Equine Vaccine Basics

Terry Hensley, MS, DVM

Assistant Agency Director/Extension Veterinarian

TVMDL/AgriLife Extension

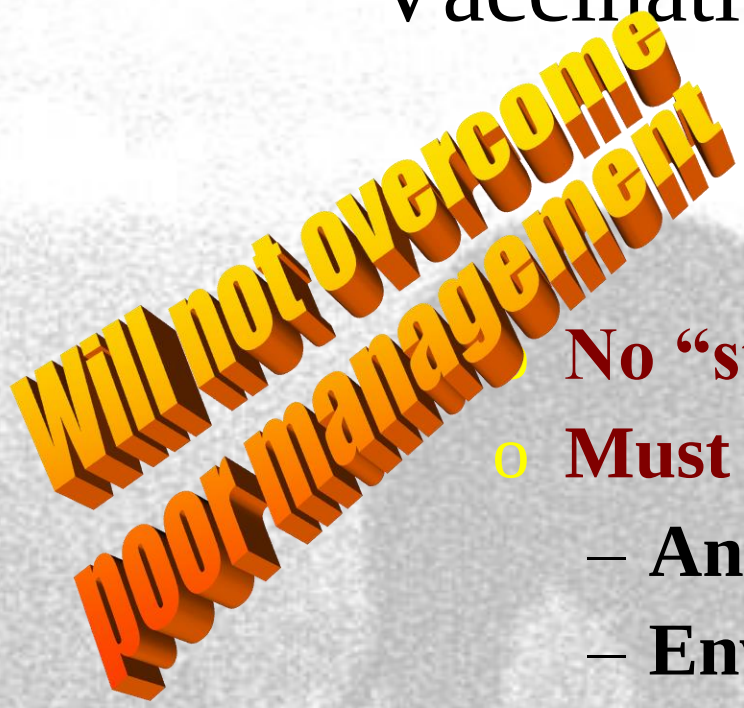
TEXAS A&M TVMDL VETERINARY MEDICAL DIAGNOSTIC LABORATORY

TEXAS A&M AGRILIFE EXTENSION

Disease Control

- **Infectious disease control program directed toward:**
  - **Biosecurity**
    - **Reducing exposure; Infection control**
  - **Minimizing factors that reduce resistance (stress, poor nutrition)**
  - **Enhancing resistance by vaccination**
    - **Herd immunity**

Vaccination Considerations



- No "standard" program
- Must be based on disease risk
  - Anticipated exposure
  - Environmental & geographic factors
  - Age, breed & sex
- Factor in expected efficacy & cost
- Aid in preventing infectious diseases

Texas A&M TVMDL Veterinary Medical Diagnostic Laboratory

Texas A&M AgriLife Extension

Vaccination Considerations

- Storage and handling per manufactures' instructions
  - Proper temp.
  - Don't use outdated vaccines
- Injection site should be clean
- Use separate new needle for each animal

Vaccination Considerations

Vaccine Response

- The vaccine itself
- Individual horses immune system
  - ~10% respond poorly to vaccination
- Vocation of the horse
- Age
  - Foal- maternal antibodies
  - Geriatric- >20yrs, immunosenescence
    - Diminished immune response
    - Lower total lymphocytes and Ig conc

Vaccine Response

- Health status
- Immune suppression
  - Long distance transport
  - Medications
  - PPID
- Response to vaccine not immediate
  - Must mount immunologic response
  - At least 14 days

Vaccine Response

- Most vaccines require 2 doses for primary immunization
  - 4-6weeks apart
  - Optimum response 2 weeks after 2nd dose
- Most vaccines require annual booster

Monovalent vs Multivalent

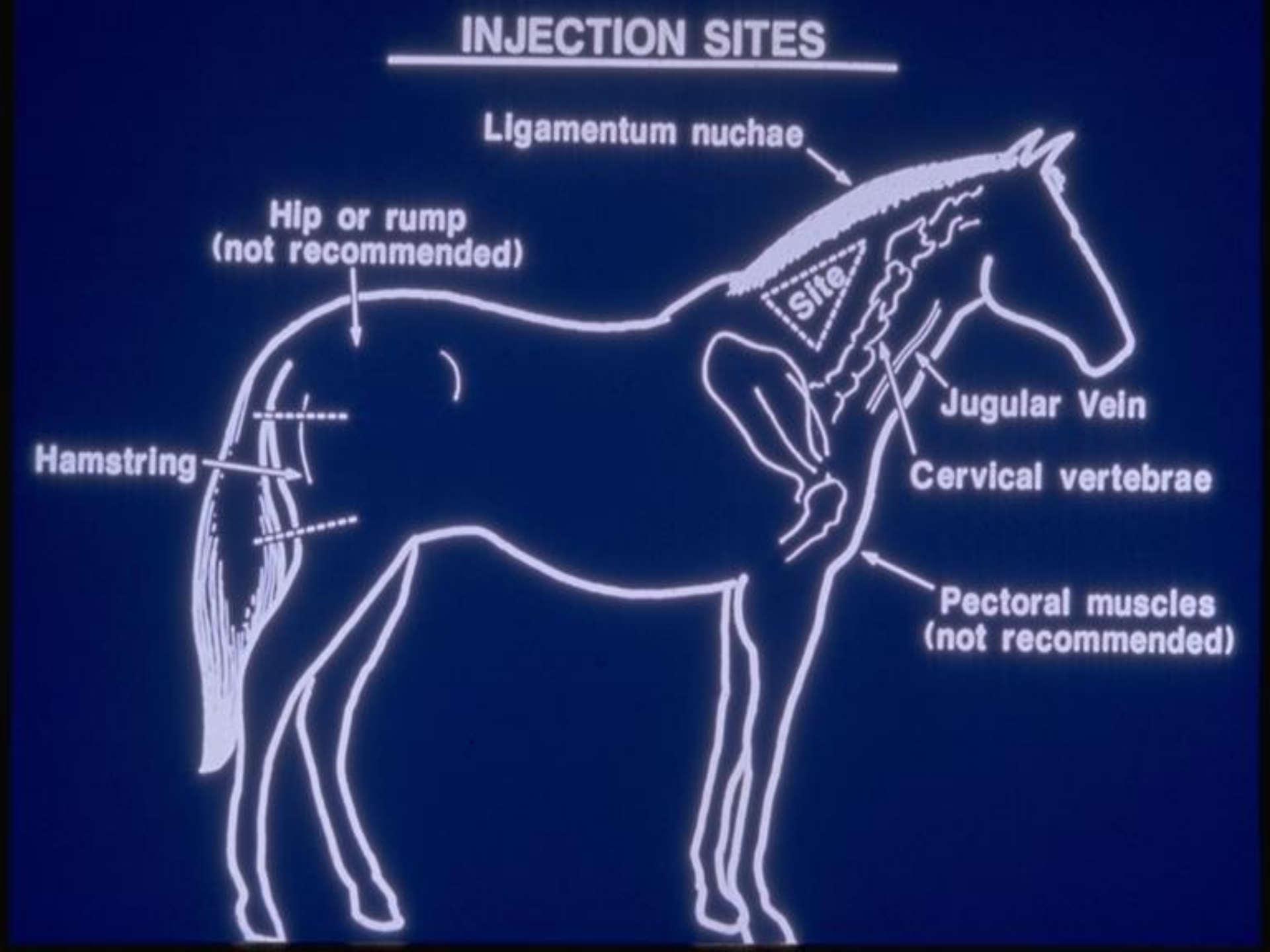
- Most horses have adequate response from multivalent vaccines
- Some circumstances may want monovalent
  - Some evidence slightly better response
    - Based on PRNT titer
  - Specific disease exposure
  - Vaccine reaction

