

**State of Oregon
West Nile Virus Summary Report
2008**

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Emilio DeBess, DVM, MPVM

Acute and Communicable Disease Prevention

800 NE Oregon St., Ste. 772

Portland, OR 97232

Phone: 971-673-1111

Fax: 971-673-1100

E-mail: Emilio.E.DeBess@state.or.us

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2008 Program Highlights

Some of the principal highlights of Oregon’s surveillance, education and planning programs for West Nile virus (WNV) control in 2008 include the following:

- A notable decrease in WNV human cases throughout Oregon.
- A westward expansion of WNV-positive mosquitoes in Morrow and Umatilla counties.
- One person was diagnosed with SLE in Malheur County.

Introduction

West Nile virus (WNV) first appeared in Oregon in 2004: the first human, avian and equine WNV cases were all diagnosed in August of that year. In 2008, a total of 16 humans, 2 birds and 16 mosquito pools were diagnosed with WNV infection. Because of financial constraints and reductions of labor resources, only Jackson County continued sentinel chicken surveillance in 2008. Figure 1 displays the number of positive WNV tests by month of collection for Oregon in 2008; Table 1 shows the trend of confirmed WNV infections in Oregon from 2004–2008.

Figure 1. Positive WNV tests by month of collection for Oregon in 2008.

