

# The Evolving West Nile Virus Epizootic in Horses

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# Acknowledgments

Data on equine cases of West Nile virus (WNV) infection were acquired only through the efforts of private veterinary practitioners, clinicians, field investigators, laboratory diagnosticians, animal health and public health officials in all the States where suspect equine cases have been investigated to date.

Laboratory confirmation of equine cases in 2001 was performed by USDA-APHIS' National Veterinary Services Laboratories (NVSL).

# Equine WNV Cases, 1999

- 25 cases eventually detected, all on Long Island (22 in Suffolk Co., 3 in Nassau Co.)
  - 19 premises affected
  - dates of onset:
    - first - 26 August (Riverhead, NY)
    - last - 18 October (Mattituck, NY)
  - all horses, no other equids
  - 9 horses (36%) died or were euthanized

# Equine WNV Cases, 2000

- **60 cases detected in 7 States**
  - ➔ *NJ (27), NY (19), CT (7), DE (4), MA (1), PA (1), RI (1)*
  - ➔ *10 cases in Monmouth Co., NJ*
  - ➔ *dates of onset:*
    - first - 17 August (Staten Island, NY)
    - last - 30 October (near Smyrna, DE)
  - ➔ *all horses, no other equids*
  - ➔ *23 horses (38%) died or were euthanized*

# Equine Surveillance Case Definition 2001

- **Confirmed** case – compatible clinical signs\* plus one or more diagnostic results:
  - *isolation of WNV from tissues*
  - *≥4-fold change in PRNT titer (paired sera)*
  - *IgM in serum/CSF, plus PRNT titer in serum*
  - *IgM in serum/CSF, plus positive PCR in tissue*
  - *IgM in serum/CSF, plus positive IHC in tissue*
  - *positive IHC and positive PCR in tissue*

\* ataxia or at least two other specified clinical signs

# Equine WNV Cases, 2001

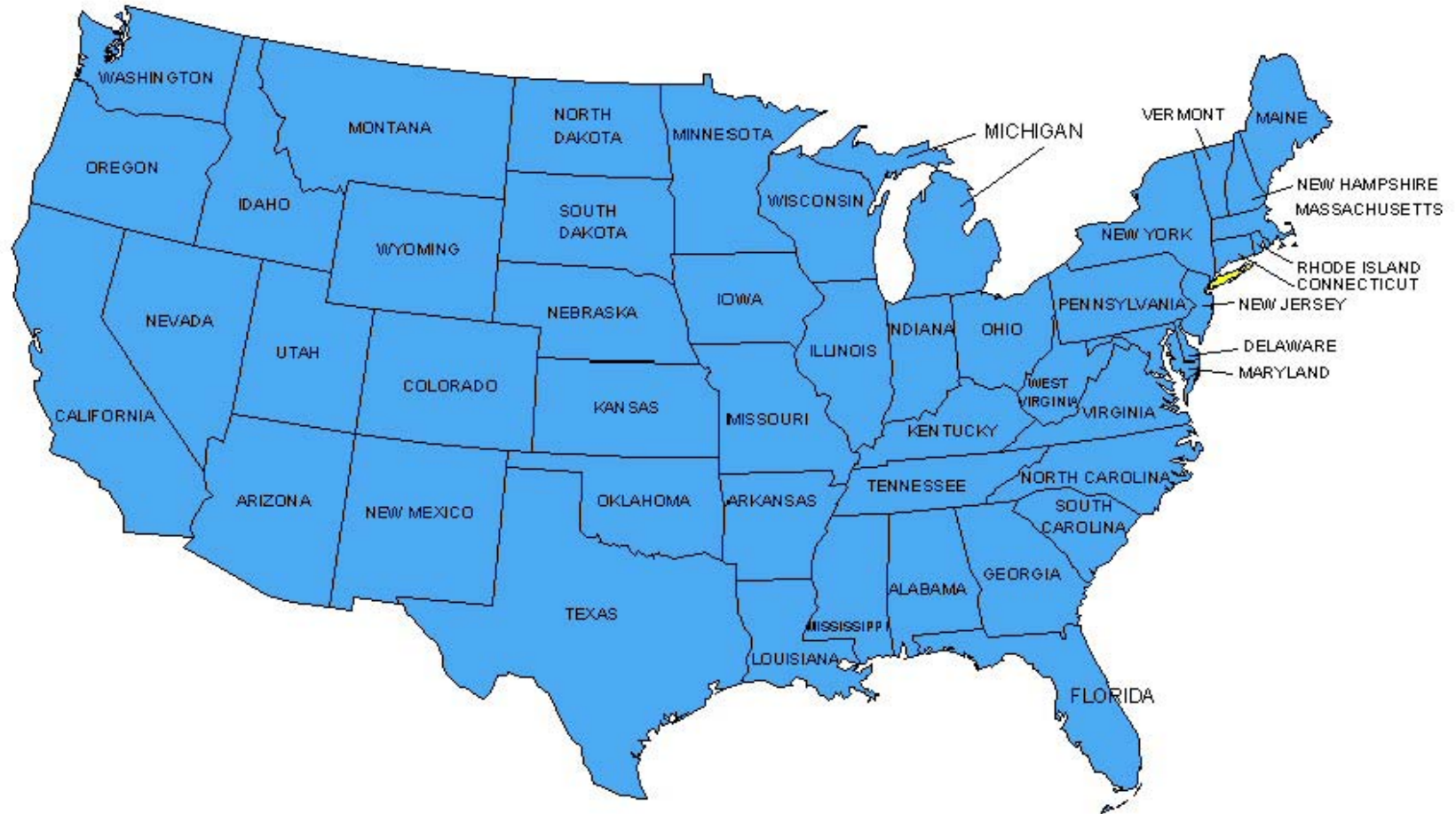
- **738 cases detected in 20 States**
  - ➔ ***States with >5 cases: FL (492), GA (68), MA (45), NJ (33), NY (22), MS (17), CT (11), LA (9), KY (8), PA (7), NC (6), VA (6)***
  - ➔ ***89 cases in Marion Co., FL***
  - ➔ ***dates of onset:***
    - ***first: 25 June, (Jefferson Co., FL)***
    - ***“last”: 21 December (Sumter Co., FL)***
  - ➔ ***all horses, no other equids***
  - ➔ ***at least 156 horses died or were euthanized***

