

# >> State of Oregon West Nile Virus Summary Report



**Oregon**  
**Health**  
Authority  
PUBLIC HEALTH DIVISION  
Acute and Communicable Disease  
Prevention Program

# Acknowledgments

This report was prepared by:

Emilio DeBess, DVM, MPVM

Brad Beauchamp, BA

Acute and Communicable Disease Prevention

800 N.E. Oregon St., Suite 772

Portland, OR 97232

Phone: 971-673-1111

Fax: 971-673-1100

This report is possible because of the input and hard work of all Oregon vector control districts and the Oregon State University Veterinary Diagnostic Laboratory.

For more information, contact [Emilio.E.DeBess@oha.oregon.gov](mailto:Emilio.E.DeBess@oha.oregon.gov)

Please cite this publication as follows:

*Oregon Public Health Division. State of Oregon West Nile virus summary report 2020. Oregon Health Authority: Portland, Oregon 2023*

# Contents

» Acknowledgments .....	ii
» Executive summary.....	iv
» Introduction.....	1
» WNV surveillance and related activities.....	3
» Human surveillance.....	3
» Veterinary surveillance .....	4
» Avian surveillance .....	4
» Sentinel chicken surveillance.....	6
» Mosquito surveillance.....	6
» Vector control districts in Oregon.....	11

## List of tables

Table 1. Confirmed WNV infections by species, Oregon, 2004–2020.....	iv
Table 2. Trend data for Oregon residents who contracted WNV in Oregon, 2004–2020.....	3
Table 3. Positive equine WNV test results, Oregon, 2020 .....	4
Table 4. Avian WNV test results by county, Oregon, 2020.....	5
Table 5. Avian WNV tests and trend of positive test results, Oregon, 2004–2020.....	5
Table 6. WNV-positive mosquito pools, Oregon, 2020 .....	6
Table 7. Total female mosquitoes collected for surveillance purposes by Oregon VCDs, 2020....	7
Table 8. Trend data, WNV-positive mosquito pools, Oregon, 2004–2020.....	8

## List of figures

Figure 1. Number of positive WNV tests, Oregon, 2020.....	iv
Figure 2. Map of Oregon with shaded counties reporting WNV, 2020.....	2
Figure 3. Potential Oregon vectors of WNV based on laboratory vector competence studies .....	10
Figure 4. Oregon counties with participating vector control districts (VCDs) and their activities ..	11

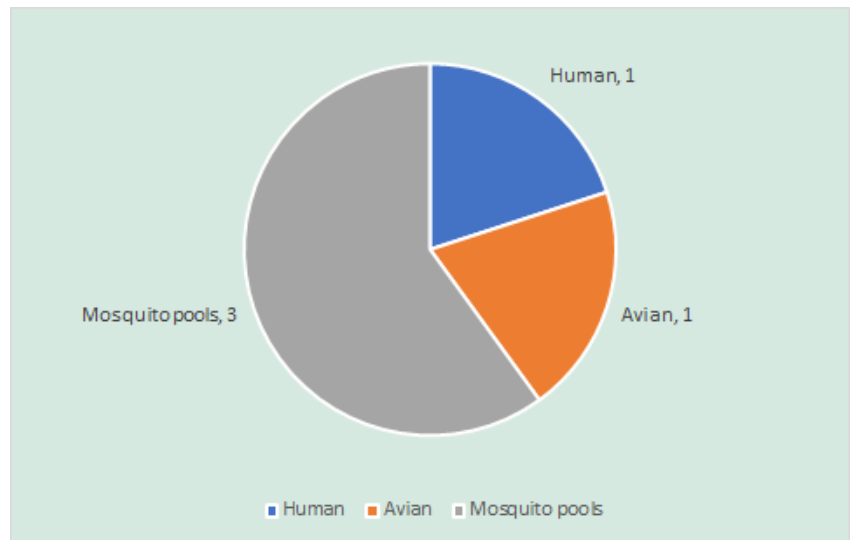
# Executive summary

## 2020 program highlights

Oregon’s surveillance for West Nile virus (WNV) in 2020 identified the following:

- 1 human case
- 1 avian case
- 3 positive mosquito pools

**Figure 1. Number of positive WNV tests, Oregon, 2020**



**Table 1. Confirmed WNV infections by species, Oregon, 2004–2020**

Group	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Human	5	8	73	27	16	12	0	0	12	16	8	1	3	7	2	9	1
Horse	32	46	35	16	0	5	0	2	2	6	3	6	6	5	2	9	0
Bird	23	15	25	52	2	16	0	0	2	2	7	11	12	1	1	0	1
Mosquito	0	11	22	28	16	262	4	3	71	89	58	59	51	92	57	87	3
Sentinel chickens*	0	15	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0

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

\*Sentinel chicken surveillance ended in 2011

# Introduction

Oregon launched a West Nile virus (WNV) surveillance program in 2001. The virus was first identified in humans, birds and horses in Oregon in 2004. Our peak year followed two years later when 73 human cases were reported.