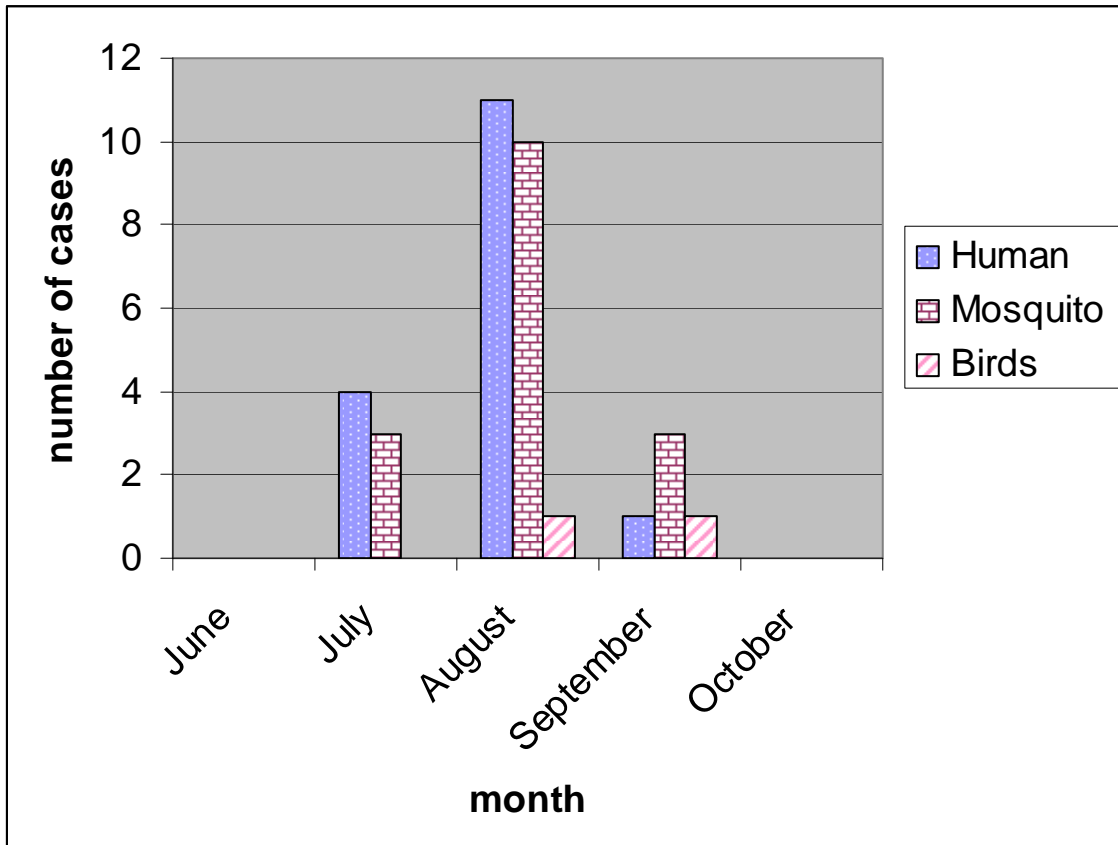


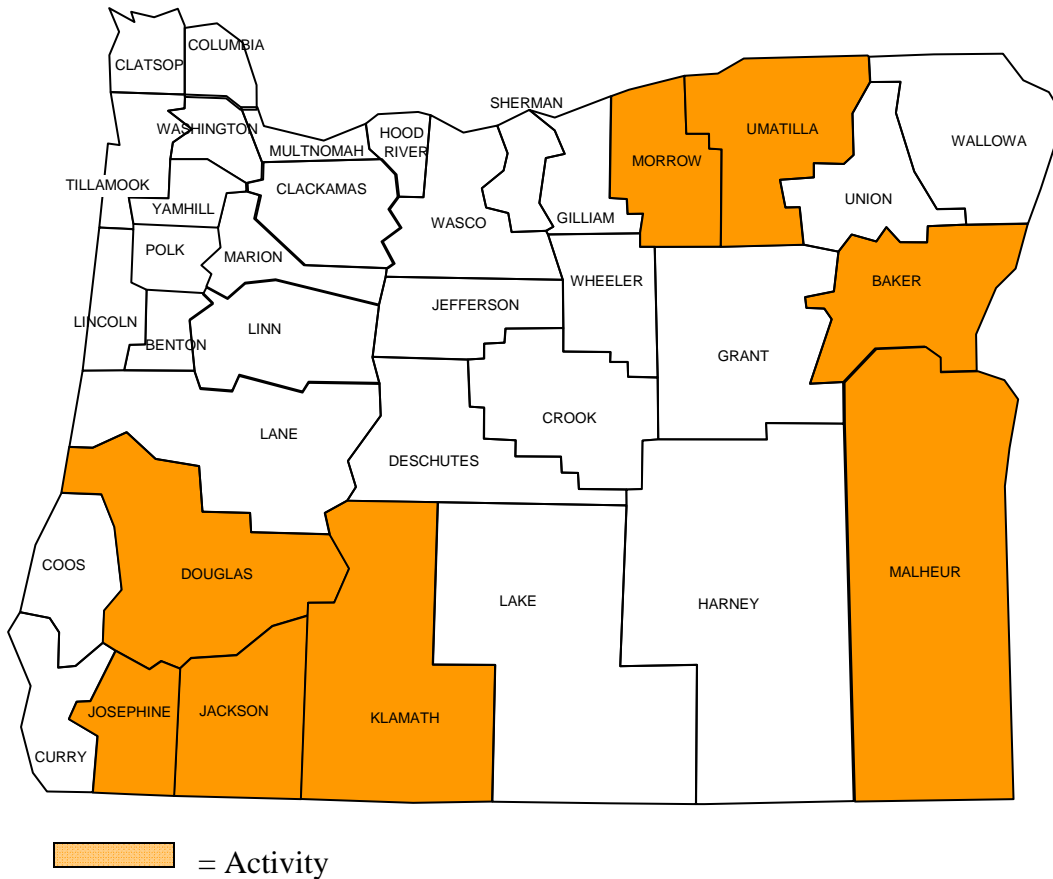
Table 1. Confirmed WNV infections in Oregon, 2004–2008.

