Annual West Nile Meeting-Denver, CO Feb. 2004

Invasion of California by West Nile Virus

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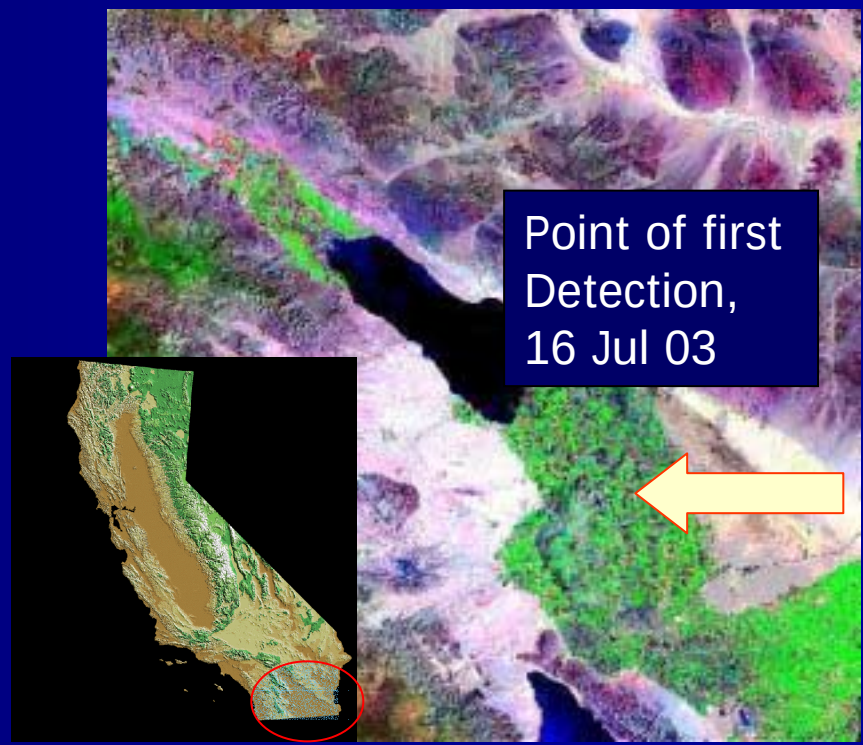

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Sacramento: V Armijos

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Greater Los Angeles Co MVCD: M Madon, J Sphoel, P OConnor, J Hazzelrigg

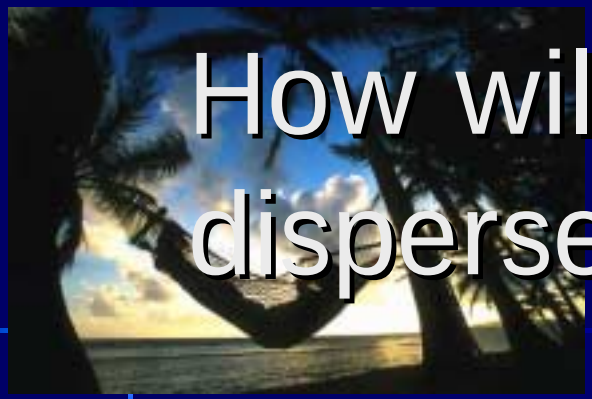
Kern MVCD: R Takahashi, R Quiring

Sac/Yolo MVCD: S Wright, G Yoshimura, S Yamamoto, D Brown

Laboratory diagnostics

- Humans: local IFA screen; DHS confirmation by IgM and PRNT
- Horses: isolation, PRNT serology
- Chickens: EIA on filter paper; followed by PRNT on whole sera
- Mosquitoes: in situ EIA using Vero cell culture; robotic TaqMan
- Dead birds: robotic TaqMan, virus isolation

How will West Nile virus disperse to California?



- **Infected birds**
- **Infected mosquitoes**
- **Domestic animals**
- **Travelers**

Fall migration 2002, because WN active in Washington State

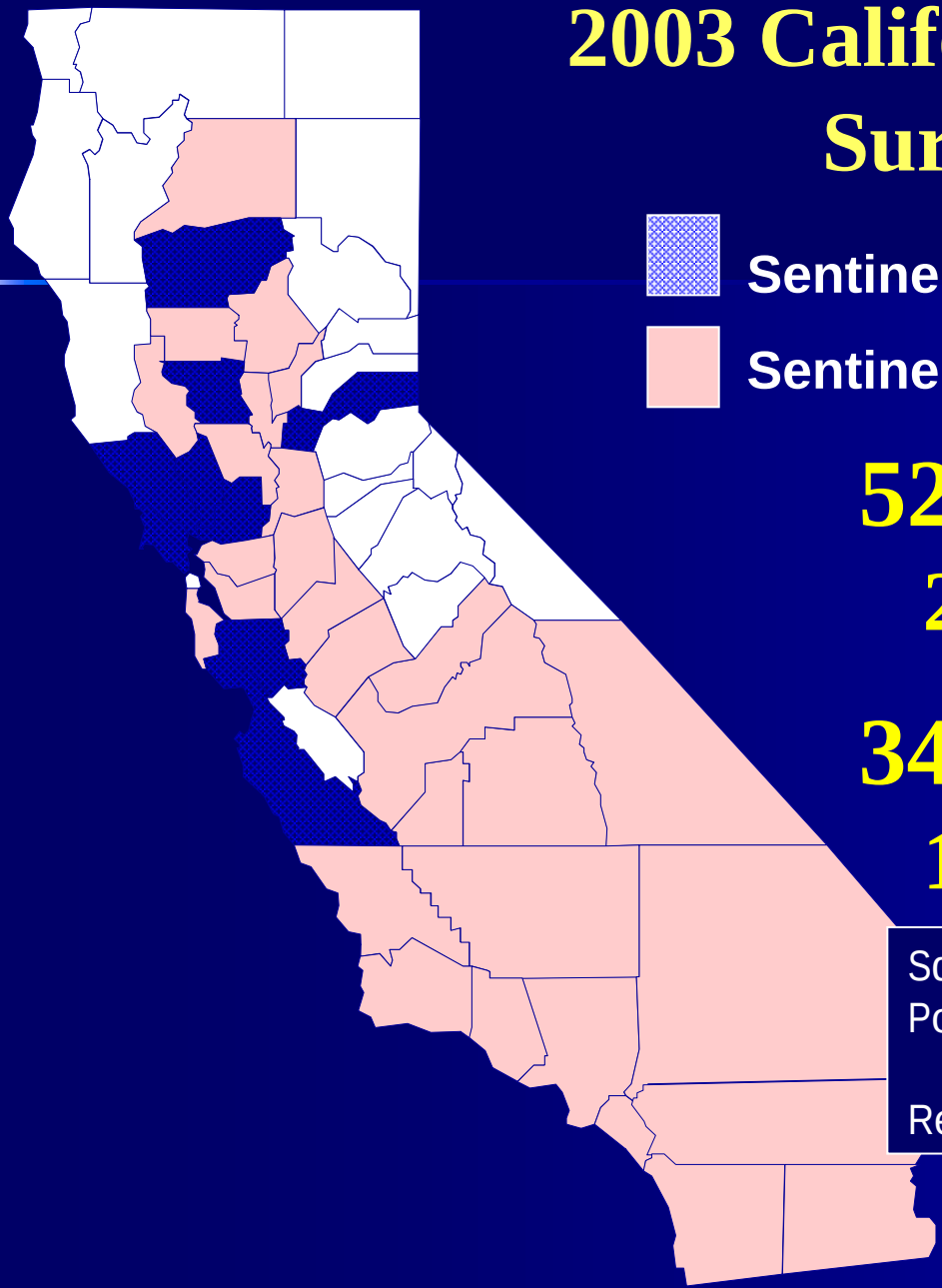
Possible routes for West Nile Virus invasion of California