Vaccinate vs Do Not Vaccinate

- Started in Human Medicine now in Veterinary Medicine
- Titers used to determine need for vaccination
  - Plaque reduction neutralization test –PRNT
  - Protective levels of immunity not defined
  - Correlation between Ab levels and protective immunity under field conditions not deffined

Vaccine Administration

- **Only vaccinate healthy horses**
- **Follow manufacturer's recommendations**
- **IM vaccines given deep in the muscle**
  - 1.5 inch needle, 20g
  - Neck or hamstring
- **Don't use outdated vaccine**
- **Store vaccines properly**


INJECTION SITES
Ligamentum nuchae
Hip or rump
(not recommended)
Site
Jugular Vein
Hamstring
Cervical vertebrae
Pectoral muscles
(not recommended)

Vaccination Considerations

- Don't assume complete protection during a disease outbreak
- Protection is not immediately afforded the patient
  - Multiple doses necessary to prime the immune system
- Each horse is different
  - Degree of protection
  - Duration of protection
- Adverse reactions rare but possible

Vaccination
AAEP guidelines for foals

- **Initial series of 3 doses**
  - **1st at 4-6 months**
  - **2nd in 4-6 weeks**
  - **3rd at 10-12 months**
- **If mare was not vaccinated or no vaccine history then start at 3-4 months**

Vaccines Available

Tetanus	**EVA**
Rhinopneumonitis (1 & 4)	**Influenza**
Potomac horse fever	**Strangles**
Botulism	**Rabies**
EEE, WEE, VEE	**WNV**
Rotavirus A	**Anthrax**
Leptospirosis	

Core Vaccines
AAEP

- ☑ **Tetanus**
- ☑ **Rabies**
- ☑ **West Nile**
- ☑ **WEE (Western Equine Encephalomyelitis)**
- ☑ **EEE (Eastern Equine Encephalomyelitis)**

Vaccination programs should be developed in consultation with your veterinarian.

Equine Encephalitides

(*Sleeping Sickness*)

- **Equine Encephalomyelitis Viruses**
  - **Eastern (EEE)**
  - **Western (WEE)**
  - **Venezuelan (VEE)**
  - **West Nile virus**
- **Occurrence of disease is seasonal**
- **Maintenance Cycle– mosquitoes and wild birds (small mammals, reptiles)**

Equine Encephalomyelitis

- **Humans susceptible**
- **Humans/Equine dead-end hosts**
  -> Yes for WEE, EEE, WNV
  -> <u>NOT</u> for VEE
- **Mortality rate varies**
  - **EEE --- 50 to 90%**
  - **WEE --- 20 to 50%**
  - **VEE --- 40 to 80%**
  - **WNV--- 20 to 40%**

West Nile Virus

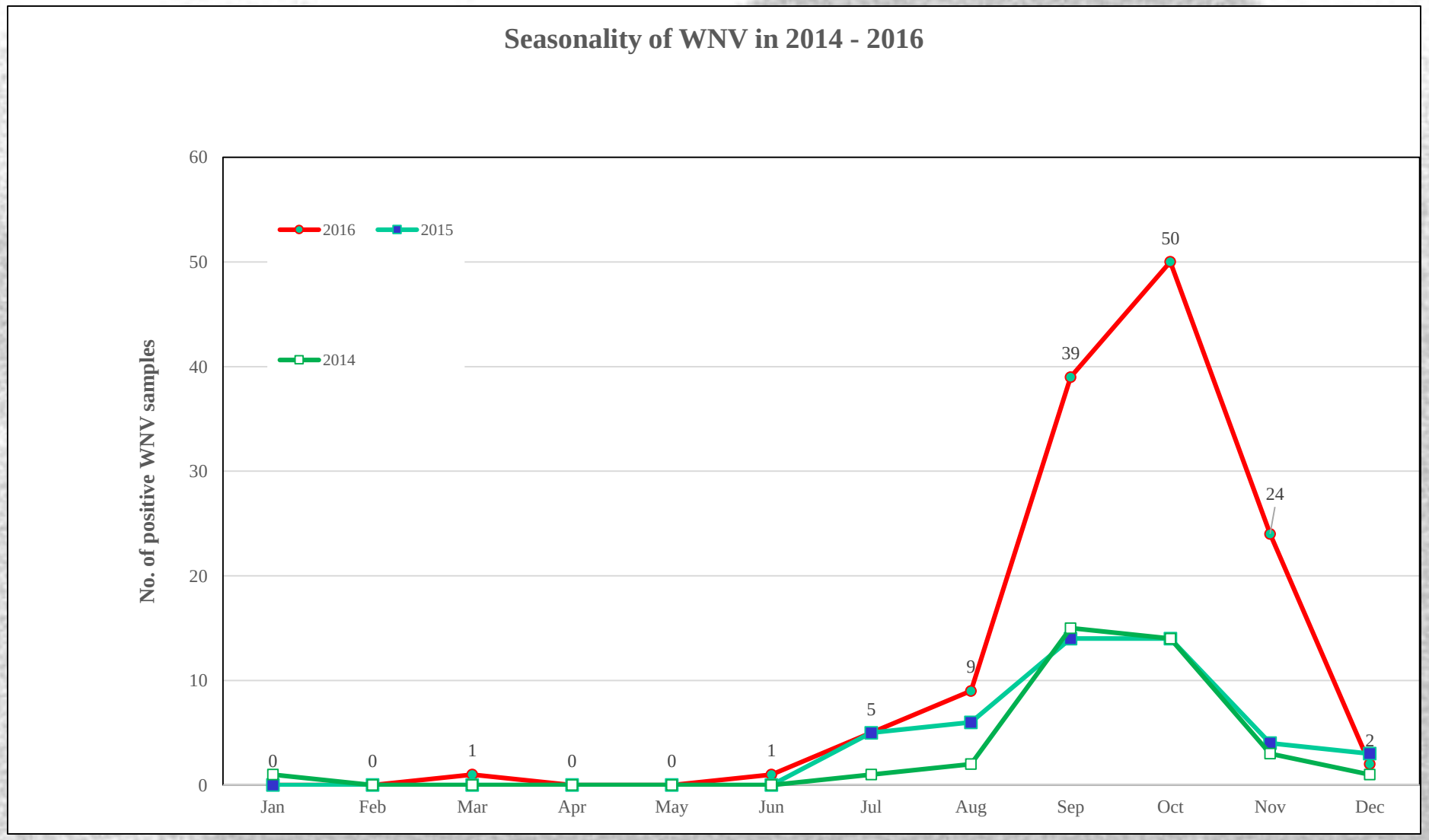
- **First Dx in U.S. in 1999**
  - **New York**
  - **Within 4 yrs all continental US, Canada, Mexico**
- **Leading cause of mosquito transmitted encephalitis in horses and humans in U.S**
- **Since 1999 over 25,000 cases of WNV encephalitis reported in U.S. horses**

