

# Animal Disease Surveillance Report 2015

Los Angeles County | Veterinary Public Health



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## Message from the Director

I am pleased to present the Los Angeles County Department of Public Health, Veterinary Public Health (VPH) Program's 2015 Animal Disease Surveillance Report. This document adds to the data published in VPH's 2013 Animal Disease Surveillance Report. It provides the reader with an analysis of the most commonly reported diseases affecting local pets and wildlife in Los Angeles (LA) County, as well as summaries regarding a few unique and unusual animal diseases. Report improvements include data on antibiotic-resistant bacterial infections and improved surveillance for three diseases (heartworm, leptospirosis and valley fever) as the result of a new Electronic Laboratory Reporting (ELR) system.

Our department recognizes that human, animal and environmental health are intricately linked, a concept called One Health.<sup>1</sup> There are some diseases that spread from animals to people (zoonotic diseases), and a few that spread in the opposite direction (reverse zoonotic diseases). Three of every five new infectious diseases affecting humans originated in animals.<sup>2</sup> With approximately 40% of people in the County having at least one pet,<sup>3</sup> and wildlife often living in close proximity to homes, human-animal interactions are common. Therefore, tracking and controlling infections in pets and wildlife may help reduce the risk of certain diseases in humans. It also provides our agency with a baseline understanding of local natural disease cycles in animals, information which is critical when assessing potentially new or emerging diseases, or bioterrorist attacks affecting animals.

LA County has one of the most comprehensive animal disease surveillance programs in the nation. The basis for the program is our county's unique animal disease reporting ordinances; however, effective surveillance would not be possible without the support of our many partners. These include local veterinarians, animal control agencies, wildlife experts, vector control specialists, animal diagnostic laboratories, the Los Angeles Quarantine Station of the Centers for Disease Control and Prevention (CDC) at the Los Angeles International Airport, and many others.

This document provides further evidence of the importance of integrating human and animal disease surveillance and the promotion of public health from a One Health perspective in LA County, uniting the fields of human, animal and environmental health.

Sincerely,



Karen Ehnert, DVM, MPVM, DACVPM  
Director  
Veterinary Public Health Program  
Los Angeles County Department of Public Health

## Background

### 1. About Veterinary Public Health

#### **Mission**

*To take advantage of the relationships between human and animal health in order to promote a healthy community environment for residents of LA County.*

#### **Vision**

*The residents of LA County are protected from zoonoses and animals are free of reportable diseases.*

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**Animal disease surveillance and outbreak investigations.** The Veterinary Public Health (VPH) Program performs animal disease surveillance for LA County. VPH is an integral part of the Los Angeles County Department of Public Health (DPH), serving all of LA County, except for cities that operate under their own health departments: Long Beach and Pasadena. The program is staffed by veterinarians, animal sanitation inspectors, registered veterinary technicians, administrative staff, and (as of 2016) a health educator and an epidemiology analyst.

LA County has unique animal disease reporting requirements. After a devastating foot-and-mouth disease outbreak in local livestock in the 1920s, a wide-range of animal disease reporting ordinances were passed. These ordinances stated that all infectious diseases in animals were to be reportable.<sup>4</sup> Such laws enabled better detection, control, and prevention of diseases in animals. As the county urbanized and the amount of livestock declined, disease surveillance in animals also declined. After the anthrax attacks on people in the United States in 2001, concerns grew about bioterrorism threats, including those from infectious diseases that could infect both people and animals.<sup>5</sup> VPH re-instituted the legal requirement that local veterinarians report infectious diseases in animals, including pets (companion animals). To further improve disease tracking, in 2007 VPH created a Reportable Disease Priority List, which was last updated in 2016, after the data in this report was collected (Appendix). Readers can review both the human and animal disease reporting requirements for LA County at [publichealth.lacounty.gov/cdcp/proreporting.htm](http://publichealth.lacounty.gov/cdcp/proreporting.htm). Additionally, the California Department of Public Health requires reporting of six diseases in animals: anthrax, brucellosis (except *B. canis*), plague, rabies, tularemia, and viral hemorrhagic fevers (e.g., Crimean-Congo, Ebola, Lassa and Marburg viruses).<sup>6</sup>

Veterinary practices and animal control agencies are the eyes and ears of the community when it comes to detecting animal diseases. Reporting by veterinarians has allowed VPH to uncover trends and discover new diseases in a way that is unique to LA County. These data inform veterinarians about diseases that are circulating in the community. It may also guide clinical decisions on testing, treatment and prevention of disease in animals. In addition, these data can inform physicians about local zoonotic and vector-borne diseases to which their patients may be exposed, including emerging infectious diseases.

**Pets imported from abroad.** Imported animals may carry diseases that can subsequently infect people and other animals in the United States.<sup>7</sup> VPH assists federal authorities at the Los Angeles International Airport (LAX) to ensure that dogs entering the county are healthy and are accompanied by accurate paperwork. During visual inspections, it is not unusual for VPH staff to identify instances of fraudulent documentation

(e.g. describing the animals as older than their actual age), presumably to avoid federal quarantine (see p.46). VPH also hosts quarterly meetings to bring together multiple agencies to discuss animal importation concerns, including the variety of species being imported, the diseases that may be imported, and humane issues that arise for the animals themselves.

## 2. Abbreviations, Definitions and Technical Notes

### *Abbreviations*

CDC – Centers for Disease Control and Prevention

CDPH – California Department of Public Health

DFA – Direct Fluorescent Antibody

LACDPH – Los Angeles County Department of Public Health

ELISA – Enzyme-linked immunosorbent assay

LA County – Los Angeles County

LAX – Los Angeles International Airport

MRSA – Methicillin-resistant *Staphylococcus aureus*

PEP – Post-exposure prophylaxis

PCR – Polymerase chain reaction

SPD – Salmon poisoning disease

USDA – United States Department of Agriculture

VPH – Los Angeles County Department of Public Health, Veterinary Public Health Program

WNV – West Nile virus

### **Data Sources**

Individual disease reports are received from veterinary practices, animal shelters and veterinary diagnostic laboratories throughout the jurisdiction of LACDPH. Additional data come from disease investigations and surveys.

### **Case Definitions**

A case definition is a set of criteria used to evaluate reported cases of a disease and determine how they should be counted. Each disease has its own case definition. Cases are categorized as “confirmed,” “probable” or “suspected” based on the level of laboratory, clinical, and epidemiologic evidence that the animal has the disease. Laboratory test verification is required for a case to be considered confirmed. VPH is currently the only public health program in the United States consistently tracking numerous infectious

diseases in companion animals. Therefore, this program has established case definitions for multiple animal diseases described in this report.<sup>8</sup> Exceptions are: rabies, West Nile virus (WNV), and psittacosis. These diseases are also tracked by state and Federal programs, and case definitions for these diseases in animals already existed.<sup>9-11</sup> Case definitions for diseases tracked by VPH are available at: [publichealth.lacounty.gov/vet/surveillance.htm](http://publichealth.lacounty.gov/vet/surveillance.htm)

## Types of Animal Disease Data



**Directly-transmitted zoonotic disease.** Zoonotic diseases (or zoonoses) can infect both humans and animals and can be transmitted between humans and animals. According to the Centers for Disease Control and Prevention (CDC), about 60% of infectious diseases infecting humans emerged from animals.<sup>12</sup> Examples from this report include rabies and leptospirosis.



**Vector-borne.** Vector-borne diseases are infections transmitted to people and animals by arthropods such as fleas, ticks or mosquitoes. Examples from this report include heartworm disease and WNV.



**Environmental.** Environmental diseases are those transmitted to people and animals from a common source in the environment. An example from this report is the fungal disease valley fever (coccidioidomycosis) which is transmitted to people and to animals from soils in some areas.



**Sentinel.** Sick animals can serve as sentinels, or warnings that a disease may be present nearby. Dead birds diagnosed with WNV can help identify areas in the community where the risk of exposure to the disease is higher.



**Reverse zoonosis.** Reverse zoonotic diseases are those primarily transmitted from people to animals. An example from this report is methicillin-resistant *Staphylococcus aureus* (MRSA).



**Animal disease only.** Although animals and humans may suffer from the same diseases, many infections of pets are not transferred to people. An example from this report is canine parvovirus.

### **Counts versus Rates**

Most animal disease data in this report are reported as raw case counts instead of rates. Because there is no census for animals, the total number of animals in LA County is unknown. Therefore, disease rates and percent cannot be accurately calculated.

### **Under-Reporting and Reporting Delays**

Under-reporting is a problem with surveillance of both human and animal diseases. Therefore, reported data typically reflect the minimum number of cases. Factors contributing to under-reporting include the following: misdiagnosis; animals with mild illness not seen or tested by a veterinarian; owners declining to pay for diagnostic tests; veterinarians neglecting to report diseases; or cases of disease reported months or years after they initially occurred. These factors may further complicate analysis.

