

*2004 – 2005 Surveillance Program Report*

# **West Nile Virus Environmental Surveillance in Washington State**

October 2006



*Environmental Health Division  
Office of Environmental Health and Safety*



*2004 – 2005 Surveillance Program Report*

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The *2004 – 2005 Surveillance Program Report – West Nile Virus Environmental Surveillance in Washington* is available in electronic format on the Internet at [www.doh.wa.gov/wnv](http://www.doh.wa.gov/wnv). For persons with disabilities this document is available on request in other formats. To submit a request, please call 1.800.525.0127 (voice) or 1.800.833.6388 (TTY/TDD).

Mary C. Selecky  
Secretary of Health



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## 2004 – 2005 Program Highlights

- Surveillance efforts detected West Nile virus activity in Washington for the first time since 2002. Early detection resulted in an increase of local mosquito surveillance and control, and of efforts to raise public awareness of the presence of West Nile virus and appropriate prevention measures.
- Mosquito surveillance resulted in the identification of mosquito species never before reported in 15 counties. Multiple mosquito species were newly detected in several of these counties.
- Mosquito species considered potential West Nile virus vectors were newly detected in 12 counties.
- Outreach to minority communities was expanded. The *West Nile Virus – Fight the Bite* flyer was translated into five languages: Russian, Khmer, Chinese, Korean, and Vietnamese. The flyer was made available to local health jurisdictions and other interest groups for distribution.
- The Washington State Department of Health bi-weekly West Nile virus newsletter continues to be a successful publication aimed at informing agencies of the latest local, regional, and national perspectives on West Nile virus.
- Two 60-second audio public service announcements were developed. These attention-grabbing public service announcements provide a strong and clear message on West Nile virus prevention. The announcements were distributed to over 100 radio stations in both English and Spanish across the state.





# West Nile Virus Environmental Surveillance Program

## Introduction

The Washington State Department of Health established the West Nile virus surveillance program in 2000 under a grant sponsored by the U.S. Centers for Disease Control and Prevention. The program coordinates surveillance and response activities to reduce the exposure of Washington's citizens to West Nile virus.

The program is a cooperative effort of numerous partners including local health jurisdictions, mosquito control districts, local and state agencies, health care providers, veterinarians, and other interested parties. The program also collaborates with state and federal agencies including the Washington State Department of Transportation, Washington State Department of Fish and Wildlife, Washington State Parks and Recreation Commission, Washington Animal Disease Diagnostic Laboratory, Washington State University Extension, U.S.G.S. National Wildlife Health, U.S. Army Center for Health Promotion and Preventive Medicine-West, and U.S. Centers for Disease Control and Prevention.

The program coordinates the following activities:

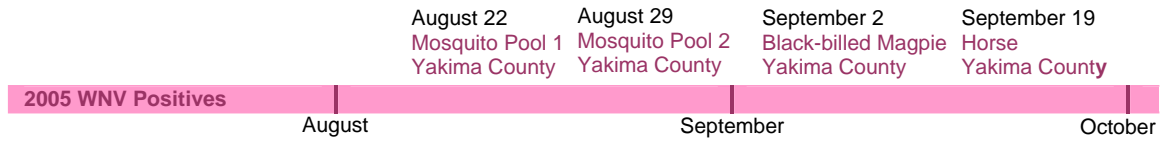
1. Monitoring mosquito populations to identify potential West Nile virus vector species.
2. Testing mosquito pools for the presence of West Nile, western equine encephalitis, and St. Louis encephalitis viruses.
3. Providing extended coverage of the aquatic mosquito control National Pollutant Discharge Elimination System general permit to agencies and private entities.
4. Testing and reporting of dead birds, particularly corvids, for West Nile virus infection.
5. Testing of horses that exhibit clinical signs consistent with West Nile virus infection.
6. Distributing West Nile virus health educational materials to state and local agencies and the public.
7. Providing information on West Nile virus through the Internet.

This report summarizes the program's surveillance and prevention activities from January 2004 through December 2005.

## West Nile Virus Activity

During 2005, West Nile virus surveillance detected viral activity in Washington for the first time since 2002. In August, the Benton County Mosquito Control District, which monitors for arboviruses in mosquito populations in areas of Benton and Yakima Counties, detected West Nile virus in two mosquito pools of *Culex pipiens*. These mosquitoes were collected from traps set approximately a mile apart along the eastern boundary of Yakima County near the Sunnyside Wildlife Recreation Area. In September, a Black-billed Magpie and a horse tested positive from the same vicinity. No human cases of West Nile virus acquired in-state were reported. Figure 1 shows a timeline of West Nile virus activity in 2005.

**Figure 1. Sequence of West Nile Virus Activity in 2005**



As expected, West Nile virus activity occurred late in the summer after the virus had an opportunity to amplify in mosquito and bird populations within a localized area. These detections served as a warning for potential human infection. Mosquito trapping and control were increased in the area, and communications activities associated with the detections included messages to raise public awareness of the presence of West Nile virus.

## Trends in West Nile Virus Activity and Surveillance

By the end of 2004, human infection caused by West Nile virus had been reported in every state in the contiguous United States with the exception of Maine and Washington. West Nile virus has become established throughout California and viral activity has spread northward into southern counties of Oregon and Idaho. Over the past three years, the number of human cases increased markedly in western United States, as shown in Table 1.

**Table 1. West Nile Virus Activity in Western United States, 2003-2005**

Human WNV Cases and Fatalities by Year						
State	2003		2004		2005	
	Cases	Fatalities	Cases	Fatalities	Cases	Fatalities
Arizona	13	1	391	16	113	5
California	3	0	779	28	880	19
Idaho	1	0	3	0	13	0
Nevada	2	0	44	0	31	1
Oregon	0	0	3	0	7	0
Utah	1	0	11	0	52	1
Washington	0	0	0	0	0	0

Source: CDC West Nile virus statistics, 2003-2005

Despite the impact of West Nile virus on neighboring states, surveillance decreased in dead birds submitted for testing and mosquito trapping over the last two years. Equine specimens submitted for testing decreased as well, however, this may be partially the result of owners vaccinating for West Nile virus. Mosquito pool testing increased due to available testing provided through the Washington State Department of Health and U.S. Army Center for Health Promotion and Preventive Medicine-West. Table 2 displays trends in West Nile virus surveillance and positive viral detection from 2001 through 2005.

**Table 2. Surveillance and West Nile Virus Activity in Washington State, 2001-2005**

Non-human Surveillance and WNV-Positives by Year					
	2001	2002	2003	2004	2005
Dead Birds Tested	28	325	906	553	660
WNV-Positive Birds	0	4	0	0	1
Sentinel Chicken Sera Tested	94	387	435	392	576
WNV-Positive Chicken Sera	0	0	0	0	0
Equine Tested	1	50	102	57	54
WNV-Positive Equine	0	2	0	0	1
Mosquito Trapping Events*	346	444	2370	1877	1637
Mosquito Pools Tested	47	43	582	1015	915
WNV-Positive Pools	0	0	0	0	2

\* Mosquito trapping events collected mosquitoes primarily for speciation and population density. Selected mosquitoes from these trapping events were pooled for West Nile virus testing.

As the virus spreads into Washington, the West Nile virus surveillance program anticipates an increased need for maintaining old and establishing new surveillance partnerships across the state to ensure early detection and protection against West Nile virus infection.

## Mosquito Surveillance

### Surveillance Activities

In 2004, between April and October, 23 local agencies from 22 counties collected adult mosquitoes primarily using carbon dioxide traps. Some mosquitoes were also collected as larvae and reared to adults. Mosquitoes were submitted for identification of potential West Nile virus vectors and to monitor population densities of those vectors within a particular area.

Mosquito surveillance efforts for 2004 resulted in a combined total of 1,877 trapping events. Surveillance partners conducted 1,557 trapping events, which collected 102,198 mosquitoes for identification by Washington State Department of Health and mosquito control districts. The U.S. Army Center for Health Promotion and Prevention Medicine-West also conducted 320 trapping events in six counties, which collected 4,130 mosquitoes for identification.

In 2005, between February and October, 26 local agencies collected adult mosquitoes from 23 counties using primarily carbon dioxide traps. Some mosquitoes were also collected as larvae and reared to adults.

For 2005, mosquito surveillance efforts resulted in a combined total of 1,637 trapping events. Partners conducted 1,389 trapping events, which collected 127,259 mosquitoes for identification by Washington State Department of Health and mosquito control districts. The U.S. Army Center for Health Promotion and Prevention Medicine-West also conducted 248 trapping events in 4 counties, which collected 1,185 mosquitoes for identification.

Fewer local agencies remain involved in mosquito surveillance than in previous years, resulting in a significant decrease in effort. Twenty-three local agencies participated in mosquito surveillance in 2004 and 26 local agencies in 2005. In comparison, 35 local agencies conducted trapping events in 31 counties during 2003.

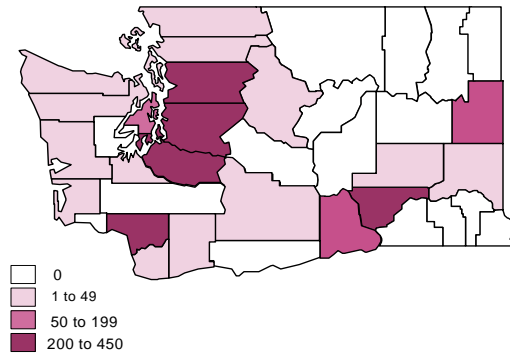
Figure 2 and Figure 3 display the state coverage of mosquito trapping events for 2004 and 2005, respectively. A majority of the trapping events continue to occur in the heavily populated counties. From 2004 to 2005, fewer trapping events occurred in the more populated counties, Snohomish, King, and Pierce. However, an increase of trapping events was observed among counties in southwest (Cowlitz and Clark) and southeast (Benton and Yakima) Washington.

