

The Sharp Rise of West Nile Virus in Texas, 2012

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Abstract

In 2012, West Nile Virus infection cases were at their most lethal levels nationwide, since the disease arrived in the US in 1999. Texas led the nation in both the most incidences of infection and fatalities. As of December 31, 2012 Texas had approximately 1/3 of all incidences as well as approximately 1/3 of fatalities, while having approximately 8% of the US population. The 2012 Texas total WNV cases of 1878 is two and a half times the size of any other annual total. Our study of Texas produced a mean age of death of 79.9 years, and nearly 55% of those infected in Texas were men. Our analysis shows that the Dallas-Fort Worth metropolitan area was heavily affected by the outbreak.

Background

West Nile Virus (WNV) was first isolated in the West Nile District of Uganda in 1937.¹ WNV is an arbovirus (transmitted by an insect) and a flavivirus (a genus in the family Flaviviridae). This genus includes dengue virus, yellow fever virus, and dozens of others.² The WNV is most commonly transmitted to humans by mosquitoes. Fortunately, most people infected with WNV will have no symptoms. About 20% of infected people will develop a fever, headache, body aches, joint pains, vomiting and other flu-like symptoms. Less than 1% of infected people develop a more serious, sometimes fatal, neuroinvasive illness such as encephalitis or meningitis (inflammation of the brain or surrounding tissues).³

Birds act as a reservoir host for the virus, and mosquitoes are a vector for the virus. Both humans and horses are incidental hosts unable to amplify the virus and transmit it.³

West Nile Virus was first identified in the United States in 1999, and has since spread across the continental U.S.⁴ In 2012, West Nile cases were higher across the U.S. than any year, and Texas had the most cases.³ The fact that Texas's largest metropolitan area—Dallas-Fort Worth was heavily impacted by the disease is what brought the outbreak to the attention of public officials, the media, and the public at large.

Methodology

Tabular data for the U.S. was obtained from the Centers for Disease Control and Prevention (CDC). More specific tabular data for the state of Texas was obtained from the Zoonosis Control Branch of the Department of State Health Services (DSHS). The data was collected by doctors and hospitals and reported to state health officials, who then passed the data onto the CDC.

Tables, maps, and charts were created from this data. This data includes demographic traits such as age, race, and gender, as well as, date of onset and date of death.

Results

For 2012 a national total of 5,674 cases were reported to the CDC, with 1,868 in Texas, and there was a mortality national total of 286, of which 89 were in Texas.^{3, 5} Of the 1868 cases in Texas, 758 occurred in the four North Texas counties of Collin, Dallas, Denton, and Tarrant.⁵ This area is known as the Dallas-Fort Worth metropolitan area, and is the largest metropolitan area of Texas. Table 1 and Figures 1 and 2 show these national results, and Figures 3-6 show Texas results.

Table 1. WNV cases for the U.S. in 2012

State	Neuroinvasive*	Non-neuroinvasive	Total cases†	Deaths
Alabama	38	24	62	2
Arizona	87	46	133	7
Arkansas	44	20	64	7
California	297	182	479	20
Colorado	62	69	131	5
Connecticut	12	9	21	0
Delaware	2	7	9	1
District of Columbia	8	2	10	1
Florida	52	21	73	3
Georgia	46	53	99	6
Idaho	5	12	17	0
Illinois	187	103	290	12
Indiana	46	31	77	8
Iowa	11	20	31	0
Kansas	20	36	56	3
Kentucky	13	10	23	3
Louisiana	155	180	335	16
Maine	1	0	1	0
Maryland	25	22	47	6
Massachusetts	25	8	33	1
Michigan	141	61	202	17
Minnesota	34	36	70	1
Mississippi	103	144	247	5
Missouri	17	3	20	3
Montana	1	5	6	1
Nebraska	42	151	193	4
Nevada	5	4	9	1
New Hampshire	1	0	1	0
New Jersey	22	26	48	6
New Mexico	24	23	47	1
New York	61	46	107	9
North Carolina	7	0	7	2
North Dakota	39	50	89	1
Ohio	76	45	121	7
Oklahoma	103	88	191	17
Oregon	0	11	11	0
Pennsylvania	33	27	60	4
Puerto Rico	1	0	1	0
Rhode Island	2	2	4	0
South Carolina	20	9	29	4
South Dakota	62	141	203	3
Tennessee	19	14	33	1
Texas	844	1,024	1,868	89
Utah	3	2	5	1
Vermont	1	2	3	0
Virginia	20	10	30	4
Washington	4	0	4	0
West Virginia	5	5	10	0
Wisconsin	44	13	57	4
Wyoming	3	4	7	0
Totals	2873	2801	5674	286

*Includes cases reported as meningitis, encephalitis, or acute flaccid paralysis.