West Nile Virus

- **Occurrence of disease is seasonal**
  - **Climatic change**
- **Maintenance Cycle– mosquitoes and wild birds**

TEXAS A&M AGRILIFE EXTENSION

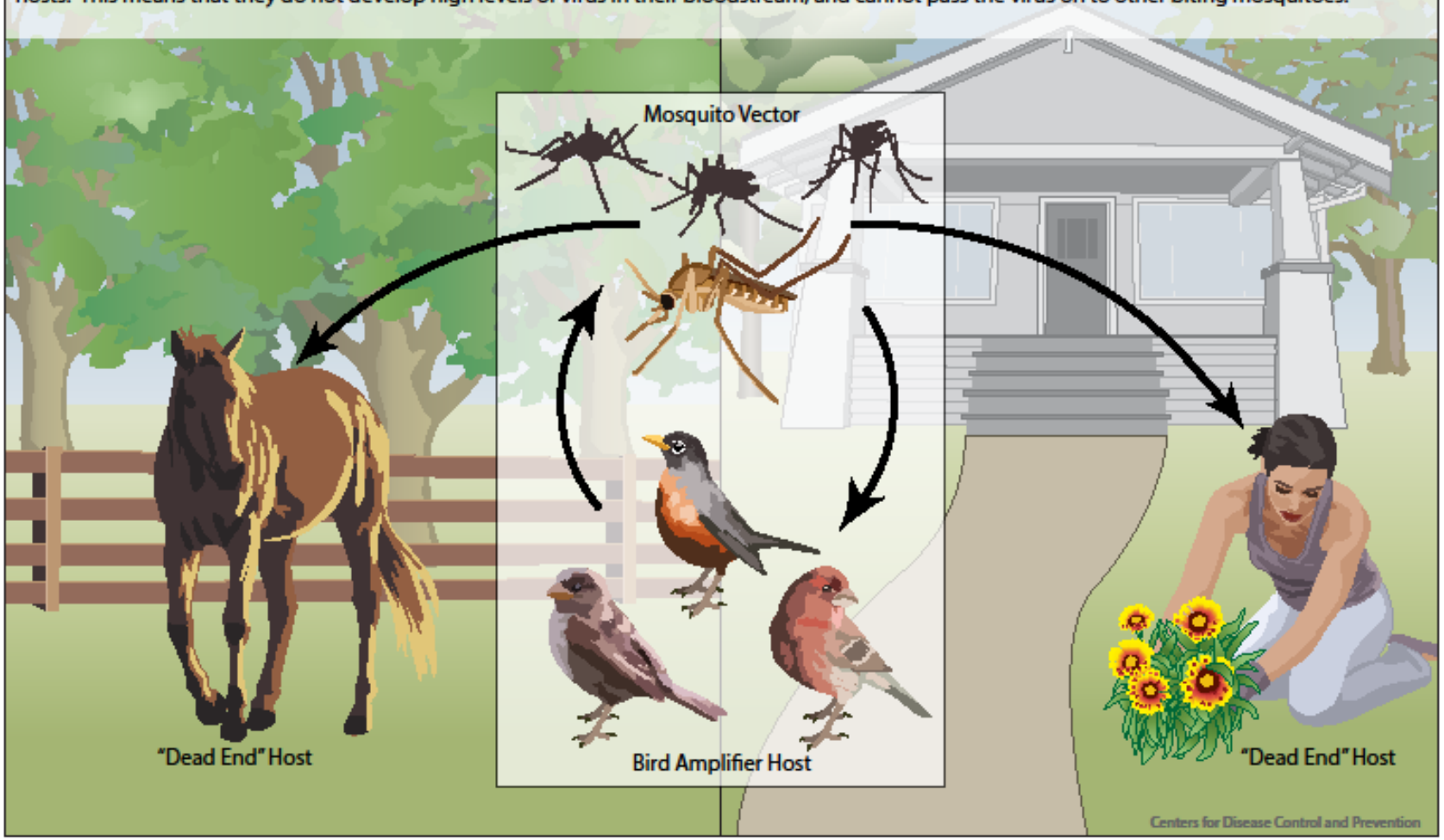
WNV: Retrospective Look



West Nile Virus Transmission Cycle

In nature, West Nile virus cycles between mosquitoes (especially *Culex* species) and birds. Some infected birds, can develop high levels of the virus in their bloodstream and mosquitoes can become infected by biting these infected birds. After about a week, infected mosquitoes can pass the virus to more birds when they bite.

Mosquitoes with West Nile virus also bite and infect people, horses and other mammals. However, humans, horses and other mammals are 'dead end' hosts. This means that they do not develop high levels of virus in their bloodstream, and cannot pass the virus on to other biting mosquitoes.



West Nile Virus

- **Incubation period– 3 to 15 days**
- **Clinical disease develops in anywhere from 10% to 39% of unvaccinated horses**
- **Fatality rate is approx. 33%**
- **40% of horses that survive exhibit residual effects 6 months post-diagnosis**

WNV Clinical Signs

✓ Fever	✓ Anorexia
✓ Sleepiness	✓ Behavior changes
✓ Incessant walking	✓ Ataxia, Circling ✓ Muscle twitching
✓ Blindness	✓ Head pressing
✓ Recumbuncy	✓ Very similar to rabies

