



# West Nile Virus Surveillance and Control in the SYMVCD

David Brown, Manager  
Sacramento-Yolo Mosquito and  
Vector Control District

# WNV in Sacramento 2004

County ↓	Human	Equine	Bird	Mosq. Pool	Sent. Chicken
Sac	3	84*	153	21	16
Yolo	1	1	26	0	0
State Leader	331 (LA)	102 Riverside	840 (LA)	408 (LA)	166 (LA)

# District Developed WNV Response Plan

- Updated plan with Board of Directors January-March 2005
- Utilized California Mosquito-Borne Virus Surveillance and Response Plan and CDC Plan
- Five Levels of Control
  - » Level 1 - Basic Level
  - » Level 2 - Mosquito Pool/dead bird
  - » Level 3 - Animal/Chicken
  - » Level 4 - Human case
  - » Level 5 - Epidemic conditions

# Basic Level of Mosquito Management Measures

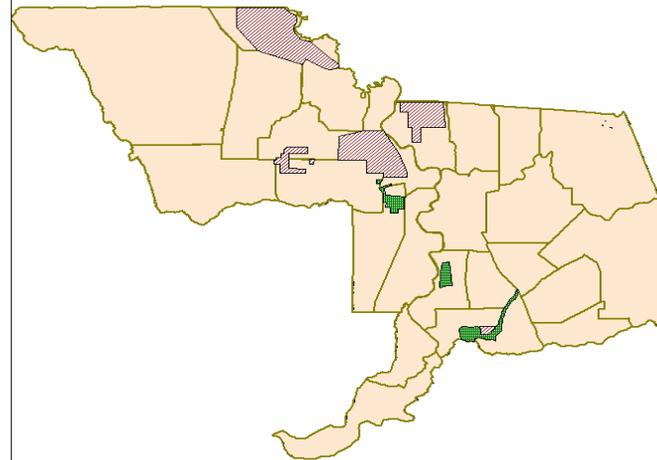
- Thresholds are
  - » 100 MMT/ EVS per trap night
  - » 25 Light /Gravid per trap night
- Source reduction/ water management
- Biological control
- Larvicide (immature mosquito) control
- Adulticide (mature mosquito) control in Rural/agricultural/open space areas
- Education

# When Response Plan Triggered

- Increase from Base Level lowers thresholds and increases levels of response
- Basic thresholds are reduced for response
  - » 25 (Magnet Trap-EVS)
  - » 10 (Light trap-Gravid Trap)
- When thresholds are triggered, Lab staff determines scope of infections
- Control operations maximize larval control
  - » Immediate treatment of all larval sources
  - » Localized Treatment for adult control
- Immediate Press Releases to inform public

# Sacramento-Yolo District

- 14,000 identified larval sites
- ~600,000 acres in Agriculture/open space (44,000 acres of rice)
- 40,000+ of wetland/wildlife habitat
- Half urban/half rural



# WNV Mosquitoes of Concern



## Flight Range

*Cx. pipiens* ~1 mile

*Cx. tarsalis* ~ 5 miles

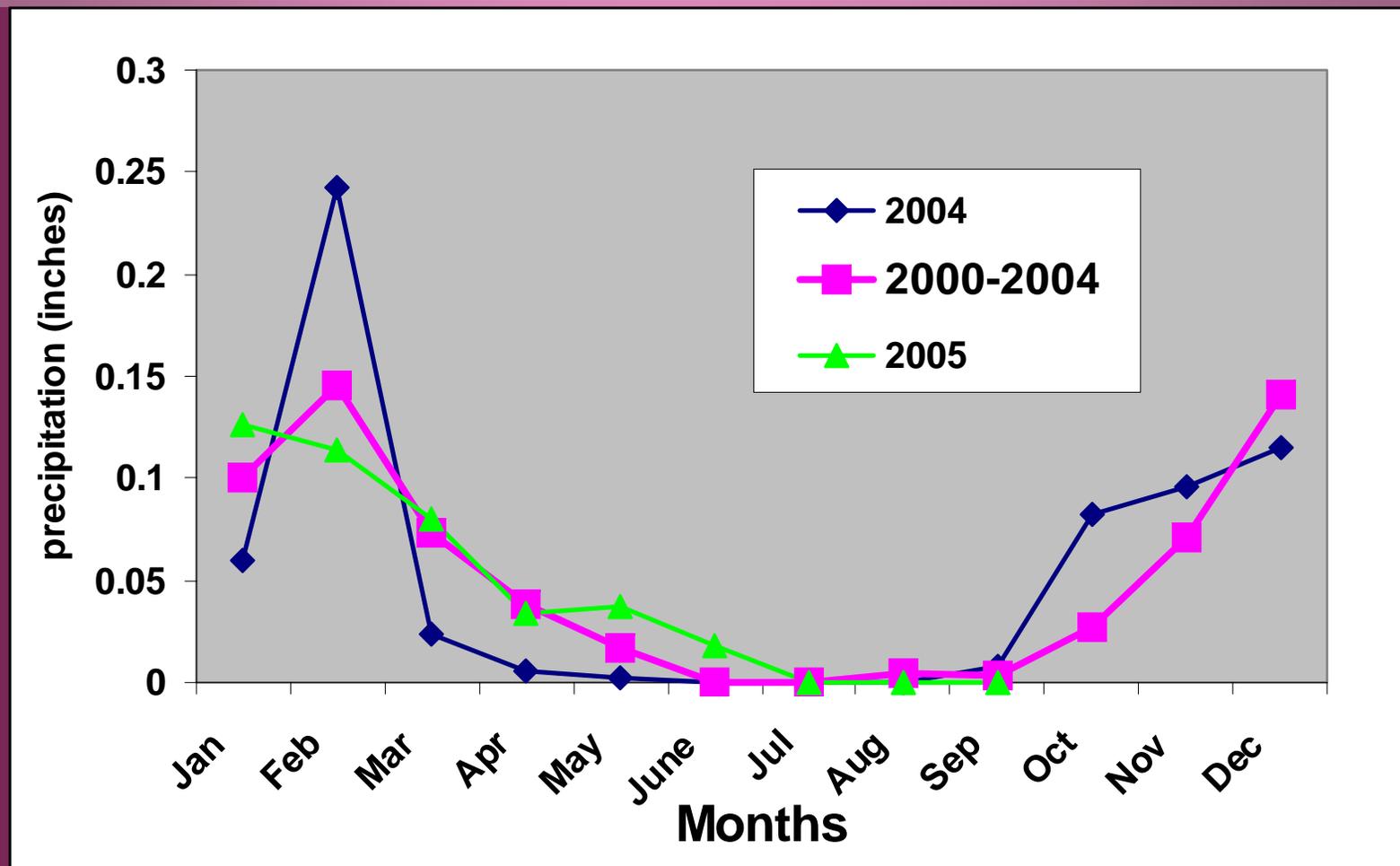
- Over 20 different species
- 2 species very efficient
- *Culex tarsalis*
  - Agriculture
  - Natural Sources
  - Urban
- *Culex pipiens*
  - Urban sources
  - Dairy/Rural

# 2005 Sequence of Events

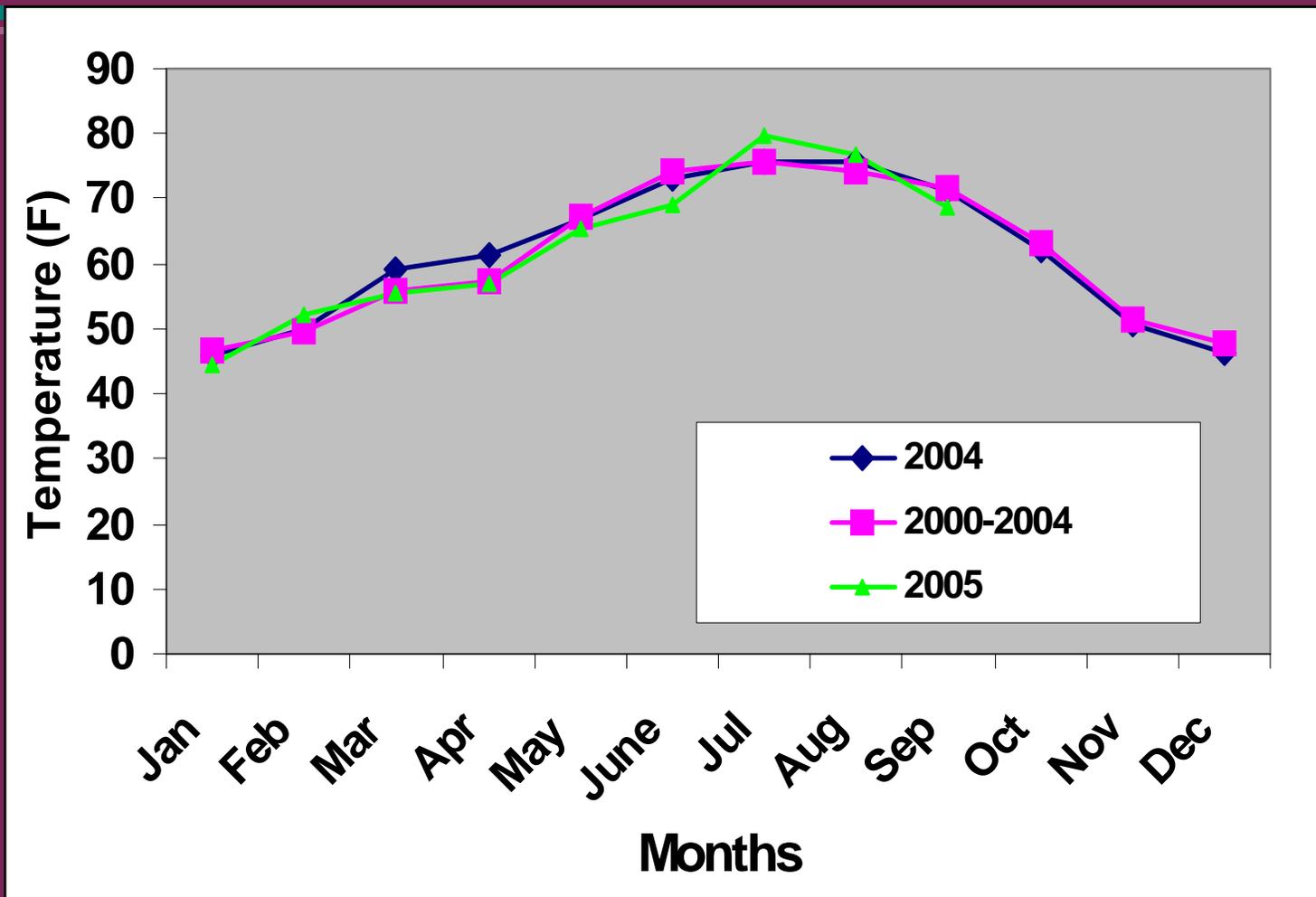
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- By February, already at level 2 (Dead Birds)
- Above Average Rainfall (Through June)
- Followed by Above Average Temperatures (record July )

