

Summary of West Nile Virus Activity in the United States, 2003



The Arbonet Team,
represented today by Ned Hayes, MD
Division of Vector-Borne Infectious Diseases
Fort Collins, Colorado

Historical Perspective

**Progression of West Nile Virus Activity in
the United States, 1999-2003**

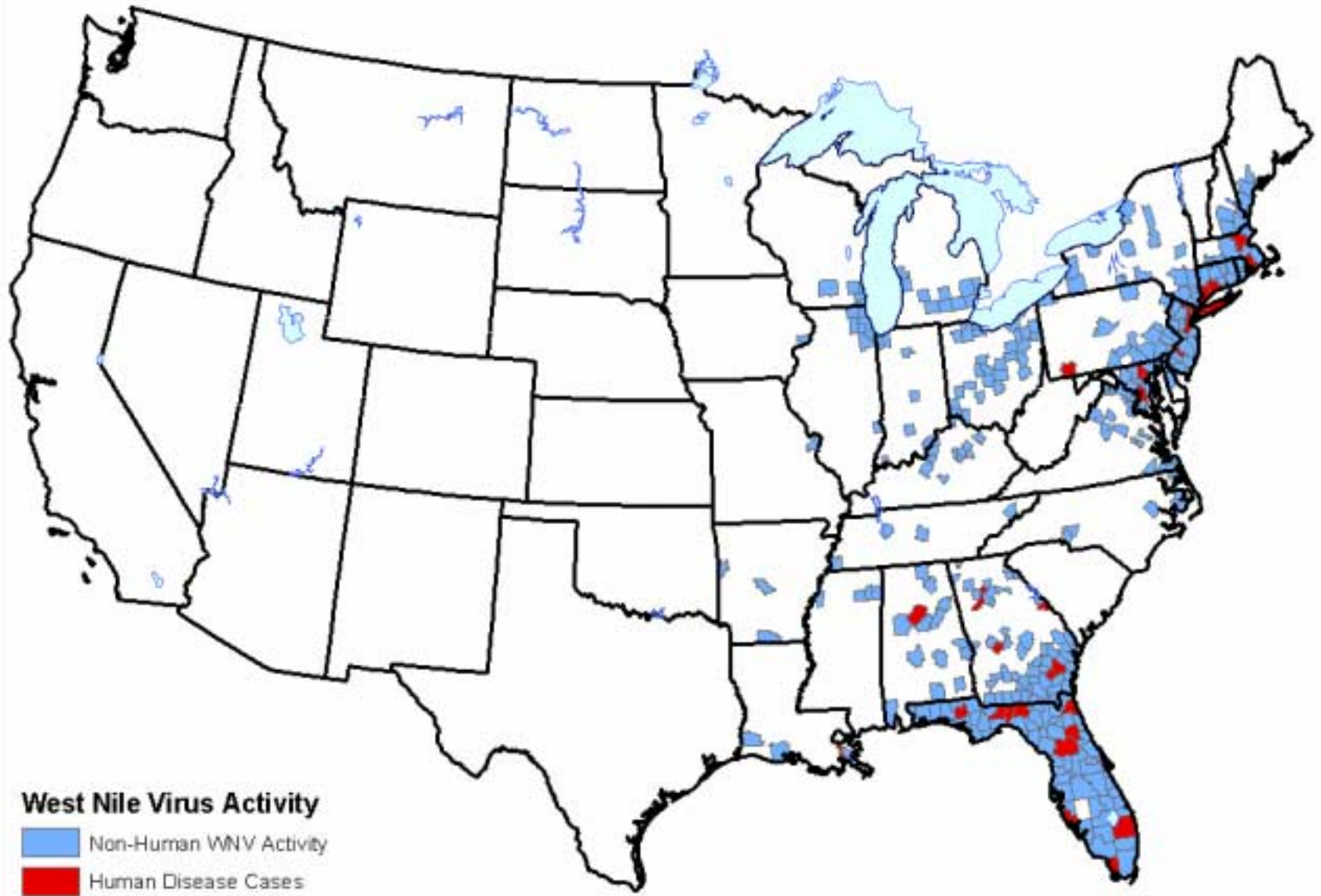


West Nile Virus Activity



-  Non-Human WNV Activity
-  Human Disease Cases

National Center for Infectious Diseases
West Nile Virus Activity
Cumulative results for 2000 calendar year

CDC



West Nile Virus Activity

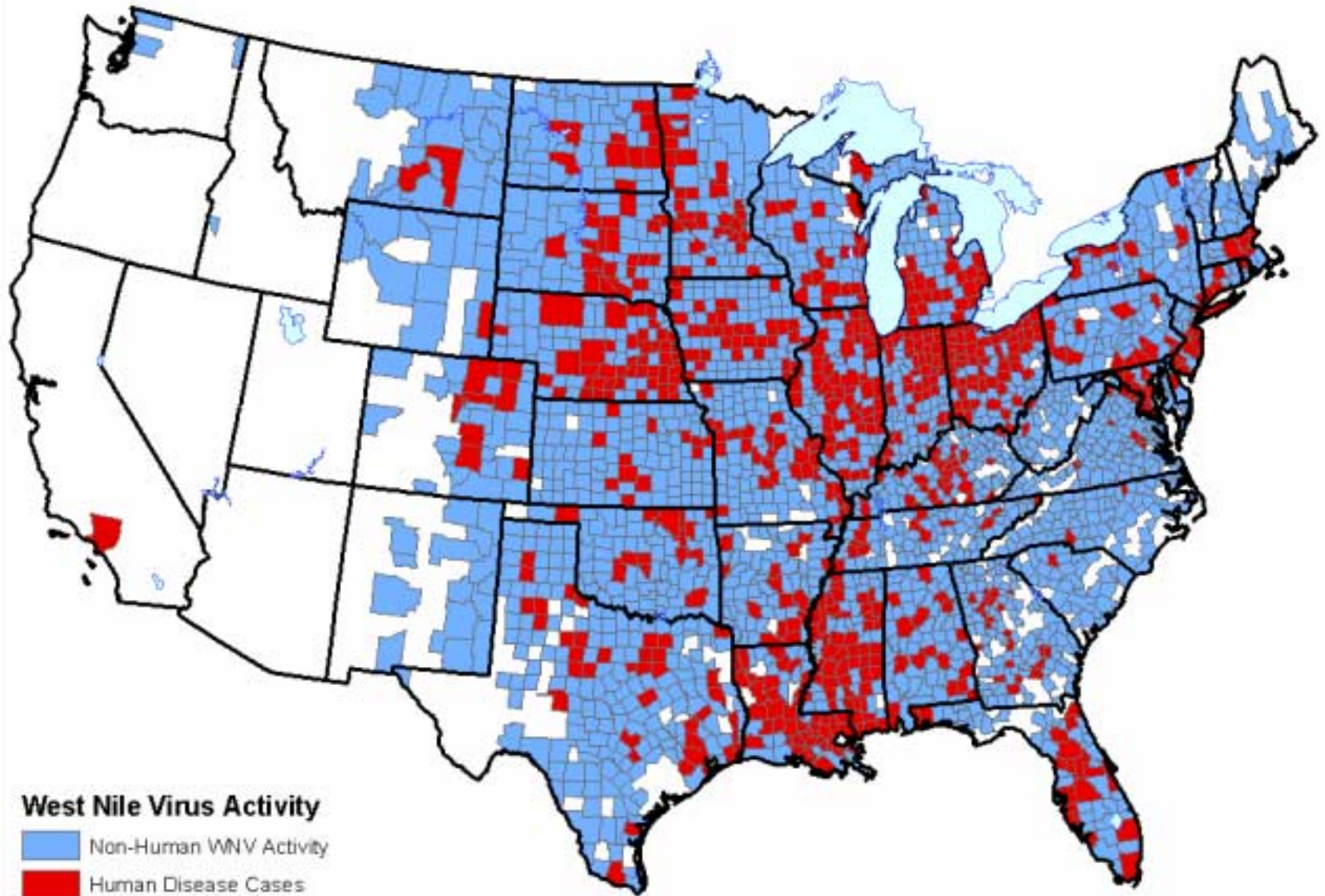
-  Non-Human WNV Activity
-  Human Disease Cases

National Center for Infectious Diseases

West Nile Virus Activity

Cumulative results for 2001 calendar year





West Nile Virus Activity

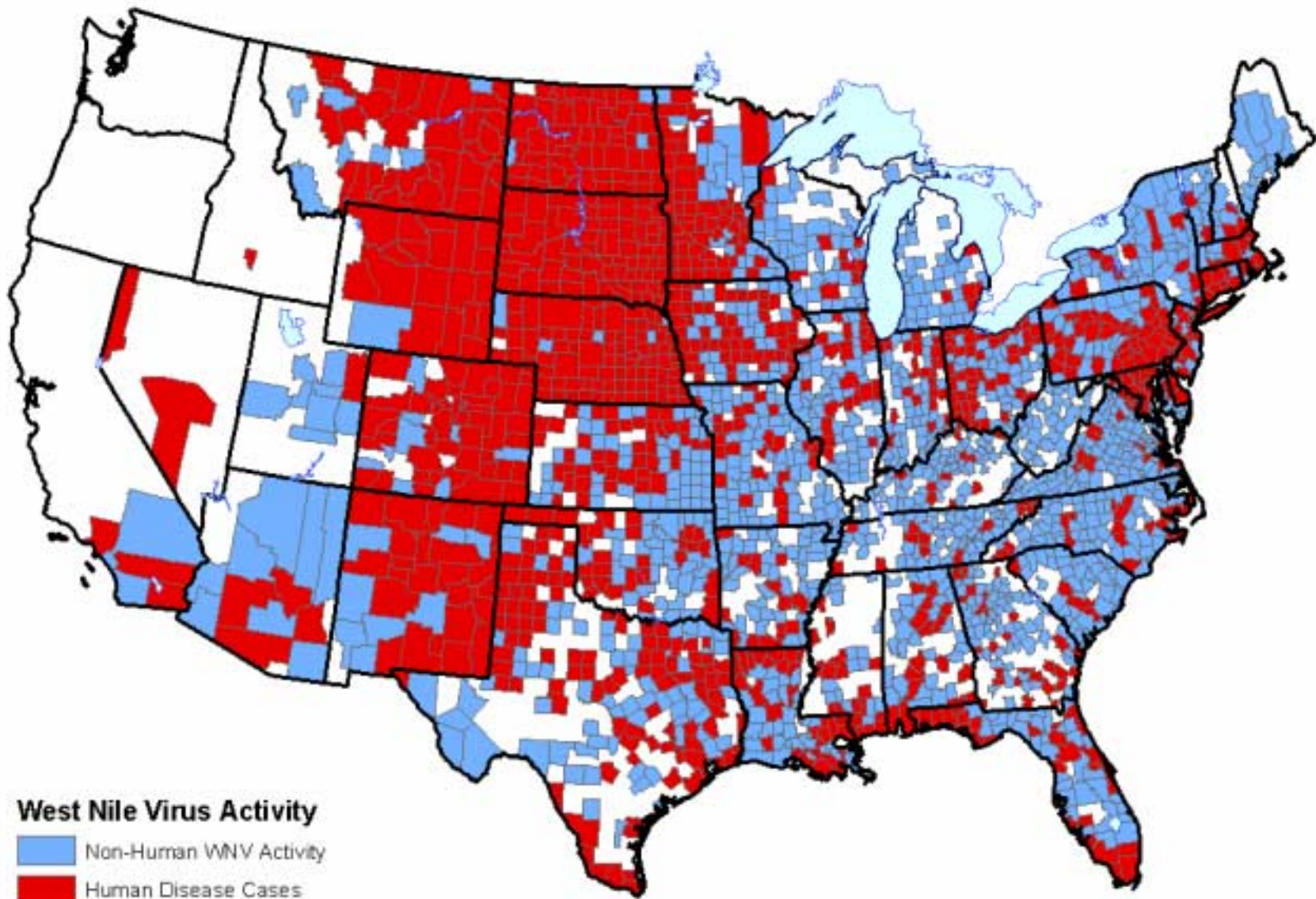
- Non-Human WNV Activity
- Human Disease Cases

National Center for Infectious Diseases

West Nile Virus Activity

Cumulative results for 2002 calendar year reported as of April 15, 2003

CDC



West Nile Virus Activity

- Non-Human WNV Activity
- Human Disease Cases

National Center for Infectious Diseases

West Nile Virus Activity

Cumulative results for 2003 calendar year reported as of January 20, 2004

CDC

States and Counties Reporting WNV Activity, United States, 1999-2003*

Year	# States	# Counties	Date Range
1999	4	28	9 AUG – 15 NOV
2000	12**	145	6 FEB – 17 NOV
2001	27**	359	8 APR – 26 DEC
2002	44**	2,531	3 JAN – 19 DEC
2003	46**	2,289	1 JAN – 12 DEC