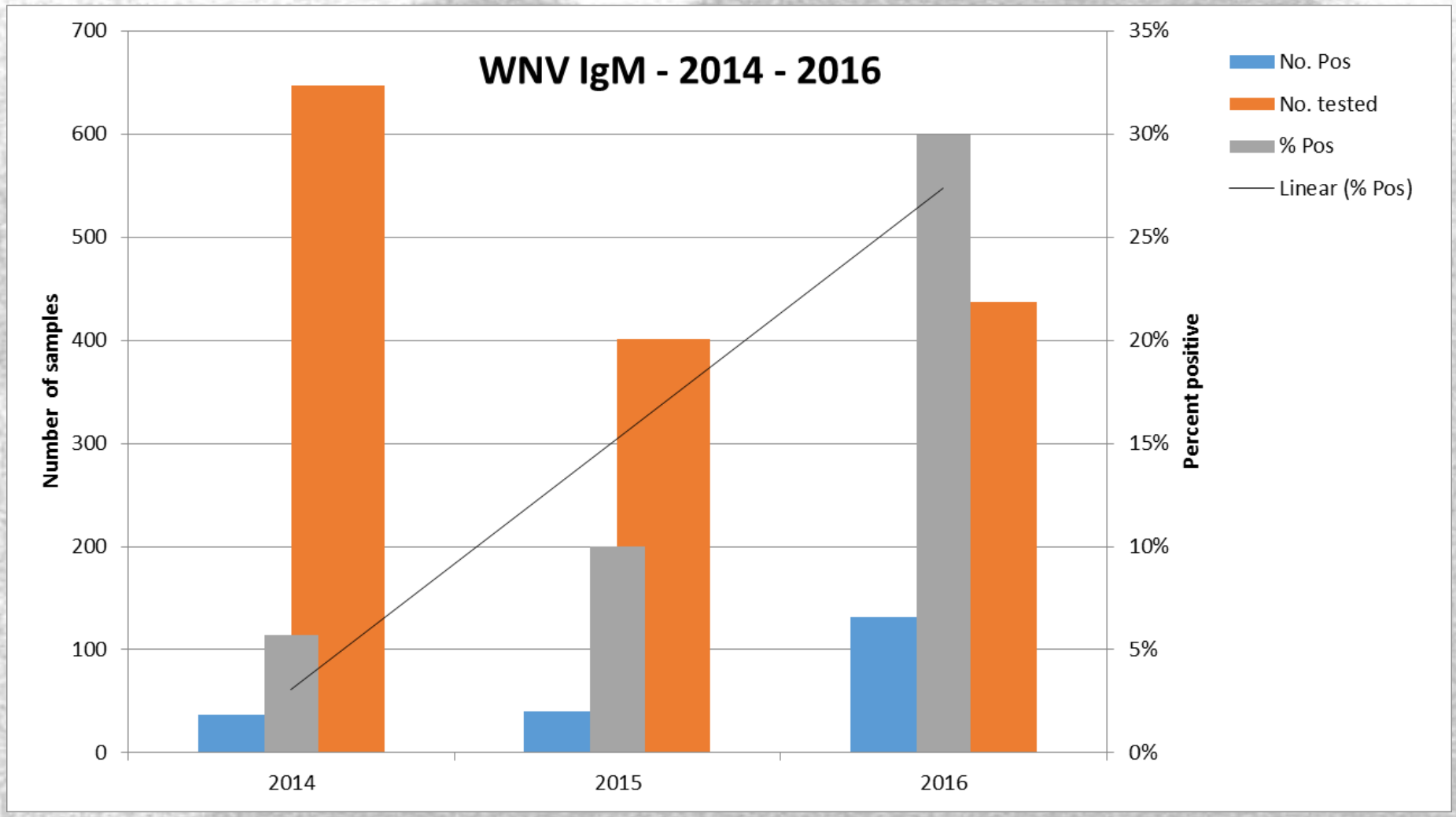
Diagnosis and Treatment of WNV

- **Postmortem Dx**
  - **qPCR; virus isolation**
- **Serological**
  - **IgM capture ELISA;PRNT;SN**
- **Symptomatic (treat the symptoms)**
  - **Anti-inflammatory drugs**
  - **IV fluids**
  - **Other support therapies**

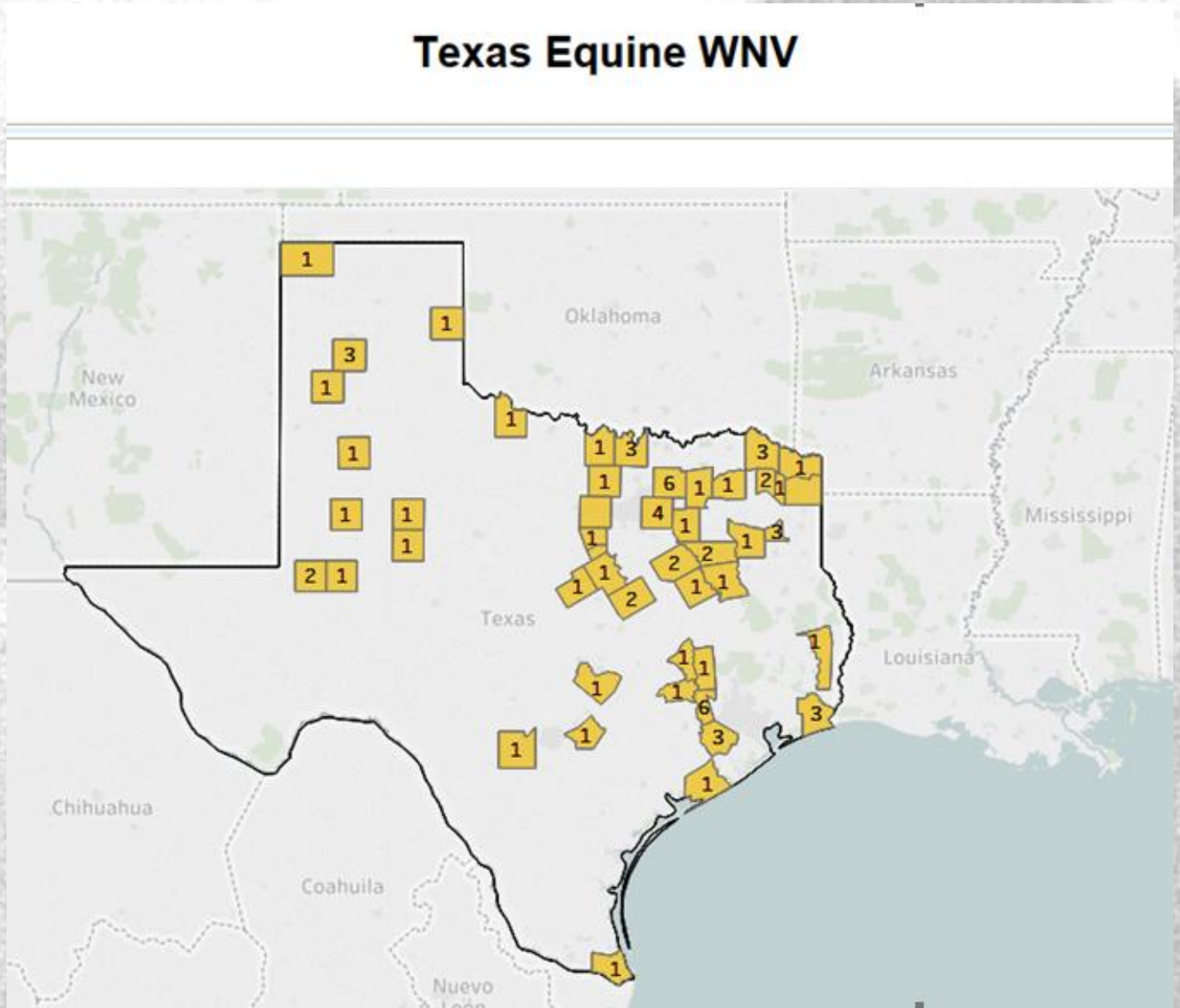
Prevention of VNV, EEE, WEE

- **Vaccination – very effective vaccine**
- **Mosquito control**
- **Insect repellent sprays**