### **Disease Dates**

Animal diseases are tracked by the date the animal was first presented to a veterinarian in LA County for evaluation for the condition. In contrast, human disease is typically tracked by the date of onset of illness. The date of disease onset is often unclear in animals, since clinical signs may remain undetected until they are overt or at an advanced stage.

### **Incidence versus Prevalence**

Animal disease data in this report consist of new cases reported within the year (incidence), as opposed to the total number of cases present at a given time (prevalence). Note: the animal disease data is not reported in incidence *rates*, since the total population of animals is not available.

### **Geographic Trends**

Some cases of disease reported in LA County may have been acquired outside of the County. For several diseases, such as heartworm disease in dogs and cats, the animal's history is evaluated to determine whether the disease was locally acquired.

For the purpose of geographic information in this report, the southern California area is considered to include the following counties (in alphabetical order): Imperial, Kern, Los Angeles, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, and Ventura.

VPH is the only program in the country consistently tracking companion animal diseases; therefore, comparing local animal disease data trends with other jurisdictions (state or national) is difficult or not possible.

## **3. Surveillance Methods**

A surveillance system is a way of monitoring disease conditions and events which affect a community's health. Disease data is reported, analyzed and then shared with the public so that protective actions can be taken.<sup>13</sup>



The majority of data in this report are derived from *passive surveillance*, which is dependent upon veterinarians (and as of 2014 – veterinary laboratories) reporting specific diseases. Animal health professionals submit case reports of animal diseases, which VPH then analyzes and summarizes so that the data may be utilized by the public. Because passive surveillance systems require community participation, many cases of animal disease are likely to be unreported. Therefore, the data in this report describe the minimum amount of disease present locally. VPH occasionally performs *active surveillance* by conducting surveys, some of which are published elsewhere.<sup>14</sup>

At the beginning of 2014, VPH began Electronic Laboratory Reporting (ELR) for three conditions in animals: heartworm infection, Valley fever (coccidioidomycosis), and leptospirosis. Veterinary diagnostic laboratories performing certain tests for these diseases on animals from LA County began reporting positive results to VPH electronically. VPH followed up on each ELR report by contacting the veterinarian caring for the animal to request a full case report. The use of ELR significantly increased the amount of available data for these three conditions. VPH plans to expand the number of animal diseases tracked by ELR in the future. Numerous human diseases in LA County are tracked the same way. For a complete list of human diseases tracked by ELR, visit: [publichealth.lacounty.gov/cdcp/proreporting.htm](http://publichealth.lacounty.gov/cdcp/proreporting.htm).

Lastly, VPH also engaged in animal syndromic surveillance, which is the practice of analyzing data based on syndromes rather than specific diagnoses.<sup>15</sup> Data were collected on a daily basis from participating animal shelters in LA County until the third quarter of 2015. Syndromes tracked include animals with any evidence of: febrile, gastrointestinal, dermatologic, respiratory or neurologic disease. Syndromic surveillance allows for the rapid detection of spikes in any of these syndromes, which may be due to outbreaks, emerging infectious diseases or bioterrorism events.<sup>15</sup>

Reporting and participation by local veterinarians in disease surveillance has allowed for the uncovering of trends and the discovery of new pathogens in a way that is nearly impossible in areas where animal disease reporting laws do not exist. This disease tracking program has also been of direct benefit to local veterinary practices. Disease reporting allows veterinarians to inform their peers about diseases they have been seeing, uncover local disease risks, identify emerging threats, and provide an evidence base for recommended tests, treatments and preventive medications.

VPH also provides access to diagnostic testing of animal specimens in certain situations to enhance surveillance. For example, through 2015, the program continued to arrange for free rabies testing of neurologic or biting animals. VPH also offered free necropsies and other diagnostic testing in cases where a potential disease outbreak was identified (three or more animals affected), or when an emerging, dangerous or foreign pathogen was suspected. Updated information on the disease surveillance services offered by VPH is available at: [publichealth.lacounty.gov/vet](http://publichealth.lacounty.gov/vet).

## 2015 Data Highlights for Los Angeles County

### Zoonotic, Vector-borne and Environmental Diseases

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#### Rabies in bats

- 34** Rabid bats detected in 2015
  - 2** Rabid bats found indoors in 2015
  - 5** People exposed to these bats
- 



#### Heartworm in dogs and cats\*

- 251** Cases reported between 2006 and 2015
  - 30%** Cases had no travel outside of southern California
  - 68%** Cases were asymptomatic when diagnosed
- 



#### Leptospirosis in dogs\*

- 28** Cases reported between 2006 and 2015
  - 54%** Likely exposed from wildlife contact in their own yard
  - 82%** Were not vaccinated against leptospirosis
- 



#### Valley Fever (Coccidioidomycosis) in various species\*

- 74** Cases reported between 2006 and 2015
  - 40%** Had not traveled outside of southern California
  - 28%** Of cases in pets seen digging frequently in soil
- 



#### West Nile virus (WNV) in dead birds

- 103** Tested positive for WNV
  - 62%** Of total tested were WNV-positive
  - 78%** Were detected in the autumn
- 

### Non-zoonotic Disease

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#### Parvovirus in Dogs

- 3,684** Cases reported between 2011 and 2015
  - 90%** Acquired the infection in the community
  - 2x** Number of times parvo cases peak each year
- 

\* Excludes reporting from veterinary practices in the cities of Long Beach and Pasadena. See page 6 for more information.

## Diseases in Detail

### 1. Rabies



#### Background and Significance

Rabies is caused by a virus that infects the brain of both humans and animals. It has one of the highest fatality rates of any known infectious disease – almost all cases are fatal once illness begins.<sup>16</sup> Rabies is transmitted through the bite of an infected animal. There are multiple animal reservoirs harboring different variants (strains) of rabies virus around the world that are capable of transmitting the disease. In the past 50 years, cases of human rabies in Los Angeles (LA) County have been very rare, and were reported only in persons who had been bitten by rabid animals in other countries (Table 1A). However, people have been exposed to rabies in LA County through encounters with rabid bats; in such cases, development of rabies has been prevented via the administration of rabies post-exposure prophylaxis (PEP) soon after exposure.

Rabies has been nearly absent in local pets for decades because of the legal requirement to vaccinate dogs. The last locally-acquired case of rabies in a dog occurred in 1978 from immunization of dogs with a live-type rabies vaccine, a vaccine which was discontinued in the 1980s and replaced with killed vaccines. Prior to that, the last naturally infected and locally-acquired case in a dog was in 1966. A rabid cat and a rabid dog were imported into LA County in 1987 and 2004, respectively. Both were imported from countries where rabies is more common in pets (Table 1A).

Historically, skunks were a reservoir for rabies in LA County. A skunk variant of rabies was established in skunk populations in the Malibu area. The last year in which a rabid skunk was detected in that area was in 1979. It is likely that a wildfire killed the last infected colony of skunks in 1979. A skunk infected with a bat variant of rabies was found more recently, in 2014 (Table 1A).

For over 35 years, insect-eating bats have been the only known reservoir for rabies in LA County. Cases of rabies in bats have been detected every year since bat testing began in 1961 (Figure 1A). Local data show that approximately 10-15% of bats that appear ill or are acting unusual are rabid; however, it is estimated that only about 1-3% of bats in nature are likely to be rabid.<sup>17</sup> Although bats are the primary reservoir for rabies in LA County, bites from other wildlife are treated as potential rabies exposures, because bats may transmit rabies to other wildlife, or rabid wild animals from other areas may be imported into LA County.

All encounters with bats must be carefully assessed by a public health professional or physician for the risk of exposure to rabies. In situations where a person or pet is directly exposed to a bat, people present at the scene should attempt to safely contain the bat without touching it directly (such as by covering it with a bucket) and then contact an animal control agency so that it may be tested for rabies. The reasons include the following:

- (1) Rabies is a highly fatal disease and effective post-exposure prophylaxis (PEP) must be administered soon after exposure.
- (2) Bat bites are small injuries that may go undetected. Therefore, when a bat is found near a sleeping or impaired person, small child, or pet, a bite from a bat cannot be ruled out.
- (3) The results of bat testing play a pivotal role in determining whether PEP is needed. If a bat tests negative for rabies virus, PEP is not necessary. If a bat is not tested, or tests positive for the rabies virus, PEP must be given if there was any chance a bite occurred.

