

2012

West Nile Virus in Maricopa County



This image depicts a uniformly-scattered grouping of deceased mosquitoes.

Image by CDC/James Stewart - License: Public Domain

Maricopa County Department of Public Health
Office of Epidemiology

7/1/2013

Commentary

West Nile virus (WNV) is a mosquito-borne virus that causes a non-specific, self-limited, febrile illness. Mosquitoes become infected when they feed on infected birds that have migrated into an area. The mosquitoes then bite people who may or may not become infected. The cycle of WNV occurs at an unusually high intensity when there is both a large number of infected birds and a high concentration of infected mosquitoes in a relatively small geographic area. Mosquitoes are the known carriers (vectors) of the virus from the host birds to humans. Humans and animals (i.e., horses) are incidental hosts in this bird-mosquito cycle, and thus cannot pass the virus to others. Because WNV causes death in birds, we expect dead birds to be the first warning of WNV activity in an area.

WNV is widespread in Africa, North America, Europe, the Middle East, India, Southeast Asia, Australia, the Caribbean and Central and South America. Although it is now widespread in the United States, WNV was not present in Arizona until 2003. WNV is now endemic in Maricopa County and is expected to be a public health concern indefinitely. WNV surveillance season begins April 1st and ends November 30th, however, in Arizona the majority of cases occur between the months of June and October, with cases as early as January and as late as November. All residents and visitors are urged to continue to take precautions against WNV infection every year.

The Maricopa County Department of Public Health (MCDPH) and the Maricopa County Department of Environmental Services (MCDES) work closely to educate and protect the residents of Maricopa County against WNV. MCDES has an extensive mosquito-trapping program that enables staff to identify areas where there is a lot of mosquito activity and to detect mosquito-borne diseases. Various types of mosquito traps are set up throughout the county that collect mosquitoes for testing. These mosquitoes are pooled together, by species, into groups of 1-50 mosquitoes. This collection of mosquitoes is called a mosquito pool. The mosquitoes are then ground up and tested for WNV and other mosquito-borne diseases. MCDES also responds to complaints regarding green (unattended) swimming pools, stagnant water, dead birds, and mosquitoes as a part of their mosquito abatement efforts.

MCDPH is responsible for monitoring the interaction of the virus with humans. Working with hospitals and medical providers throughout the county, MCDPH conducts disease surveillance to find “hot spots” in the Valley where there are a particularly high number of people with WNV. MCDPH nurses and epidemiologists monitor patients with potential WNV symptoms who seek medical care, monitor disease patterns in order to stop transmission of the virus, and assist the public by giving recommendations for controlling the spread of or exposure to WNV in different settings.

The majority (~80%) of people infected with WNV will show no symptoms at all. For those that are symptomatic (~20%), symptoms will appear 2-14 days after receiving the mosquito bite. Symptomatic cases are characterized by the acute onset of fever, headache, arthralgias, myalgias, and sometimes accompanied by a maculopapular rash or lymphadenopathy. Rarely do symptoms get more severe; however, 1-3% of symptomatic infections will develop into a neuroinvasive form of the disease. In neuroinvasive West Nile Virus, the central nervous system (CNS) is involved and clinical syndromes ranging from meningitis (inflammation of the lining of the brain and spinal cord) to encephalitis (inflammation of the brain), or acute paralysis can occur. There is no treatment for WNV; only supportive care can be given.