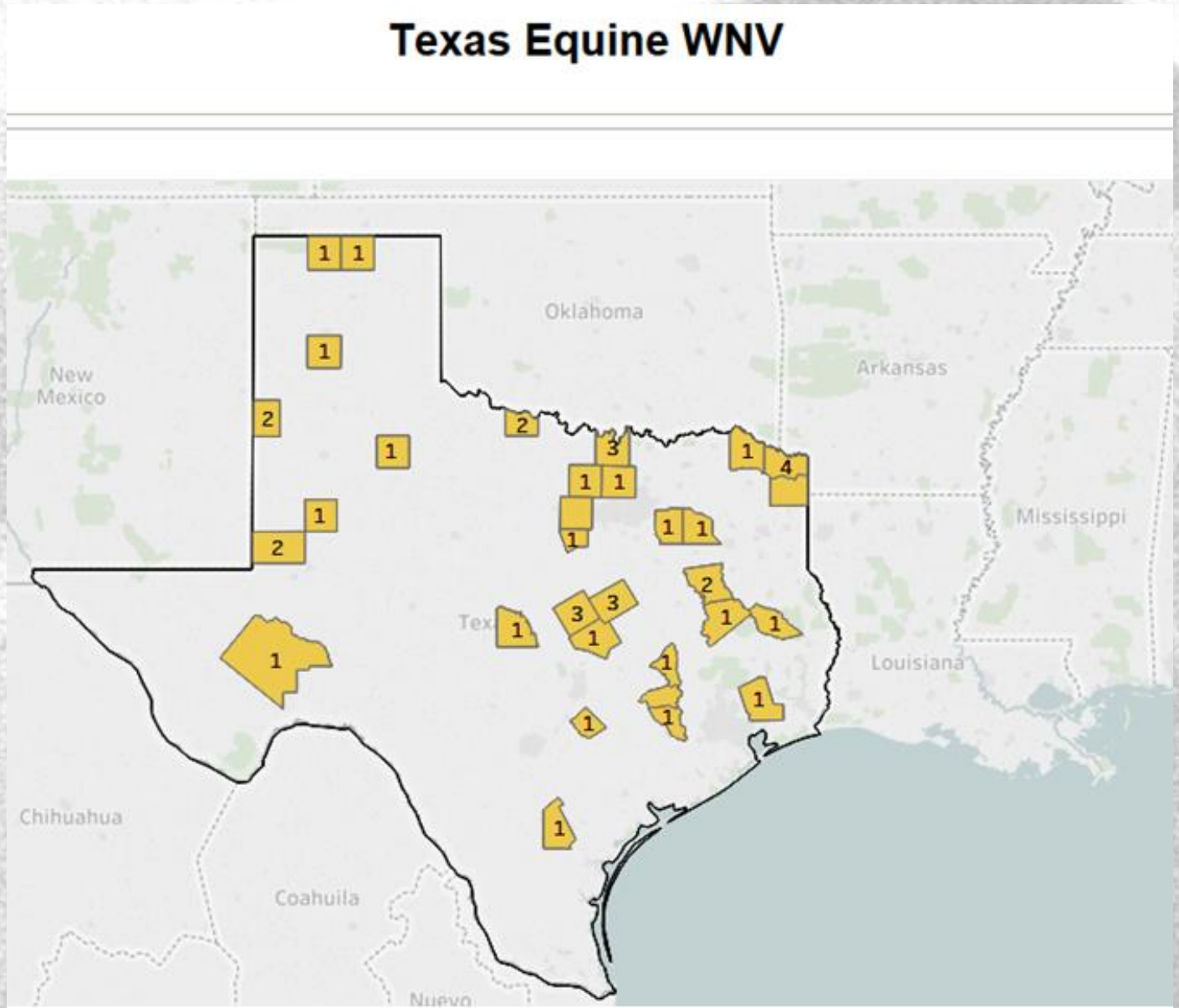
WNV: Retrospective Look



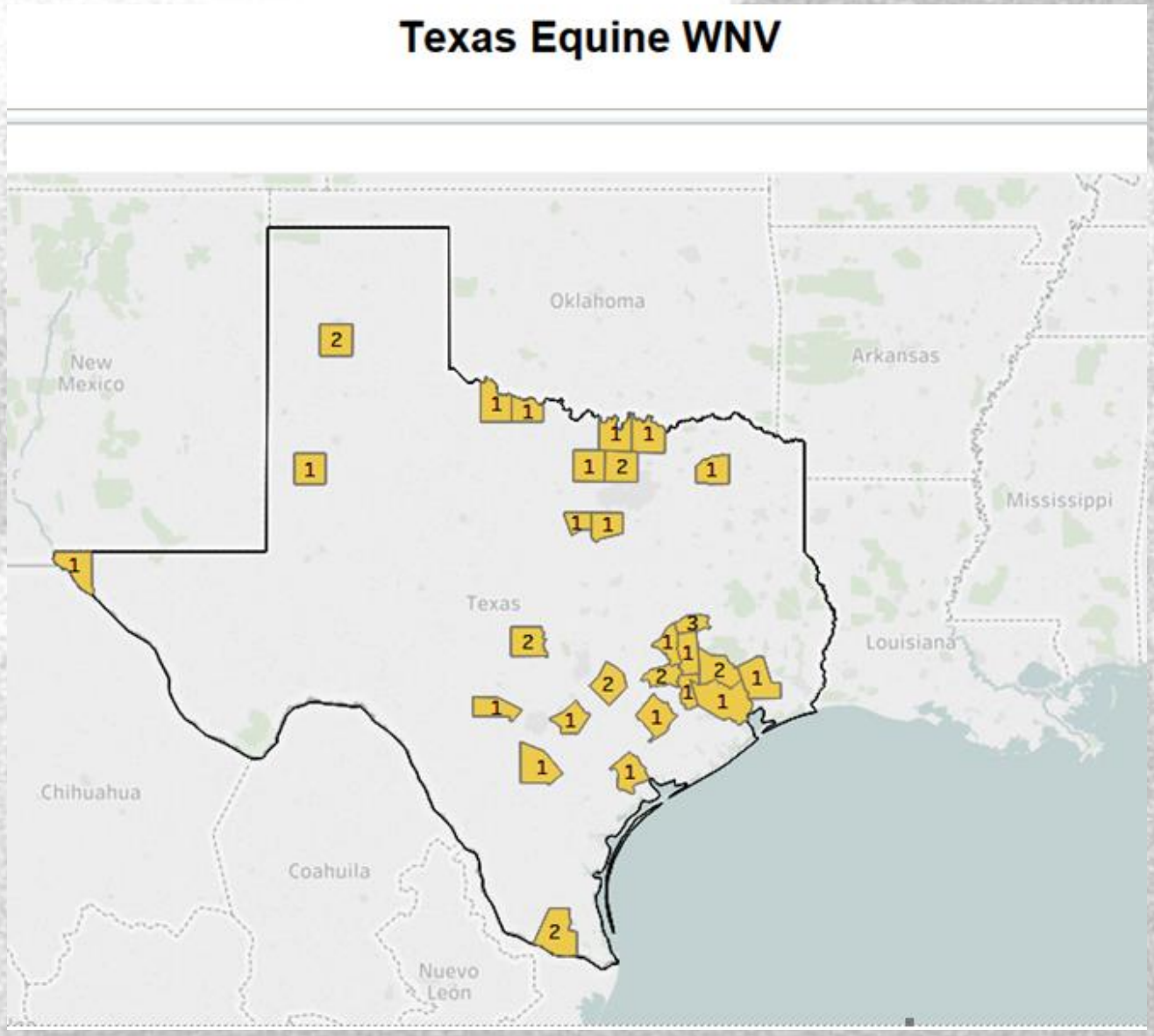
2012


Texas Equine WNV
Oklahoma
New Mexico
Arkansas
Mississippi
Texas