# **Equine WNV Cases, 2001**

## ***(continued)***

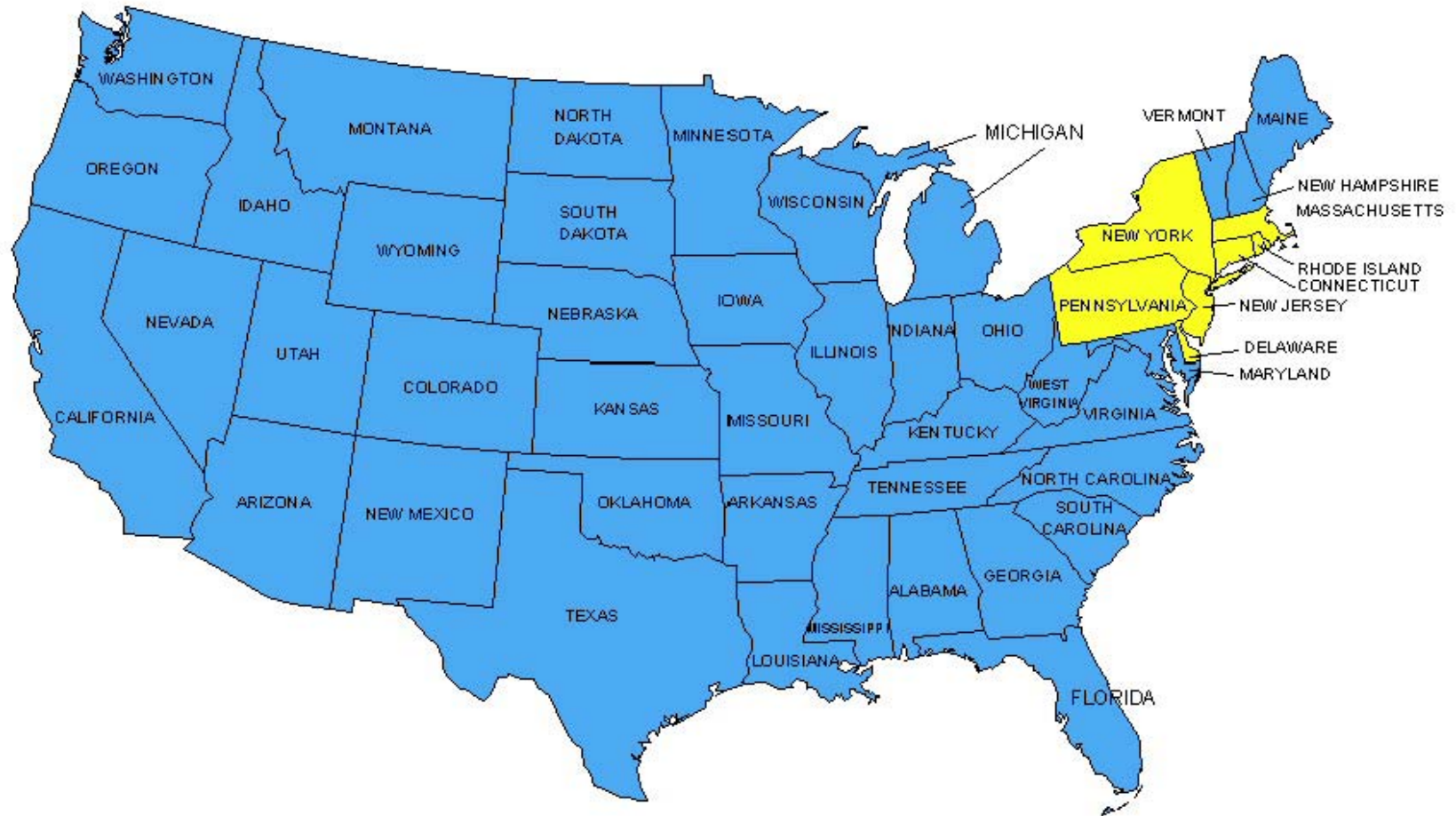
- **Information reported on the 738 cases**
  - ➔ ***County: 726 cases***
  - ➔ ***Onset date : 702 cases***
  - ➔ ***Age, county and onset date: 641 cases***
  - ➔ ***Outcome, plus some other data: 470 cases***
  - ➔ ***Outcome, plus age, and some other: 455 cases***
- **Of the 738 cases, at least 651 had diagnostic results at NVSL that met 2001 case definition**
  - ➔ ***Confirmed: 640 cases***
  - ➔ ***Probable: 11 cases***

