

**West Nile Virus
Summary Report
State of Oregon
2014**

West Nile Virus Summary Report

2014 State of Oregon

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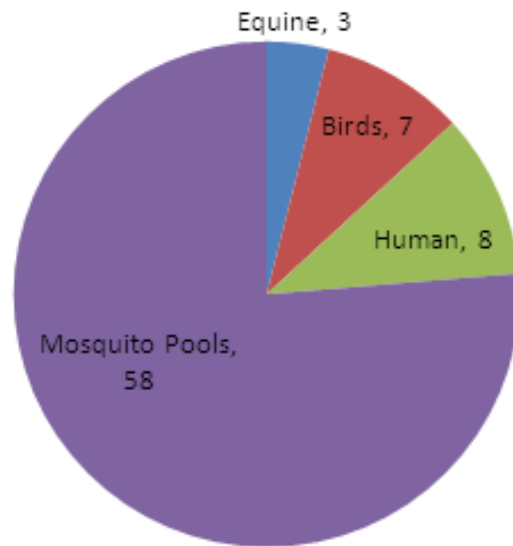
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Program Highlights

Oregon’s surveillance for West Nile virus (WNV) in 2014 identified the following:

- 8 human cases
- 3 equine cases
- 7 corvid bird cases
- 58 positive mosquito pools

Figure 1. Number of positive WNV tests, Oregon 2014



Source: Oregon State University, Veterinary Laboratory and Oregon State Public Health Laboratory

Table 1. Confirmed WNV infections, by species, Oregon, 2004–2014

Confirmed WNV infections, by species											
Group	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Human	5	8	73	27	16	12	0	0	12	16	8
Horses	32	46	35	16	0	5	0	2	2	6	3
Birds	23	15	25	52	2	16	0	0	2	2	7
Mosquito Pools	0	11	22	28	16	262	4	3	71	89	58
Sentinel Chickens	0	15	0	11	0	0	0	0	0	0	0

Source: Oregon State University, Veterinary Laboratory and Oregon State Public Health Laboratory

Introduction

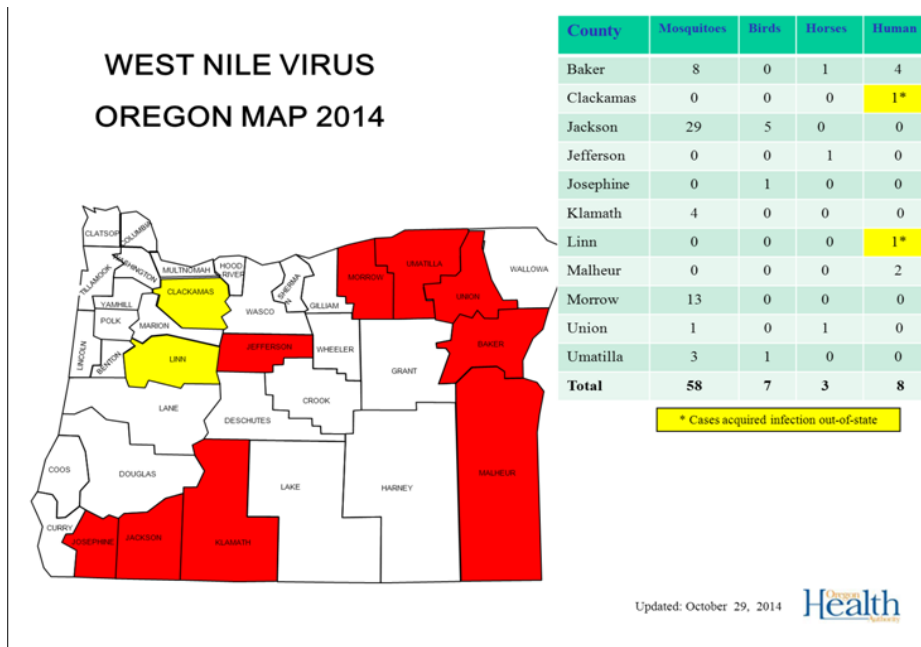
Oregon’s surveillance program for West Nile virus (WNV) was launched in 2001. The virus first appeared in Oregon in 2004 when human, avian, and equine WNV cases were diagnosed. Our peak year followed two years later, when 73 human cases were reported.