# Precipitation Records: Sacramento-Yolo Counties 2000-2005



# Average Temperature Records at Sacramento-Yolo Counties, 2000-2005

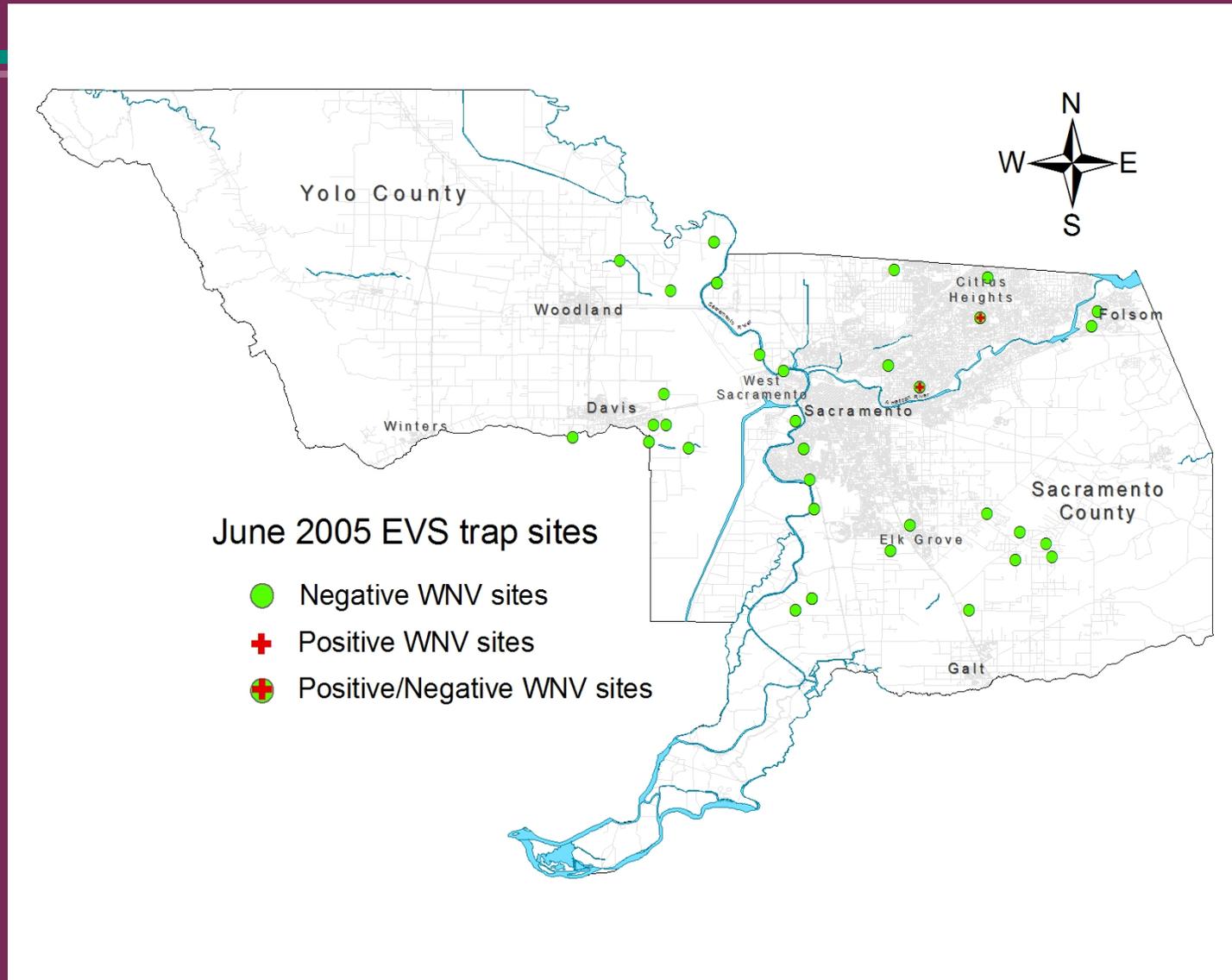


# 2005 Sequence of Events

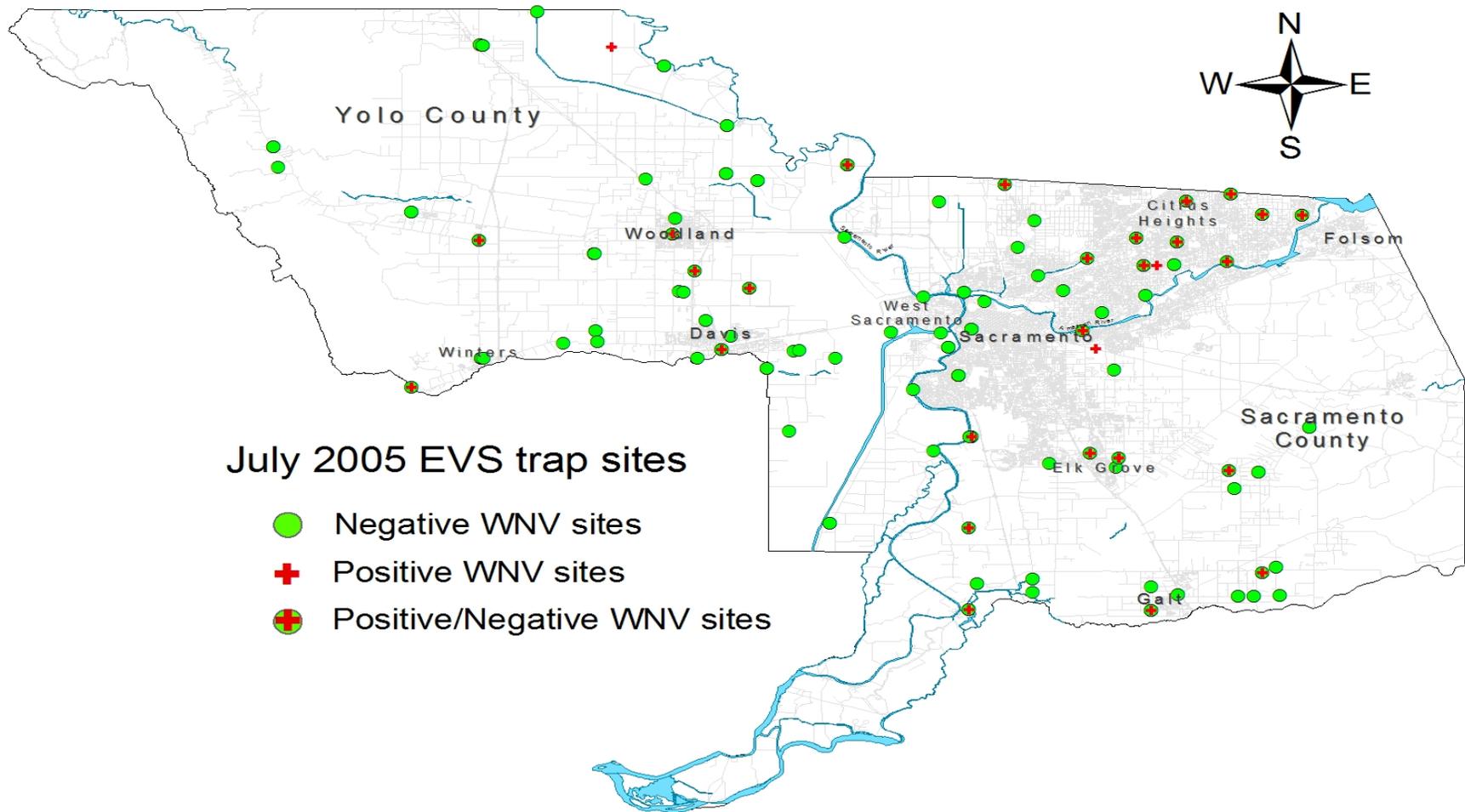
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- July 8<sup>th</sup> infected mosquito pools
- July 15<sup>th</sup> infected Sentinel Chickens
- July 21<sup>st</sup> report of human infection in Sacramento County
- Media Announcements made
- July 27<sup>th</sup> CCC hired to go door-to-door to inform residents of localized adult control