†Includes confirmed and probable cases.

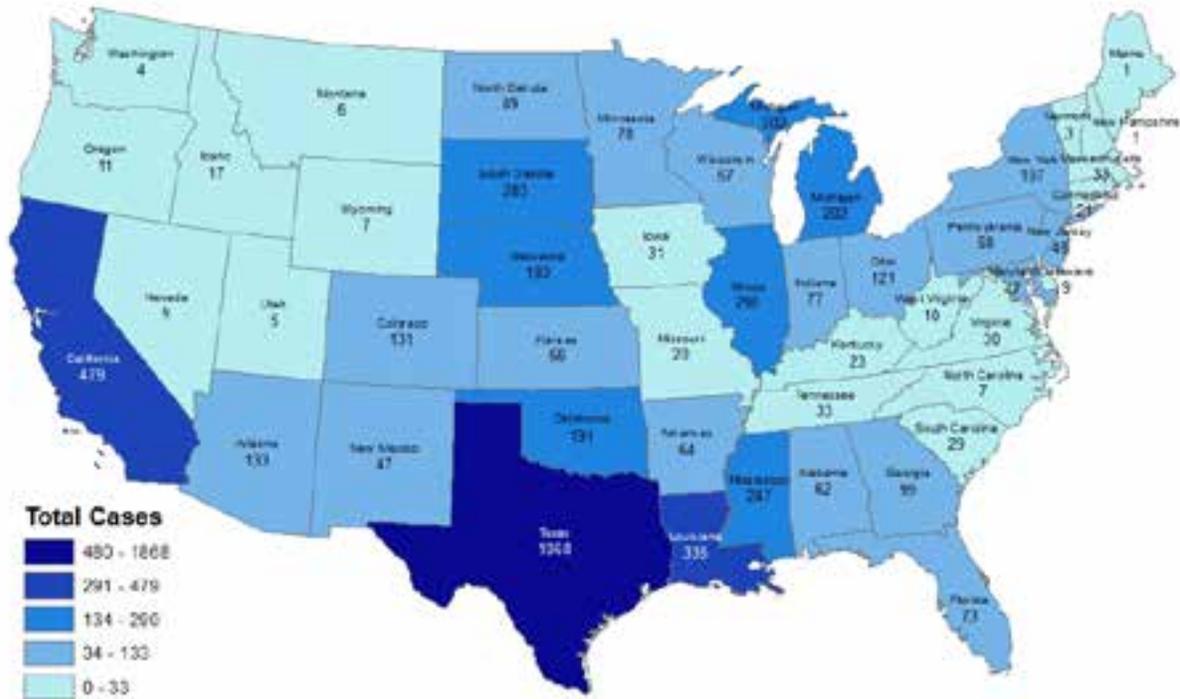


Figure 1. Total cases and deaths of WNV for 2012 in the US. This map shows all infection cases of WNV reported to the CDC in 2012. No cases were reported for Alaska and Hawaii.³