# West Nile Virus in 1999 - Equine

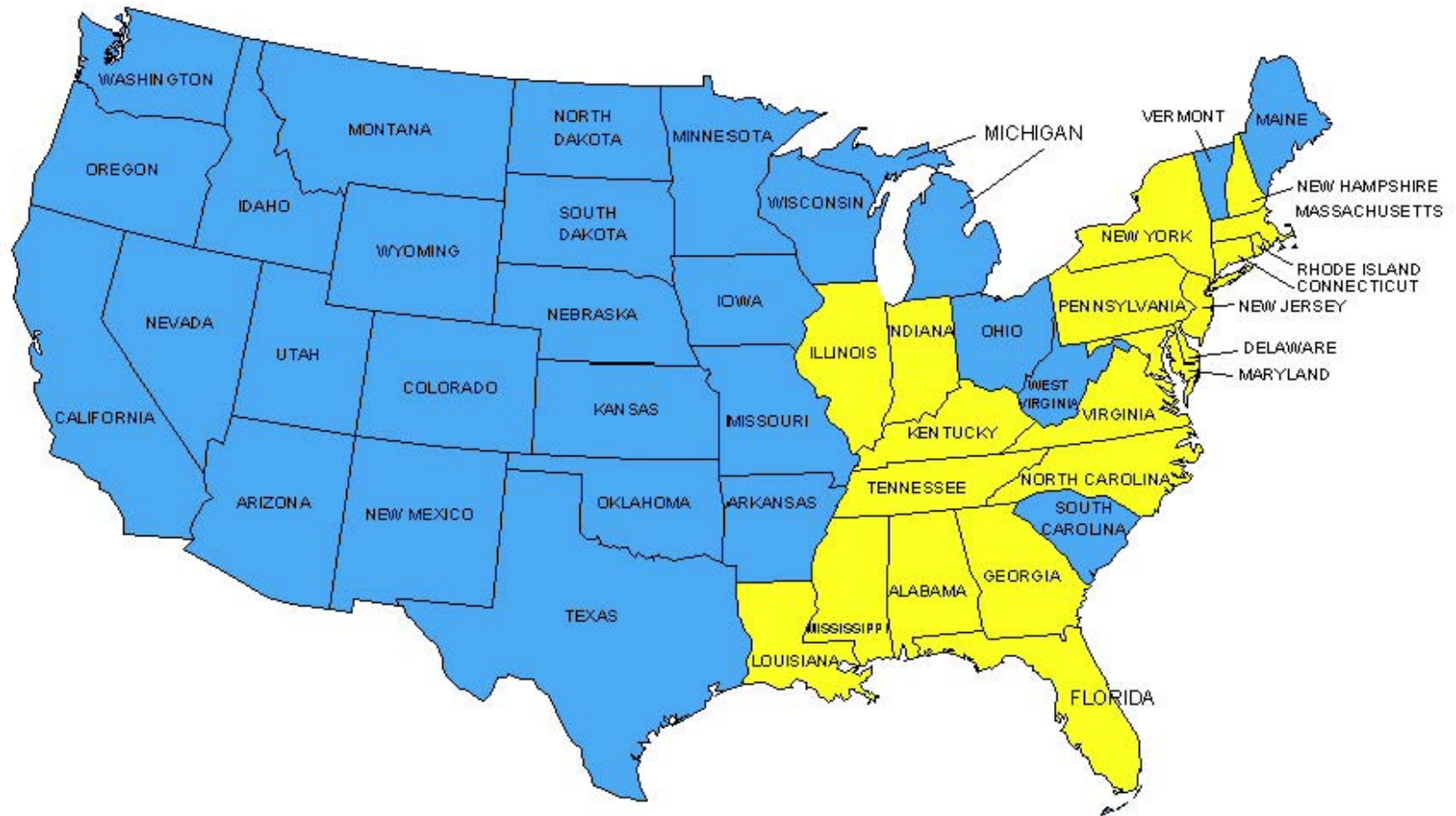




# West Nile Virus in 2000 - Equine

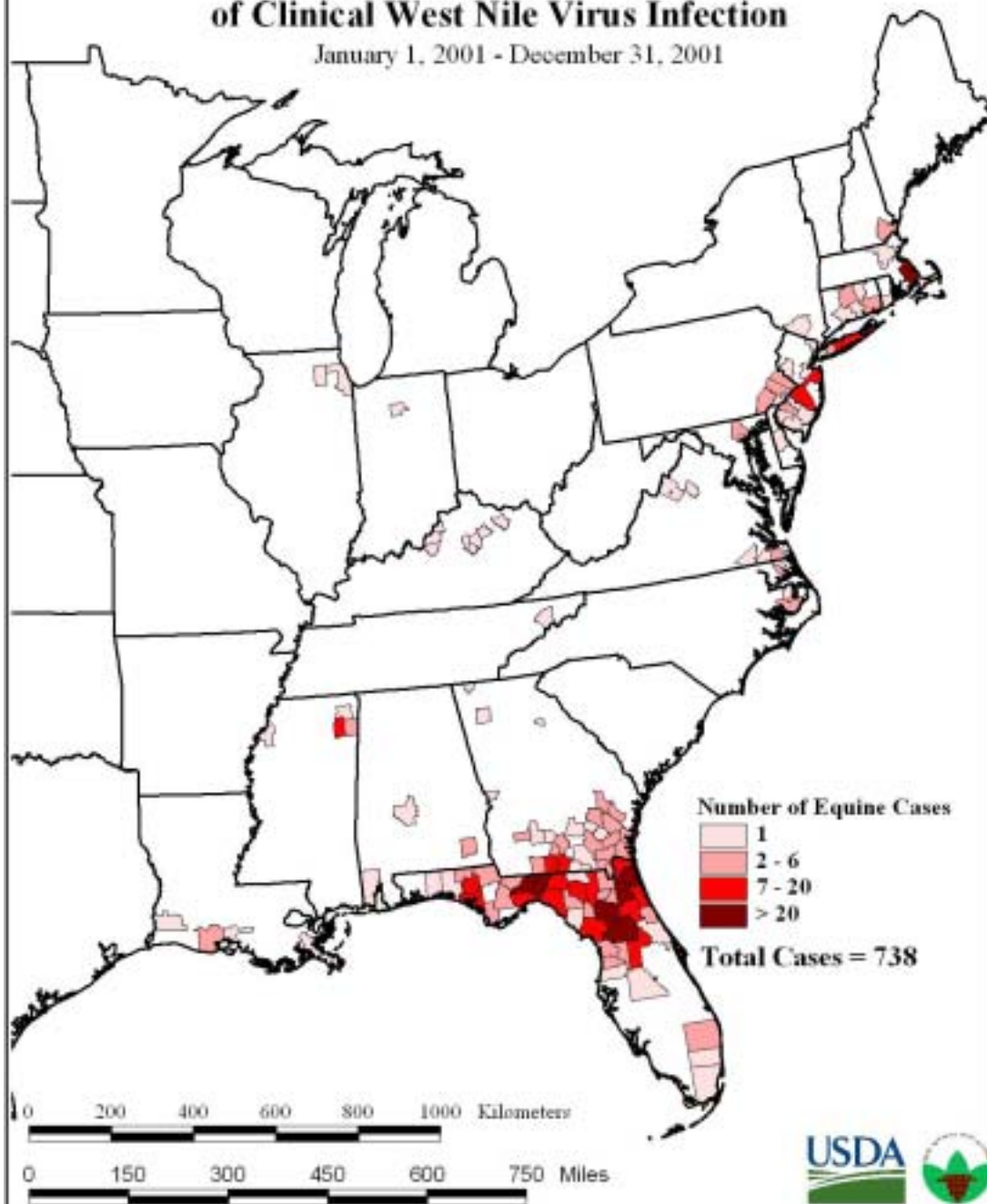


# West Nile Virus in 2001 - Equine

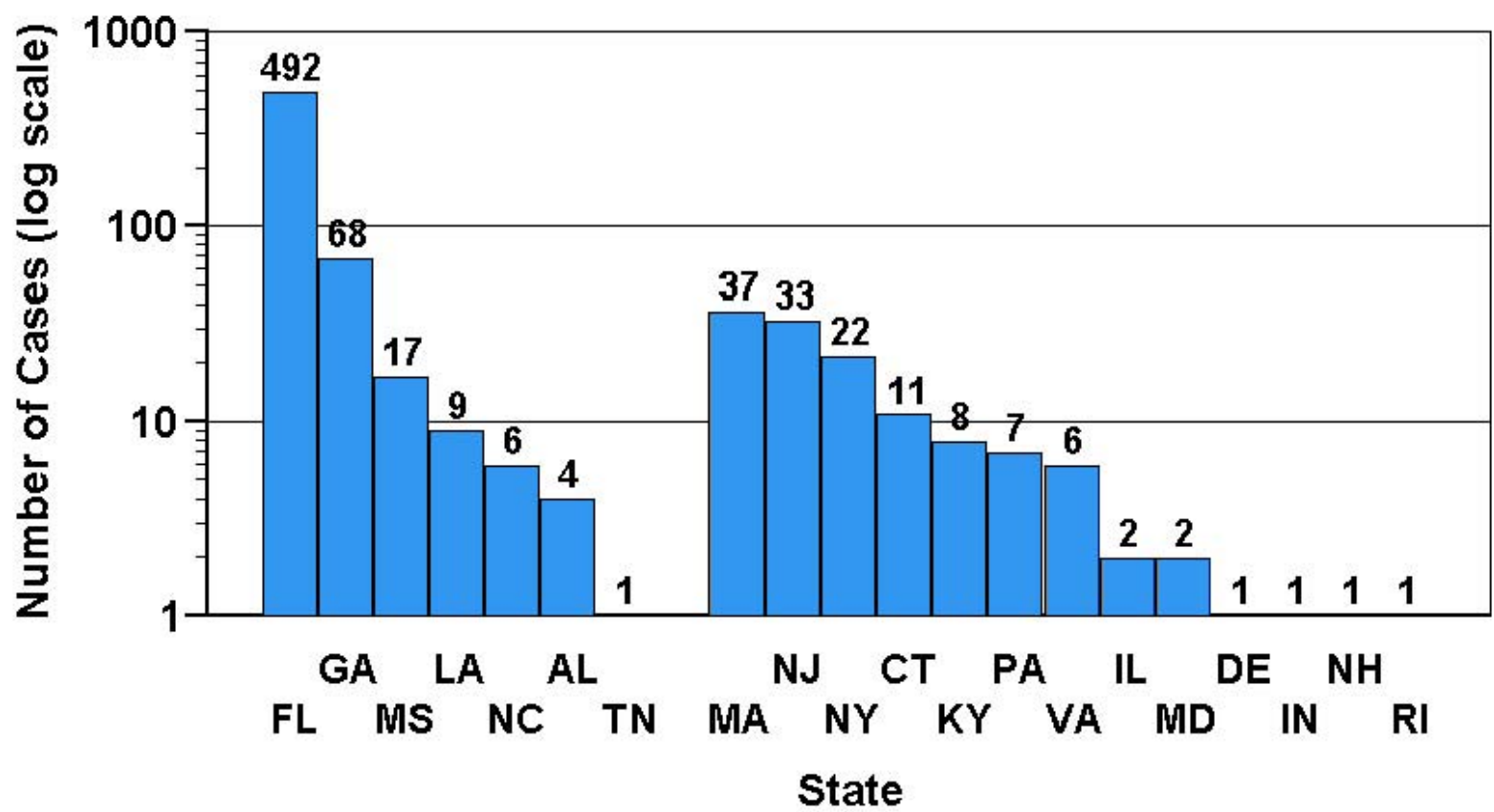


