



# **West Nile Virus Update**

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**Presentation to  
The United States Congress  
Committee on Government Reform  
Sub-Committee on Energy Policy,  
Natural Resources, and Regulatory Affairs**

**October 6, 2004**



**West Nile Epidemic in Maricopa County, Arizona**  
Sub-Committee on Energy Policy, Natural Resources and Regulatory  
Affairs

**Mr. Chairman, Members of Congress:**

**Thank you for inviting me to share what the Maricopa County Departments of Public Health and Environmental Services have learned as we struggled with the 2004 West Nile Virus (WNV) epidemic .**

**Controlling mosquitoes in the greater metropolitan Phoenix area poses unique challenges. Maricopa County is over 9000 square miles, larger than several states. Its population, 3.5 million, exceeds that of 20 states. And while much of Arizona is desert, Maricopa County has built an artificial oasis, the perfect harbor for mosquitoes. We have green lawns and fairways, lakes, wetlands, irrigation canals, storm sewers, an urban heat island and the largest number of private swimming pools in the nation-- over 500,000. During our long hot summer, many backyard pools are unused, unmanaged and available for mosquito larvae.**

> Slide 1: Urban Density in Central Maricopa County.

**1) Planning for West Nile began in 2002:**

**In December 2002, using information from earlier outbreaks, we planned for surveillance, mosquito control, and public communication. We expected WNV**

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**in late 2003. The virus did occur in birds in late 2003, but no human cases were confirmed that year; 2004 would be our time.**

**Mosquito borne arboviruses usually impact Arizona during our rainy season in late July, peaking in August and waning in late September as diurnal temperatures decline and mosquitoes become inactive.**

**Surveillance began in April. We employed mosquito traps, sentinel chicken flocks, dead bird evaluation, horse cases reports, blood bank screening for WNV, death certificate review, and infectious disease reports. We expected our first human cases in mid-summer. Larviciding of the 6000 known mosquito-breeding sites began along with fogging in areas with high mosquito counts. Public communication materials were ready for the media.**

**2) The Epidemic:**

**Nature did not cooperate. A blood donor with a positive test for West Nile was identified on April 24, and the first human case was reported in mid-May. The epidemic had begun.**

**We initiated a large scale public education campaign encouraging citizens to:**

- Clean up their own back yards and their neighborhoods.**
- Report mosquito complaints to Environmental Services,**
- Identify and report mosquito breeding sites,**

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- **Identify stagnant swimming pools,**
- **Use prevention measures, repellent, long sleeves, stay indoors after dark.**

**We were successful:**

- **Complaints to Vector Control increased to hundreds daily,**
- **A June poll showed that 98% of residents were aware of West Nile Virus and how to protect themselves and their neighborhoods; 71% had done something, but only 30% had used insect repellent even once.**
- **The media produced several stories on the outbreak.**

**July was our hottest month.**

- **Ambient temperatures exceeded 100 F every day**
- **Mosquito trap counts increased**
- **All sentinel chickens became infected**
- **The Mosquito Infection Rate (MIR) reached 2 to 4%, four times epidemic rates**
- **The number of cases reported weekly exceeded 35.**
- **By July 31, human cases exceeded 200, half being neuro-invasive.**
- **We had 4 reported deaths.**

>Slide 2: Weekly Cases

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**Larvicide use expanded as hundreds of "green" pools were reported; ground fogging with the pesticide, Anvil 2-2, doubled, and then doubled again as we added units to our fleet. In late July, CDC recommended aerial spraying.**

**We chose to increase the number of mosquito traps and expand our ground fogging in areas where traps yielded vector mosquitoes and virus. As ground fogging increased in August, the number of WNV positive mosquito pools and vectors mosquitoes (*Culex Quinquenotatus* and *Culex Tarsalis*) declined.**

**Mosquito complaints also dropped.**

- > Slide 3: Case Load after Fogging
- > Slide 4: MIR after Fogging
- > Slide 5: Map of WNV Cases
- > Slide 6: WNV Disease Breakdown (October 1, 2004)

**Human case reports also dropped in August, but fatalities continue to be reported, 4 at the end of July and 7 on September 30. Several cases are still under intensive care. A delay of two months and more between infection and death is not uncommon. Clinicians do not always identify the cause of death based upon positive WNV lab reports; therefore, mortality figures may not represent the full extent of the epidemic.**