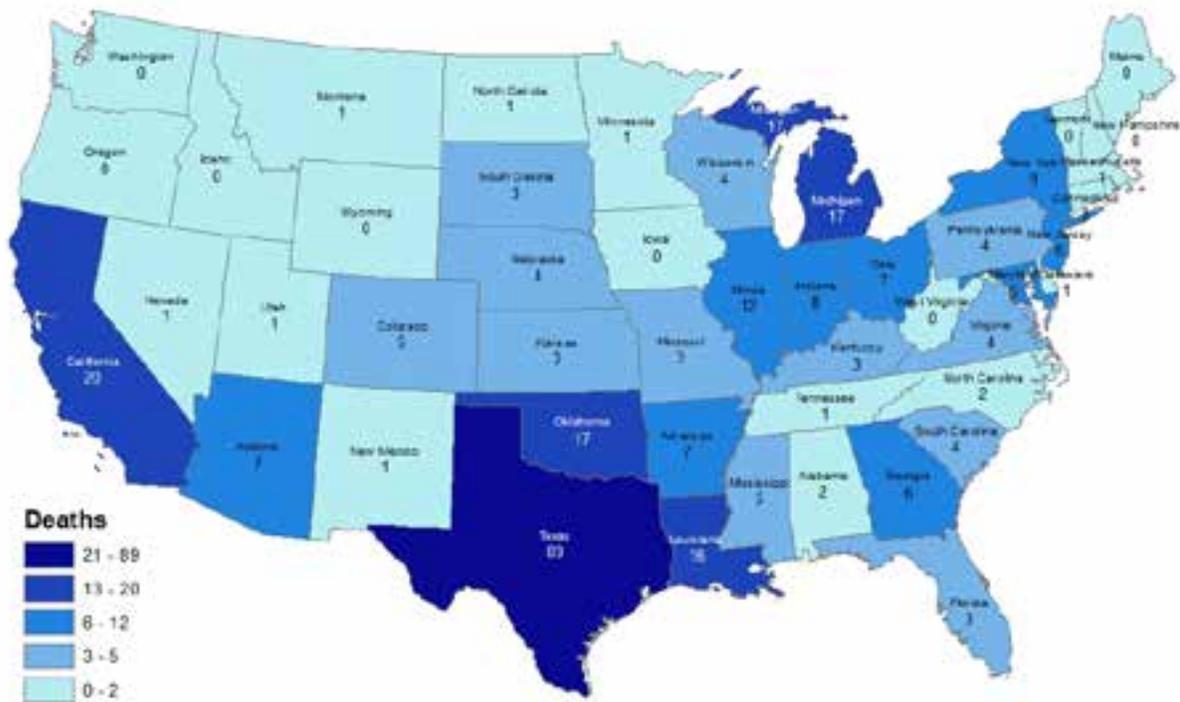


Figure 2. Total cases and deaths of WNV for 2012 in the US. This map shows all death cases due to WNV reported to the CDC in 2012. No deaths were reported for Alaska and Hawaii.³