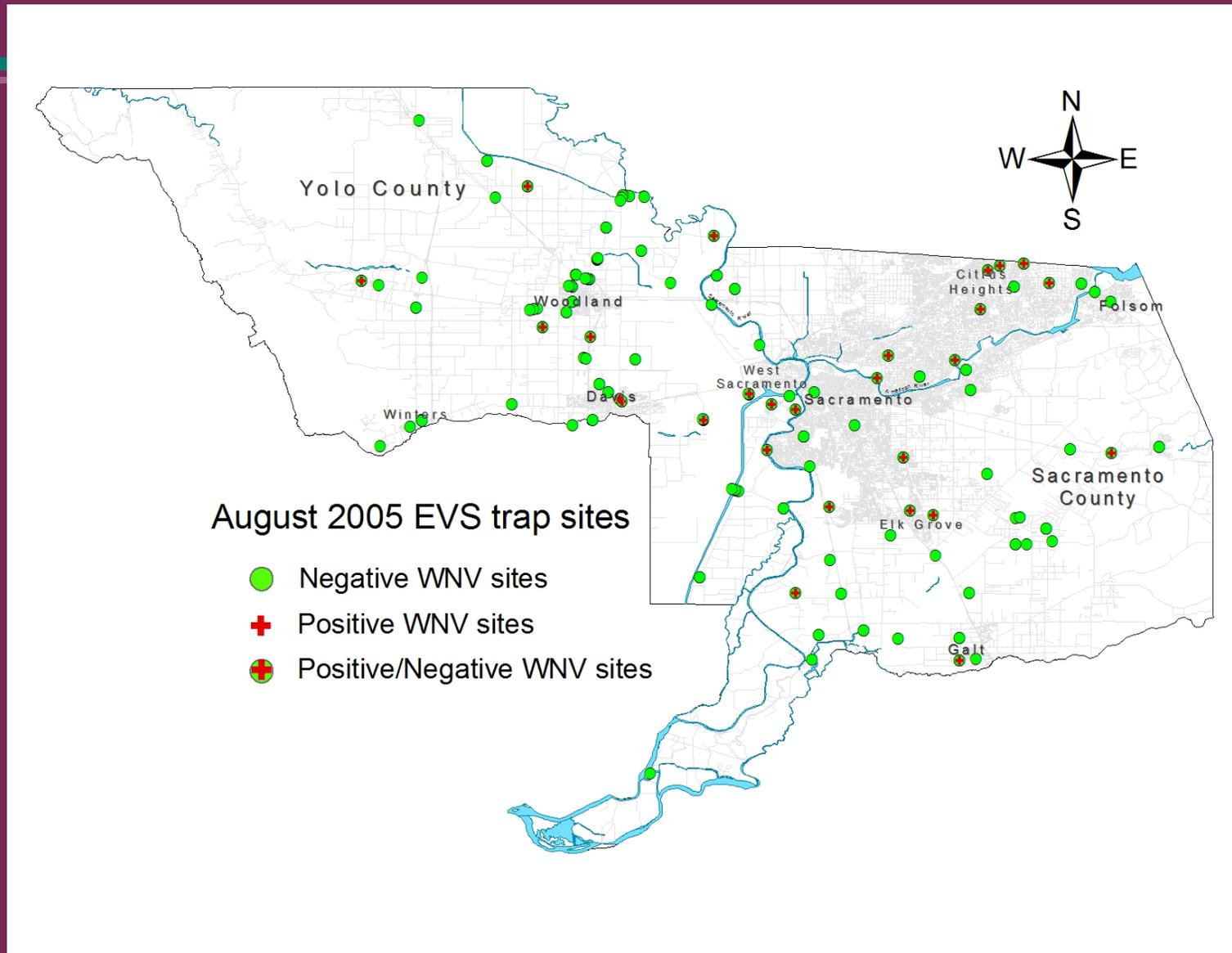
# WNV positive and negative mosquito pools in June 2005: 4 +ve and 109 -ve



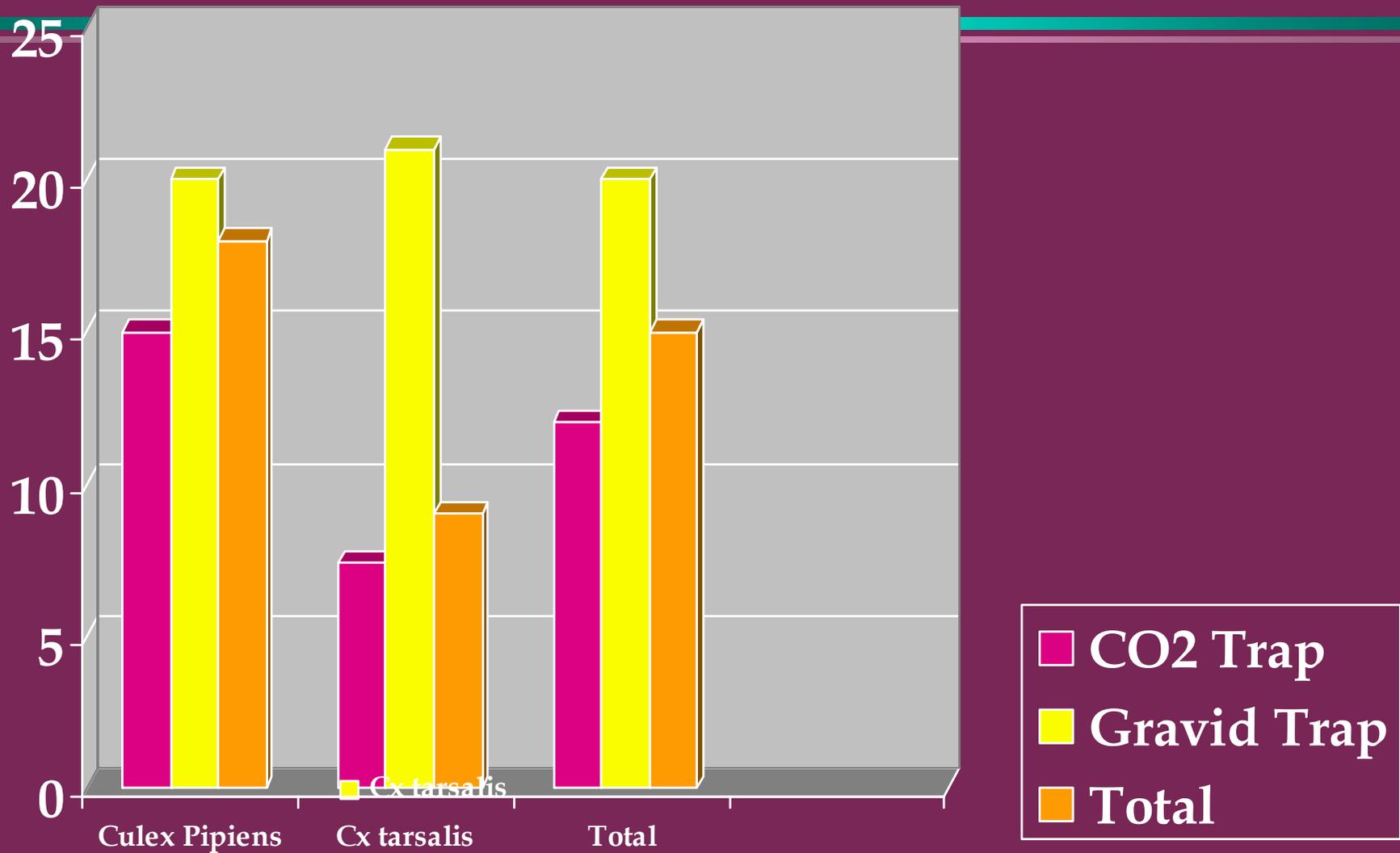
# WNV positive and negative mosquito pools in July 2005: 70 +ve and 310 -ve