The incidence of human WNV disease remained low in Oregon in 2020. One human case, one bird, and 3 mosquito pools tested positive for WNV in 2020.

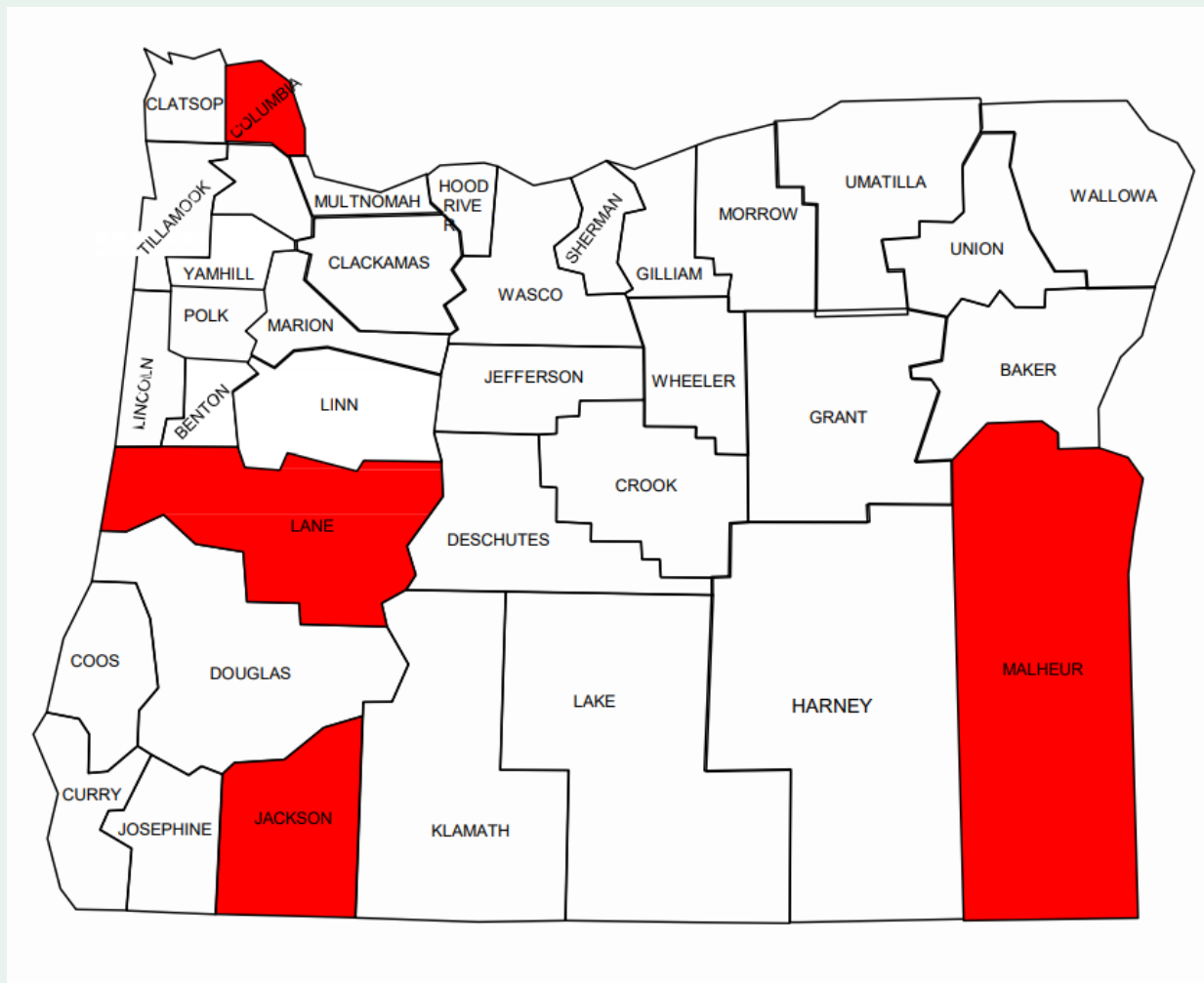
Thirteen vector control districts (VCDs) collect, identify and test dead birds and mosquitoes (in pools of approximately 40 females of the same species) for purposes of WNV surveillance (Figure 4). Some VCDs conduct initial WNV tests for mosquito pools and dead birds using the Rapid Analyte Measurement Platform (RAMP). The Oregon State Public Health Laboratory (OSPHL) performs confirmatory testing of WNV for human specimens.