### Mosquito Species Findings

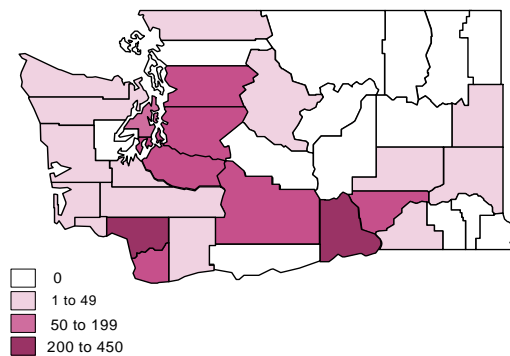
Mosquito surveillance during 2004 and 2005 resulted in the identification of species never before reported in 16 counties. Potential West Nile virus vectors were newly detected in 14 of these counties. Table 3 lists the new findings of mosquito species and potential vectors by county for the past two years.

Mosquito surveillance resulted in an increased understanding of the distribution of these vector species and populations in specific areas within the state. This information is useful in identifying geographic areas of high risk and implementing prevention and control measures to reduce the risk of human infection.

**Figure 2. Mosquito Trapping Events, 2004**



**Figure 3. Mosquito Trapping Events, 2005**



**Table 3. New Mosquito Species Findings by County, 2004-2005**

County	Number	Species
Adams	4	<i>Aedes vexans</i> *, <i>Anopheles freeborni</i> *, <i>Coquillettidia perturbans</i> *, and <i>Ochlerotatus melanimon</i> *
Benton	2	<i>Coquillettidia perturbans</i> * and <i>Ochlerotatus cataphylla</i>
Cowlitz	4	<i>Culiseta minnesotae</i> , <i>Ochlerotatus aboriginis</i> , <i>Ochlerotatus aloponotum</i> , <i>Ochlerotatus communis</i> , and <i>Ochlerotatus fitchii</i> *
Franklin	4	<i>Aedes vexans</i> *, <i>Anopheles punctipennis</i> *, <i>Coquillettidia perturbans</i> *, and <i>Ochlerotatus campestris</i>
Grays Harbor	4	<i>Culiseta impatiens</i> *, <i>Culiseta minnesotae</i> , <i>Ochlerotatus sierrensis</i> , and <i>Ochlerotatus sticticus</i> *
Jefferson	4	<i>Anopheles punctipennis</i> *, <i>Culiseta inornata</i> *, <i>Ochlerotatus aboriginis</i> , and <i>Ochlerotatus sticticus</i> *
King	3	<i>Aedes vexans</i> *, <i>Culex boharti</i> , and <i>Culex morsitans</i> *
Kitsap	2	<i>Culiseta particeps</i> and <i>Ochlerotatus increpitus</i>
Pierce	2	<i>Culex boharti</i> , <i>Culex stigmatosoma</i> *, and <i>Culiseta minnesotae</i>
Skagit	1	<i>Culex pipiens</i> *
Snohomish	3	<i>Anopheles earlei</i> , <i>Anopheles freeborni</i> *, <i>Culiseta morsitans</i> *, and <i>Ochlerotatus dorsalis</i> *
Spokane	3	<i>Culex salinarius</i> *, <i>Culiseta minnesotae</i> , and <i>Ochlerotatus sierrensis</i>
Wahkiakum	10	<i>Anopheles freeborni</i> *, <i>Anopheles punctipennis</i> *, <i>Coquillettidia perturbans</i> *, <i>Culex pipiens</i> *, <i>Culiseta inornata</i> *, <i>Culiseta minnesotae</i> , <i>Culiseta particeps</i> , <i>Ochlerotatus aboriginis</i> , <i>Ochlerotatus fitchii</i> *, and <i>Ochlerotatus sierrensis</i>
Whatcom	1	<i>Culex boharti</i>
Whitman	1	<i>Ochlerotatus sticticus</i> *
Yakima	1	<i>Ochlerotatus trivittatus</i> *

\* WNV-positive mosquito species reported to CDC, United States, 1999-2005.

Since 2001, West Nile virus surveillance has resulted in new findings of mosquito species for the state. Species identified included *Culex salinarius*, *Ochlerotatus trivittatus* (unconfirmed), and *Ochlerotatus japonicus japonicus*. Surveillance findings also indicate that *Culiseta morsitans* is becoming more widely spread in western Washington.

### Potential West Nile Virus Vectors

In the United States, 60 mosquito species have been reported infected with West Nile virus. Although considered potential vectors, West Nile virus is transmitted primarily by members of the *Culex* species. Twenty-two mosquito species of these potential West Nile virus vectors have been found in Washington, including several *Culex* species.

During 2004 and 2005, six members of the *Culex* species were identified. Members include *Culex boharti*, *Culex pipiens*, *Culex salinarius*, *Culex stigmatasoma*, *Culex tarsalis*, and *Culex territans*. Among these, *Culex pipiens* and *Culex tarsalis* are two of the most widespread species in the state. A general comparison of *Culex* species between western and eastern Washington reveals a difference in the occurrence and distribution of mosquito species. Figure 4 illustrates this comparison for the past two years of surveillance data.

The occurrence of *Culex* species in the western counties comprised 41 percent of the total number of mosquitoes collected during trapping events. The majority (88 percent) of the *Culex* species were *Culex pipiens*. Similar to past findings, the prevalence of *Culex pipiens* appears strongest in the more populated counties including King, Pierce, and Snohomish counties.

To a much lesser extent, *Culex tarsalis* and three other *Culex* species constitute 12 percent of the *Culex* species. In general *Culex pipiens*, commonly referred to as the “northern house mosquito,” can be found in rural environments, but reach their greatest numbers in urban and suburban areas.

In the eastern counties, *Culex* species comprised 29 percent of the total mosquitoes collected during trapping events. *Culex tarsalis* represented 52 percent of the *Culex* species collected and *Culex pipiens* represented 48 percent. The prevalence of both species appears high in several counties including Benton, Franklin, Spokane, Walla Walla, and Yakima Counties. Infrequently, *Culex salinarius* and *Culex territans* are two other *Culex* species that are found in eastern counties. Surveillance history indicates *Culex tarsalis* as the predominant *Culex* species. *Culex tarsalis* is a mosquito found in large numbers in floodwater and irrigated habitats.

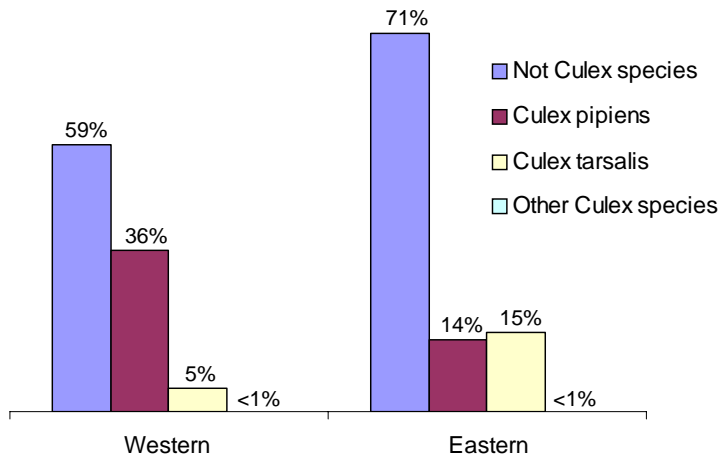
*Culex pipiens* and *Culex tarsalis* are anticipated to play a major role in the transmission of West Nile virus as indicated by outbreaks experienced in other states. Because large populations of *Culex pipiens* and *Culex tarsalis* are widely distributed throughout Washington, the activity of these competent West Nile virus vectors should be closely monitored. For more information on mosquito habitat, refer to Appendix A of the *Washington State Mosquito-borne Disease Response Plan*.

See Appendices 1 through 6 for the summary of mosquito species by county, including number of mosquitoes collected, total number identified, and total number of trapping events.

### Mosquito Pool Testing

Mosquito pools were tested for West Nile virus by Washington State Department of Health, U.S. Army Center for Health Promotion and Preventive Medicine-West, and several mosquito control districts. Pools submitted by Benton and Cowlitz County Mosquito Control Districts were also

**Figure 4. Comparison of *Culex* Species in Western and Eastern Washington, 2004-2005**



tested for western equine encephalitis and St. Louis encephalitis viruses. Pools from Clark County Mosquito Control District were tested for St. Louis encephalitis virus.

In 2004, 1015 mosquito pools from 11 counties tested negative for West Nile virus. The results of pools tested for other arboviruses were also negative.

In 2005, 915 mosquito pools from ten counties were tested. In late August, the Benton County Mosquito Control District detected two mosquito pools of *Culex pipiens* positive for West Nile virus. The mosquito pools were collected from traps set approximately a mile apart along the eastern boundary of Yakima County near Sunnyside Wildlife Recreation Area. No other mosquito pools tested positive for any arboviruses.

See Appendices 7 and 8 for a summary of the number of mosquito pools tested for West Nile virus by county for 2004 and 2005.

### **Mosquito Control**

To reduce the risk from West Nile virus and other arboviral diseases, the Washington State Department of Health obtained a National Pollutant Discharge Elimination System general permit for aquatic mosquito control through the Washington State Department of Ecology. An extension of the department's permit coverage was available to entities qualified to follow the permit conditions and best management practices for mosquito control. The Washington State Department of Health completed the State Environmental Policy Act checklist and waived permit fees for entities covered under the department's permit.