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**3) What we have learned to prepare for 2005:**

- **The WNV epidemic in Maricopa County is not over; it did not conform to the normal mosquito and arbovirus pattern.**
- **Many parameters effect time and place of the outbreak, including:**
  - **migration patterns of birds,**
  - **the over-winter cycle of mosquitoes,**
  - **seasonal variations in temperature and rainfall,**
  - **the peculiar nature of the Maricopa County urban environment**
- **The interrelationship of these many factors is largely unknown**
- **Our best surveillance tool is the mosquito trap; We will use 200 next year**
- **Physician do not always identify WNV as the cause of death**
- **Close surveillance of death certificates is necessary to identify WNV deaths**
- **Stagnant swimming pools of unknown location may be our most significant breeding sites.**
- **Stagnant pools are difficult to manage**
- **We must find an efficient way to identify pools, or we will be forced to depend on vector control that includes pesticides.**
- **The absence of data on the human impact of pesticides undermines our ability to assure citizens that the risks associated with spraying are very low compared to the risk posed by the virus.**

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**4) Questions for the future:**

- **What are the interrelationships between the parameters that define WNV?**
- **Can a mathematical model be built to help state and local health departments predict an outbreak and plan for action?**
- **Does the virus hide in birds, mosquitoes, or some other animal during the winter; how does it survive?**
- **What triggers the explosive multiplication of virus in birds and mosquitoes?**
- **Is a human vaccine justified or will herd immunity prevail?**
- **What is needed to change people's behavior as well as their knowledge**
- **Where will resources come from to help local health agencies prepare for WNV and other threats?**
- **What proportion of the population may suffer acute sensitivity to any specific pesticide — a critical factor in risk-benefit analysis for spraying.**

**The Congress, the Centers for Disease Control, the EPA and other government agencies must find resources to study these questions. When any epidemic unfolds, public health decision makers need trigger points to know when to take specific action.**