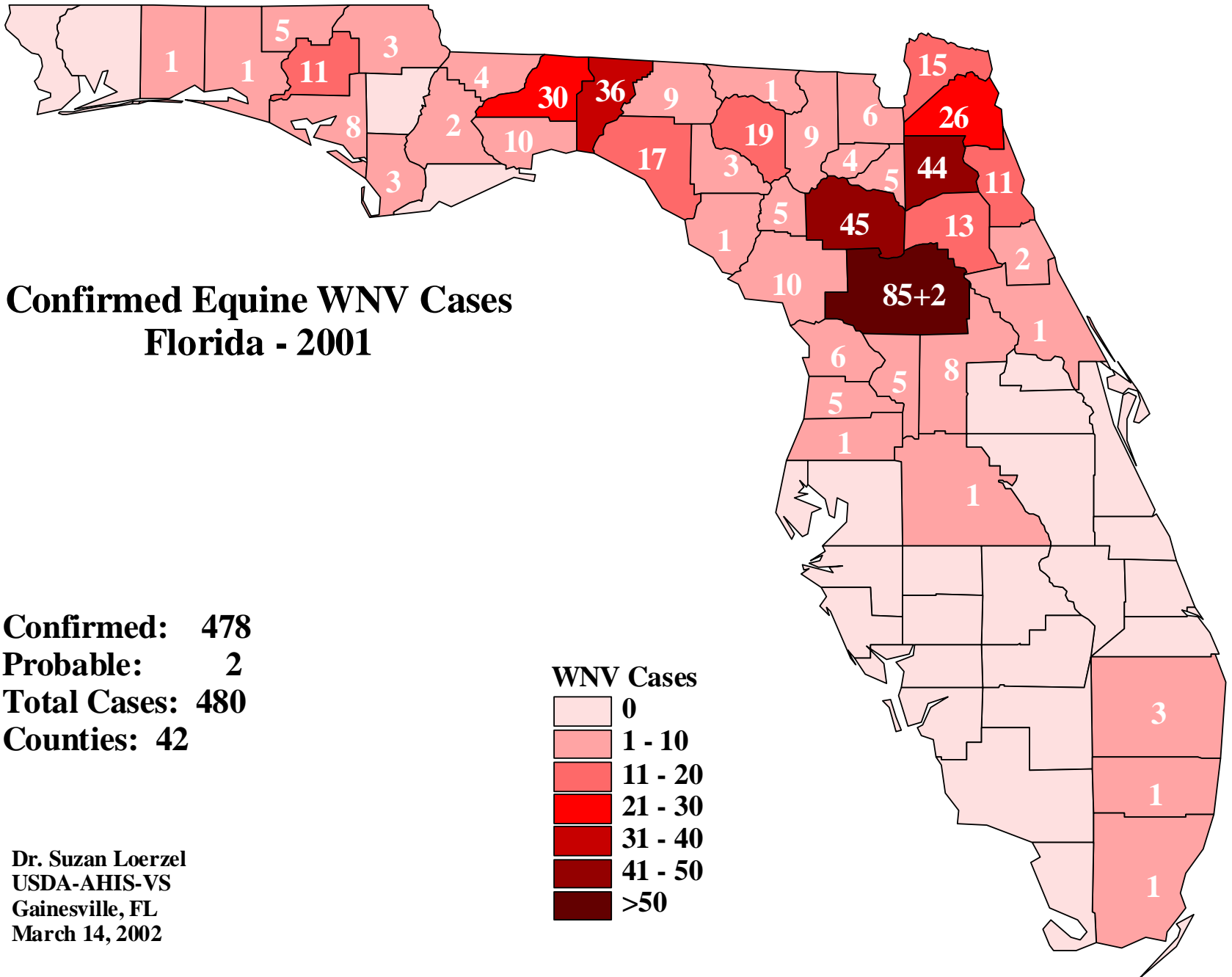
# Summary of Equine Cases of Clinical West Nile Virus Infection

January 1, 2001 - December 31, 2001



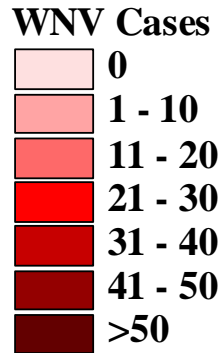
# Equine Cases of West Nile Encephalitis By State, 2001