During the 2004 and 2005 mosquito control season, the Washington State Department of Health extended permit coverage to over 70 entities in the state. For the first time, commercial pest control companies were allowed coverage under the department's permit. Pest control companies can now provide a rapid response to mosquito problems, and can simplify the permit process and maintain consistency by assuming permit requirements on behalf of their customers. Table 4 summarizes the type and number of entities covered and how many applied larvicide.

**Table 4. Entities and Larvicide Used Under Washington State Department of Health Permit, 2004-2005**

Coverage Under Washington State Department of Health, Aquatic Mosquito Control Permit				
Entity Type	2004		2005	
	Permitted	Applied Larvicide	Permitted	Applied Larvicide
City/Town	25	8	29	9
County	10	2	10	3
Mosquito Control District	10	10	10	10
Pest Control Company*	7	7	8	7
Private	15	5	13	5
School District	1	0	1	0
State	3	2	3	2
<b>Total</b>	<b>71</b>	<b>34</b>	<b>74</b>	<b>36</b>

\* In 2004, 7 pest control companies contracted with 25 unique sites for potential larval control. In 2005, 8 pest control companies contracted with 31 unique sites. Sites included private businesses, residential properties, cities, and school districts. Not all of these contracted sites required larval control.

## Bird Surveillance

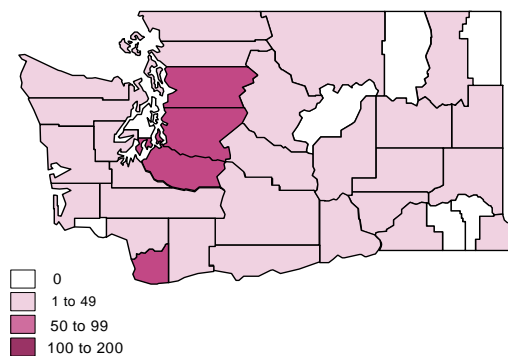
### Surveillance Activities

As part of a collaborative West Nile virus surveillance program, participating local health jurisdictions tracked dead bird reports and submitted suitable specimens for West Nile virus testing. Dead bird surveillance focused primarily on the reporting and collection of corvids (crows, jays, magpies, and ravens) and raptors. This type of surveillance acts as an early detection system for West Nile virus. Monitoring of infected dead birds is useful in identifying where humans may be at risk for infection. Resources for prevention and control may then be directed to those areas.

From March through November 2004, 572 dead birds collected from 32 counties were submitted for West Nile virus testing. All specimens tested negative for the virus. The majority of dead birds collected were from more populated counties, as shown in Figure 5.

From January through November 2005, 676 dead birds collected from 34 counties were submitted for testing. One specimen, a Black-billed Magpie from Yakima County, tested positive for West Nile virus. The majority of dead birds collected were from the more populated counties, as shown in Figure 6. Over these two years, dead bird surveillance efforts decreased.

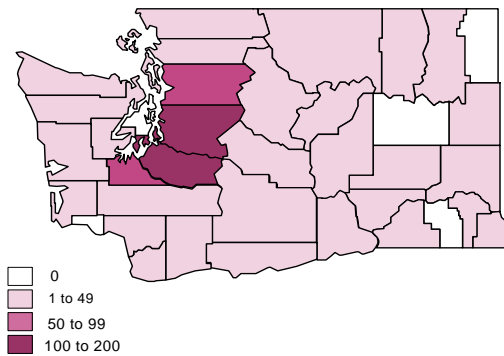
**Figure 5. Dead Birds Tested, 2004**





Although corvids were the principal bird species tested for West Nile virus during 2004 and 2005, a variety of other species were tested as well. In the United States, the top five West Nile virus positive bird species reported to CDC for 2005 are 1) American Crow, 2) Blue Jay, 3) Western Scrub Jay, 4) Yellow-billed Magpie, and 5) House Sparrow. Table 5 summarizes the number and species of dead birds submitted for testing in 2004-2005 in Washington.

**Figure 6. Dead Birds Tested, 2005**



**Table 5. Bird Species Submitted for West Nile Virus Testing, 2004-2005**

Bird Species Submitted for WNV Testing					
Species	2004	2005	Species	2004	2005
American Crow	446	533	House Finch	2	0
American Kestrel	2	2	House Sparrow	4	1
American Robin	8	1	Mourning Dove	4	4
Barn Owl	3	8	Northern Flicker	5	3
Barn Swallow	5	1	Northern Pygmy Owl	1	0
Barred Owl	1	2	Pileated Woodpecker	1	0
Belted Kingfisher	1	0	Pacific-slope Flycatcher	2	0
Black-billed Magpie	12	31	Pigeon Guillemot	0	1
Blue Jay	1	1	Red-breasted Sapsucker	1	0
Cedar Waxwing	1	1	Red-headed Woodpecker	1	1
Chukar	1	0	Red-shafted Flicker	1	0
Common Grackle	0	1	Red-tailed Hawk	7	4
Common Raven	7	3	Rock Dove	2	0
Common Yellowthroat	2	0	Sharp-shinned Hawk	2	8
Cooper's Hawk	1	5	Spruce Grouse	1	0
Downy Woodpecker	0	0	Steller's Jay	24	29
European Starling	2	15	Swainson's Thrush	1	0
Evening Grosbeak	1	0	Western Screech Owl	2	0
Fox Sparrow	1	0	Western Scrub Jay	5	4
Great Horned Owl	0	4	Other Species	10	13
Herring Gull	1	0			

See Appendices 7 and 8 for a summary of the number of dead birds submitted for West Nile virus testing by county for 2004 and 2005.

## Sentinel Chicken Serosurveillance

During 2004 and 2005, the Benton County Mosquito Control District maintained five sentinel chicken flocks with ten birds each, from which blood specimens were collected throughout the summer. In 2004, a total of 392 chicken sera were tested for West Nile virus as well as for western equine encephalitis and St. Louis encephalitis. Test results were negative for these three arboviruses. In 2005, a total of 576 chicken sera were tested. One specimen from a sentinel flock in Benton County tested positive for St. Louis encephalitis. All specimens tested negative for West Nile virus and western equine encephalitis. See Appendices 7 and 8 for a summary of the number chicken sera tested by county for 2004 and 2005.

## Veterinary Surveillance

### Surveillance Activities

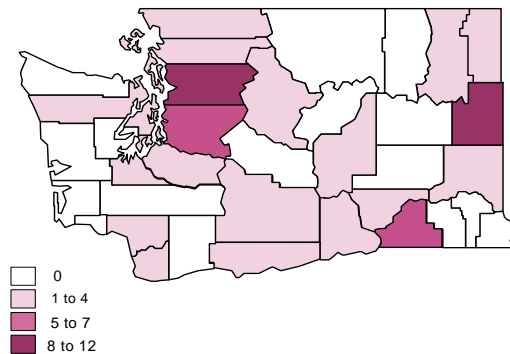
The West Nile Virus Surveillance Program and Washington State Department of Agriculture encourage veterinarians to report suspect cases of West Nile virus in horses and other animals to the Washington State Department of Health. This surveillance provides early detection of West Nile virus activity, particularly in rural areas.

Between January and November 2004, 57 specimens from suspected horse cases were submitted for West Nile virus testing. All specimens tested negative. County information was only available for 43 of the total horse cases. These particular cases came from 20 counties across the state.

From January to December 2005, specimens from 54 suspected horse cases were submitted for West Nile virus testing. County information was only available for 32 of the total horse cases. These particular cases came from 17 counties. Figure 7 shows the horse cases tested for West Nile virus during 2004 and 2005.

In 2005, specimens from four horses tested positive for West Nile virus. Three of the four positive horse cases (two from Snohomish County and one from Thurston County) acquired West Nile virus out-of-state. One positive horse case from Yakima County acquired West Nile virus in-state.

Figure 7. Horses Tested, 2004-2005



Horse vaccines to prevent West Nile virus infection have been available since 2002. As local horse populations are vaccinated, the use of horses as early indicators for West Nile virus may become less effective. See Appendices 7 and 8 for a summary of horse cases by county for 2004 and 2005.

## Zoo Surveillance

The Seattle Woodland Park Zoo participated in the National Surveillance System for West Nile Virus in Zoo Institutions. In 2004, the zoo collected 18 zoo specimens for West Nile virus testing, including 1 mammal and 17 bird specimens. No feral specimens were tested. The mammal and seven of the birds tested positive for West Nile virus. All positives resulted from animals known

to have been previously vaccinated, except for one bird. The bird arrived into quarantine from a California zoo with a low titer indicating vaccination or exposure. It was not determined whether the bird had previously been vaccinated. In 2005, 49 zoo and feral specimens were tested, including 5 mammal and 44 bird specimens. Seven of the birds were feral crows. Again, all positives resulted from animals known to have been previously vaccinated.

## **Outreach Activities**

The program produces a variety of public information and educational materials to help communities understand the health significances of West Nile virus and how best to protect themselves and their families.