Other affected western States such as Colorado through Arizona

Commerce? Previous human Case in LA

Spring migration 2003, because WN detected in several areas of Mexico

2003 California Arbovirus Surveillance



Sentinel flocks

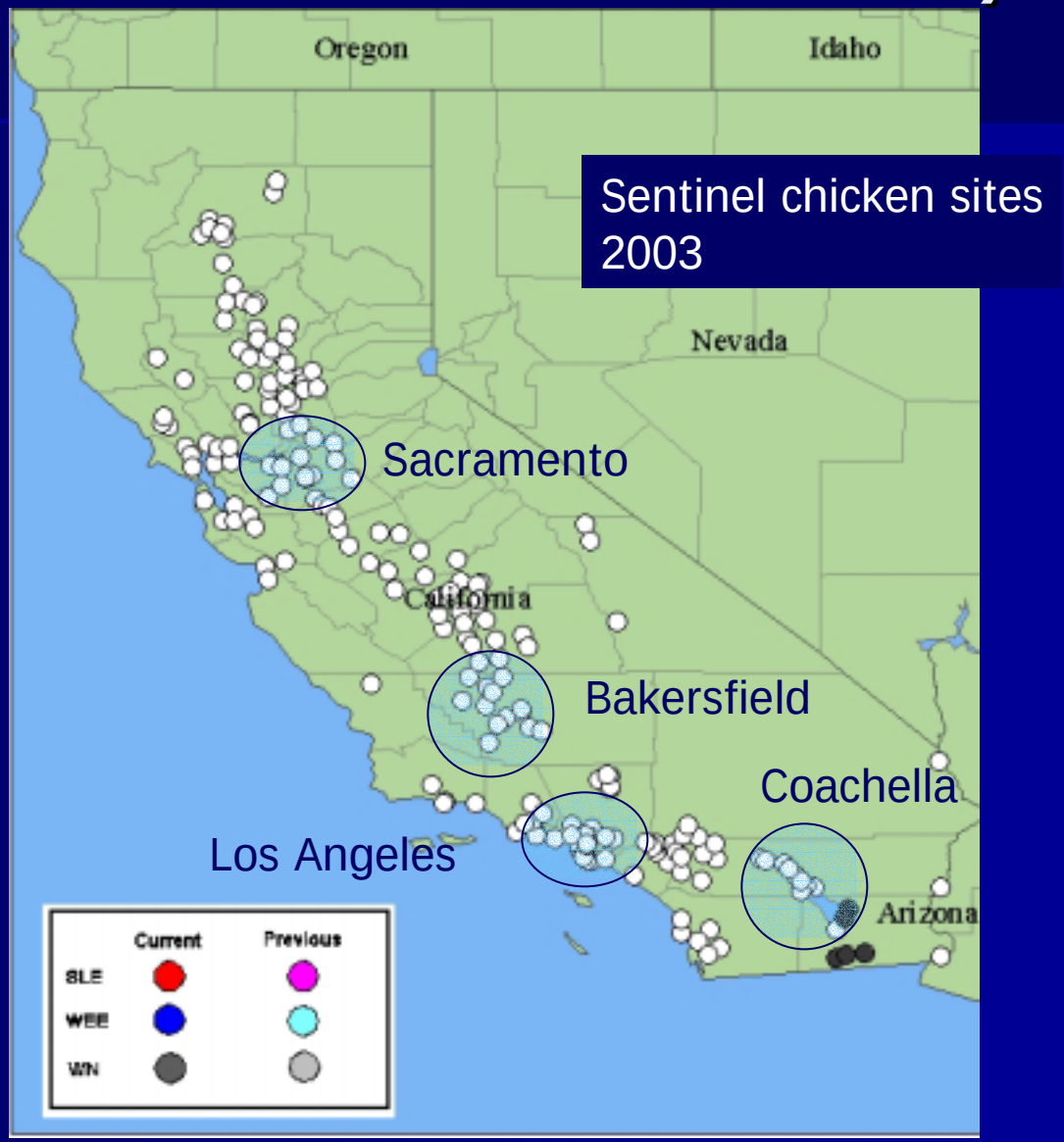
Sentinel flocks and mosquito pools

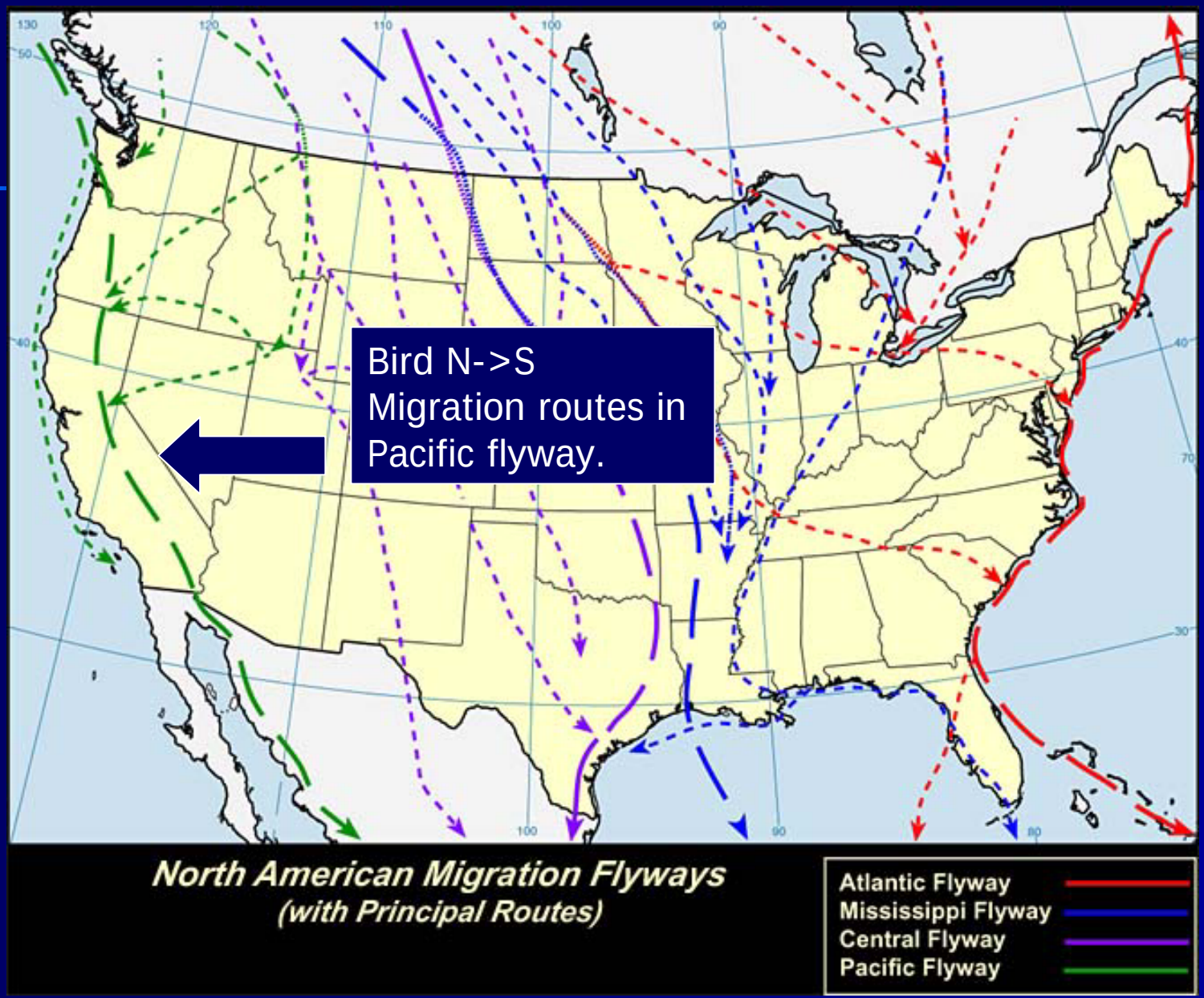
52 agencies
226 flocks

34 agencies
10,111 mosq. pools

Square miles: 59,561
Population protected: 26,900,000
[72% CA and 14% US pop]
Revenue: $75,841,000

COLLABORATIVE UC DAVIS/MVCD STUDY SITES, 2003



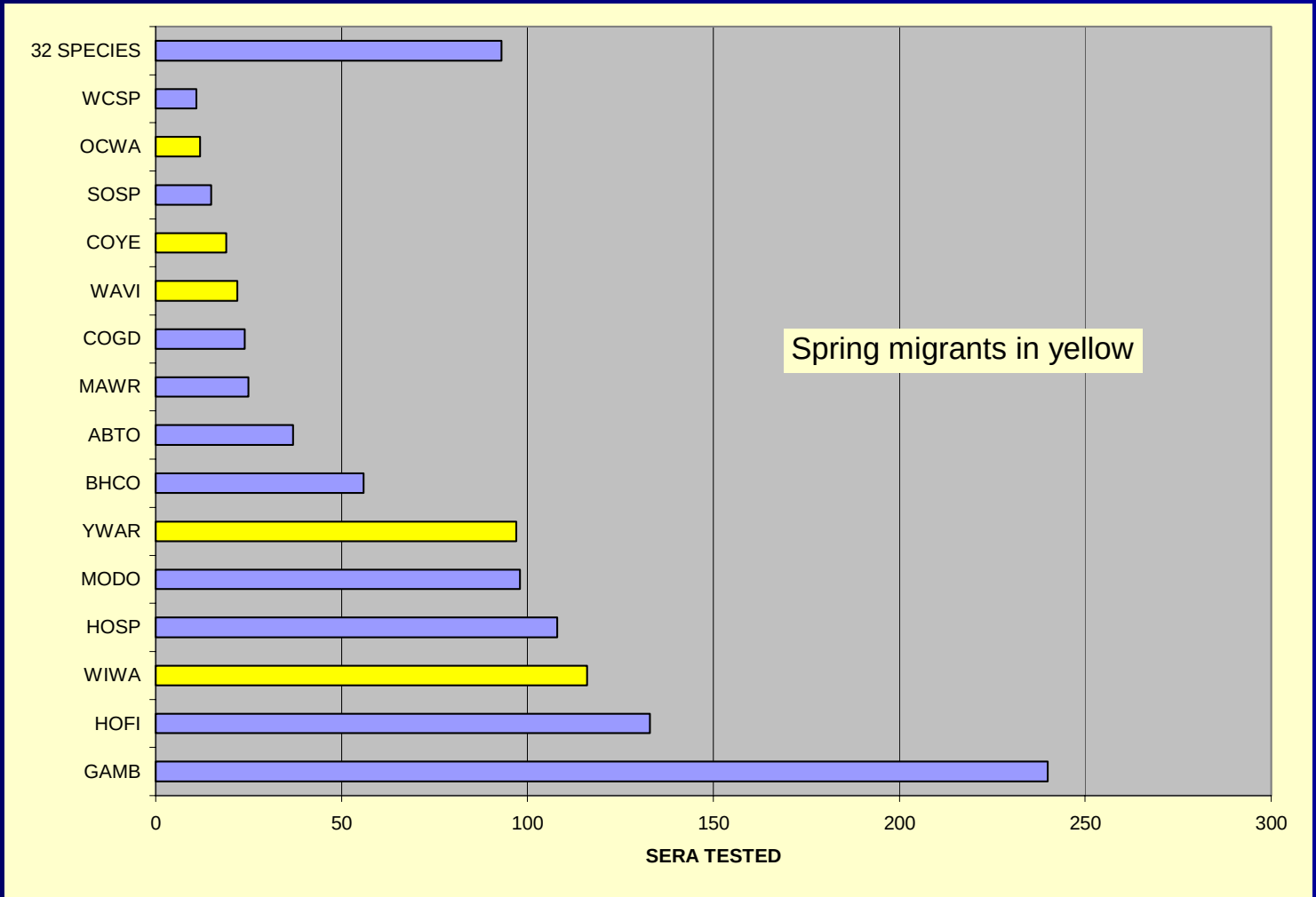

Bird N->S
Migration routes in
Pacific flyway.
North American Migration Flyways
(with Principal Routes)
Atlantic Flyway
Mississippi Flyway
Central Flyway
Pacific Flyway

