



Disease Bulletin

- Plague in Idaho
- WNV Surveillance
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Plague epizootic in Southwestern Idaho rodents leads to public health response

Reports of illness clustering or mortality events (“die-offs”) in wild animals, even before the etiologic agent is determined, can suggest the presence of an emergent or re-emergent zoonotic disease threat of public health importance. This was the case beginning mid-May 2015 when Piute ground squirrel (*Urocitellus mollis*) mortality events in the Snake River Birds of Prey National Conservation Area (NCA) in Ada County were first observed. Concerned citizens who noted an unusual number of dead ground squirrels while working or recreating in the NCA south of Boise, ID reported their observations to the Idaho Department of Fish and Game (IDFG). Wild rodent population die-offs in the western United States occur for many reasons; when infectious disease is suspected, plague (*Yersinia pestis*) is one of the pathogens considered as the likely cause. Because plague was suspected in these situations, IDFG alerted the Idaho Division of Public Health (IDPH) State Public Health Veterinarian on May 19 and sent samples from dead ground squirrels collected from two of the NCA mortality events to the Centers for Disease Control and Prevention (CDC) for laboratory analysis. *Y. pestis* was detected by direct fluorescent antibody (DFA) on 5/21 in two ground squirrels from each mortality event sampled and was confirmed by bacterial culture on 5/22. Idaho Bureau of Laboratories (IBL) laboratorians and local public health district (PHD) epidemiologists joined the investigation to manage risk to persons and pet dogs and cats possibly exposed to dead rodents or their fleas, to offer risk-based testing for humans and pet dogs and cats, and assist IDFG with testing of wild animals associated with additional mortality events. Two mortality events in voles were subsequently investigated, one each in Canyon County and Owyhee County in June; samples were tested by the IBL. One vole from each mortality event was determined to be presumptive positive by DFA for *Y. pestis*.

Plague has been a reportable condition in Idaho since as early as 1925. Only five reports have been received, with one each from Gem (1940), Lemhi (1968), Ada (1987), Bingham (1991), and Owyhee (1992) counties with a case-fatality rate of 60%. In all cases, a rodent, flea, or other wild animal exposure prior to illness onset was reported. Because untreated *Y. pestis* infections can result in up to 90% mortality, a rapid, multiagency prevention campaign was mounted. Press releases distributed in southern Idaho by local and state public health agencies and IDFG alerted the public to avoid rodents and their fleas, to protect their pets by preventing them from roaming into ground squirrel habitat, and by using flea control products (to prevent flea bites to the pet and to reduce the chance that pets could bring fleas into the home). Informational posters were placed in plague-affected areas by IDFG and targeted direct mailings were sent by local PHDs to residences near animal die-offs alerting them to avoid ground squirrel colonies, dead animals, and their fleas¹. Notifications to healthcare providers and veterinarians were also distributed by local and state public health agencies. The Idaho

Health Alert Network was used by Central District Health Department and Southwest District Health to send health alerts to health care providers covering the following topics: situational awareness, clinical recognition (bubonic, septicemic, and pneumonic forms of plague), laboratory testing options, treatment, infection prevention (standard precautions and droplet isolation), and reporting requirements. An advisory was e-mailed to veterinarians in four counties of Southwestern Idaho (Ada, Canyon, Elmore, and Owyhee counties). The veterinary advisory described the clinical presentation of plague in the dog and cat, testing options, and the need to communicate with public health officials about high risk situations in the veterinary practice setting. Plague situational updates were available through various agency websites and blogs¹.

During the response, the IBL tested two persons for *Y. pestis*; both were negative. IBL also tested 18 domestic animals; one ill domestic dog in Ada county was considered presumptive positive for plague by PCR and survived with treatment. Persons with high risk exposures to the presumptive positive dog received antibiotic prophylaxis. The exchange of surveillance information between public health, wildlife management, and other state agencies was critical for the rapid integrated response to this zoonotic disease threat.