Figure 1: WNV Cases in Humans in Maricopa County by Month of Onset, 2006-2012

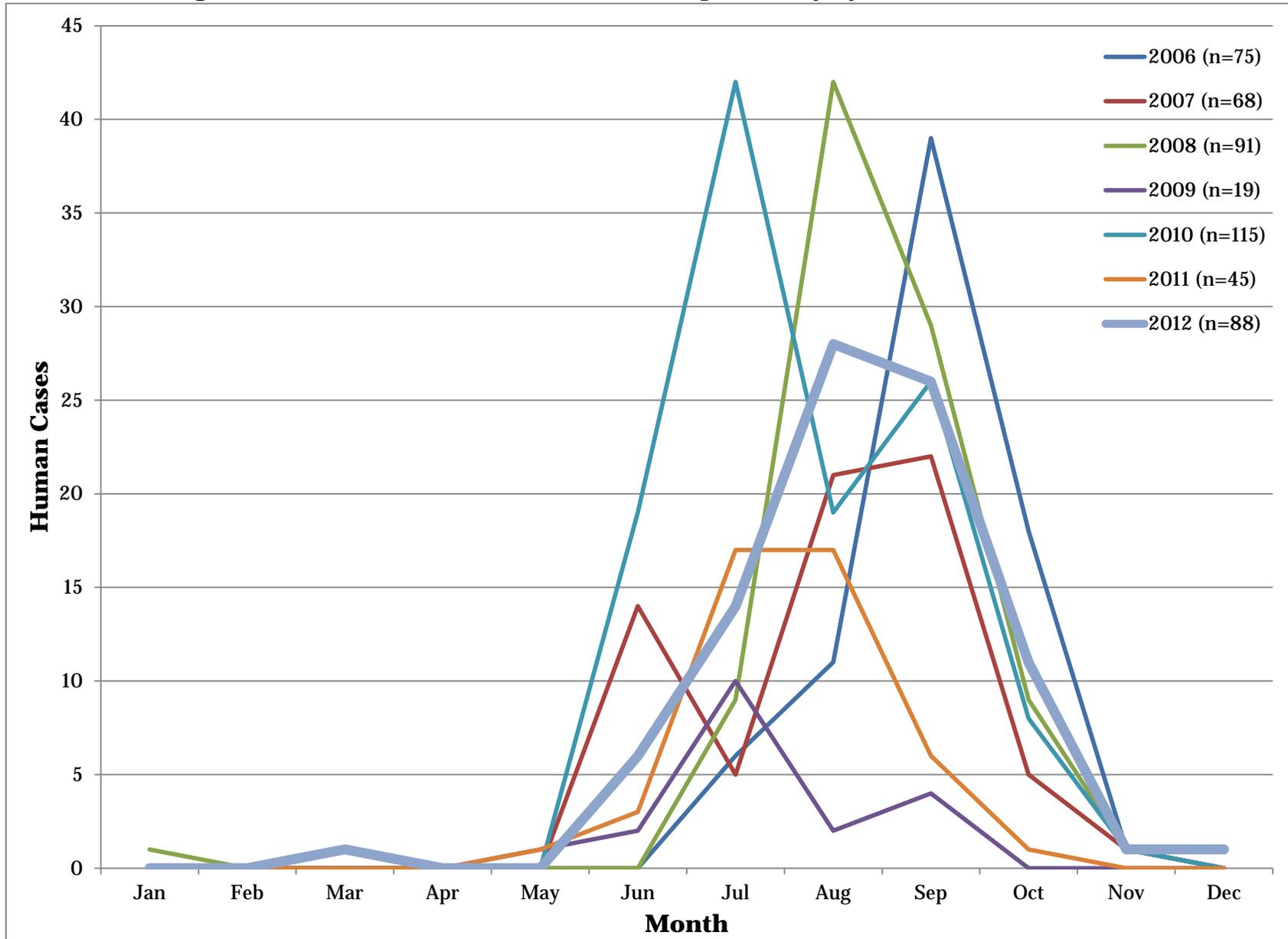
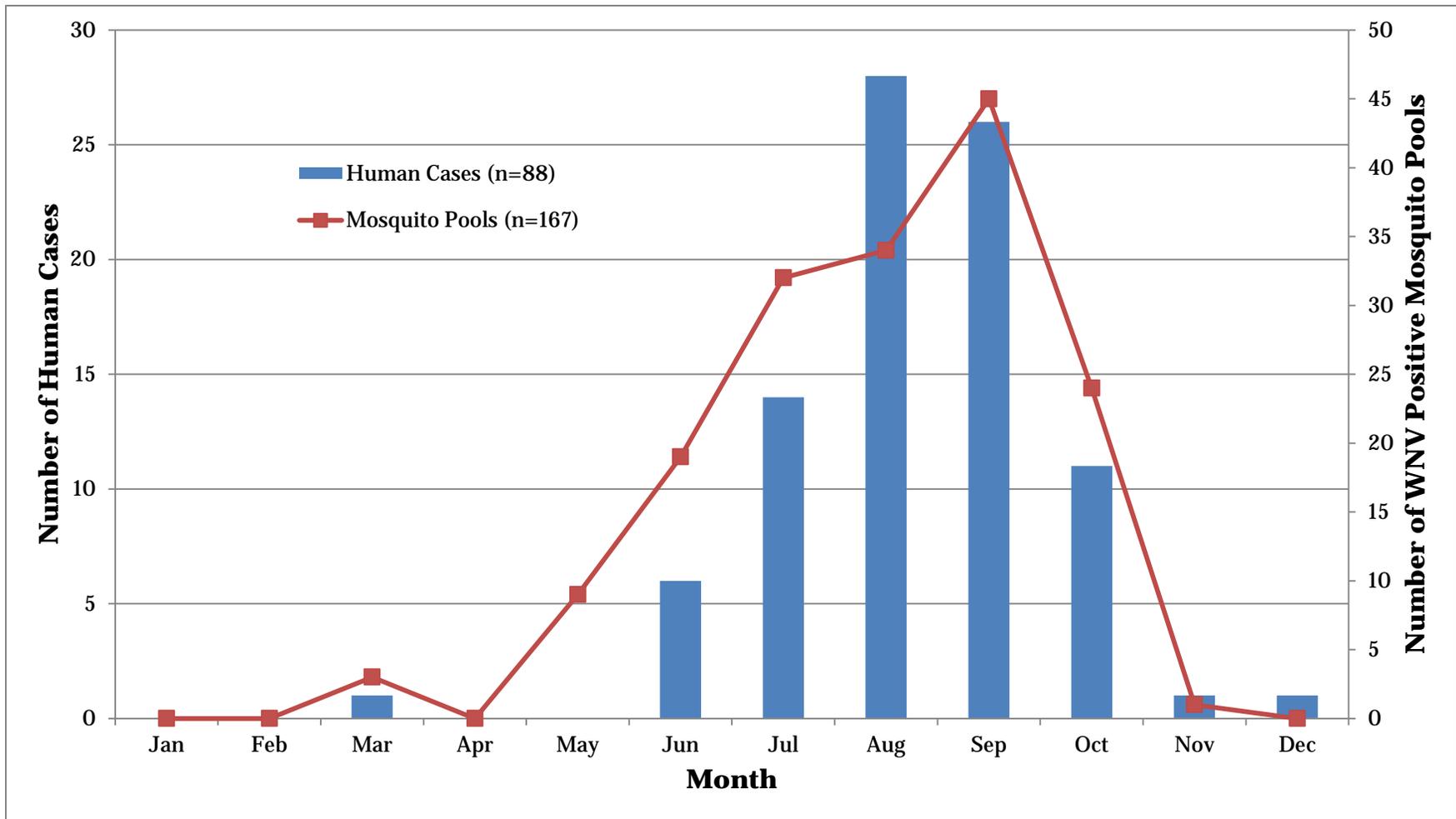


Figure 2: WNV Cases in Humans and WNV Positive Mosquito Pools in Maricopa County by Month, 2012



¹A human case is an individual infected with WNV and with a clinically compatible illness.

²Mosquito pools are a collection of mosquitoes collected from a county trap that have tested positive for WNV.

³Human data are based on the date of symptom onset. Mosquito data are based on the date the mosquitoes were collected.

Figure 3: West Nile Virus Surveillance Indicators: Dates of First Positive Findings in a Mosquito Pool and Onset in a Human in Maricopa County, 2012