Oregon State University's (OSU's) Veterinary Diagnostic Laboratory performs WNV testing of mosquitoes, dead birds, horses and other mammals.

The following sections summarize Oregon WNV surveillance findings for humans, horses, birds and mosquitoes in 2020.

**Figure 2. Map of Oregon with shaded counties reporting WNV, 2020**

County	Mosquitoes	Birds	Horses	Human
Lane	0	1	0	0
Jackson	1	0	0	0
Malheur	2	0	0	0
Columbia	0	0	0	1
<b>Total</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>1</b>



See <https://www.oregon.gov/oha/PH/DISEASESCONDITIONS/DISEASESAZ/WESTNILEVIRUS/Pages/wnile.aspx> for more information about West Nile virus.

# WNV surveillance and related activities

## Human surveillance

In 2020, one Oregon resident tested positive for WNV by Immunoglobulin M (IgM) antibody (Table 2). Illnesses related to neuroinvasive disease are usually characterized by the acute onset of fever with stiff neck, altered mental status, seizures, limb weakness, cerebrospinal fluid (CSF) pleocytosis or abnormal neuroimaging. Acute flaccid paralysis (AFP) may result from anterior myelitis, peripheral neuritis or post-infectious peripheral demyelinating neuropathy (i.e., Guillain-Barré syndrome). Less common neurological manifestations, such as cranial nerve palsies, also occur.

**Table 2. Trend data for Oregon residents who contracted WNV in Oregon, 2004–2020**

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
2015	1	0	0
2016	3	1	0
2017	7	4	1
2018	2	2	0
2019	9	6	0
2020	1	0	0
<b>Total</b>	<b>195</b>	<b>48</b>	<b>3</b>

Source: Oregon State Public Health Laboratory

## Veterinary surveillance

WNV surveillance in Oregon’s equine population resulted in zero positive tests in 2020. Table 3 summarizes the test results by county.

**Table 3. Positive equine WNV test results, Oregon, 2020**

County	Horses Tested for WNV	Horses with Positive WNV Test Results
Deschutes	1	0
Jackson	1	0
Tillamook	1	0
<b>Total</b>	<b>3</b>	<b>0</b>

Source: Oregon State University Veterinary Diagnostic Laboratory

## Avian surveillance

WNV surveillance in Oregon’s avian population resulted in one positive test result out of 24 birds tested by OSU’s Veterinary Diagnostic Laboratory and the VCDs; the positive bird was recovered from Lane County. Of the 24 birds collected, 10 were of the family Corvidae (aka corvids), while the remaining 14 were American species other than corvid. Table 4 shows Oregon’s avian species collection totals by county for 2020. Table 5 presents trend data for avian WNV testing and positive test results for Oregon counties for the years 2004–2020.



**Table 4. Avian WNV test results by county, Oregon, 2020**

County	Corvids tested	All other species tested	Total	Total Positive
Benton	2	4	6	0
Clackamas	1	4	5	0
Columbia	0	1	1	0
Lane	0	3	3	1
Multnomah	7	0	7	0
Umatilla	0	1	1	0
Washington	0	1	1	0
<b>TOTAL</b>	<b>10</b>	<b>14</b>	<b>24</b>	<b>1</b>

Source: Oregon State Public Health Laboratory

**Table 5. Avian WNV tests and trend of positive test results, Oregon, 2004–2020**

Year	Number tested	Number positive	% positive
2004	448	23	5.1%
2005	298	15	5.0%
2006	212	25	11.8%
2007	246	55	22.4%
2008	117	2	1.7%
2009	90	16	17.8%
2010	24	0	0.0%
2011	20	0	0.0%
2012	35	2	5.7%
2013	22	2	9.1%
2014	35	7	20.0%
2015	36	11	30.6%
2016	44	12	27.3%
2017	27	1	3.7%
2018	30	1	3.3%
2019	19	0	0.0%
2020	24	1	4.2%

Source: Oregon State Public Health Laboratory

## Sentinel chicken surveillance

Sentinel chicken surveillance was discontinued in 2011.