**Confirmed Equine WNV Cases  
Florida - 2001**

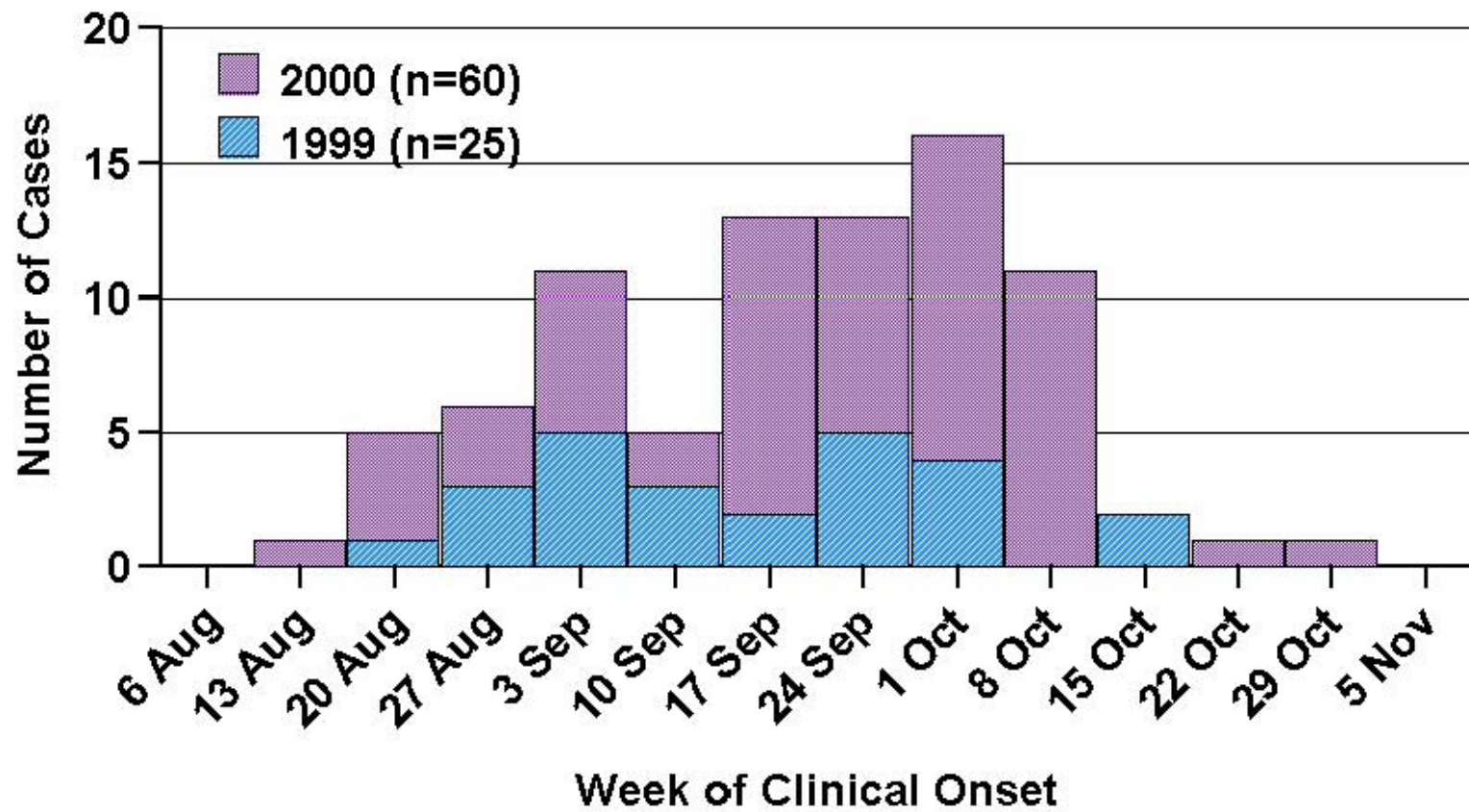
**Confirmed: 478**  
**Probable: 2**  
**Total Cases: 480**  
**Counties: 42**



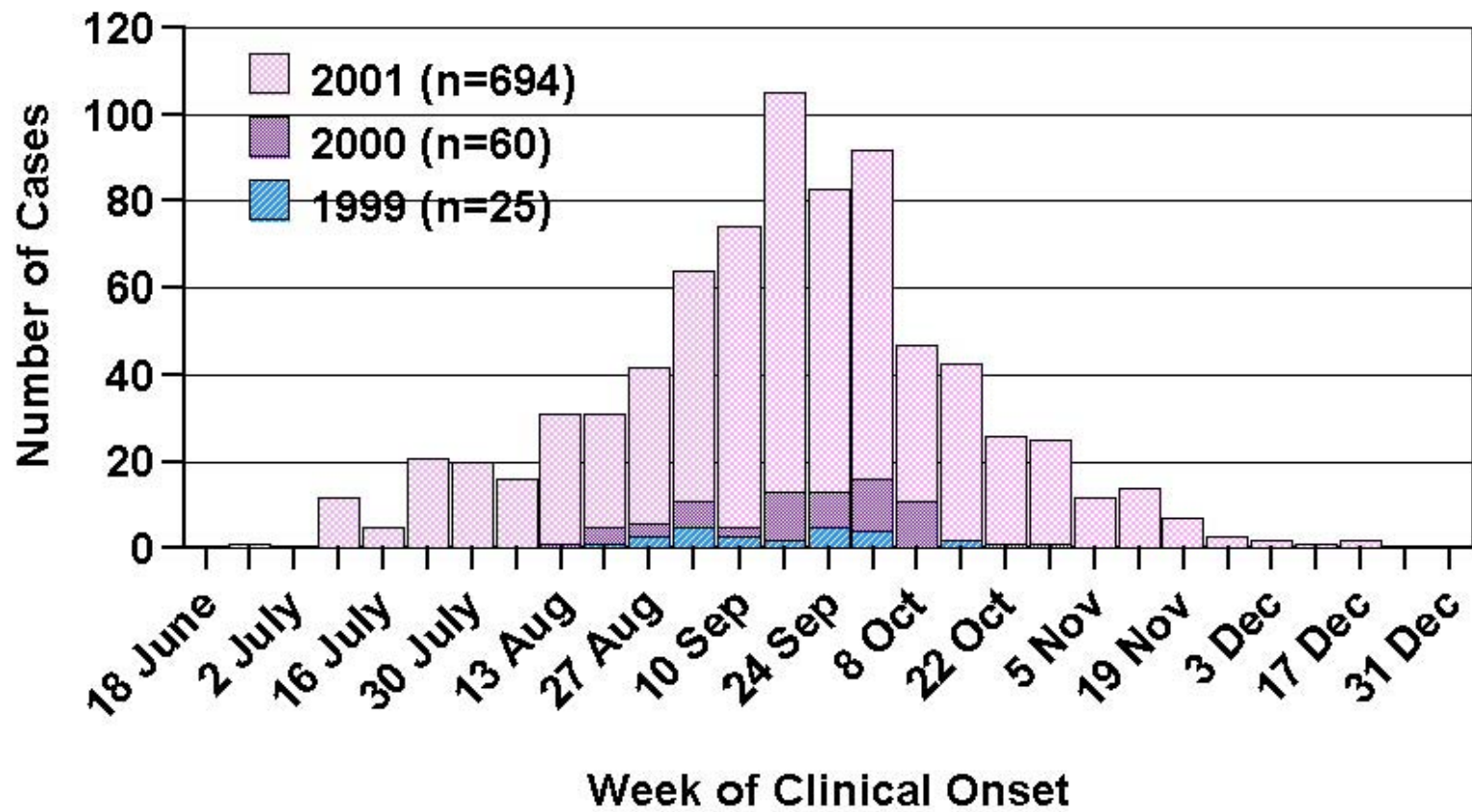
Dr. Suzan Loerzel  
 USDA-AHIS-VS  
 Gainesville, FL  
 March 14, 2002