•Reported to ArboNET as of 1/20/2004

** Plus D.C.

Reported WNV Disease Cases in Humans, United States, 1999-2003*

Year	# Cases	# States	# Counties	Onset Date Range
1999	62	1	6	2 AUG – 24 SEP
2000	21	3	10	20 JUL – 27 SEP
2001	66	10	39	13 JUL – 7 DEC
2002	4,156	39**	740	19 MAY – 19 DEC
2003	9,100	45**	1053	28 MAR – 3 DEC

* Reported as of 1/20/2004

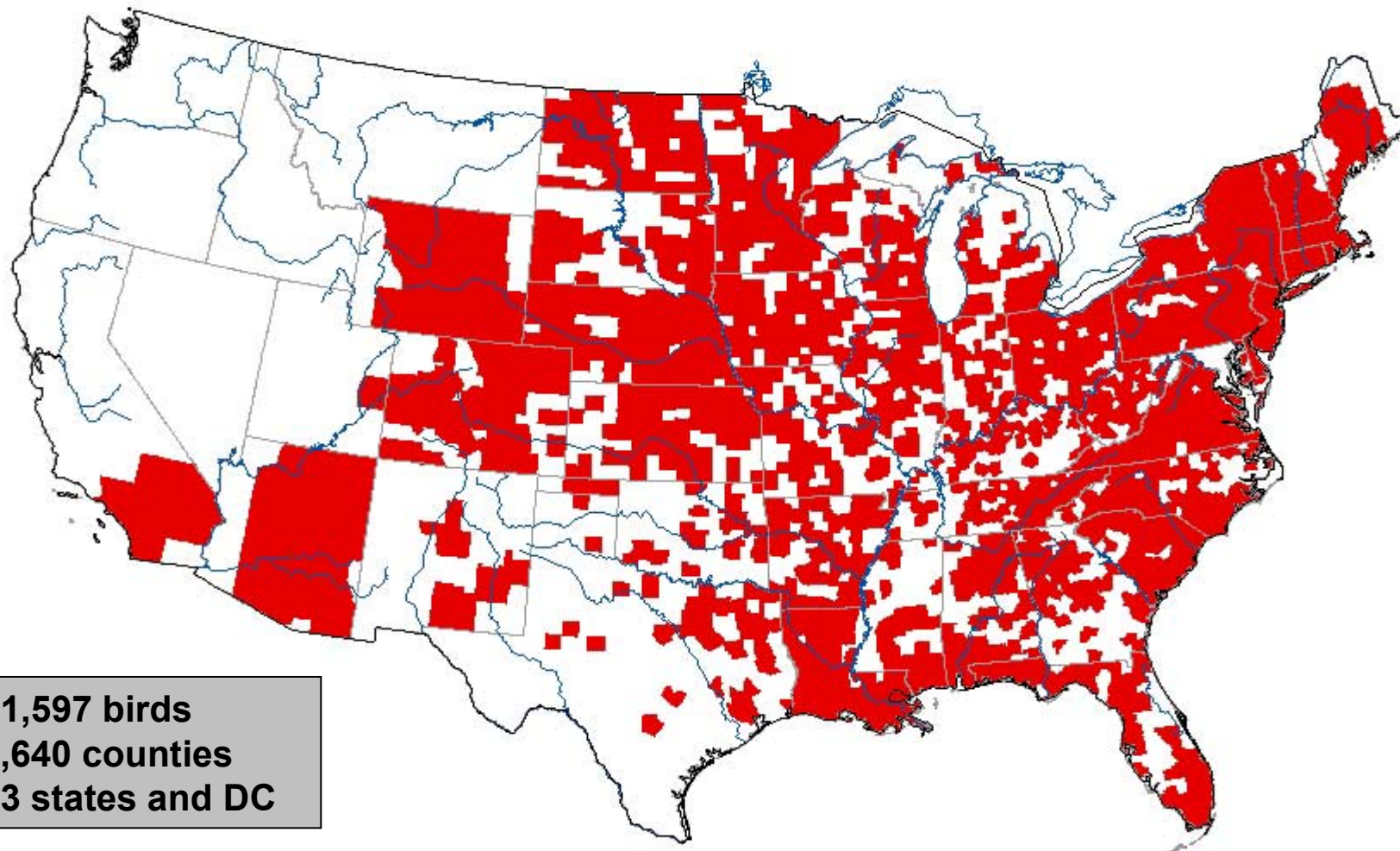
** Plus D.C.



**West Nile Virus
Bird Surveillance**

United States, 2003

U.S. Counties Reporting WNV-Positive Dead Birds, 2003



Through MMWR week 53 (ending 1/3/2004) - 1640 counties
Reported and verified through ArboNET as of 1/20/2004

CDC/NCID/DVBID

CDC

WNV Surveillance, United States, 2003*: *Summary of Dead Bird Data*

- **73,861 dead birds reported**
- **22,455 tested (30%)**
- **11,597 WNV-positive birds reported**
 - **9797 corvids (84%)**
 - **1804 birds of other spp. (16%)**

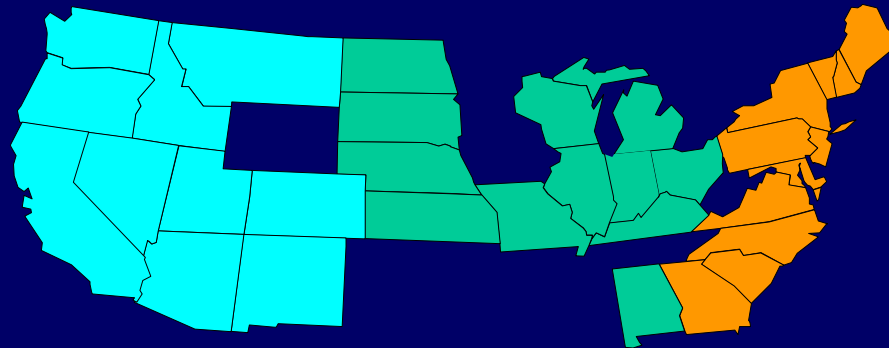
(1999-2003: 225 spp. WNV-positive dead birds reported to CDC)

“Top Ten” WNV-Positive Bird Species Reported, United States, 2003*

Species	# positive birds	% of Total
American Crow	4077	35
Blue Jay	3532	30
Crow Species	1723	15
Other Species	500	4
Black-Billed Magpie	319	3
House Sparrow	241	2
Northern Cardinal	175	2
Fish Crow	100	1
Common Grackle	91	1
Red-tailed Hawk	90	1

* Reported as of 1/20/2004

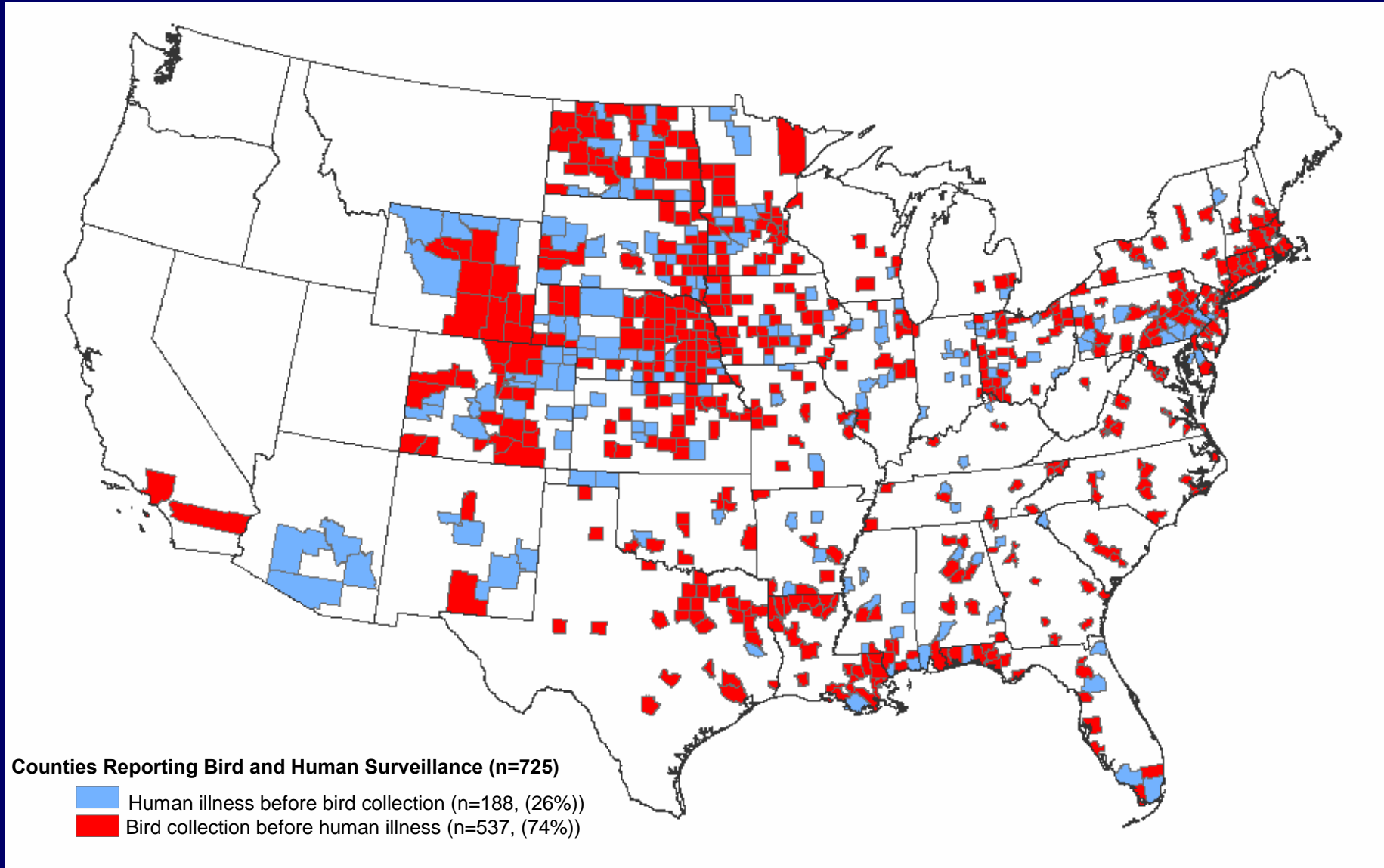
Regional Differences in WNV Surveillance, 2003*



Region	Area (hundred mi ²) (A)	# dead birds tested (B)	Ratio (B/A)
East	3,400	11,814	3.5
Central	6,610	5,031	0.8
West	9,301	5,602	0.6