Incidence of human WNV disease remained low in Oregon in 2014, with eight human cases yielding a statewide incidence of 2.0 cases per million Oregonians. In addition, seven birds, three horses and 58 mosquito pools tested positive for WNV in 2014. With the exception of two human cases acquired out of state, both the human cases and the positive animals were from eastern or southern Oregon — i.e., outside of the Willamette Valley and the Oregon Coast.

Twelve Vector Control Districts (VCDs) perform mosquito surveillance in Oregon (Figure 4). The VCDs collect mosquitoes (and dead birds), identify and classify them, and prepare them for testing. Some VCDs conduct initial WNV tests for mosquito pools and dead birds using the Rapid Analyte Measurement Platform (RAMP). Confirmatory testing of WNV for human specimens is performed by the Oregon State Public Health Laboratory (OSPHL). Oregon State University’s (OSU’s) Veterinary Diagnostic Laboratory performs WNV testing of mosquitoes, dead birds, horses, and other mammals.

Oregon WNV surveillance findings for humans, horses, birds, and mosquitoes in 2014 are summarized in the sections that follow.

Figure 2. Map of Oregon with shaded counties reporting WNV, 2014.



See <https://public.health.oregon.gov/DiseasesConditions/DiseasesAZ/WestNileVirus/Documents/countymap14.pdf> for more information about West Nile Virus.

WNV Surveillance and Related Activities

Human Surveillance

In 2014, eight Oregon residents tested positive for WNV by IgM antibody; two had neuroinvasive disease.

Table 2. Trend data for Oregon residents who contracted WNV in Oregon, 2000–2014

Trend data for Oregon residents who contracted WNV in Oregon			
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
2009	8	0	0
2010	0	0	0
2011	0	0	0
2012	12	1	0
2013	16	8	0
2014	8	2	0
Total	172	35	2

Source: Oregon State Public Health Laboratory

Veterinary Surveillance

Surveillance for WNV in Oregon's equine population resulted in three positive tests, while 19 other equine tests were negative for WNV. Positive test results by county are summarized in Table 3. No other mammals tested positive for WNV in 2014.

Table 3. Positive equine WNV test results Oregon, 2000–2014

Positive equine WNV test results	
County	Horses with Positive WNV Test Results
Baker	1
Jefferson	1
Union	1
Total	3

Source: Oregon State University, Veterinary Diagnostic Laboratory

Avian Surveillance

Surveillance for WNV in Oregon's avian population resulted in seven positive test results out of 35 birds tested by OSU's Veterinary Diagnostic Laboratory and the VCDs. Of the 35 birds that were collected, 26 were of the family Corvidae (a.k.a. corvids), while the remaining nine were American species other than corvid. Table 4 shows the avian species collection totals in Oregon by county for 2014. Trend data for avian WNV testing and positive test results for Oregon counties for the years 2004–2014 are presented in Table 5.

Table 4. Avian WNV test results by county, Oregon, 2014.

Avian species collection totals by county			
County	Corvids Tested	All Other Species Tested	Total Positives
Clatsop	0	1	0
Columbia	1	0	0
Coos	1	0	0
Deschutes	0	1	0
Grant	2	0	0
Jackson	6	0	5
Josephine	2	0	1
Linn	0	1	0
Morrow	1	0	0
Multnomah	5	0	0
Polk	1	0	0
Umatilla	4	4	1
Union	2	1	0
Washington	0	1	0
Yamhill	1	0	0
TOTAL	26	9	7 (20%)

Source: Oregon State Public Health Laboratory

Table 5. Avian WNV tests and trend of positive test results, Oregon, 2004–2014.

Avian WNV tests and trend of positive test results			
Year	Number Tested	Number Positive	% Positive
2004	448	23	5%
2005	298	15	5%
2006	212	25	12%
2007	246	55	22%
2008	117	2	2%
2009	90	16	18%
2010	24	0	0%
2011	20	0	0%
2012	35	2	6%
2013	22	2	9%
2014	35	7	20%

Source: Oregon State Public Health Laboratory

Sentinel Chicken Surveillance

None tested in 2014.