Elsewhere in the United States, there are multiple other important reservoirs of rabies, and multiple variants, including skunks (northern California and the Midwest), foxes (Alaska, Arizona, New Mexico, and Texas), and raccoons (East Coast). In 2007, the United States was declared free of the dog strain of rabies.<sup>18</sup> This was achieved through several decades of strict legal rabies vaccination requirements for all dogs. Animal control agencies continue to enforce these requirements today to maintain this status. However, it is important to understand that any strain of rabies can infect wildlife or pets (including local bat rabies strains), and dog rabies continues to be a major problem in other countries. Furthermore, local residents must be aware that animals incubating the rabies virus could be imported into LA County through global travel and trade, creating the risk of new variants becoming established in local wildlife. Because of these risks, VPH provides a strong rabies surveillance program for the county. Rabies testing is not limited to animals that have bitten a person - VPH also tests suspected animals with neurologic illnesses or abnormal behaviors. VPH continues to detect rabid animals throughout the county using these protocols. Surveillance data on rabies in LA County highlight the importance of rabies vaccination of pets. Local data on rabies also help physicians decide on whether to administer rabies PEP to people bitten by animals.

<b>Table 1A. Selected Historical Rabies Cases in LA County</b>			
<b>IN HUMANS</b>			
<b>Year</b>	<b>Age and sex</b>	<b>Probable virus source</b>	<b>Comments</b>
2004	22 year old man	Bite from rabid dog in El Salvador	Likely bitten 15 months before illness
1975	16 year old girl	Bite from rabid dog in Mexico	Likely bitten 8 months before illness
1949	24 year old man	Bite from his own rabid dog in LA	Last locally-acquired human rabies case
<b>IN PETS</b>			
<b>Year</b>	<b>Species</b>	<b>Probable virus source</b>	<b>Comments</b>
2004	Dog	Bite from rabid dog in Thailand	Stray dog rescued in Thailand by an American tourist. Dog flew into LA County, died in Santa Barbara County
1987	Cat	Bite from rabid dog in Mexico	Stray cat rescued in Acapulco by an American tourist. Cat bitten by a rabid dog
1978	Dog	Live-type rabies vaccine for dogs	<b>Live vaccines involved no longer used.</b> All rabies vaccines changed to killed-type 30+ years ago
1966	Dog	Bite from local rabid skunk	Last locally acquired, naturally acquired rabies case in a dog
<b>IN WILD ANIMALS</b>			
<b>Year</b>	<b>Species</b>	<b>Probable virus source</b>	<b>Comments</b>
2014	Skunk (Long Beach)	Bite from local rabid bat	Example of how local bat variant of rabies can “spill over” into other species
1979	Skunk	Bite from local rabid skunk	Last case of skunk variant of rabies
1973	Raccoon	Bite from local rabid skunk or bat	Rabid skunks present locally in 1970s

<b>Table 1A. Selected Historical Rabies Cases in LA County (continued)</b>			
<b>IN WILD ANIMALS (continued)</b>			
1964	Fox	Bite from local rabid skunk or bat	Rabid skunks common locally in 1960s Four rabid foxes diagnosed that year
1946	Coyote	Bite from local rabid dog	Rabid dogs common locally in the 1940s
1944	Opossum	Bite from local rabid dog	Rabid dogs common locally in the 1940s

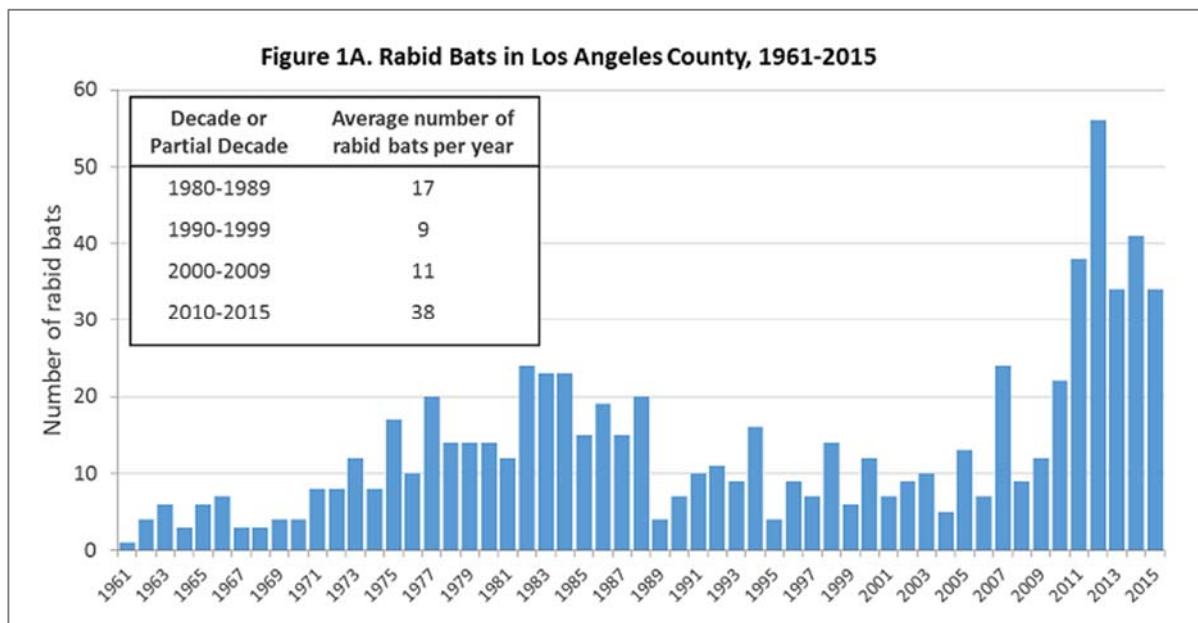
### Data Sources

Reports of animal bites and contact with bats are received by VPH from animal control agencies, physicians, veterinarians and the public. Animal control agencies and veterinarians submit deceased animals to VPH for rabies testing. The LA County Public Health Laboratory tests brain tissues of submitted specimens using the Direct Fluorescent Antibody (DFA) test. All samples which test positive by DFA are considered confirmed cases. Rabies data from Long Beach and Pasadena are included in this report, shared by the Long Beach Department of Health and Human Services and the Pasadena Department of Public Health.

### Findings

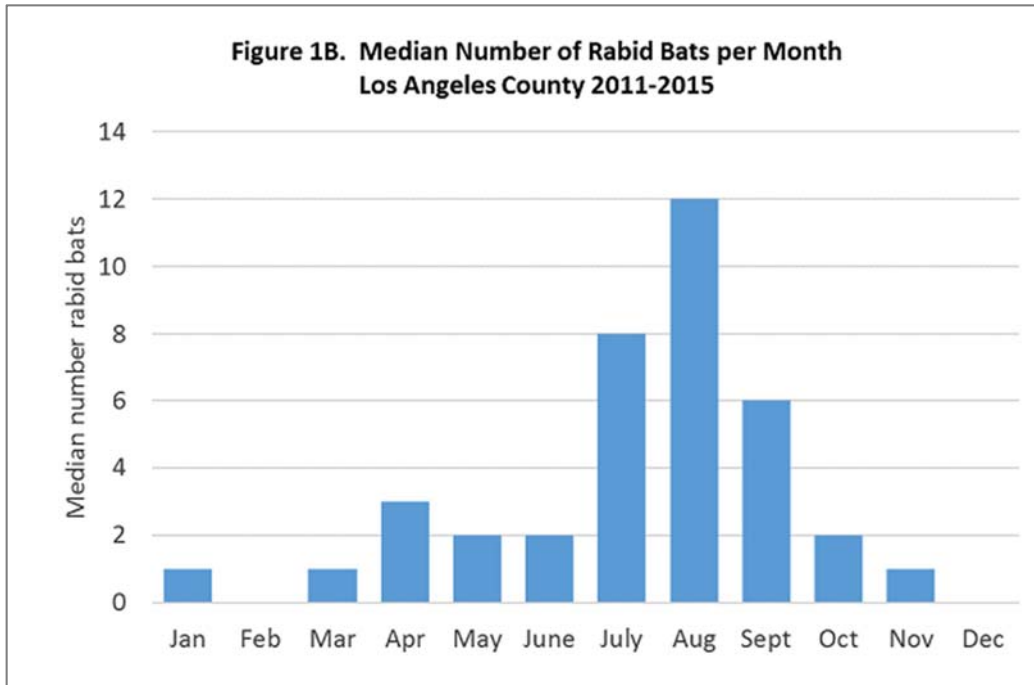
#### Totals - Rabid Bats and One Rabid Skunk

- 34 rabid bats were detected in 2015, a decrease from the 41 rabid bats detected in 2014.
- The number of rabid bats detected in one year is above the historical average. So far in this decade, an average of 38 rabid bats have been detected per year. The average number in previous decades was only 9-17 per year. The highest annual count of rabid bats ever recorded in LA County occurred in 2012, with 56 rabid bats (Figure 1A).
- 16% of bats submitted for diagnostic testing in 2015 were positive for rabies. This was just slightly above the expected range of 10-15%.
- Long Beach Department of Public Health and Human Services reported a rabid skunk in 2014. Analysis of the virus revealed the skunk had been infected by rabies from a Mexican Free-Tailed Bat. See Table 1A and Figure 1D.