## Mosquito surveillance

In 2020, the VCDs conducted WNV surveillance in Oregon’s mosquito population. Figure 4, page 11 shows the counties with participating VCDs and their activities. Statewide, 2,943 mosquito pools were sampled (see Table 7, page 7). The tested mosquitoes comprise 10 mosquito species. OSU conducted polymerase chain reaction (PCR) testing.

Table 6 below displays the number of Oregon mosquito pools by species that tested positive for WNV in 2020. Table 8 (page 8-9) displays Oregon mosquito species between 2004 and 2020 found positive for WNV. Figure 3 (page 10) 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, 2020**

VCD	Mosquito species	Number of positive mosquito pools	Collection date
Jackson	<i>Culex pipiens</i>	2	8/18/2020
Malheur	<i>Culex tarsalis</i>	1	8/19/2020

Source: Oregon vector control districts

**Table 7. Female mosquito pools collected by Oregon VCDs and tested for WNV at Oregon State University, 2020**

County / VCD	<i>Aedes dorsalis</i>	<i>Aedes nigromaculis</i>	<i>Aedes vexans</i>	<i>Anopheles freeborni</i>	<i>Anopheles punctipennis</i>	<i>Coquillettidia perturbans</i>	<i>Culex NFS</i>	<i>Culex pipiens</i>	<i>Culex tarsalis</i>	<i>Culiseta inornata</i>	Not Provided	Total mosquito pools
Baker			1				6	265				<b>272</b>
Clackamas							12	1				<b>13</b>
Columbia				3	3		128	46				<b>180</b>
Deschutes			7				12	12	7			<b>38</b>
Jackson							195	113		2		<b>310</b>
Klamath	50	164	126	97		3	13	77	53	12		<b>595</b>
Lane			7				9	24				<b>40</b>
Linn			39		2		40	19				<b>100</b>
Malheur							2	8				<b>10</b>
Morrow					6		455	231		8		<b>700</b>
Multnomah				1	1		4	56				<b>62</b>
Umatilla							3	17	17			<b>37</b>
Union			205				22	139				<b>366</b>
Washington				17	6		26	171				<b>220</b>
<b>Total:</b>	<b>50</b>	<b>164</b>	<b>378</b>	<b>105</b>	<b>23</b>	<b>18</b>	<b>3</b>	<b>941</b>	<b>1179</b>	<b>60</b>	<b>22</b>	<b>2,943</b>

Source: Oregon vector control districts and Oregon State University

**Table 8. Trend data, WNV-positive mosquito pools\*, Oregon, 2004–2020**

Year	Mosquito species	Number of positive pools
2004	-	-
2005	<i>Culex tarsalis</i>	11
	<i>Culex stigmatosoma</i>	
	<i>Culex pipiens</i>	
2006	<i>Culex tarsalis</i>	22
2007	<i>Aedes vexans</i>	8
	<i>Culex pipiens</i>	2
	<i>Culex tarsalis</i>	23
2008	<i>Aedes vexans</i>	5
	<i>Culex pipiens</i>	3
	<i>Culex tarsalis</i>	8
2009	<i>Aedes vexans</i>	1
	<i>Anopheles freeborni</i>	1
	<i>Anopheles punctipennis</i>	1
	<i>Coquillettia perturbans</i>	1
	<i>Culex pipiens</i>	75
	<i>Culex tarsalis</i>	131
2010	<i>Culex pipiens</i>	1
	<i>Culex tarsalis</i>	2
	<i>Culex sp.</i>	1
2011	<i>Culex sp.</i>	3
2012	<i>Culex pipiens</i>	53
	<i>Culex tarsalis</i>	3
	<i>Culex sp.</i>	15
2013	<i>Culex pipiens</i>	14
	<i>Culex tarsalis</i>	74
	<i>Anopheles freeborni</i>	1

2014	<i>Aedes vexans</i>	4
	<i>Culex pipiens</i>	13
	<i>Culex tarsalis</i>	41
2015	<i>Culex pipiens</i>	20
	<i>Culex tarsalis</i>	35
	Genus <i>Culex</i>	4
2016	<i>Culex pipiens</i>	21
	<i>Culex tarsalis</i>	28
	Genus <i>Culex</i>	2
2017	<i>Culex pipiens</i>	49
	<i>Culex tarsalis</i>	15
	Genus <i>Culex</i>	28
2018	<i>Culex pipiens</i>	13
	<i>Culex tarsalis</i>	37
	Genus <i>Culex</i>	7
2019	<i>Culex pipiens</i>	65
	<i>Culex tarsalis</i>	22
2020	<i>Culex pipiens</i>	2
	<i>Culex tarsalis</i>	1