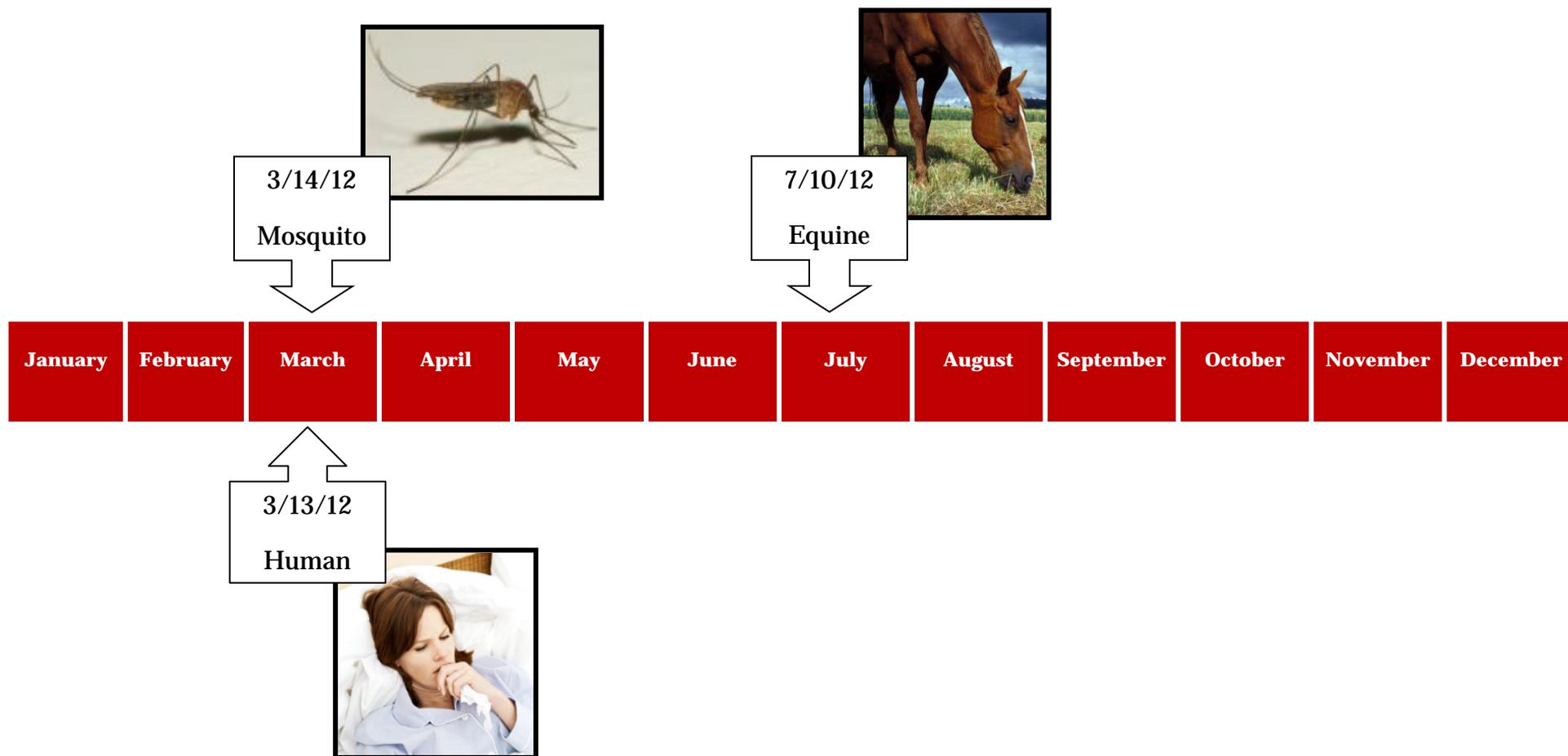


Table 1: West Nile Virus Cases in Maricopa County by Gender and Case Classification, 2012

Case Classification ¹	WNV Cases			% of Total Cases
	Male	Female	Total	
Meningitis	16	13	29	33
Encephalitis	17	4	21	24
Paralysis Syndrome	2	2	4	5
Neuroinvasive Disease Total	35	19	54	62
Fever	16	14	30	34
Fever in Viremic Donors ²	3	1	4	5
Non-Neuroinvasive Disease Total	19	15	34	39
Total	54	34	88	100
Viremic Donors Asymptomatic	8	2	10	-

¹ Case Classification may differ from the numbers reported by Arizona Department of Health Services.

²Fever in a viremic donor cases are included in fever cases throughout the rest of this report.

Case Classifications:

MCDPH uses the Centers for Disease Control and Prevention’s (CDC) case definition to confirm a case of West Nile virus. A case of WNV is a clinically compatible illness that is West Nile virus laboratory confirmed. WNV infection can be asymptomatic or result in a febrile illness of variable severity sometimes associated with CNS involvement. Cases of WNV are classified either as neuroinvasive or non-neuroinvasive, which are explained below:

Non-Neuroinvasive West Nile Virus: Requires, at minimum, the presence of documented fever, as measured by the patient or clinician, the absence of neuroinvasive disease, and the absence of a more likely clinical explanation for the illness. Non-neuroinvasive cases are also referred to by the category “Fever”.

- Fever: A non-localized, self-limited febrile illness characterized by the acute onset of fever, headache, arthralgias, myalgias, and sometimes accompanied by a maculopapular rash or lymphadenopathy.

Neuroinvasive West Nile Virus: Requires the presence of fever, the absence of a more likely clinical explanation for the illness, and at least one of the following documented by a physician:

1. Acutely altered mental status (e.g., disorientation, obtundation, stupor, or coma)
2. Acute signs of central or peripheral neurologic dysfunction (e.g., paresis or paralysis, nerve palsies, sensory deficits, abnormal reflexes, generalized convulsions, or abnormal movements)
3. Pleocytosis (increased white blood cell concentration in cerebrospinal fluid [CSF]) associated with illness clinically compatible with meningitis (e.g., headache or stiff neck)

Neuroinvasive cases are classified using the following categories:

- **Meningitis:** WNV meningitis is characterized by fever, headache, stiff neck, and pleocytosis.
- **Encephalitis:** WNV encephalitis is characterized by fever, headache, and altered mental status ranging from confusion to coma with or without additional signs of brain dysfunction (e.g., paresis or paralysis, cranial nerve palsies, sensory deficits, abnormal reflexes, generalized convulsions, and abnormal movements).
- **Paralysis syndrome:** No CDC case definition for this syndrome exists at the present time. The criteria applied to Maricopa County cases are:
 - Laboratory confirmed acute WNV-infection; **AND**
 - Physician documented acute paralysis.

Viremic Donor: The CDC defines a WNV positive viremic donor as a person who donated blood and had a positive test when screened for the presence of West Nile virus. Viremic donors are followed up by the blood agency to verify their infection with additional tests. Some viremic donors will remain asymptomatic, but others will go on to develop symptoms.

- Asymptomatic Viremic Donor: Viremic donors who do not become symptomatic are not included in case numbers. The criteria applied to Maricopa County cases are:
 - Laboratory confirmed acute WNV-infection; AND
 - No report of symptoms.
 - Symptomatic Viremic Donor: Once the symptoms are reviewed, the case will be classified as a confirmed case of viremic donor encephalitis, viremic donor meningitis, viremic donor paralysis syndrome, or viremic donor fever. The criteria applied to Maricopa County cases are:
 - Laboratory confirmed acute WNV-infection; AND
 - A report of symptoms compatible with West Nile fever, meningitis, encephalitis, or paralysis syndrome (see above definitions).
-

For more information visit:

CDC Arboviral Diseases, Neuroinvasive and Non-Neuroinvasive 2012 Case Definition:

<http://wwwn.cdc.gov/NNDSS/script/casedef.aspx?CondYrID=616&DatePub=1/1/2011%2012:00:00%20AM%20>

Arizona Department of Health Services Case Definitions for Reportable Communicable Morbidities:

<http://www.azdhs.gov/phs/oids/pdf/casedefinitions.pdf>

Figure 4: West Nile Virus Cases in Maricopa County by Gender and Case Classification, 2012 (n=88)