## **Educational Materials**

- Jointly, the Washington State Department of Health West Nile Virus Surveillance Program and Public Health-Seattle & King County expanded outreach efforts to minority communities by providing translations of the West Nile virus prevention message. *West Nile Virus—Fight the Bite* flyers were printed in five different languages, including Russian, Khmer, Chinese, Korean, and Vietnamese.
- The following educational materials were distributed during 2004 and 2005:
  - *West Nile Virus—Do You Know What’s Biting You?* available in English and Spanish: 22,244 brochures were distributed.
  - *Mosquito Repellent—How to Use It Safely*: 9,619 brochures were distributed.
  - *Mosquito Problems Start At Home* flyers, bookmarks, and posters: 7,414 were distributed.
- The West Nile virus electronic newsletter was published bi-weekly to provide agencies with the latest local, regional, and national perspectives on West Nile virus.

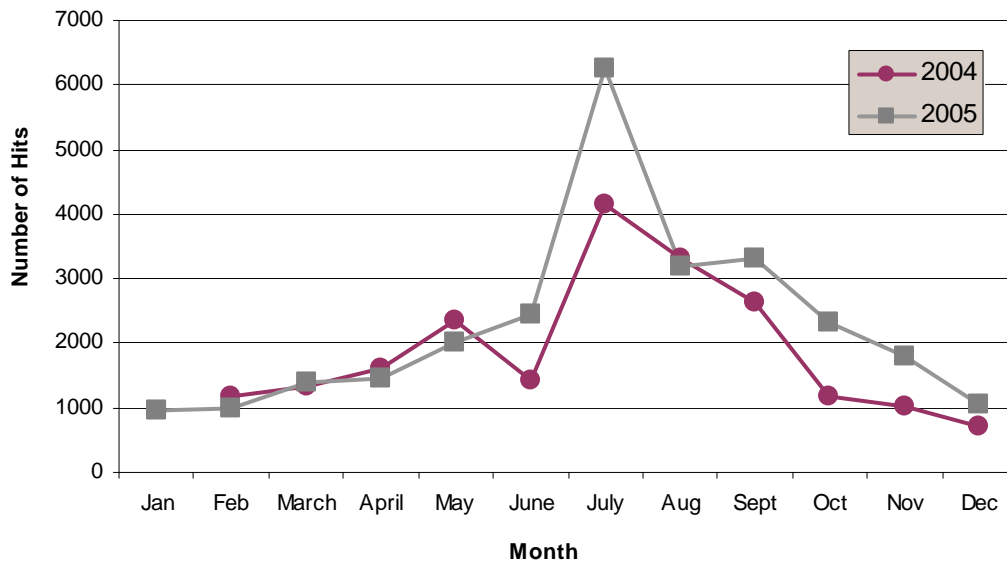
All health educational materials are available for print or order on the Washington State Department of Health, Health Education Resource Exchange Web site ([www.doh.wa.gov/here](http://www.doh.wa.gov/here)).

## **Public Information**

- Fifteen news releases relating to West Nile virus were issued by state agencies during 2004 and 2005. Ten of these were issued by the Washington State Department of Health and contained the program’s prevention messages on West Nile virus.

- Two new audio public service announcements were developed. These 60-second radio spots are attention-grabbing and provide a strong and clear message on West Nile virus prevention. The public service announcements were distributed to over 100 radio stations in both English and Spanish across the state. The radio spots are made available on the West Nile virus Web site.
- A toll-free information line, 1.866.78VIRUS, was maintained for the public. Callers can learn the latest status on West Nile virus activity in Washington, have commonly asked questions answered, and be directed to additional resources. The information line received 578 calls during 2004 and 2005, of which 71 were out-of-state calls. The majority of the calls occurred during May through September, peaking in the month of June.
- The West Nile virus Web site ([www.doh.wa.gov/wnv](http://www.doh.wa.gov/wnv)) continues to be one of the most popular Washington State Department of Health Web sites. The West Nile virus portal Web page reached the top 20 most accessed Web pages out of over 4,500 active department pages during the warmer months of June through September. Figure 8 indicates that July was the peak month for portal Web page hits for both 2004 and 2005. The highest peak in July 2005 of 6,265 hits was likely due to the reporting of a suspected human case.

**Figure 8. West Nile Virus in Washington Web Site Portal Hits, 2004-2005**



\* January 2004 Web statistics were unavailable.

## **Appendices**

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Appendix 1  
 Final 2004 WNV Surveillance  
 Washington State Department of Health  
 Mosquito Species by County

7/7/2006

County	Species	Number Collected	Total ID	Trapping Events
Adams	<i>Ochlerotatus dorsalis</i>	1		
	<b><i>Ochlerotatus melanimon</i></b>	<b>1</b>		
	<b><i>Aedes vexans</i></b>	<b>1</b>		
	<b><i>Anopheles freeborni</i></b>	<b>8</b>		
	<b><i>Coquillettidia perturbans</i></b>	<b>3</b>		
	<i>Culex pipiens</i>	330		
	<i>Culex tarsalis</i>	255		
	<i>Culiseta inornata</i>	10	<b>609</b>	<b>5</b>
Benton	<i>Ochlerotatus dorsalis</i>	1		
	<i>Ochlerotatus increpitus</i>	495		
	<i>Aedes vexans</i>	6,344		
	<i>Anopheles freeborni</i>	353		
	<i>Anopheles punctipennis</i>	19		
	<b><i>Coquillettidia perturbans</i></b>	<b>79</b>		
	<i>Culiseta inornata</i>	425		
	<i>Culex pipiens</i>	1,188		
	<i>Culex tarsalis</i>	2,016	<b>10,920</b>	<b>63</b>
Chelan	<i>Ochlerotatus increpitus</i>	26		
	<i>Ochlerotatus sierrensis</i>	10		
	<i>Ochlerotatus sticticus</i>	4		
	<i>Aedes sp.</i>	2		
	<i>Aedes vexans</i>	102		
	<i>Anopheles punctipennis</i>	1		
	<i>Culex pipiens</i>	22		
	<i>Culex tarsalis</i>	13		
	<i>Culiseta incidens</i>	5		
	<i>Culiseta inornata</i>	1	<b>186</b>	<b>28</b>
Clallam	<i>Ochlerotatus dorsalis</i>	209		
	<i>Coquillettidia perturbans</i>	2		
	<i>Culiseta incidens</i>	23	<b>234</b>	<b>2</b>
Clark	<i>Other Species / Unknown</i>	71		
	<i>Ochlerotatus increpitus</i>	1		
	<i>Ochlerotatus sticticus</i>	442		
	<i>Aedes vexans</i>	1,270		
	<i>Anopheles freeborni</i>	5		
	<i>Anopheles punctipennis</i>	95		
	<i>Coquillettidia perturbans</i>	3		
	<i>Culex pipiens</i>	410		
	<i>Culex tarsalis</i>	250		
	<i>Culiseta incidens</i>	89		
	<i>Culiseta particeps</i>	15	<b>2,651</b>	<b>42</b>
	Cowlitz	<i>Other Species / Unknown</i>	1	
<b><i>Ochlerotatus aboriginis</i></b>		<b>16</b>		
<b><i>Ochlerotatus aloponotum</i></b>		<b>1</b>		
<i>Aedes cinereus</i>		6		
<b><i>Ochlerotatus communis</i></b>		<b>26</b>		
<i>Ochlerotatus increpitus</i>		121		
<i>Ochlerotatus sierrensis</i>		77		
<i>Ochlerotatus sticticus</i>		3,383		
<i>Aedes sp.</i>		4		
<i>Aedes vexans</i>		580		
<i>Anopheles freeborni</i>		14		
<i>Anopheles punctipennis</i>		269		
<i>Coquillettidia perturbans</i>		19,167		
<i>Culex pipiens</i>		4,087		
<i>Culex stigmatosoma</i>		28		
<i>Culex tarsalis</i>		1,047		
<i>Culex territans</i>		1		
<i>Culiseta impatiens</i>		18		
<i>Culiseta incidens</i>		48		
<i>Culiseta inornata</i>		27		
<b><i>Culiseta minnesotae</i></b>	<b>9</b>			
<i>Culiseta particeps</i>	31	<b>28,961</b>	<b>370</b>	

Appendix 1  
Final 2004 WNV Surveillance  
Washington State Department of Health  
Mosquito Species by County