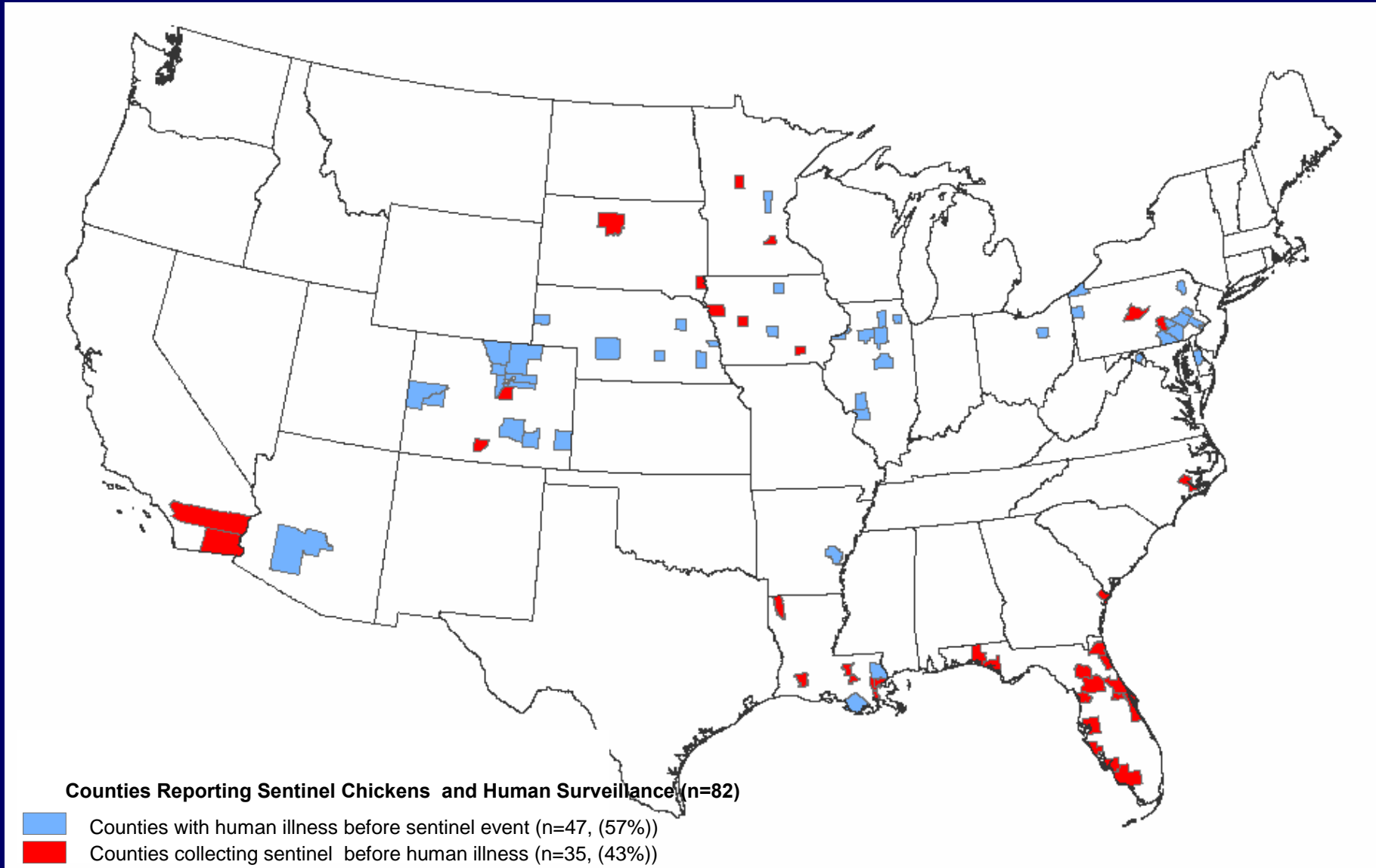
* Reported as of 1/20/2004

Timing of WNV-Positive Dead Bird Collection and Human WNV Case Onset, By County, United States, 2003*

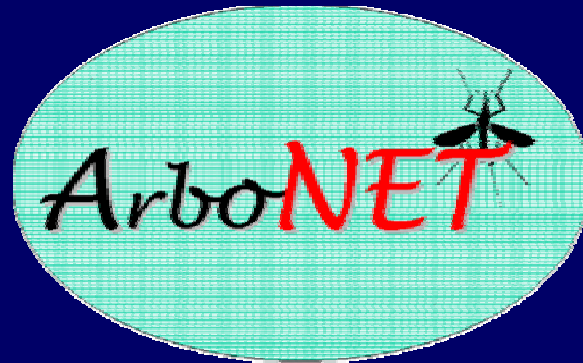


* Reported as of 1/29/2004

Timing of WNV-Positive Sentinel Chicken Events and Human WNV Case Onset, By County, United States, 2003*



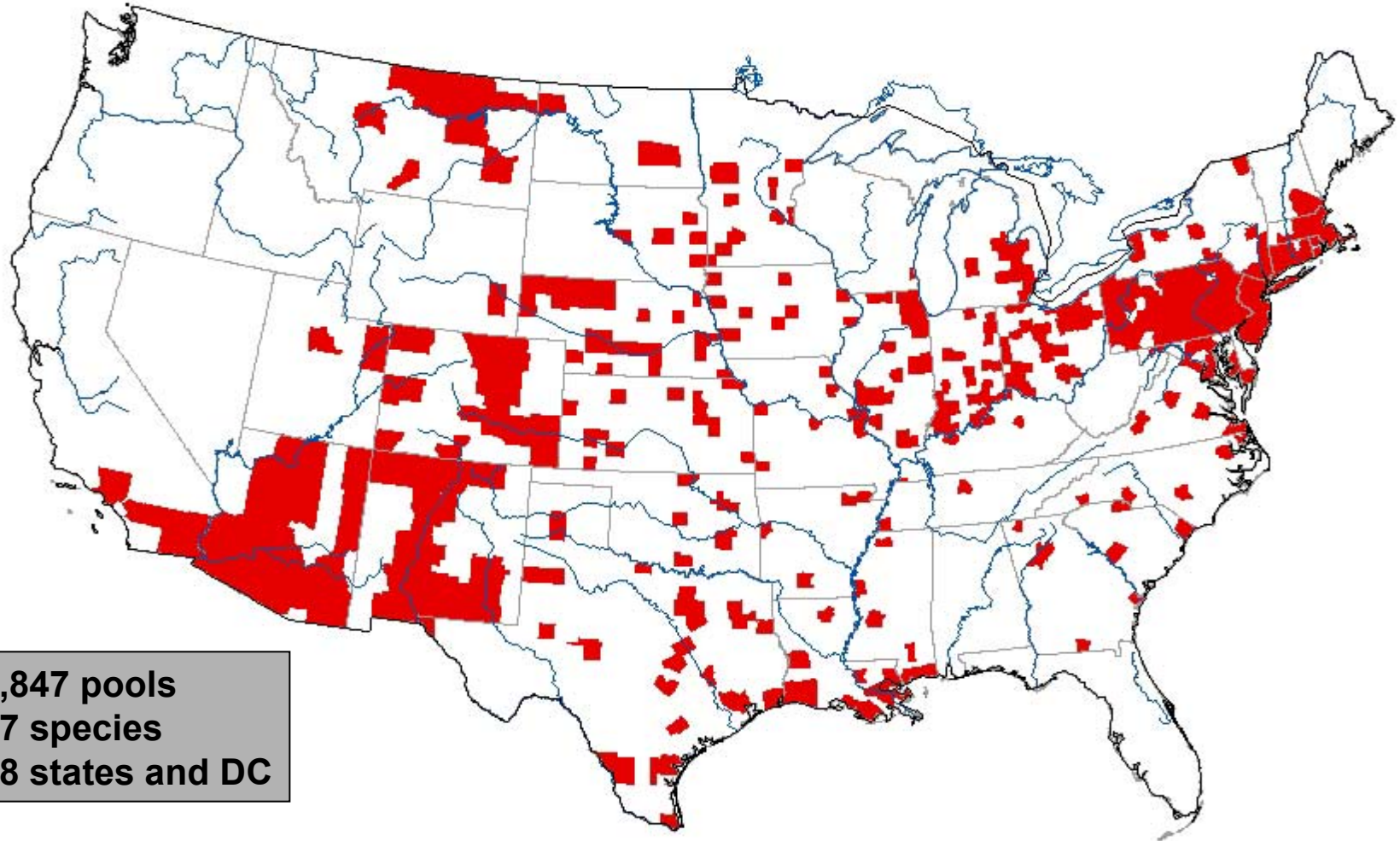
* Reported as of 1/29/2004



**West Nile Virus
Mosquito Surveillance**

United States, 2003

U.S. Counties Reporting WNV-Positive Mosquitoes, 2003



7,847 pools
37 species
38 states and DC

Through MMWR week 53 (ending 1/3/2004) - 472 counties
Reported and verified through ArboNET as of 1/20/2004

CDC/NCID/DVBID

CDC

WNV Surveillance, United States, 2003*: *Summary of Mosquito Data*

- 7,847 WNV-positive mosquito pools
- 37 positive species
- Earliest: 18 JAN, *Cx. pipiens*, Monmouth Co., NJ (overwintering mosquito), then 17 MAR, *Cx. quinquefasciatus*, St. Tamany Parish, LA
- Latest: 29 OCT, *Cx. quinquefasciatus*, Maricopa Co., AZ

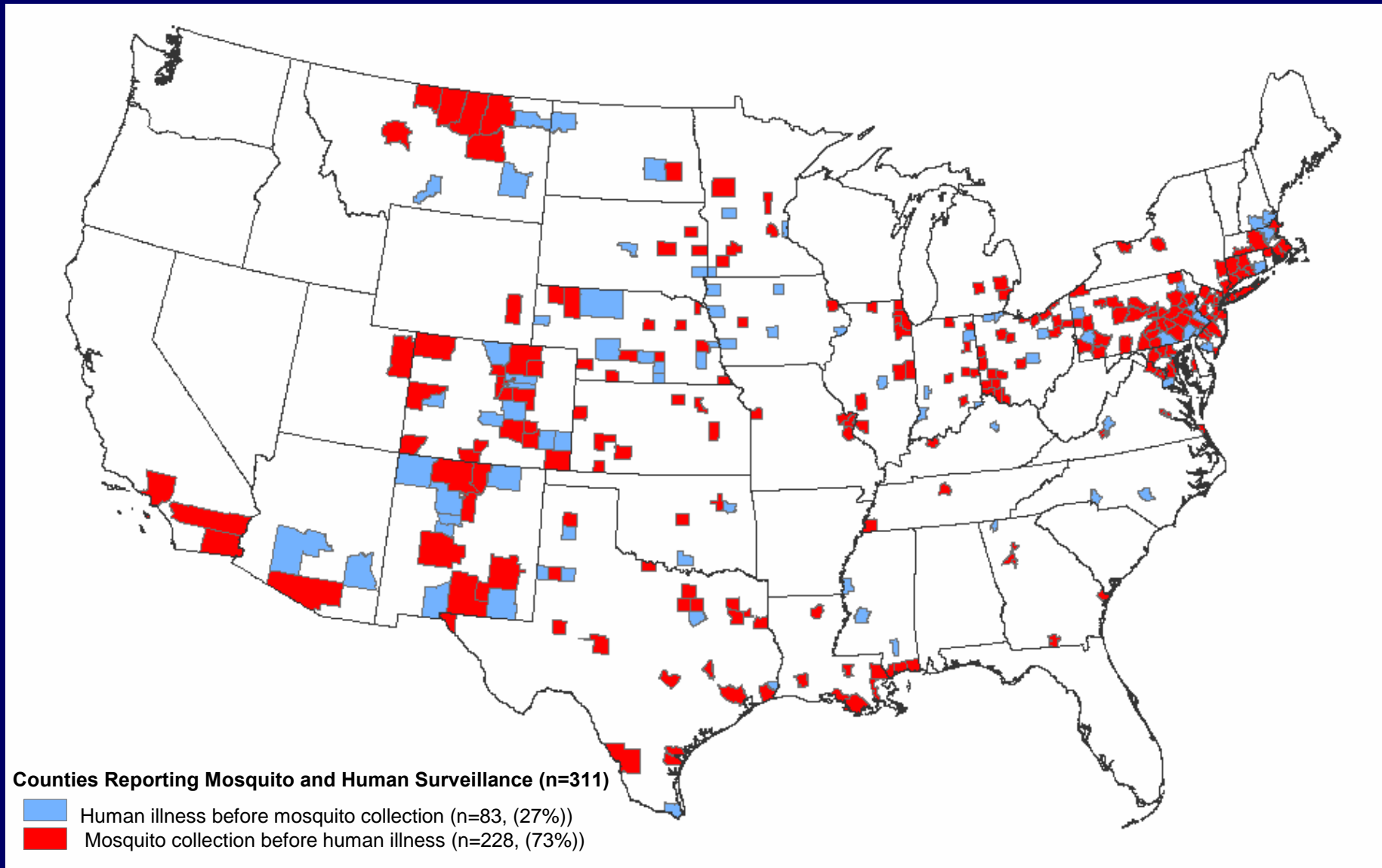
* Reported as of 1/20/2004

“Top 10” WNV-Positive Mosquito Species Reported, By Number of WNV-Positive Pools, United States, 2001-2003*

2001	2002	2003
<i>Cx. pipiens</i> (349)	<i>Cx. species</i> (2124)	<i>Cx. species</i> (1775)
<i>Cx. species</i> (184)	<i>Cx. pipiens</i> (1536)	<i>Cx. tarsalis</i> (1724)
<i>Cx. pip/rest</i> (119)	<i>Cx. pip/rest</i> (1186)	<i>Cx. pipiens</i> (1171)
<i>Cx. restuans</i> (76)	<i>Cx. quinq</i> (625)	<i>Cx. restuans</i> (846)
<i>Cx. salinarius</i> (70)	<i>Cx. restuans</i> (298)	<i>Cx. quinq</i> (778)
<i>Cs. melanura</i> (26)	<i>Cx. tarsalis</i> (249)	<i>Cx. pip/rest</i> (611)
<i>Oc. triseriatus</i> (13)	<i>Cx. salinarius</i> (119)	<i>Cx. salinarius</i> (244)
<i>Cx. quinq</i> (13)	<i>Ae. albopictus</i> (66)	<i>Cx. pip complex</i> (243)
<i>Oc. japonicus</i> (8)	<i>Oc. triseriatus</i> (63)	<i>Ae. vexans</i> (124)
<i>Oc. sollicitans</i> (6)	<i>Ae. vexans</i> (62)	<i>Cs. melanura</i> (69)