### Seasonal pattern

- Rabies in bats is seasonal (Figure 1B). Just as in prior years, during 2015 and 2014 most rabid bats were detected in late summer and early autumn, when new young bats are learning to fly.



### Human and pet exposed to rabid bats

- In 2015, 5 people and 11 pets were exposed, or potentially exposed, to the 34 bats confirmed to have rabies. This was a slight decrease compared to the 12 people and 13 pets exposed to confirmed rabid bats in 2014.
  - The 5 people were advised by VPH to see a physician for rabies PEP.
  - The 11 pets were vaccinated, quarantined at home and observed for clinical signs of rabies. Quarantines after rabies exposure last 30 days for pets that were up-to-date on their rabies vaccine at the time of the exposure, and 6 months for pets that were not up-to-date on rabies vaccination.

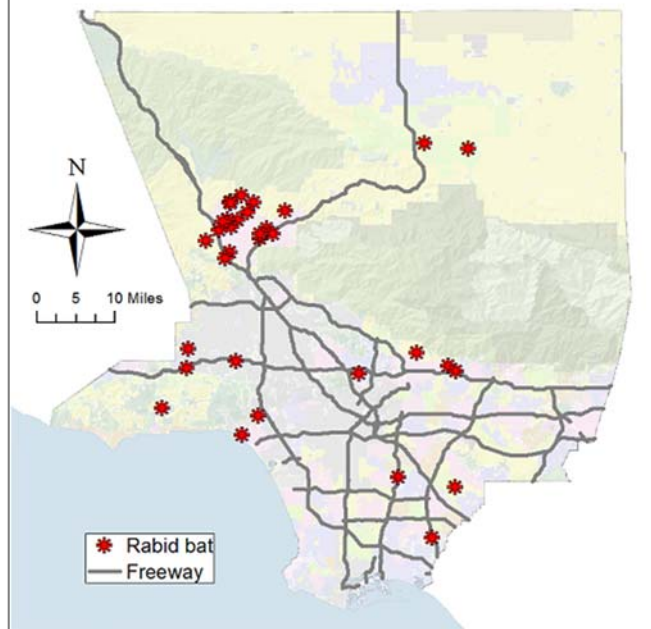
### Geographic Pattern

- Rabid bats were found in a wide variety of areas LA County in 2015 (Figure 1C) and in the past decade (Figure 1D).
- The vast majority of rabid bats were found in urban areas. A total of 83% of the bats in the past decade were found in areas categorized as urban by the LA County Fire Department.
- In recent years, a large proportion of the rabid bats were found in the city of Santa Clarita. This phenomenon was especially significant in 2015, when more than half (18 rabid bats or 53%) of the total for the year were found there. The reason for the clustering is unknown.
- A rabid skunk was found in the City of Long Beach in 2014. This case was in the jurisdiction of the Long Beach Department of Health and Human Services (Figure 1D).

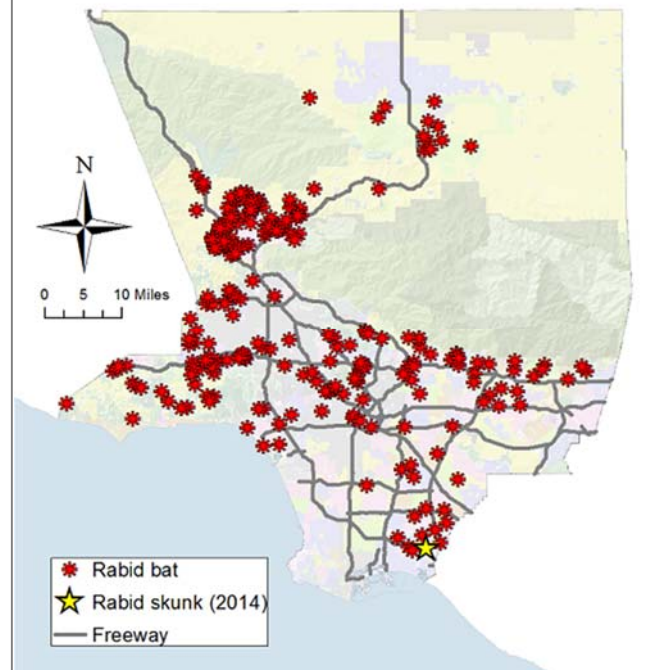
### Settings where rabid bats found

- The majority of rabid bats were found at private residences. In 2015, 23 (68%) were found at homes, and in 2014, 30 (73%) were found at homes.
- A few rabid bats were detected indoors. Rabid bats found indoors present an increased risk of rabies exposure for people and pets. In 2015, one rabid bat was found inside a home and another inside a business. In 2014, two were found inside homes and one inside a business.
- Rabid bats were occasionally found at schools. In 2015, one rabid bat was found outdoors at a school by custodial staff. In another case it was found on the ground by the entrance to the school and was handled by a parent. No children were reported to have contact with the bats.

**Figure 1C. Locations of Reported Cases of Rabies in Bats (n=34 bats), Los Angeles County 2015**



**Figure 1D. Locations of Reported Cases of Rabies in Bats (n=203 bats) and one Skunk Los Angeles County 2006-2015**



## Limitations

Cases of rabies in animals are likely under-counted because bats and other wildlife may become infected with rabies and die without being detected by people, especially in mountainous or remote areas of the county. These data show of *reported* rabid bats only. The actual number of rabid bats during these time periods was likely higher.

## Implications and Recommendations

- Ideally, all health professionals and health educators should educate the public about the ongoing occurrence of rabies in bats in LA County, and the potential for other animals to become infected, especially wild animals.
- Animal health professionals should vaccinate all dogs and cats against rabies, including indoor-only animals. Two confirmed rabid bats were found indoors during 2015, and three were found indoors in 2014.
- Schools and camps should educate all staff about bats and rabies, including custodial staff. Children and many adults are often unaware of the risk of rabies from bats.
- Residents should be informed to not feed wildlife. Wildlife routinely fed by people often become more accustomed to being near people and pets. Some species become more aggressive and territorial and are more willing to bite.
- Bat encounters with people or domestic animals should be reported by anyone with knowledge of them to VPH at 213-989-7060. This includes bats that have been found near pets, small children, and sleeping or incapacitated persons.
  - Because of their small teeth, marks from bat bites can disappear rapidly and bites themselves may not wake a sleeping person. Therefore, an unrecognized bite may have occurred if a bat was not observed the entire time it was near people or pets.
  - Bats found inside homes should be tested to ensure that they are not rabid. Bats should not be allowed to fly away, and should be safely contained if possible.
  - Bats should not be touched with bare hands. If possible, they should be covered with a bucket or similar object, and the local animal control agency should be contacted. A list of animal control agencies in LA County is available at:  
[publichealth.lacounty.gov/vet/animalcontrollist.htm](http://publichealth.lacounty.gov/vet/animalcontrollist.htm).
- The risk of rabies may be higher in imported animals. Rabies suspicion should be high if a sick dog, cat, or other animal comes from another country, especially where rabies is endemic or common in dogs.

**For More Information:** [publichealth.lacounty.gov/vet/rabies.htm](http://publichealth.lacounty.gov/vet/rabies.htm).



## 2. Heartworm



### Background and Significance

Canine heartworm disease is caused by a parasitic worm, *Dirofilaria immitis*, which is spread to animals through the bite of infected mosquitoes.<sup>19</sup> Mosquitoes breed in standing water, therefore removal of stagnant water is a critical step in reducing the risk of heartworm exposure. In LA County, the Western Treehole Mosquito (*Aedes sierrensis*) is considered the best local vector for this parasite, although other species can also transmit the disease.<sup>20</sup> In recent years, two new vectors for heartworm, the Asian Tiger Mosquito (*Aedes albopictus*) and Australian Backyard Mosquito (*Aedes notoscriptus*), have been spreading in LA County.<sup>21</sup> The eggs of these mosquitoes are drought-resistant, increasing the challenge for preventing heartworm transmission. These new mosquitoes are potential vectors for human diseases as well, highlighting the importance of mosquito control in protecting both human and animal health.