7/7/2006

County	Species	Number Collected	Total ID	Trapping Events
Franklin	<i>Other Species / Unknown</i>	2		
	<i>Ochlerotatus dorsalis</i>	1,380		
	<i>Ochlerotatus increpitus</i>	91		
	<i>Ochlerotatus nigromaculis</i>	197		
	<i>Ochlerotatus sticticus</i>	13		
	<b>Aedes vexans</b>	<b>318</b>		
	<i>Anopheles freeborni</i>	37		
	<b>Anopheles punctipennis</b>	<b>5</b>		
	<b>Coquillettidia perturbans</b>	<b>14</b>		
	<i>Culex pipiens</i>	9,271		
	<i>Culex tarsalis</i>	4,078		
	<i>Culiseta inornata</i>	119	15,525	313
Grays Harbor	<i>Ochlerotatus dorsalis</i>	142		
	<i>Ochlerotatus fitchii</i>	10		
	<b>Ochlerotatus sticticus</b>	<b>1</b>		
	<i>Coquillettidia perturbans</i>	11		
	<i>Culex pipiens</i>	8		
	<i>Culex tarsalis</i>	1		
	<b>Culiseta impatiens</b>	<b>7</b>		
	<i>Culiseta incidens</i>	1	181	6
Island	<i>Other Species / Unknown</i>	1		
	<i>Ochlerotatus dorsalis</i>	554		
	<i>Ochlerotatus increpitus</i>	1		
	<i>Ochlerotatus sierrensis</i>	3		
	<i>Ochlerotatus sticticus</i>	1		
	<i>Coquillettidia perturbans</i>	35		
	<i>Culex pipiens</i>	8		
	<i>Culex tarsalis</i>	30		
	<i>Culiseta incidens</i>	3		
	<i>Culiseta inornata</i>	120		
	<i>Culiseta particeps</i>	13	769	16
King	<i>Ochlerotatus fitchii</i>	10		
	<i>Ochlerotatus j. japonicus</i>	5		
	<i>Ochlerotatus sierrensis</i>	9		
	<i>Ochlerotatus sticticus</i>	39		
	<b>Aedes vexans</b>	<b>6</b>		
	<i>Anopheles punctipennis</i>	7		
	<i>Coquillettidia perturbans</i>	85		
	<b>Culex boharti</b>	<b>2</b>		
	<i>Culex pipiens</i>	11,893		
	<i>Culex tarsalis</i>	372		
	<i>Culex territans</i>	4		
	<i>Culiseta impatiens</i>	1		
	<i>Culiseta incidens</i>	862		
	<i>Culiseta inornata</i>	46		
<i>Culiseta minnesotae</i>	32			
	<i>Culiseta particeps</i>	3	13,376	239
Pacific	<i>No Mosquitoes Collected</i>	0	0	1
Pierce	<i>Ochlerotatus fitchii</i>	9		
	<i>Ochlerotatus impiger</i>	209		
	<i>Ochlerotatus increpitus</i>	34		
	<i>Ochlerotatus sierrensis</i>	73		
	<i>Ochlerotatus sticticus</i>	1		
	<i>Aedes vexans</i>	2		
	<i>Ochlerotatus sp.</i>	90		
	<i>Anopheles punctipennis</i>	3		
	<i>Coquillettidia perturbans</i>	923		
	<b>Culex boharti</b>	<b>4</b>		
	<i>Culex pipiens</i>	1,679		
	<b>Culex stigmatosoma</b>	<b>9</b>		
	<i>Culex tarsalis</i>	114		
	<i>Culiseta impatiens</i>	3		
	<i>Culiseta incidens</i>	961		
	<i>Culiseta inornata</i>	11		
	<b>Culiseta minnesotae</b>	<b>2</b>		
	<i>Culiseta particeps</i>	6	4,133	98



Appendix 1  
 Final 2004 WNV Surveillance  
 Washington State Department of Health  
 Mosquito Species by County

7/7/2006

County	Species	Number Collected	Total ID	Trapping Events
Skagit	<b>Culex pipiens</b>	1		
	<i>Culiseta incidens</i>	11	12	1
Skamania	<i>Ochlerotatus increpitus</i>	63		
	<i>Ochlerotatus sierrensis</i>	8		
	<i>Aedes vexans</i>	3		
	<i>Culex pipiens</i>	2		
	<i>Culiseta incidens</i>	3	79	5
Snohomish	<i>Other Species / Unknown</i>	6		
	<i>Ochlerotatus aboriginis</i>	11		
	<i>Aedes cinereus</i>	40		
	<b>Ochlerotatus dorsalis</b>	428		
	<i>Ochlerotatus fitchii</i>	14		
	<i>Ochlerotatus increpitus</i>	290		
	<i>Ochlerotatus sierrensis</i>	21		
	<i>Ochlerotatus sticticus</i>	10		
	<i>Aedes vexans</i>	7		
	<i>Anopheles punctipennis</i>	19		
	<i>Coquillettidia perturbans</i>	394		
	<i>Culex pipiens</i>	10,476		
	<i>Culex tarsalis</i>	1,453		
	<i>Culiseta impatiens</i>	49		
	<i>Culiseta incidens</i>	44		
	<i>Culiseta inornata</i>	310		
	<i>Culiseta minnesotae</i>	10		
<i>Culiseta particeps</i>	17	13,599	233	
Spokane	<i>Aedes cinereus</i>	11		
	<i>Ochlerotatus fitchii</i>	1		
	<i>Ochlerotatus flavescens</i>	3		
	<i>Ochlerotatus increpitus</i>	193		
	<b>Ochlerotatus sierrensis</b>	7		
	<i>Ochlerotatus sp.</i>	1		
	<i>Aedes vexans</i>	1		
	<i>Anopheles freeborni</i>	19		
	<i>Anopheles punctipennis</i>	3		
	<i>Coquillettidia perturbans</i>	17		
	<i>Culex pipiens</i>	591		
	<b>Culex salinarius</b>	7		
	<i>Culex tarsalis</i>	531		
	<i>Culex sp.</i>	28		
<i>Culiseta inornata</i>	7			
<i>Culiseta sp.</i>	2	1,422	53	
Thurston	<i>Ochlerotatus fitchii</i>	2		
	<i>Ochlerotatus sierrensis</i>	10		
	<i>Culiseta incidens</i>	45	57	2
Walla Walla	<i>Other Species / Unknown</i>	815		
	<i>Ochlerotatus increpitus</i>	209		
	<i>Ochlerotatus nigromaculis</i>	380		
	<i>Ochlerotatus sticticus</i>	1		
	<i>Aedes vexans</i>	1,749		
	<i>Anopheles freeborni</i>	23		
	<i>Culex pipiens</i>	182		
	<i>Culex tarsalis</i>	91		
	<i>Culex territans</i>	2		
<i>Culiseta inornata</i>	1	3,453	32	
Whatcom	<i>Other Species / Unknown</i>	1		
	<i>Ochlerotatus dorsalis</i>	636		
	<i>Ochlerotatus fitchii</i>	396		
	<i>Ochlerotatus increpitus</i>	20		
	<i>Ochlerotatus sierrensis</i>	35		
	<i>Aedes vexans</i>	6		
	<i>Anopheles punctipennis</i>	14		
	<i>Coquillettidia perturbans</i>	43		
	<b>Culex boharti</b>	5		
	<i>Culex pipiens</i>	358		
	<i>Culex tarsalis</i>	52		
<i>Culiseta impatiens</i>	1			
<i>Culiseta incidens</i>	55			
<i>Culiseta inornata</i>	8	1,630	36	

Appendix 1  
 Final 2004 WNV Surveillance  
 Washington State Department of Health  
 Mosquito Species by County

7/7/2006

County	Species	Number Collected	Total ID	Trapping Events
Whitman	<i>Other Species / Unknown</i>	3		
	<i>Ochlerotatus fitchii</i>	18		
	<b><i>Ochlerotatus sticticus</i></b>	11		
	<i>Anopheles freeborni</i>	1		
	<i>Culex pipiens</i>	571		
	<i>Culex tarsalis</i>	8		
	<i>Culiseta inornata</i>	7	619	5
Yakima	<i>Ochlerotatus dorsalis</i>	7		
	<i>Ochlerotatus increpitus</i>	207		
	<i>Aedes vexans</i>	604		
	<i>Anopheles freeborni</i>	86		
	<i>Culex pipiens</i>	776		
	<i>Culex tarsalis</i>	2,053		
	<i>Culiseta inornata</i>	49	3,782	7
<b>22 Counties</b>		<b>102,198</b>	<b>102,198</b>	<b>1,557</b>

New mosquito species findings for county are listed in bold.

Data Sources:

- Local Health Jurisdictions (11)
- Bayview School (Island County)
- Benton County Mosquito Control District (Benton County and areas of Yakima County)
- Bob Reineke, University of Washington (King County)
- Clark County Mosquito Control District
- Columbia Mosquito Control District (Walla Walla County)
- Franklin County Mosquito Control District
- Leavenworth Mosquito Control District (Chelan County)
- Lee Pederson, US Army (Fairchild AFB, Spokane County)
- Makah Tribe (Clallam County)
- Mosquito Control District of Cowlitz County
- Mt. Rainer National Park (Lewis and Pierce Counties)
- Skamania Mosquito Control District

Final 2004 WNV Surveillance  
US Army Center for Health Promotion and Prevention Medicine-West  
Mosquito Species by County

County	Species	Number Collected	Total ID	Trapping Events
Jefferson	<i>Ochlerotatus dorsalis</i>	149		
	<i>Ochlerotatus increpitus</i>	13		
	<b>Anopheles punctipennis</b>	5		
	<i>Coquillettidia perturbans</i>	35		
	<i>Culex pipiens</i>	15		
	<i>Culex tarsalis</i>	54		
	<i>Culiseta incidens</i>	23	294	15
Kitsap	<i>Ochlerotatus dorsalis</i>	7		
	<i>Ochlerotatus fitchii</i>	55		
	<b>Ochlerotatus increpitus</b>	2		
	<i>Ochlerotatus sierrensis</i>	11		
	<i>Anopheles punctipennis</i>	72		
	<i>Coquillettidia perturbans</i>	198		
	<i>Culex pipiens</i>	831		
	<i>Culex tarsalis</i>	63		
	<i>Culiseta incidens</i>	148		
	<i>Culiseta inornata</i>	13		
	<b><i>Culiseta particeps</i></b>	2	1,402	158
King	<i>Culex pipiens</i>	4		
	<i>Culex tarsalis</i>	1		
	<i>Culiseta incidens</i>	4		
	<i>Culiseta particeps</i>	2	11	4
Pierce	<i>Ochlerotatus aboriginis</i>	56		
	<i>Ochlerotatus fitchii</i>	100		
	<i>Ochlerotatus increpitus</i>	13		
	<i>Ochlerotatus sierrensis</i>	5		
	<i>Aedes vexans</i>	14		
	<i>Anopheles punctipennis</i>	323		
	<i>Coquillettidia perturbans</i>	1,144		
	<i>Culex pipiens</i>	87		
	<i>Culex tarsalis</i>	79		
	<i>Culiseta incidens</i>	91		
	<i>Culiseta inornata</i>	20		
	<i>Culiseta particeps</i>	17	1,949	106
Snohomish	<b><i>Anopheles earlei</i></b>	11		
	<i>Anopheles punctipennis</i>	30		
	<i>Coquillettidia perturbans</i>	7		
	<i>Culex pipiens</i>	6		
	<i>Culex tarsalis</i>	5	59	5
Yakima	<i>Ochlerotatus dorsalis</i>	7		
	<i>Ochlerotatus nigromaculis</i>	1		
	<b><i>Ochlerotatus trivittatus*</i></b>	2		
	<i>Aedes vexans</i>	2		
	<i>Anopheles freeborni</i>	22		
	<i>Anopheles punctipennis</i>	13		
	<i>Culex pipiens</i>	87		
	<i>Culex tarsalis</i>	217		
	<i>Culiseta inornata</i>	64	415	32
<b>Totals</b>			<b>4,130</b>	<b>320</b>

New mosquito species findings for county are listed in bold.