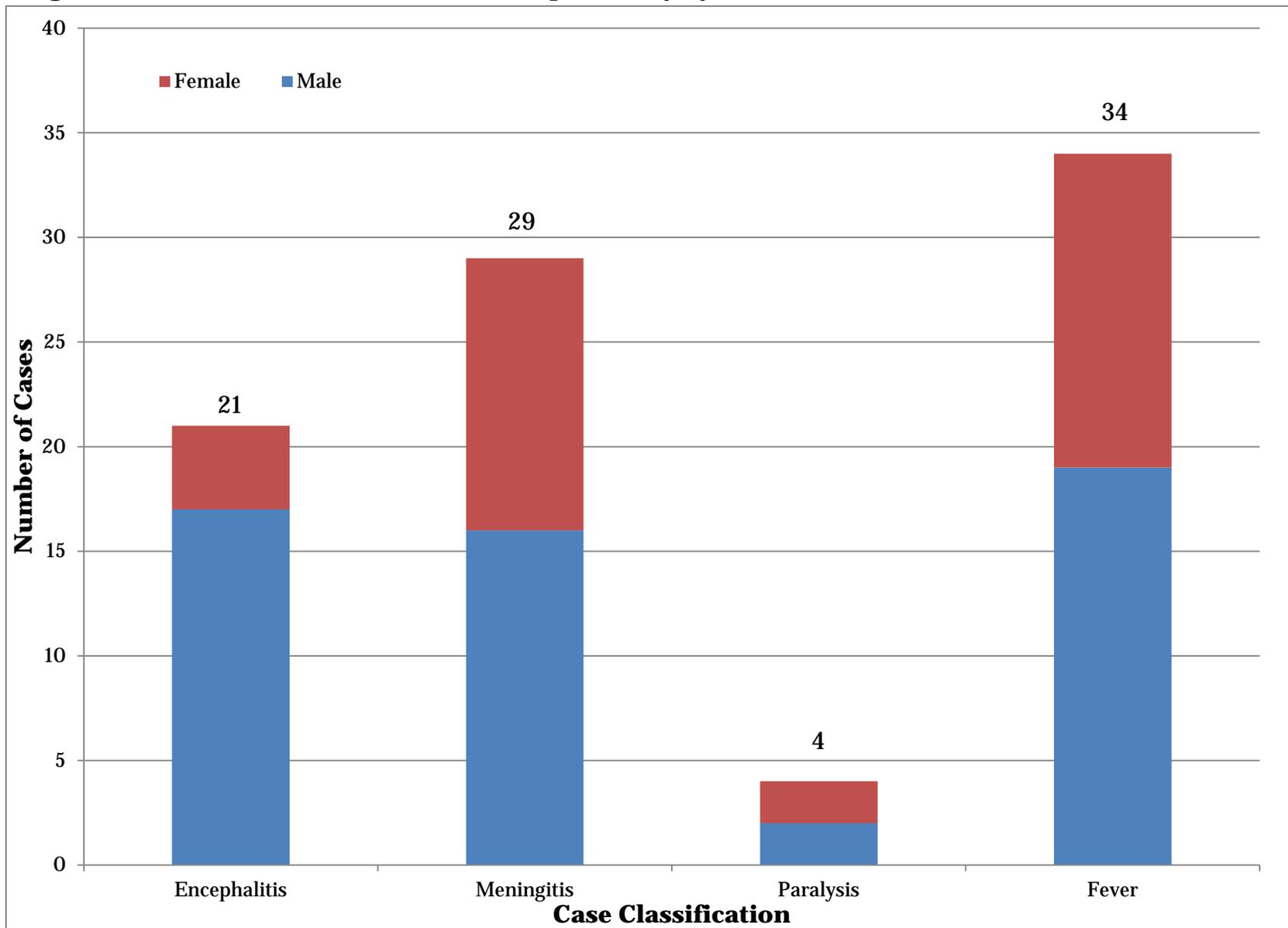


Figure 5: West Nile Virus Cases in Maricopa County by Case Classification, 2006-2012