Group	2004	2005	2006	2007	2008
Human	5	8	73	27	16
Horses	32	46	35	16	0
Birds	23	15	25	52	2
Mosquito pools	0	11	22	28	16
Sentinel chickens	0	15	0	11	0

Oregon’s surveillance program for WNV was launched in 2001 and has expanded to include 11 vector control districts (VCDs) and 3 county health departments, along with mosquito collection activities throughout the state (see map of Oregon with participating VCDs highlighted in Figure 3). The VCDs collect mosquito pools, maintain sentinel chicken flocks and conduct preliminary WNV tests on mosquitoes, sentinel chickens and dead birds. In counties without VCDs, this work may be conducted by the local health department. Confirmatory testing of WNV in humans and sentinel chickens is performed by the Oregon State Public Health Laboratory (OSPHL). Oregon State University’s (OSU’s) Veterinary Diagnostic Laboratory performed all WNV testing of mosquitoes, horses and dead birds.

Figure 2 illustrates the Oregon counties reporting West Nile virus in 2008. The Oregon WNV surveillance findings for humans, horses, birds and mosquitoes in 2008 are summarized in the sections that follow.

Figure 2. Oregon counties reporting WNV activity (shaded) 2008.



WNV Surveillance and Related Activities

Human Surveillance

Sixteen Oregon residents tested positive for WNV by IgM antibody in 2008. This includes 15 people who contracted WNV in Oregon and one person who contracted WNV in another state. The majority of Oregon cases were Malheur County residents, but cases were also seen in residents of Klamath, Douglas, and Grant counties. Descriptive data for the 16 Oregon residents who contracted WNV are presented in Table 2. Trend data of Oregon residents who contracted WNV from 2004–2008 are presented in Table 3.

Table 2. Descriptive data for Oregon residents who contracted WNV in Oregon in 2008.

		Cases (n=16)	Percent
Sex	Male	8	50%
	Female	8	50%
Age	<19	1	6%
	19–29	2	13%
	30–39	4	25%
	40–49	1	6%
	50–59	4	25%
	60–69	3	19%
	70–79	1	6%
County	Douglas	1	6%
	Grant	1	6%
	Klamath	1	6%
	Malheur	13	82%
Exposure	In State	15	94%
	Out of State	1	6%
Symptoms	Uncomplicated fever	13	82%
	Encephalitis+Meningitis	1	6%
	Meningitis	2	12%

Table 3. Trend data for Oregon residents who contracted WNV in Oregon in 2004–2008.

Year	All Cases	Neuroinvasive	Deaths
2004	5	0	0
2005	8	1	0
2006	73	13	1
2007	27	7	1
2008	15	3	0

Equine and Other Animal Surveillance

Surveillance for WNV in Oregon’s equine population resulted in zero positive test results by OSU’s Veterinary Diagnostic Laboratory. Moreover, no small animals tested positive for WNV in Oregon in 2008.

Avian Surveillance

Surveillance for WNV in Oregon’s avian population resulted in two positive test results out of 117 birds tested by OSU’s Veterinary Diagnostic Laboratory and the VCDs. Numbers of avian WNV tests and positive test results for Oregon counties in 2008 are summarized in Table 4. The two birds that tested positive in Josephine and Morrow counties were corvids (*Corvidae*); a Stellar’s Jay, *Cyanocitta stelleri* and a Magpie, *Pica hudsonia*. Trend data for avian WNV testing and positive test results for Oregon counties are presented in Table 5.

Table 4. Avian WNV tests and positive test results for Oregon counties in 2008.

County*	Positive Test Results	Avian Specimens Tested	Percent positive
Baker	0	2	0
Benton	0	4	0
Clackamas	0	1	0
Clatsop	0	2	0
Columbia	0	3	0
Deschutes	0	5	0
Douglas	0	2	0
Grant	0	1	0
Jackson	0	8	0
Josephine	1	3	33%
Lane	0	3	0
Lincoln	0	9	0
Linn	0	1	0
Marion	0	4	0
Morrow	1	5	20%
Multnomah	0	36	0
Polk	0	1	0
Tillamook	0	1	0
Umatilla	0	11	0
Union	0	2	0
Washington	0	11	0
Yamhill	0	1	0
Total	2	117	

*Counties with positive test results are indicated in **bold**.

Table 5. Avian WNV tests and trend of positive test results for Oregon counties, 2004–2008.