Once heartworm is transmitted to a pet, the parasites mature in the pet's body over 6 months, and then migrate to the heart and lungs. An infected dog or cat may appear healthy for months or years after infection. Eventually, heartworm infection can cause a wide range of clinical signs such as fatigue, exercise intolerance or cough. If untreated, an infected pet may develop severe heart failure, lung disease and even die. Dogs are the most commonly diagnosed animals; however, the parasites can also infect cats, ferrets, wolves, coyotes and marine mammals.<sup>19</sup> The disease is maintained in areas where mosquitoes can feed on infected coyotes and infected, untreated dogs.<sup>22</sup> Infection in humans is rare,<sup>19</sup> but data may be lacking.

Historically, heartworm was not thought to be present in LA County. However, locally-acquired cases have occurred. The local transmission of this disease may be facilitated by a warming climate and movements of infected pets or wildlife into the county. Epidemiologic data on local heartworm disease can help veterinarians make clinical decisions on heartworm testing and prevention. Since heartworm disease is mosquito-borne, local data can also reveal patterns in local mosquito ecology.

### Data Sources

In LA County, cases of heartworm in dogs and cats are reportable to VPH by local veterinarians. Starting in 2014, VPH began receiving electronic laboratory reports (ELR) from veterinary diagnostic laboratories for every positive heartworm antigen and antibody test result. These positive laboratory reports prompt VPH to further investigate by contacting the veterinarian treating the animal, and occasionally the animal owner, in order to obtain the full report.

Laboratory tests commonly performed to diagnose heartworm in animals include: antigen testing, microscopic identification of parasite larvae (microfilariae) in the animal's blood and occasionally echocardiography. Heartworm testing is routinely done in veterinary clinics prior to starting heartworm preventive medications. Animals may have no overt clinical signs at the time testing is performed.

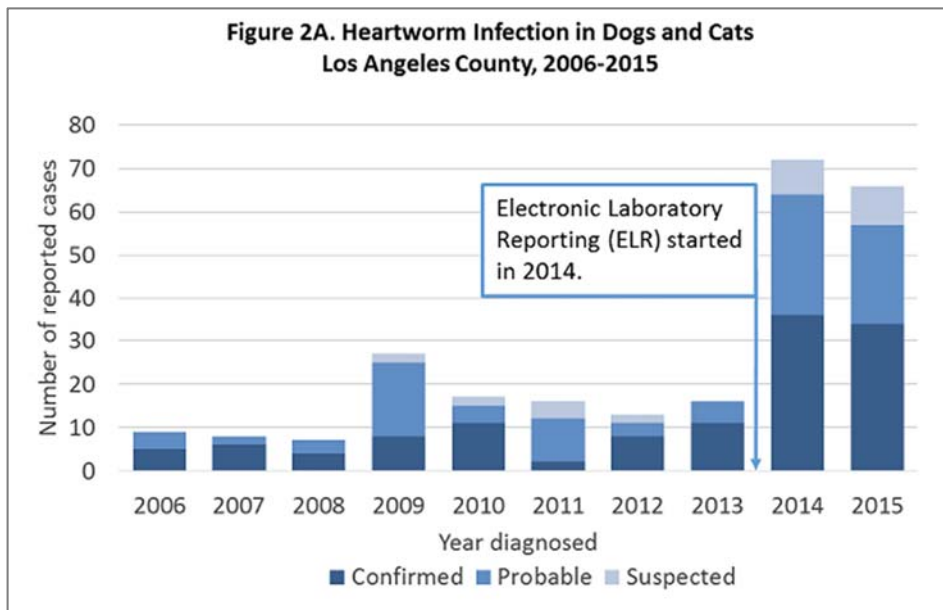
Cases in animals that did not travel outside of southern California in the two years prior to diagnosis were considered southern California-acquired. Cases were categorized as confirmed, probable or suspected based on the results of diagnostic tests performed.\* The data exclude cases seen by veterinary practices in the cities of Long Beach and Pasadena (see p.6); however, veterinary practices outside of Long Beach reported seven cases that live in Long Beach, which are included in this report.

\* Heartworm case definition available at: [publichealth.lacounty.gov/vet/HeartwormCaseDef.htm](http://publichealth.lacounty.gov/vet/HeartwormCaseDef.htm)

## Findings

### Totals - Dogs and cats with heartworm

- In 2015, 66 cases of heartworm infection were reported in 63 dogs and 3 cats. This was a decrease from the 72 cases reported in 2014.
  - In 2014, veterinary laboratories began to report cases electronically (ELR). The median number of cases reported during 2006 through 2013 was 14.5 per year. Between 2014 and 2015, the median number increased to 69 per year. Therefore, ELR likely improved surveillance, and it is unknown whether the true incidence of heartworm increased in 2014.
- Over the decade between 2006 and 2015, a total of 251 cases were reported in 233 dogs and 18 cats (see Figure 2A).
  - 50% were categorized as confirmed, 39% probable and 11% suspected).
  - The median age of dog cases was 5 years, with a range of 9 months to 15 years.
  - The median age of cat cases was 4.7 years, with a range of 1 year to 17 years.



### Clinical Findings

- Most cases (68%) had no clinical signs of heartworm disease at the time of diagnosis. Of the 76 with signs, 51% had cough, 36% had fatigue, and 9% had heart failure. (Note: Since one pet could have multiple clinical signs, percent totals exceed 100%). For 26% of cases with clinical signs, the exact types of clinical signs were not reported.

**Treatment**

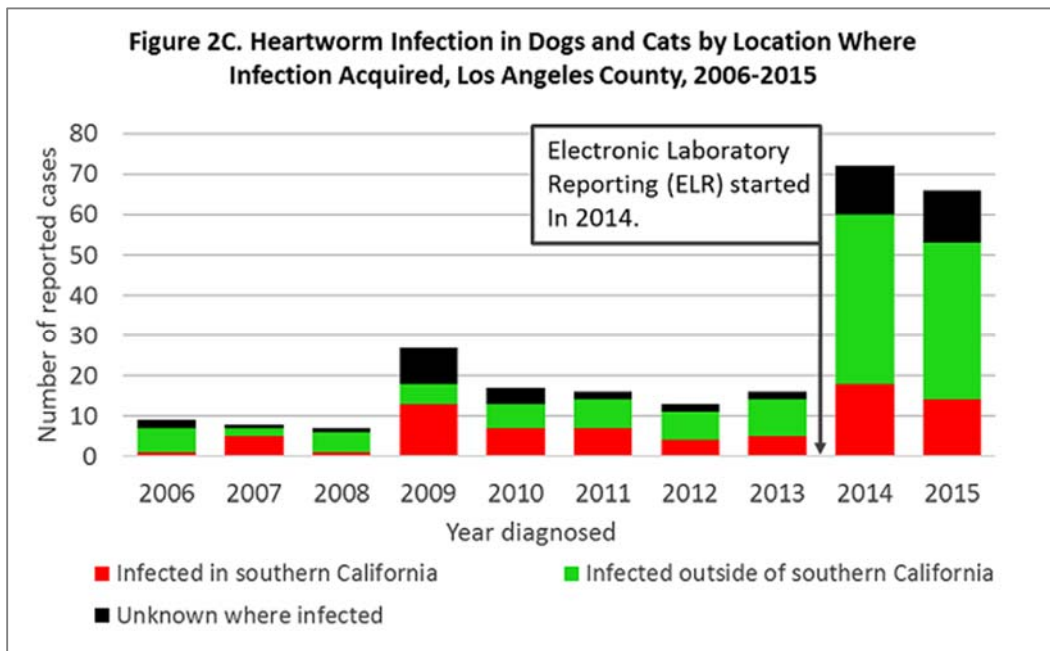
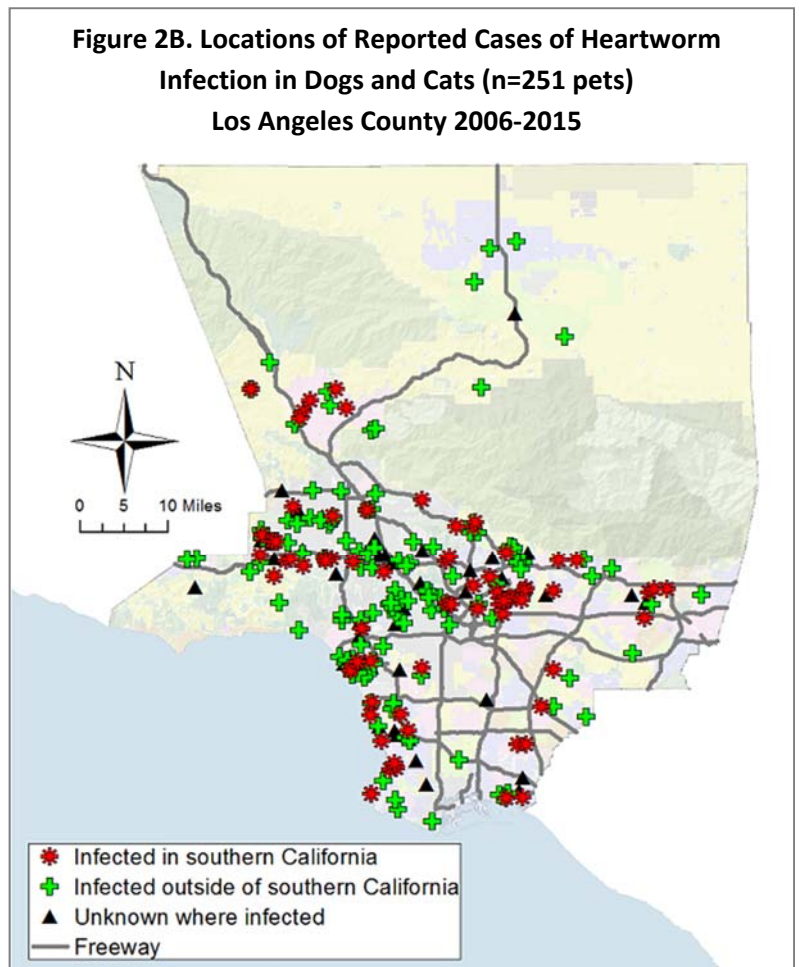
- 73% of cases were receiving some treatment at the time of reporting, 21% were untreated, and for 6% the treatment status was unknown.

