

Surveillance for Mosquito-Borne Encephalitis Virus Activity in California, 2007



Vector-Borne Disease Section
California Department of Public Health

Collaborators



- Local Health Departments
- Local Public Health Laboratories
- Environmental Health Departments

CA Arbovirus Surveillance Program Components

1. Encephalitis Case Surveillance

- Human
- Equine



2. Mosquito Testing

3. Sentinel Chicken Testing

4. Dead Bird and Squirrel Testing (WNV only)



2007 Highlights

- 36 % increase in human cases
- State of Emergency proclamation
 - \$6,214,219 allocated to 67 agencies in 36 counties
- Improvements in sentinel chicken TAT
- Introduction of CalSurv
- CA WNV website and Surveillance Gateway enhancements

Summary of Arbovirus Activity, 2007



378 WNV human cases (30 counties)



28 WNV horse cases (14 counties)

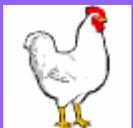


1,395 WNV positive dead birds (50 counties)



1,007 WNV positive mosquito pools (30 counties)

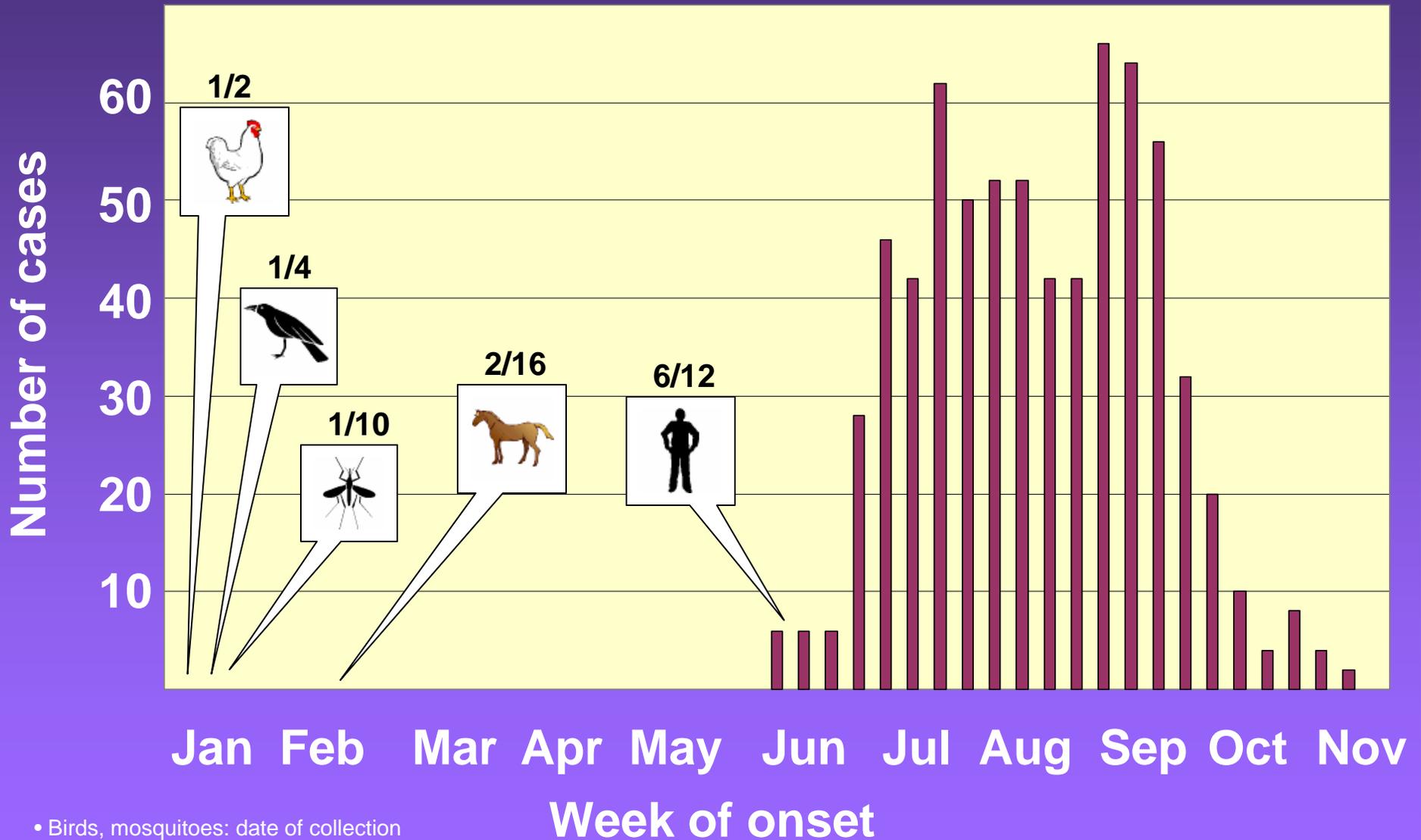
16 WEE positive mosquito pools (2 counties)



510 WNV seroconversions (27 counties)

13 WEE seroconversions (2 counties)

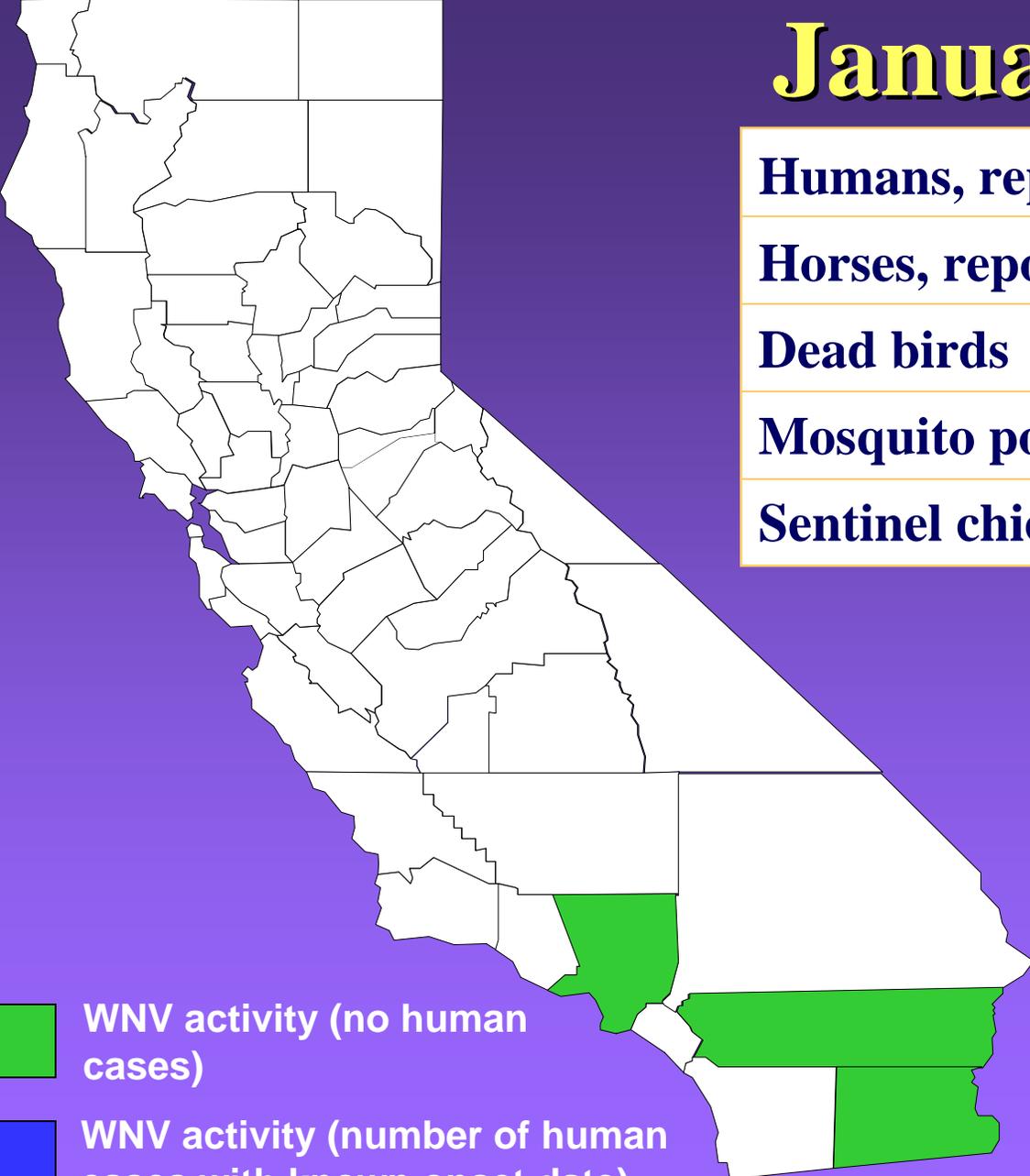
Sequence of WNV detection events in California relative to human case onset, 2007



- Birds, mosquitoes: date of collection
- Chickens: date of probable seroconversion