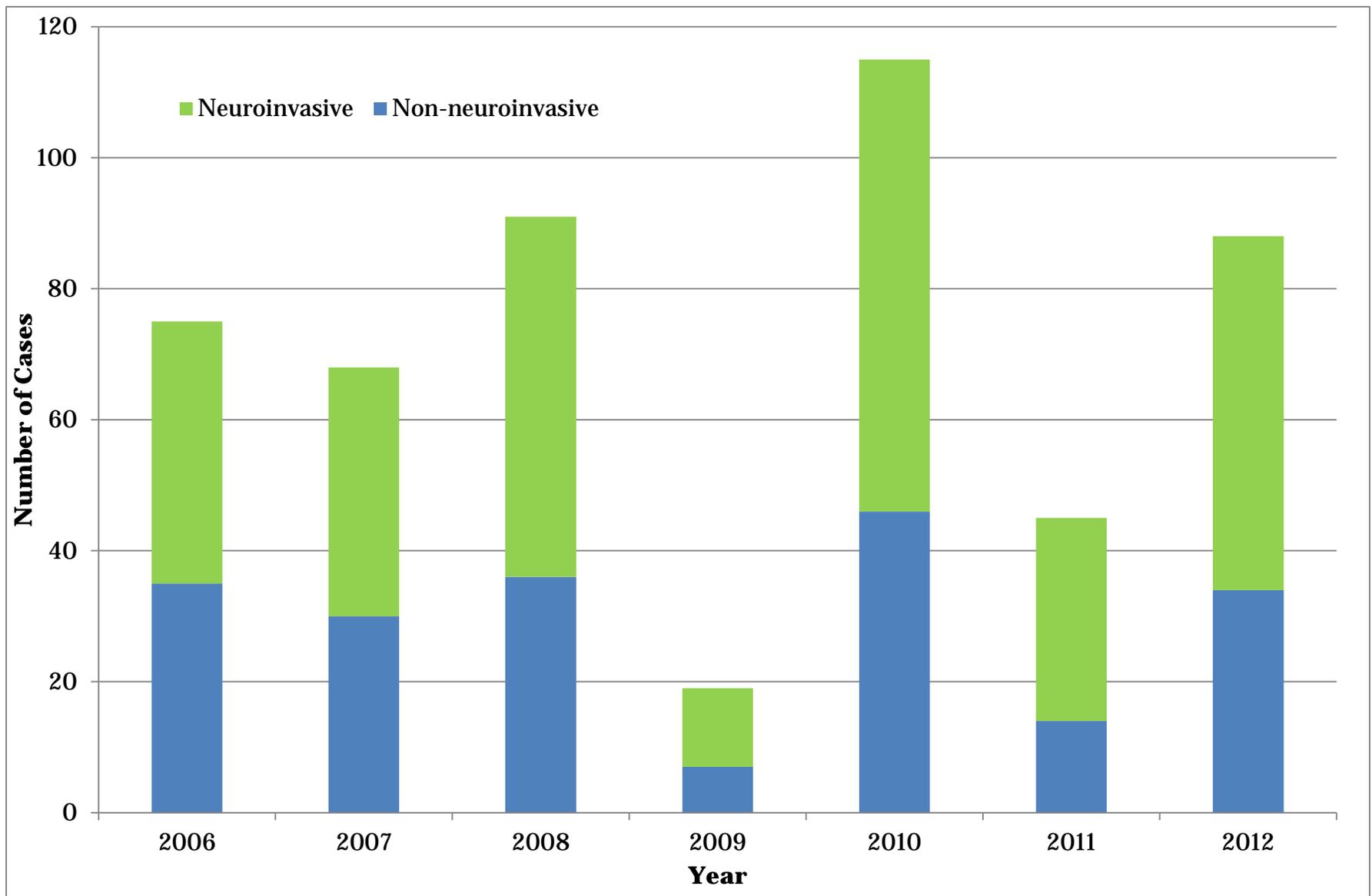


Table 2: Mean, Median, and Range of Ages of West Nile Virus Death and Survivors in Maricopa County, 2012

	Mean Age	Median Age	Age Range
Died (n=4)	68.8	67.5	57-83
Survived (n=84)	51	52	6-85
Total (n=88)	51.8	52	6-85

Mean age of West Nile Virus survivors versus deaths were not statistically significant ($\alpha=0.05$)

Figure 6: West Nile Virus Deaths in Maricopa County by Gender, 2006-2012 (n=34)

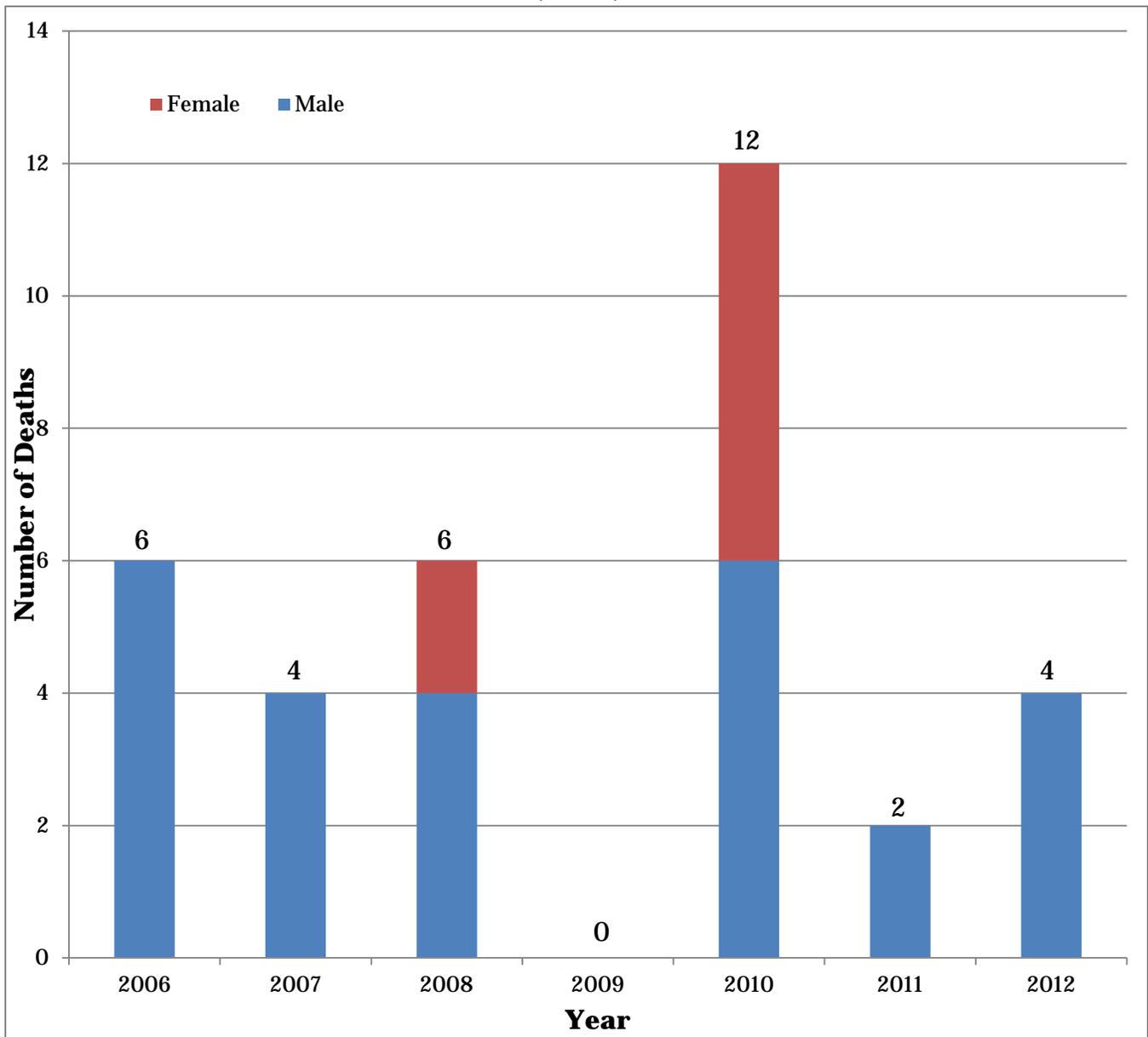


Table 3: Mean, Median, and Range of Ages of West Nile Virus Cases in Maricopa County, 2012

	Mean Age	Median Age	Age Range
Neuroinvasive (n=54)	56.1	57.5	25-85
Non-neuroinvasive (n=34)	45.1	45	6-82
Total (n=88)	51.8	52	6-85

Mean age of West Nile Virus Neuroinvasive cases versus non-neuroinvasive cases were not statistically significant ($\alpha=0.05$)

Figure 7: West Nile Virus cases in Maricopa County by Age and Case Classification, 2012 (n=88)