Year	Number Positive	Number Tested	Percent Positive
2004	23	448	5%
2005	15	298	5%
2006	25	212	12%
2007	55	248	22%
2008	2	117	2%

Mosquito Surveillance

In 2008, the VCDs conducted surveillance for WNV in Oregon's mosquito population. Figure 3 shows the counties with participating VCDs and their activities. Statewide, approximately 140,876 individual female mosquitoes (2,818 mosquito pools*) were collected and tested; 11 mosquito species were represented. Table 6 displays the number of individual female mosquitoes collected by VCDs for mosquito species in 2008. PCR testing for WNV was conducted by OSPHL where 16 mosquito pools (comprising 1,000 female mosquitoes) tested positive. Table 7 displays the mosquito species found positive for WNV in Oregon in 2008.

Table 8 displays the trend data for WNV positive mosquito species in Oregon between 2004 through 2008. Figure Table 8 represents the species of mosquitoes positive for WNV since 2005.

Table 6. Female mosquitoes collected by Oregon VCDs for each species in 2008.

Vector Control District	<i>Culex tarsalis</i>	<i>Culex pipiens</i>	<i>Culex stigmatosoma</i>	<i>Aedes vexans</i>	<i>Aedes dorsalis</i>	<i>Culiseta inornata</i>	<i>Aedes increpitus</i>	<i>Aedes nigromaticus</i>	<i>Culex erythrothorax</i>	<i>Anopheles freeborni</i>	<i>Aedes washinoi</i>	<i>Anopheles punctipennis</i>	<i>Aedes sticticus</i>
Baker	5,434					66				28			
Clackamas	157	525											
Columbia	678	276		476									3,693
Deschutes (Four Rivers)	437			665		155				50			
Jackson	3,937	3,784		1,180					1,836				
Klamath	261			16,534		771							
Lane	667	5,425		21,080									
Morrow	17,445	6,347		1,498	161			24		119			
Multnomah	3,845	1,313		3,813		155							
Umatilla	25,472	9,626											
Union	901	154				44							
Washington		97											
Total	59,234	27,547		45,246	161	1,191		24	1,836	197			3,693

*50 mosquitoes/pool

Table 6. Female mosquitoes collected by Oregon VCDs for each species in 2008 (continued)

Vector Control District	<i>Culiseta particeps</i>	<i>Culex spp.</i>	<i>Aedes spp.</i>	<i>Aedes cinereus</i>	<i>Culiseta impatiens</i>	<i>Culiseta spp.</i>	<i>Coquilleidia perturbans</i>	TOTAL
Baker								5,528
Clackamas								682
Columbia								5,123
Deschutes (Four Rivers)								1,307
Jackson							1,668	12,405
Klamath								17,566
Lane								27,172
Morrow								25,594
Multnomah								9,126
Umatilla		79						35,177
Union								1,099
Washington								
Total		79					1,668	140,779

Table 7. WNV-positive mosquitoes by species in Oregon counties, 2008

Vector Control District	Mosquito Species	Positive Mosquito pools*	Dates of Collection
Baker	<i>Culex tarsalis</i>	3	7/22–8/5
Jackson	<i>Culex tarsalis</i>	1	8/5
Klamath	<i>Aedes vexans</i>	5	8/22–8/29
Morrow	<i>Culex pipiens</i>	1	9/3
Morrow	<i>Culex tarsalis</i>	2	9/2–9/15
Umatilla	<i>Culex pipiens</i>	2	8/29
Umatilla	<i>Culex tarsalis</i>	2	8/18–9/3
Total		16	