Wild Bird Studies

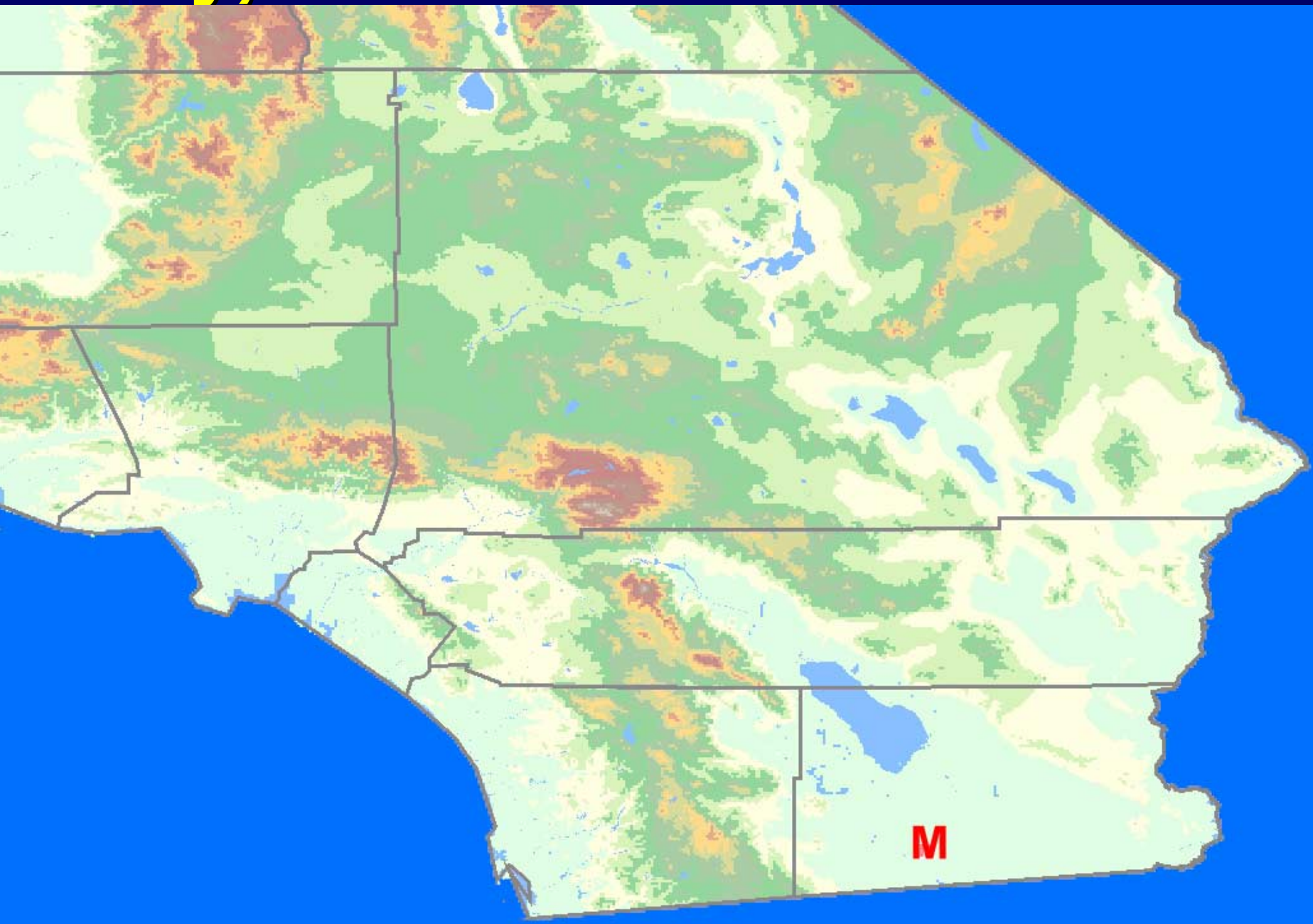
Serum samples tested for IgG antibody

For PRNT testing

Wild bird sera tested during spring, 2003

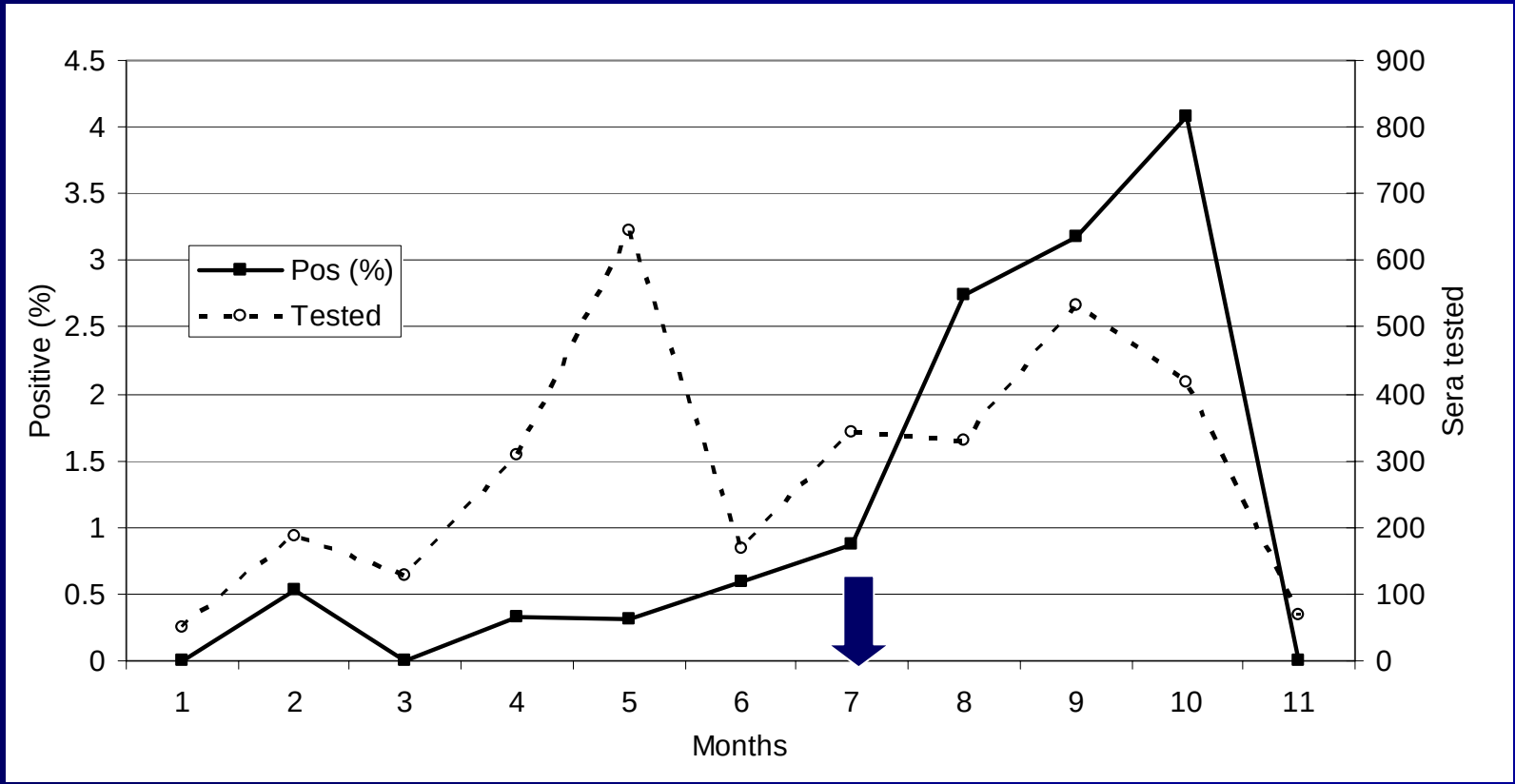


July, 2003



Southern shore of the Salton Sea, Imperial Co., California

Flavivirus seroprevalence in wild birds Coachella Valley 2003



EIA results only

Species with sera testing positive for arboviruses by EIA, Coachella Valley, 2003

Species	Sera tested	% Flavi	% WEE
ABTO	108	0.93	0
COGD	95	5.26	0
GAMB	643	3.27	0.16
HOFI	251	0.40	0
LEBI	10	10.00	0
MODO	729	1.51	0.14
PLPI	39	25.64	0
WWDO	6	16.67	0
58 species	1297	0.00	0
Total	3178	1.60	0.06

*confirmatory PRNTs pending

Results of cross PRNTs on birds with SLE EIA P/N >2.0 (difficulties associated with sympatric flaviviruses)

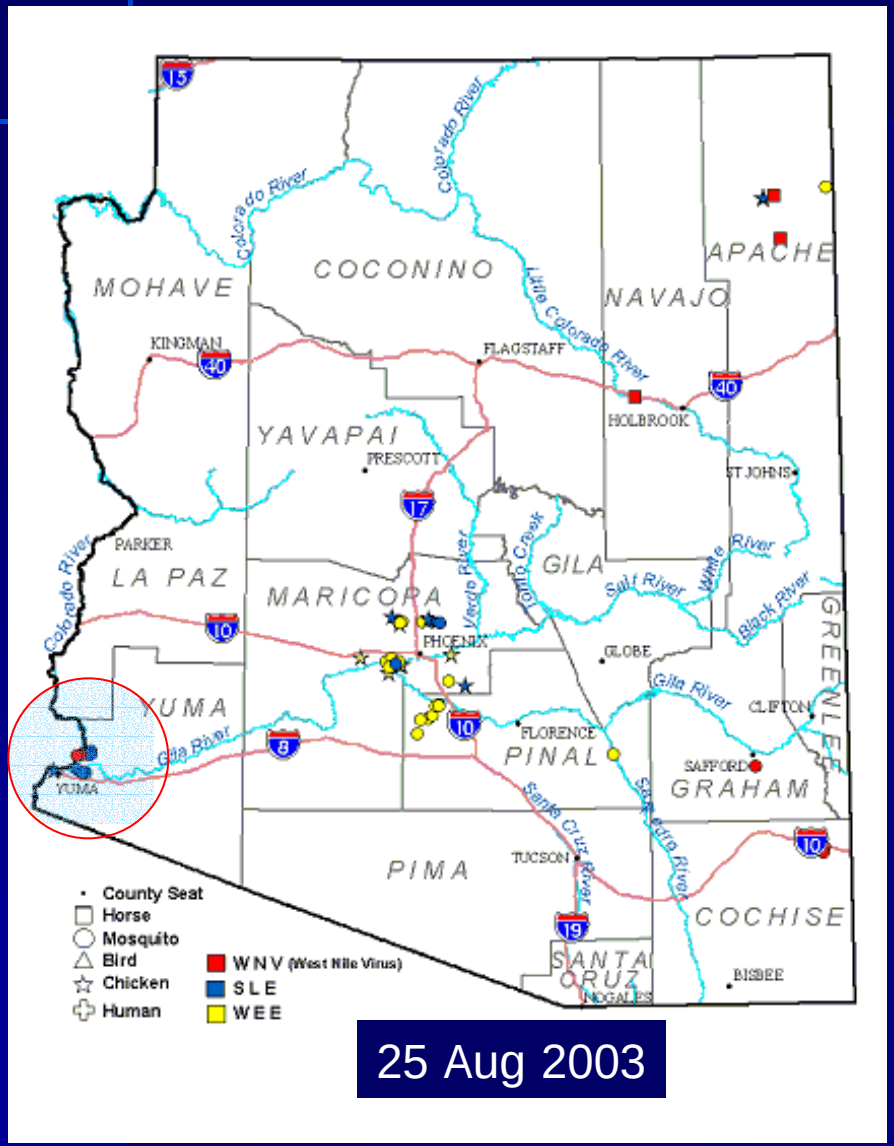
Sera No.	Week	Species	SLE EIA P/N	PRNT S	PRNT W	Virus
2410	38	ABTO	4.06	n	80	WNV
2079	35	COGD	2.70	20	40	WNV?
2393	38	COGD	4.16	20	160	WNV
2112	36	COGD	4.37	20	80	WNV
2408	38	GAMB	2.45	n	20	WNV?
2564	39	GAMB	2.98	160	80	SLEV?
2414	38	GAMB	4.73	20	n	SLEV?
2573	39	GAMB	7.71	n	160	WNV
2403	38	GAMB	11.24	80	40	SLEV?
2012	34	GAMB	14.40	80	80	??
1179	22	HOFI	3.82	20	n	SLEV?
2066	35	LEBI	3.70	40	n	SLEV?
2451	39	MODO	5.10	n	80	WNV
2133	36	MODO	5.90	40	n	SLEV
2455	39	MODO	7.10	20	40	WNV?
2397	38	WWDO	2.97	40	20	SLEV?
17 bloods			2.47-7.87	n	n	

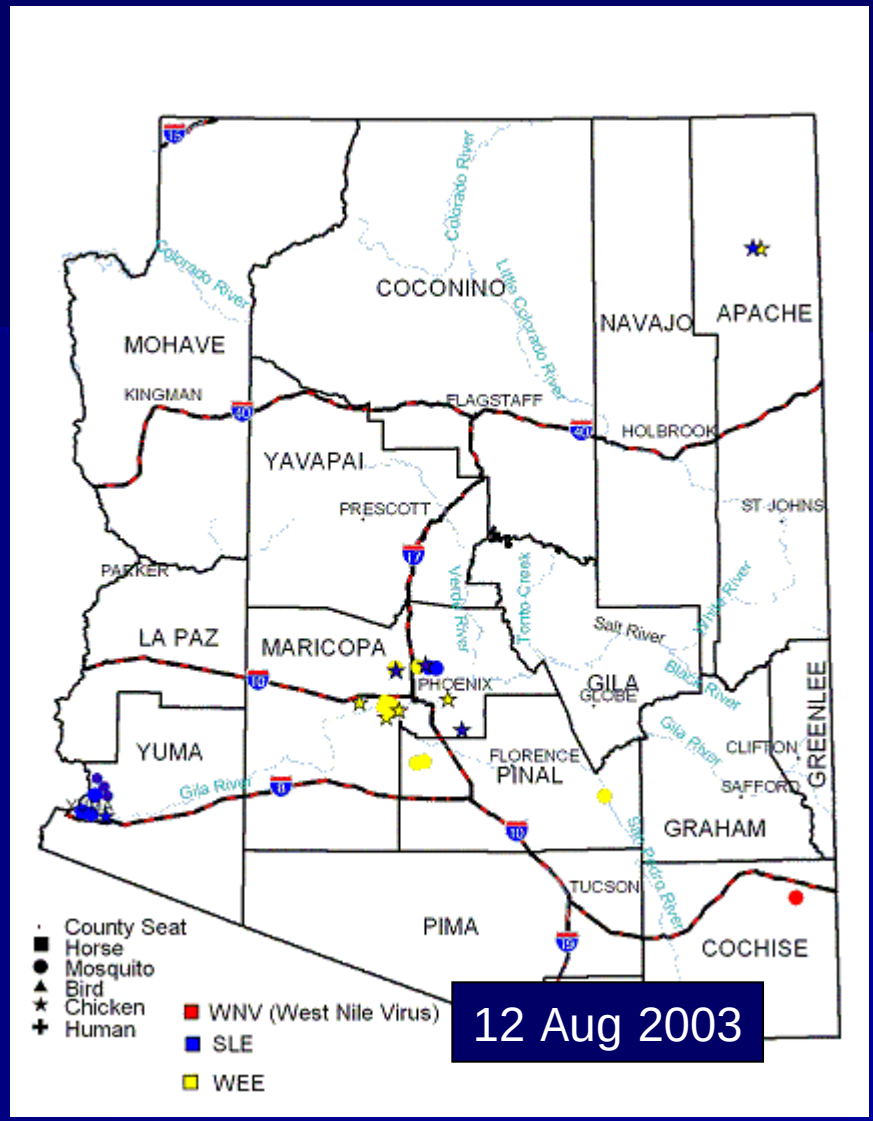
n = <1:20 [some <1:10]

Mosquito mechanisms

- Weather – storm fronts
- Commerce

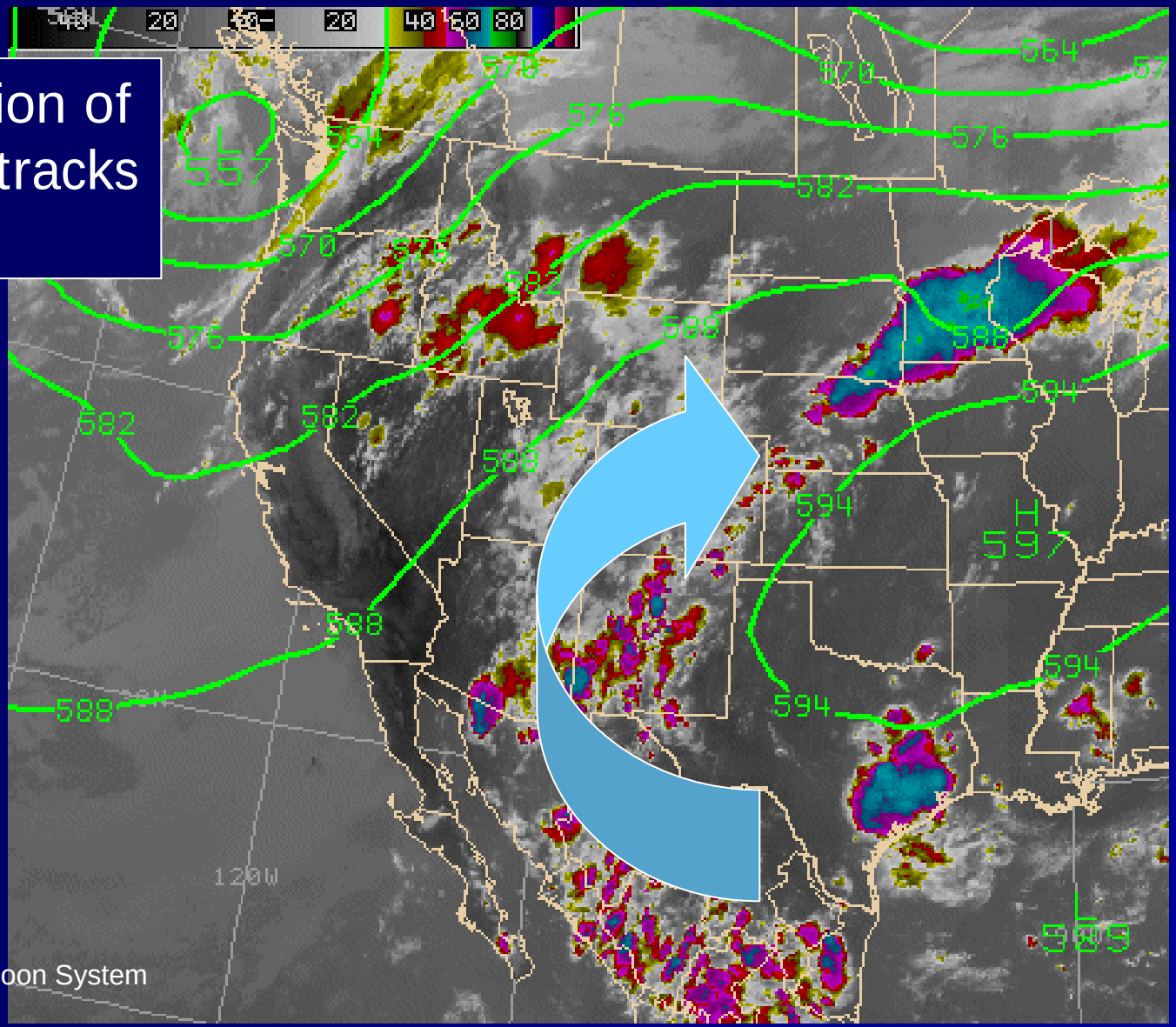
West Nile virus activity, Arizona, August 2003