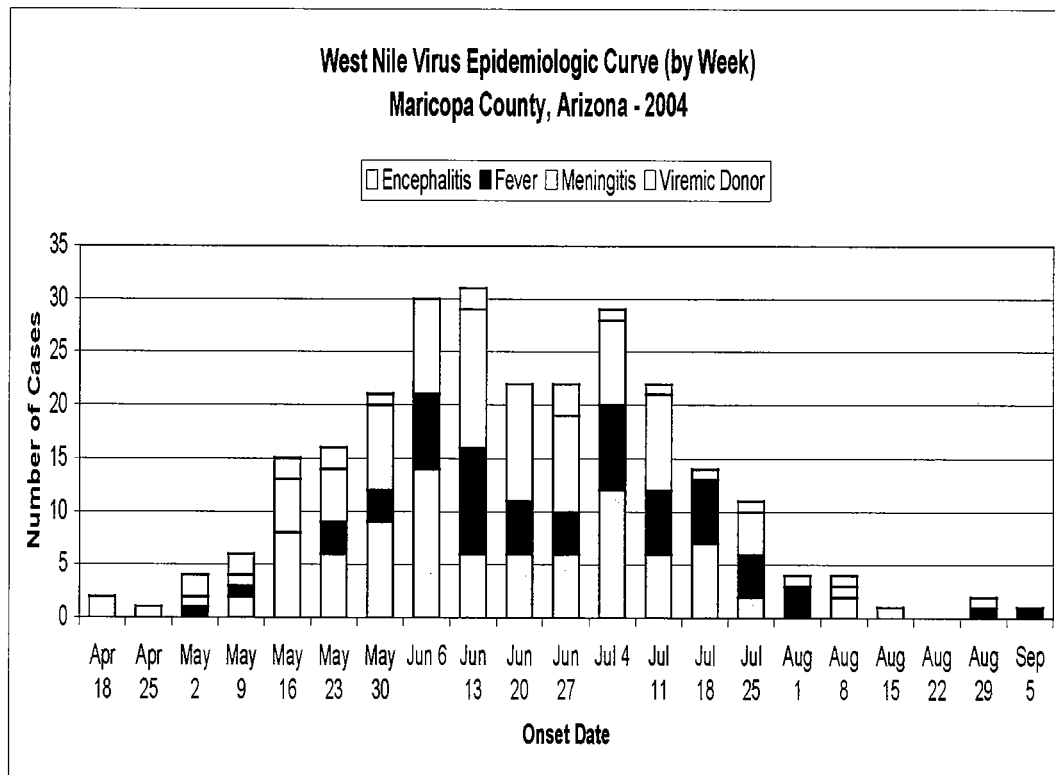
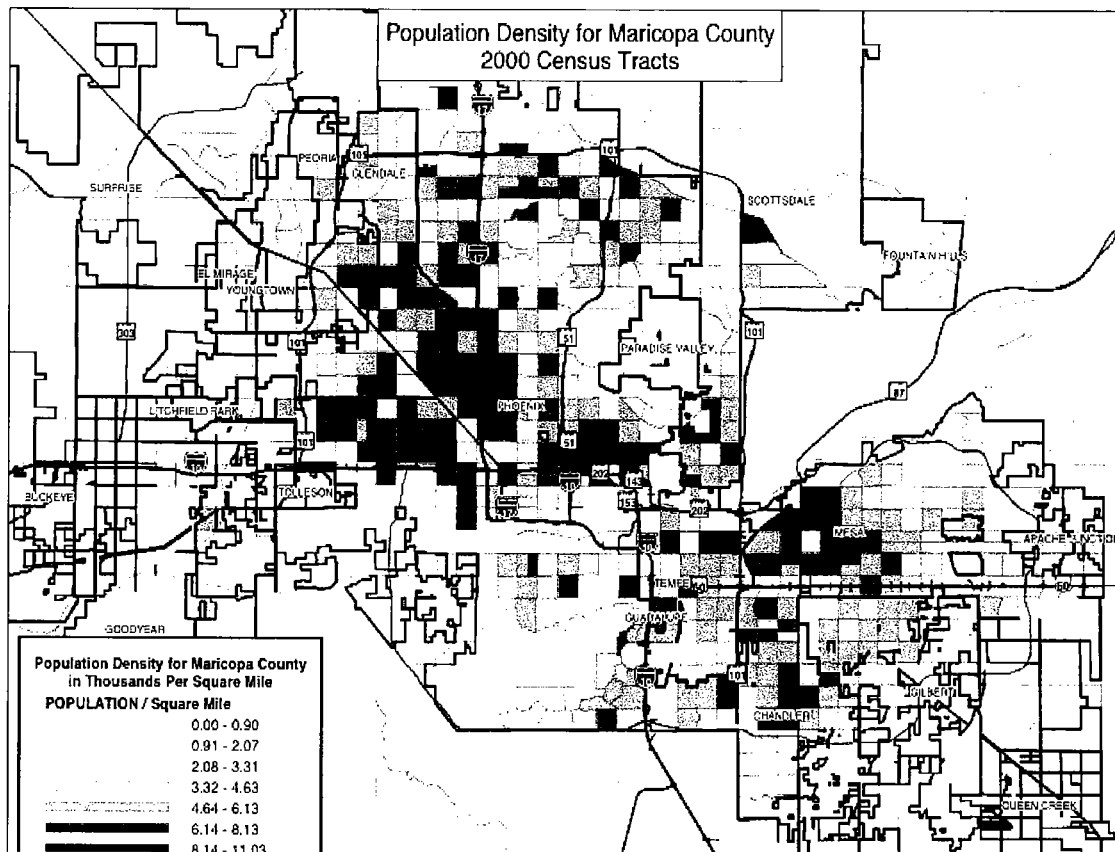
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**5) Conclusions:**