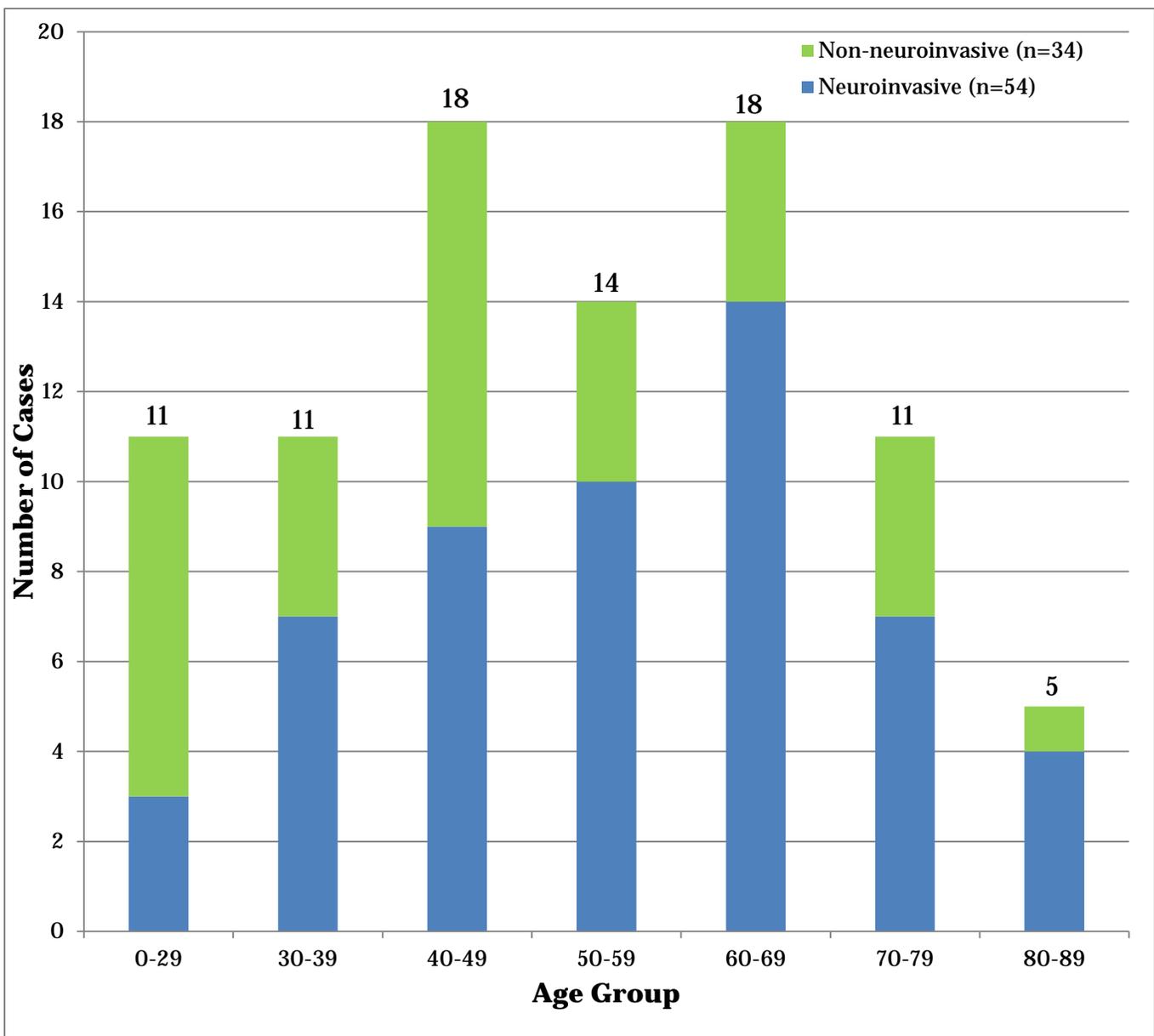


Figure 8: Mean Ages in Years of West Nile Virus Cases in Maricopa County by Case Classification, 2006-2012