* Reported as of 1/20/2004

Timing of WNV-Positive Mosquito Pool Collection and Human WNV Case Onset, By County, United States, 2003*



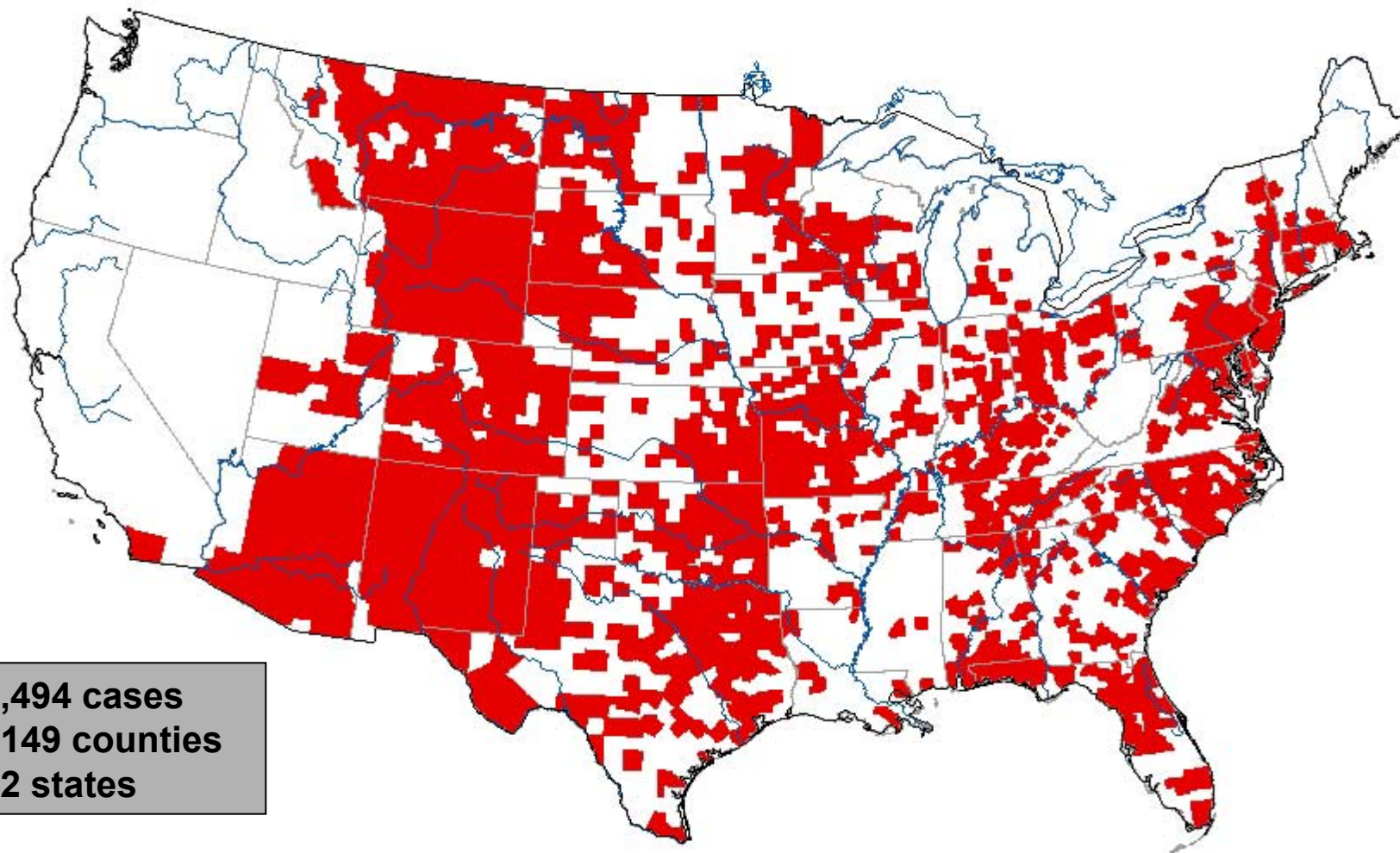
* Reported as of 1/29/2004



**West Nile Virus
Equine Surveillance**

United States, 2003

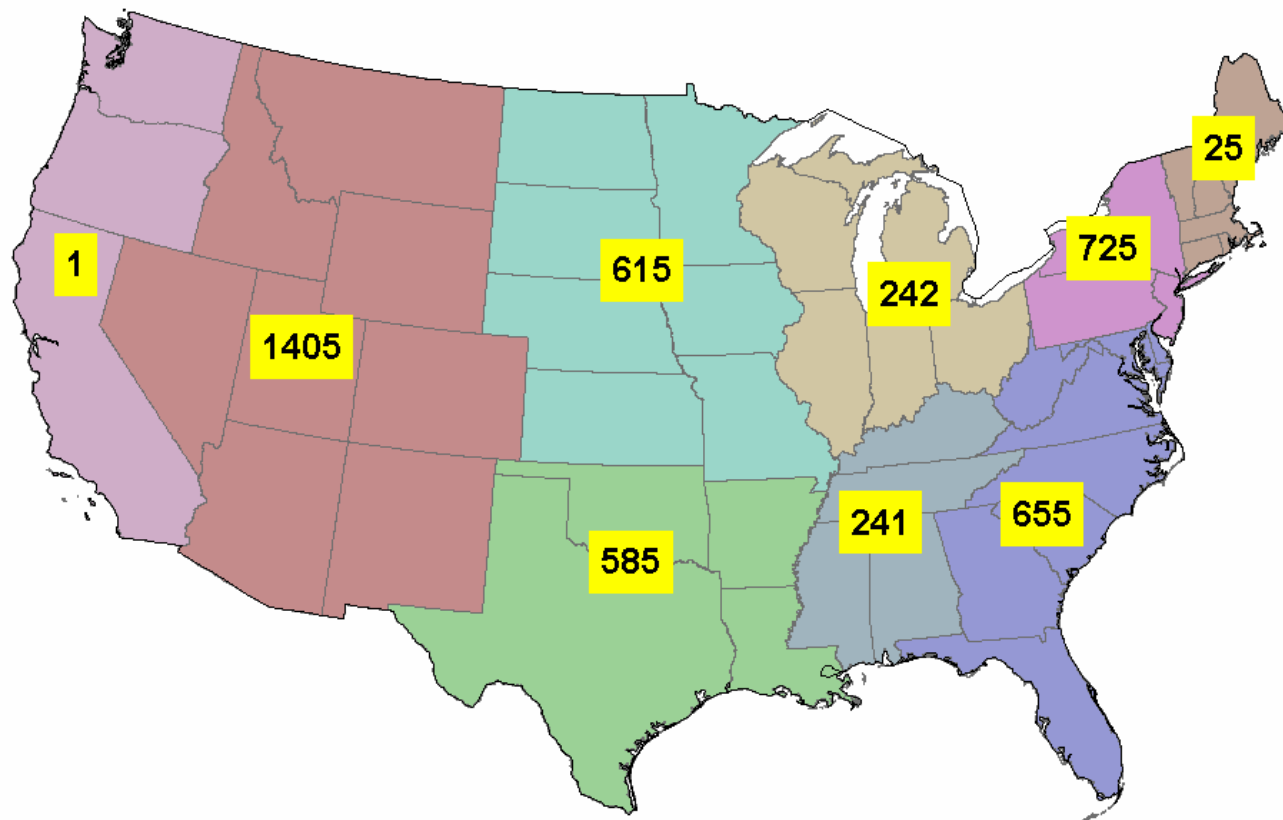
U.S. Counties Reporting Equine WNV Disease Cases, 2003



Through MMWR week 53 (ending 1/3/2004) - 1149 counties
Reported and verified through ArboNET as of 1/20/2004