\* *Ochlerotatus trivittatus* is a newly detected (unconfirmed) species for Washington State.

Data Sources for 2004 Mosquito Species Identification: USACHPPM-West

Appendix 3  
Final 2005 WNV Surveillance  
Washington State Department of Health  
Mosquito Species by County

7/7/2006

County	Mosquito Species	Total Number Collected	Total ID	Trapping Events
Adams	<i>Ochlerotatus dorsalis</i>	37		
	<i>Ochlerotatus melanimon</i>	19		
	<i>Aedes vexans</i>	11		
	<i>Anopheles freeborni</i>	49		
	<i>Coquillettidia perturbans</i>	1		
	<i>Culex pipiens</i>	69		
	<i>Culex tarsalis</i>	277		
	<i>Culiseta inornata</i>	27	490	9
Benton	<i>Ochlerotatus dorsalis</i>	3		
	<b><i>Ochlerotatus cataphylla</i></b>	<b>77</b>		
	<i>Ochlerotatus melanimon</i>	6		
	<i>Aedes vexans</i>	47,083		
	<i>Anopheles freeborni</i>	673		
	<i>Coquillettidia perturbans</i>	44		
	<i>Culex pipiens</i>	1,405		
	<i>Culex tarsalis</i>	1,980		
	<i>Culex territans</i>	1		
	<i>Culiseta inornata</i>	592	51,864	209
Chelan	<i>Other Species / Unknown</i>	6		
	<i>Ochlerotatus fitchii</i>	8		
	<i>Ochlerotatus sierrensis</i>	1		
	<i>Aedes vexans</i>	3		
	<i>Culex pipiens</i>	28		
	<i>Culex tarsalis</i>	10		
	<i>Culex territans</i>	5		
	<i>Culiseta impatiens</i>	14		
	<i>Culiseta incidens</i>	30		
	<i>Culiseta inornata</i>	32	137	22
Clallam	<i>Ochlerotatus dorsalis</i>	536		
	<i>Ochlerotatus sierrensis</i>	2		
	<i>Coquillettidia perturbans</i>	58		
	<i>Culex pipiens</i>	7		
	<i>Culex tarsalis</i>	6		
	<i>Culiseta inornata</i>	4	613	8
Clark	<i>Ochlerotatus increpitus</i>	61		
	<i>Ochlerotatus sierrensis</i>	2		
	<i>Ochlerotatus sticticus</i>	1,384		
	<i>Aedes vexans</i>	3,226		
	<i>Anopheles freeborni</i>	4		
	<i>Anopheles punctipennis</i>	29		
	<i>Coquillettidia perturbans</i>	3		
	<i>Culex pipiens</i>	1,374		
	<i>Culex tarsalis</i>	709		
	<i>Culiseta impatiens</i>	5		
	<i>Culiseta incidens</i>	73		
	<i>Culiseta inornata</i>	15		
	<i>Culiseta particeps</i>	40	6,925	76
Cowlitz	<i>Other Species / Unknown</i>	30		
	<i>Ochlerotatus aboriginis</i>	3		
	<i>Ochlerotatus aloponotum</i>	3		
	<i>Aedes cinereus</i>	2		
	<i>Ochlerotatus communis</i>	1		
	<b><i>Ochlerotatus fitchii</i></b>	<b>1</b>		
	<i>Ochlerotatus increpitus</i>	41		
	<i>Ochlerotatus sierrensis</i>	7		
	<i>Ochlerotatus sticticus</i>	2,497		
	<i>Aedes vexans</i>	474		
	<i>Anopheles freeborni</i>	1		
	<i>Anopheles punctipennis</i>	31		
	<i>Coquillettidia perturbans</i>	12,051		
	<i>Culex pipiens</i>	1,100		
	<i>Culex stigmatosoma</i>	2		
	<i>Culex tarsalis</i>	321		
	<i>Culiseta impatiens</i>	6		
	<i>Culiseta incidens</i>	15		
	<i>Culiseta inornata</i>	28		
	<i>Culiseta minnesotae</i>	1		
<i>Culiseta particeps</i>	114	16,729	221	

Appendix 3  
Final 2005 WNV Surveillance  
Washington State Department of Health  
Mosquito Species by County

7/7/2006

County	Mosquito Species	Total Number Collected	Total ID	Trapping Events
Franklin	<i>Other Species / Unknown</i>	60		
	<b><i>Ochlerotatus campestris</i></b>	<b>302</b>		
	<i>Ochlerotatus dorsalis</i>	1,686		
	<i>Ochlerotatus sticticus</i>	3		
	<i>Aedes vexans</i>	1,467		
	<i>Anopheles freeborni</i>	1,996		
	<i>Anopheles punctipennis</i>	21		
	<i>Culex pipiens</i>	2,202		
	<i>Culex tarsalis</i>	3,588		
	<i>Culiseta incidens</i>	2		
<i>Culiseta inornata</i>	638	11,965	191	
Grays Harbor	<i>Ochlerotatus aboriginis</i>	5		
	<i>Ochlerotatus dorsalis</i>	15		
	<i>Ochlerotatus fitchii</i>	2		
	<b><i>Ochlerotatus sierrensis</i></b>	<b>1</b>		
	<i>Coquillettidia perturbans</i>	66		
	<i>Culex pipiens</i>	48		
	<i>Culex tarsalis</i>	5		
	<i>Culiseta impatiens</i>	24		
	<i>Culiseta incidens</i>	2		
	<b><i>Culiseta minnesotae</i></b>	<b>1</b>		
<i>Culiseta particeps</i>	3	172	10	
Jefferson	<b><i>Ochlerotatus aboriginis</i></b>	<b>3</b>		
	<i>Ochlerotatus dorsalis</i>	27		
	<i>Ochlerotatus fitchii</i>	4		
	<i>Ochlerotatus sierrensis</i>	5		
	<b><i>Ochlerotatus sticticus</i></b>	<b>1</b>		
	<i>Aedes sp.</i>	1		
	<i>Coquillettidia perturbans</i>	2		
	<i>Culex pipiens</i>	22		
	<i>Culex tarsalis</i>	8		
	<i>Culiseta incidens</i>	10		
<b><i>Culiseta inornata</i></b>	<b>7</b>	<b>90</b>	<b>13</b>	
King	<i>Other Species / Unknown</i>	1		
	<i>Aedes cinereus</i>	31		
	<i>Ochlerotatus fitchii</i>	4		
	<i>Ochlerotatus j. japonicus</i>	1		
	<i>Ochlerotatus sierrensis</i>	6		
	<i>Anopheles punctipennis</i>	4		
	<i>Coquillettidia perturbans</i>	122		
	<i>Culex pipiens</i>	1,442		
	<i>Culex stigmatosoma</i>	8		
	<i>Culex tarsalis</i>	230		
	<i>Culiseta incidens</i>	788		
	<i>Culiseta inornata</i>	28		
	<i>Culiseta minnesotae</i>	16		
<b><i>Culiseta morsitans</i></b>	<b>3</b>			
<i>Culiseta particeps</i>	11	2,695	131	
Kitsap	<i>Ochlerotatus sierrensis</i>	4		
	<i>Culex pipiens</i>	6		
	<i>Culex tarsalis</i>	3		
	<i>Culiseta incidens</i>	29		
	<i>Culiseta inornata</i>	1	43	5
Lewis	<i>Ochlerotatus aboriginis</i>	88		
	<i>Ochlerotatus communis</i>	20	108	2
Pacific	<i>Ochlerotatus aboriginis</i>	599		
	<i>Ochlerotatus dorsalis</i>	639		
	<i>Ochlerotatus fitchii</i>	505		
	<i>Ochlerotatus sierrensis</i>	57		
	<i>Aedes vexans</i>	16		
	<i>Coquillettidia perturbans</i>	489		
	<i>Culex pipiens</i>	74		
	<i>Culex tarsalis</i>	17		
	<i>Culiseta incidens</i>	1		
	<i>Culiseta minnesotae</i>	1		
	<i>Culiseta morsitans</i>	38		
<i>Culiseta particeps</i>	139	2,575	41	

Appendix 3  
Final 2005 WNV Surveillance  
Washington State Department of Health  
Mosquito Species by County