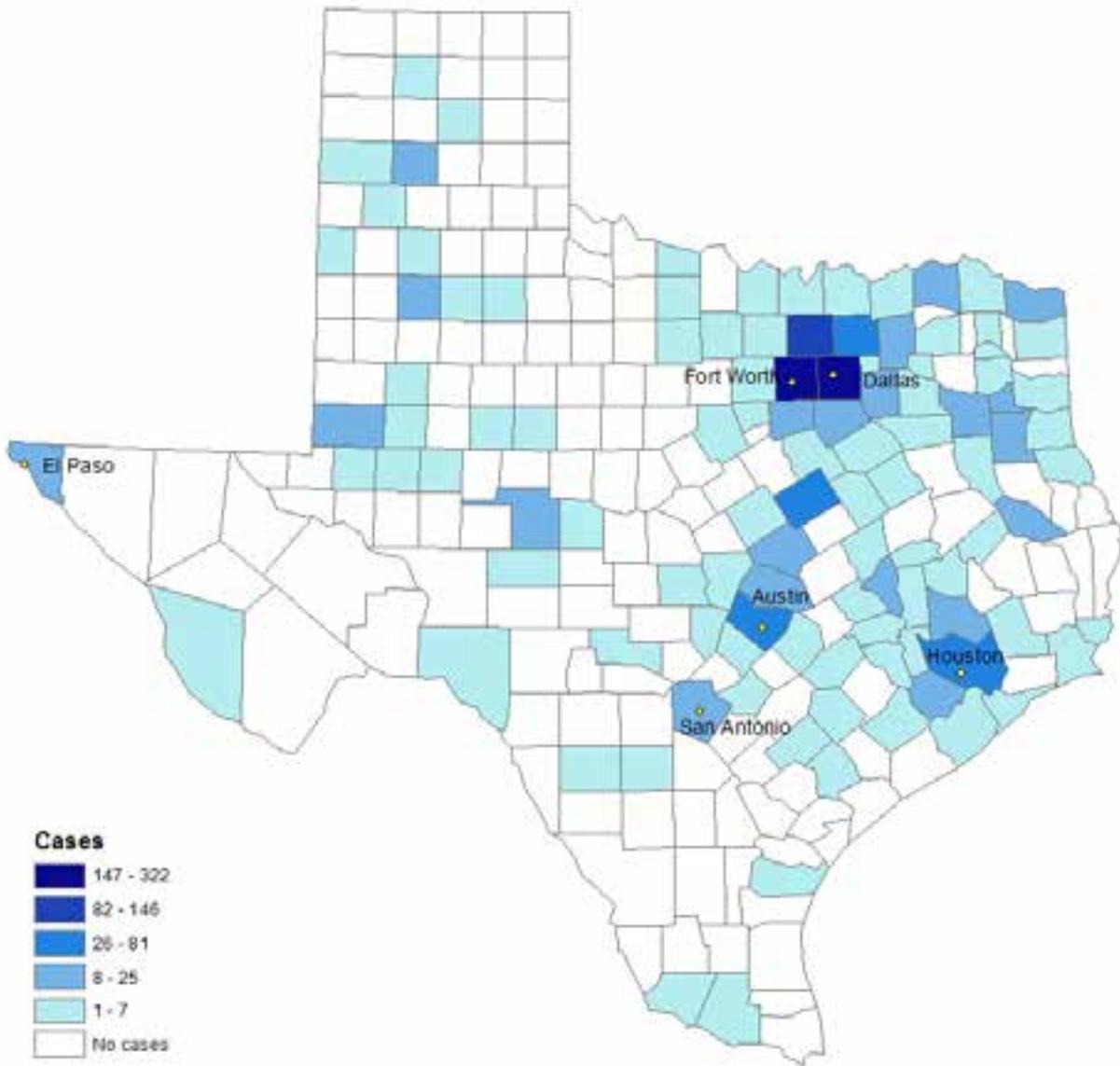


Figure 3. Total cases of WNV for 2012 in Texas. This map shows all infection cases of WNV, at the county level, reported to the DSHS in 2012.⁵