Detected concurrently with WNV in Imperial Valley, California

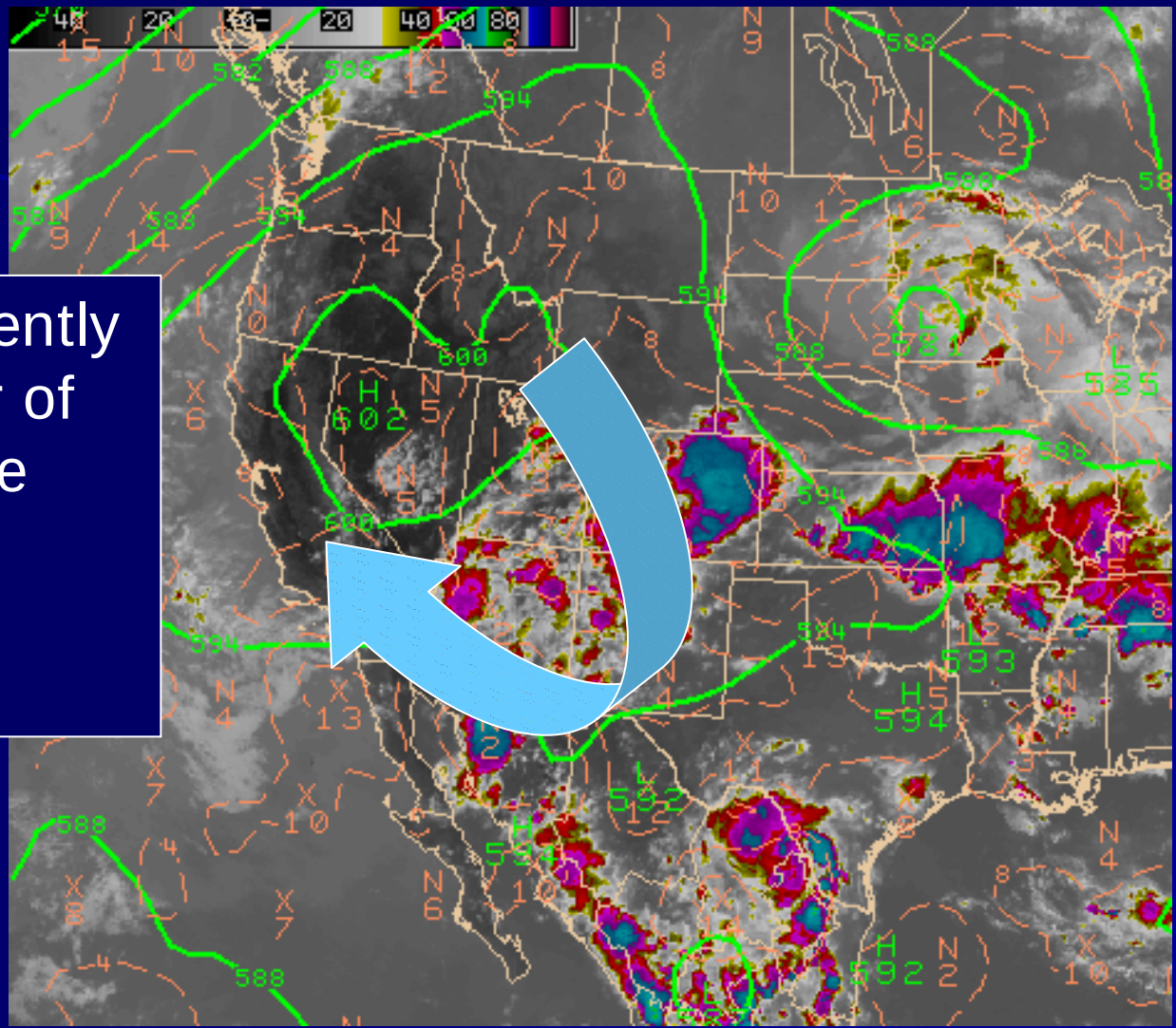
Frequent direction of summer storm tracks in the SW US



Acronyms to look for:
NAMS – North American Monsoon System
VAMOS -

From the web page:
http://www.srh.noaa.gov/abq/climate/Monthlyreports/July/nams.htm

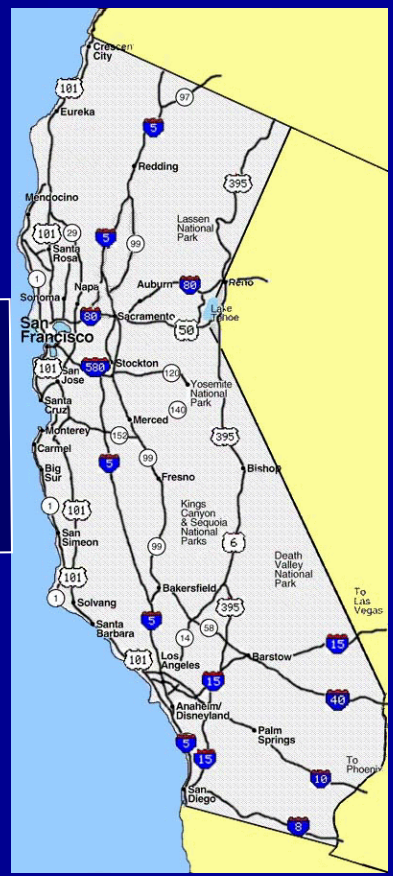
Pattern seen frequently during the summer of 2003 with clockwise flow around high pressure set over Nevada



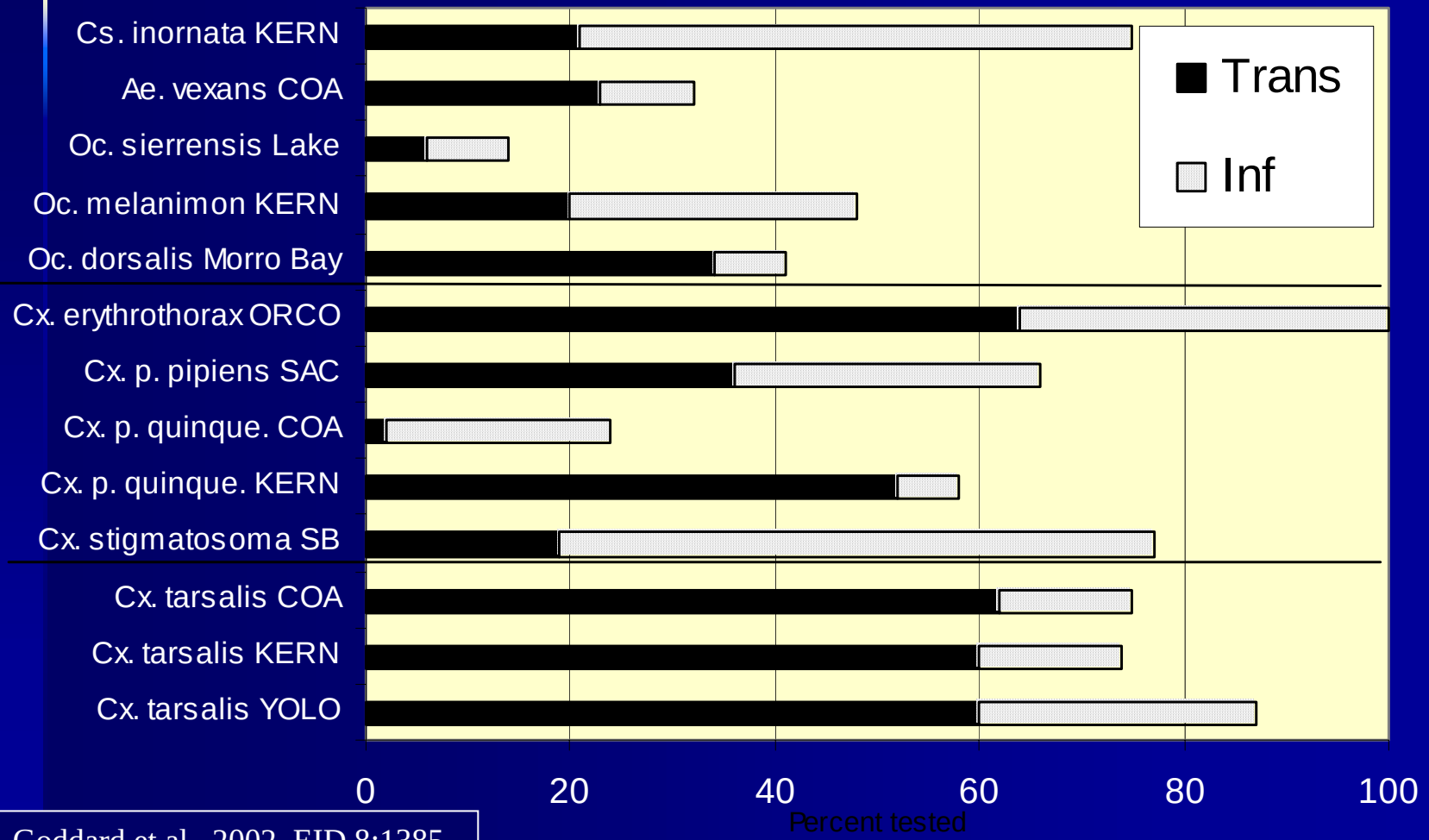
From the web page:
http://www.srh.noaa.gov/abq/climate/Monthlyreports/July/nams.htm