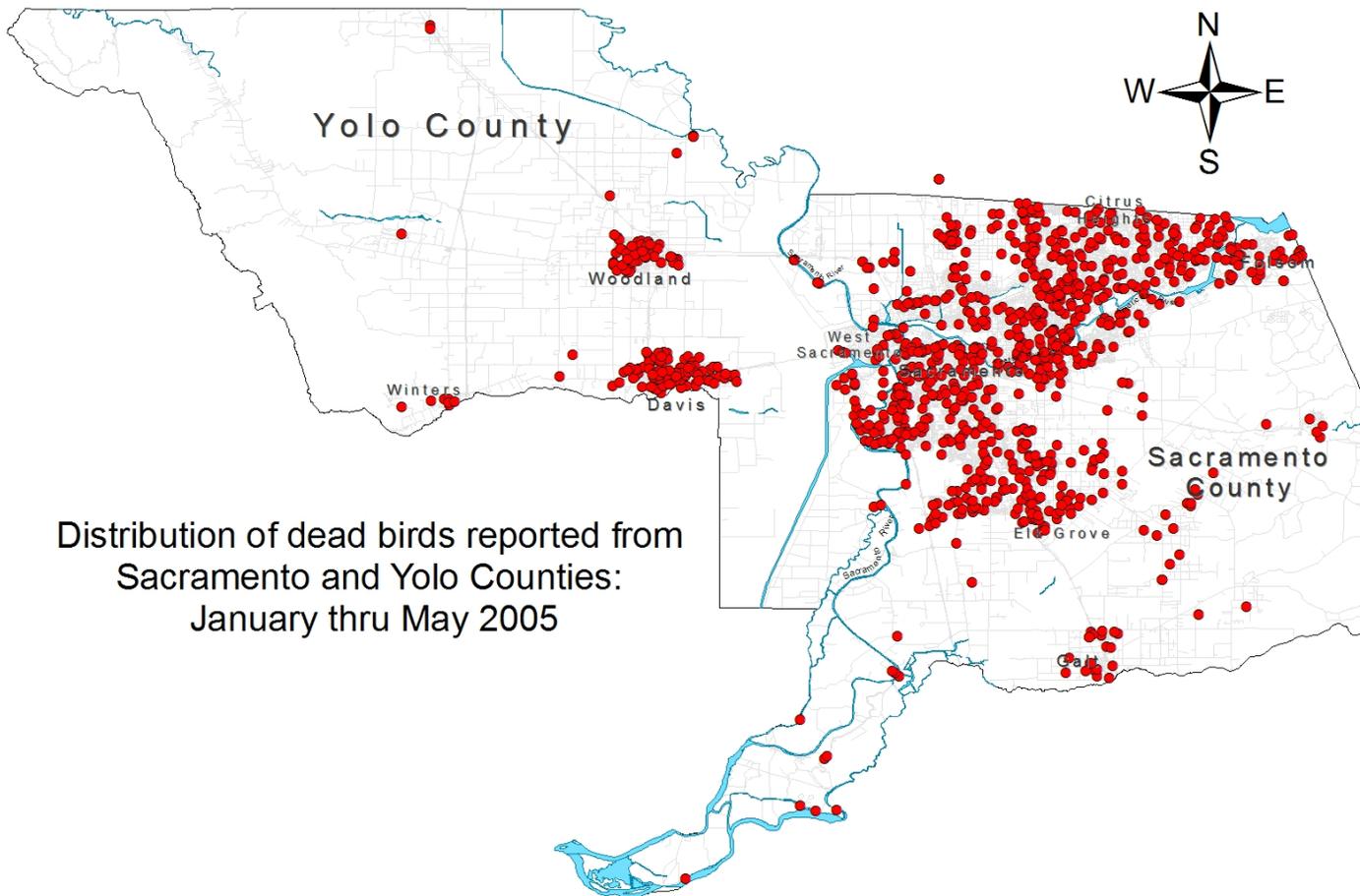


# WNV positive and negative mosquito pools in August 2005: 53+ve and 503 -ve

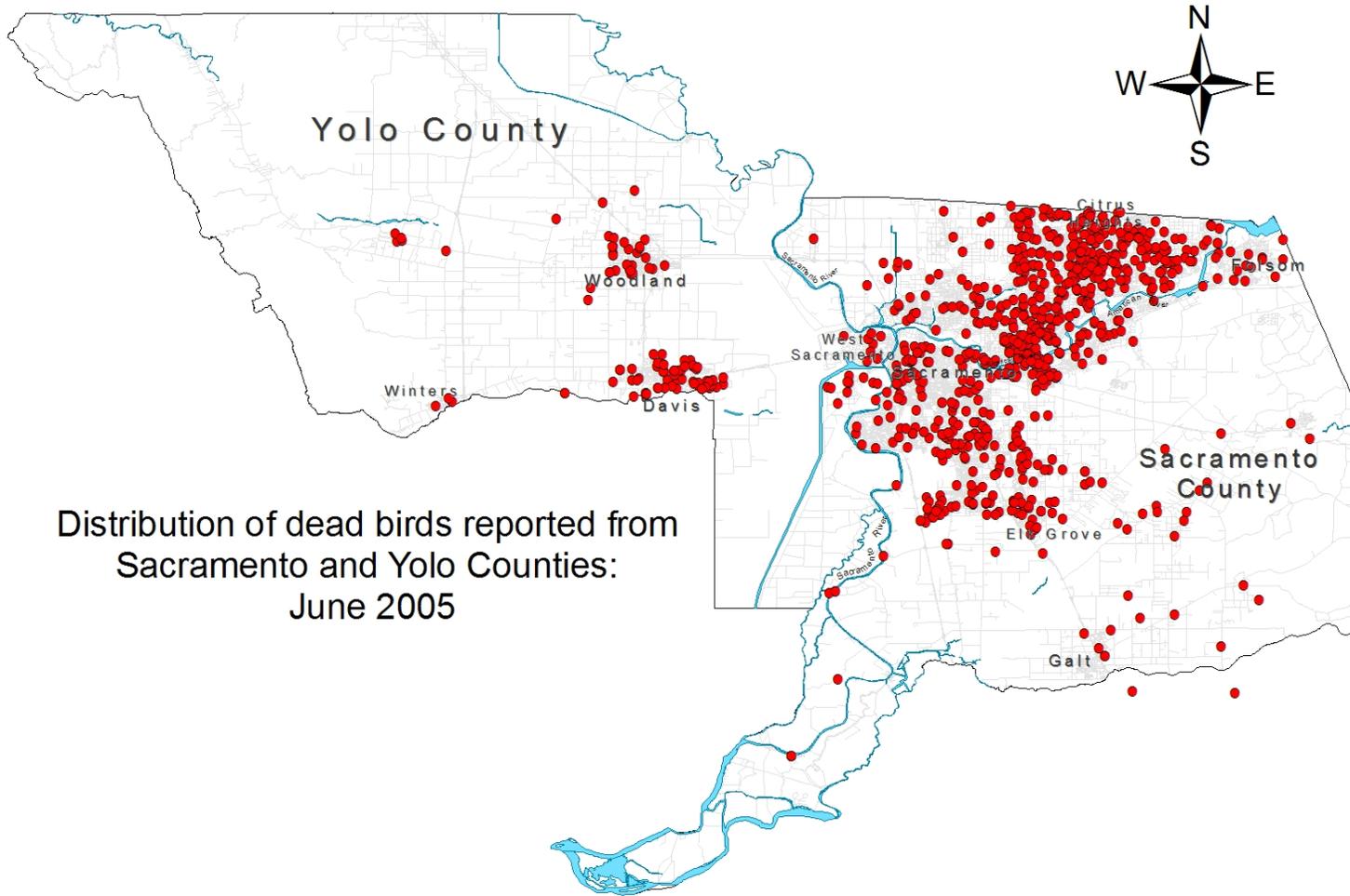


# Sacramento Mosquito Infection Rates (Late July- Early August)

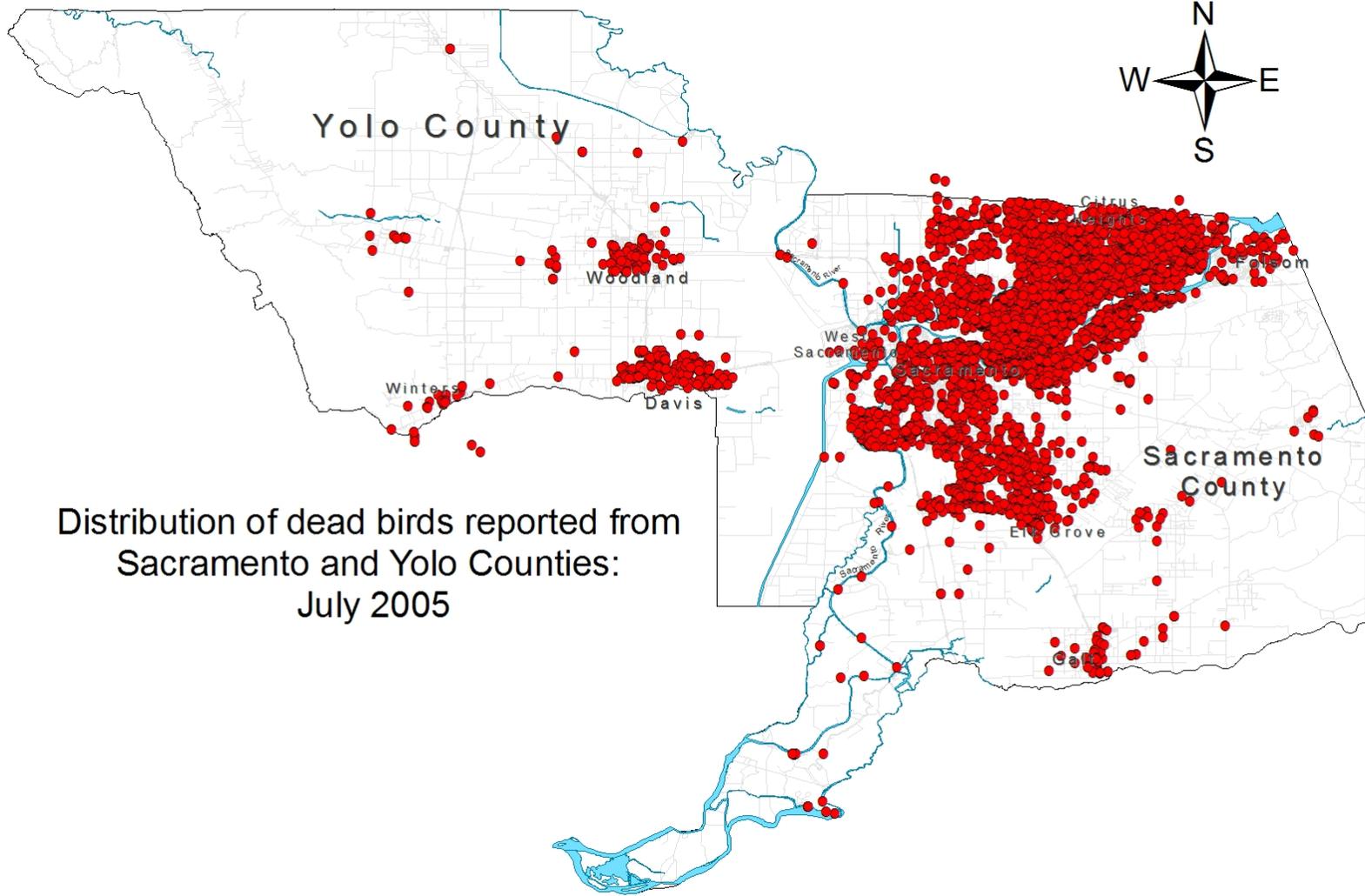




Distribution of dead birds reported from Sacramento and Yolo Counties: January thru May 2005



Distribution of dead birds reported from  
Sacramento and Yolo Counties:  
June 2005



Distribution of dead birds reported from  
Sacramento and Yolo Counties:  
July 2005

# Enhanced Larval Control in Entire Area

- Performed when dip counts exceed 0.1 larvae
- Bti / Bs
- Insect growth regulators
- Light film oils
- 60,000+ treatments to date in District
  - » 10 additional Technicians (Swat Team) hired to perform control