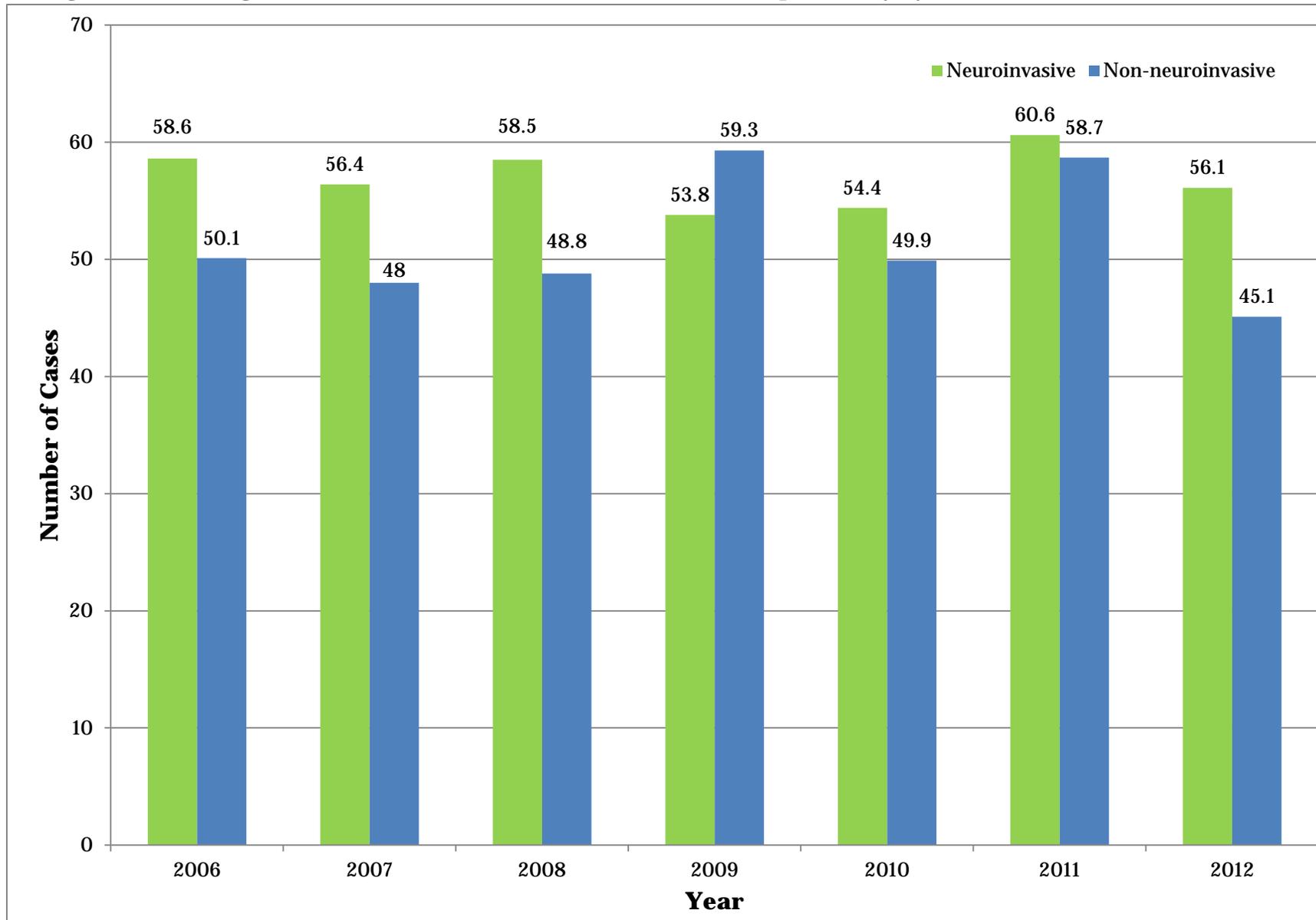
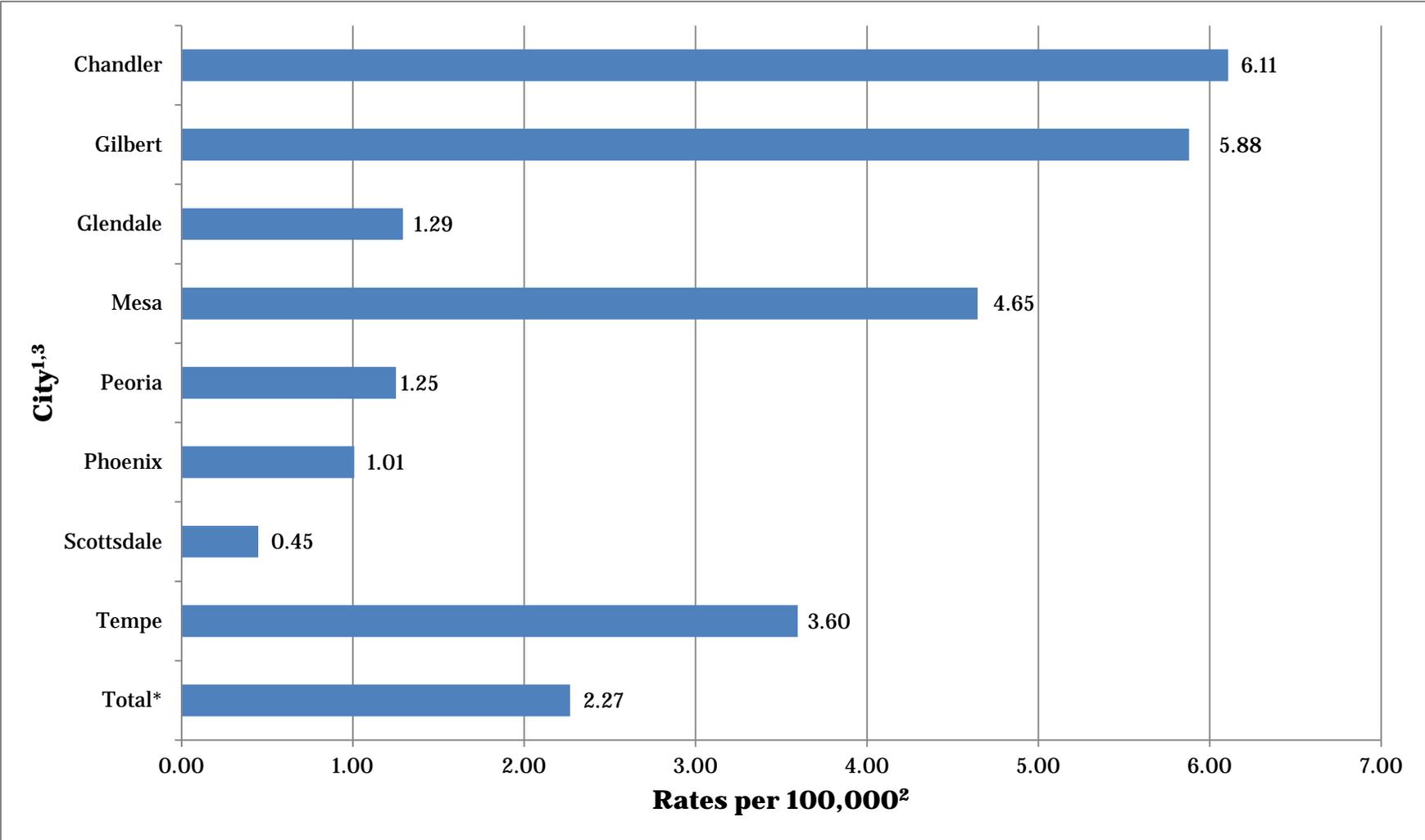


Figure 9: Rates of West Nile Virus in Maricopa County by City, 2012³



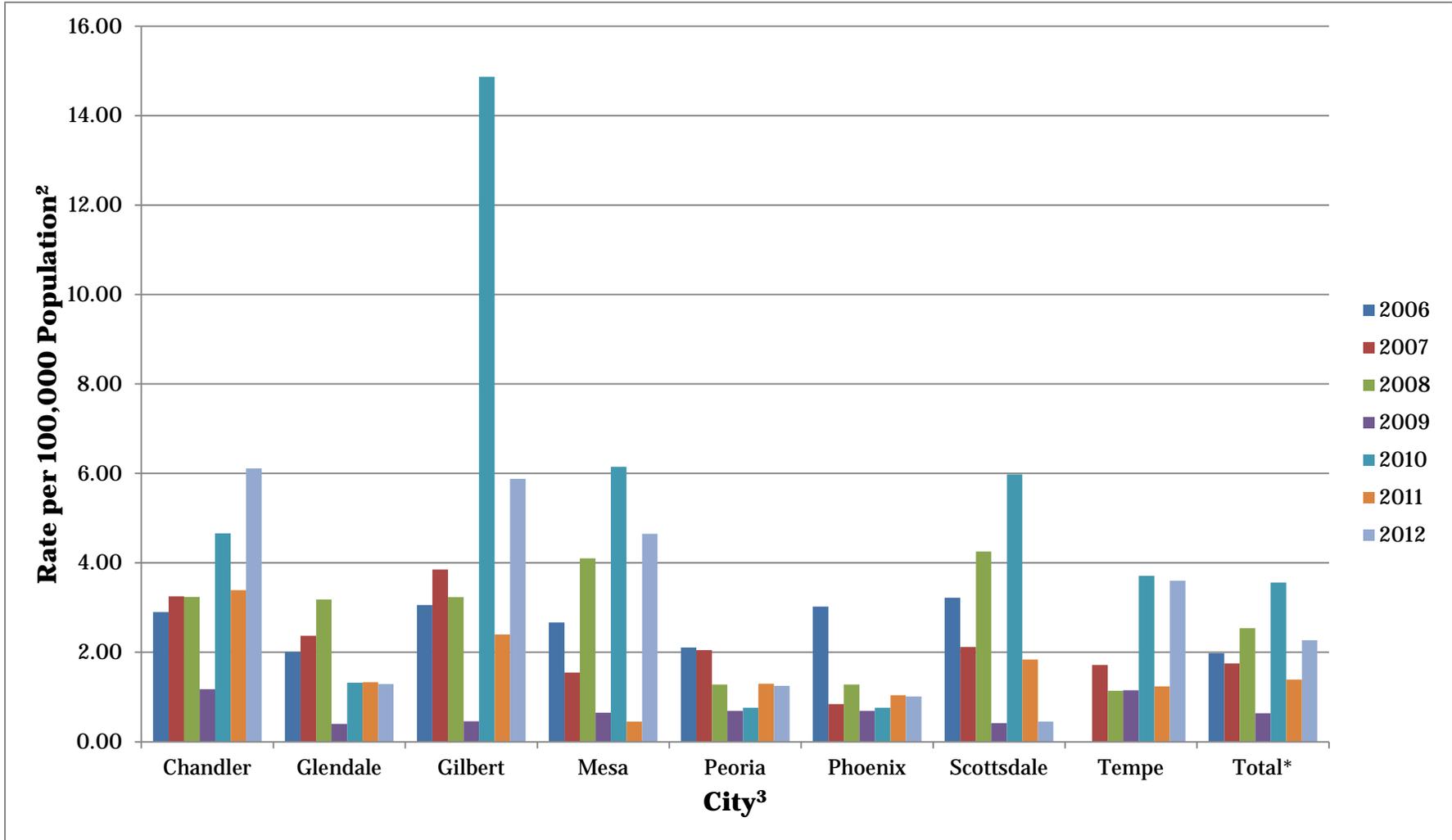
¹Population statistics for each city were obtained from United States Census Bureau 2012 Population Estimates