**Geographic Pattern**

- Cases appeared to be more common in the western San Fernando Valley, the western and eastern edges of the San Gabriel Valley, and along the western coastline.
- There were 2 clusters: 3 dogs on one property in South Pasadena in 2009 and two dogs on one property in Palos Verdes in 2015.
- There was a lack of cases in the South Los Angeles area. However, this may be due to lack of veterinary services and testing (Figure 2B).

**Where Infections Acquired**

- 30% of cases had not traveled outside of the region and likely acquired heartworm infection in southern California. Over half (51%) were likely infected while outside of southern California. For 19%, not enough travel history was available to assess exposure (Figure 2C).



## Limitations

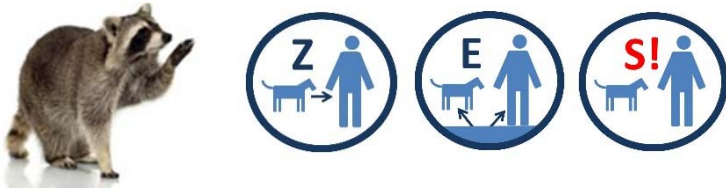
Identification of heartworm cases by VPH is affected by various steps during the reporting process. Under-reporting can occur if: 1) owners do not bring their pets to a veterinarian, or 2) the veterinarian decides not to test the pet for the disease, or 3) the client declines to accept or pay for the test. Identification of southern California-acquired cases vs. cases imported into the area may be affected by the ability of animal owners to recall travel done with their pet in the previous two or more years before diagnosis (recall bias).

## Implications and Recommendations

- Heartworm cases are found in low numbers in LA County. However, local transmission is known to occur.
- The majority of cases (68%) were diagnosed before developing clinical signs, most likely during routine screening tests for heartworm.
- Untreated pets (21% of reported cases) and coyotes may act as reservoirs for the disease.<sup>22</sup>
- Monitoring trends in heartworm cases in animals is an important part of monitoring LA County for mosquito-borne disease in general. The local incidence of heartworm may potentially increase in the future. The arrival and spread of a new vectors for heartworm, *Aedes notoscriptus* and *Aedes albopictus*, may increase the risk of transmission. Increases in ambient temperatures may shorten the life cycles of local mosquitoes, leading to larger mosquito populations.
- Prevention
  - Reduce mosquito populations. Areas of standing water around a property should be identified and removed 1-2 times weekly. This step is cost-free and helps protect people and animals from heartworm, West Nile Virus and other mosquito-borne diseases.
  - Monthly heartworm preventive medication is recommended.
    - Many of these medications also protect against a variety of other diseases and parasites of pets, some of which can cause infection in humans, such as roundworms and hookworms.
    - Prevention is advisable, as treatment of infected pets can be costly and presents some risk to their health.
- Screening tests
  - It is recommended that pets be tested annually for heartworm infection.<sup>23, 24</sup>

**For More Information:** [publichealth.lacounty.gov/vet/heartworm.htm](http://publichealth.lacounty.gov/vet/heartworm.htm).

### 3. Leptospirosis



#### Background and Significance

Wildlife can carry several zoonotic pathogens of importance. One of them is the *Leptospira* bacteria, which causes leptospirosis. These bacteria thrive in water and can be found in the urine of commonly infected wildlife such as raccoons, skunks, opossums or rats.<sup>25</sup> Therefore, the risk of this disease being transmitted to animals and people exists even in urban and suburban environments. People and animals become infected with leptospirosis when the bacteria enter the body through mucous membranes (gums, eyes) or breaks in the skin. This occurs most often through contact with water contaminated with animal urine.

There are many different strains (serovars) of *Leptospira* bacteria that circulate among specific animal species (reservoir hosts). Disease usually occurs when an animal-specific serovar infects another species, including humans. The bacteria most commonly attack the liver and kidneys of infected hosts. Depending on the strain involved, clinical signs in animals may include: fever, vomiting and dehydration.<sup>25</sup> While clinical signs in people can vary, they may include: fever, headache, chills and muscle pain.<sup>26</sup> In dogs, vaccines are available that protect against four serovars: canicola, icterohemorrhagiae, grippityphosa, and pomona.

Animals act as sentinels for the disease. Infected dogs indicate that the bacteria are present in the animal's environment, such as water sources (pets' food/water bowls or fountains) that have been contaminated by infected wildlife. Pets may also be a direct source of infection to people through shedding of the pathogen in infected urine.

#### Data Sources

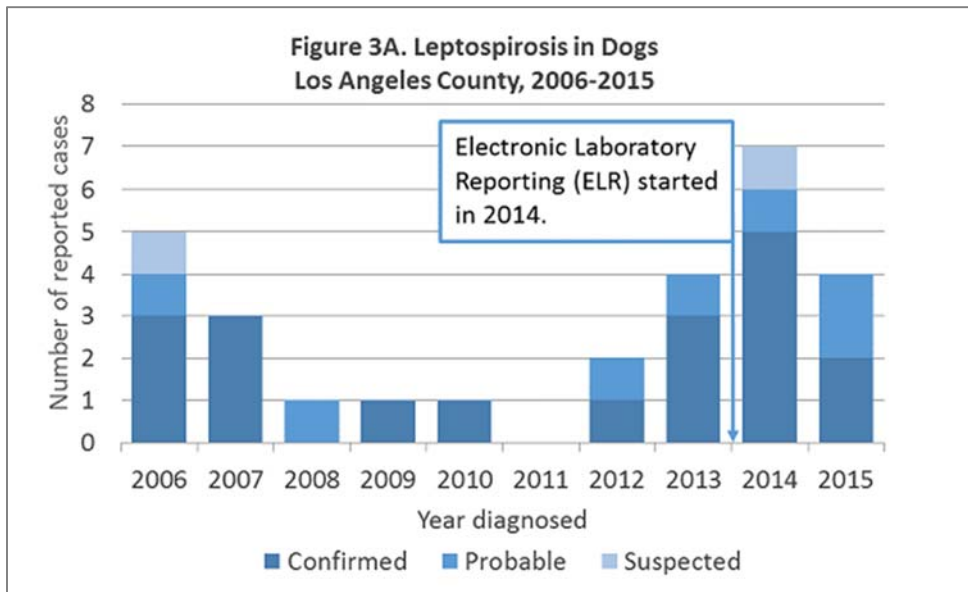
In LA County, cases of leptospirosis in dogs are reportable to VPH by local veterinarians. Starting in 2014, VPH began receiving electronic laboratory reports (ELR) from veterinary diagnostic laboratories for every positive antibody or polymerase chain reaction (PCR) test result for leptospirosis. These positive laboratory reports prompt VPH to contact the veterinarian treating the animal to obtain the full report. Diagnosis was typically made through serology or PCR on urine or blood. Serology measures the level of antibodies against *Leptospira* and is best performed by testing two blood samples taken at 2 to 4-week intervals. It provides insight into the serovar of *Leptospira* likely involved in the infection. A single positive PCR test confirms leptospirosis but gives no information on the infecting serovar. VPH veterinarians investigate each leptospirosis case to identify risk factors involved and provide recommendations for testing and prevention of additional infections. Cases of leptospirosis are classified as confirmed, probable or suspected based on test results and the presence of clinical signs\*. The data do not include any reports from veterinary practices in the cities of Long Beach and Pasadena (see p. 6); however, one veterinarian reported a case in a dog that lives in Pasadena and this dog is included in this report.