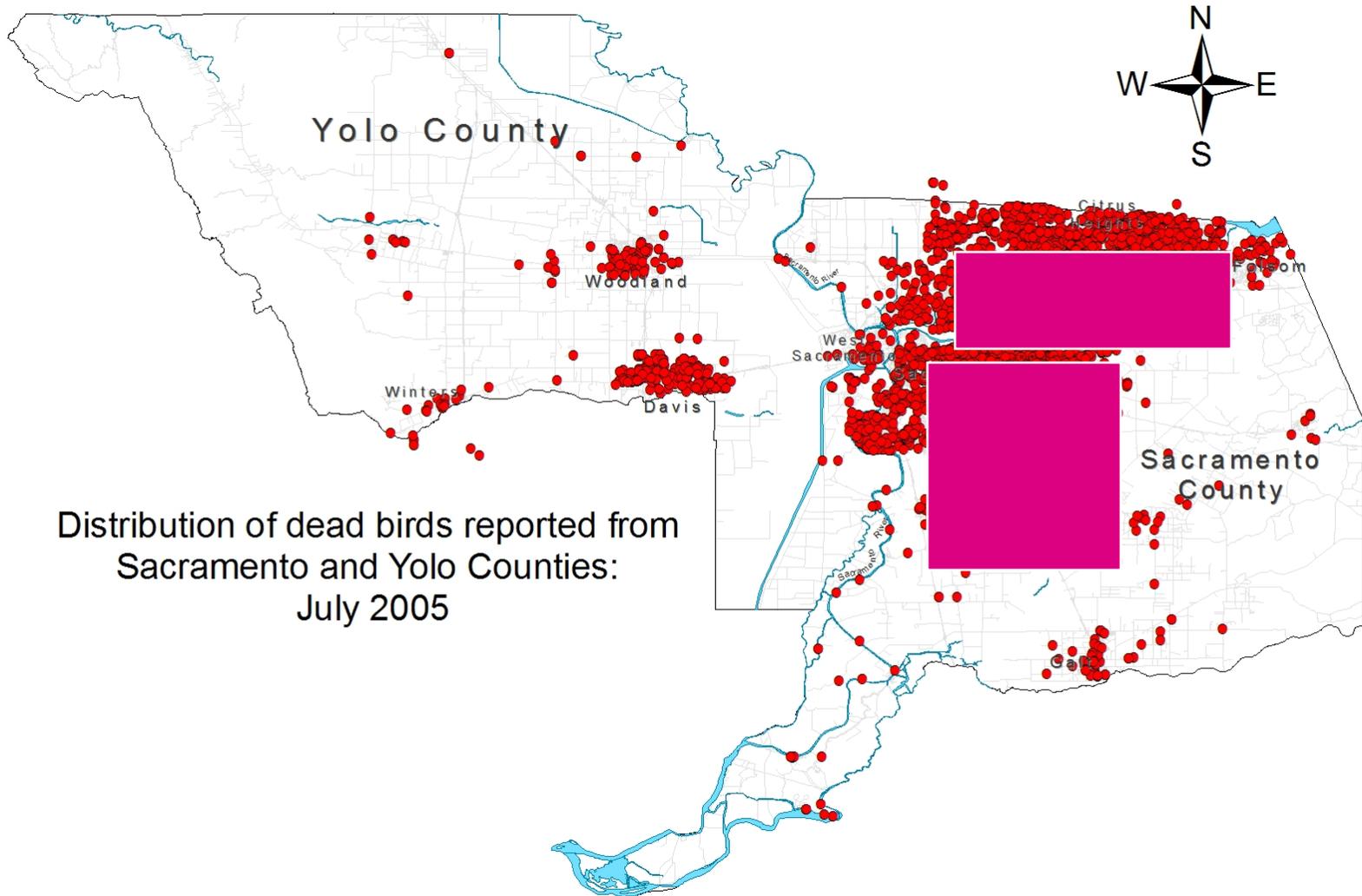
# Performed Localized adult control measures

- Ground Rigs performed localized control
- Presentation to City Council in Target Area
  - » “Well, if it was really a problem, he would not have smiled”
- Quickly realized ground control would not adequately meet control objectives

# Aerial Adult Mosquito Control initiated



- Decision made August 4 to treat 50,000 acres North of American River
- 70,000 acres south to follow
- Pyrethrin/PBO product selected
- Material applied at 0.66 ounces per acre (0.0025lbs of pyrethrin)
- Anticipated start date August 8



Distribution of dead birds reported from Sacramento and Yolo Counties: July 2005



...ay it's safe, but public fears are ...  
... counts called 'biased' lead

**W. Nile spraving**  
Officials say it's safe, but pu

**Delta breeze delays W. Nile**

**County to fight W. Nile by air**  
71,000 acres north of American River will be sprayed Monday.

**W. Nile forum fray is faulted**

**begin**

The disrupted meeting was a lost chance to inform Davis residents, official says.

By Hudson Sangree and Carrie Peyton Dahlberg

Sacramento Bee/José Luis Villagrán  
county was said to carry West Nile virus.

► SPRAYING, Page

# Held Town Hall Meetings



Ranging from  
mild protest

To “Thank you”, or “ Why are you not spraying us?”



# Even Spent a day in Court!



**Judge Lawrence Karlton**

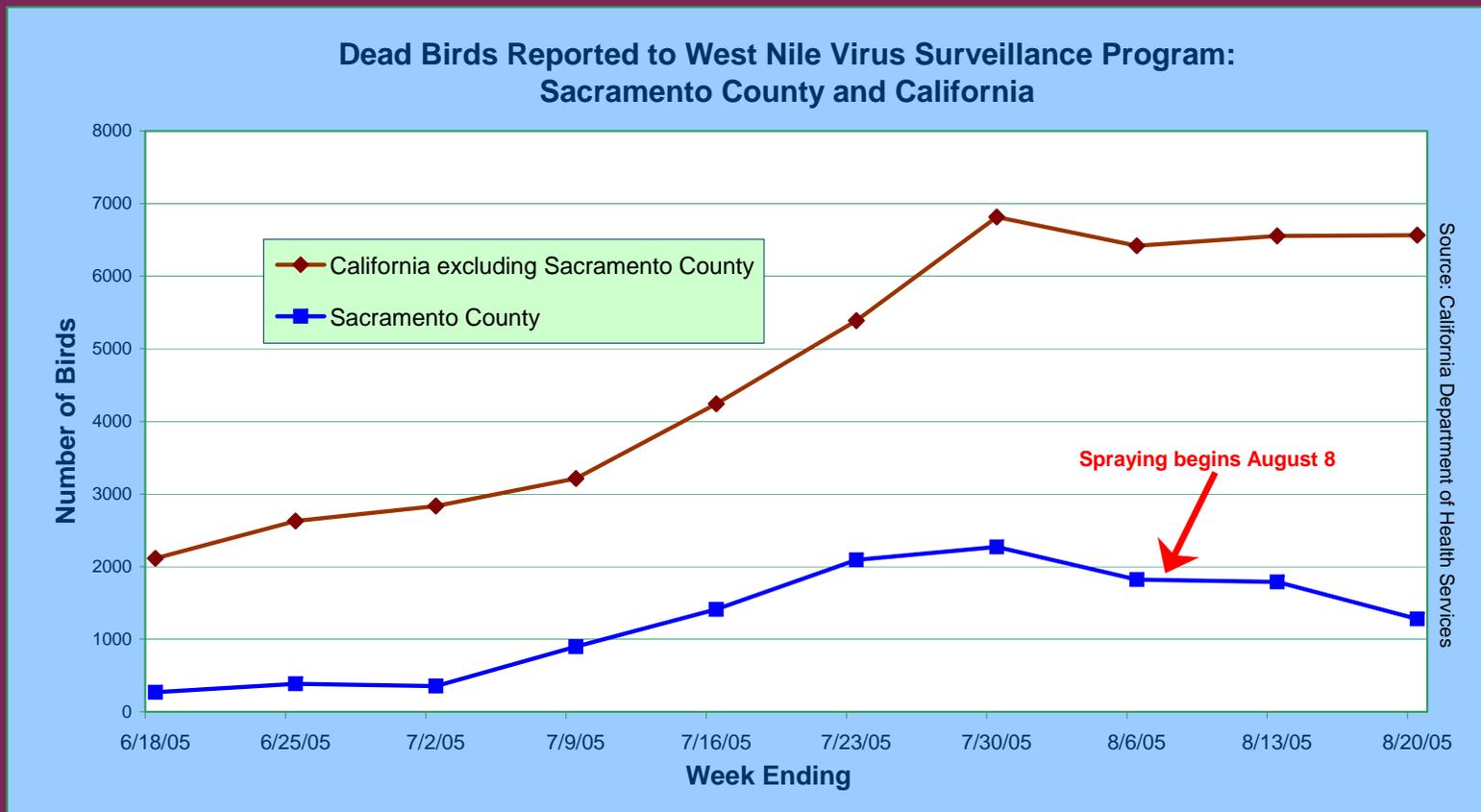
Started to treat August 8<sup>th</sup>,  
Sued on August 9<sup>th</sup> for  
Alleged violations of the  
Clean Water Act