# Equine Cases of West Nile Encephalitis United States, 1999-2000

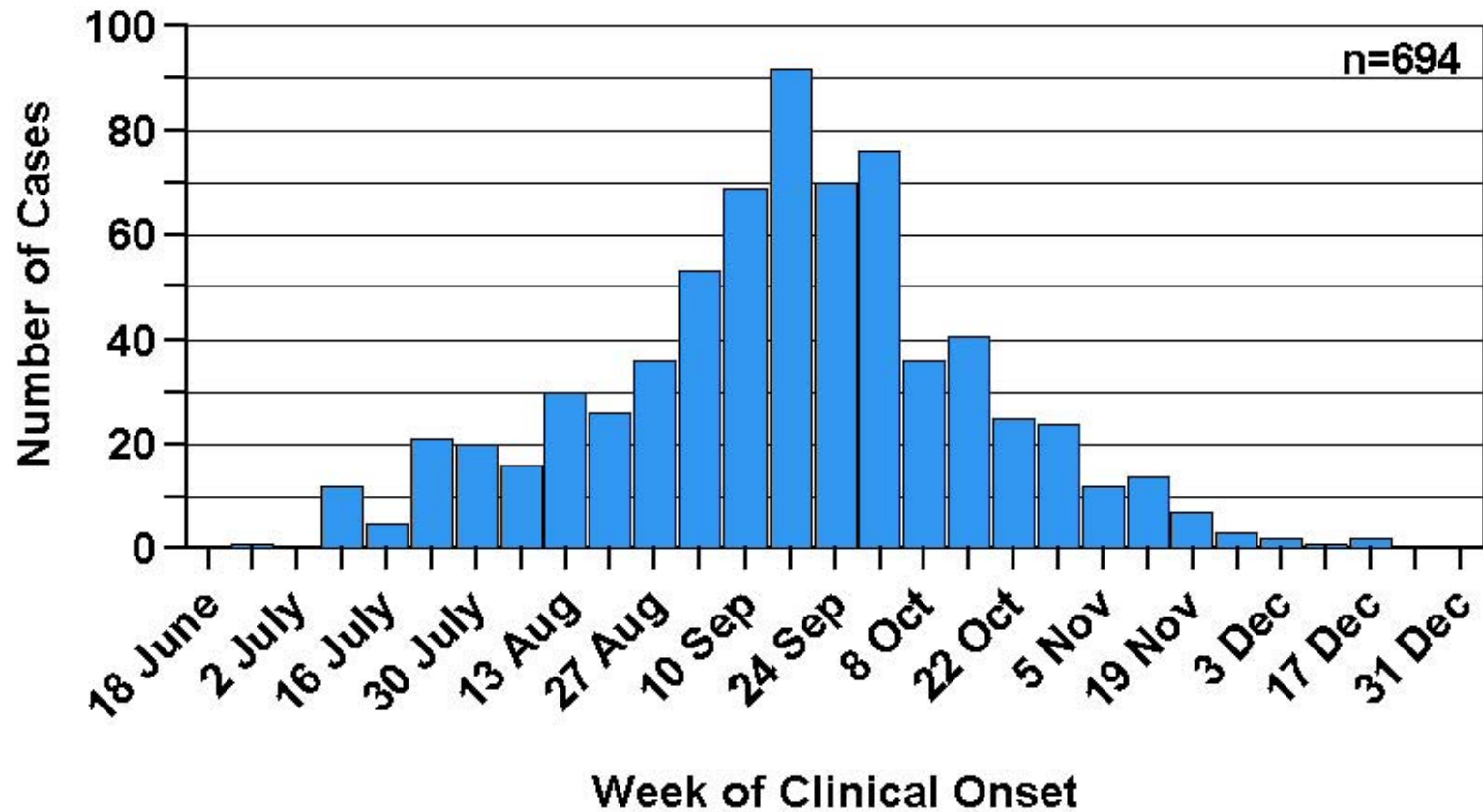


# Equine Cases of West Nile Encephalitis United States, 1999-2001

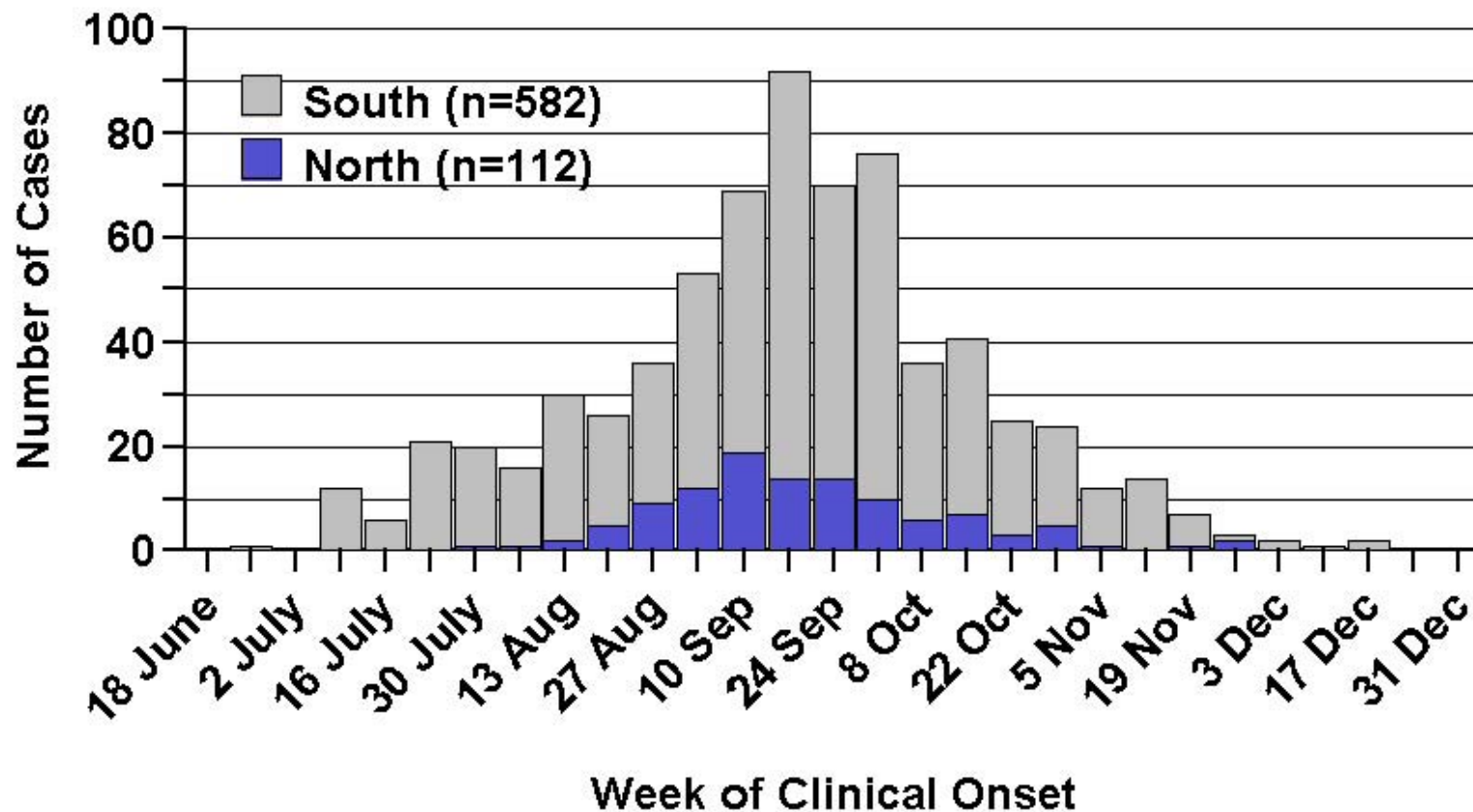