Infected mosquitoes moved by commerce from affected states or Mexico

Most E-W highways enter CA in south

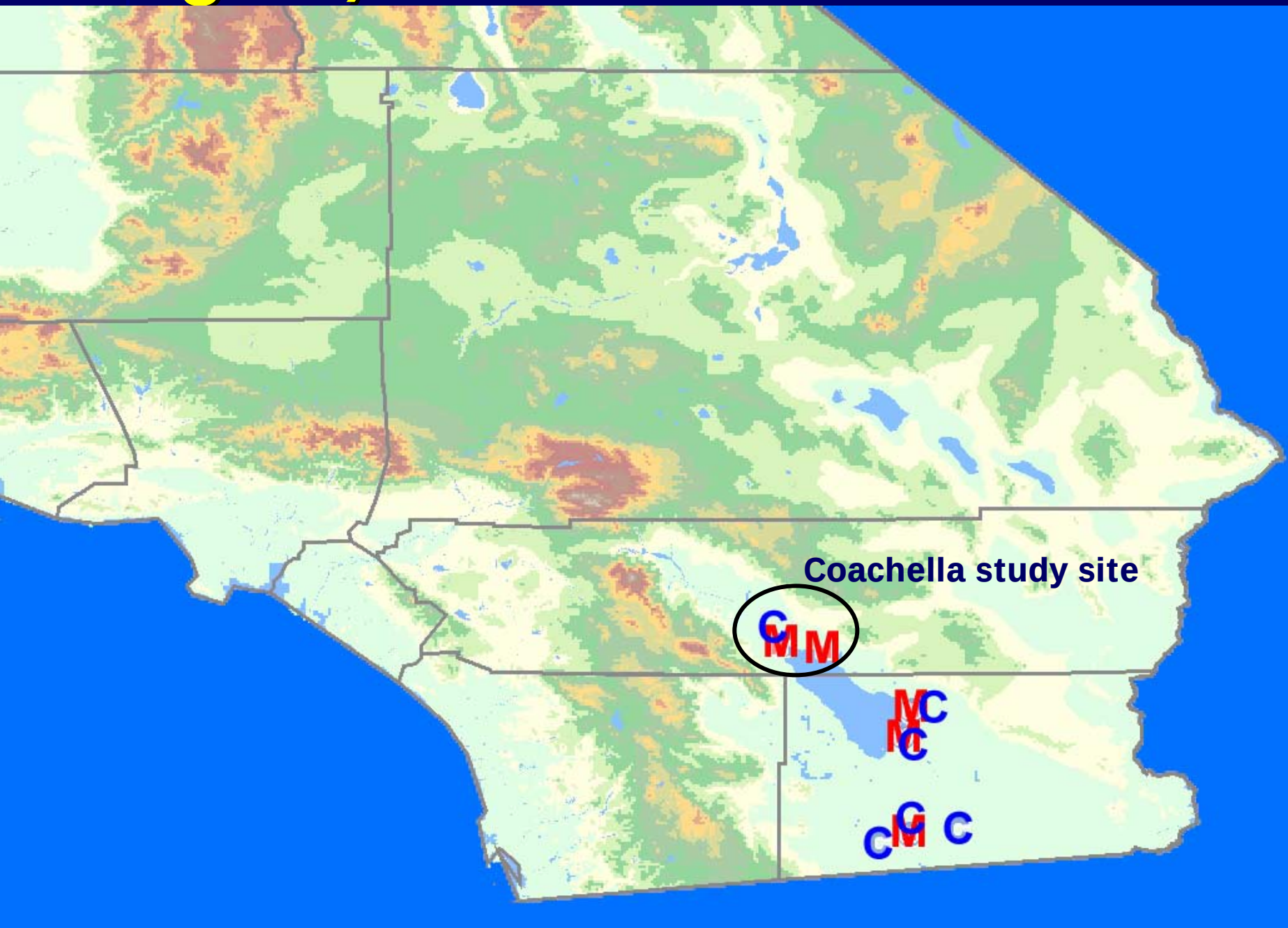


Vector competence of California mosquitoes for West Nile virus



Goddard et al. 2002. EID 8:1385

August, 2003



Mosquito Sampling

New Jersey light trap

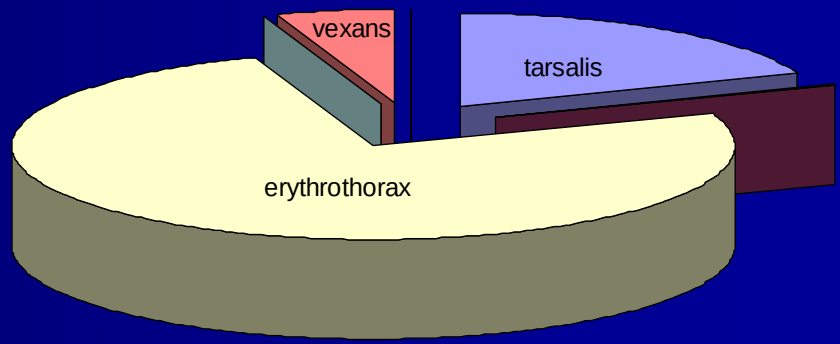
Dry ice-baited trap

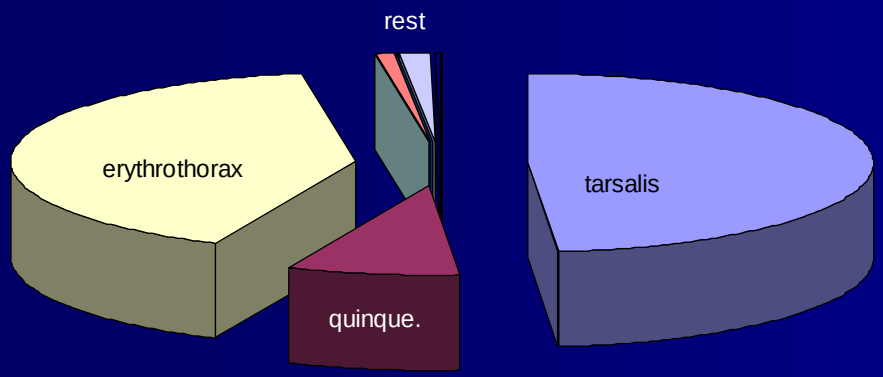
Gravid female trap

Specimens enumerated to species and pooled for virus testing

Situation at the time of WN virus introduction

IMPERIAL COUNTY
WETLANDS
N = 24,566
tn = 64

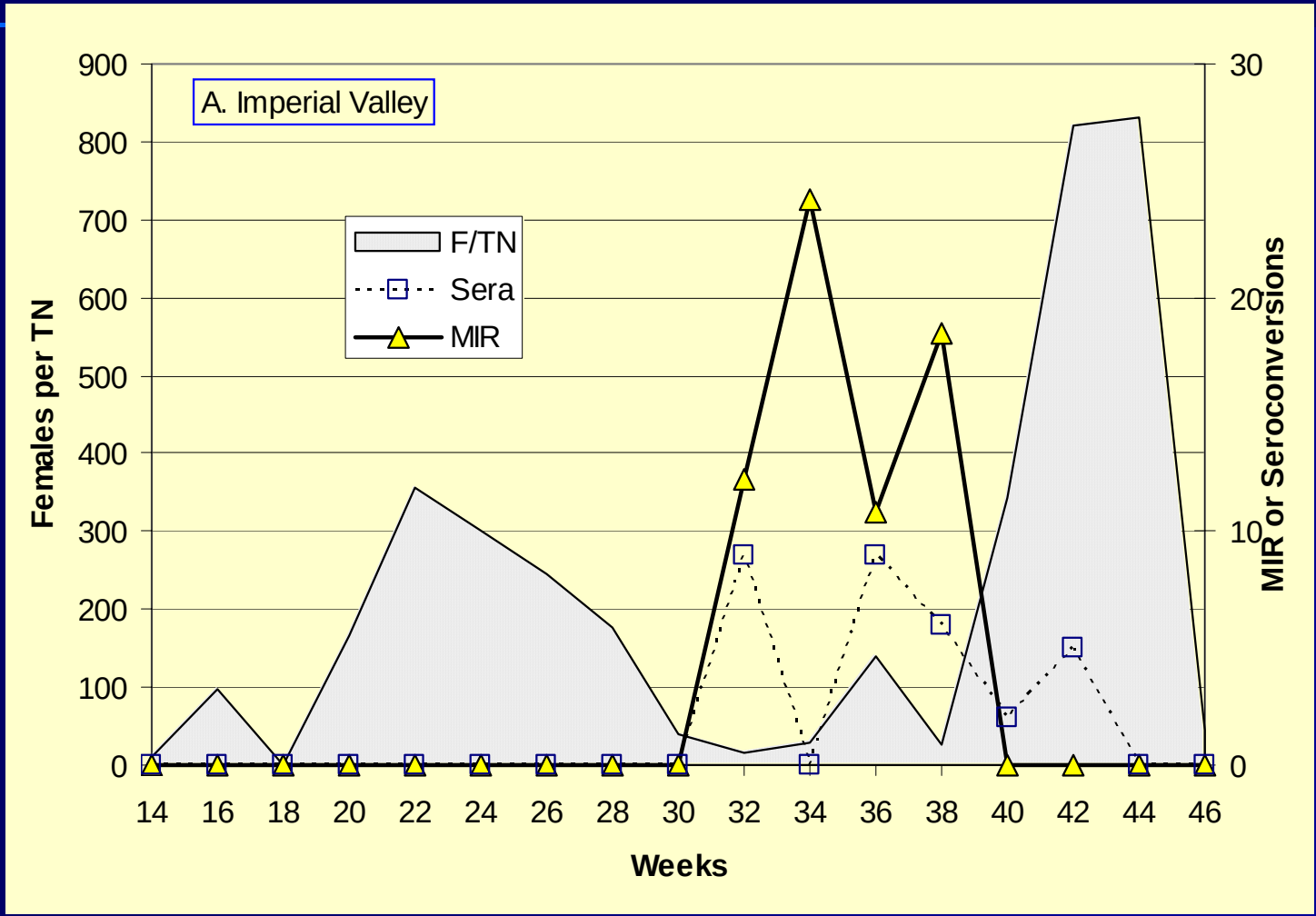




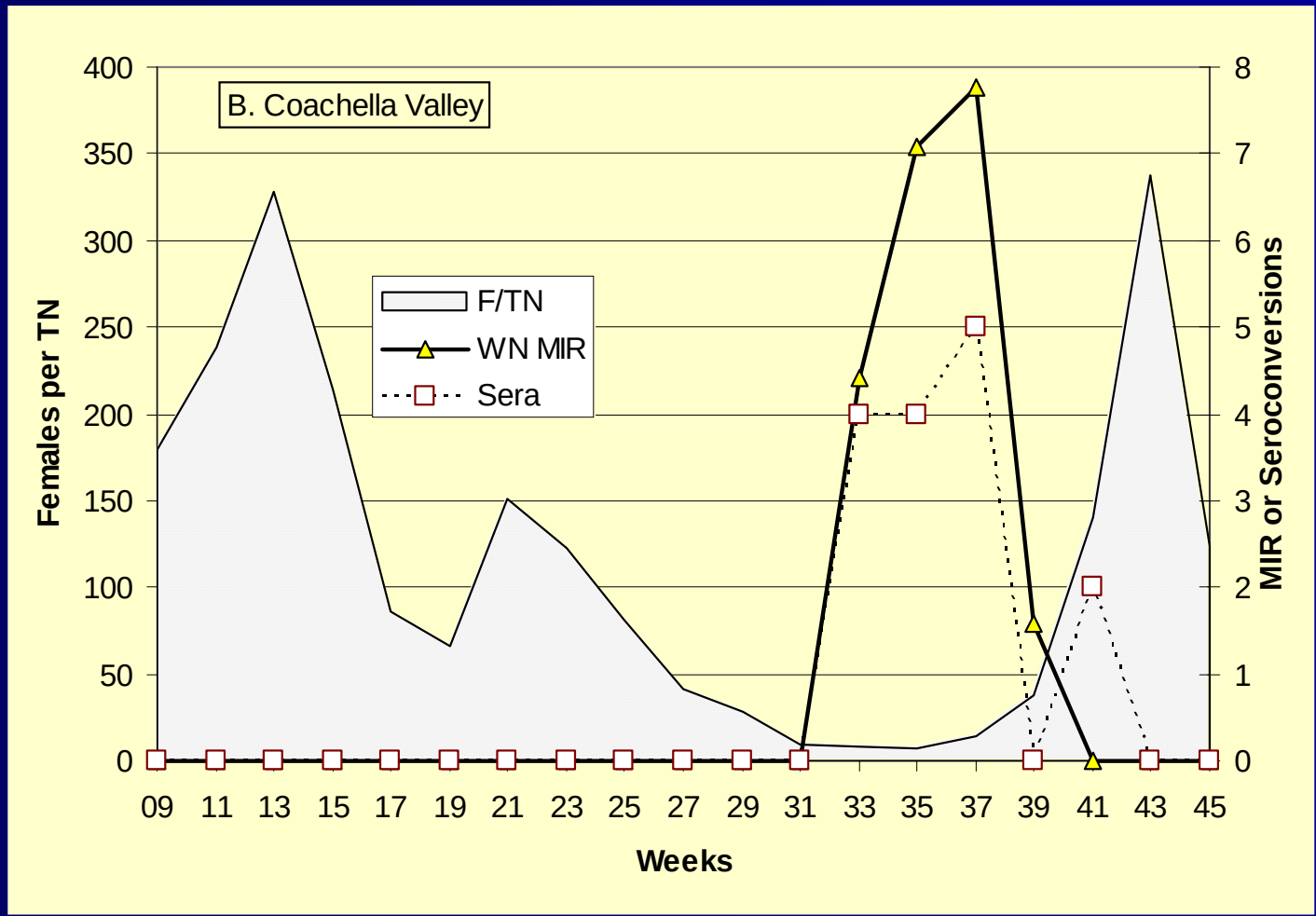
COACHELLA VALLEY
N = 133,676
tn = 585

Mosquito species composition

