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2008 WEST NILE VIRUS SURVEILLANCE SUMMARY

2008 Summary of Reported Cases among Orange County Residents

A total of 79 West Nile Virus (WNV) infections were reported among Orange County residents in 2008 (Table 1). Of these, 54 (68%) cases had West Nile neuroinvasive disease (WNND), 17 (22%) cases had West Nile fever (WNF), and 8 (10%) were asymptomatic positive blood donors (BD+). Dates of onset for symptomatic cases ranged from disease week 27 (late June) to disease week 41 (early October), with a peak in disease week 33 (mid-August), as depicted in Figure 1. Among the WNND cases, 25 (46%) had encephalitis, 24 (44%) had meningitis, and 5 (9%), had acute flaccid paralysis[1].

The median age of all WNV infections, including blood donors, was 53 years (range: 4-90 years), and 53 (67%) were male. The median age of WNND cases was 53 years (range: 4-90 years), and 35 (65%) were male. WNF cases had a median age of 56 years (range: 27-80 years), and 12 (71%) were male. Positive blood donors had a median age of 45 years (range: 18-62 years) and 6 (75%) were male. The distribution of all infections by age category is depicted in Figure 2. WNND cases comprised the largest number of cases within each age category, with the greatest number of WNND cases (n=19) in the oldest age category (65+ years).

Among symptomatic cases (WNND and WNF) for whom race and ethnicity information was known (n=57), 35 (61%) were identified as White Non-Hispanic and 16 (28%) were White Hispanic. Black Non-Hispanic and Other (both Hispanic and Non-Hispanic) together made up a small proportion of symptomatic cases (6, or 11%). A similar pattern was seen within the WNND and WNF groups: 27 (60%) White Non-Hispanic and 13 (29%) White Hispanic among WNND cases, and 8 (67%) White Non-Hispanic and 3 (25%) White Hispanic among WNF cases. Race and ethnicity information was not consistently available for BD+.

Fifty-four (76%) of the 71 symptomatic cases were hospitalized, including 51 (94%) of the 54 WNND cases and 3 (18%) of the 17 WNF cases. Of the 54 cases that were hospitalized, 33 (61%) cases were discharged to home and 2 (4%) expired during their hospitalization, with a median length of stay in the hospital of 6 days (range: 1-21 days). The remaining 19 (35%) hospitalized cases were discharged to a sub-acute care facility. As of March 26, 2009, 16 (84%) of the patients in sub-acute care were discharged to home, 2 (11%) remained in sub-acute care, and 1 (5%) case expired. The total (hospital plus sub-acute) median length of stay for the 17 cases that were discharged from a sub-acute care facility, including the one case that expired, was 45 days (range: 11-164 days). For these cases, the median length of stay within the sub-acute care facilities alone was 17 days (range: 7-135 days). The total length of stay (hospital plus sub-acute) for the two cases remaining in sub-acute care was 191 and 234 days, as of March 26, 2009.

A total of three WNV case fatalities (4% of symptomatic cases) were reported in 2008, of which all were WNND cases: two WNND-acute flaccid paralysis cases and one WNND-encephalitis case. All were hospitalized.

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[1] Cases with acute flaccid paralysis could also have encephalitis and/or meningitis.

The overall incidence for symptomatic cases in Orange County was 2.27 per 100,000 population.[2] In general, the incidence of WNV cases was greater in cities located in the northern and central parts of the county. As exposure could vary based on travel and other factors, it is important to note that reported city of residence for infections does not necessarily imply location of West Nile Virus exposure.

West Nile Virus in Previous Years: Reported Cases among Orange County Residents

Reported human infections with WNV in 2008 (N=79) surpassed the previous peak in 2004 (N=64), the first year that human WNV cases were reported in Orange County. The 2005, 2006, and 2007 seasons were mild in comparison (Table 2 and Figure 3). There were 10 total infections reported in 2007: 6 WNND, 3 WNF, and 1 BD+. In 2006, there were a total of 7 infections reported (4 WNND, 2 WNF, 1 BD+) and in 2005 the number of reported infections totaled 17 (13 WNND, 4 WNF).[3] The 2004 WNV season had a total of 64 reported WNV infections: 34 (53%) WNND cases, 28 (44%) WNF cases, and 2 (3%) BD+. Four (6%) of the symptomatic cases in 2004 died, all of whom had WNND-encephalitis.