Source: Oregon State University Veterinary Diagnostic Laboratory

\*1 pool ≈ 40 mosquitoes

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

Species	Association with other viruses <sup>a</sup>	Host preference	Activity time	Flight range	Vector competence for WNV <sup>b</sup>	Field isolations of WNV <sup>c</sup>	Potential to serve as a	
							Enzootic vector <sup>d</sup>	Bridge vector <sup>e</sup>
<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>Cs. inornata</i>	WEE	Mammals	Crepuscular/night	2 km	+++ , 5	+	+	++
<i>Cx. stigmatosoma</i>	SLE	Birds	Night	1 km	+++ , 5	0	+++	+
<i>Cx. erythrorhax</i>	WEE	Opportunistic	Crepuscular/day	<2 km	++++, 5	0	++	+++
<i>Cx. nigripalpus</i>	EEE, SLE	Opportunistic <sup>f</sup>	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 <sup>f</sup>	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).

<sup>a</sup> 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).

<sup>b</sup> 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).

<sup>c</sup> Relative number of WNV-positive pools detected. 0, none; +, few; +++++, many.

<sup>d</sup> 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.

<sup>e</sup> 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.

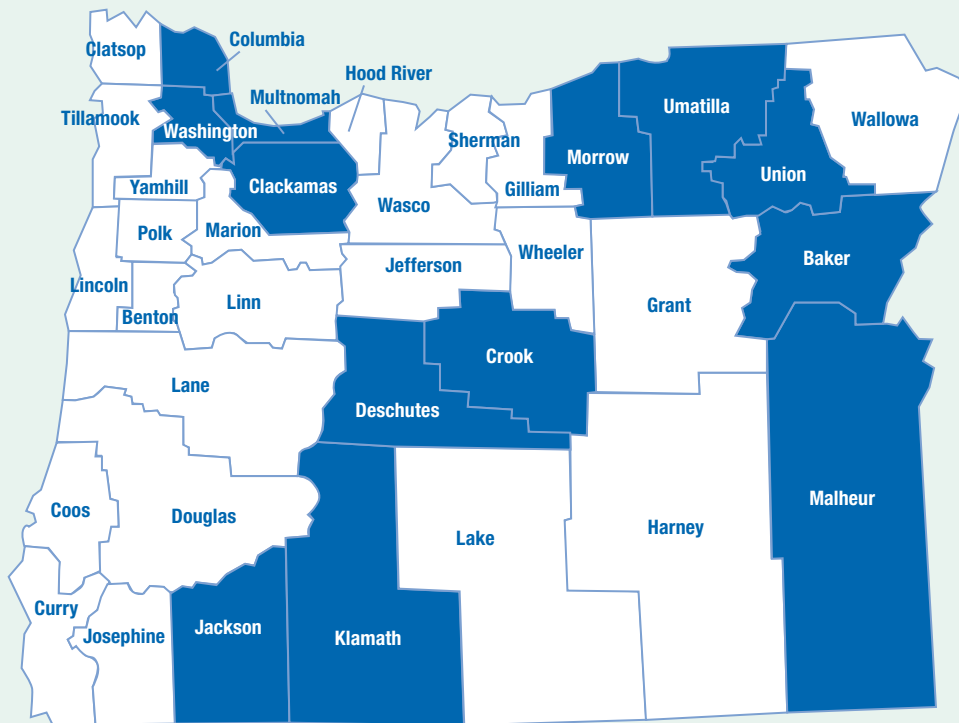
<sup>f</sup> Feeds primarily on avian hosts in spring and early summer and mixed between avian and mammalian hosts in late summer and fall.

\* 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.

# Vector control districts in Oregon

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

County	Mosquito collection	Bird collection
Baker	YES	YES
Clackamas	YES	YES
Columbia	YES	YES
Crook	YES	YES
Deschutes	YES	YES
Jackson	YES	YES
Klamath	YES	YES
Malheur	YES	YES
Morrow	YES	YES
Multnomah	YES	YES
Umatilla	YES	YES
Union	YES	YES
Washington	YES	YES



Source: Oregon Health Authority



PUBLIC HEALTH DIVISION

Acute and Communicable Disease

Prevention Program

Phone: 971-673-1111

Fax: 971-673-1100

You can get this document in other languages, large print, Braille or a format you prefer. Contact the Acute and Communicable Disease Prevention Program at 971-673-1111. We accept all relay calls, or you can dial 711.