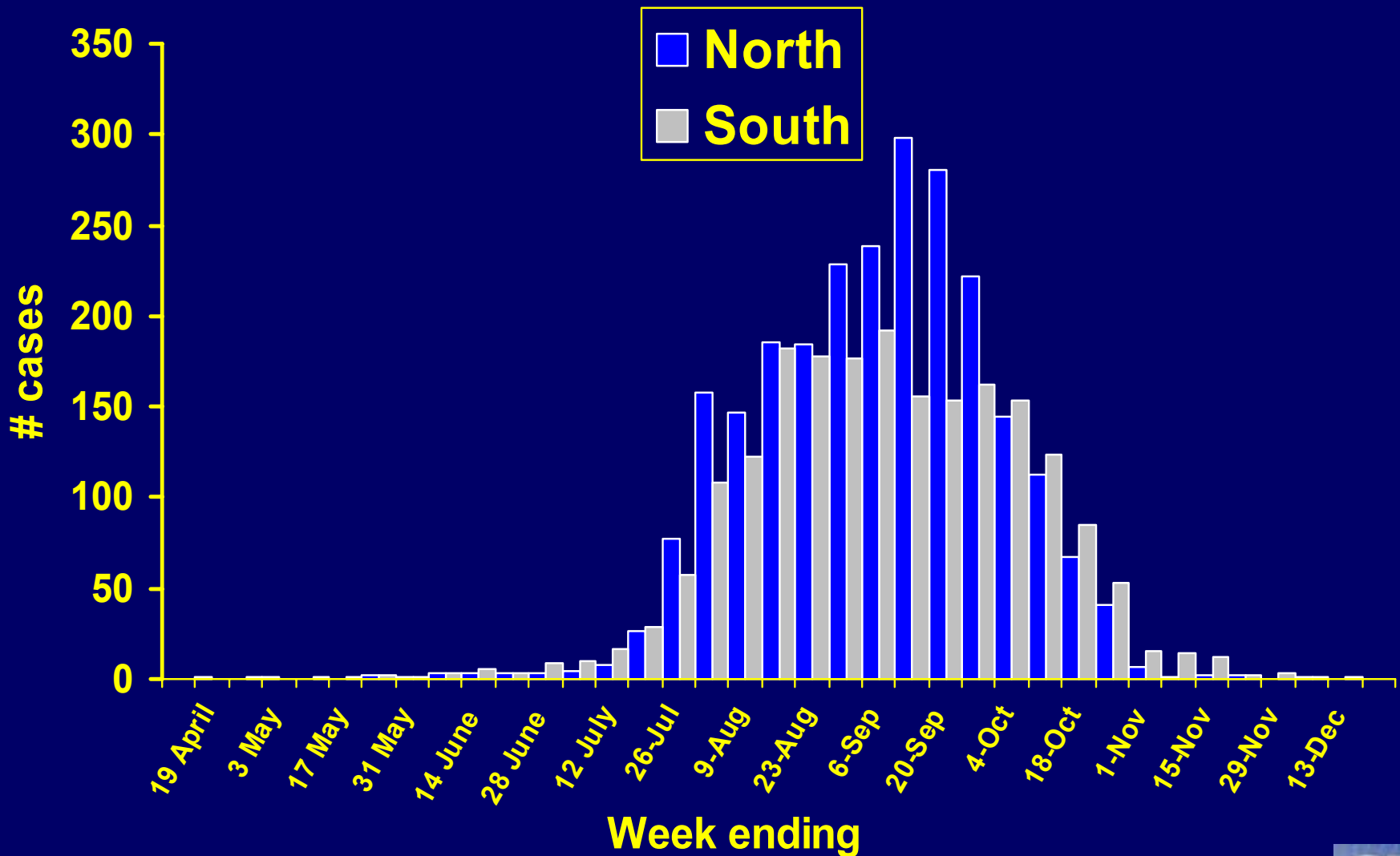
CDC/NCID/DVBID

Equine WNV Disease Cases, U.S., 2003*: *Regional Distribution*



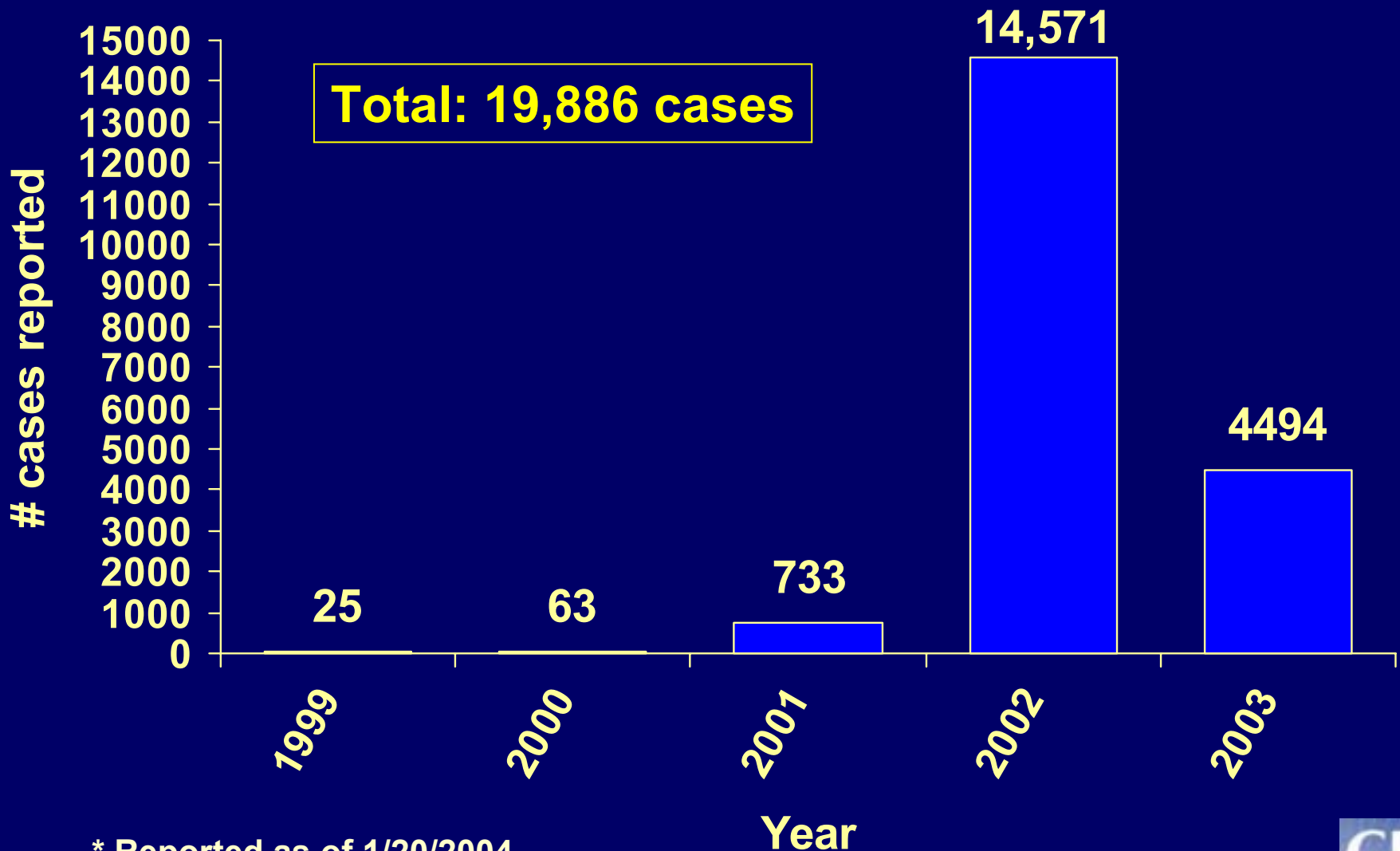
* Reported as of 1/20/2004

Equine Disease Cases, by Week of Onset, Northern vs. Southern United States, 2003*



* Reported as of 1/20/2004

Equine WNV Disease Cases Reported, United States, 1999-2003*

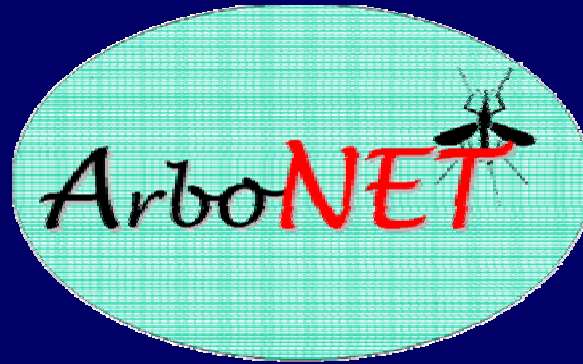


* Reported as of 1/20/2004

WNV-Infected Non-Human Mammals Reported, United States, 1999-2003*

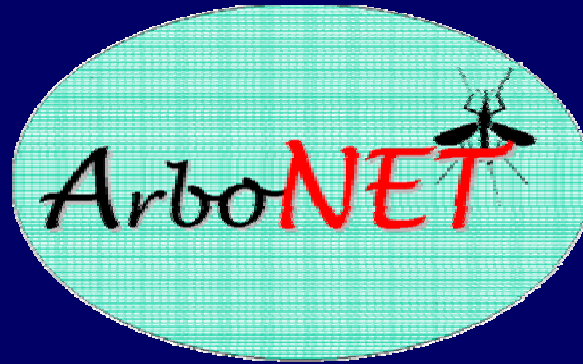
Species	# Infected 1999-2001	# Infected 2002	# Infected 2003
Equine	821	14,571	4394
Squirrel	1	9	19
Canine	0	7	35
Cat	1	1	1
Sheep	0	1	0
Domestic rabbit	1	0	0
Eastern Chipmunk	1	0	0
Striped Skunk	1	0	0
Big Brown Bat	1	0	0
Little Brown Bat	1	0	0
Other	3	14	45

* Reported as of 1/20/2004



(Blood Donor Surveillance)

**To be discussed by
Dr. Susan Montgomery in a later talk**



West Nile Virus Human Disease Surveillance

United States, 2003

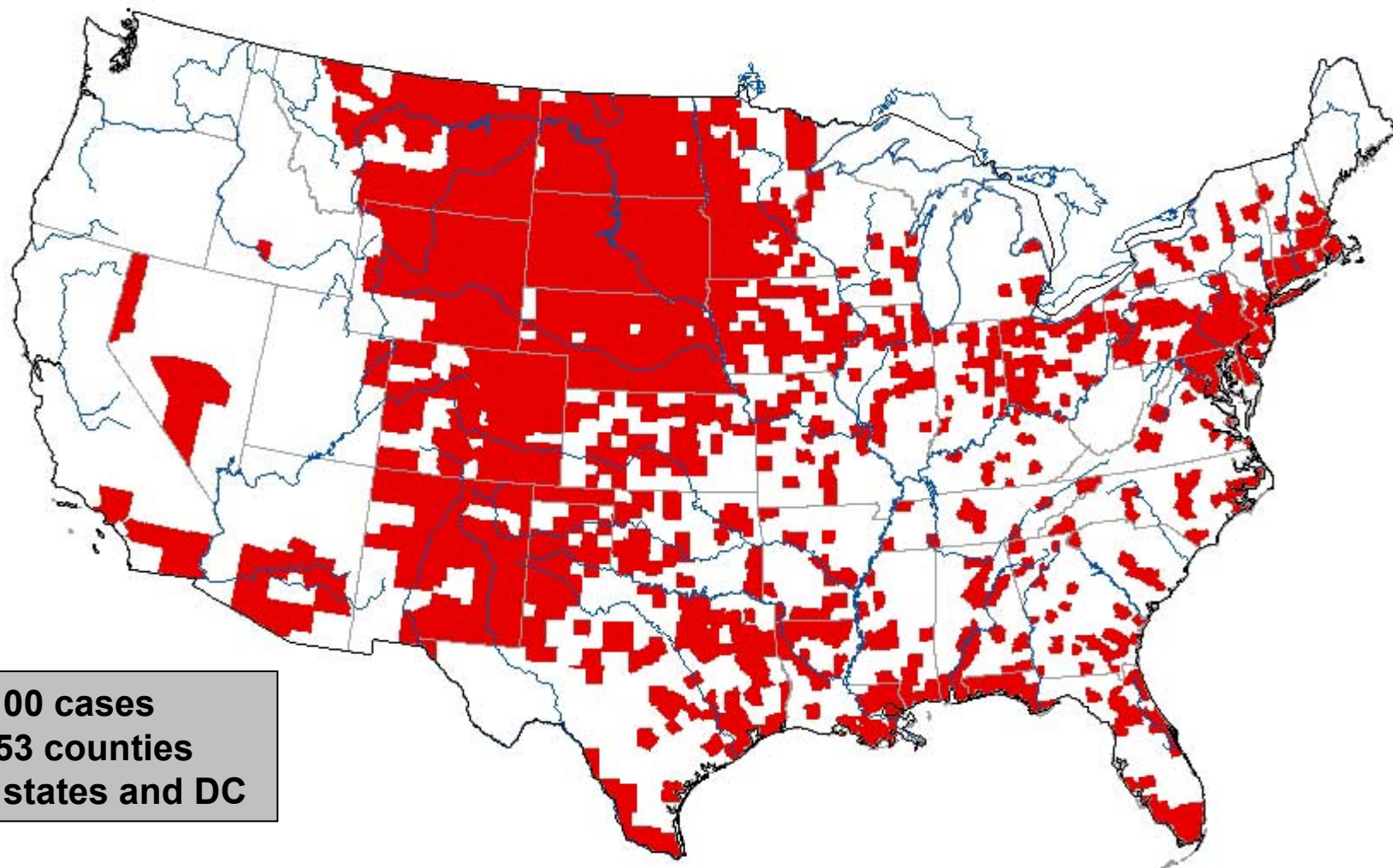
Reported WNV Disease Cases in Humans, United States, 1999-2003*

Year	# Cases	# States	# Counties	Onset Date Range
1999	62	1	6	2 AUG – 24 SEP
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* Reported as of 1/20/2004

** Plus D.C.

U.S. Counties Reporting Human WNV Disease Cases, 2003



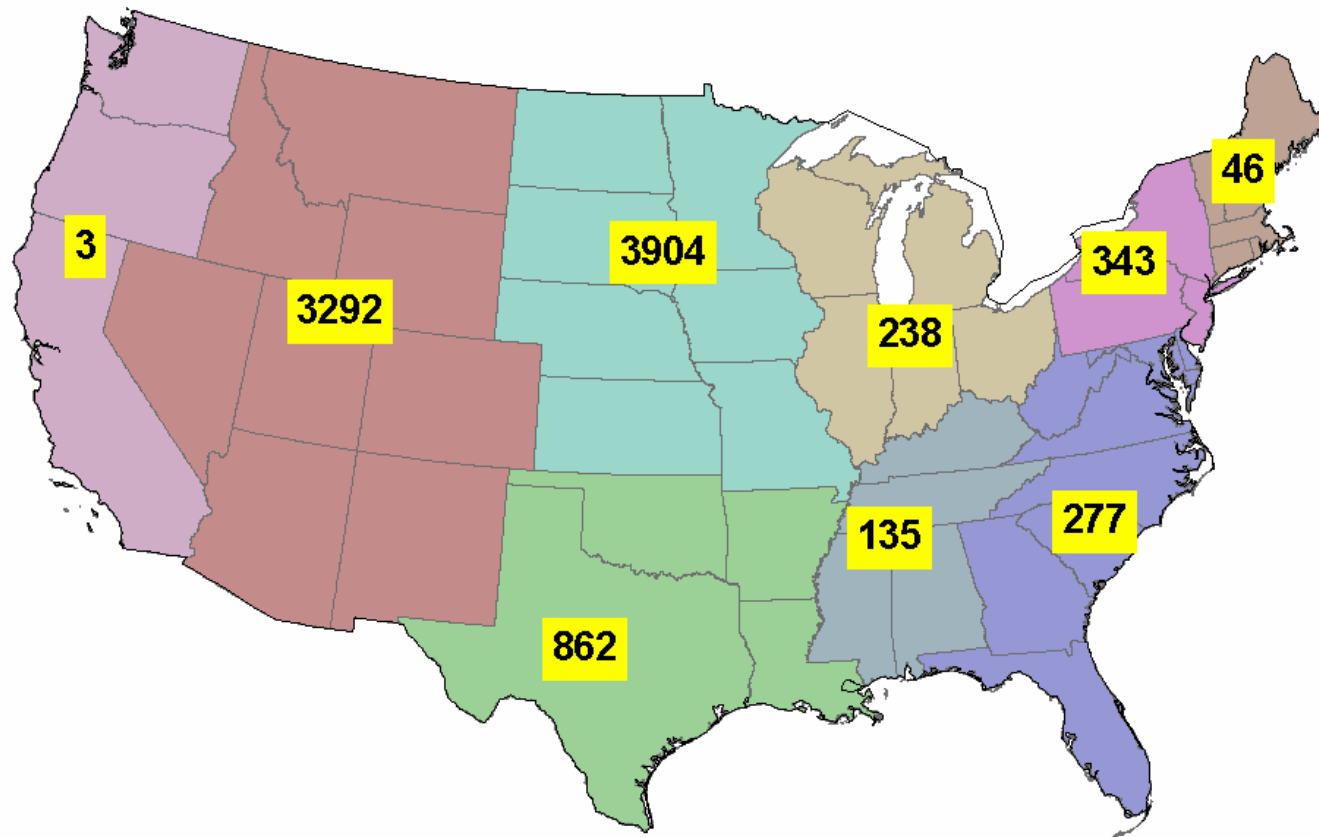
9,100 cases
1053 counties
45 states and DC