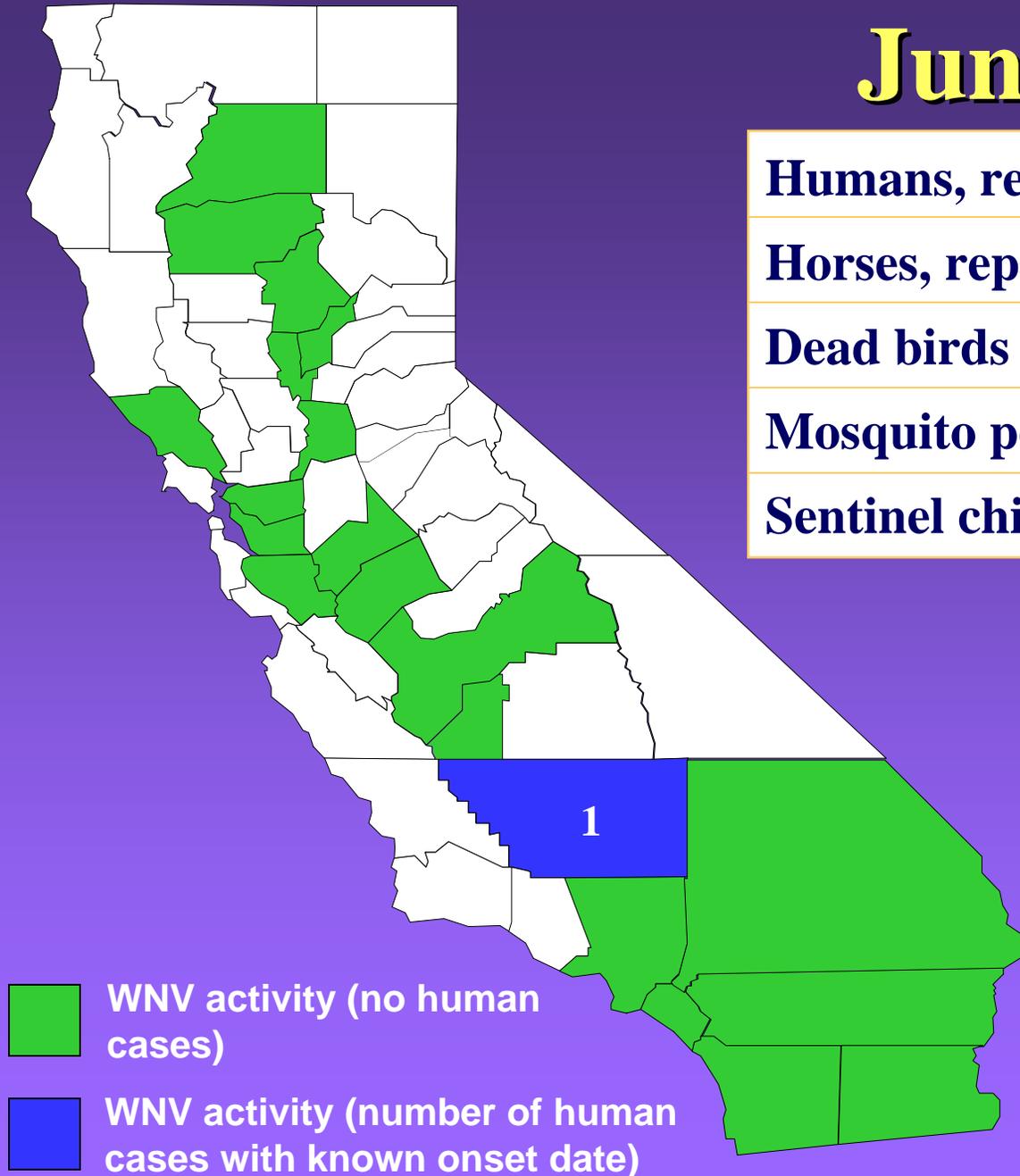
January 31, 2007

Humans, reported	0
Horses, reported	0
Dead birds	1
Mosquito pools	2
Sentinel chickens	1

- 
-  WNV activity (no human cases)
 -  WNV activity (number of human cases with known onset date)

June 30, 2007

Humans, reported	1
Horses, reported	2
Dead birds	99
Mosquito pools	72
Sentinel chickens	4

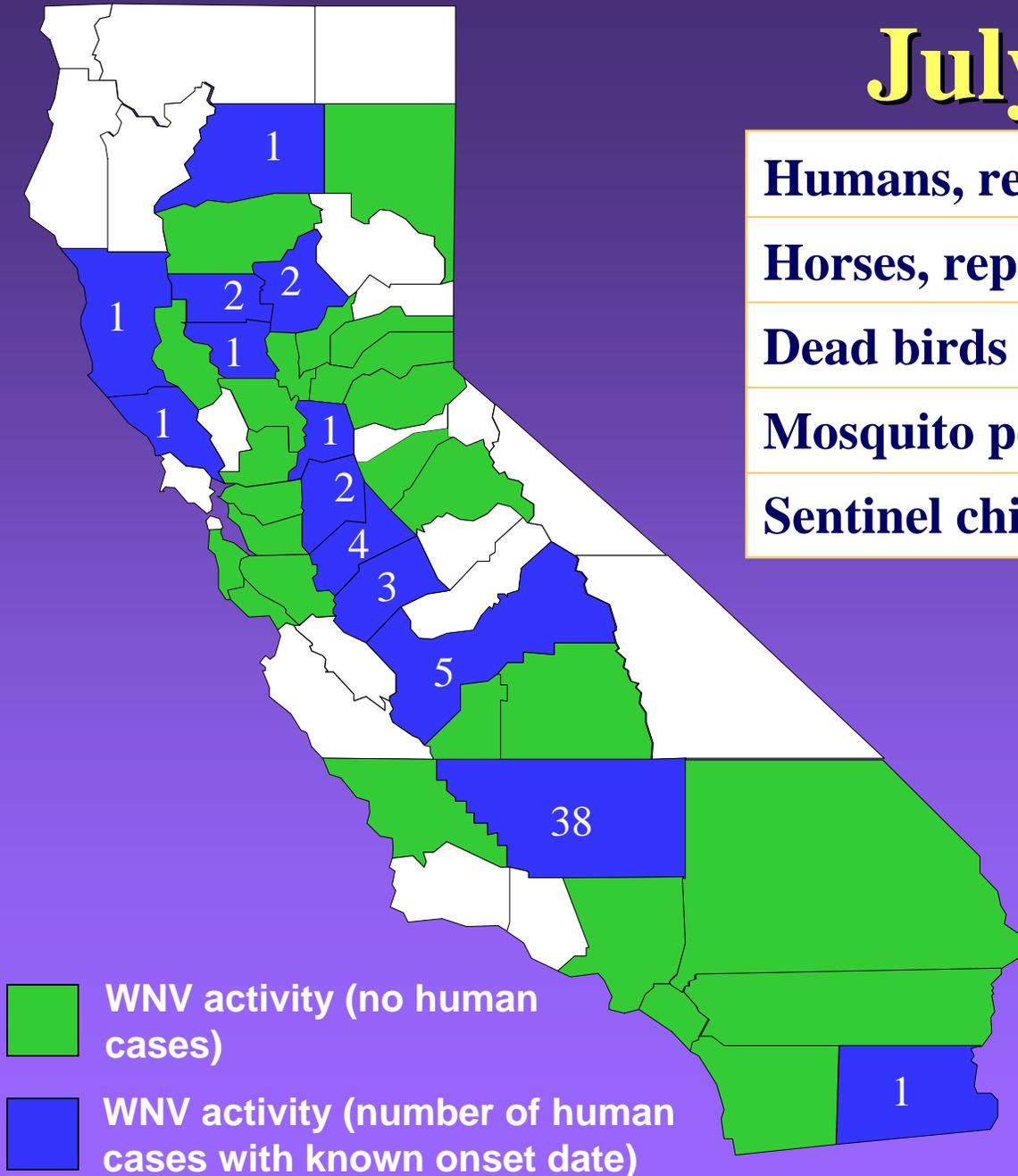


-  WNV activity (no human cases)
-  WNV activity (number of human cases with known onset date)

July 31, 2007

Humans, reported	56
Horses, reported	5
Dead birds	423
Mosquito pools	317
Sentinel chickens	30