Louisiana
Chihuahua
Coahuila
Nuevo

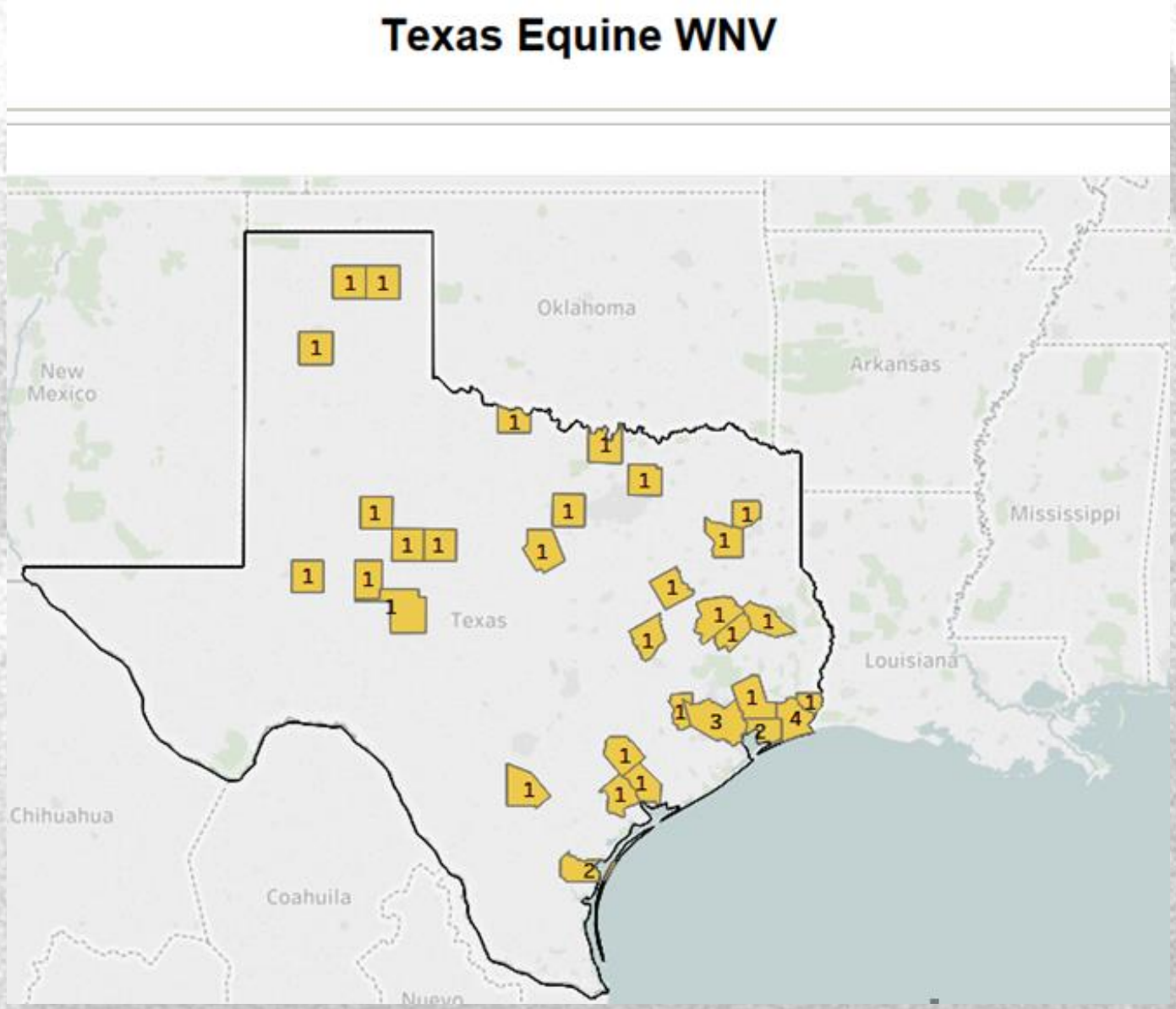
2013


Texas Equine WNV
Oklahoma
New Mexico
Arkansas
Mississippi
Louisiana
Chihuahua
Coahuila
Nuevo