Through MMWR week 53 (ending 1/3/2004) - 1053 counties
Reported and verified through ArboNET as of 1/20/2004

CDC/NCID/DVBID

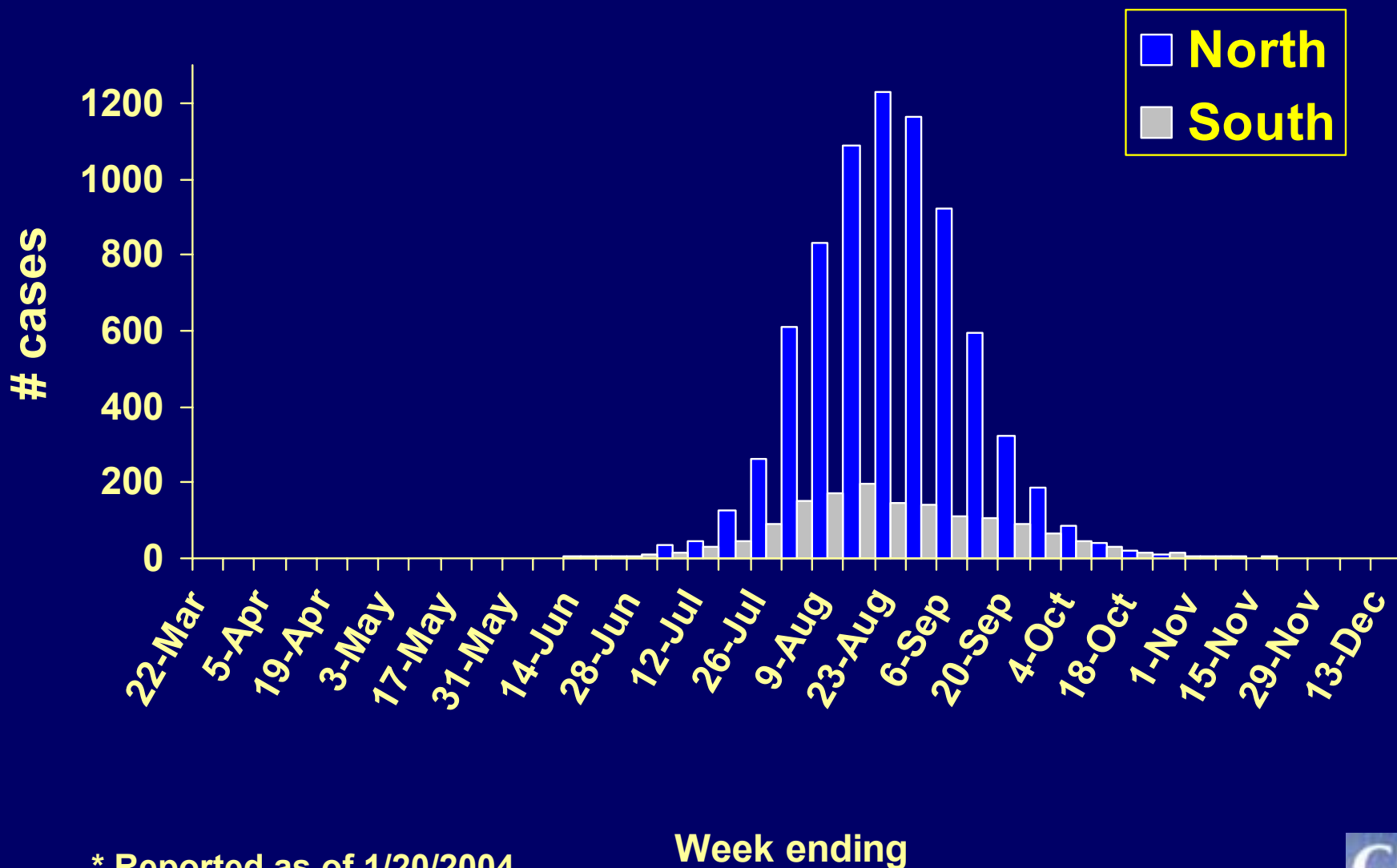
CDC

Human WNV Disease Cases, U.S., 2003*: *Regional Distribution*



* Reported as of 1/20/2004

Human WNV Disease Cases, by Week of Onset, Northern vs. Southern United States, 2003*



* Reported as of 1/20/2004

WNV Human Disease Cases, Demographics & Mortality, United States, 2002 vs 2003*

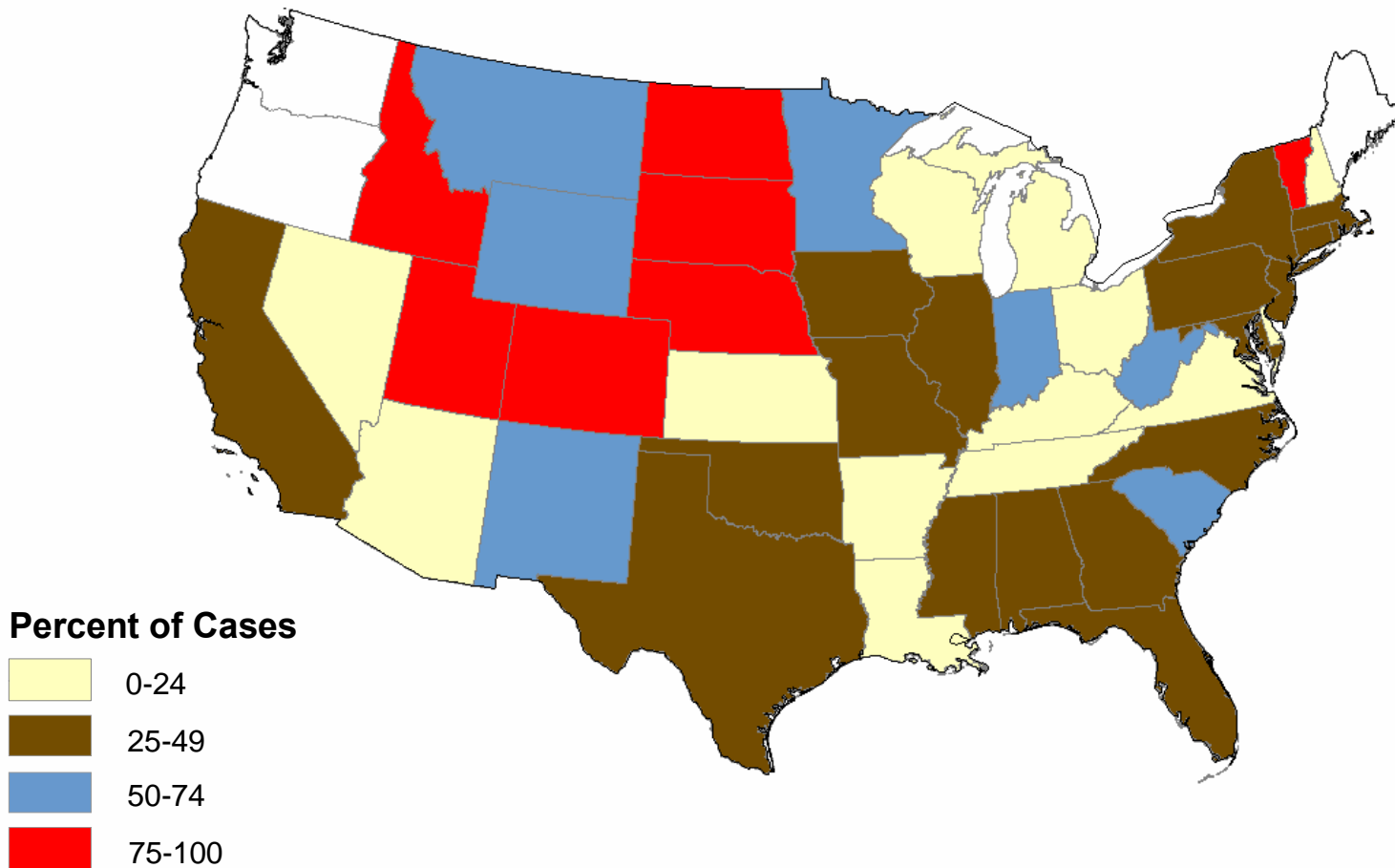
	2002 (All)	2002 (Fatal)	2003 (All)*	2003 (Fatal)*
n	4146	284	8,982	218
Clinical category				
WNND	71%	97%	29%	87%
WN Fever	28%	2%	69%	7%
Other Clinical	N/A	N/A	<1%	2%
Unknown	1%	<1%	1%	4%
Age (yr)				
median	55	77	47	77
range	0 – 99	19 – 99	0 – 99	0 – 97
Males	53%	64%	53%	63%
Mortality	7%**		2%***	

** 9% of WNND Cases

*** 7% WNND Cases

* Reported as of 1/20/2004

Percent of Reported West Nile Virus Cases Classified as West Nile Fever, United States, 2003



* Reported as of 1/29/2004

Meningoencephalitis ???

- **Clinical outcome of viral encephalitis usually severe**
- **Clinical outcome of viral meningitis often benign**
- **Encephalitis usually manifested clinically by change in mental status**

Meningoencephalitis = Encephalitis and meningitis in the same patient.

Meningoencephalitis \neq Encephalitis or meningitis

Patients with meningoencephalitis are more like encephalitis patients than meningitis patients, and could be reported as having encephalitis instead of meningoencephalitis.

In Arbonet, is “meningoencephalitis” really encephalitis, or are meningitis cases without encephalitis being reported as “meningoencephalitis”?

For this analysis of 2003 data,
Neuroinvasive disease (WNND) = Encephalitis
or Meningitis or “Meningoencephalitis”.

WNND tends to be more severe and more likely to cause hospitalization than uncomplicated West Nile fever.

For 2004:

ME. NINGOENCEPHALITIS



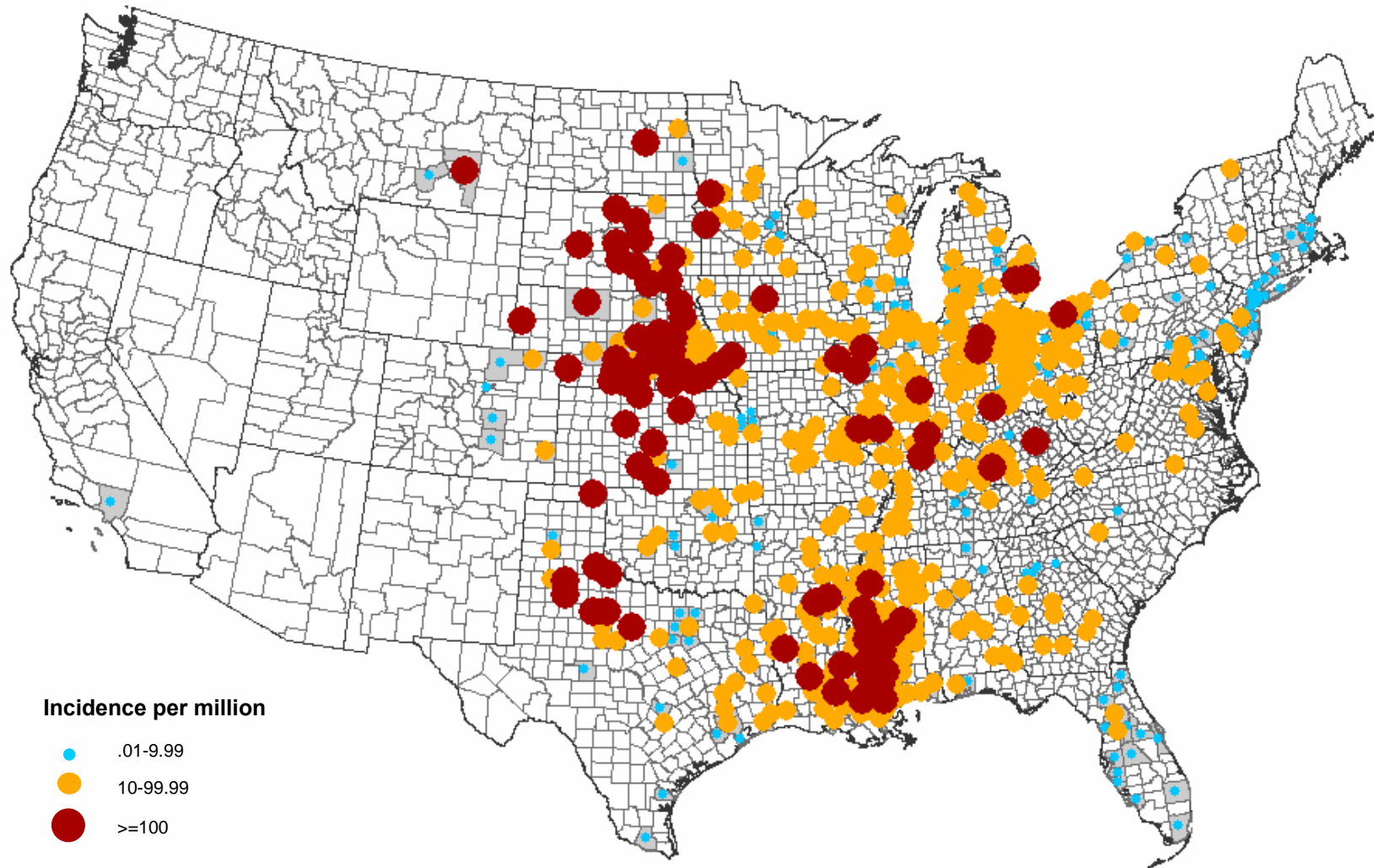
WNV Human Neuroinvasive Disease Cases*, Demographics & Mortality, United States, 2002 vs 2003**