Restraining order denied

# Results

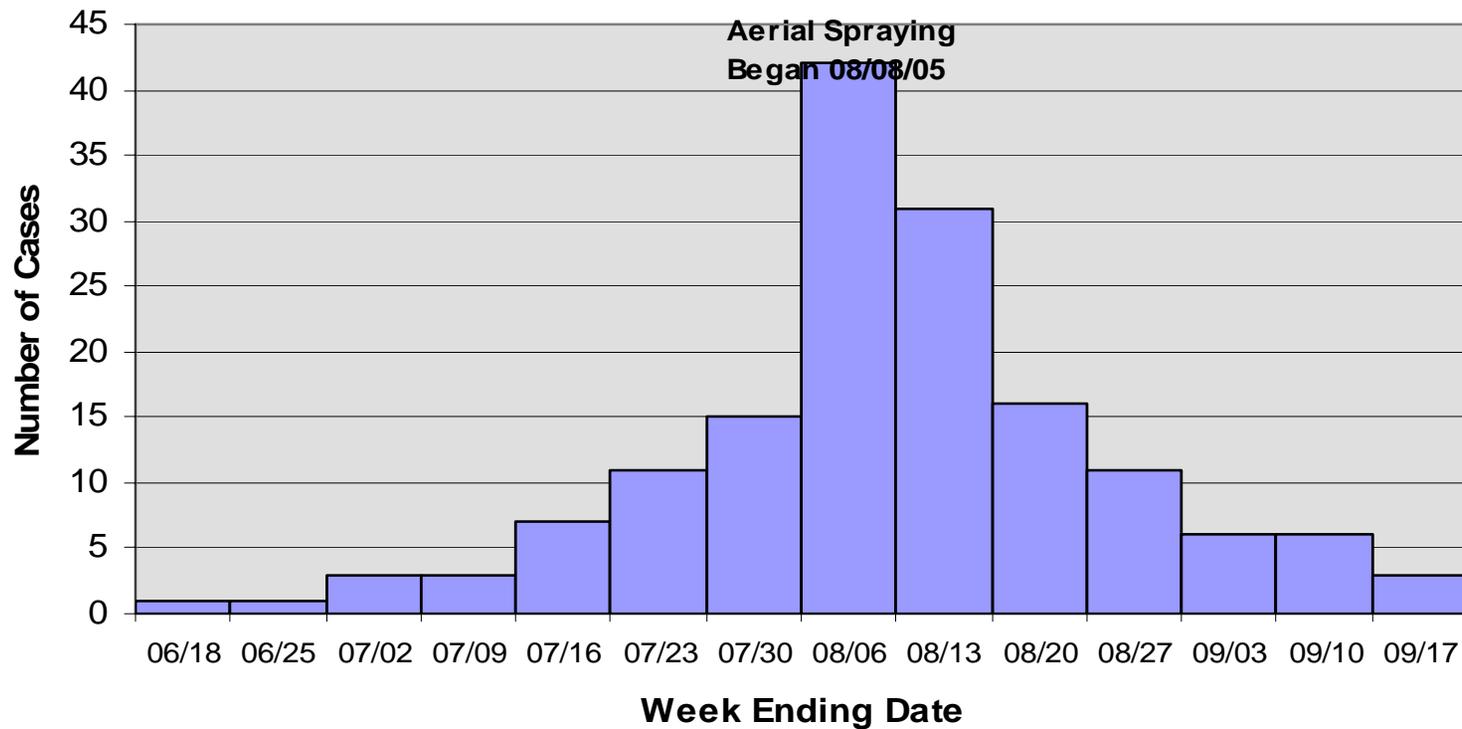
- Significant reduction in mosquitoes in North Sacramento County
  - » reduction of 50% of adult *Cx. tarsalis* mosquito population based on trap counts
  - » Significant reduction of 33% of *Cx. pipiens* population
- Post trap counts show a continued reduction of mosquito population and infection rate

# Bird Reporting Decline

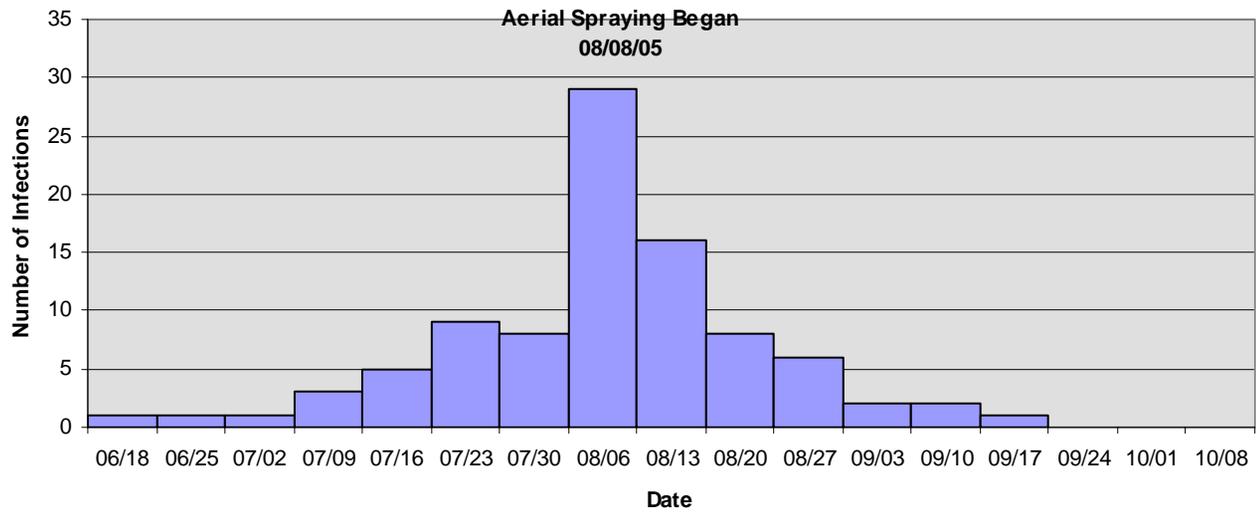


# WNV Week of Onset

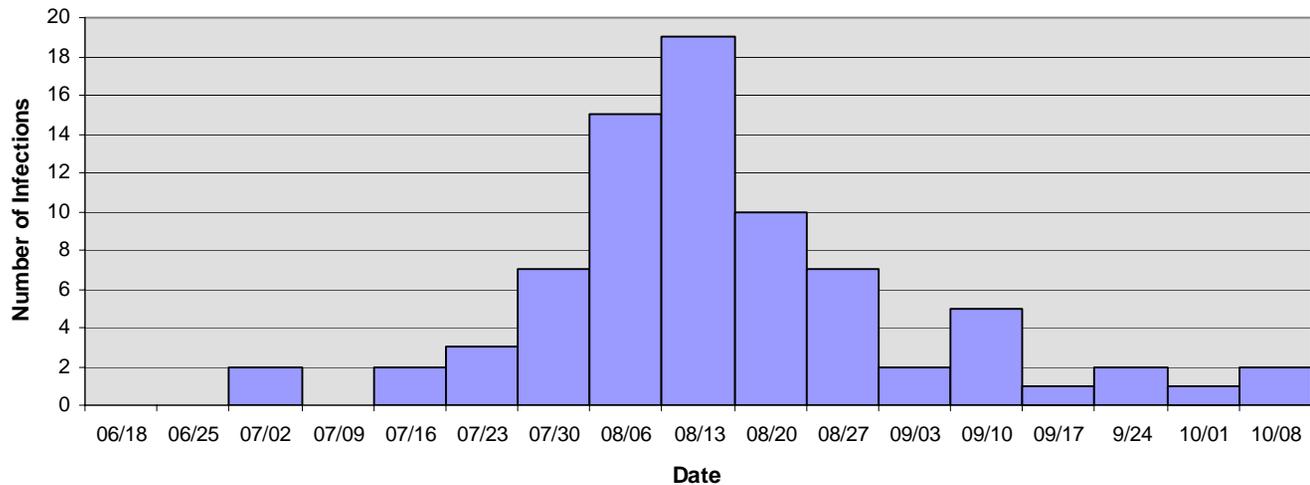
**WNV Symptomatic Infections and Positive Blood Donors  
by Week of Onset  
Sacramento County 2005**



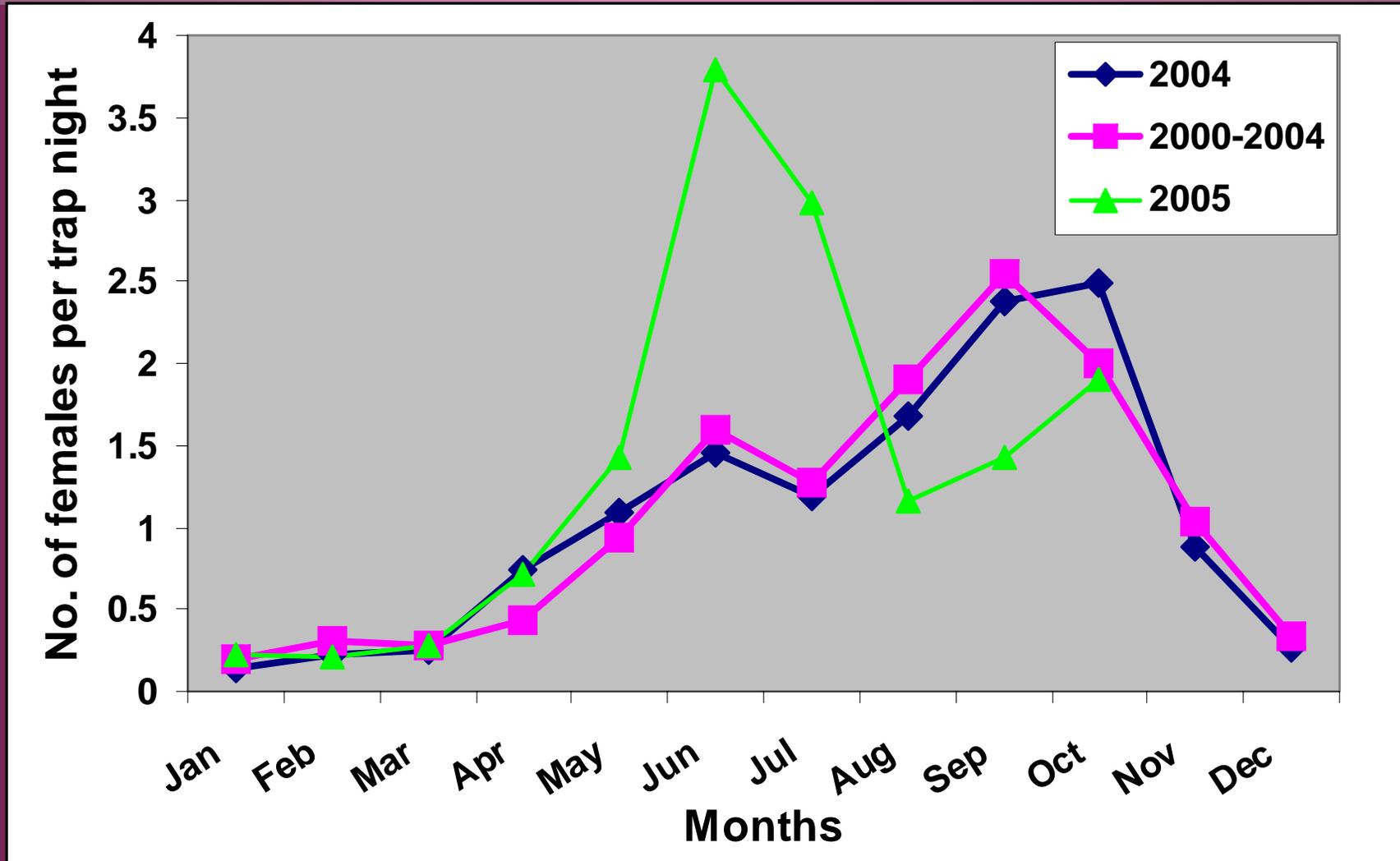
**WNV Symptomatic Infections and Positive Blood Donors by Week of Onset (North of American River)  
Sacramento County 2005**