7/7/2006

County	Mosquito Species	Total Number Collected	Total ID	Trapping Events
Pierce	<i>Ochlerotatus aboriginis</i>	89		
	<i>Ochlerotatus communis</i>	327		
	<i>Ochlerotatus hexodontus</i>	4		
	<i>Ochlerotatus j. japonicus</i>	2		
	<i>Ochlerotatus pullatus</i>	47		
	<i>Ochlerotatus sierrensis</i>	6		
	<i>Aedes vexans</i>	4		
	<i>Coquillettidia perturbans</i>	5		
	<i>Culex pipiens</i>	224		
	<i>Culex stigmatosoma</i>	9		
	<i>Culex tarsalis</i>	125		
	<i>Culiseta incidens</i>	859		
	<i>Culiseta inornata</i>	1		
<i>Culiseta particeps</i>	33	1,735	37	
Skamania	<i>Anopheles punctipennis</i>	5		
	<i>Coquillettidia perturbans</i>	2		
	<i>Culiseta incidens</i>	6	13	3
Snohomish	<i>Ochlerotatus aboriginis</i>	48		
	<i>Ochlerotatus dorsalis</i>	2		
	<i>Ochlerotatus fitchii</i>	257		
	<i>Ochlerotatus increpitus</i>	8		
	<i>Ochlerotatus sierrensis</i>	6		
	<i>Ochlerotatus sticticus</i>	7		
	<i>Aedes vexans</i>	1		
	<b><i>Anopheles freeborni</i></b>	<b>1</b>		
	<i>Anopheles punctipennis</i>	5		
	<i>Coquillettidia perturbans</i>	1,354		
	<i>Culex pipiens</i>	3,281		
	<i>Culex tarsalis</i>	471		
	<i>Culiseta incidens</i>	115		
	<i>Culiseta inornata</i>	115		
	<i>Culiseta minnesotae</i>	31		
	<b><i>Culiseta morsitans</i></b>	<b>13</b>		
	<i>Culiseta particeps</i>	87	5,802	115
Spokane	<i>Aedes cinereus</i>	45		
	<i>Ochlerotatus excrucians</i>	203		
	<i>Ochlerotatus fitchii</i>	91		
	<i>Ochlerotatus flavescens</i>	6		
	<i>Ochlerotatus increpitus</i>	102		
	<i>Aedes vexans</i>	3		
	<i>Ochlerotatus sp.</i>	7		
	<i>Anopheles freeborni</i>	29		
	<i>Anopheles punctipennis</i>	2		
	<i>Coquillettidia perturbans</i>	74		
	<i>Culex pipiens</i>	806		
	<i>Culex salinarius</i>	11		
	<i>Culex tarsalis</i>	571		
	<i>Culex sp.</i>	24		
	<i>Culiseta incidens</i>	10		
	<i>Culiseta inornata</i>	14		
	<b><i>Culiseta minnesotae</i></b>	<b>113</b>	<b>2,111</b>	<b>44</b>
Thurston	<i>Ochlerotatus fitchii</i>	7		
	<i>Ochlerotatus sierrensis</i>	132		
	<i>Coquillettidia perturbans</i>	2		
	<i>Culex pipiens</i>	21		
	<i>Culex tarsalis</i>	10		
	<i>Culiseta incidens</i>	40		
	<i>Culiseta inornata</i>	3	215	10
Wahkiakum	<b><i>Ochlerotatus aboriginis</i></b>	<b>4</b>		
	<b><i>Ochlerotatus fitchii</i></b>	<b>6</b>		
	<b><i>Ochlerotatus sierrensis</i></b>	<b>2</b>		
	<b><i>Anopheles freeborni</i></b>	<b>4</b>		
	<b><i>Anopheles punctipennis</i></b>	<b>6</b>		
	<b><i>Coquillettidia perturbans</i></b>	<b>1,453</b>		
	<b><i>Culex pipiens</i></b>	<b>109</b>		
	<i>Culex tarsalis</i>	43		
	<i>Culiseta incidens</i>	6		
	<b><i>Culiseta inornata</i></b>	<b>1</b>		
	<b><i>Culiseta minnesotae</i></b>	<b>13</b>		
<b><i>Culiseta particeps</i></b>	<b>12</b>	<b>1,659</b>	<b>25</b>	

**Appendix 3**  
**Final 2005 WNV Surveillance**  
**Washington State Department of Health**  
**Mosquito Species by County**

7/7/2006

<b>County</b>	<b>Mosquito Species</b>	<b>Total Number Collected</b>	<b>Total ID</b>	<b>Trapping Events</b>
<b>Walla Walla</b>	<i>Other Species / Unknown</i>	1		
	<i>Ochlerotatus increpitus</i>	2		
	<i>Ochlerotatus nigromaculis</i>	1		
	<i>Ochlerotatus sticticus</i>	1		
	<i>Aedes sp.</i>	51		
	<i>Aedes vexans</i>	2,604		
	<i>Anopheles freeborni</i>	1,237		
	<i>Culex pipiens</i>	2,961		
	<i>Culex tarsalis</i>	3,344		
	<i>Culiseta impatiens</i>	10		
	<i>Culiseta inornata</i>	142	<b>10,354</b>	<b>152</b>
<b>Whatcom</b>	<i>Ochlerotatus fitchii</i>	92		
	<i>Ochlerotatus sierrensis</i>	13		
	<i>Aedes vexans</i>	31		
	<i>Anopheles freeborni</i>	2		
	<i>Anopheles punctipennis</i>	2		
	<i>Coquillettidia perturbans</i>	39		
	<i>Culex pipiens</i>	36		
	<i>Culex tarsalis</i>	22		
	<i>Culiseta impatiens</i>	1		
	<i>Culiseta incidens</i>	36		
	<i>Culiseta inornata</i>	7		
<i>Culiseta minnesotae</i>	17	<b>298</b>	<b>16</b>	
<b>Whitman</b>	<i>Culiseta incidens</i>	28		
	<i>Culiseta inornata</i>	1	<b>29</b>	<b>2</b>
<b>Yakima</b>	<i>Ochlerotatus dorsalis</i>	5		
	<i>Ochlerotatus fitchii</i>	1		
	<i>Ochlerotatus melanimon</i>	10		
	<i>Aedes vexans</i>	762		
	<i>Anopheles freeborni</i>	129		
	<i>Coquillettidia perturbans</i>	5		
	<i>Culex pipiens</i>	5,769		
	<i>Culex tarsalis</i>	3,729		
	<i>Culiseta inornata</i>	227	<b>10,637</b>	<b>47</b>
<b>23 Counties</b>		<b>127,259</b>	<b>127,259</b>	<b>1,389</b>

New mosquito species findings for county are listed in bold.

- Data Sources:
- Local Health Jurisdictions (11)
  - Benton County Mosquito Control District (Benton County and areas of Yakima County)
  - Clark County Mosquito Control District
  - Columbia Mosquito Control District (Walla Walla County)
  - Franklin County Mosquito Control District
  - Julia Butler Hansen National Wildlife Refuge (Wahkiakum County)
  - Leavenworth Mosquito Control District (Chelan County)
  - Lee Pederson, US Army (Fairchild AFB, Spokane County)
  - Makah Tribe (Clallam County)
  - Mosquito Control District of Cowlitz County
  - Mt. Rainier National Park (Lewis and Pierce Counties)
  - North Cascades National Park (Whatcom County)
  - North Cascades National Park - Stehekin (Chelan County)
  - Washington State Department of Transportation (Yakima County)
  - Washington State Parks
  - Willapa National Wildlife Refuge (Pacific County)

**2005 WNV Surveillance**  
**US Army Center for Health Promotion and Prevention Medicine - West**  
**Mosquito Species by County**

<b>County</b>	<b>Mosquito Species</b>	<b>Total Number Collected</b>	<b>Total ID</b>	<b>Trapping Events</b>
<b>Jefferson</b>	<i>Culex tarsalis</i>	23	<b>23</b>	<b>14</b>
<b>Kitsap</b>	<i>Culex pipiens</i>	889		
	<i>Culex tarsalis</i>	48	<b>937</b>	<b>133</b>
<b>Pierce</b>	<i>Culex pipiens</i>	33		
	<i>Culex tarsalis</i>	124	<b>157</b>	<b>69</b>
<b>Yakima</b>	<i>Culex pipiens</i>	6		
	<i>Culex tarsalis</i>	62	<b>68</b>	<b>32</b>
<b>Totals</b>		<b>1,185</b>	<b>1,185</b>	<b>248</b>

New mosquito species findings for county are listed in bold.

