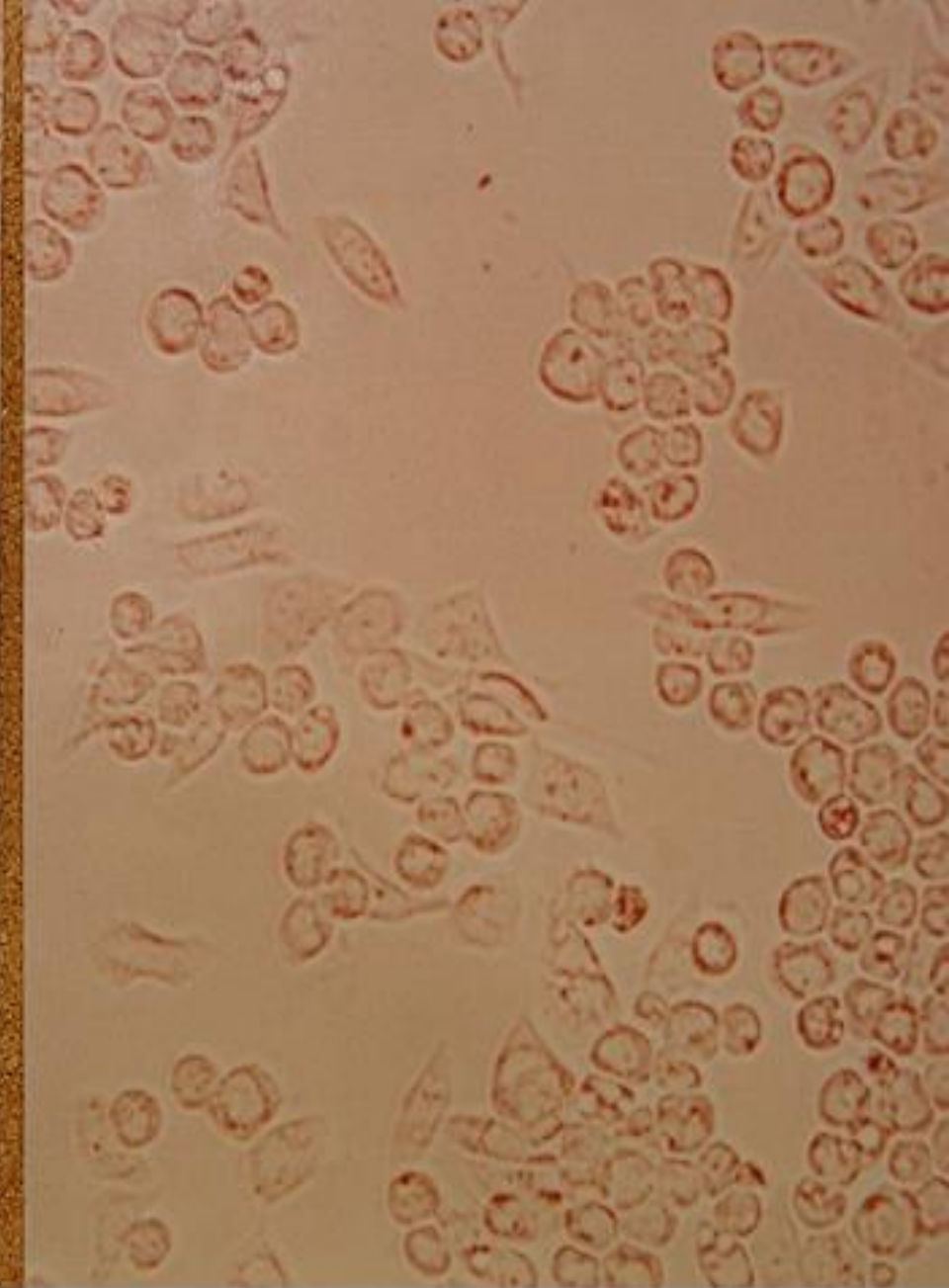
- Subgenus *Stegomyia*
- Both are invasive species that are firmly established
- 2 hours after sunrise and several hours before sunset are usually the optimal activity periods for these species, but can be active (and taking blood meals) anytime during the daylight hours
- Flight range of both species is limited to approximately 200 meters from emergence
- *Ae. aegypti* females take blood meals from humans exclusively; *Ae. albopictus* has a broader host range
- Cavity breeders (in evolutionary past); use artificial, water-holding containers for oviposition
- Synanthropic: close association with humans
- *Ae. aegypti* is the more efficient vector potential: multiple blood meals/gonotrophic cycle