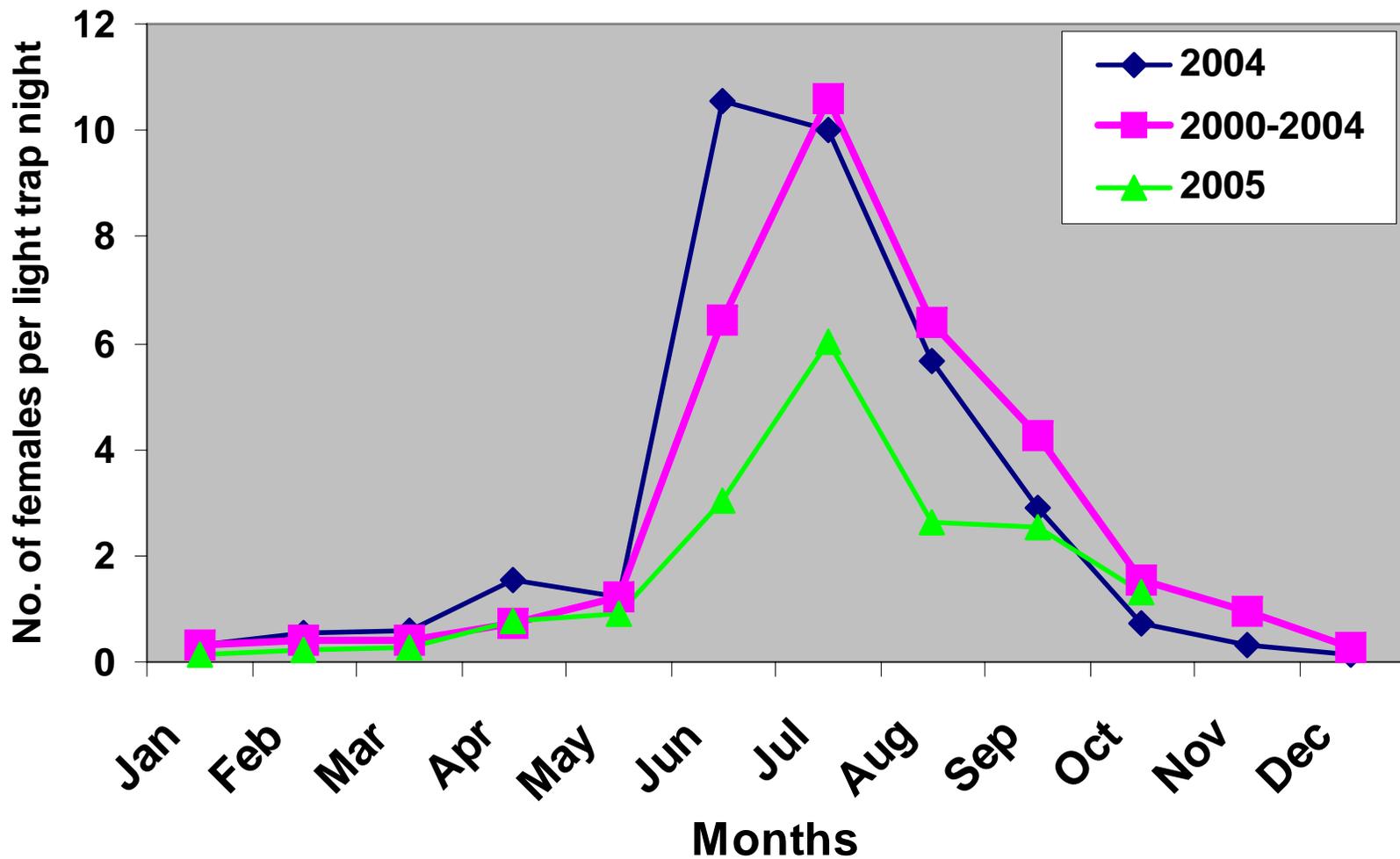
**WNV Symptomatic Infections and Positive Blood Donors by Week of Onset (South of American River)  
Sacramento County 2005**



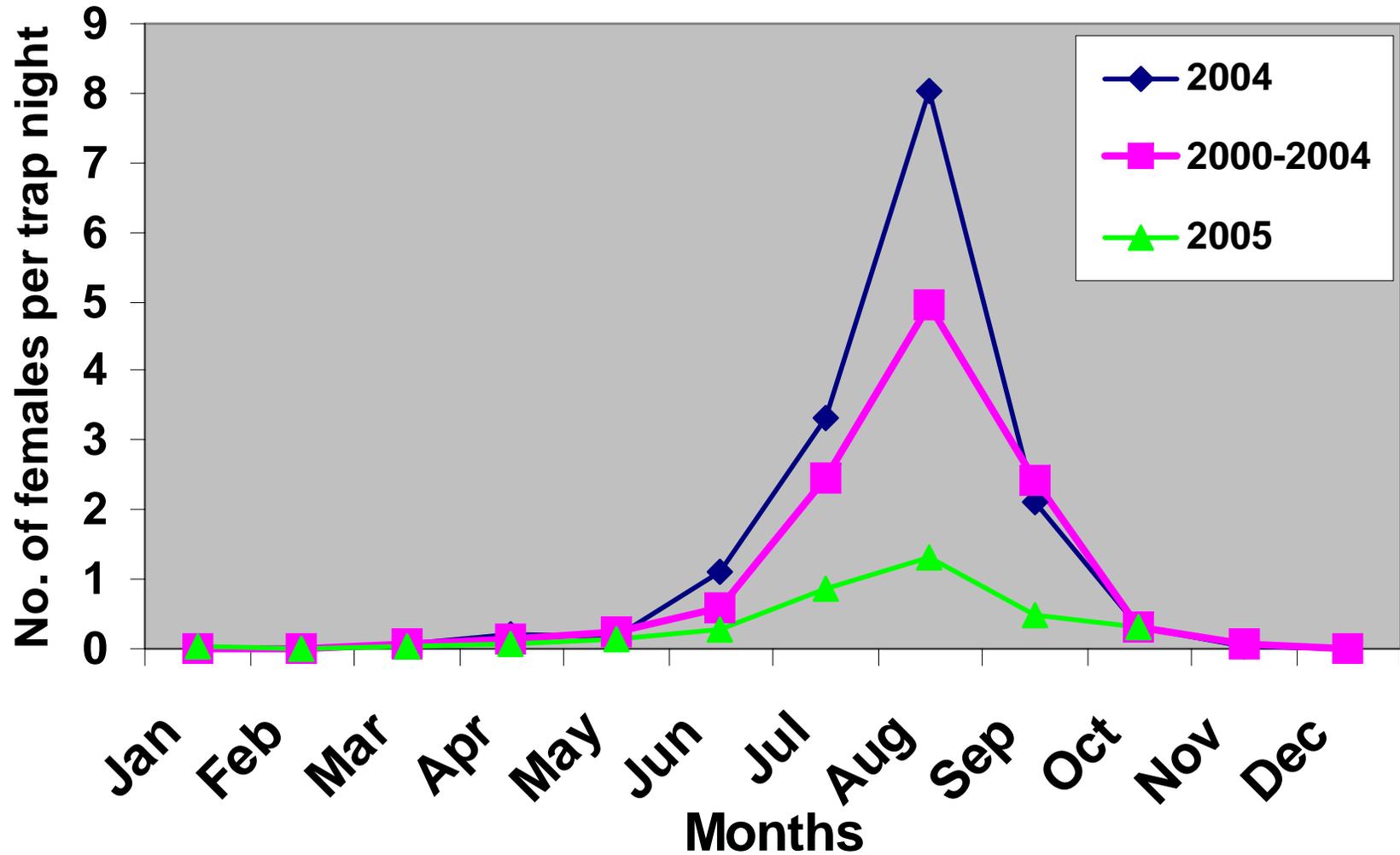
# American Light Trap collection of *Culex pipiens* in Sacramento-Yolo Counties, 2000-2005