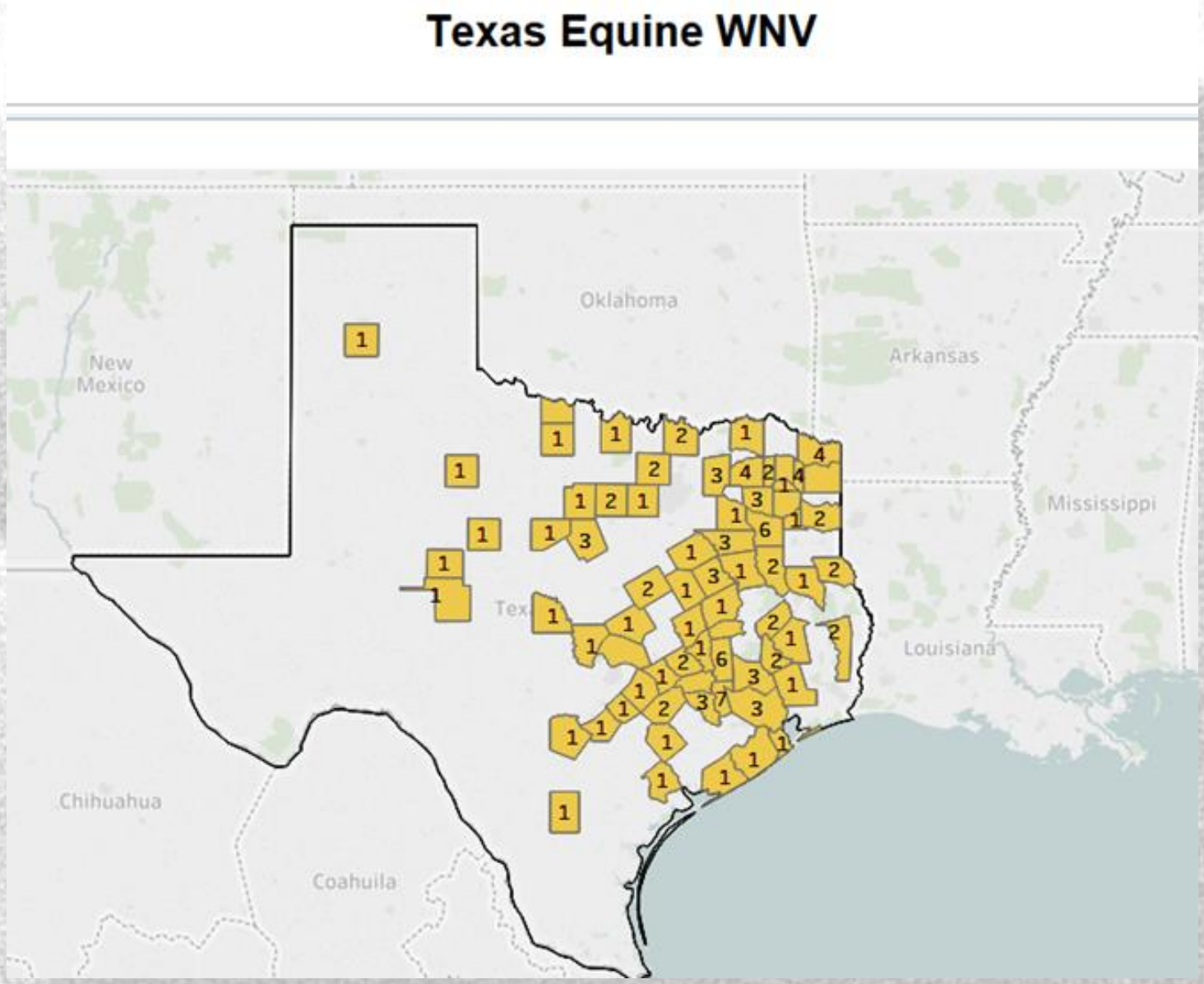
2014


Texas Equine WNV
Oklahoma
New Mexico
Arkansas
Mississippi
Louisiana
Texas
Chihuahua
Coahuila
Nuevo León

2015

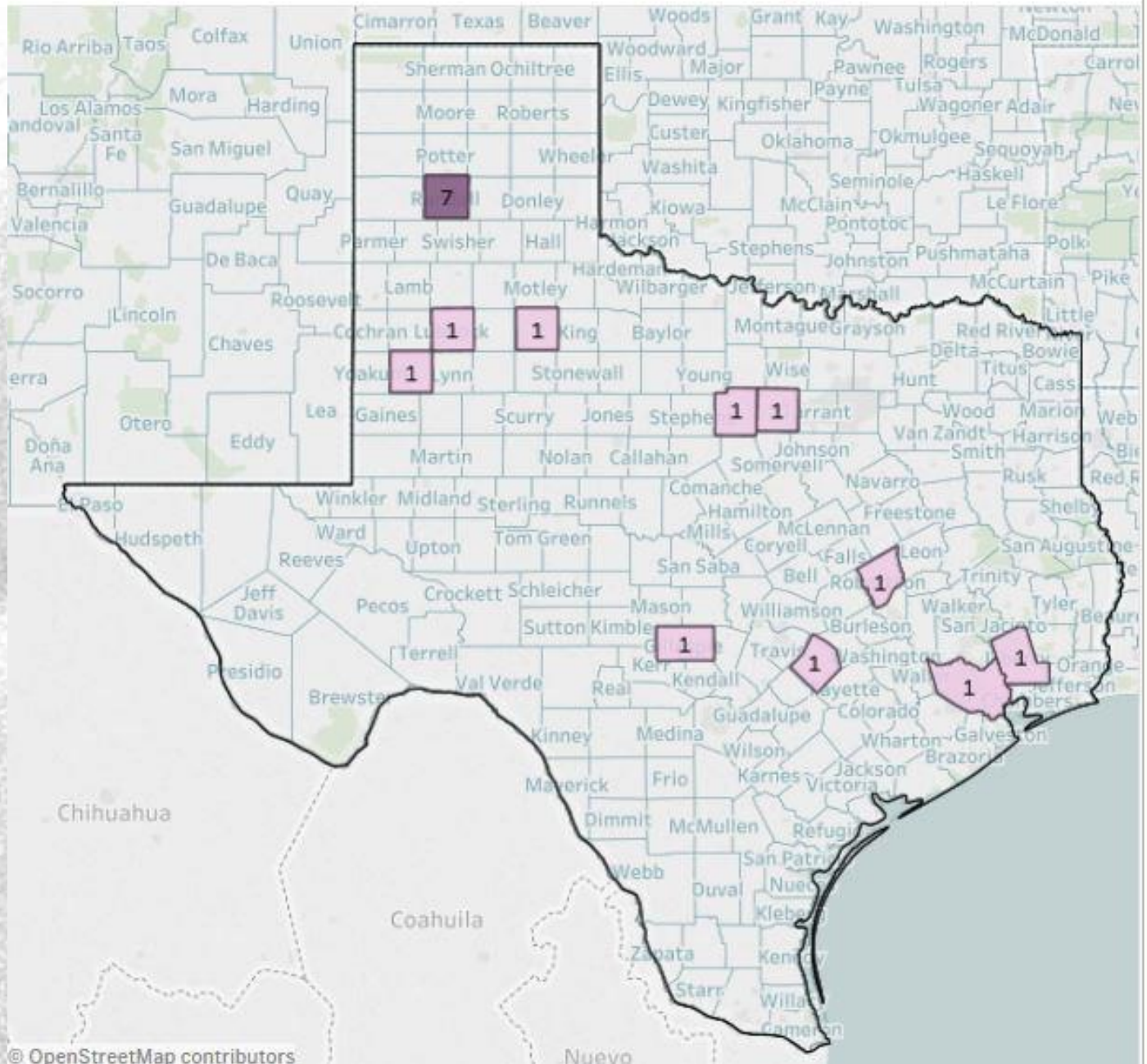

Texas Equine WNV
Oklahoma
New Mexico
Arkansas
Mississippi
Texas
Louisiana
Chihuahua
Coahuila
Nuevo