West Nile surveillance practices in Idaho

The mosquito-borne arbovirus West Nile virus (WNV) is endemic to Idaho. WNV infections in humans are not considered rare: since its introduction around 2004, the average annual incidence of WNV in Idaho was 31 cases (range: 3 – 135)², excluding the epidemic year of 2006, during which 996 cases were reported. Annual WNV infection incidence is likely an underrepresentation of true disease burden because infections resulting in severe or neuroinvasive disease are more likely to be reported than mild febrile illnesses³. Reported human cases, classified as neuroinvasive or non-neuroinvasive, reports of presumptive positive viremic blood donors by the American Red Cross, and examination of death certificates provides information on disease burden and severity but non-human surveillance practices, described below, also inform seasonal risk for infection.

Routine mosquito, veterinary, and wildlife surveillance activities are conducted seasonally each year to inform public health risk reduction activities. Mosquito surveillance is conducted to detect virus activity in the environment, as a sentinel for human risk. Surveillance for WNV in mosquito populations in Idaho was initiated in 2001 after the detection of WNV in the United States in 1999. It wasn't until 2004 that WNV was first detected in Idaho mosquitoes. Mosquito trapping is conducted by jurisdiction-specific mosquito abatement districts (MADs)⁴ and Southwest District Health; mosquito surveillance is not conducted in all counties. Climate change can alter ecosystems and affect the complex transmission cycle of emergent or endemic arthropod-

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borne pathogens⁵. With a warming trend, vectors can expand their traditional geographic range and transmission seasons could be prolonged. *Culex* mosquitoes are considered the most medically important vectors of WNV in Idaho and are targeted for population studies and WNV testing. Encephalitis virus surveillance (EVS) CO2 light traps are used to collect mosquitoes weekly throughout the summer months. *Culex* mosquitoes are separated from all insects collected in the EVS traps, pooled according to *Culex* species (e.g., *tarsalis*, *pipiens*, *erythrothorax*), collection location site, collection date, and routinely tested for WNV. Idaho MADs track *Culex* population dynamics closely using relative frequencies of mosquito species in trap contents over time. Typically *Culex* populations emerge later in the spring and early summer than other mosquito species, such as the pest mosquito *Aedes vexans*. When *Culex* population densities increase, human risk for WNV infection increases. Some MADs have the ability to test for WNV in-house, while others ship species *Culex* mosquito pools to IBL for testing. Mosquitoes tested by IBL are also tested for the arboviruses St. Louis Encephalitis virus (SLE) and Western Equine Encephalomyelitis virus (WEE). Neither SLE or WEE has been detected in submitted *Culex* pools to date. Testing by MADs and IBL generally starts in June and continues until a killing frost eliminates the risk to humans. Local mosquito control efforts are conducted in response to both increased rates of *Culex* emergence and positive WNV test results.

Veterinary WNV surveillance relies on reports provided to the State Public Health Veterinarian by the Idaho State Department of Agriculture. Clinically affected horses comprise the majority of these reports; however, reports of infection in other species such as llama and alpaca have also been received.

Wildlife WNV surveillance, conducted in collaboration with the Idaho Department of Fish and Game (IDFG), signals activity in the environment and provides an insight into the effect WNV has on wildlife

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An electronic version of the Idaho Reportable Diseases Rules may be found at <http://adminrules.idaho.gov/rules/current/16/0210.pdf>.

Current and past issues are archived online at www.idb.dhw.idaho.gov.

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species. In 2006, a noticeable reduction in squirrel, crow, and magpie populations, particularly in southwest Idaho counties, was reported by IDFG, and testing revealed WNV as the primary cause.

Mosquito, veterinary, and wildlife surveillance data are routinely collected and analyzed by the Division of Public Health's State Public Health Veterinarian because of their potential to indicate public health risks associated with the environment. Although positive mosquito pools or a veterinary report are considered key signals of WNV season onset, during 2004 through 2014, these reports were the first indication of the WNV season only half the time; ill persons were the first indicator

of WNV activity in the other seasons. Surveillance in Idaho has resulted in the detection of WNV season onset as early as April 24 and the end of WNV season as late as October 31, although analysis of surveillance data shows that WNV seasons typically start in June and are, on average, 116 days long (Figure).