2006 YTD = 16 Cases



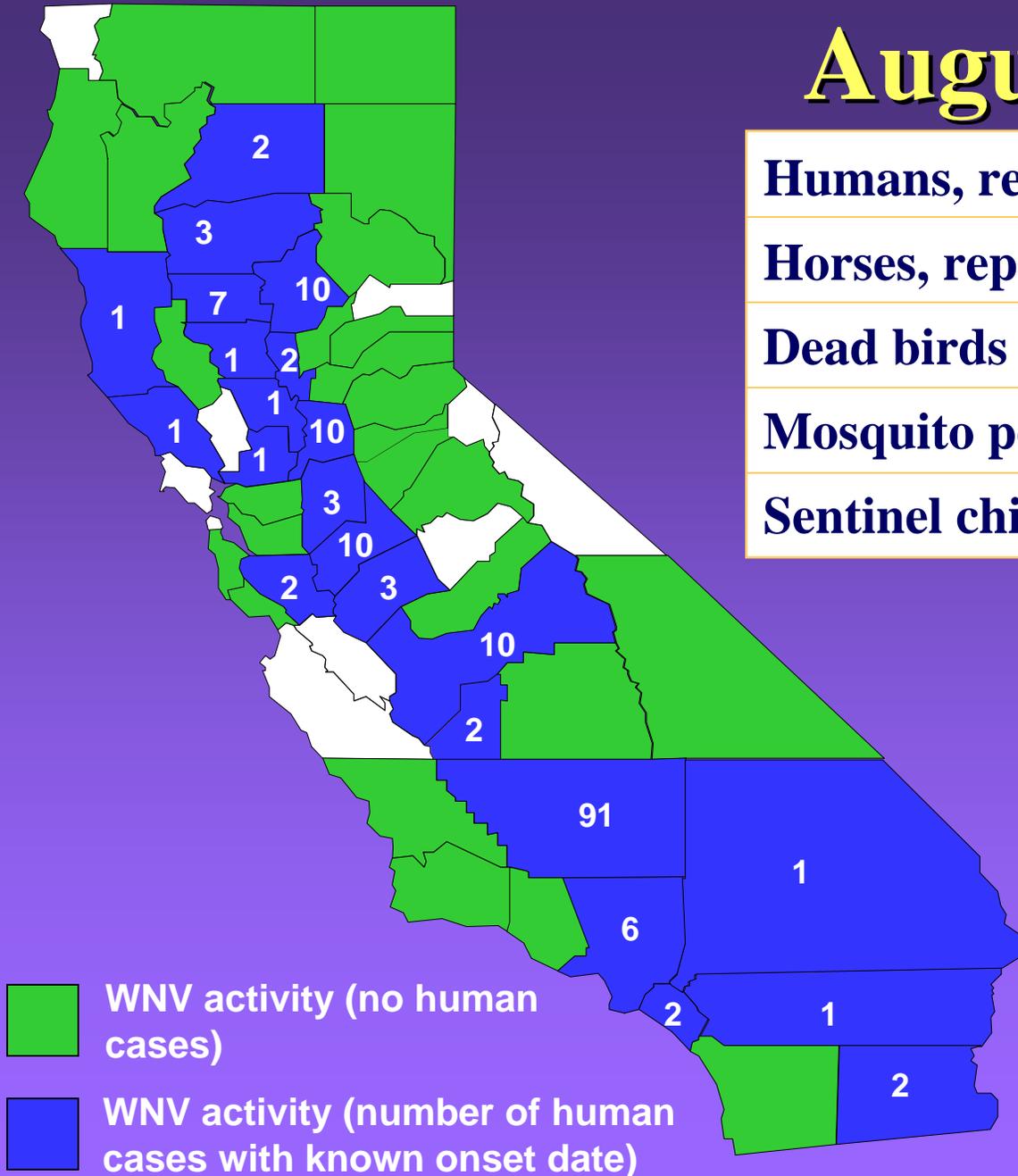
Human Case Comparison, 2004-07

Year	Thru July	Year total (fatalities)
2004	54	779 (28)
2005	56	880 (18)
2006	16	278 (7)
2007	56	378 (17)

Emergency Declaration on Aug 2

August 31, 2007

Humans, reported	172
Horses, reported	18
Dead birds	789
Mosquito pools	761
Sentinel chickens	194

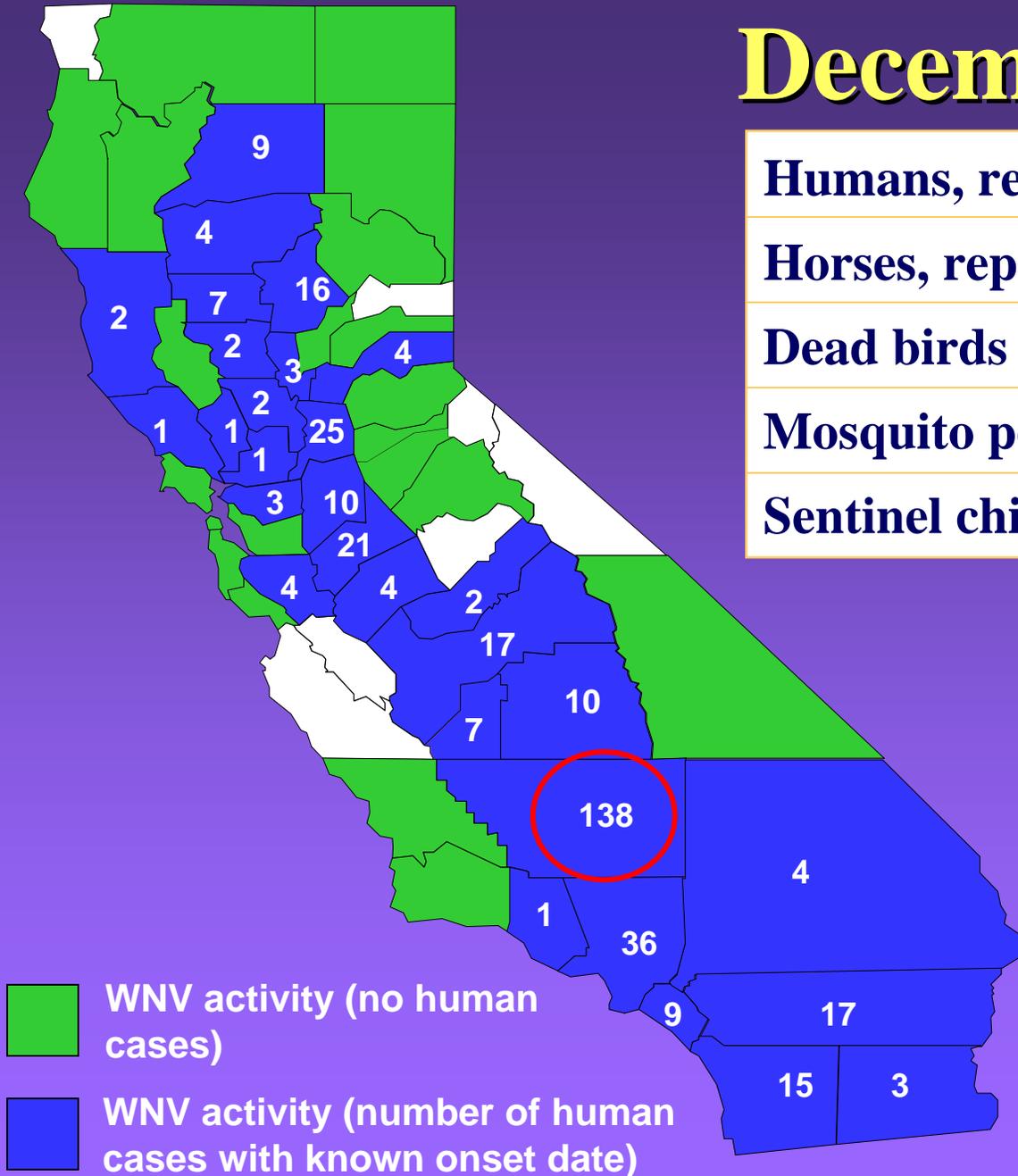


N=23 Counties with Human Cases

2006 YTD = 138 Cases

December 31, 2007

Humans, reported	378
Horses, reported	28
Dead birds	1,395
Mosquito pools	1,007
Sentinel chickens	510



N=30 Counties with Human Cases

2006 Total = 278 Cases

WNV activity (no human cases)
 WNV activity (number of human cases with known onset date)