2016


Texas Equine WNV
Oklahoma
New Mexico
Arkansas
Mississippi
Louisiana
Chihuahua
Coahuila

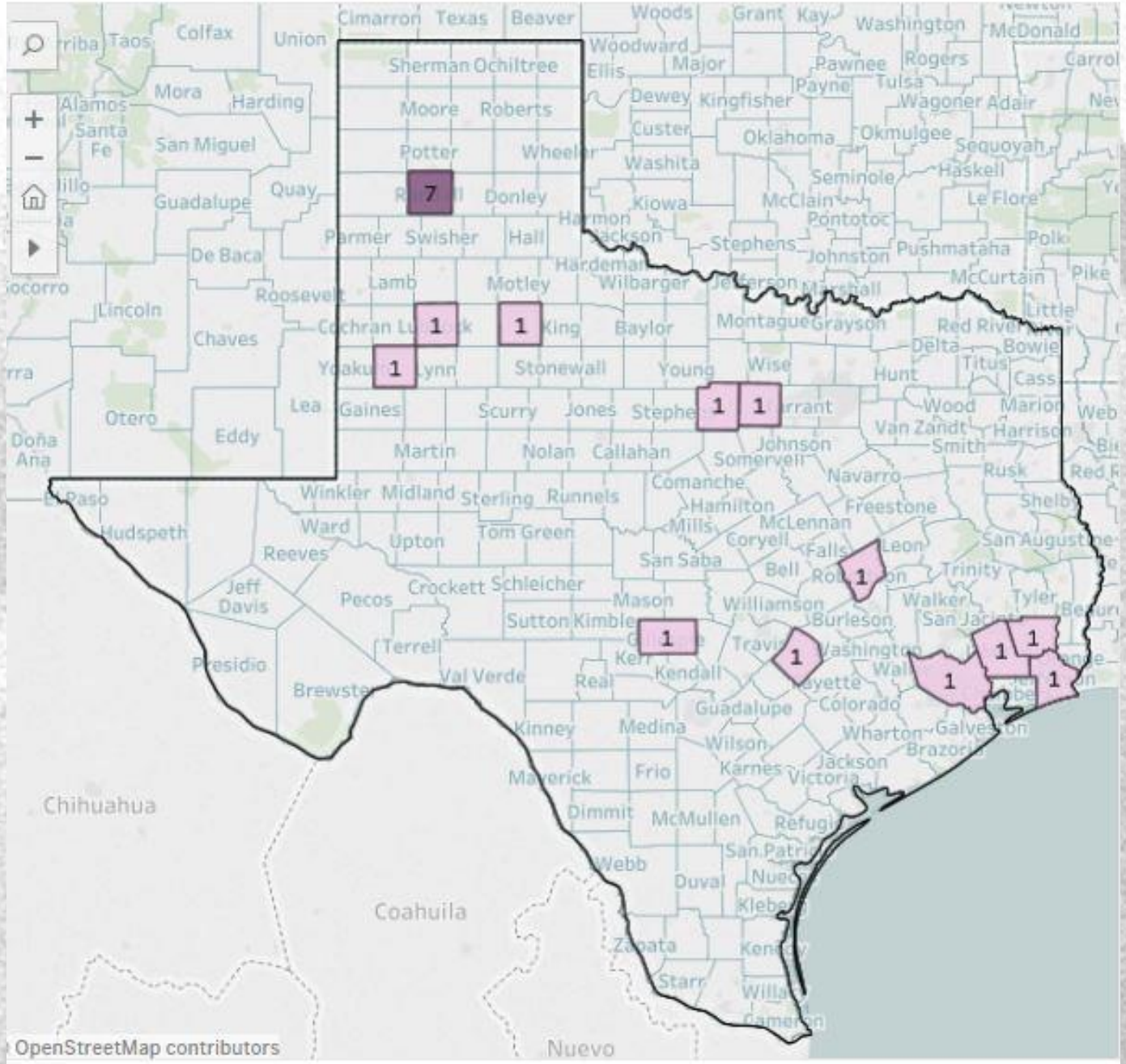
Map of Positive West Nile Cases

Last Updated On 12-5-2017



Map of Positive West Nile/EEE Cases

Last Updated On 12-5-2017



Parasite Control

- Commonly used strategies developed based on knowledge that is 40 years old
- Parasitic fauna of the horse has changed
  - Large stronglyes (Strongylus vulgaris) now rare
  - Small strongyles (cyathostomins) now major parasite in adult horses
  - Ascarids (Parascaris spp.) still most important parasite in foals and weanlings

Parasite Control

- Traditional parasite control program
  - Based on large strongyle (S.vulgaris)
  - Kill parasite before it could mature and lay eggs
  - Took about 2 months for eggs to reappear after treatment
  - Treat every 2 months; very successful

Small strongyles

#1 culprit in horse parasite world

- Virtually all grazing horses are infected
- Relatively mild pathogen
- Produce disease when in high numbers

Parasite Control

- Anthelmintic resistance is prevalent in cyathostomins and ascarids.
- Variation in adult horses concerning innate resistance to infection
- Horses less than about 3 years of age are more susceptible to parasite infection

Anthelmintic Resistance

- The ability of worms in a population to survive treatments that are generally effective
- Inherited trait
- Rate of development determined by selection pressure and passing genes to next gereration
- Resistance genes increase to point of tx failure
- Once present resistant parasites do not revert

Parasite Refugia

- The portion of a population of parasites that escapes selection with the drug during a treatment event
- More worms in refugia the more slowly resistance develops
- Worms in refugia not selected for resistance
- Resistance worms diluted by susceptible worms

Strongyle Egg Shedding

- Horses demonstrate differences in egg shedding
- Egg counts highly conc in certain horses
  - 20% of the horses shed 80% of the eggs
  - Individuals tend to be consistent
- Fecal egg counts are necessary to properly develop and monitor a parasite control program

Goals of Parasite Control

- Limit parasite infections so animals remain healthy and clinical illness doesn't develop
- Not to eradicate all parasites from a horse
  - Impossible
  - Inevitable result is drug resistance
- Control parasite egg shedding
- Avoid further development of anthelmintic resistance

Goal of Parasite Control Program

- Minimize the risk of parasitic disease
- **Control parasite egg shedding**
- Maintain efficacious drugs
- Avoid further anthelmintic resistance as much as possible
- Eradication of parasites from an individual is not the goal(impossible) and inevitably results in accelerated development of parasite drug resistance.