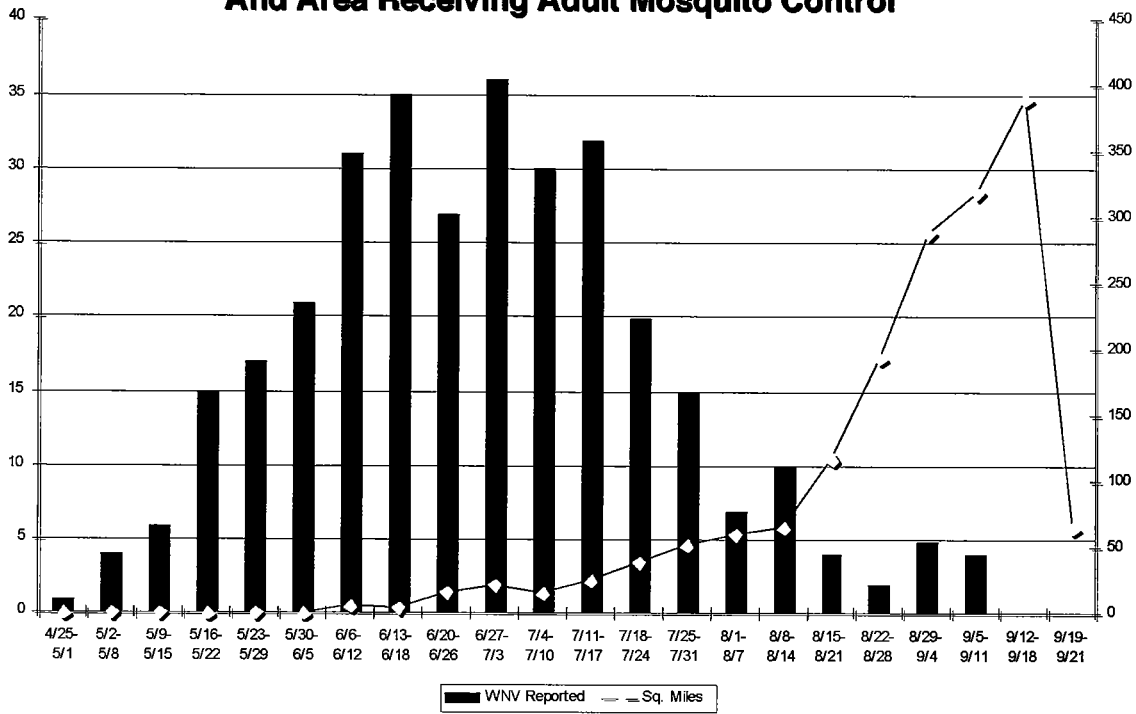
**Our experience with West Nile Virus exposed underlying deficiencies in the Public Health infrastructure that can only be rectified with adequate funding of state and local public health systems and a national investment in applied research for public health. Congress and the states should determine how health departments will receive adequate funding to support the public health infrastructure under a set of professional standards that will assure that the public is protected. A small percentage of the monies spent in the national health and medical care system specifically allocated to strengthen the public health infrastructure would assure that the health of the public and of communities would be preserved in the event of unexpected biologic events. Absent the necessary resources, the health of the nation is at risk.**

**Thank you for the opportunity to meet with you today sharing with you that which we have learned about a major outbreak of disease in central Arizona.**