Top Ten Counties with Human WNV Infections

2006

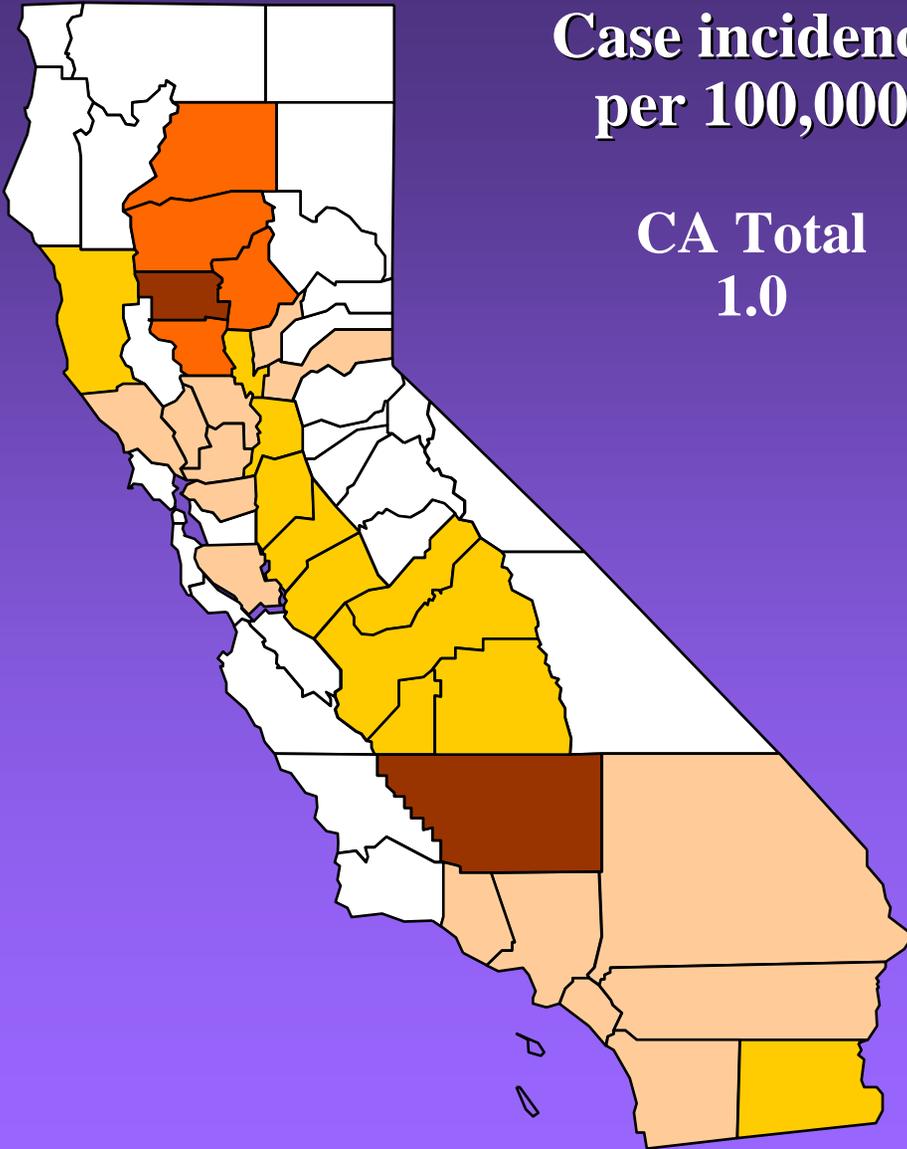
2007

Kern	51
Butte	34
Yolo	27
Sacramento	16
Los Angeles	16
Stanislaus	12
Fresno	12
Glenn	12
Sutter	11
Contra Costa	8

Kern	138
Los Angeles	36
Sacramento	25
Stanislaus	21
Fresno	17
Riverside	17
Butte	16
San Diego	15
San Joaquin	10
Tulare	10

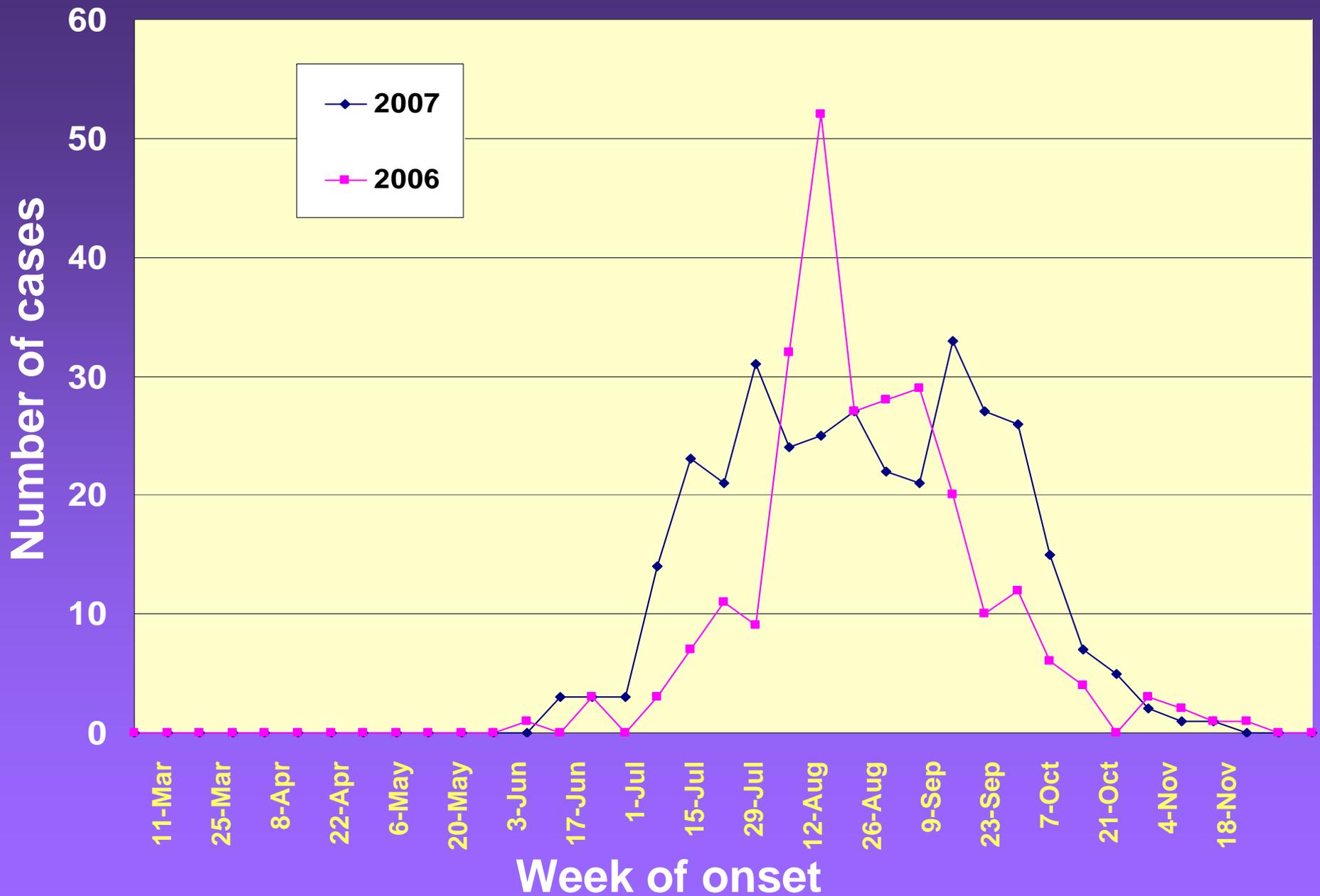
2007 Case incidence per 100,000

CA Total
1.0



■	Glenn	24.2	≥ 10
	Kern	17.1	
■	Colusa	9.1	≥ 5
	Butte	7.3	
	Tehama	6.5	
	Shasta	5.0	
■	Kings	4.6	≥ 1
	Stanislaus	4.0	
■	Tulare	2.3	> 0
	Mendocino	2.2	
	Sutter	2.1	
	Fresno	1.9	
	Sacramento	1.8	
	Imperial	1.7	
	Merced	1.6	
	San Joaquin	1.5	
	Madera	1.3	
	Others		

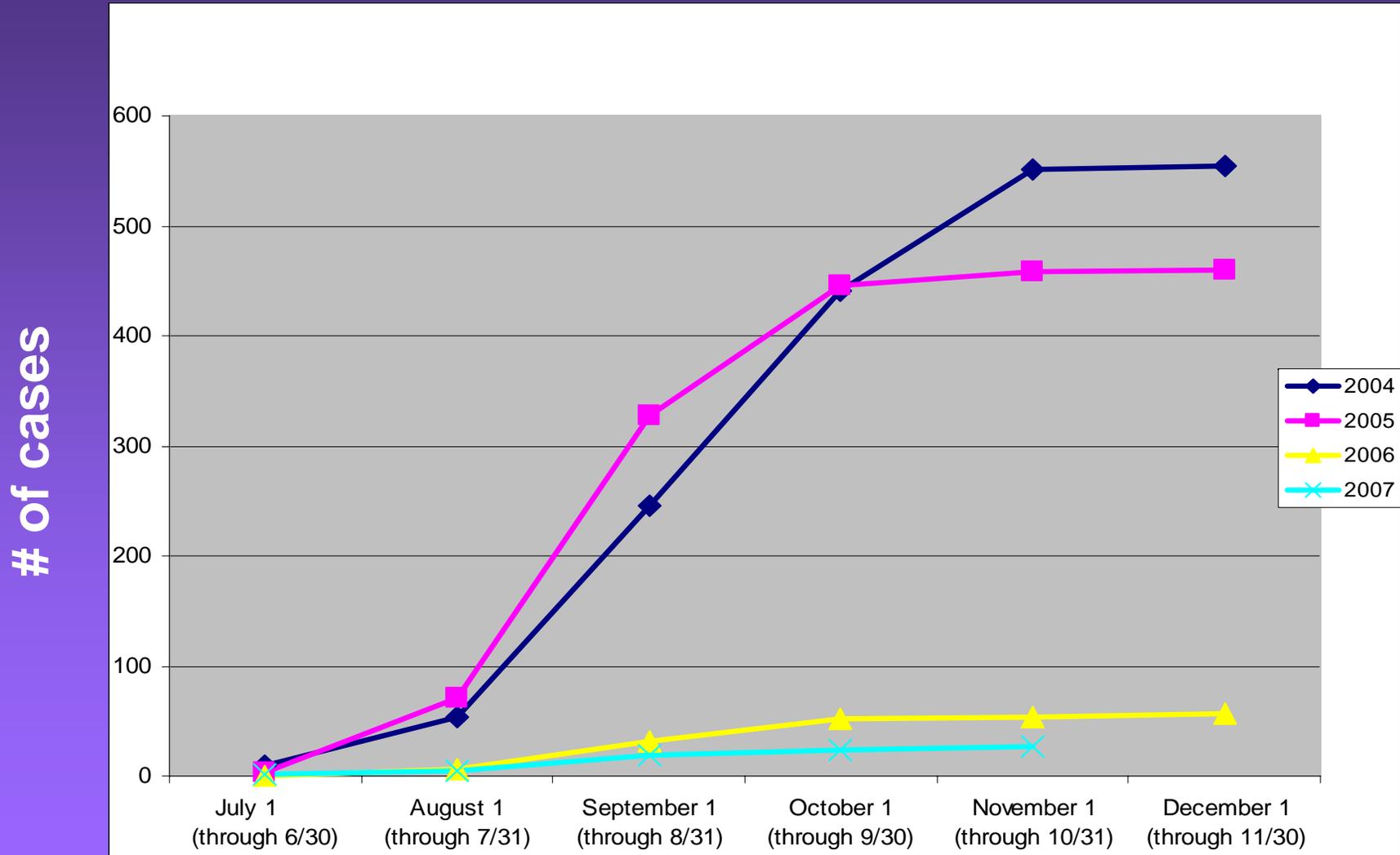
Onset of Human Illness 2006-2007



Human WNV Clinical Presentation 2006 vs. 2007

	2006	2007
Number of Symptomatic Cases	278	378
Neuroinvasive	90 (30%)	154 (41%)
Fever	190 (68%)	218 (58%)
Unknown	5	5
Median Age	49 yrs	55 yrs
Fatal Cases	7 (2.5%)	17 (4.4%)
Median Age of Fatalities	82 yrs	81 yrs
Percent Male	64%	56%