Inoculations performed in BSL3 suite



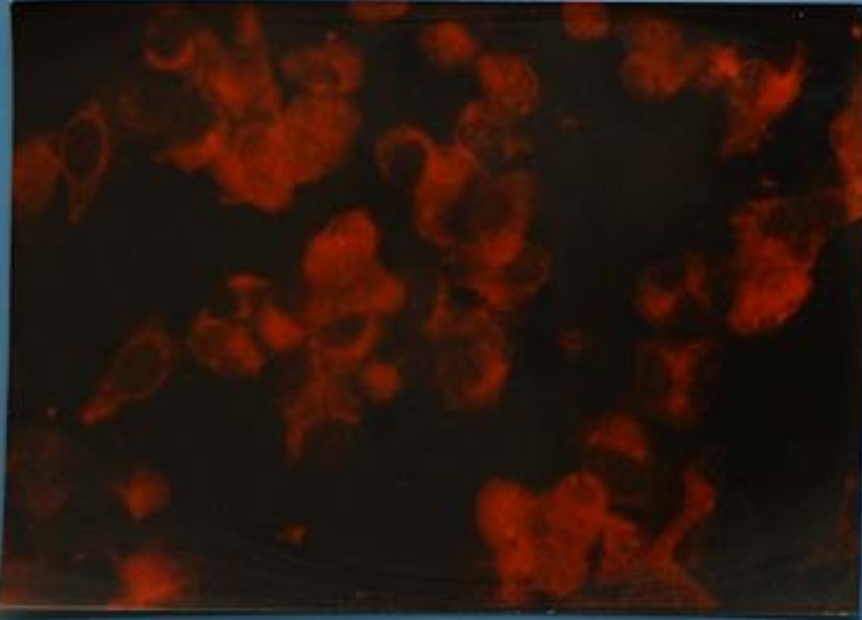


Photographs of normal tissue culture-Left side

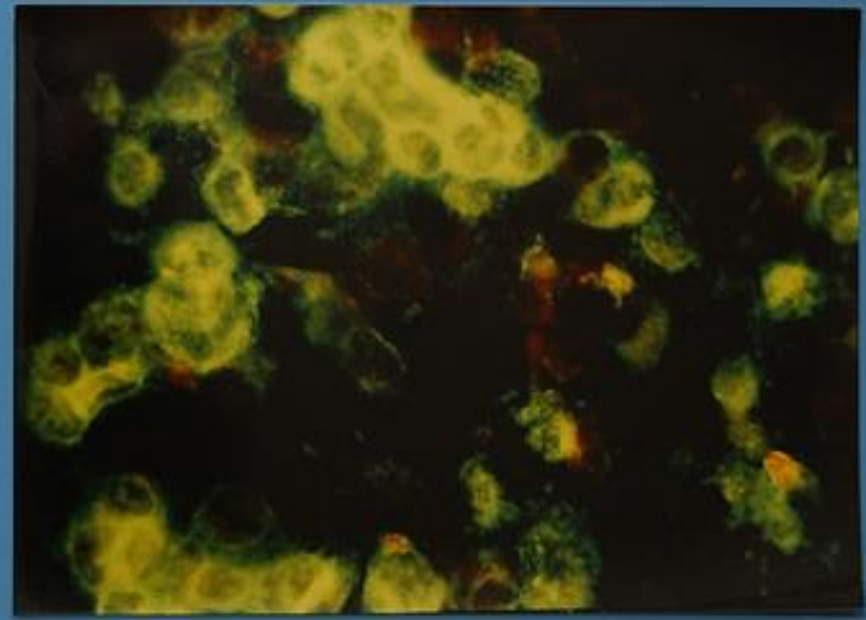


Photographs of infected tissue-Right side

IFA results



Photographs of negative fluorescent antibody test used to identify viruses-Left side