WNV infections can be life-threatening at any age and there is no human vaccine available. For these reasons, Idaho will continue to collect data from mosquito, veterinary, and wildlife surveillance to inform early and season-long public health activities, including the promotion of "Fight the Bite" awareness campaigns².

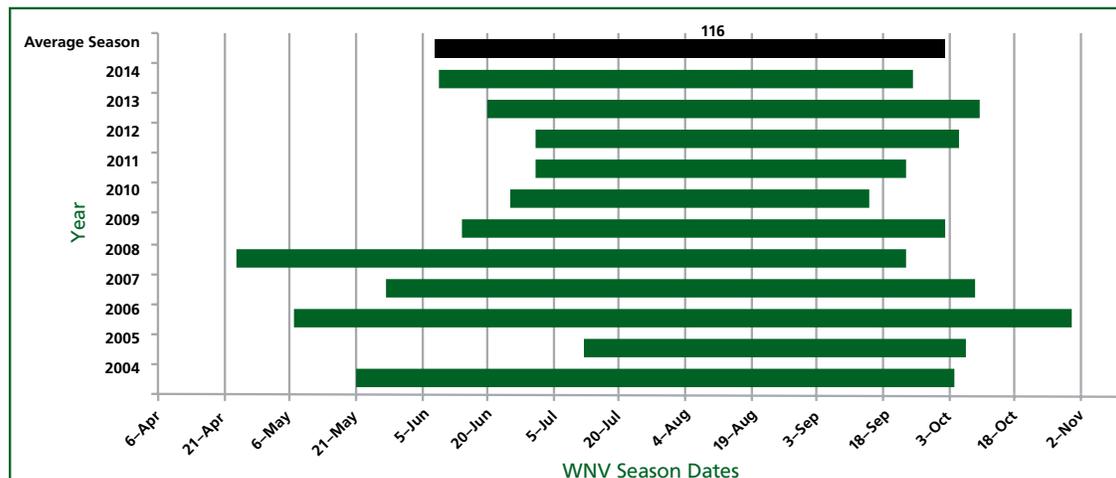
Echinococcosis is now a reportable condition in Idaho

Each case of echinococcosis, a parasitic disease (sometimes called "hydatid disease") caused by accidental ingestion of eggs of the *Echinococcus* tapeworm, must be reported within three working days of identification. Reported cases will be investigated to confirm the diagnosis and identify possible sources of infection. Cases in Idaho are rare and most infections are acquired in other countries; however, local transmission should be ruled out. Idaho's new reportable disease rules can be found at <http://adminrules.idaho.gov/rules/current/16/0210.pdf>.

References

- 1 Plague situational updates, by agency:
 - IDHW: <http://dhwblog.com/2015/06/15/possible-plague-found-in-canyon-county-rodents-vole-deaths-near-caldwell-prompt-testing-for-plague-bacteria/>
 - CDHD plague website <http://www.cdhd.idaho.gov/news/current/groundssquirrelplague.htm>
 - IDFG plague page: <https://fishandgame.idaho.gov/content/tags/plague>
- 2 DHW West Nile virus website: <http://healthandwelfare.idaho.gov/Default.aspx?TabId=112>
- 3 Idaho Disease Bulletin, June 2014. WNV neuroinvasive disease reports; important predictors of incidence. <http://healthandwelfare.idaho.gov/Portals/0/Health/EpiIDB/201406.pdf>
- 4 Map of 2015 mosquito abatement district taxing districts in Idaho. <http://tax.idaho.gov/i-1071.cfm>
- 5 Centers for Disease Control and Prevention, Climate and Health, Diseases Carried by Vectors <http://www.cdc.gov/climateandhealth/effects/vectors.htm>

Figure. WNV season duration, by year—Idaho, 2004–2014*



*The average WNV season start date, as determined by any positive surveillance indicator, is June 8th and the average WNV season end date, as determined by the last positive surveillance indicator, is October 3rd with an average duration of 116 days.