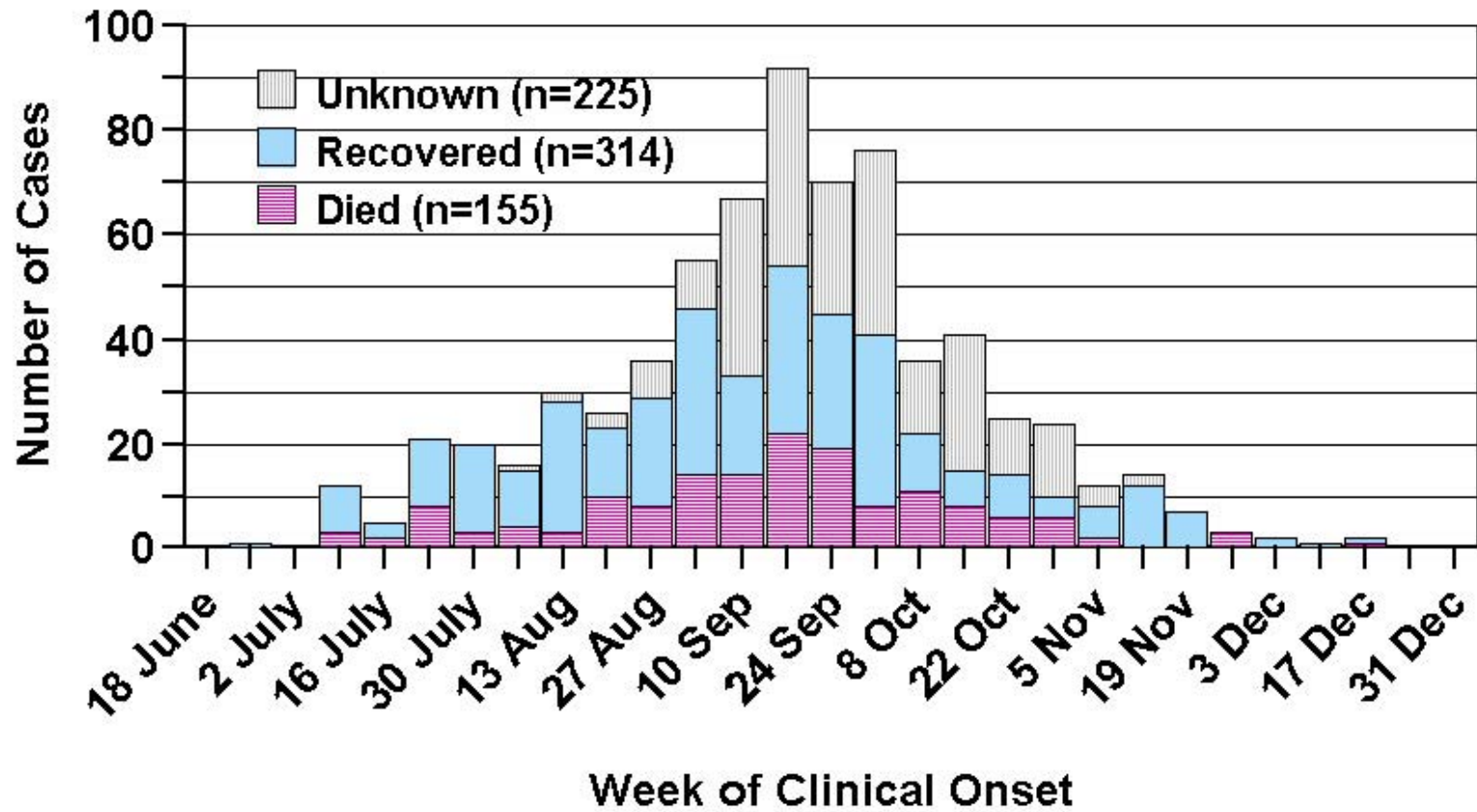
# Equine Cases of West Nile Encephalitis United States, 2001



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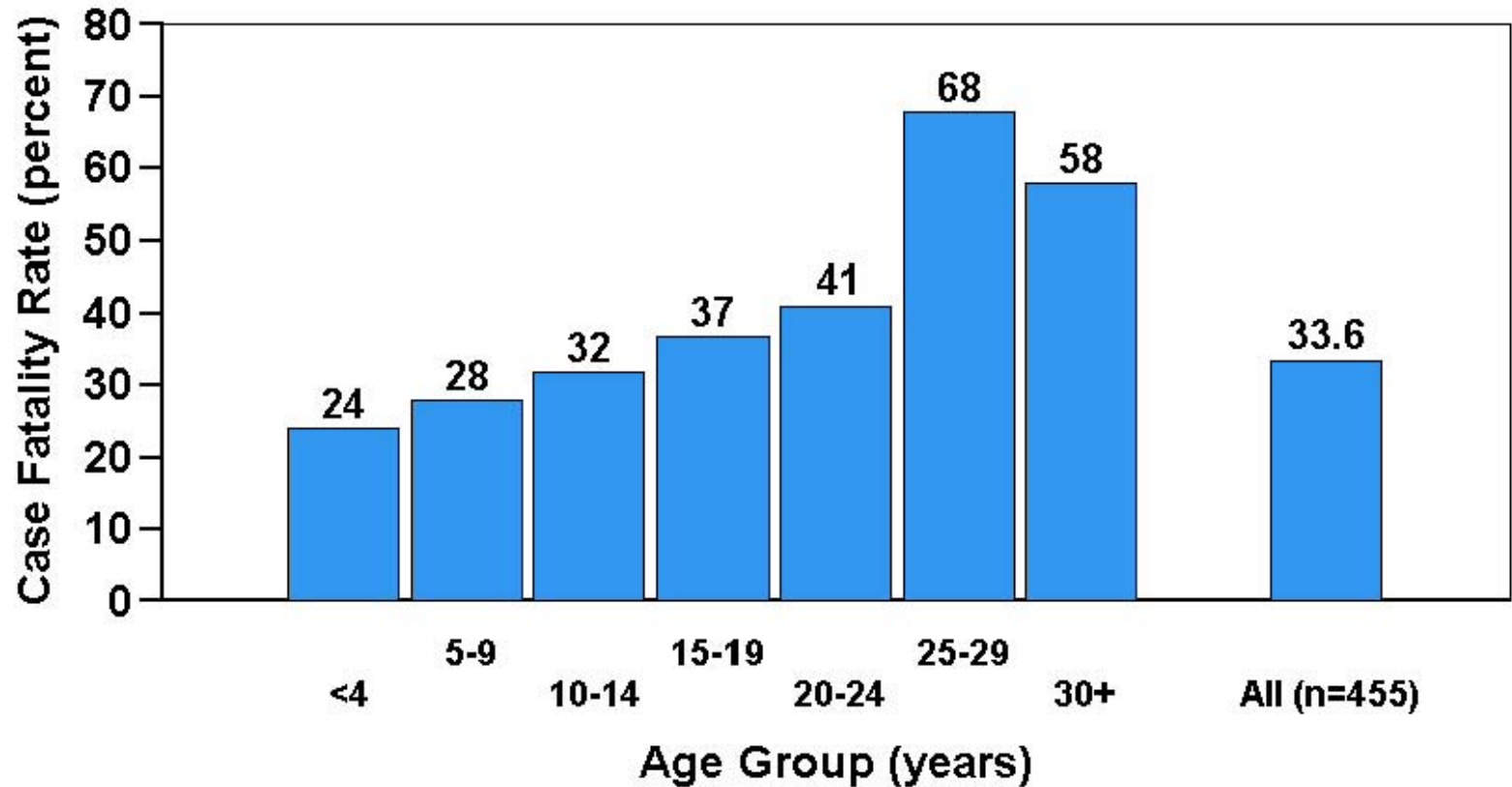
# Clinical WNV Cases in Horses 1999-2000