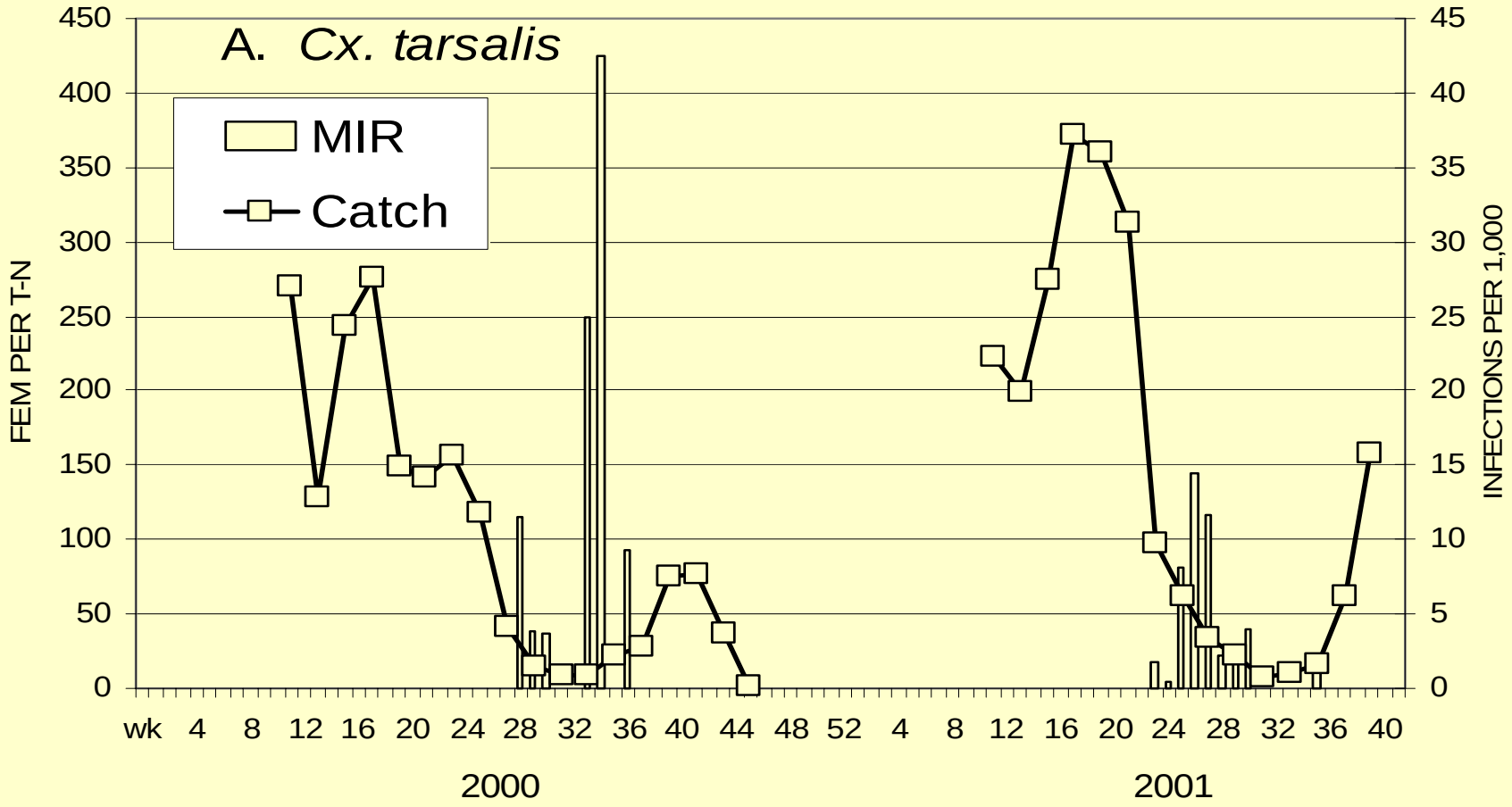
Enzootic activity
Imperial County, 2003



Enzootic Activity Coachella Valley, 2003

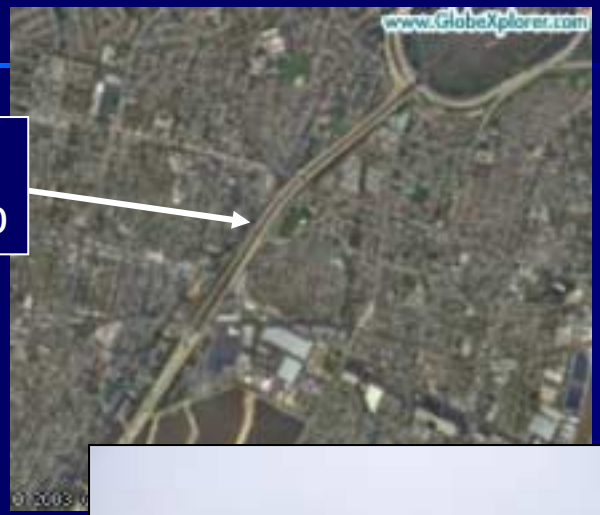


Vector abundance and infection rates with SLE, Coachella Valley, 2000-01



Reisen et al. 2002. JME 39: 763

Whittier narrows site of WNV introduction, Los Angeles Co.?



Rio Hondo

Gravid trap site

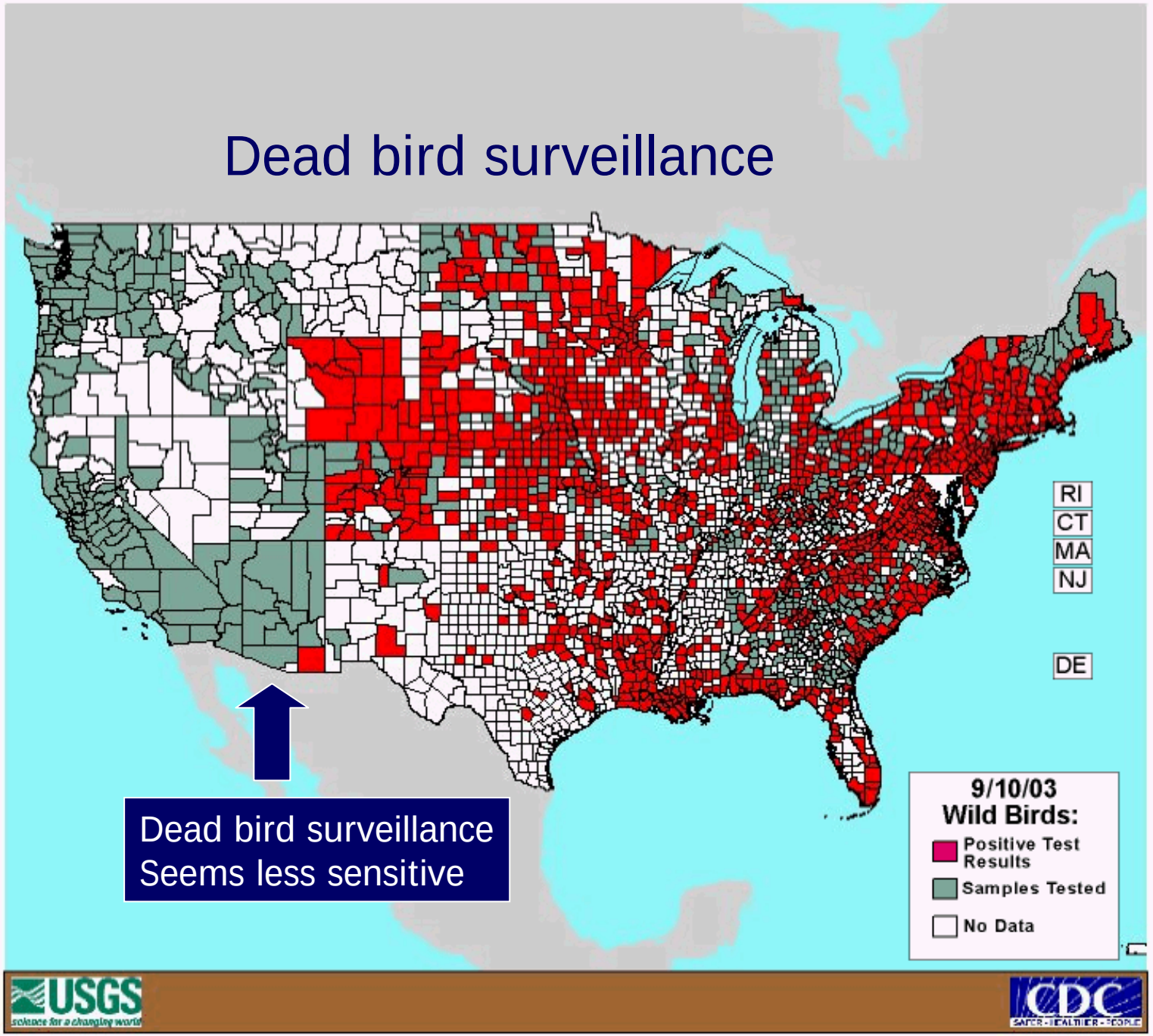
Urban horse sites

September, 2003

Dead Birds

Human Case

Dead bird surveillance



Dead bird surveillance
Seems less sensitive

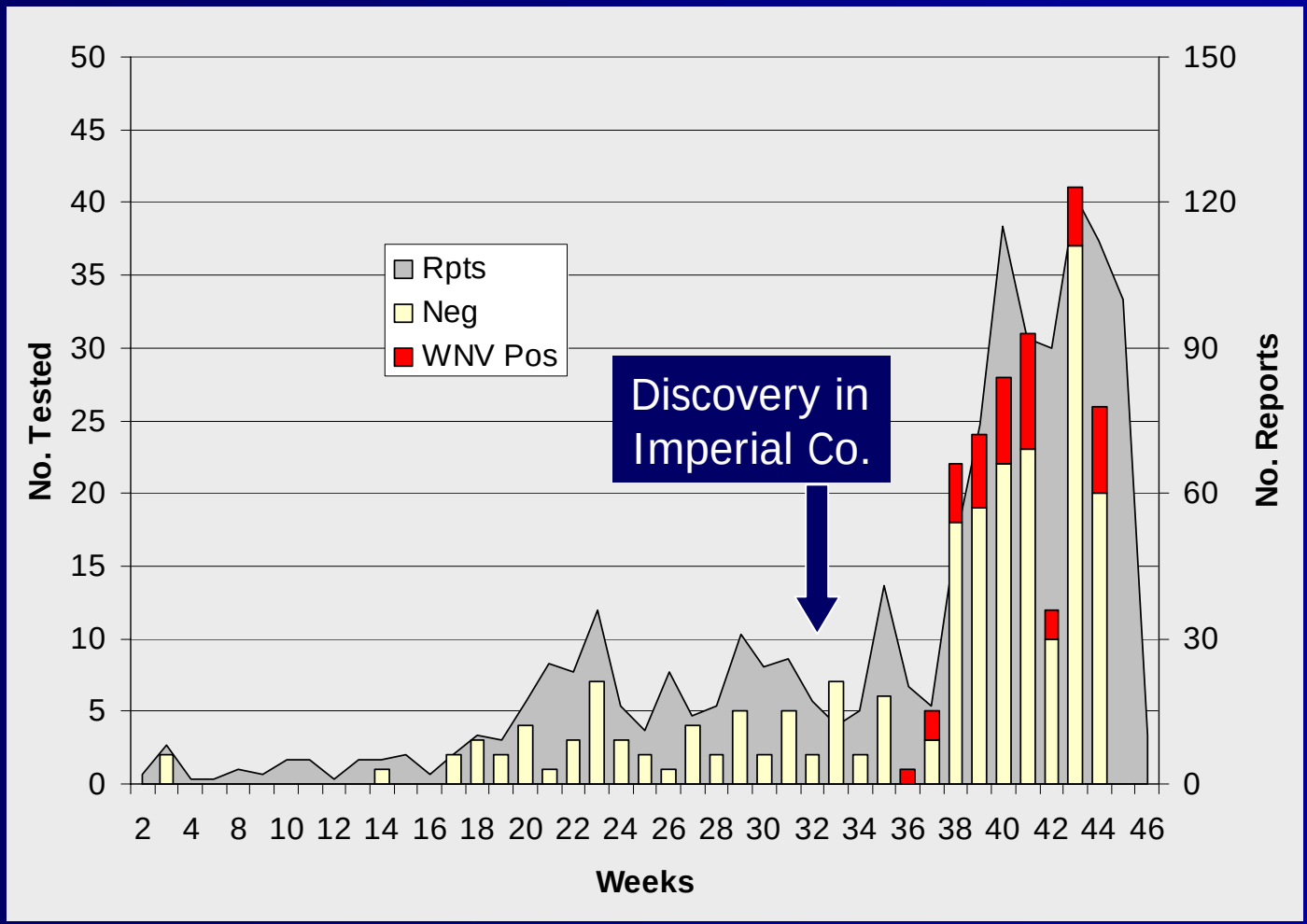
American Crow breeding bird survey

BBS limit

101 and above
31 to 100
11 to 30
4 to 10
2 to 3
One and below
None Counted

Less people
Less crows
Dead bird surveillance?