Number of Equine Cases 2004-2007



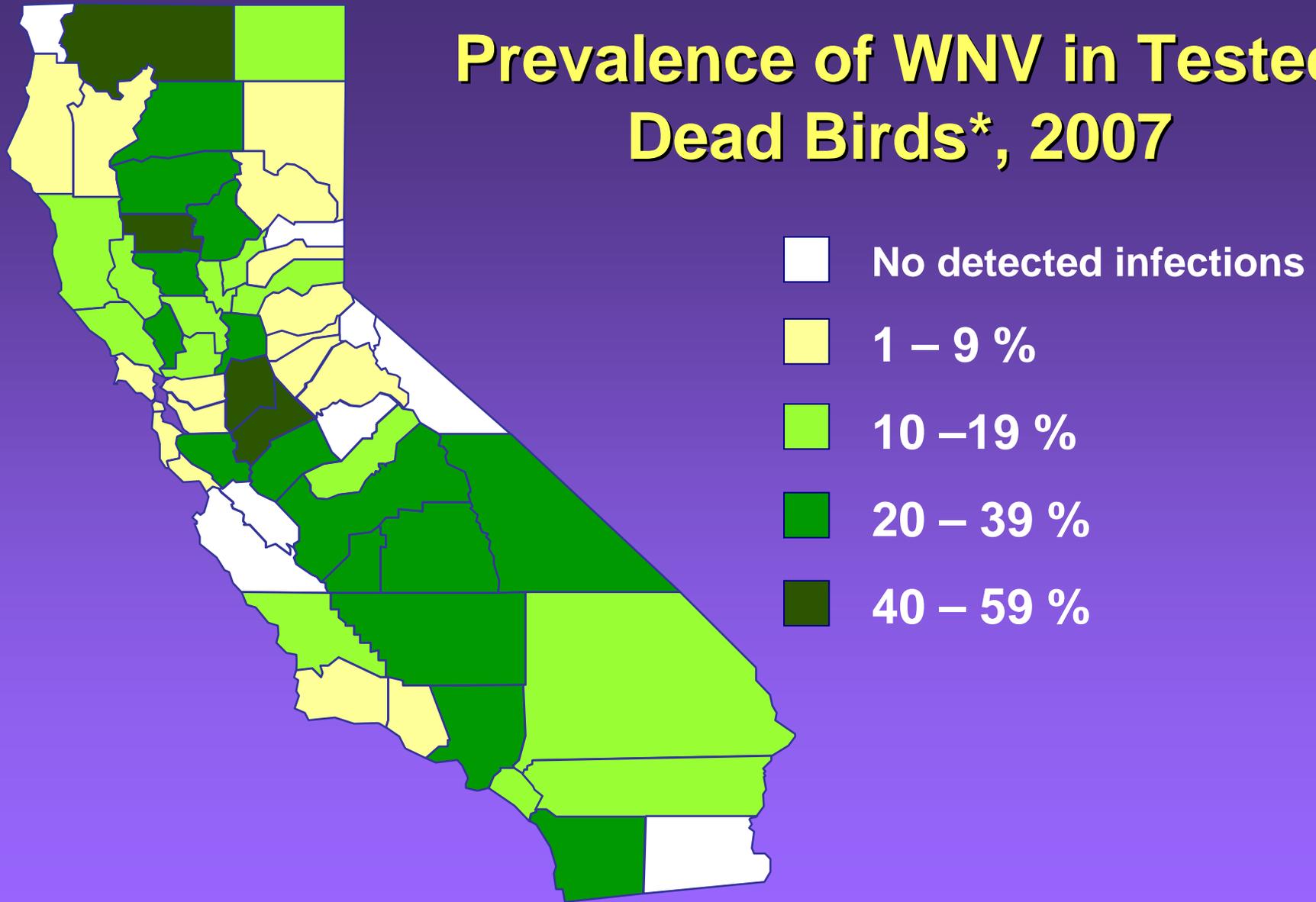
Dead Bird Surveillance



Dead Birds Reported, Tested, Positive 2006 vs. 2007

Year	Reported	Tested	Positive
2006	46,345	6,535	1,446 (22.1%)
2007	31,950	5,943	1,395 (23.5%)

Prevalence of WNV in Tested Dead Birds*, 2007



* Prevalence = (# pos birds / # tested birds) x 100

Top 5 Positive Species

- American Crow (49.6%)
- Western Scrub-Jay (17.1%)
- Yellow Billed Magpie (8.1%)
- House Finch (5.2%)
- House Sparrow (3.0%)



78 different species tested positive for WNV

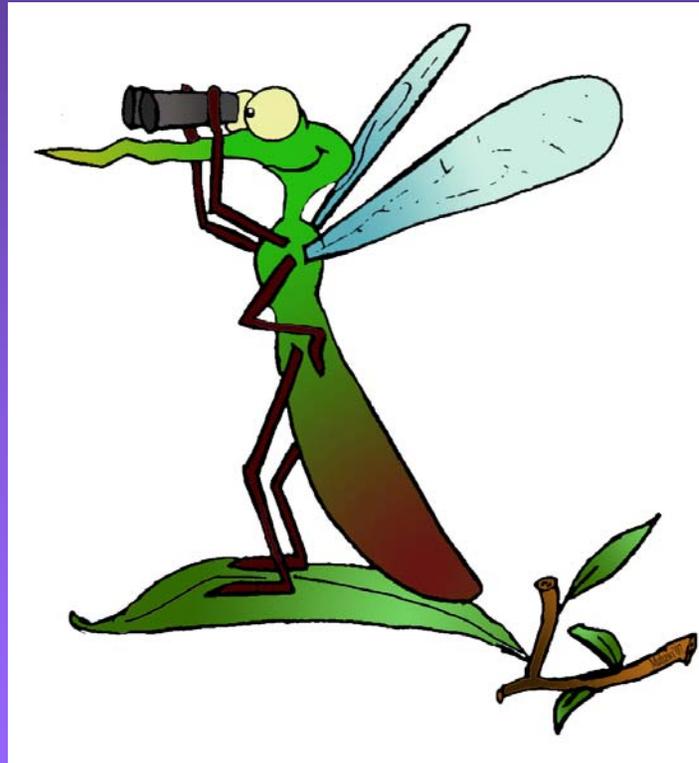
WNV-Positive Tree Squirrels



Photo credit: Peter Harland

Year	Reported	Tested	Positive	# Counties
2006	398	138	32 (23.2%)	9
2007	730	224	26 (11.6%)	10