Mosquito Surveillance

In 2014, the VCDs conducted surveillance for WNV in Oregon's mosquito population. Figure 4 (page 10) shows the counties with participating VCDs and their activities. Statewide, 15,477 mosquitoes were collected see Table 7, page 7. Of those, 110,630 mosquitoes in 3,096 pools were collected and tested for WNV (see Table 8, page 7). The mosquitoes submitted represent 16 mosquito species. PCR testing for WNV was conducted by OSPHL and RAMP was performed by some VCDs. Table 6 displays the number of mosquito pools, by species that tested positive for WNV in Oregon in 2014. Table 7 displays the mosquito species and the number of individual female mosquitoes that VCDs collected for testing in Oregon in 2014. Table 8 displays the mosquito species in Oregon between 2004 through 2014 found positive for WNV. Figure 3 indicates the efficiency of vector transmission for various mosquito species (information obtained from the Centers for Disease Control and Prevention).

Table 6. WNV positive mosquito pools, Oregon 2014.

WNV positive mosquito pools			
VCD	Mosquito Species	Number of Positive Mosquito Pools	Collection Date
Baker	<i>Culex tarsalis</i>	8	8/1–8/29
Jackson	<i>Culex tarsalis</i>	21	8/5–9/12
Jackson	<i>Culex pipiens</i>	7	8/19–9/12
Jackson	<i>Aedes vexans</i>	1	9/12
Klamath	<i>Aedes vexans</i>	3	7/31–8/29
Klamath	<i>Culex tarsalis</i>	1	8/29
Morrow	<i>Culex pipiens</i>	3	8/20–9/18
Morrow	<i>Culex tarsalis</i>	10	7/17–9/18
Umatilla	<i>Culex pipiens</i>	3	8/20–8/28
Union	<i>Culex tarsalis</i>	1	8/8
Total		58	

Source: Oregon Vector Control District

Table 7. Female mosquitoes collected for surveillance purposes by Oregon VCDs, 2014.

Mosquito Pools Collected, 2014																																		
County	<i>Aedes cinereus</i>	<i>Aedes dorsalis</i>	<i>Aedes incrucipitus</i>	<i>Aedes melani</i>	<i>Aedes nigromaculis</i>	<i>Aedes sierrensis</i>	<i>Aedes sp.</i>	<i>Aedes sollicitus</i>	<i>Aedes vexans</i>	<i>Aedes washinoi</i>	<i>Anopheles freeborni</i>	<i>Anopheles punctipennis</i>	<i>Coquillettidia perturbans</i>	<i>Culex erythrothorax</i>	<i>Culex peirs</i>	<i>Culex pipiens</i>	<i>Culex restuans</i>	<i>Culex sp.</i>	<i>Culex stigmatizans</i>	<i>Culex tarsalis</i>	<i>Culex territans</i>	<i>Culiseta impudens</i>	<i>Culiseta incidens</i>	<i>Culiseta inornata</i>	<i>Culiseta inornata</i>	<i>Culiseta inornata</i>	<i>Culiseta particeps</i>	<i>Culiseta sp.</i>	<i>Ochlerotatus sierrensis</i>	<i>Ochlerotatus sticticus</i>	<i>Ochlerotatus washinoi</i>	Total		
Baker	7481						4384		6205		343					12			8562															28367
Clackamas							1	6	72	269		88				1840			1	55			983	2				1					3308	
Columbia																																	0	
Coos	2487						36			45		36								296				14				50				2874		
Deschutes									1850		1080					810				1875				100									5715	
Jackson	11	838	30	97	483		788	2859		365	314	640	8564	921	3978					8362		121	135			47						28511		
Klamath	248				131			10081		2597						2083				3077				1899									20196	
Morrow	39	1358				17		3888		2788		60	17		2814					11963		2	1248				25					24293		
Multnomah					196	17	611	5100	393	2	1053	442			2938	3	29	4854			1040		60				528					17386		
Umatilla															7122		870	3061									16					11169		
Union																																0		
Washington	20				13	70	1	378	578	2	449	146			6189	1	29			2278	2	2	1583	6	1206	54	3	13	1	578		13578		
Total	20	10286	2192	30	97	793	4525	1406	30433	1283	7155	1914	1324	8581	921	27846	1	1002	30	46471	2	2	3709	3932	1206	101	623	13	1	578	156477			

Source: Oregon Vector Control District

Table 8. Female mosquitoes collected by Oregon VCDs and tested at Oregon State University or RAMP, 2014.