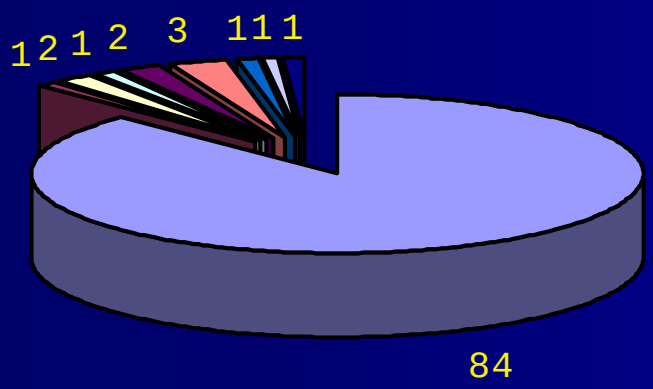
Los Angeles County, 2003
Dead bird reports and test results



Dead Bird WNV positives (TaqMan RT-PCR)

First from AMCR in L.A. Sep. 3

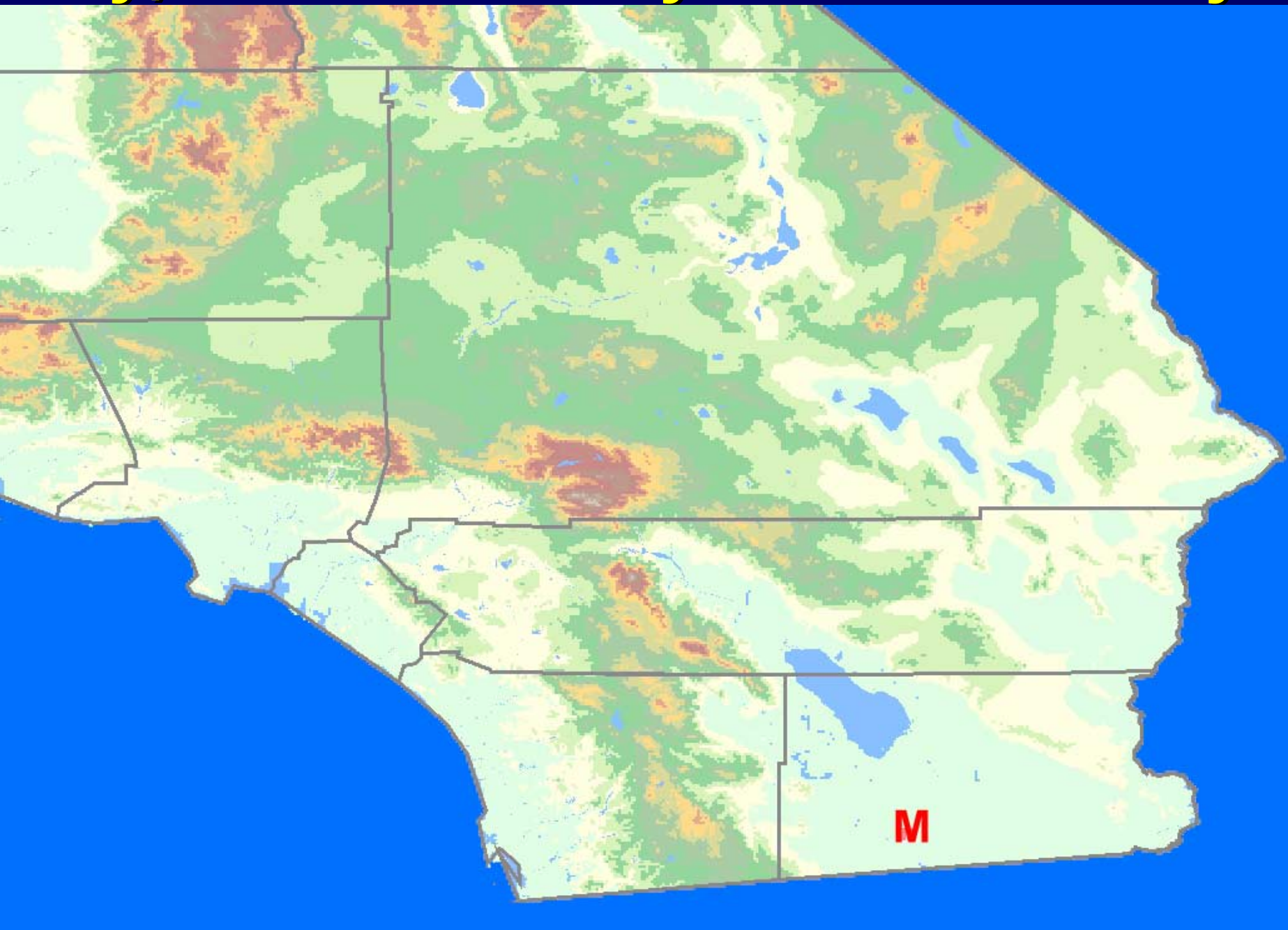
(Total 96)



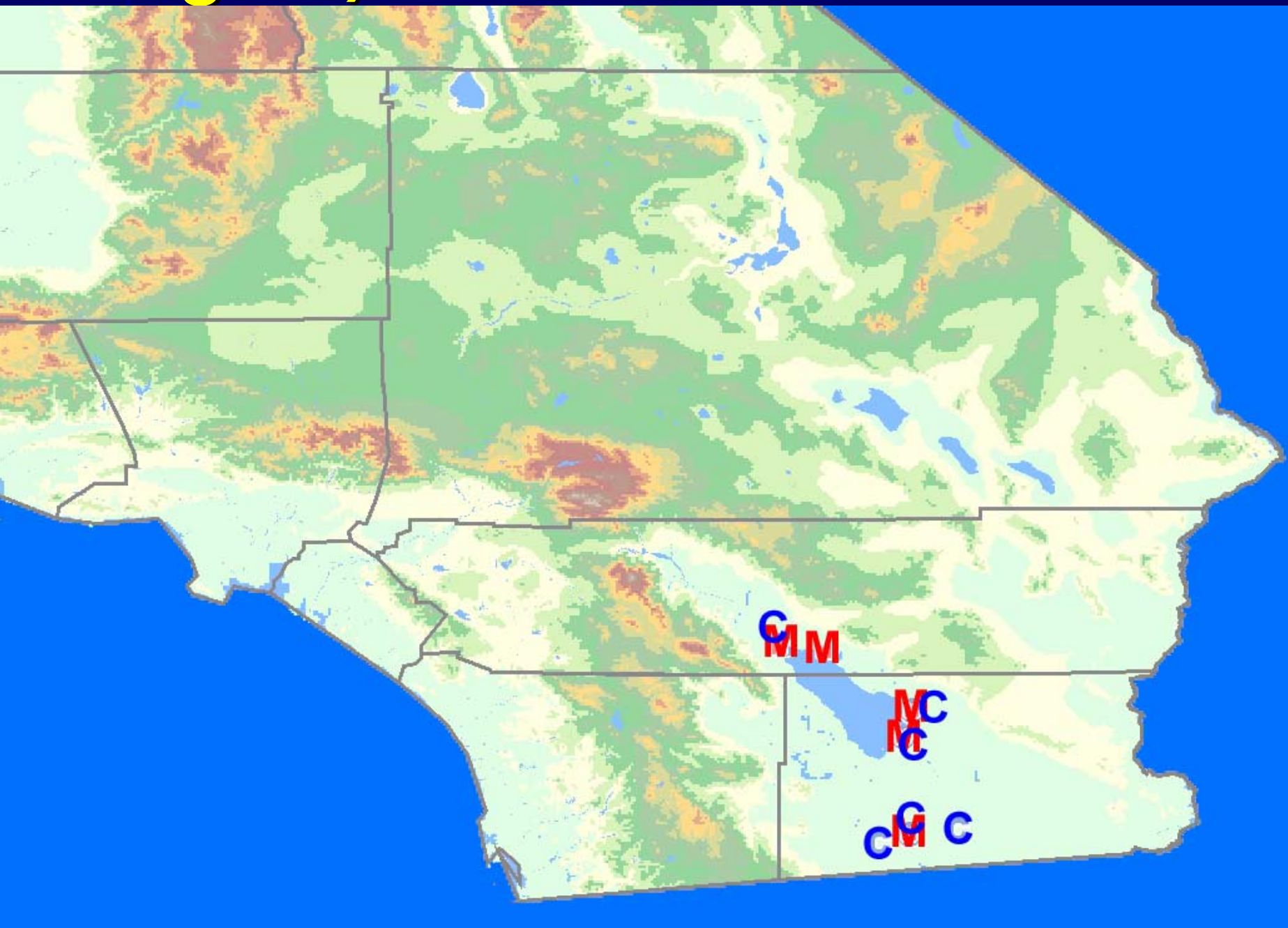
Los Angeles (65), Riverside (13),
San Bernadino (10), Orange 3), San Diego (5)

- American crow
- Common Raven
- Western Scrub Jay
- Brewer's Blackbird
- House Finch
- House Sparrow
- Northern Flicker
- White-crowned Sparrow
- Northern Mockingbird