The percent hospitalized and the median length of stay within a hospital and sub-acute care facility for WNV symptomatic cases reported from 2004 through 2008 are summarized in Table 3. There were a total of 165 symptomatic WNV cases reported, with 116 (70%) admitted to a hospital. WNND cases accounted for 92% (n=107) of hospitalized cases. A greater proportion of WNND cases were hospitalized (96%) compared to WNF cases (17%). Among the WNND cases transferred to sub-acute care after hospitalization, 66% (n=21) had encephalitis. Median length of stay was longer for WNND-encephalitis cases in both hospital and sub-acute care settings compared to WNND-meningitis cases. Overall, median length of stay within a hospital was longest for WNND-acute flaccid paralysis cases with a median of 15 days (range: 6-88 days). Total median length of stay in hospital and sub-acute care facility (including those cases hospitalized without subsequent sub-acute care) was greatest for WNND-acute flaccid paralysis cases, with a median length of stay of 27 days (range: 6-191 days).

West Nile Virus Transmission: Initial Detection of Seasonal Activity

WNV is characterized by a transmission cycle that involves birds and mosquitoes, which are monitored by the Orange County Vector Control District. In 2008, a WNV-positive dead bird was the first indicator of WNV activity detected in Orange County (April), followed by detection of a positive mosquito pool (April), and then by onset of a human case (June), as depicted in Figure 4. In each season since WNV first appeared in Orange County, the detection of a WNV-positive dead bird has been the first sign of the impending WNV season. In 2006 and 2007, the first human case onset occurred before the first positive mosquito pool was detected. Among reported human WNV cases in 2004 through 2008, the earliest onsets of symptoms were in June or July and the last observed onsets were in September or October.

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[2] Population denominator from State of California, Department of Finance, E-1 Population Estimates for Cities, Counties and the State with Annual Percent Change — January 1, 2007 and 2008. Sacramento, California, May 2008.

[3] West Nile Virus-positive blood donors were not included in official California statistics until 2006.

2008 State and National West Nile Virus Activity

Statewide WNV activity in 2008 was widespread, with West Nile Virus detected in 49 of 58 counties. As of March 13, 2009, twenty-seven counties had reported human activity with a total of 445 WNV cases. Of the 445 cases, 293 (66%) were WNND. An additional 53 blood donors tested positive for WNV for a total of 498 WNV infections. There were 15 deaths reported (3% of symptomatic cases). The median age of all cases was 55 years (range: 3-94 years) and 283 (64%) of the cases were male. As of March 13, 2009, the statewide WNV symptomatic case incidence for 2008 was 1.17 cases per 100,000 population. For additional information on California WNV activity, see www.westnile.ca.gov.

As of February 13, 2009, the Centers for Disease Control (CDC) reported a total of 1,338 WNV cases in 43 states and 178 asymptomatic blood donors. Of the 1,338 cases, 674 (50%) were categorized as West Nile encephalitis or meningitis, 624 (47%) were WNF and 40 (3%) were reported with unspecified or unknown clinical classification, which includes other clinical manifestations such as West Nile acute flaccid paralysis.[4] In addition, 43 deaths (3%) were reported. Additional information on national WNV activity is available at http://www.cdc.gov/ncidod/dvbid/westnile/ index.htm.

[4] Percent of WNND cases is not comparable between CDC and Orange County data as acute flaccid paralysis cases are grouped within the WNND case classification for the Orange County data and under “unspecified or unknown clinical classification” for the CDC data.

Tables and Figures

Table 1. Reported West Nile Virus Infections with Gender and Syndrome Classification, Orange County Residents, 2008

Gender	WNND	% of WNND	WNF	% of WNF	Total Sx* Cases	% of Total Sx Cases	Deaths	BD+	Total Infections	% of Total Infections
Male	35	65%	12	71%	47	66%	2	6	53	67%
Female	19	35%	5	29%	24	34%	1	2	26	33%
Total	54	100%	17	100%	71	100%	3	8	79	100%
% of Total Sx Cases	76%		24%		100%		4%			

*Sx=symptomatic; WNND and WNF cases only

Table 2. Reported West Nile Virus Infections by Syndrome Classification and Year, Orange County Residents, 2004-2007

Year	WNND	% of Total Sx* Cases	WNF	% of Total Sx Cases	Total Sx Cases	Deaths	% of Total Sx Cases	BD+	Total Infections
2007	6	67%	3	33%	9	0	0%	1	10
2006	4	67%	2	33%	6	0	0%	1	7
2005	13	76%	4	24%	17	0	0%	0	17
2004	34	55%	28	45%	62	4	6%	2	64

*Sx=symptomatic; WNND and WNF cases only

Table 3. Percent Hospitalized and Median Length of Stay (LOS) in Hospital and Sub-Acute Care for reported West Nile Virus Cases, Orange County, 2004-2008 (N=165)