²Rate per 100,000 population = (N/population) * 100,000.

³Rates for cities with populations ≥ 100,000 shown

* Total includes cities displayed in figure, as well as other cities and unincorporated areas with populations <100,000

Figure 10: Rates of West Nile Virus in Maricopa County by City¹, 2006-2012



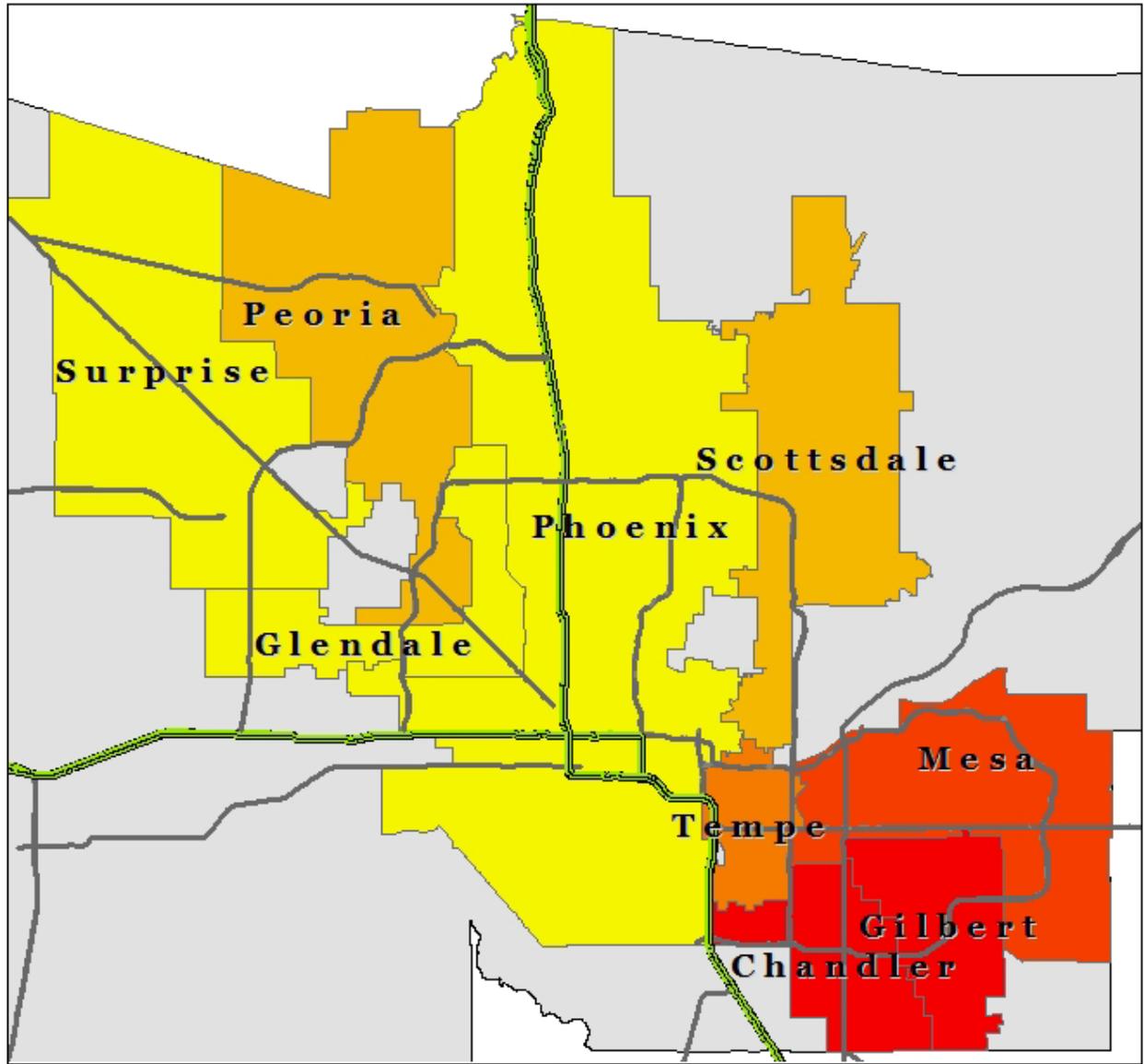
¹Rates shown for the top 8 cities by population in Maricopa County.

²Rate per 100,000 population = (N/population) * 100,000.

³Population statistics for each city were obtained from United States Census Bureau 2006, 2007, 2008, 2009, 2011, and 2012 estimates and from the 2010 Census.

*Total includes cities displayed in figure, as well as other cities and unincorporated areas.

Figure 11: Rates of WNV in Major Maricopa County Cities, 2012



0 3.75 7.5 15 22.5 30 Miles

 Interstate Highway	Rates of WNV per 100,000 Population
 State\US\Other Highway	
 Interchange\Ramp	
 0.0 - 1.2	
 1.3 - 2.4	
	 2.5 - 3.5
	 3.6 - 4.7
	 4.8 - 5.9