Mosquito Pools Tested for WNV, 2014																	
County	<i>Aedes dorsalis</i>	<i>Aedes incrucipitus</i>	<i>Aedes sierrensis</i>	<i>Aedes sp.</i>	<i>Aedes vexans</i>	<i>Anopheles freeborni</i>	<i>Anopheles punctipennis</i>	<i>Coquillettidia perturbans</i>	<i>Culex erythrothorax</i>	<i>Culex pipiens</i>	<i>Culex sp.</i>	<i>Culex tarsalis</i>	<i>Culiseta incidens</i>	<i>Culiseta inornata</i>	<i>Culiseta sp.</i>	Other/Sp. unknown	Total
Baker										100		7865				62	8027
Clackamas					60					1457							1517
Columbia					3619		74	1292		43		369				3277	8674
Coos	143																143
Deschutes					1850	1080				810		2345		100			6185
Jackson					2513			409	8338	3357	405	8324					23346
Klamath	232		131		8294	1990				1862		2872		1699			17080
Morrow		572			3772	2404		25		2386		11467		830		10	21466
Multnomah					1552		336	200		1012		2086	359			232	5777
Umatilla										3848	448	1020					5316
Union				526	50					2067		2696					5339
Washington										5634		1962			164		7760
Total	375	572	131	526	21710	5474	410	1926	8338	22576	853	41006	359	2629	164	3581	110630

Table 9. Trend data, WNV positive mosquito pools, Oregon 2004–2014.

Trend data, WNV positive mosquito pools		
Year	Mosquito Species	Number of Positive Pools Tested
2004	-	-
2005	<i>Culex tarsalis</i>	11 pools*
	<i>Culex stigmatosoma</i>	
	<i>Culex pipiens</i>	
	<i>Culex pipiens</i>	
2006	<i>Culex tarsalis</i>	22 pools
2007	<i>Aedes vexans</i>	8 pools
	<i>Culex pipiens</i>	2 pools
	<i>Culex tarsalis</i>	23 pools
2008	<i>Aedes vexans</i>	5 pools
	<i>Culex pipiens</i>	3 pools
	<i>Culex tarsalis</i>	8 pools
2009	<i>Aedes vexans</i>	1 pool
	<i>Anopheles freeborni</i>	1 pool
	<i>Anopheles punctipennis</i>	1 pool
	<i>Coquillettidia perturbans</i>	1 pool
	<i>Culex pipiens</i>	75 pools
	<i>Culex tarsalis</i>	131 pools
	<i>Culex sp.</i>	52 pools
2010	<i>Culex pipiens</i>	1 pool
	<i>Culex tarsalis</i>	2 pools
	<i>Culex sp.</i>	1 pool
2011	<i>Culex sp.</i>	3 pools
2012	<i>Culex pipiens</i>	53 pools
	<i>Culex tarsalis</i>	3 pools
	<i>Culex sp.</i>	15 pools
2013	<i>Culex pipiens</i>	14 pools
	<i>Culex tarsalis</i>	74 pools
	<i>Anopheles freeborni</i>	1 pool
2014	<i>Aedes vexans</i>	4 pools
	<i>Culex pipiens</i>	13 pools
	<i>Culex tarsalis</i>	41 pools

*1 pool ≈ 40 mosquitoes

Source: Oregon Vector Control District

Figure 3. Potential Oregon vectors of WNV based on laboratory vector competence studies*

Table 3. Potential for selected North American mosquitoes to transmit WNV based on bionomics, vector competence, virus isolations, and involvement with other arboviruses