Case Classification	Total Cases	Number Hospitalized (% total)	Median LOS-Hospital in days (range)	Number in Sub-acute Care** (% total)	Median LOS-Sub-acute Care in days (range)	Median Combined LOS-Hospital and Sub-acute care*** in days (range)
Total	165	116 (70%)	7 (1-144)	33 (20%)	20 (1-214)	8 (1-234)
WNF	54	9 (17%)	4 (1-10)	1 (2%)	1 (n/a)	4 (1-10)
WNND	111	107 (96%)	8 (1-144)	32 (29%)	20 (7-214)	9 (1-234)
WNND-meningitis	*53*	*50 (94%)*	*5 (1-19)*	*7 (13%)*	*14 (8-65)*	*6 (1-84)*
WNND-encephalitis	*50*	*49 (98%)*	*11 (3-144)*	*21 (42%)*	*22 (7-214)*	*17 (3-234)*
WNND-AFP*	*8*	*8 (100%)*	*15 (6-88)*	*4 (50%)*	*31 (9-156)*	*27 (6-191)*

*AFP=acute flaccid paralysis (may have had encephalitis and/or meningitis in addition to AFP)
**Includes two WNND cases from 2008 that remain in sub-acute care as of 3/26/09.
***Includes all cases that were hospitalized.

Figure 1. Reported West Nile Neuroinvasive Disease and West Nile Fever Cases by Week and Approximate Month of Symptom Onset, Orange County Residents, 2008

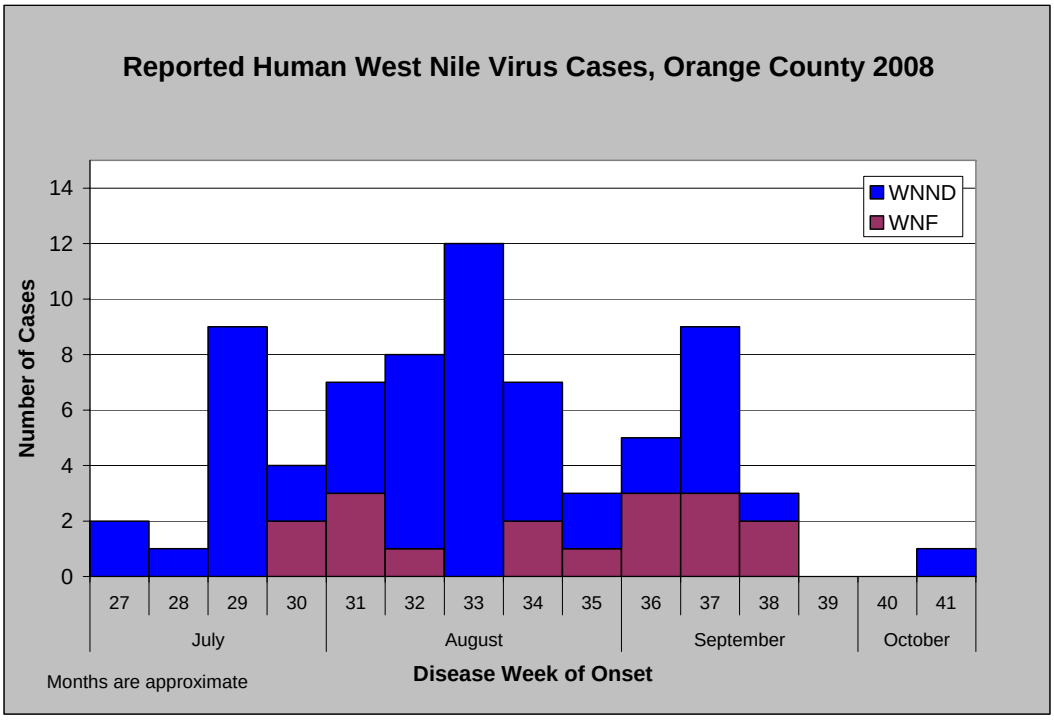


Figure 2. Reported West Nile Virus Infections by Syndrome Classification and Age Category, Orange County Residents, 2008