	2002 (All)	2002 (Fatal)	2003 (All)*	2003 (Fatal)*
N	2942	276	2605	190
Age (yr)				
median	59	78	54	77
range	0 – 99	19 – 99	0 – 99	0 – 97
Males	54%	63%	58%	64%
Mortality	9%		7%	

* With available demographic data

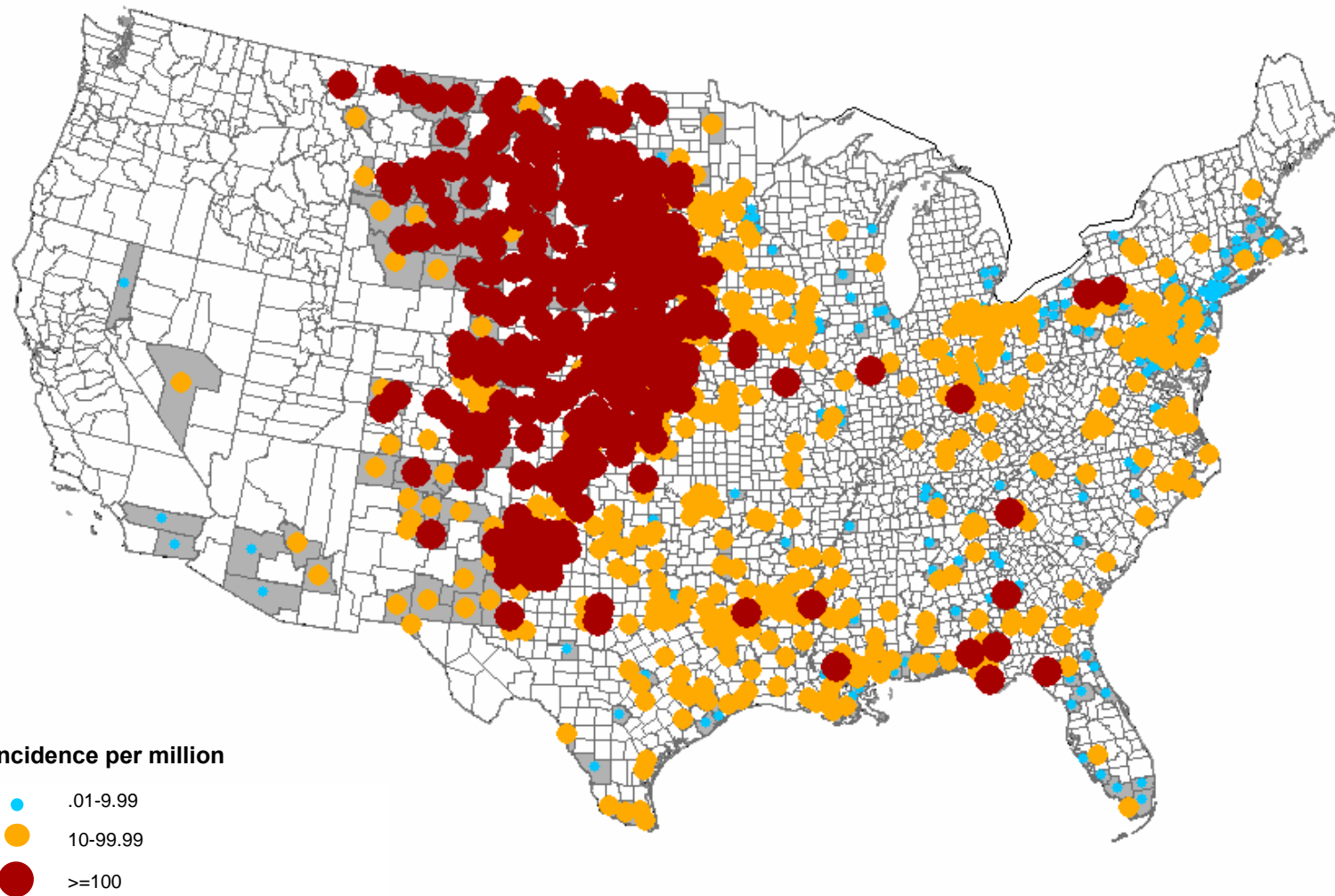
**Reported as of 1/20/2004

WNND County Level Incidence per Million, United States, 2002*



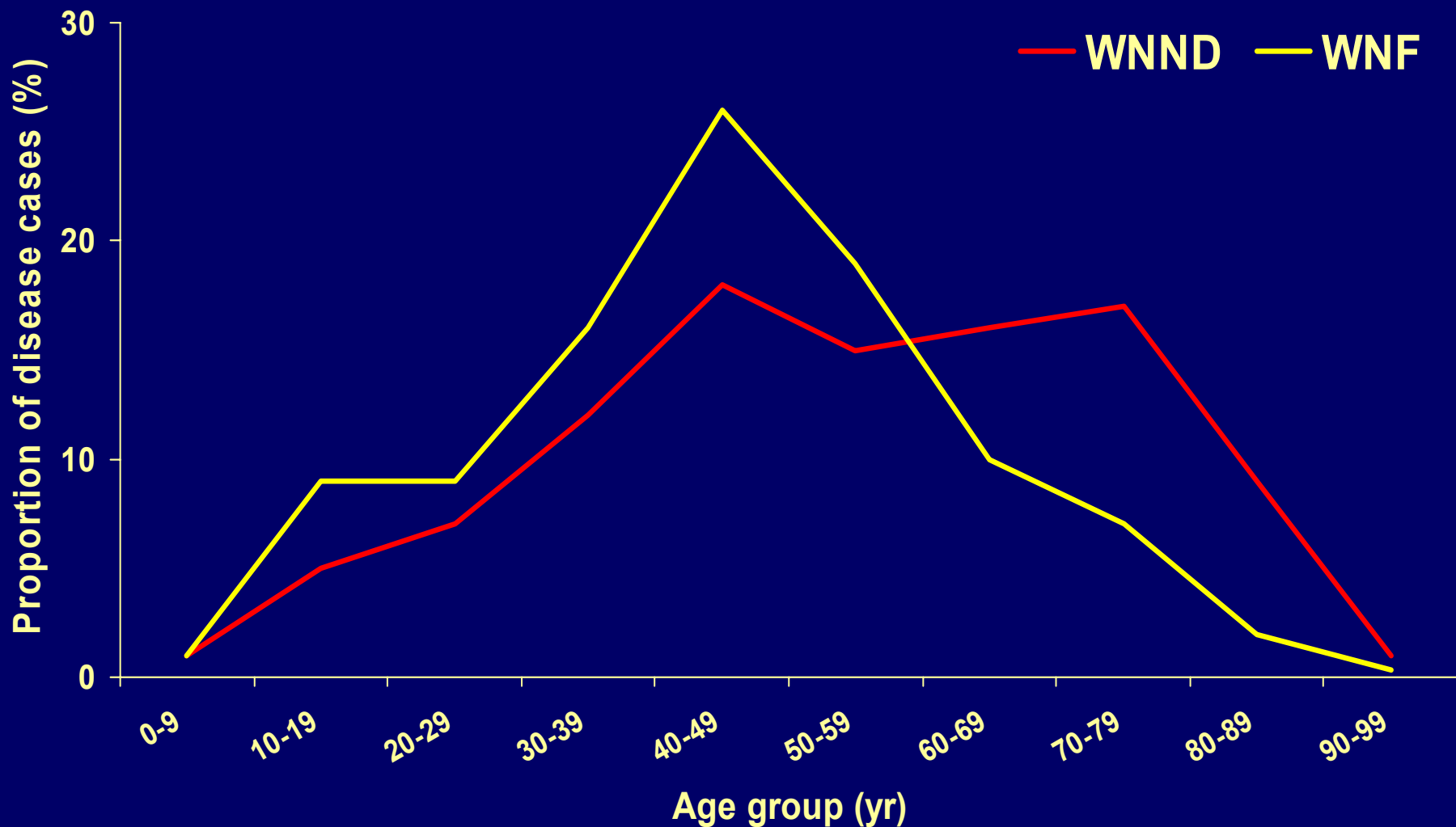
* Reported as of 4/15/2003

WNND County Level Incidence per Million, United States, 2003*



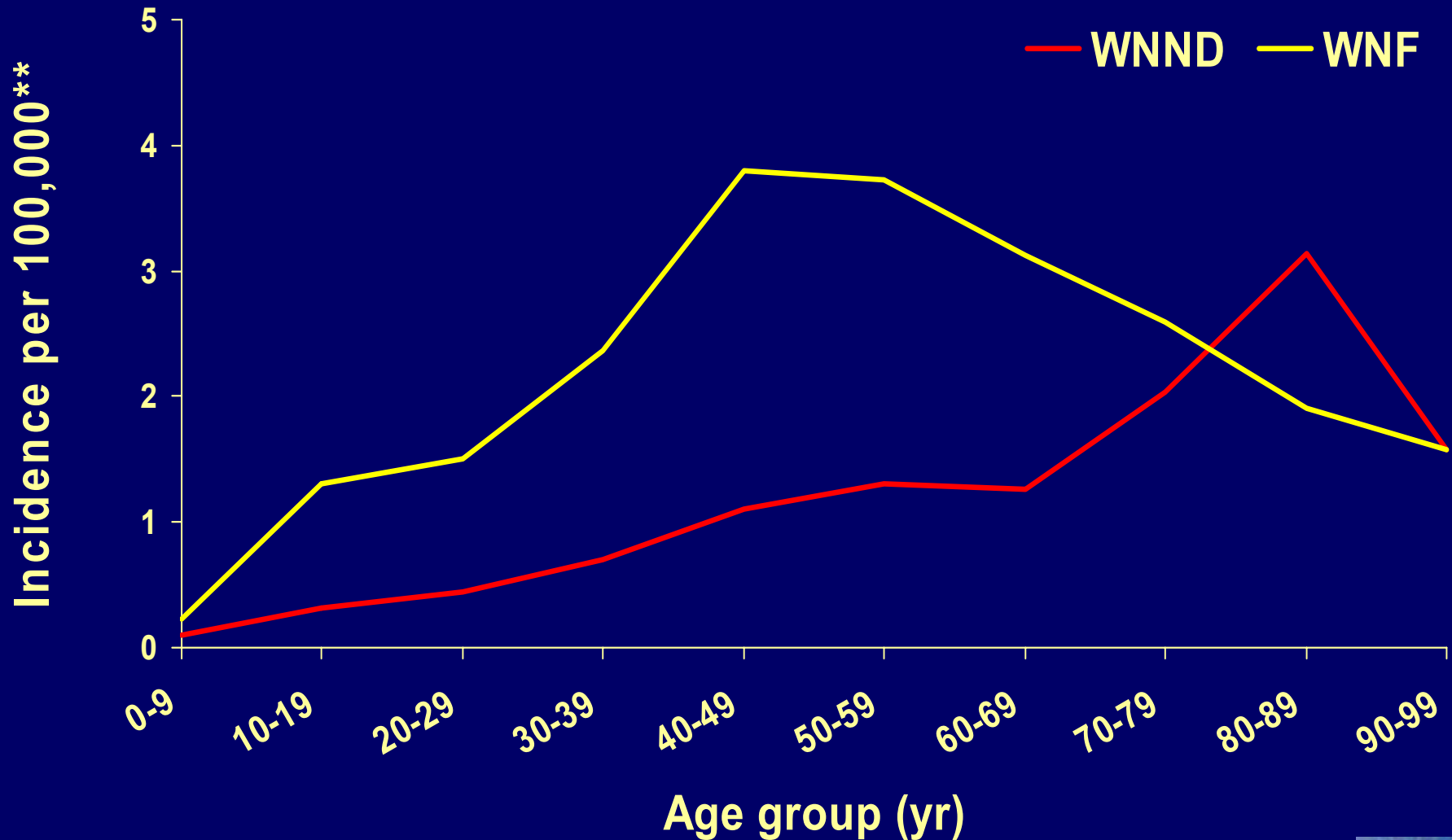
*Reported as of 1/20/2004

Human WNV Disease Cases, by Age Group and Clinical Category, United States, 2003*