Photographs of positive fluorescent antibody test used to identify viruses-Right side

Arbovirus Positive Pools 2002-2014

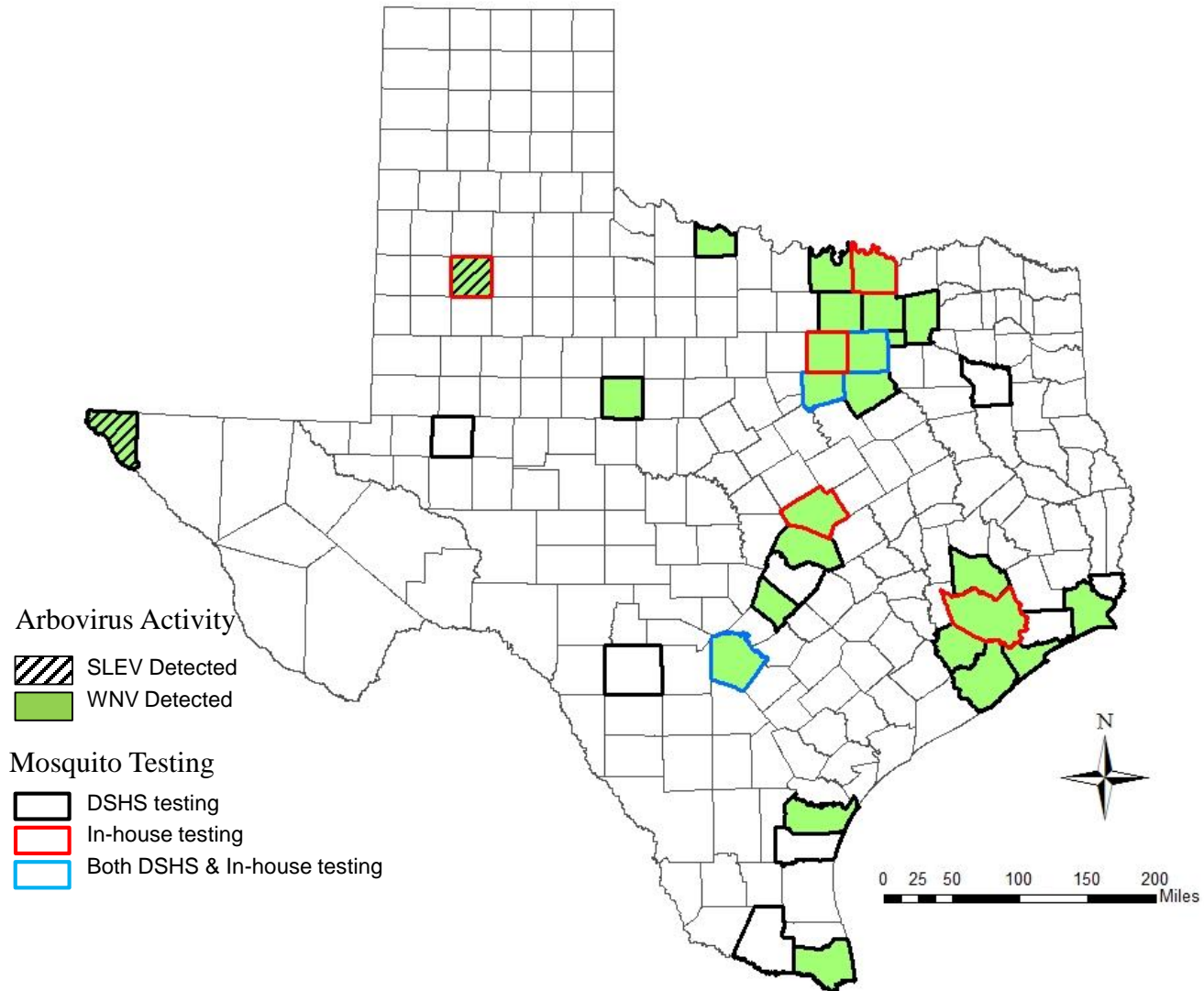
Year	Pools tested	Pools positive	WN	SLE	WEE	WN/ SLE	Other
2002	7,814	466	189	229	10	34	4
2003	10,814	839	836	1			2
2004	10,951	170	164		2		4
2005	9,779	328	309		10		5
2006	9,567	438	432				6
2007	11,074	226	223				3
2008	9,580	93	92				1
2009	9,850	161	144	6			11
2010	8,997	22	16	6			
2011	8,473	52	52				
2012	11,863	803	798				5
2013	11,998	75	73	2			
2014	12,158	326	320	6			