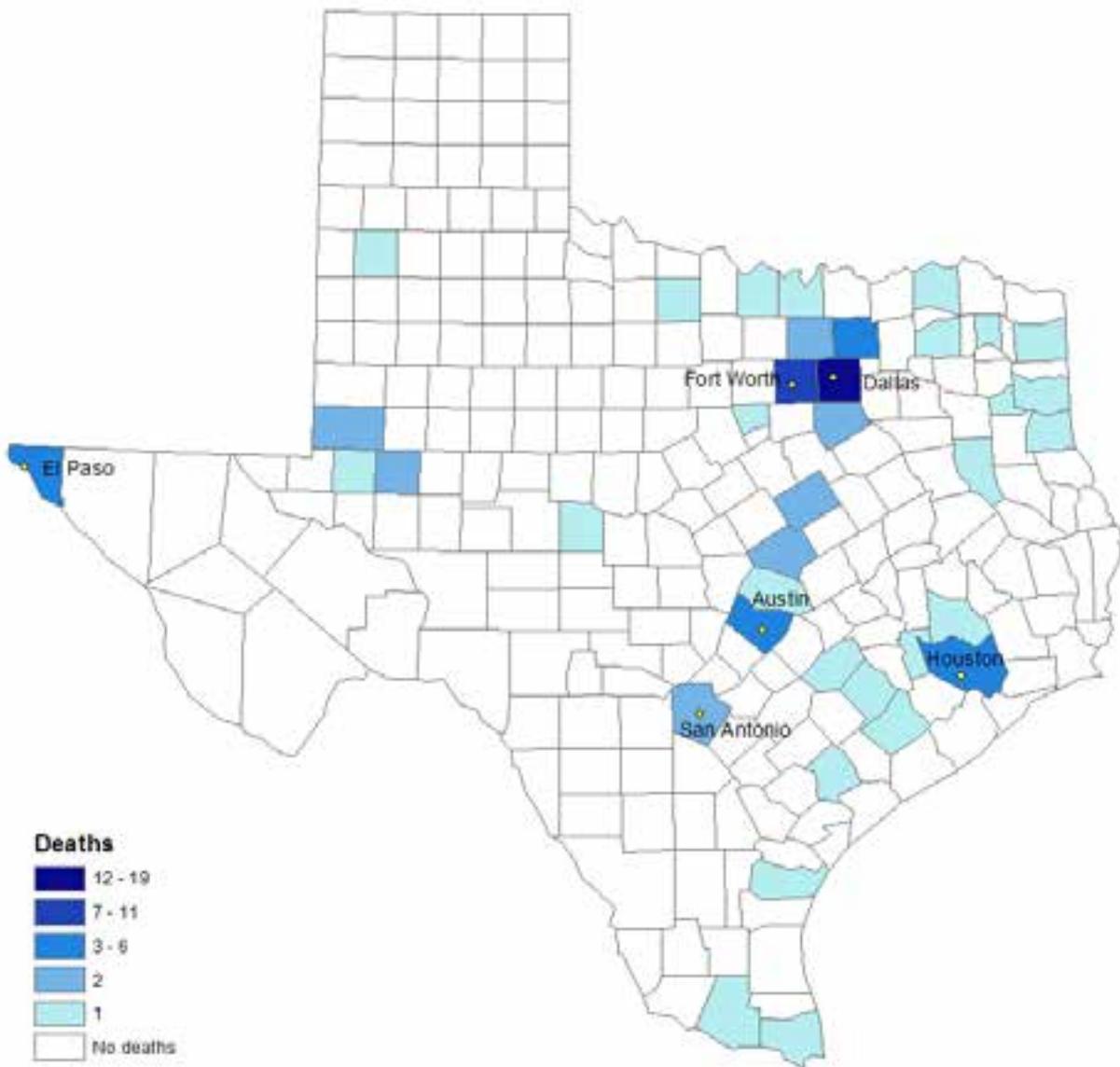


Figure 4. Total deaths of WNV for 2012 in Texas. This map shows all deaths due to WNV, at the county level, reported to the DSHS in 2012.⁵

August typically is the month with the most reported cases. Nearly 900 cases were reported for August 2012, almost half the annual total of 1878.