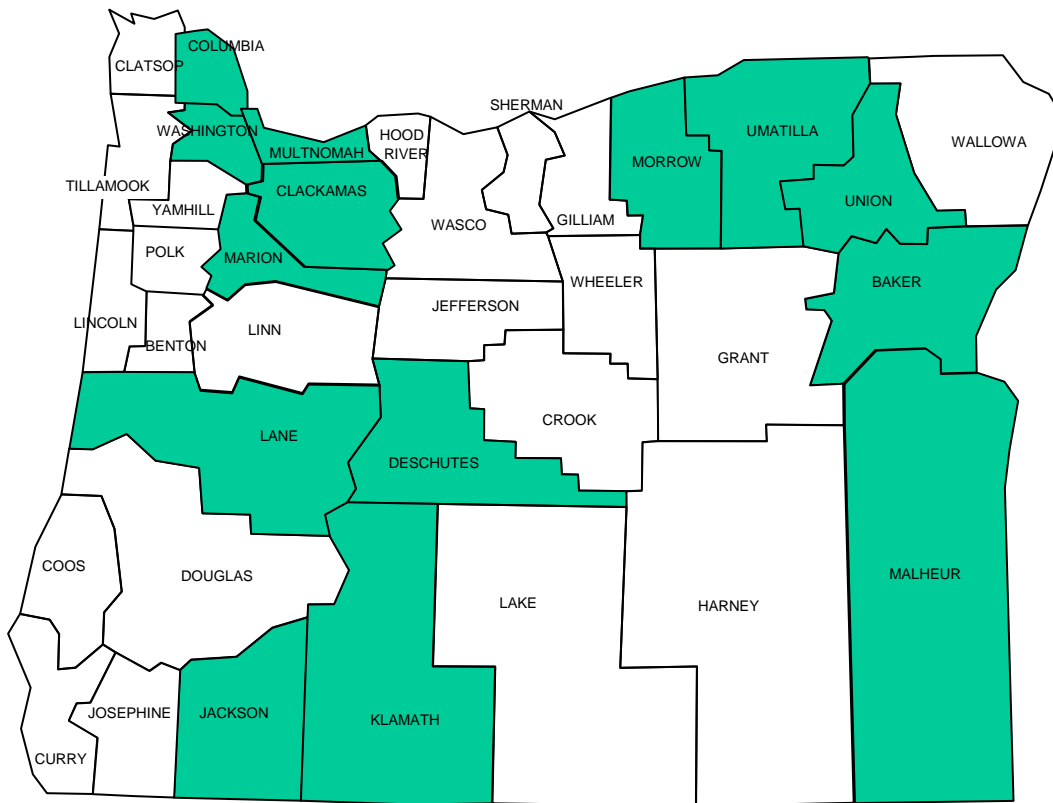
*50 mosquitoes/pool

Table 8. Trend data, WNV positive mosquitoes, Oregon 2004–2008

Year	Mosquito Species	Number Positive
2004	-	-
2005	<i>Culex tarsalis</i> –	(11 pools)*
	<i>Culex stigmatosoma</i>	
	<i>Culex pipiens</i>	
2006	<i>Culex tarsalis</i>	(22 pools)
2007	<i>Culex tarsalis</i>	(23 pools)
	<i>Culex pipiens</i>	(2 pools)
	<i>Aedes Vexans</i>	(8 pools)
2008	<i>Aedes vexans</i>	(5 pools)
	<i>Culex pipiens</i>	(3 pools)
	<i>Culex tarsalis</i>	(8 pools)

*50 mosquitoes/pool

Figure 3. Oregon counties with participating vector control districts (VCDs) and their activities.



District/county	Mosquito collection	Mosquito fish	Sentinel Chickens	Bird collection	Larvaciding	Adulticiding
Columbia	*			*	*	*
Deschutes	*			*	*	*
Jackson	*		*	*	*	*
Klamath	*	*		*		*
Lane	*			*		
Malheur				*		
Marion	*			*	*	*
Morrow	*			*	*	*
Multnomah	*	*		*	*	*
Umatilla	*	*		*	*	*
Union	*	*		*	*	*
Washington	*	*		*	*	*

References

1. Kilpatrick AM, Kramer LD, Jones MJ, Marra PP, Daszak P (2006) West Nile virus epidemics in North America are driven by shifts in mosquito feeding behavior. *PLoS Biol* 4(4): e82.27