2004-2012 Virus + Mosquito Pools

Mosquito Species on Testing List	LACV	SLEV	WEEV	WNV	Total
<i>Aedes aegypti</i>				4	4
<i>Aedes albopictus</i>	1*			25	26
<i>Aedes taeniorhynchus</i>				1	1
<i>Aedes triseriatus</i>	1*			1	2
<i>Aedes trivittatus</i>					0
<i>Culex (Melanoconion)</i>			1	40	41
<i>Culex nigripalpus</i>				7	7
<i>Culex quinquefasciatus</i>		12	1	2069	2082
<i>Culex restuans</i>				3	3
<i>Culex salinarius</i>				7	7
<i>Culex species</i>				2	2
<i>Culex stigmatosoma</i>					0
<i>Culex tarsalis</i>			5	46	51
Total	2	12	7	2205	2226

*Combined pool of *Ae. albopictus* and *Ae. triseriatus*

Arbovirus Positive Mosquito Pools - 2015



Human Cases of Reportable Mosquito-borne Diseases in Texas, 2003-2014

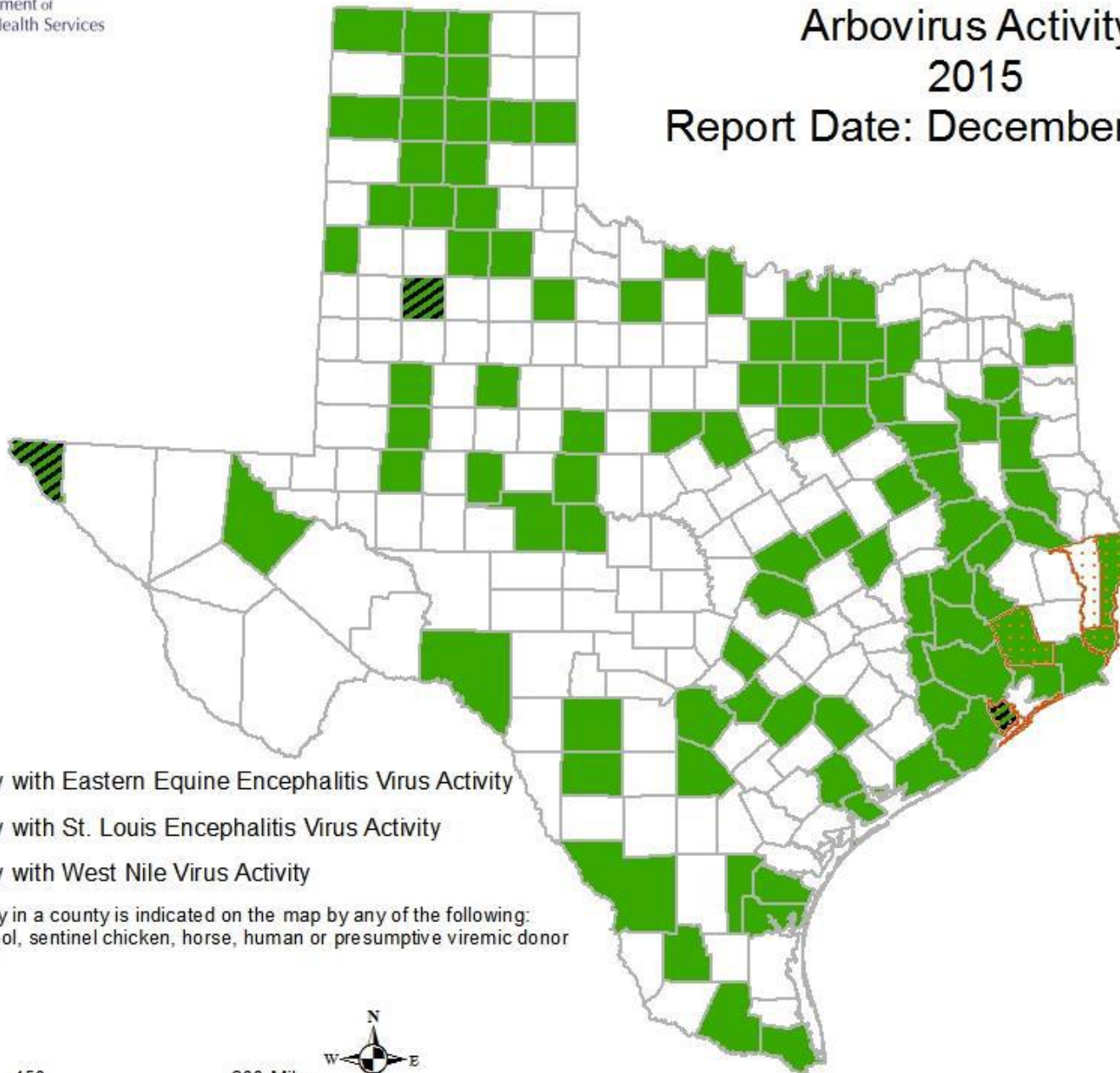
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
California Serogroup Virus*	0	0	0	0	0	0	0	1	0	3	0	0
Chikungunya	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	114
Dengue Virus	1	3	32	8	32	22	14	19	7	16	95	34
Eastern Equine Encephalitis Virus	0	0	0	0	0	0	0	0	0	0	0	0
Japanese Encephalitis Virus	0	0	0	0	0	0	0	1	1	0	0	0
St. Louis Encephalitis Virus	18	4	0	1	0	0	4	3	0	3	1	4
Venezuelan Equine Encephalitis Virus	0	0	0	0	0	0	0	0	0	0	0	0
West Nile Virus	720	176	195	354	260	64	115	89	27	1868	183	379
<i>West Nile Encephalitis</i>	431	119	128	233	170	40	93	77	20	844	113	253
<i>West Nile Fever</i>	289	57	67	121	90	24	22	12	7	1024	70	126
Western Equine Encephalitis Virus	0	0	0	0	0	0	0	0	0	0	0	0
Yellow Fever	0	0	0	0	0	0	0	0	0	0	0	0