Mosquito Surveillance



Mosquito Pool Testing

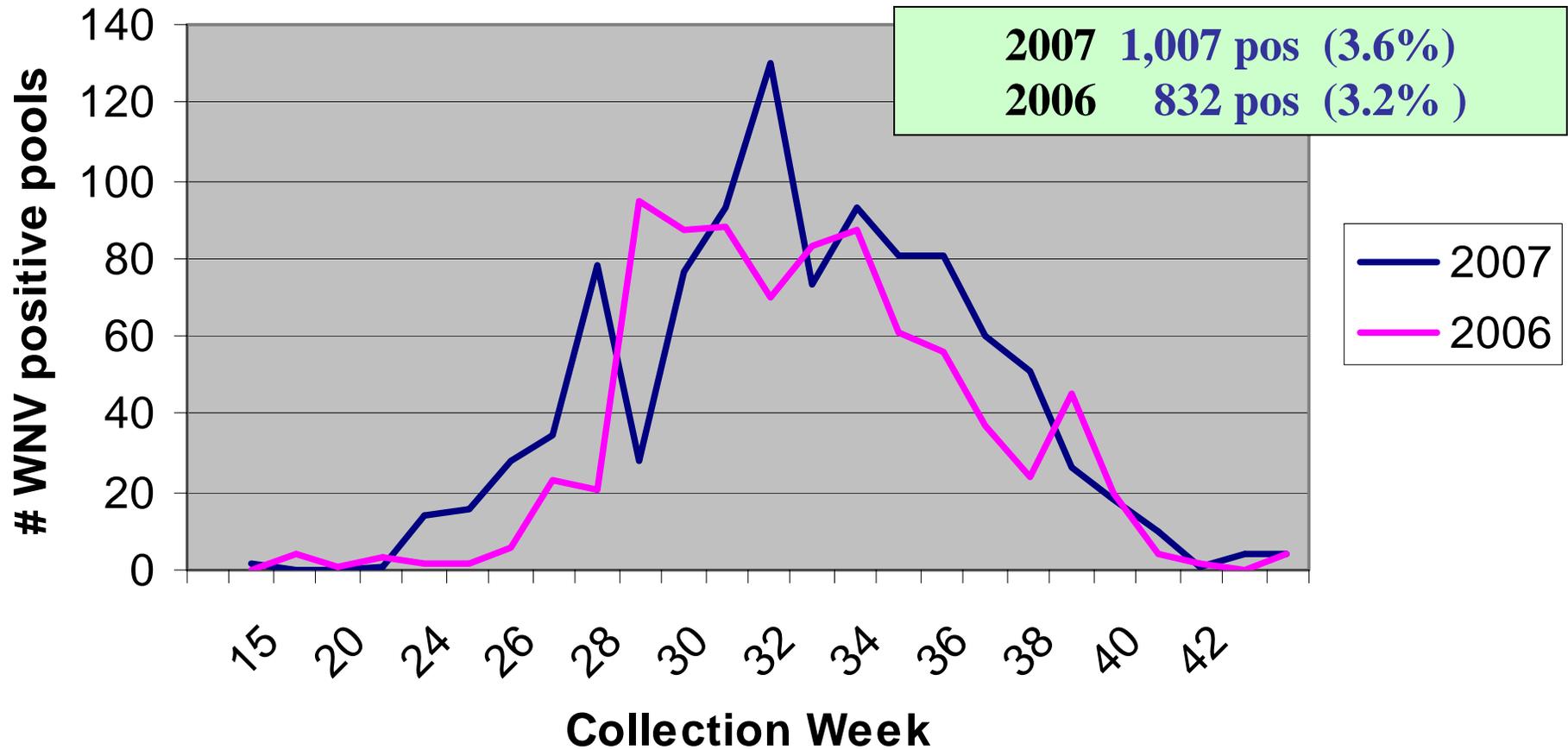
- ✓ ~26,000 mosquito pools screened for SLE, WEE, and WNV via RT-PCR
 - 49 local agencies from 44 counties
 - 827 (3.2%) pools WNV +
 - 16 pools WEE +

- ✓ Additional 2,737 mosquito pools tested by RAMP only for WNV
 - 6 local agencies
 - 180 (6.6%) WNV +

- ✓ 25 species (5 genera) tested

- ✓ 30 counties with WNV positive pools
- ✓ 2 counties (Kern and Fresno) with WEE positive pools

WNV Activity in Mosquitoes 2006-2007



WNV Positive Mosquito Species

1,007 WNV positive pools

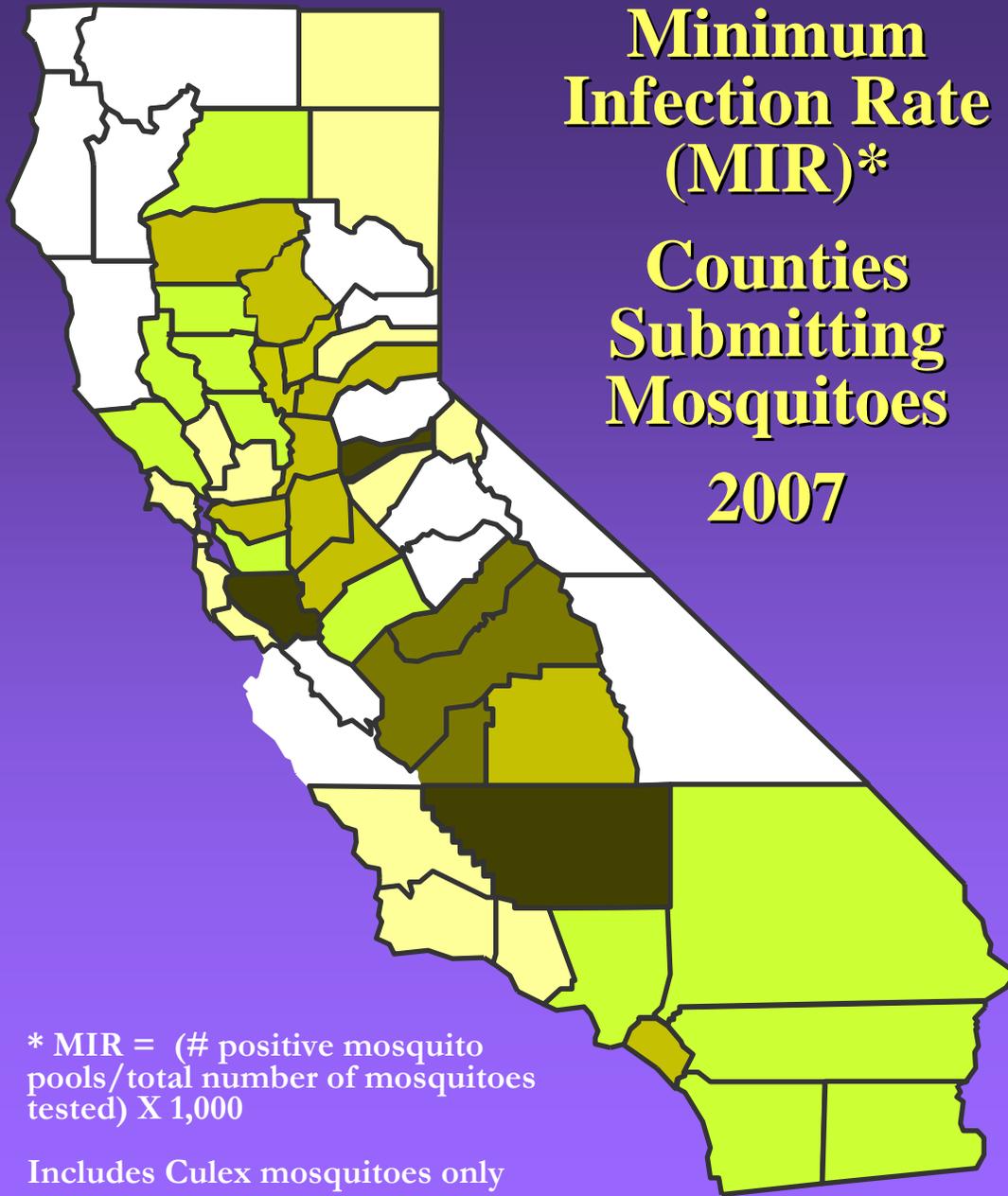
<i>Culex</i>	<u>+ pools</u>	<u>MIR</u>
<i>tarsalis</i>	370 (37%)	0.99
<i>quinquefasciatus</i>	339 (34%)	1.47
<i>pipiens</i>	284 (28%)	1.48
<i>stigmatosoma</i>	5 (<1%)	0.95
<i>erythrothorax</i>	4 (1%)	0.06
<i>Culiseta incidens</i>	1	
<i>Culiseta particeps</i>	1	
<i>Aedes melanimon</i>	2	



Minimum Infection Rate (MIR)*

Counties Submitting Mosquitoes

2007



* MIR = (# positive mosquito pools/total number of mosquitoes tested) X 1,000

Includes Culex mosquitoes only

Amador	6.9	
Santa Clara	5.5	≥ 5.0
Kern	5.0	

Madera	3.4	
Kings	3.2	≥ 3.0
Fresno	3.1	

Butte	2.8	
Yuba	2.8	
Tehama	2.5	
Sutter	2.2	
San Joaquin	1.9	
Sacramento	1.5	≥ 1.0
Tulare	1.4	
Placer	1.3	
Stanislaus	1.3	
Orange	1.1	
Contra Costa	1.0	

San Diego	0.9	
Shasta	0.9	
Glenn	0.8	
Lake	0.7	
Los Angeles	0.6	
Imperial	0.3	≥ 0.1
Riverside	0.2	
Yolo	0.2	
San Bernardino	0.2	
Sonoma	0.2	
Merced	0.1	
Colusa	0.1	
Alameda	0.1	