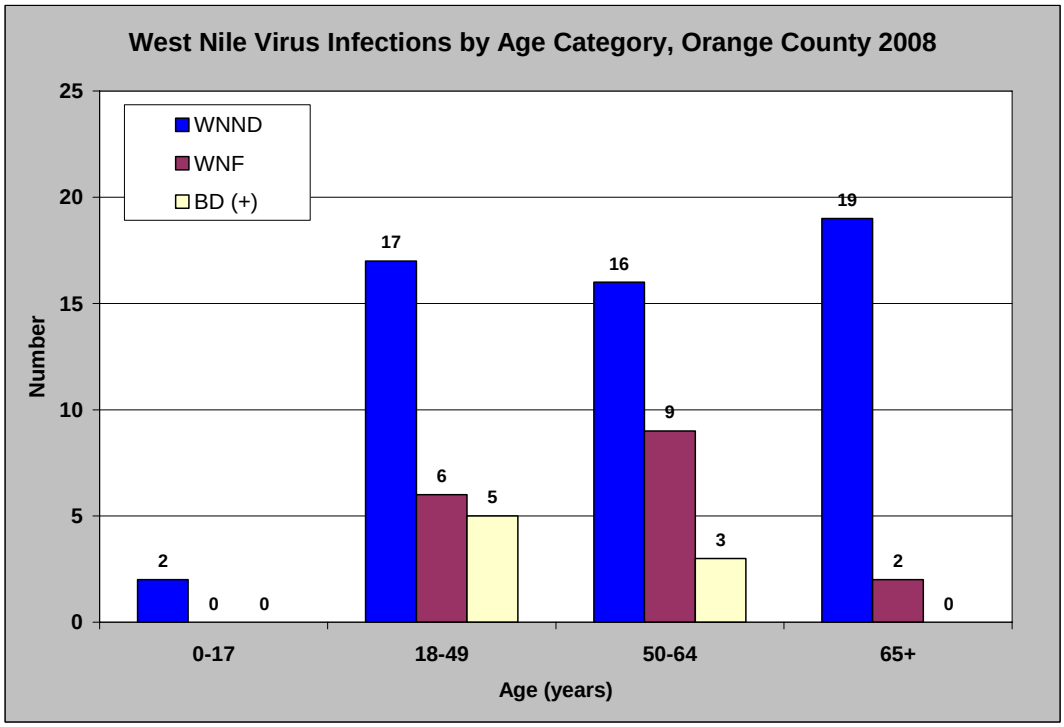
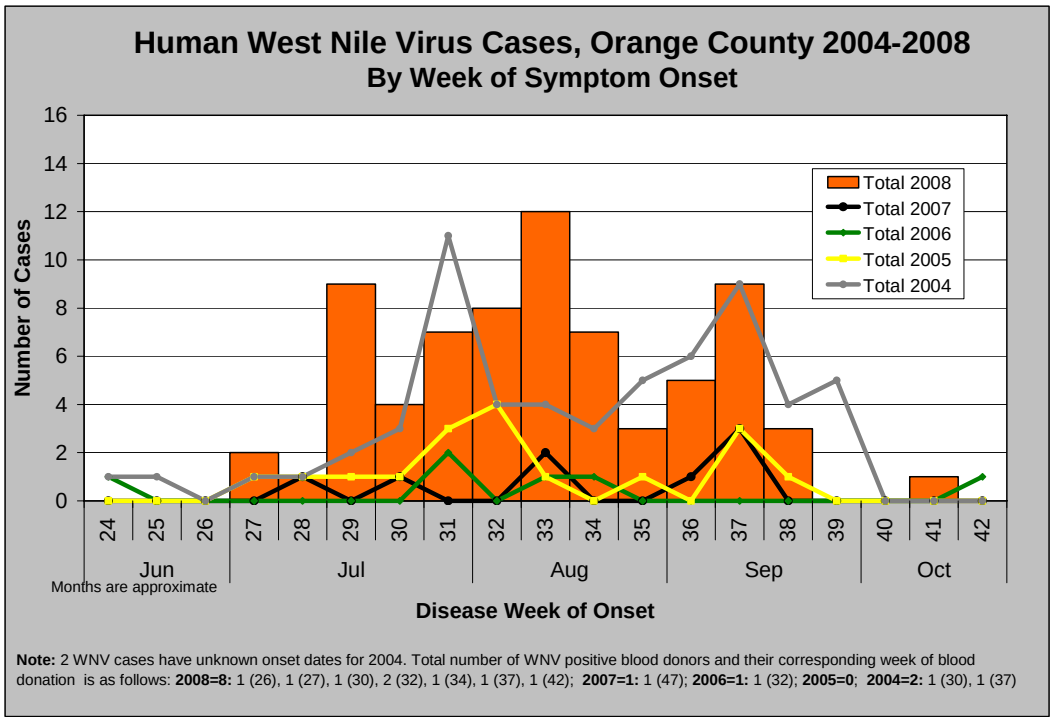