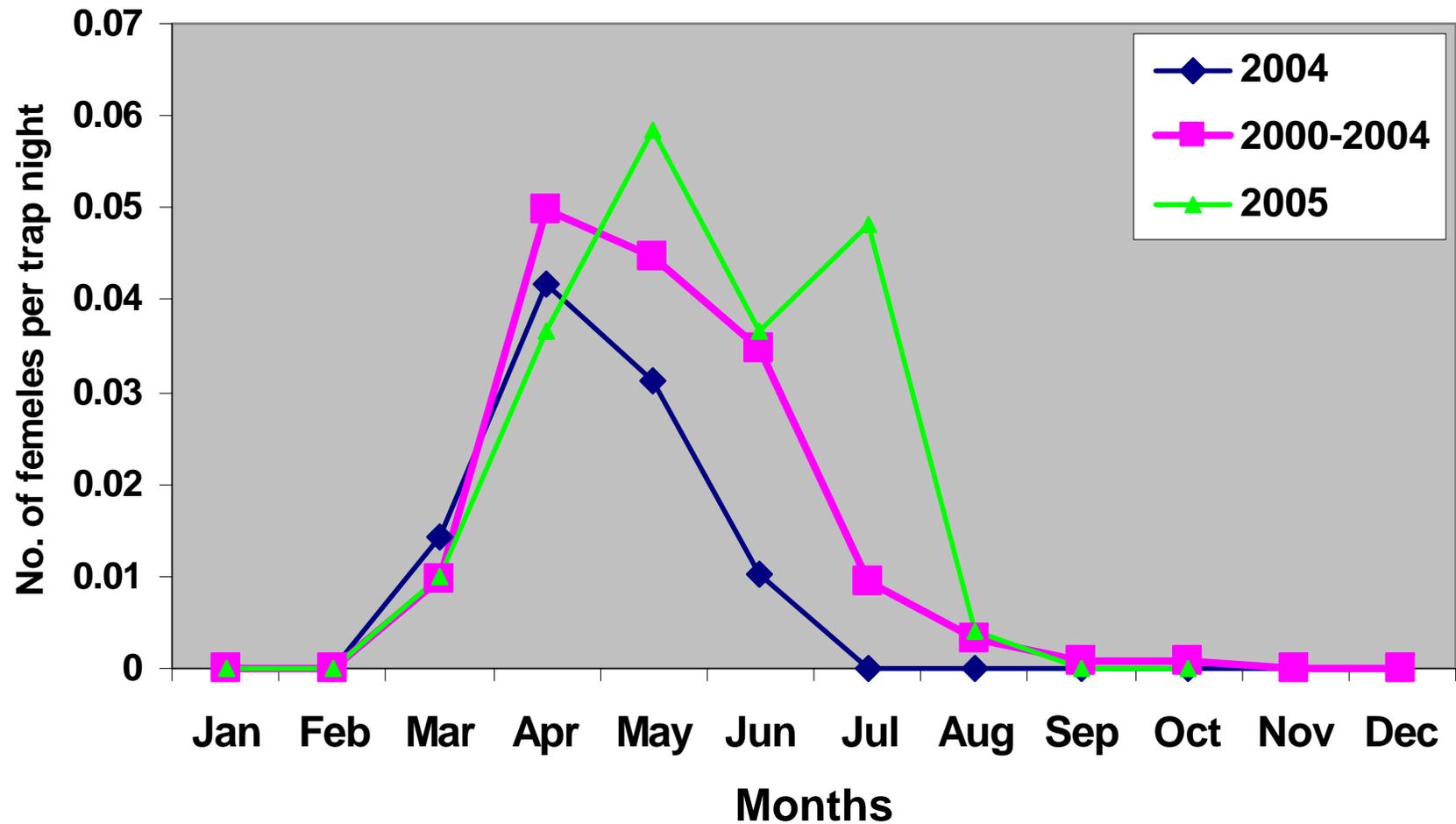
# American Light Trap collection of *Culex tarsalis* in Sacramento-Yolo Counties, 2000-2005



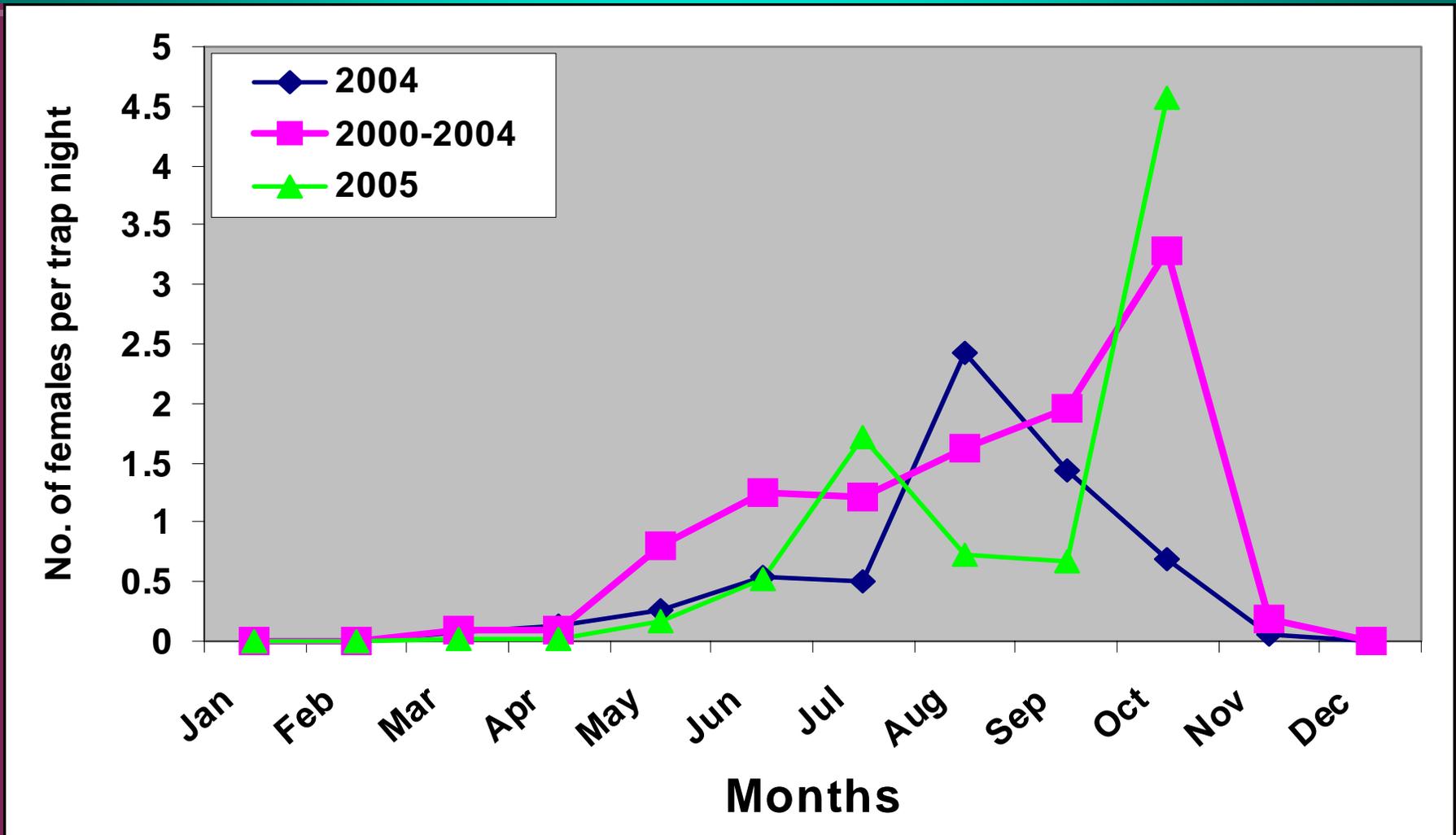
# American Light Trap Collection of *Anopheles freeborni* in Sacramento-Yolo Counties, 2000-2005



# American Light Trap collection of *Ochlerotatus sierrensis* in Sacramento-Yolo Counties, 2000-2005



# American Light Trap collection of *Ochlerotatus melanimon* in Sacramento-Yolo Counties, 2000-2005



# Issues to be addressed

- FISH KILLS / NON TARGETS

- » Study done with DPR indicates that 14% of product deposits on the ground (or 0.000374 lbs per acre)
- » No fish kills reported
- » Non-targets unaffected (Dr. Walter Boyce (UCD) did some work with beetles in the spray zone and showed no impacts.)

# Issues to be addressed

- CURE WORSE THAN DISEASE
  - » PBO listed as “possible cancer causing agent”
  - » WNV not that serious of a disease
  - » “Disease affects only those over 50....they do not reproduce nor are they long for the world anyway”

# ISSUES to be addressed

- PRODUCTS AVAILABLE
- Naled
  - » OP- Tolerance in mosquitoes
- Pyrethroids
  - » Effective, but non-crop uses
  - » Toxic Streams
- Pyrethrin (Evergreen 60-6)
  - » Extracts from the chrysanthemum flower and used in organic programs.
  - » Effective against all species of mosquitoes
  - » Synergized with Piperonyl Butoxide (Not used in organic programs)

# Issues

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- Notification
  - » Even though every media outlet had us lead off, we were told we needed to provide better prior notification
- Other languages

# What we will do

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- Review ERP for coming year to include
  - » Evaluate effectiveness of adult control measures
  - » Can you eliminate adult control measures?
  - » Better notification
    - Educate public that it is surveillance based

# Plans for winter and summer

- Analysis of data to improve surveillance and evaluate control efforts.
- Special efforts to find WNV in overwintering mosquitoes
- Risk-mapping the distribution of mosquitoes in Sacramento and Yolo Counties
- Surveillance studies to determine hosts of *pipiens* and *tarsalis* and human-biting rates at different localities and times

# Further Information

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- [www.fightthebite.net](http://www.fightthebite.net)