\* Case definition available at: [publichealth.lacounty.gov/vet/LeptospirosisCaseDef.htm](http://publichealth.lacounty.gov/vet/LeptospirosisCaseDef.htm)

## Findings

### Totals - Dogs and marine mammals with leptospirosis

- In 2015, 4 cases of were reported in dogs. This was a decrease from the 7 reported in 2014 (Figure 3A).
  - In 2014, veterinary laboratories began to report cases electronically (ELR). The median number of cases reported during 2006 through 2013 was 1.5 per year. Between 2014 and 2015, the median number increased to 5.5 per year. Therefore, ELR likely improved surveillance, and it is unknown whether the true incidence of leptospirosis increased in 2014.
- Over the decade between 2006 and 2015, 28 cases of leptospirosis in dogs were reported (Figure 3A).
  - 68% of cases in dogs were categorized as confirmed, 25% probable, and 7% suspected.
  - The median age of the dogs was 7 years, with a range of 2.5 months to 15 years.
  - 65% were diagnosed by serology alone, 21% by PCR alone, and 14% by both.
  - 82% had not been vaccinated for leptospirosis.
- 10 marine animals (2 Northern elephant seals and 8 California sea lions) were also reported to have leptospirosis.

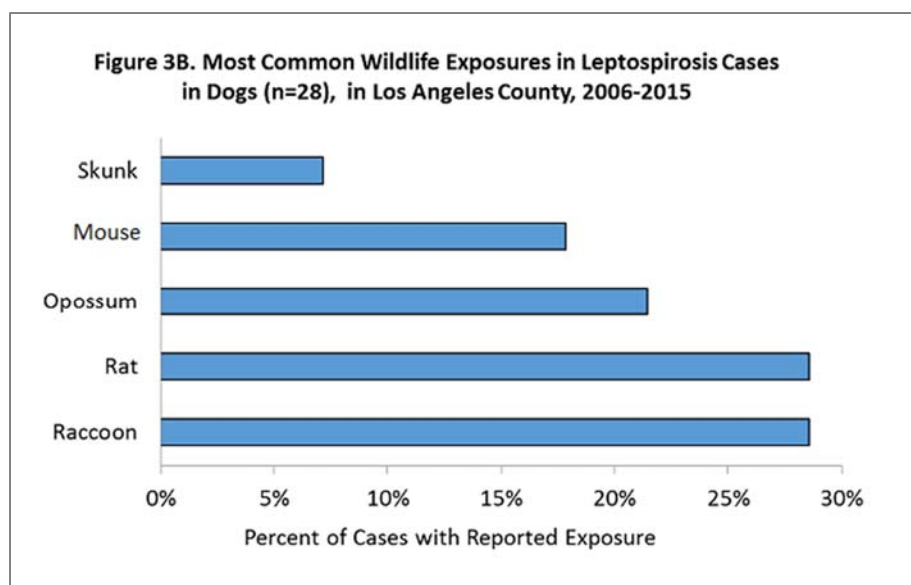


### Season Pattern

- Most cases in dogs (71%) were diagnosed in in the second half of the year.

### Exposures to Wildlife

- Most cases in dogs were associated with exposure to backyard wildlife and therefore potential exposure to the urine of wildlife. In 54% of cases, the dog's owner reported seeing wildlife in their yard. These included raccoons, mice, rats, opossums and skunks (Figure 3B).



### Clinical findings

- Azotemia was the most common test finding (82% of cases in dogs). Azotemia typically indicates involvement of the kidneys, dehydration, or both (see Table 3A).
- Elevated liver blood values were reported in 61% of cases.
- Fever was reported in only 18% of cases.
- Vomiting was the most common sign, reported in 46% of cases.

**Table 3A. Common clinical findings in reported leptospirosis cases in dogs\* (n=28), Los Angeles County, 2006-2015**

	Number of cases	Percent of cases
Azotemia	23	82%
Elevated liver enzymes	17	61%
Vomiting	13	46%
Icterus	5	18%
Fever	5	18%
Diarrhea	3	11%

### Infecting serovars of *Leptospira* in dogs

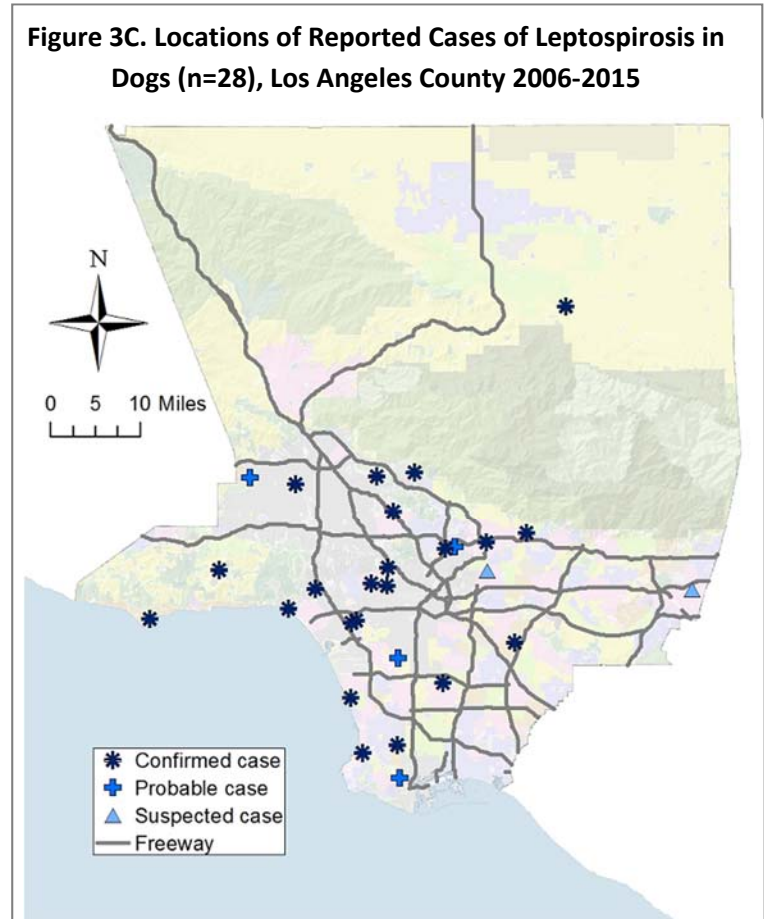
- In 10 cases, two serologic tests (paired serology) were performed on the dog. The suspected serovar(s) of leptospirosis infecting the dog were identified based on a documented four-fold increase or decrease in the antibody titer against each serovar. In two cases, more than one serovar was implicated in infecting the animal (see Table 3B).

**Table 3B. Infecting serovars in cases of confirmed leptospirosis in dogs diagnosed by paired serology (n=10), Los Angeles County, 2006-2015**

Infecting Serovar(s)	Number of cases	Percent of cases
<i>Autumnalis</i>	6	60%
<i>Autumnalis &amp; Pomona</i>	2	20%
<i>Bratislava</i>	1	10%
<i>Canicola</i>	1	10%

### Geographic Pattern

- Dogs with leptospirosis lived in areas throughout LA County. No clear geographic pattern has emerged to date. Due to the cost of testing, dog owners and veterinarians may be more likely to order testing for leptospirosis in higher income areas of the county.



### Limitations

Identification of leptospirosis cases by VPH is affected by various steps during the reporting process. Under-reporting can occur if: 1) the animal is not brought to a veterinarian, 2) the veterinarian decides not to test the animal for the disease, or 3) the pet owner declines to accept or pay for the test. Identification of southern California-acquired cases vs. cases imported into the area may be affected by the ability of animal owners to recall travel done with their pet in the previous two or more years before diagnosis (recall bias).

Some cases of leptospirosis could not be confirmed because only one serologic test was performed or reported. In other cases, a lack of an accurate vaccine history lead to test misinterpretation as infection instead of as a vaccine-induced positive serologic test. Note that due to cross-reactivity among *Leptospira* serovars in serologic testing, the serovar responsible for infection cannot be completely confirmed.