Figure 3. Reported Symptomatic West Nile Virus Cases by Week and Approximate Month of Symptom Onset, Orange County Residents, 2004-2008



Note: 2 WNV cases have unknown onset dates for 2004. Total number of WNV positive blood donors and their corresponding week of blood donation is as follows: **2008=8:** 1 (26), 1 (27), 1 (30), 2 (32), 1 (34), 1 (37), 1 (42); **2007=1:** 1 (47); **2006=1:** 1 (32); **2005=0**; **2004=2:** 1 (30), 1 (37)

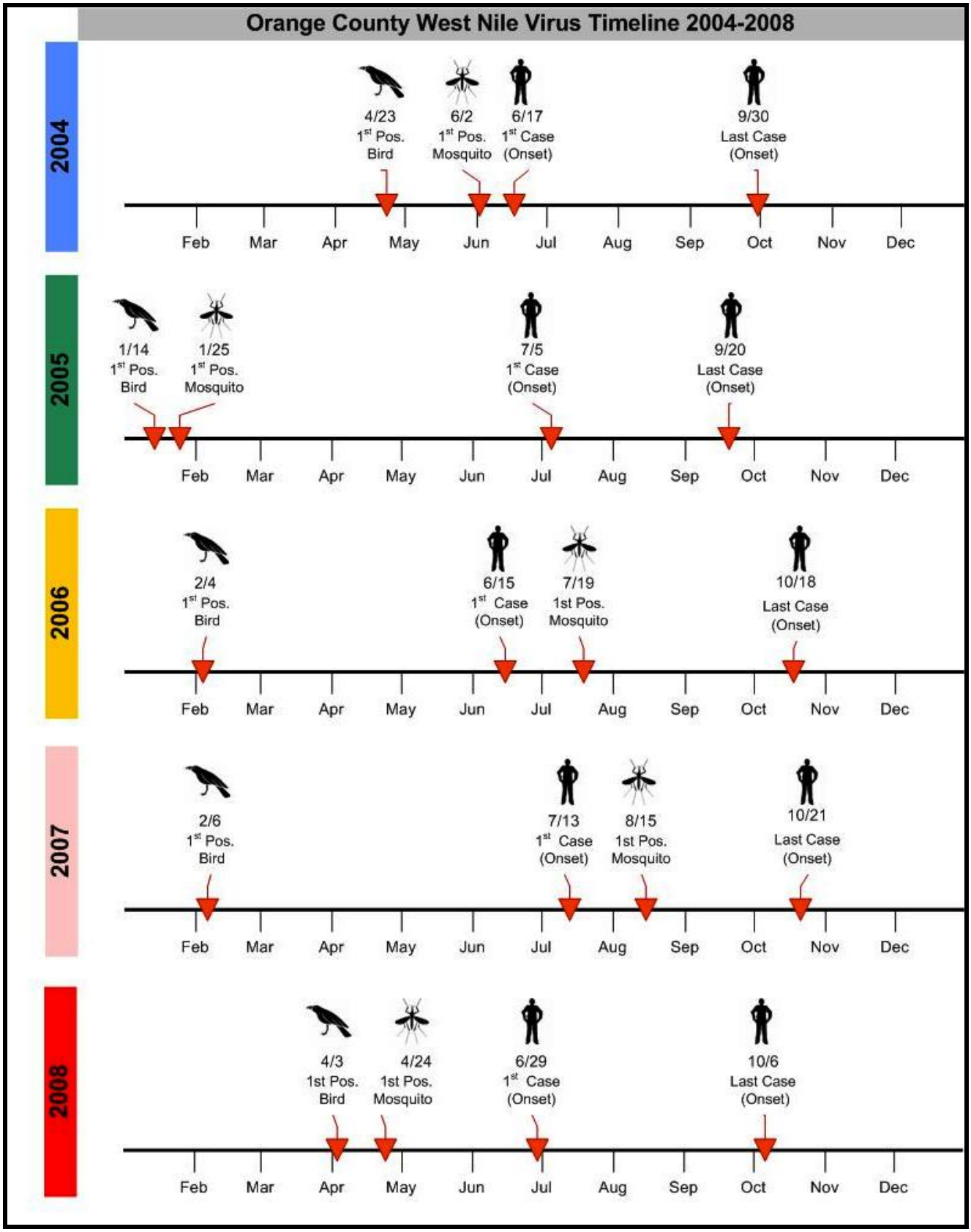



Figure 4. Timeline of First Positive Dead Bird Detections, First Positive Mosquito Pool Detections, and First and Last Human Case Symptom Onsets, West Nile Virus, Orange County, 2004-2008