No positive pools	0	
No mosquitoes tested		

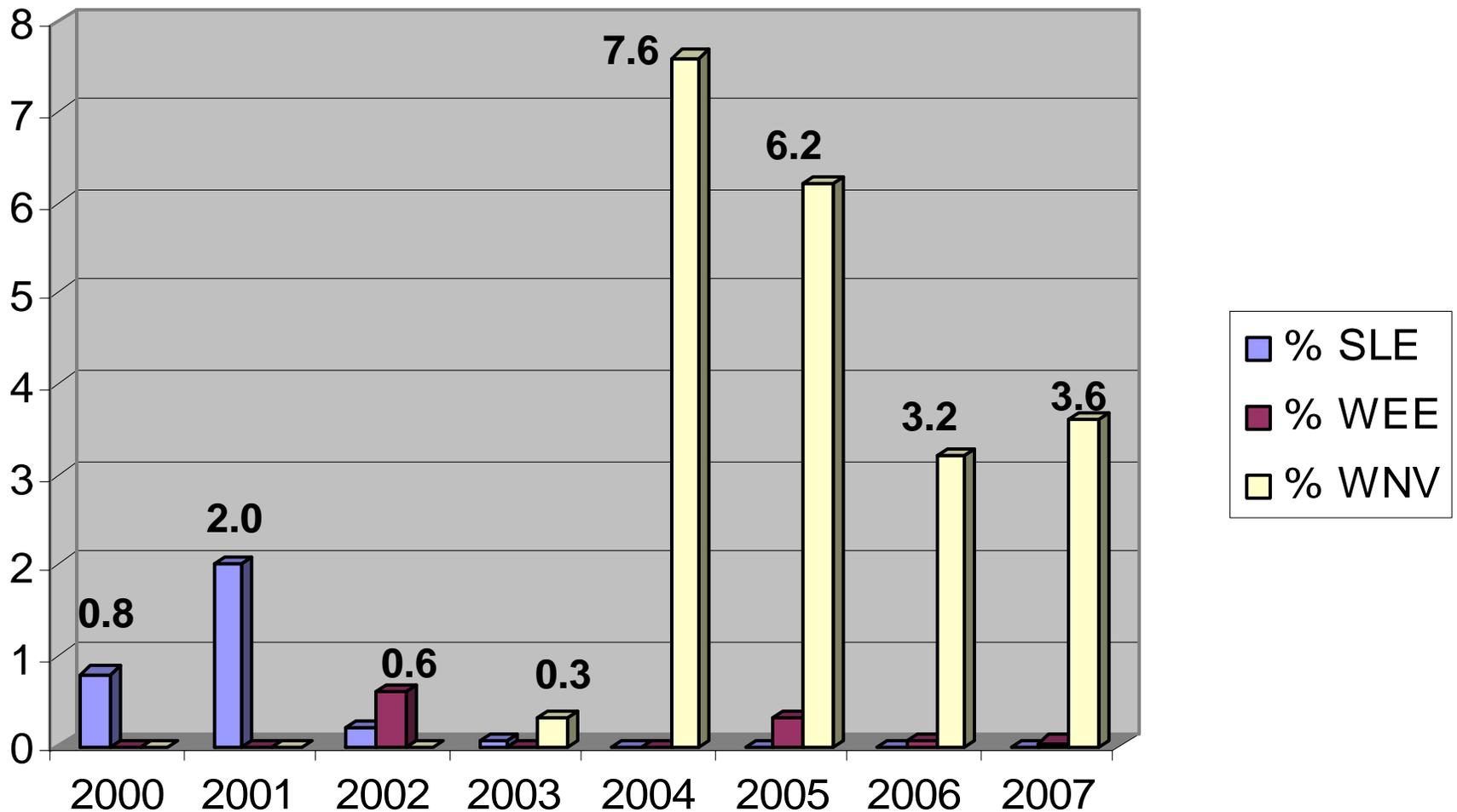
WEE Activity in Mosquitoes

- 16 positive pools (*Cx. tarsalis*)
- First Detection: 6/19/07
- Last Detection: 9/12/07