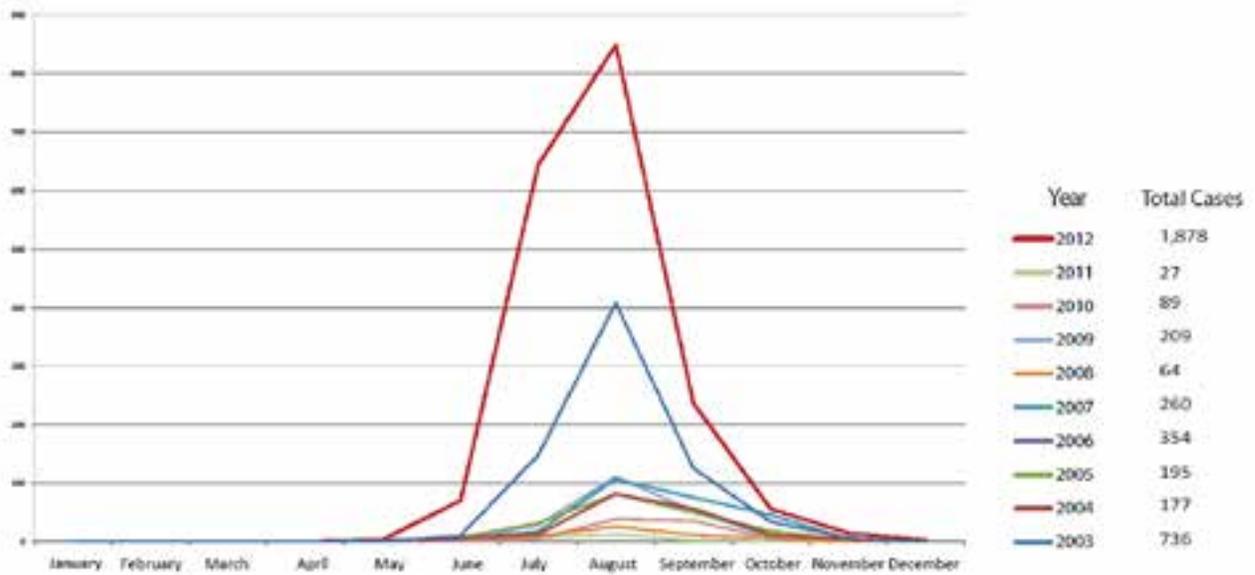


Figure 5. Monthly total cases of WNV for years 2003-2012, in Texas. August typically is the month with the most reported cases. Cases includes deaths as well as illnesses.⁵

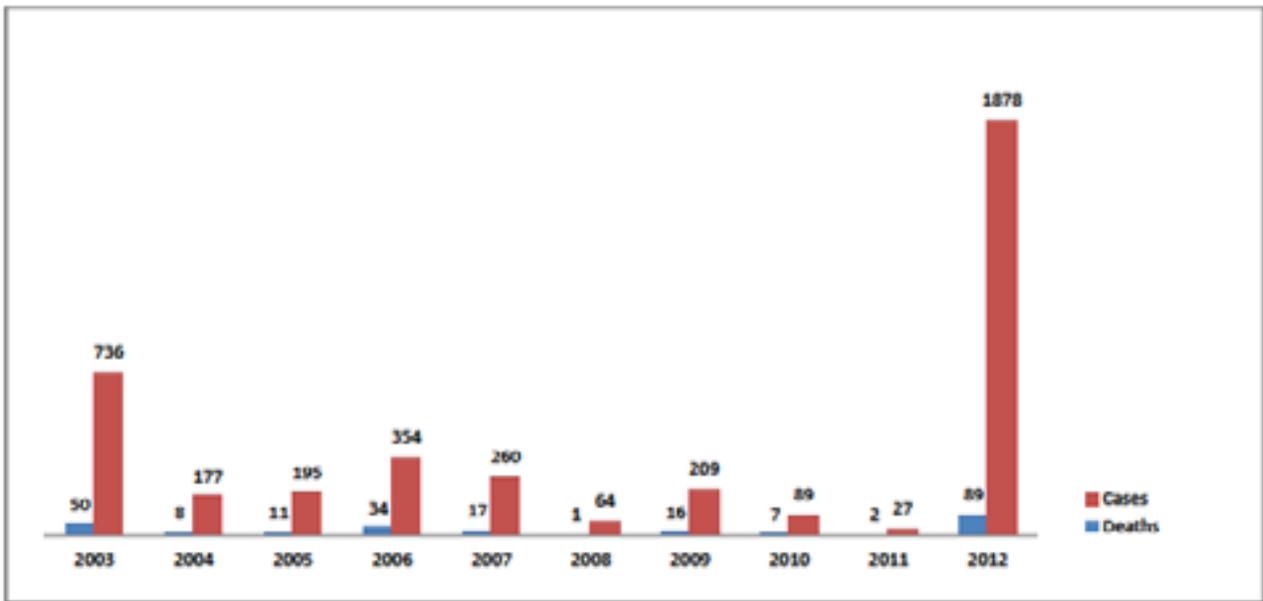


Figure 6. Annual totals of cases and deaths, in Texas for years 2003-2012. This chart compares cases and deaths reported to the DSHS in 2012. Cases include both illnesses and deaths.⁵

Age or age related traits appear to affect whether someone became ill or died. Texas has a median age of 33.6 years for all residents. In contrast, the median age for all 2012 Texas WNV cases is 54.6 years, and 79.9 years for deaths. Of the 1878 infection cases in Texas, men made up 54.95%, whereas men make up 49.6% of the overall Texas population.⁶

Conclusion

A weakened immune system likely contributes to one's susceptibility to becoming ill from WNV. High spring rainfall and a new batch of young birds without immunity to WNV likely caused the virus to become more prevalent among birds, allowing mosquitoes to carry it to humans. More research will be done, using remote sensing data, to analyze how much more precipitation Texas had during the spring of 2012.

References

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