Species	Association with other viruses ^a	Host preference	Activity time	Flight range	Vector competence for WNV ^b	Field isolations of WNV ^c	Potential to serve as a	
							Enzootic vector ^d	Bridge vector ^e
<i>Ae. aegypti</i>		Mammals	Crepuscular/day	200 m	+++ , 3	+	0	+
<i>Ae. albopictus</i>	EEE	Opportunistic	Crepuscular/day	200 m	++++, 3, 6	+	+	++++
<i>Ae. vexans</i>	EEE, WEE, SLE	Mammals	Crepuscular/night	>25 km	++ 1, 5, 8	+++	0	++
<i>Cq. perturbans</i>	EEE	Opportunistic	Crepuscular/night	5 km	+, 4	+	+	+
<i>Cs. melanura</i>	EEE	Birds	Crepuscular/night	9 km	+, 8	++	++	0
<i>Cx. inornata</i>	WEE	Mammals	Crepuscular/night	2 km	+++ , 5	+	+	++
<i>Cx. stigmatosoma</i>	SLE	Birds	Night	1 km	+++ , 5	0	+++	+
<i>Cx. erythrothorax</i>	WEE	Opportunistic	Crepuscular/day	<2 km	++++, 5	0	++	+++
<i>Cx. nigripalpus</i>	EEE, SLE	Opportunistic ^f	Crepuscular	5 km	++ , 4	+++	+++	++
<i>Cx. pipiens</i>	SLE	Birds	Crepuscular/night	2 km	+++ , 1, 3, 5	++++	+++++	++
<i>Cx. quinquefasciatus</i>	SLE	Birds	Crepuscular/night	2 km	+++ , 4, 5	0	++++	++
<i>Cx. restuans</i>	SLE	Birds	Crepuscular/night	2 km	++++, 4	+++	+++++	++
<i>Cx. salinarius</i>	EEE, SLE	Opportunistic	Crepuscular/night	10 km	++++, 4	+++	+++	+++++
<i>Cx. tarsalis</i>	WEE, SLE	Opportunistic ^f	Crepuscular/night	>6 km	++++, 5, 7	++++	++++	+++
<i>Oc. atropalpus</i>		Mammals	Day and night	1 km	++++, 3	+	+	++
<i>Oc. canadensis</i>	EEE	Mammals	Day	2 km	++ , 8	+	0	++
<i>Oc. cantator</i>	EEE	Mammals	Day	>10 km	++ , 8	+	0	++
<i>Oc. dorsalis</i>	WEE	Mammals	Day and night	5 km	+++ , 5	+	0	++
<i>Oc. japonicus</i>	JE?	Mammals	Crepuscular/day	unk	++++, 2, 3	+++	+	++++
<i>Oc. melanimon</i>	WEE	Mammals	Day and night	>10 km	+++ , 5	0	0	++
<i>Oc. sierrensis</i>		Mammals	Crepuscular/day	1 km	+, 5	0	0	+
<i>Oc. sollicitans</i>	EEE	Mammals	Crepuscular/night	>25 km	++ , 1, 3	+	0	+
<i>Oc. taeniorhynchus</i>	EEE	Mammals	Day and night	>25 km	+, 1, 3	+	0	+
<i>Oc. triseriatus</i>		Mammals	Day	200 m	+++ , 8	++	0	+++
<i>Ps. ferox</i>	SLE	Mammals	Day	2 km	0, 8	+	0	0

Distribution and bionomics based on and generalized from information in Carpenter and LaCasse (1955), Darsie and Ward (1981), and Moore et al. (1993).

^a Known association with other viruses with a similar transmission cycle. EEE, eastern equine encephalomyelitis virus; JE, Japanese encephalitis virus; SLE, St. Louis encephalitis virus; WEE, western equine encephalomyelitis virus. Based on Karabatsos (1985).

^b Efficiency with which this species is able to transmit WNV in the laboratory. 0, incompetent; +, inefficient; +++, extremely efficient vector. Based on 1 (Turell et al. 2000), 2 (Sardelis and Turell 2001), 3 (Turell et al. 2001), 4 (Sardelis et al. 2001), 5 (Goddard et al. 2002), 6 (Sardelis et al. 2002), 7 (Turell et al. 2003), or 8 (present study).