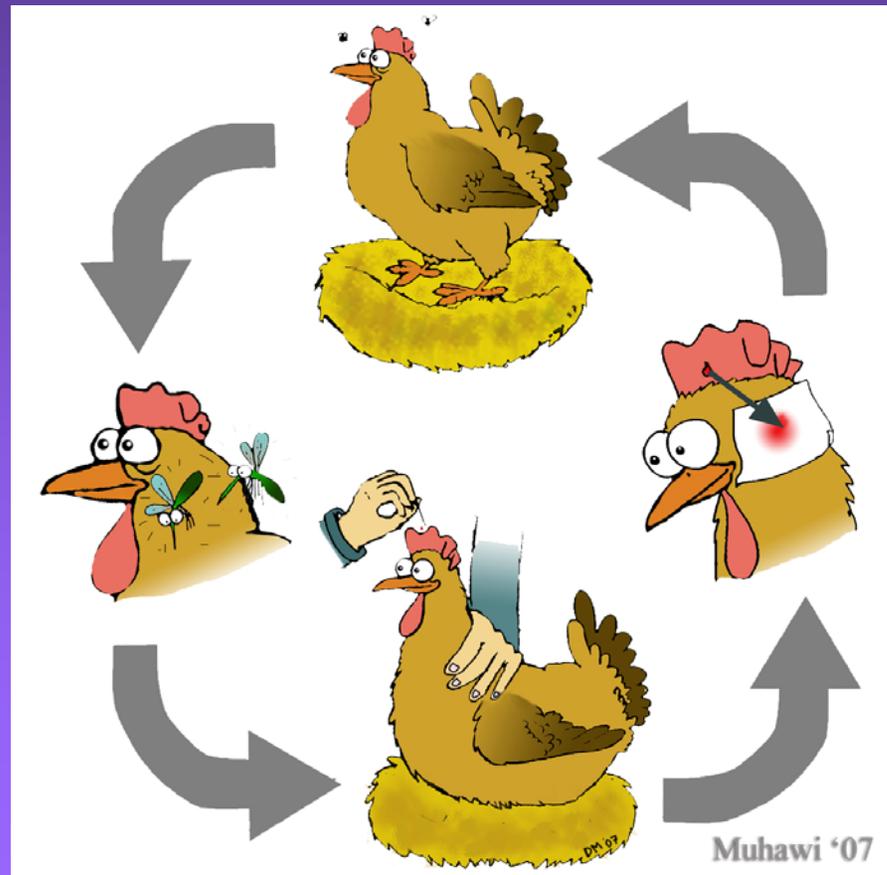


2006: 18 WEE + pools

Proportion of SLE, WEE, & WNV Positive Mosquitoes: 2000-2007



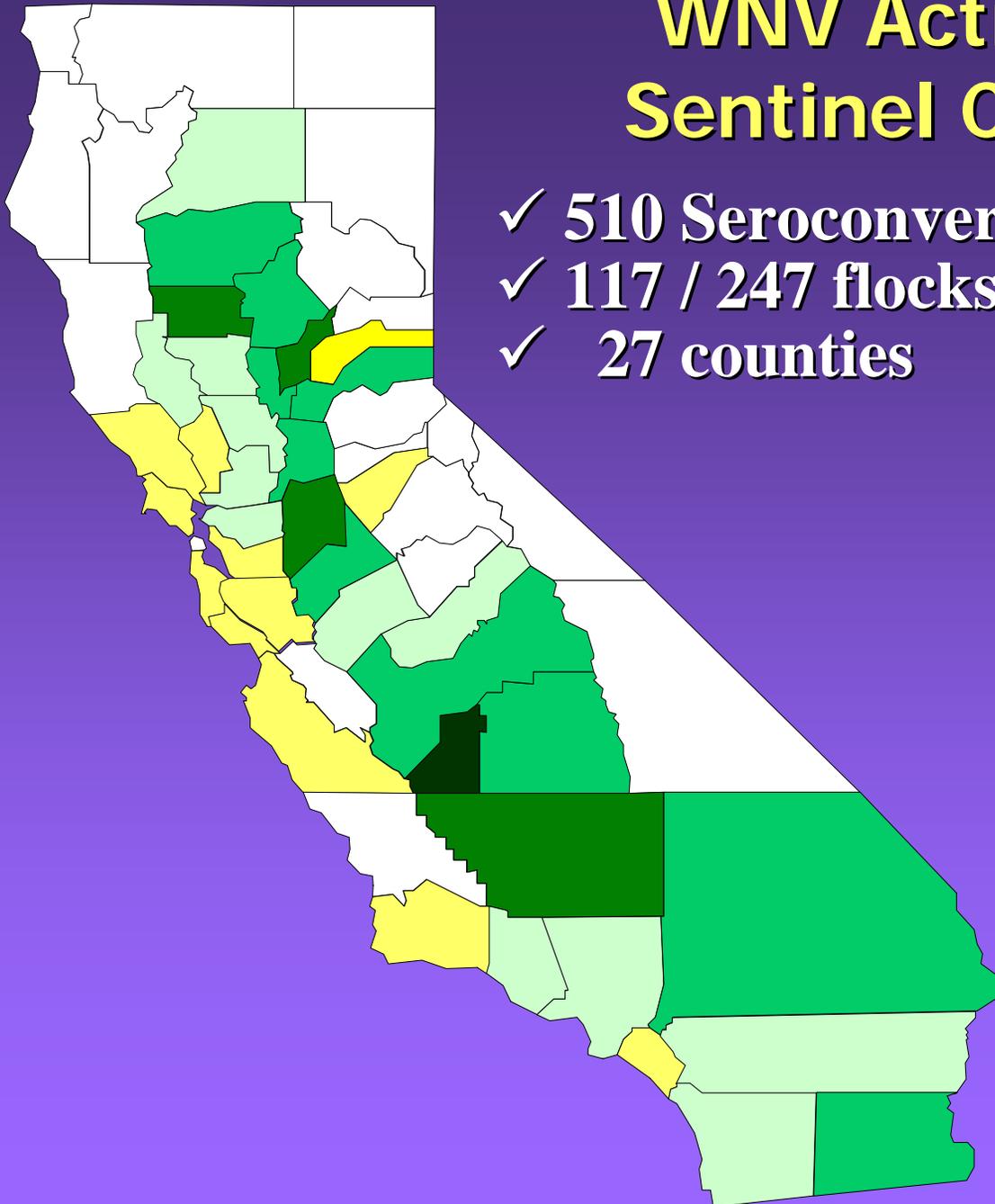
Sentinel Chicken Surveillance



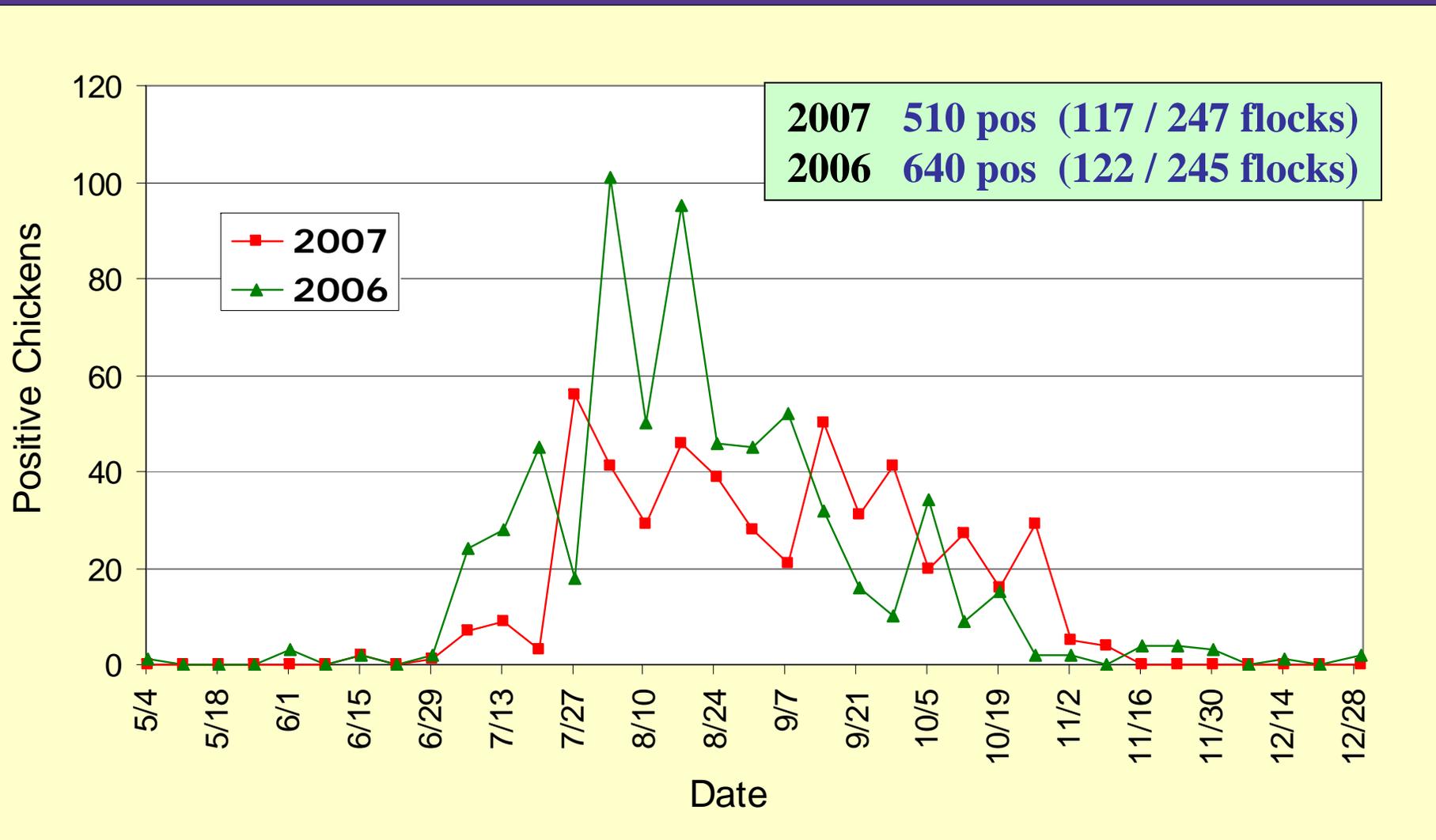
WNV Activity in Sentinel Chickens

- ✓ 510 Seroconversions (23%)
- ✓ 117 / 247 flocks
- ✓ 27 counties

% Seroconversions



Seroconversions by Week 2006-2007



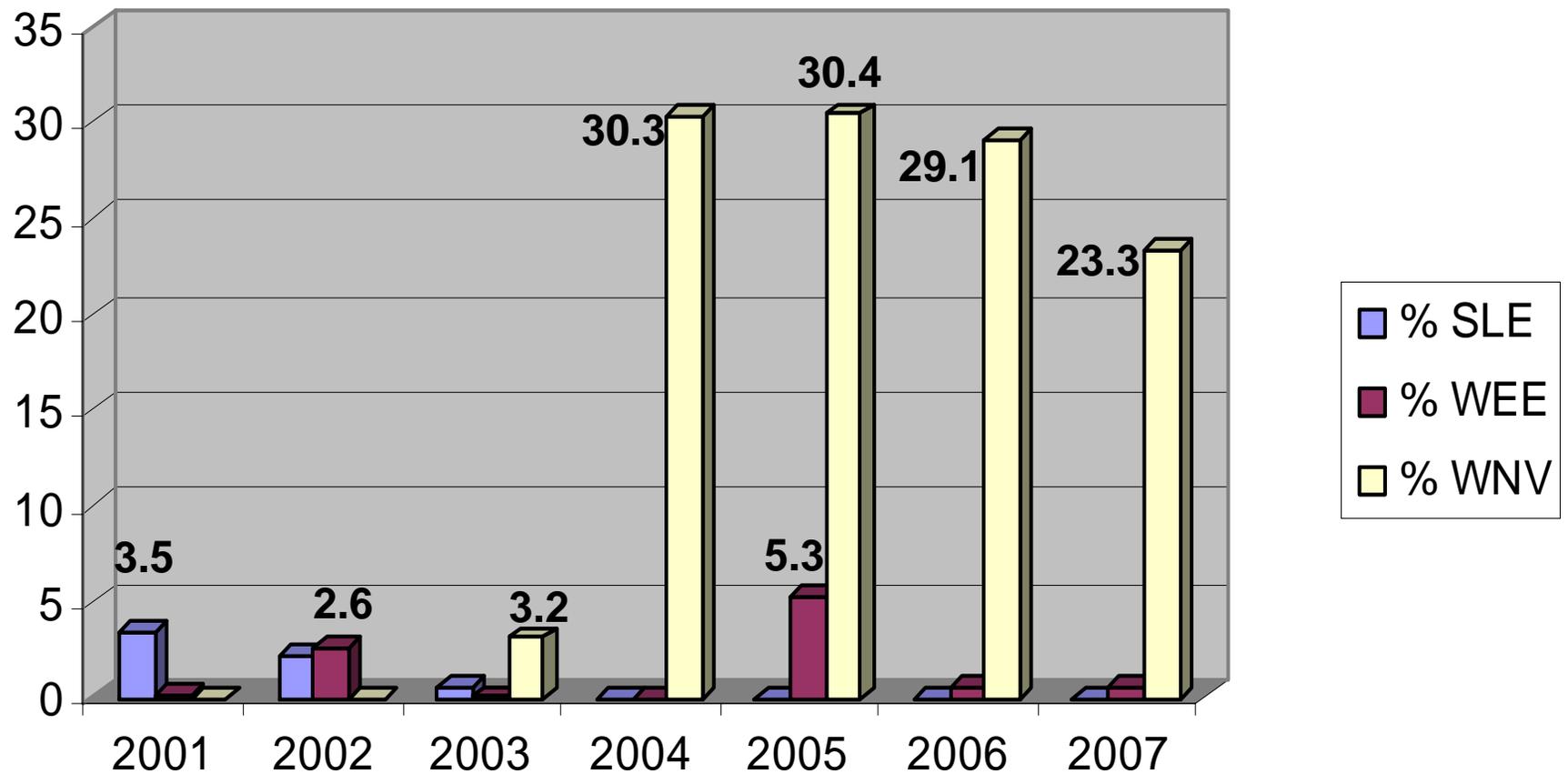
WEE Seroconversions

- ✓ **13 (0.6%) Seroconversions**
- ✓ **9 Flocks**
- ✓ **2 Counties**

- ✓ **First Detection: 7/24/07**
- ✓ **Last Detection: 10/15/07**



Proportion of Seroconversions to SLE, WEE, and WNV: 2001-2007



In Summary:

- Human WNV cases ↑ this year
 - Kern County hit the hardest
- Equine WNV cases continued to ↓
- Dead birds continued to be earliest indicator of WNV activity
- Emergency funding helped limit number of cases
- Mosquitoes and chickens continue to detect low levels of WEE activity



WNV Team at CDPH

■ VBDS

- ✓ Vicki Kramer
- ✓ Stan Husted
- ✓ Tina Feiszli
- ✓ Erin Parker
- ✓ Ervic Aquino
- ✓ Long Her
- ✓ Kerry Padgett
- ✓ Anne Kjemtrup
- ✓ Mark Novak
- ✓ Renjie Hu
- ✓ Hotline staff
- ✓ Regional biologists

■ DIS

- ✓ Jon Rosenberg

■ VPHS

- ✓ Ben Sun
- ✓ James Glover
- ✓ Claudia Erickson

■ VRDL

- ✓ Carol Glaser
- ✓ Cynthia Jean
- ✓ Cindi Cossen
- ✓ Shilpa Jani

■ OPA

- ✓ Michele Mussuto