Data Sources for 2005 Mosquito Species Identification: USACHPPM-West





## Appendix 6

### Mosquito Species by County, Eastern Washington

County	<i>Aedes cinereus</i> *	<i>Aedes trichurus</i>	<i>Aedes vexans</i> *	<i>Anopheles earlei</i>	<i>Anopheles freeborni</i> *	<i>Anopheles occidentalis</i>	<i>Anopheles punctipennis</i> *	<i>Coquilletidia perturbans</i> *	<i>Culex apicalis</i>	<i>Culex boharti</i>	<i>Culex pipiens</i> *	<i>Culex restuans</i> *	<i>Culex salinarius</i> *	<i>Culex stigmatasoma</i> *	<i>Culex tarsalis</i> *	<i>Culex territans</i> *	<i>Culiseta impatiens</i>	<i>Culiseta incidens</i> *	<i>Culiseta inornata</i> *	<i>Culiseta minnesotae</i>	<i>Culiseta moritans</i> *	<i>Culiseta particeps</i>	<i>Ochlerotatus aboriginis</i>	<i>Ochlerotatus aloponotum</i>	<i>Ochlerotatus campestris</i>	<i>Ochlerotatus canadensis</i> *	<i>Ochlerotatus cataphylla</i>	<i>Ochlerotatus communis</i>	<i>Ochlerotatus dorsalis</i> *	<i>Ochlerotatus excrucians</i>	<i>Ochlerotatus fitchii</i> *	<i>Ochlerotatus flavescens</i>	<i>Ochlerotatus hexodontus</i>	<i>Ochlerotatus impiger</i>	<i>Ochlerotatus impicatus</i>	<i>Ochlerotatus increpitus</i>	<i>Ochlerotatus intrudens</i>	<i>Ochlerotatus japonicus japonicus</i> *	<i>Ochlerotatus melanimon</i> *	<i>Ochlerotatus nigromaculis</i> *	<i>Ochlerotatus pionips</i>	<i>Ochlerotatus pullatus</i>	<i>Ochlerotatus punctor</i>	<i>Ochlerotatus sierrensis</i>	<i>Ochlerotatus spencerii idahoensis</i>	<i>Ochlerotatus sticticus</i> *	<i>Ochlerotatus togoi</i>	<i>Ochlerotatus trivittatus</i> *	<i>Ochlerotatus ventroivittis</i>
<b>Eastern Washington</b>																																																	
Adams			4		4			4			X				X															X												4	X						
Asotin					X										X																																		
Benton			X		X	X	X	4			X		X	X	X				X	X	X				X											X							X		X				
Chelan	X		X		X		X				X			X	X	X	X	X	1		X				X	X	X	X	X	X	X	X	X	X	X	X	X	X					X	X	X	X			
Columbia			X		X		X							X																						X													
Douglas			X											X															X																				
Ferry	X		X		X		X				2			X	X								X					X				X	X	X	X	X	X	X			X				2				
Franklin			4		3	X	4	4			X			X															5			X					1				X			3	X				
Garfield							X						X																																				
Grant	X		1		X		X				X		X	X															X	X	X	X	X	X	X	X	X				X								
Kittitas	X		X		X		X				X		X	X	X	X	X					X				X	X	X	X	X	X	X										X		2					
Klickitat			X										X	X									X																										
Lincoln			X		X				X		3			X	X																															3			
Okanogan	X		X	X	X	X	X	3			X			X	X									X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				X	X	X	X				
Pend Oreille	X	X	X	X	X		X				X			X	X				X				X		X	X	X	X	X	X	X	X	X	X	X	X	X				X	X							
Spokane	X		X		3	X	X	2			X		4	X																																			
Stevens	X		X	X	X		X				X			X	X	X									X	X	X	X																					
Walla Walla	X		X		X		X	3			X		X	X	1	1	X	X				X																											
Whitman			X		X		X				X			X	X																																		
Yakima	X		X		X		X	X	X	X	X		X	X	X	X	X	X	X	X				X																									

**\*WNV-Positive Mosquito Species Reported to CDC, 1999-2005.**

**New Findings for:** 1 - 2001, 2 - 2002, 3 - 2003, 4 - 2004, 5 - 2005

**Previous Findings: X**

Last Revised 06/06/06

The matrix shows the known distribution of mosquito species by county for eastern Washington through the year 2005. Previous findings are based on mosquito surveillance conducted by Washington State Department of Health in the 1960s and 1970s. New mosquito species findings which had not been identified during earlier surveillance efforts are presented by the surveillance year 2001 through 2005 when the species was first detected.

**Appendix 7**  
**Washington State Department of Health**  
**West Nile Virus Surveillance**  
**2004 Testing Summary**

County	Horses*		Birds**		Sentinel Flocks***		Mosquito Pools****	
	Tested	Positive	Tested	Positive	Tested	Positive	Tested	Positive
Adams	0	0	3	0	0	0	0	0
Asotin	0	0	1	0	0	0	0	0
Benton	0	0	18	0	311	0	84	0
Chelan	1	0	6	0	0	0	0	0
Clallam	0	0	6	0	0	0	0	0
Clark	1	0	54	0	0	0	22	0
Columbia	0	0	0	0	0	0	0	0
Cowlitz	1	0	25	0	0	0	26	0
Douglas	0	0	0	0	0	0	0	0
Ferry	0	0	0	0	0	0	0	0
Franklin	4	0	3	0	0	0	163	0
Garfield	0	0	0	0	0	0	0	0
Grant	1	0	4	0	0	0	0	0
Grays Harbor	0	0	5	0	0	0	0	0
Island	3	0	23	0	0	0	0	0
Jefferson	1	0	6	0	0	0	53	0
King	3	0	93	0	0	0	5	0
Kitsap	1	0	0	0	0	0	241	0
Kittitas	0	0	5	0	0	0	0	0
Klickitat	1	0	2	0	0	0	0	0
Lewis	0	0	19	0	0	0	0	0
Lincoln	0	0	1	0	0	0	0	0
Mason	0	0	14	0	0	0	0	0
Okanogan	0	0	2	0	0	0	0	0
Pacific	0	0	6	0	0	0	0	0
Pend Oreille	0	0	0	0	0	0	0	0
Pierce	3	0	58	0	0	0	227	0
San Juan	0	0	6	0	0	0	0	0
Skagit	0	0	16	0	0	0	0	0
Skamania	1	0	5	0	0	0	0	0
Snohomish	3	0	92	0	0	0	32	0
Spokane	8	0	14	0	0	0	0	0
Stevens	1	0	8	0	0	0	0	0
Thurston	1	0	38	0	0	0	0	0
Wahkiakum	0	0	0	0	0	0	0	0
Walla Walla	5	0	5	0	0	0	0	0
Whatcom	2	0	10	0	0	0	0	0
Whitman	1	0	2	0	0	0	0	0
Yakima	1	0	3	0	81	0	139	0
<b>Totals</b>	<b>43</b>	<b>0</b>	<b>553</b>	<b>0</b>	<b>392</b>	<b>0</b>	<b>992</b>	<b>0</b>

\*An additional 14 horses tested negative, but were not included in the table because county/state information was not available. WADDL Report Dated: December 1, 2004.

\*\*A total of 572 birds were submitted for testing, of which 19 were unsuitable and not tested for West Nile virus.

\*\*\*Benton County MCD Report Dated: September 30, 2004

\*\*\*\*USACHPPM-West Report Dated: November 12, 2004, WADDL Report Dated: September 29, 2004, Clark County MCD Reported: September 8, 2004, Benton County MCD Reported Date: September 29, 2004, and Franklin County MCD Reported Date: November 24, 2004.

**Appendix 8**  
**Washington State Department of Health**  
**West Nile Virus Surveillance**  
**2005 Testing Summary**

County	Horses* <sup>t</sup>		Birds**		Sentinel Flocks***		Mosquito Pools****	
	Tested	Positive	Tested	Positive	Tested	Positive	Tested	Positive
Adams	0	0	1	0	0	0	0	0
Asotin	0	0	2	0	0	0	0	0
Benton	1	0	29	0	456	0	277	0
Chelan	0	0	3	0	0	0	0	0
Clallam	0	0	4	0	0	0	0	0
Clark	1	0	15	0	0	0	35	0
Columbia	0	0	0	0	0	0	0	0
Cowlitz	0	0	21	0	0	0	26	0
Douglas	0	0	1	0	0	0	0	0
Ferry	0	0	2	0	0	0	0	0
Franklin	0	0	3	0	0	0	71	0
Garfield	0	0	2	0	0	0	0	0
Grant	1	0	2	0	0	0	0	0
Grays Harbor	0	0	10	0	0	0	0	0
Island	1	0	46	0	0	0	0	0
Jefferson	0	0	12	0	0	0	14	0
King	2	0	110	0	0	0	21	0
Kitsap	0	0	0	0	0	0	132	0
Kittitas	0	0	8	0	0	0	0	0
Klickitat	1	0	4	0	0	0	0	0
Lewis	0	0	19	0	0	0	0	0
Lincoln	0	0	0	0	0	0	0	0
Mason	0	0	24	0	0	0	0	0
Okanogan	0	0	2	0	0	0	0	0
Pacific	0	0	1	0	0	0	0	0
Pend Oreille	1	0	0	0	0	0	0	0
Pierce	1	0	105	0	0	0	81	0
San Juan	1	0	2	0	0	0	0	0
Skagit	1	0	12	0	0	0	0	0
Skamania	0	0	1	0	0	0	0	0
Snohomish	9	0	61	0	0	0	28	0
Spokane	3	0	21	0	0	0	0	0
Stevens	3	0	6	0	0	0	0	0
Thurston	0	0	82	0	0	0	0	0
Wahkiakum	0	0	0	0	0	0	0	0
Walla Walla	1	0	9	0	0	0	0	0
Whatcom	1	0	13	0	0	0	0	0
Whitman	1	0	6	0	0	0	0	0
Yakima	3	1	21	1	120	0	230	2
<b>Totals</b>	<b>32</b>	<b>1</b>	<b>660</b>	<b>1</b>	<b>576</b>	<b>0</b>	<b>915</b>	<b>2</b>

\*A total of 54 horses have been tested for West Nile virus. Twenty-two were not included in the table because county/state information was not available. WADDL Report Dated: January 18, 2006.

<sup>t</sup>WNV positive acquired in state.

\*\*A total of 676 birds have been submitted for West virus testing of which 16 birds were unsuitable and not tested for West Nile virus. USGS Report Date: October 11, 2005 and WADDL Report Date: November 21, 2005

\*\*\*Benton County MCD Report Dated: November 9, 2005

\*\*\*\* Mosquito pools tested by USACHPPM-West Report Date: October 14, 2005 (Week #32),

Cowlitz County MCD Report Date: August 25, 2005, Benton MCD Report Date: October 7, 2005,

Franklin MCD Report Date: August 24, 2005, Clark MCD Report Date: September 12, 2005, and

WADDL Report Date: September 7, 2005.