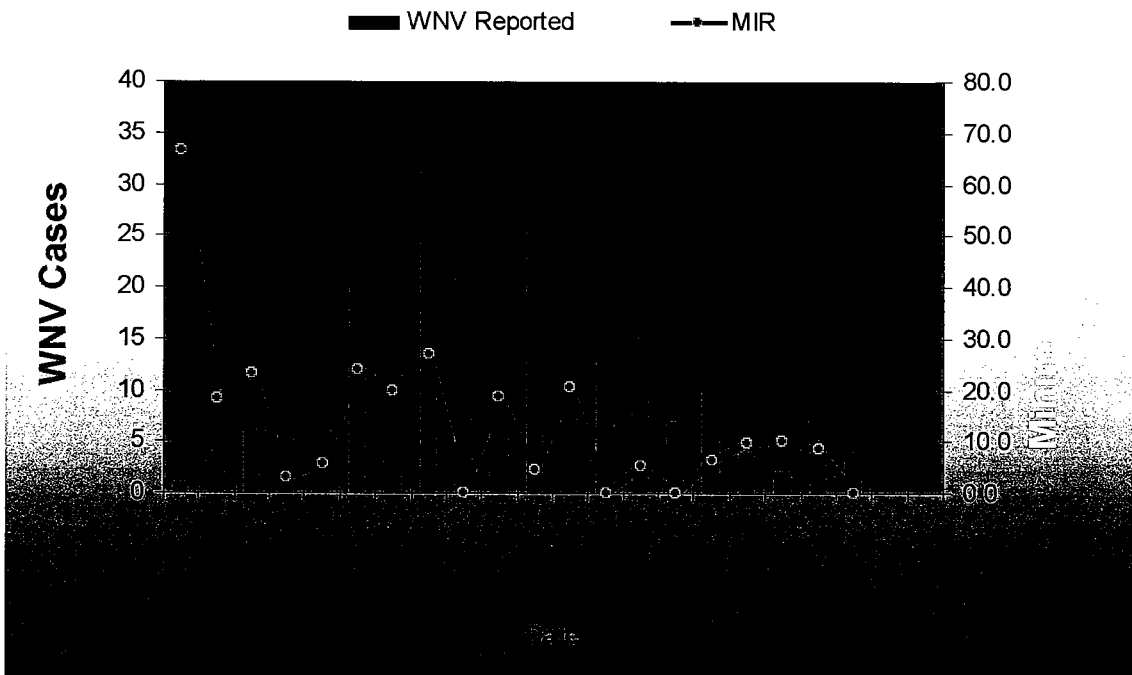




### West Nile Virus Cases by Week of Onset And Area Receiving Adult Mosquito Control



### WNV and MIR for 2004





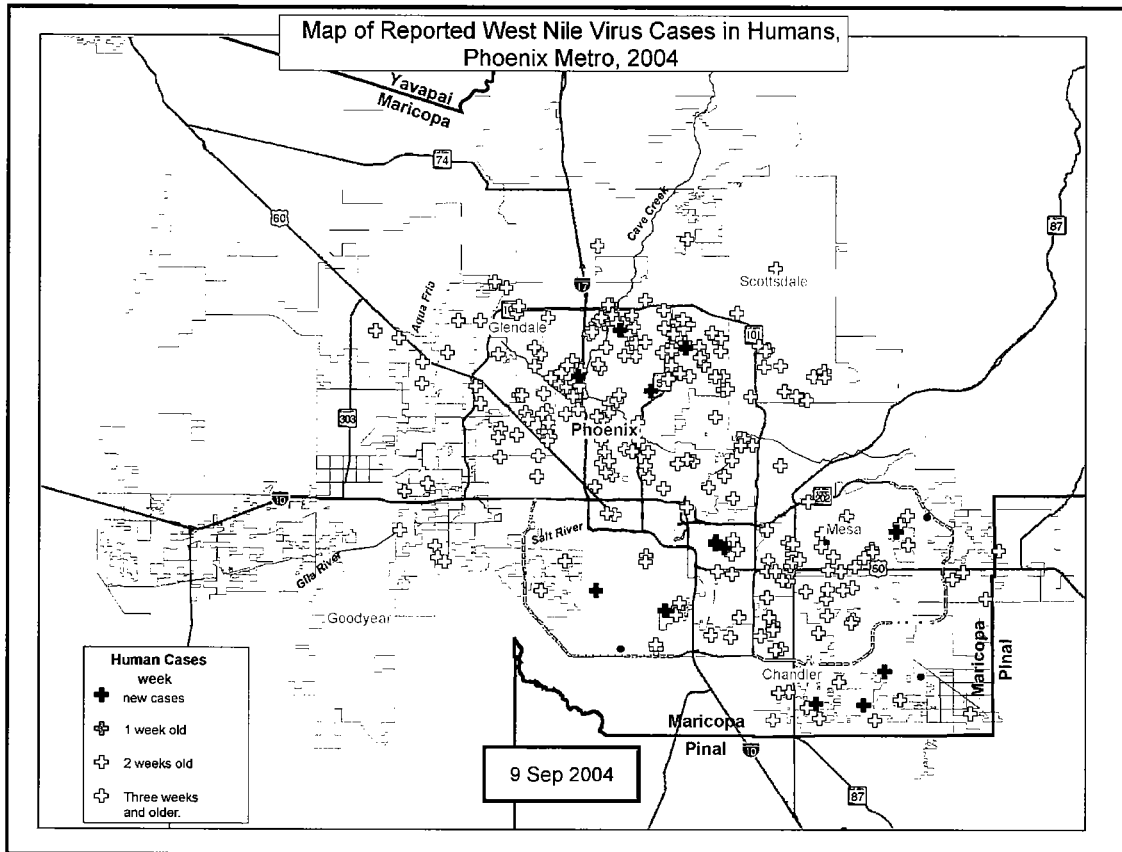
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## Disease Severity Maricopa County Cases

<b>Neuroinvasive disease:</b>	<b>185</b>
<b>West Nile Fever:</b>	<b>69</b>
<b>Viremic Donors:</b>	<b>25</b>
<b>Unknown:</b>	<b>68</b>
<b>Deaths:</b>	<b>6</b>
<b>Total Cases:</b>	<b>347</b>

**Estimated 25,000 Infections**

Based on MCPHD Case Classification Criteria