^c Relative number of WNV-positive pools detected. 0, none; +, few; +++, many.

^d Potential for this species to be an enzootic or maintenance vector based on virus isolations from the field, vector competence, feeding behavior, etc. 0, little to no risk; +++++, this species may play a major role.

^e Potential for this species to be an epizootic or bridge vector based on virus isolations from the field, vector competence, feeding behavior, etc. 0, little to no risk; +++++, this species may play a major role.

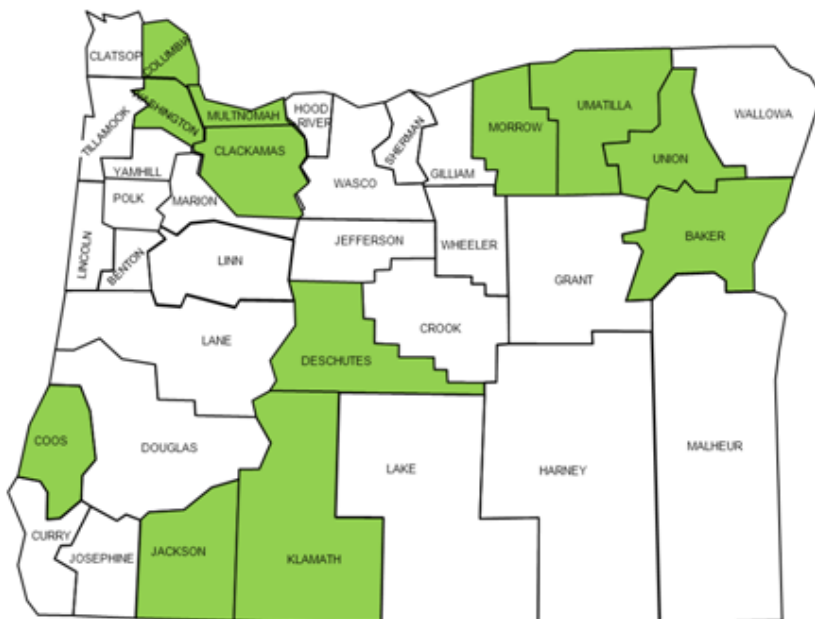
^f Feeds primarily on avian hosts in spring and early summer and mixed between avian and mammalian hosts in late summer and fall.

* Turell MJ, Dohm DJ, Sardelis MR, Oquinn ML, Andreadis DJ, Blow JA. An update on the potential of North American mosquitoes (Diptera: Culicidae) to transmit West Nile virus. J Med Entomol 2005; 42: 57–62. Used with permission.

Figure 4. Oregon counties with participating vector control districts (VCDs) and their activities

Location of Vector Control Districts

OREGON MAP 2014



Updated: Feb 24, 2015

Arboviral Surveillance Performed		
County	Mosquito Pools	Dead Birds
Baker	Y	Y
Clackamas	Y	Y
Columbia	Y	Y
Coos	Y	Y
Deschutes	Y	Y
Jackson	Y	Y
Klamath	Y	Y
Morrow	Y	Y
Multnomah	Y	Y
Umatilla	Y	Y
Union	Y	Y
Washington	Y	Y
Benton	N	Y
Clatsop	N	Y
Crook	N	Y
Curry	N	Y
Douglas	N	Y
Gilliam	N	Y
Grant	N	Y
Harney	N	Y
Hood River	N	Y
Josephine	N	Y
Lake	N	Y
Lane	N	Y
Lincoln	N	Y
Linn	N	Y
Marion	N	Y
Malheur	N	Y
Polk	N	Y
Sherman	N	Y
Tillamook	N	Y
Wallowa	N	Y
Wasco	N	Y
Wheeler	N	Y

Acknowledgment:

All Oregon Vector Control Districts and the Oregon State University Veterinary Diagnostic Laboratory, without whose input and hard work, this report would not be possible.



REV (11/14) OHA 8600