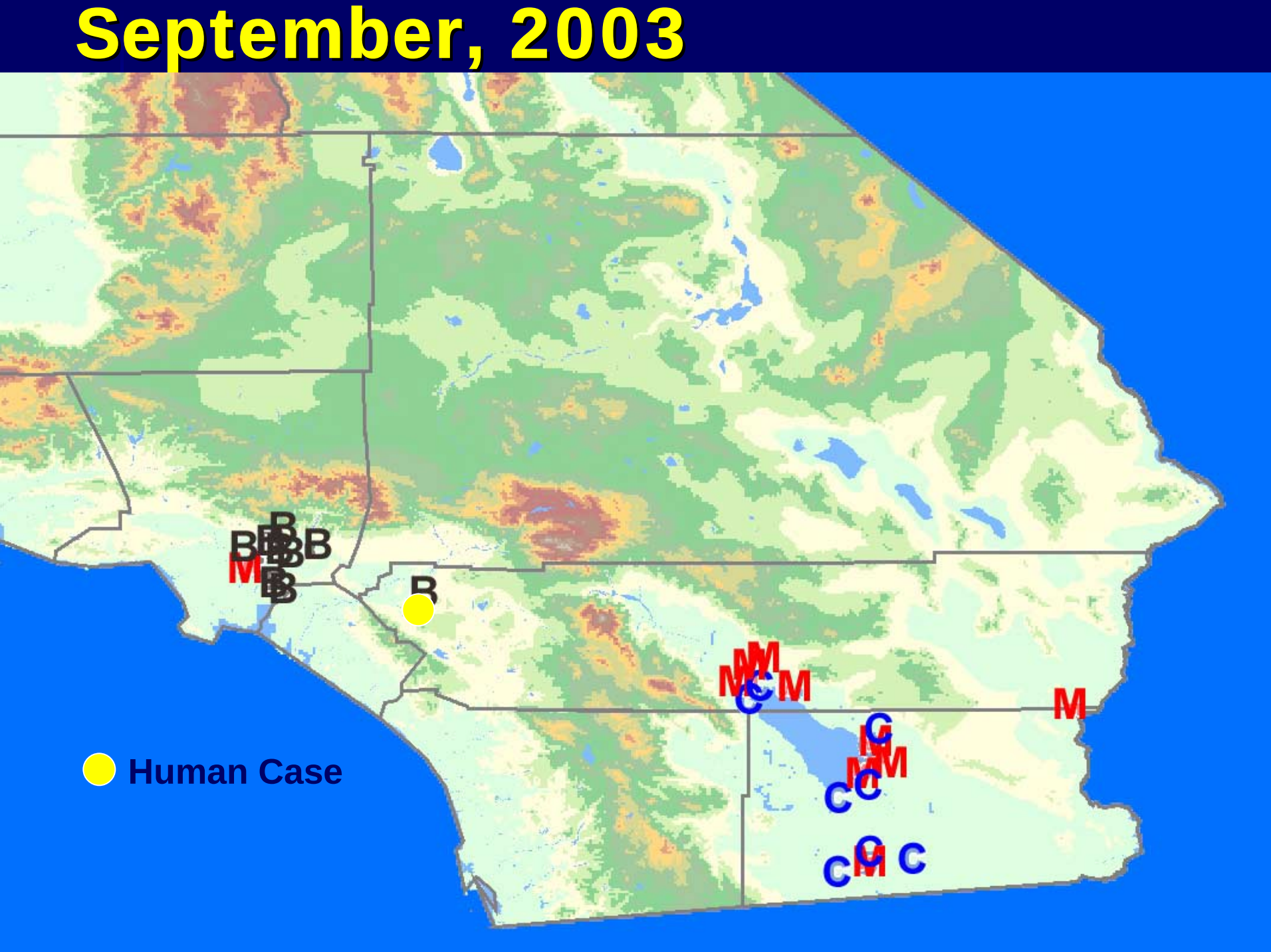
July, 2003 Summary of WNV Activity



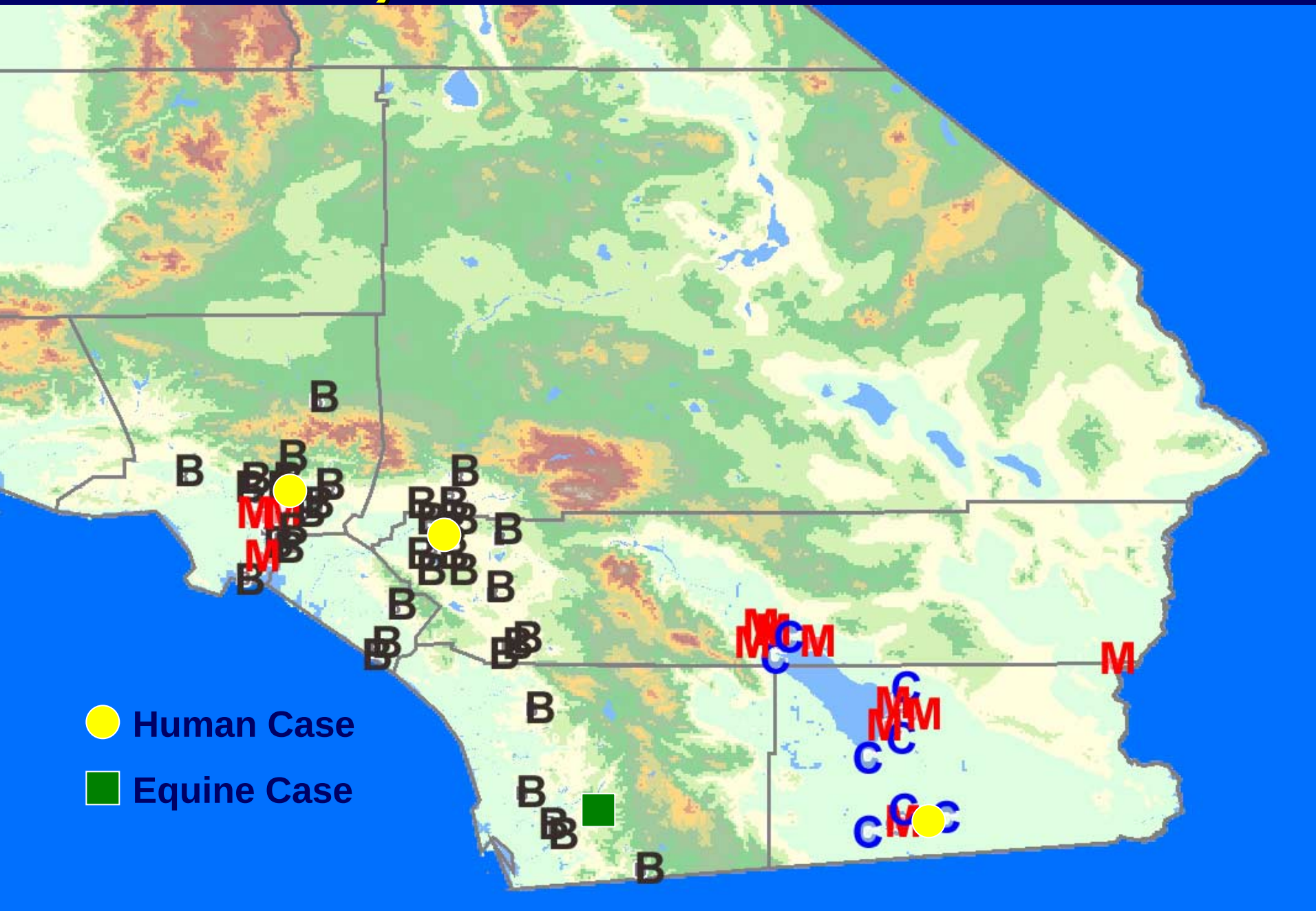
August, 2003



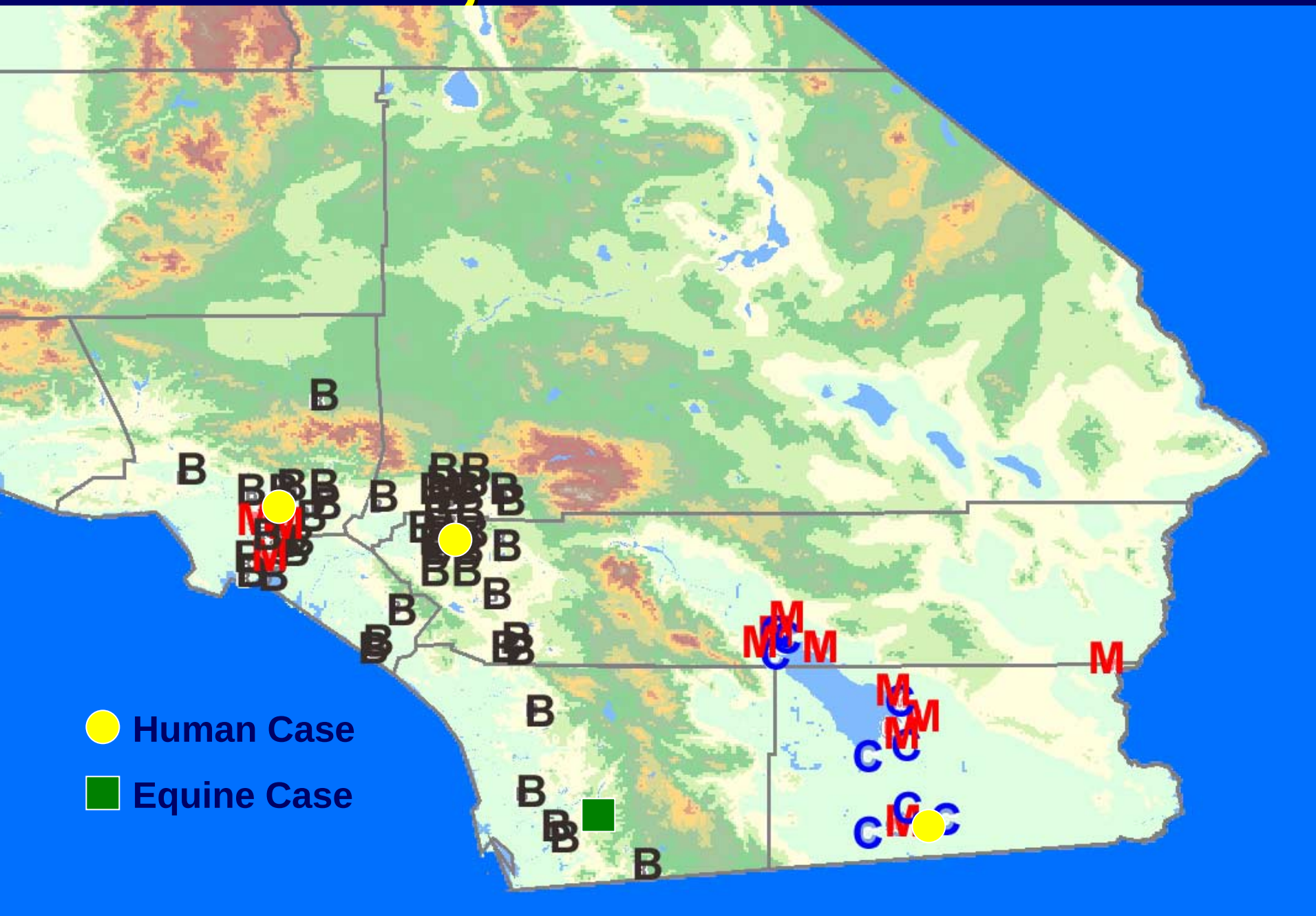
September, 2003



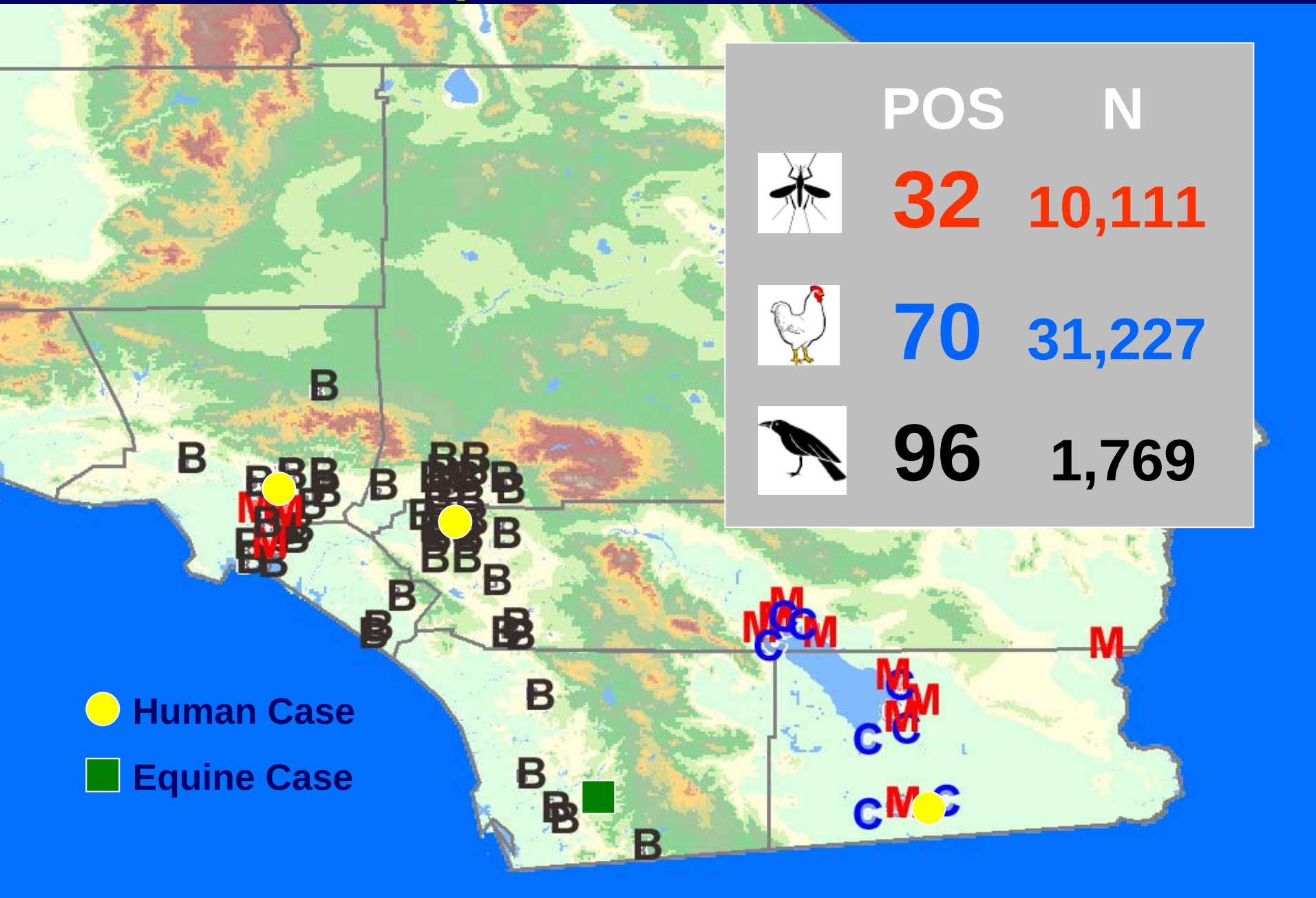
October, 2003



November, 2003



December, 2003



West Nile Virus Positive Counties

2003

Introduction in 2003 has left us with a lot of questions…

- Will WNV persist?
- What will be the persistence mechanism[s]?
- Will WN amplify to high levels as in Colorado? [14 cases in 2002; 2170 cases in 2003]
- How will WNV affect SLEV?
- Will WNV disperse into the Central Valley?

2004 Movement of WNV into the Central Valley?