* Reported as of 1/20/2004

Human WNV Disease Incidence, by Age Group and Clinical Category, United States, 2003*

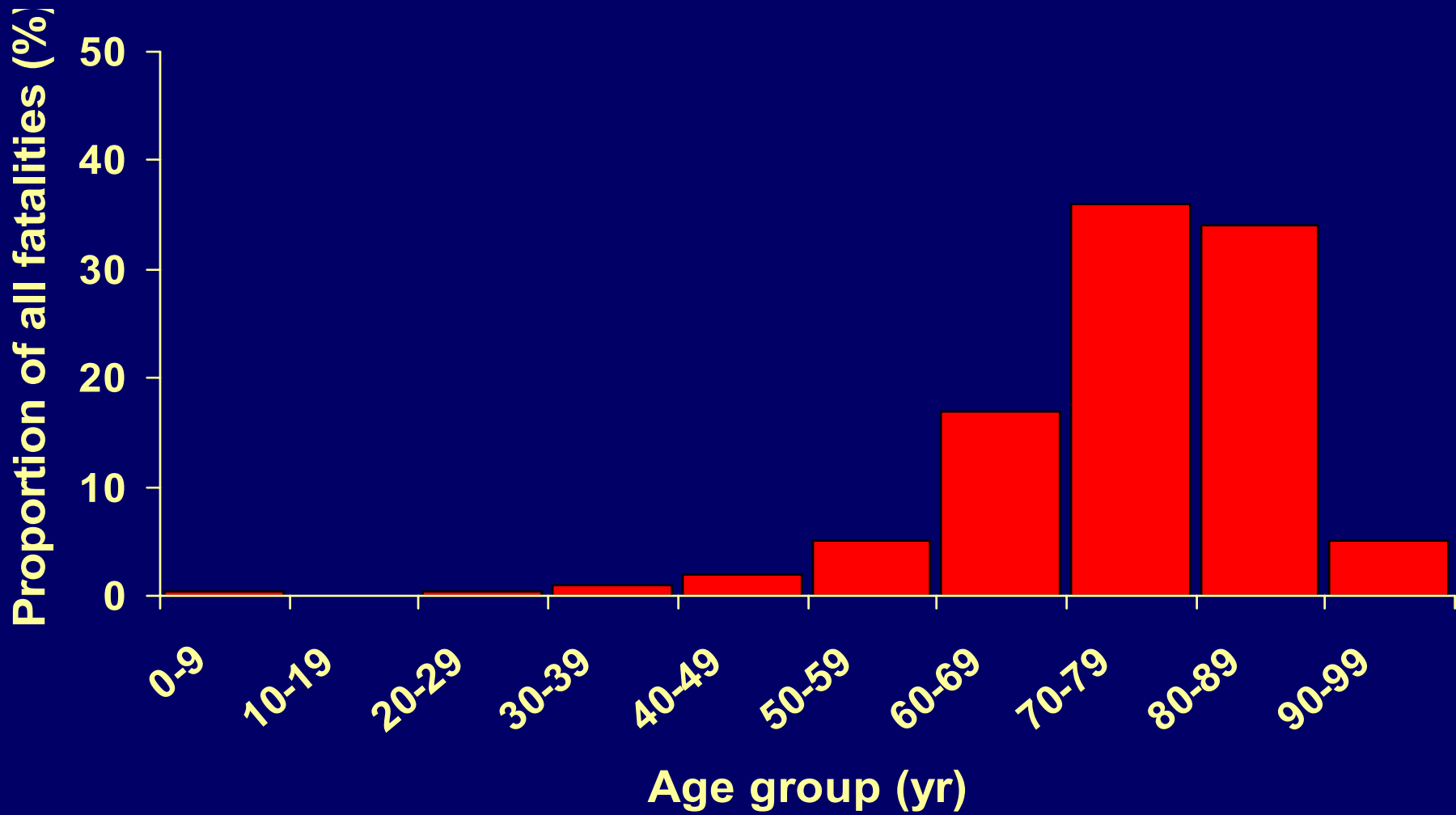


* Reported as of 1/30/2004

**Entire US population



Age Distribution of Fatal Human WNME Cases, United States, 2003*



* Reported as of 1/20/2003

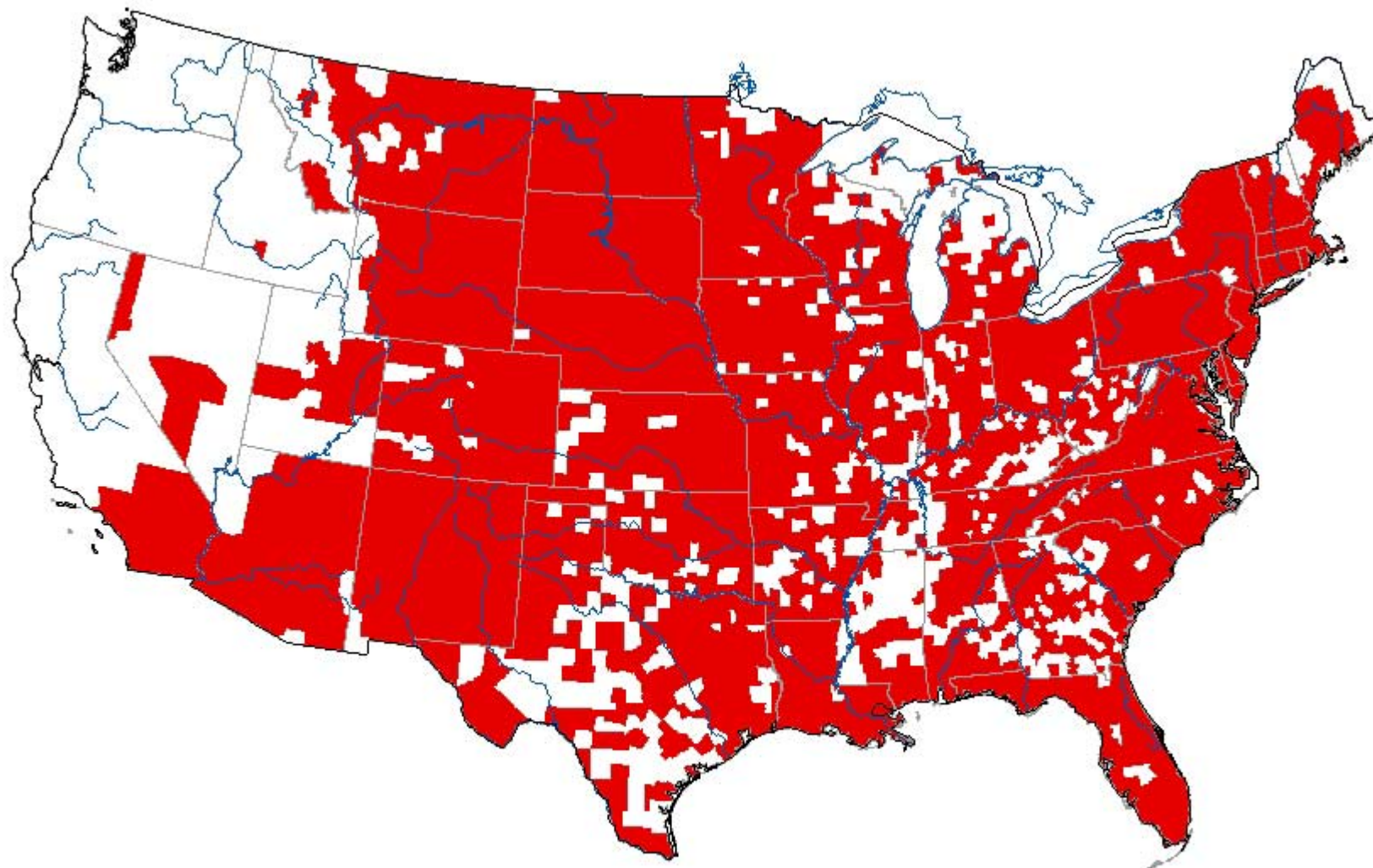
Status of West Nile Virus Activity in the United States, 2003

- **Widespread West Nile virus activity over most of the continental United States**
- **At least 225 species of birds infected; corvids most commonly reported positive bird**
- **At least 49 species of mosquitoes infected; *Culex* mosquitoes most commonly positive**
- **WNV-positive bird collections and WNV-positive mosquito collections precede onset of human cases in most counties**

Status of West Nile Virus Activity, United States, 2003 (cont)

- **Human cases have been reported from all states except Maine, Oregon, and Washington**
- **Neuroinvasive disease and high mortality most common among people over 60 years of age**
- **Impressive westward movement of most intense WNV transmission.**

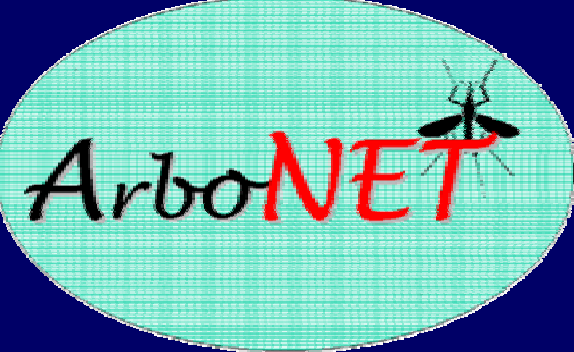
U.S. Counties Reporting Any WNV Activity, 2003



Through MMWR week 53 (ending 1/3/2004) - 2289 counties
Reported and verified through ArboNET as of 1/20/2004

CDC/NCID/DVBID

CDC



The Arbonet Team

Page 1...

2003



Jen Brown



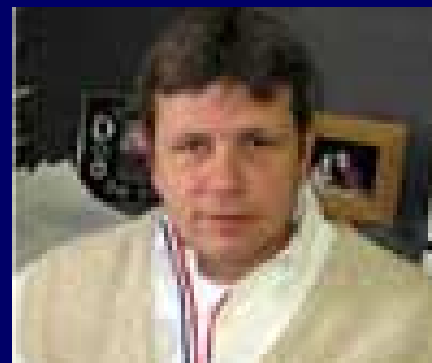
Roy Campbell



Peggy Collins



Nick Crall



John Jones



Krista Kniss



Stephanie Kuhn



Jen Lehman



Tony Marfin



Sue Montgomery



Dan O'Leary

...Page 2!

WNV-Positive Mosquito Species Reported, United States, 1999-2003*

<i>Culex</i>	<i>Aedes</i>	<i>Ochlerotatus</i>		<i>Anopheles</i>	Other
<i>erythrothorax</i>	<i>albopictus</i>	<i>atlanticus</i>	<i>sollicitans</i>	<i>atropos</i>	<i>Cs. melanura</i>
<i>pipiens</i>	<i>aegypti</i>	<i>atropalpus</i>	<i>stimulans</i>	<i>barberi</i>	<i>Cs. impatiens</i>
<i>quinq.</i>	<i>cinereus</i>	<i>canadensis</i>	<i>sticticus</i>	<i>crucians</i>	<i>Cs. inornata</i>
<i>tarsalis</i>	<i>vexans</i>	<i>dorsalis</i>	<i>taeniorhynchus</i>	<i>franciscanus</i>	<i>Cs. morsitans</i>
<i>restuans</i>		<i>cantator</i>	<i>triseriatus</i>	<i>puncitpennis</i>	<i>Cq. perturbans</i>
<i>salinarius</i>		<i>fitchii</i>	<i>trivittatus</i>	<i>quadrimac.</i>	<i>Deinocerites cancer</i>
<i>nigripalpus</i>		<i>grossbecki</i>		<i>walkeri</i>	<i>Ps. columbiae</i>
<i>erraticus</i>		<i>Infirmatus</i>			<i>Ps. ciliata</i>
<i>territans</i>		<i>japonicus</i>			<i>Ps. ferox</i>
		<i>nigromaculis</i>			<i>Ps. howardii</i>
		<i>provocans</i>			<i>Orthopodomyia signifera</i>
					<i>Uranotaenia sapphirina</i>

* Reported as of 1/20/2004– 49 species