- Case fatality rate: 38% (32/85)
- No breed predilection: 11 or more affected
- Slightly more males: 57% (48/84)
- Age related to outcome
  - *all ages infected, but those that become ill are older than those that do not*
  - *those that die are older than those that recover*

# Clinical WNV Cases in Horses 2001

- Case fatality rate: 33.2% (156/470), or lower?
- No breed predilection: >30 affected
- Slightly more males: 53.7% (350/652)
- Age related to outcome
  - ➔ *those that die are older than those that recover*

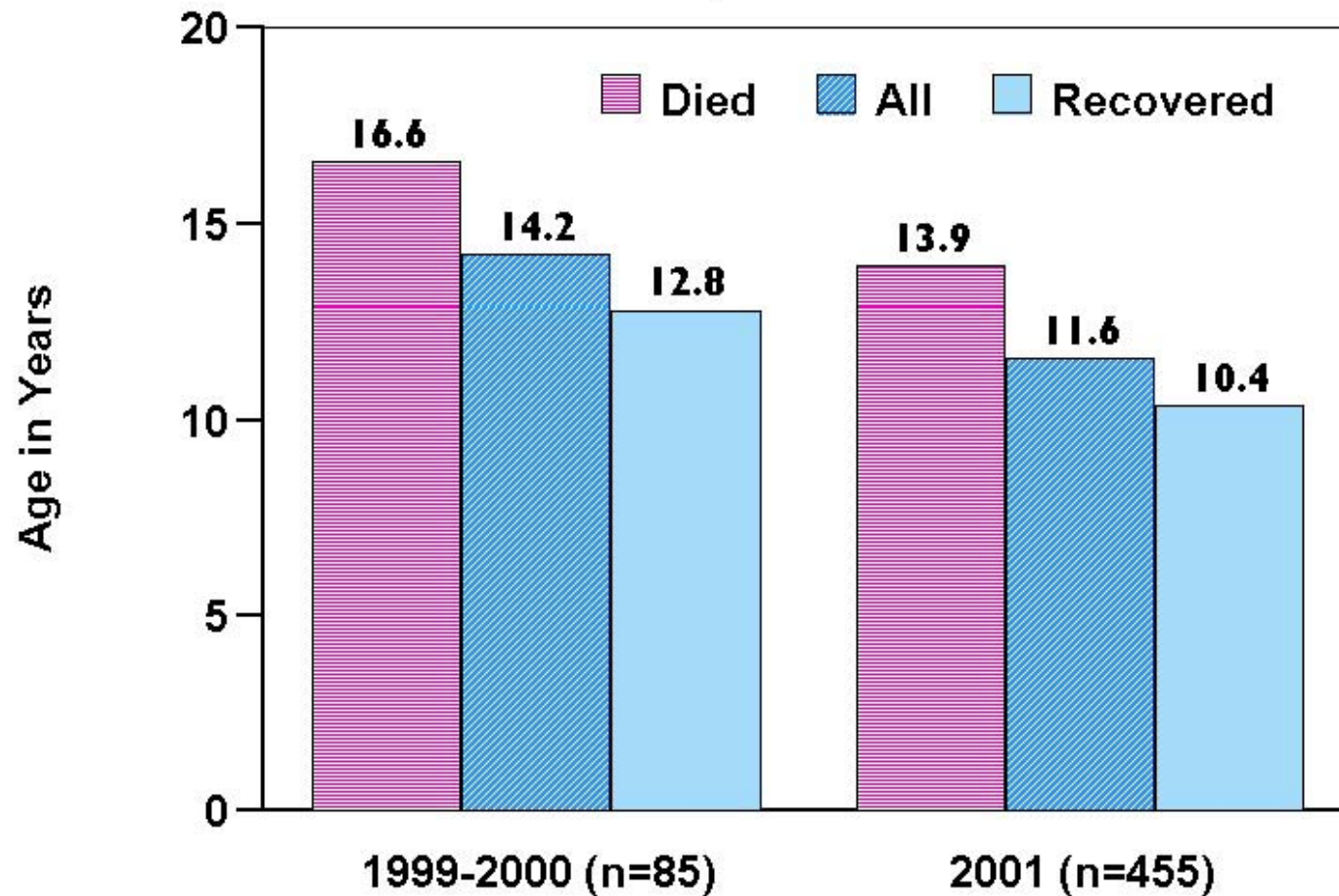
# Equine Cases of West Nile Encephalitis United States, 2001 Age Group Specific Case Fatality Rates



## Mean Ages of Horses with Cases of West Nile Encephalitis By Outcome, United States, 2001



# Mean Ages of Horses with Cases of West Nile Encephalitis United States, 1999-2000 vs. 2001





# Subclinical Infections

## Case Premises vs. Non-Case Premises

- 1999: 18% of non-case horses tested were PRNT+
  - 23% on case premises (33/146)
  - 8% on other equine premises (5/65)
- 2000: 2% of non-case horses tested were PRNT+
  - 5% on case premises (23/489)
  - <1% on other equine premises (8/1097)

# Case-Control Study / Spatial Data Analysis

## Equine Infections - Year 2000

- **Case-Control Study: 49 “case” and 101 control premises in 7 States; 1,487 equids sampled (64 seropositive)**
  - ➔ *infected horses less likely housed in stalls at night; more likely used for pleasure purposes*
  - ➔ *case premises more likely within ½ mile of blackbird roost or waterfowl congregation*
- **Spatial Data Analysis:**
  - ➔ *case premises clustered; within a cluster, exposure of individual equids appears to be chance event*

# WNV Vaccine

- Killed virus product given conditional license by APHIS-VS-CVB on August 1, 2001
  - ➔ *ensures safety and purity; “reasonable expectation” of efficacy*
- More than 1 million doses distributed to date
- Administration: 2 doses IM, 3-6 weeks apart; one annual booster
- Antibody response: no IgM; high levels of neutralizing Ab after 2<sup>nd</sup> dose

# WNV Cases in “Vaccinated” Horses

- At least 132 horses developed cases of WNV after receiving vaccine
  - ➔ *113 after one dose; 19 after two doses*
  - ➔ *States: FL (107), GA (18), NJ (2), CT, DE, IL, RI, VA*
- Of those occurring after 1<sup>st</sup> dose of vaccine:
  - ➔ *onset appeared to be at random intervals after inoculation*
- Of those occurring after 2<sup>nd</sup> dose of vaccine:
  - ➔ *14 had onset at 15 or fewer days after inoculation*
  - ➔ *5 had onset at 20 or more days after inoculation:*  
*37, 33, ~27, 21, and 20 days*

# What should we expect in the future?

- Areas that have had WNV in horses, will have it again (although in different horses).
- Additional areas/states are likely to have WNV cases in horses.
- Detecting equine cases of WNV will help define areas of WNV activity, but those cases may not be predictors of human cases.
- The efficacy of equine vaccine, and the number of horses vaccinated, will determine the impact of vaccination on all of the above.