*California encephalitis/meningitis refers to all California serogroup viruses. California serogroup includes California encephalitis, Jamestown Canyon, Keystone, La Crosse, Snowshoe Hare, and Trivittatus virus

Arbovirus Activity*

2015

Report Date: December 8, 2015



-  County with Eastern Equine Encephalitis Virus Activity
-  County with St. Louis Encephalitis Virus Activity
-  County with West Nile Virus Activity

*Arbovirus activity in a county is indicated on the map by any of the following:
bird, mosquito pool, sentinel chicken, horse, human or presumptive viremic donor

0 75 150 300 Miles

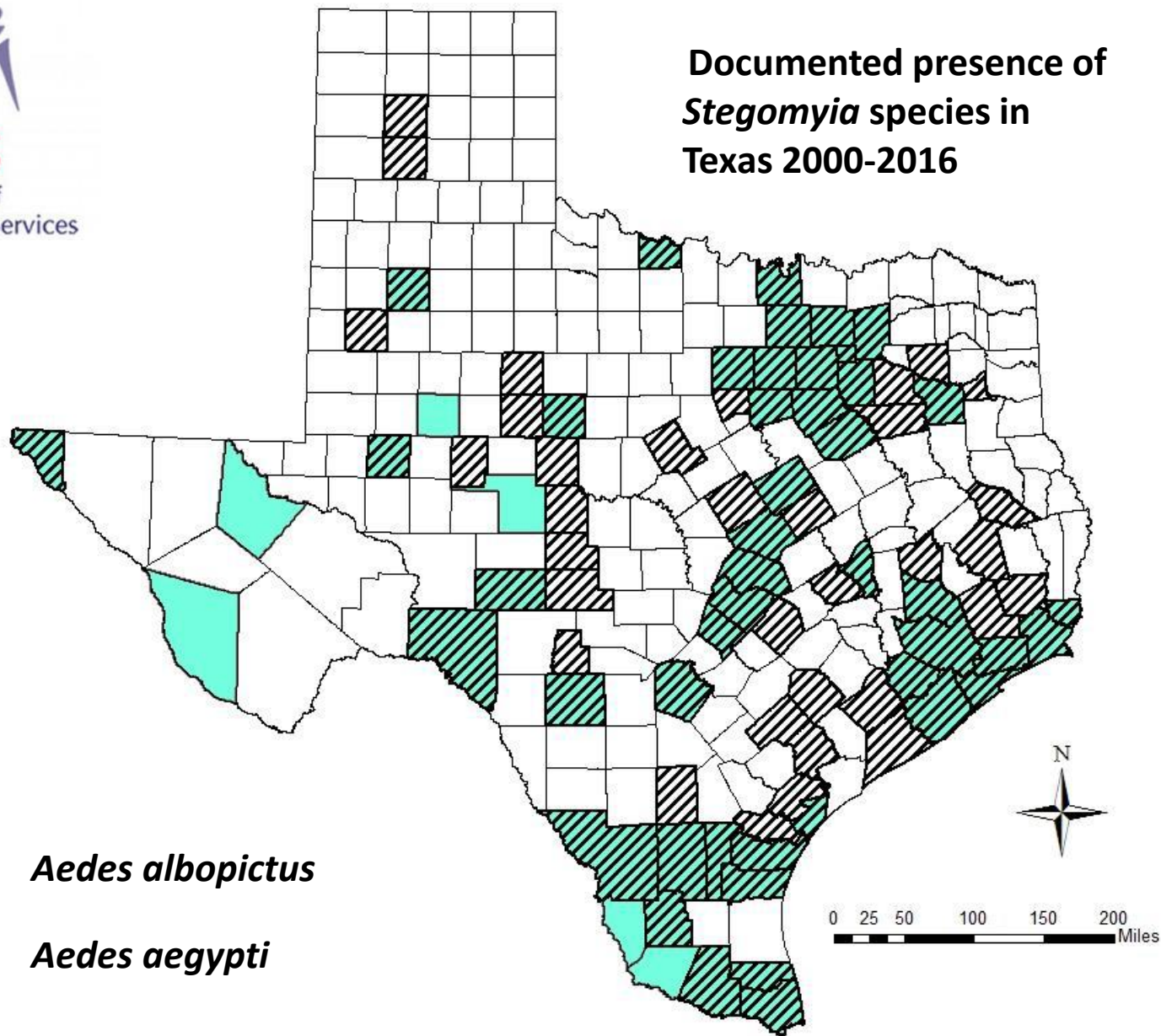




TEXAS

Department of
State Health Services

Documented presence of *Stegomyia* species in Texas 2000-2016



Zika Virus Vectors: Plans for Improving Distribution Maps

- Use ovitraps to surveil for *Stegomyia*
- Submitters must be recruited and provided materials and instructions for submission
- Ship eggs to one of the participating laboratories
- Eggs will be reared to adults and speciated

Plans for Improving Distribution Maps

- Procedures and logistics are being established
 - Mechanism for appropriate notification of local jurisdictions will be established prior to implementation
- First priority will be given to counties for which there are no data on the presence of *Stegomyia*
- Leveraging this process by adding pesticide resistance testing is being discussed

Arbovirus Outbreak Response

- During public health emergency, follow ICS process to request resources
 - DSHS Vector Control Response Operating Guidelines
 - Documenting needs is critical
- Local jurisdictions may access DSHS contract with vendor(s) for vector control services
 - Aerial application
 - Ground-based application (contracting in process)

Additional resources

- CDC Zika virus information: <http://www.cdc.gov/zika/>
- DSHS Zika information: <http://www.texaszika.org>
- Travel notices: <http://wwwnc.cdc.gov/travel/notices>
- DSHS zoonosis information: <http://www.texaszoonosis.org>

QUESTIONS?