## Implications and Recommendations

- Leptospirosis is present in LA County. Although the total number of cases remains low, local pets may be at risk of infection.
- Although leptospirosis often affects multiple organs and may cause systemic disease, infected animals often do not develop a fever.  
Backyard wildlife is a suspected source of leptospirosis in dogs of LA County. Wildlife likely contaminate backyard sources of water (e.g., water bowls, fountains) consumed by dogs.
- Epidemiologic data on leptospirosis in dogs is highly valuable to veterinarians and physicians. It directly affects decisions regarding clinical testing, treatment, and prevention of the disease in animals and people.
- Consider vaccinating dogs against leptospirosis.
  - Especially important in dogs that share an environment with wildlife such as raccoons or rodents.
  - Four-way leptospirosis vaccines are protective against more serovars than the two-way vaccine. The Pomona serovar is likely present in LA County, and is not covered by the two-way vaccine.
- Dogs should be tested for leptospirosis if they have compatible clinical signs.
  - Performing either PCR or paired serologic testing and obtaining a thorough leptospirosis vaccination history is crucial to confirming the disease in dogs.
- Do not attract wildlife into the yard.
  - Keep pets' food and water bowls inside the house, especially at night.
  - Clean pets' bowls daily using soap and hot water.
  - Do not feed wildlife; pick up fallen fruits and other potential food sources in a yard.
- Prevent leptospirosis infection in people. Reduce contact with potentially infected urine by:
  - Washing hands frequently.
  - Cleaning potentially infected areas using gloves.
  - Contacting an exterminator if rat infestations are present.

**For More Information:** [publichealth.lacounty.gov/vet/Leptospirosis.htm](http://publichealth.lacounty.gov/vet/Leptospirosis.htm)

## 4. Parvovirus in Dogs



### Background and Significance

Canine parvovirus is a vaccine-preventable viral disease affecting dogs. The virus attacks the intestinal mucosa and immune system, causing vomiting and diarrhea.<sup>27</sup> The diarrhea is often severe and bloody, and contributes to rapid dehydration, as well as loss of protein and electrolytes.<sup>27</sup> Cases of parvovirus in dogs are often fatal without hospitalization and intensive support.<sup>27</sup> Parvovirus in dogs is commonly diagnosed with a rapid enzyme-linked immunosorbent assay (ELISA) test on feces that can be easily performed in most veterinary clinics.<sup>27</sup>

Parvovirus is highly contagious, and is transmitted between dogs by direct or indirect contact with their feces. The virus can survive for prolonged periods in the environment.<sup>27</sup> Vaccination against parvovirus can prevent infection, and has been a part of the standard vaccination recommendations for dogs for over 30 years. To be fully protected, puppies must receive a series of 3 vaccines at ages 2, 3, and 4 months, followed by a booster one year later. Adult dogs are typically revaccinated every 1-3 years.<sup>28</sup>

Canine parvovirus is not zoonotic and, therefore, does not pose a health risk to humans. However, cases of parvovirus in dogs serve as a marker for areas in LA County where access to, or utilization of, basic veterinary preventive health care is low. A lack of basic veterinary care can increase the risk of human exposure to zoonotic diseases.

### Data Sources

Surveillance for parvovirus in dogs began in 2007, when it was first listed by VPH as a priority reportable disease. Because of the large volume of cases, minimal data is collected in each case. Canine parvovirus is reported using an abbreviated spreadsheet-style reporting form. Data collected include only the dog's breed, age, impound date (if applicable), date diagnosed, clinical signs, diagnostic test results, and the dog's zip code of origin. Vaccine status of the dogs was not available for the majority of cases, since most cases were reported by shelters. Medical history is usually not available for stray dogs and dogs relinquished to shelters. Information on the categorization of cases (i.e. the case definition) is available on the VPH website.\* Reports were received from Long Beach in years 2010-2015 and from Pasadena in years 2010-2011 and in 2015.

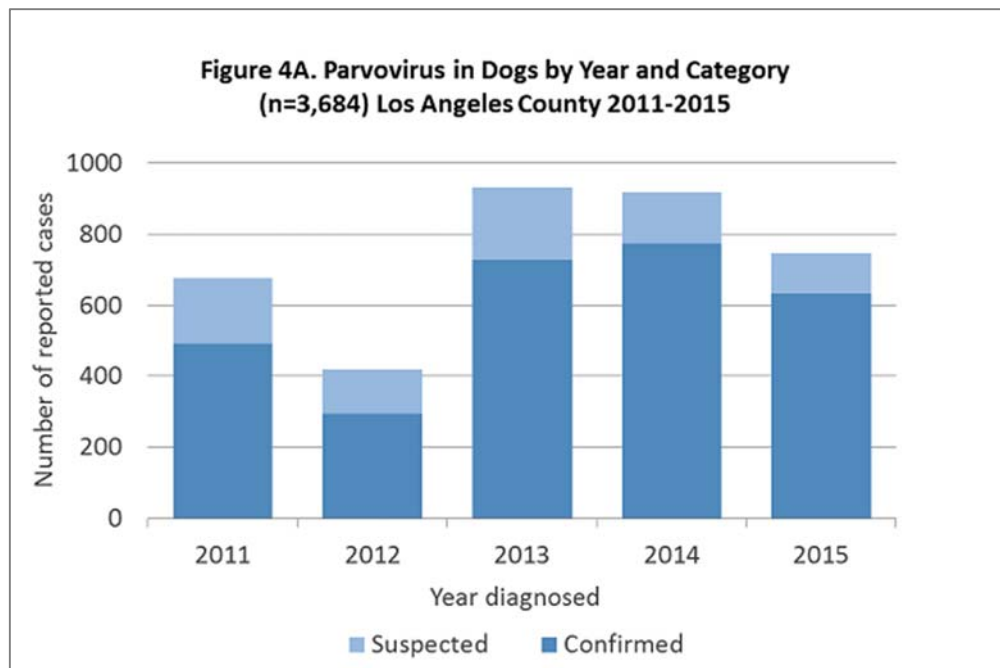
Confirmed canine parvovirus cases were those that had compatible clinical signs and a positive ELISA or PCR test on feces. Because of the minimal amount of data available on cases, no cases were categorized as probable. Suspected cases were those that had compatible clinical signs and/or epidemiologic links to confirmed cases, and had either no diagnostic testing performed or a negative ELISA test. Confirmed and suspected cases were analyzed together, except where indicated.

\* Case definition available at: [publichealth.lacounty.gov/vet/ParvoCaseDef.htm](http://publichealth.lacounty.gov/vet/ParvoCaseDef.htm)

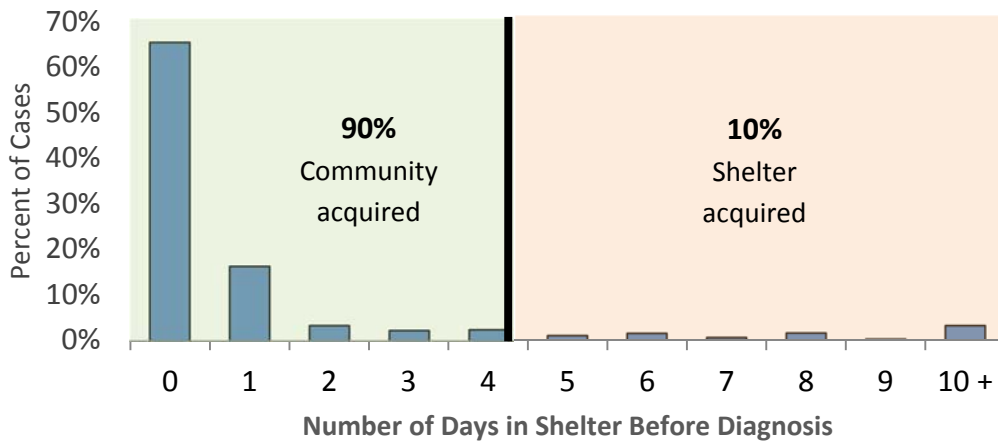
## Findings

### Totals - Dogs with parvovirus

- In 2015, 745 cases of canine parvovirus were reported in dogs. This was a decrease from the 916 cases reported in 2014 (Figure 4A).
- In the five years between 2011 and 2015, a total of 3,684 canine parvovirus cases were reported.
  - 79% were categorized as confirmed, and 21% were suspected.
  - The number of cases reported was highest in 2013 (Figure 4A).
  - The median age of the cases was consistently 4 months across all five data years. The average age fluctuated slightly under and over 6 months. The age range was 3 weeks to 9 years.
  - Source of Reports. Animal shelters contributed the most to surveillance, reporting 82% of cases, while private veterinary practices reported 18% cases. A small number (0.3%) were reported by other sources such as pet owners.
  - Sources of Infection. Although most cases were reported by animal shelters, the vast majority of those cases had obtained the infection while living in the community.
    - Shelter-reported cases between 2013 and 2015 were analyzed for length of stay in the shelter before diagnosis. Dates of entry and diagnosis were available for 1,962 shelter-reported cases. Of these:
      - 66% had clinical signs on the day of entry
      - 90% were diagnosed within 4 days of entry, and were therefore likely infected before entry into the shelter (i.e. community acquired) (Figure 4B)



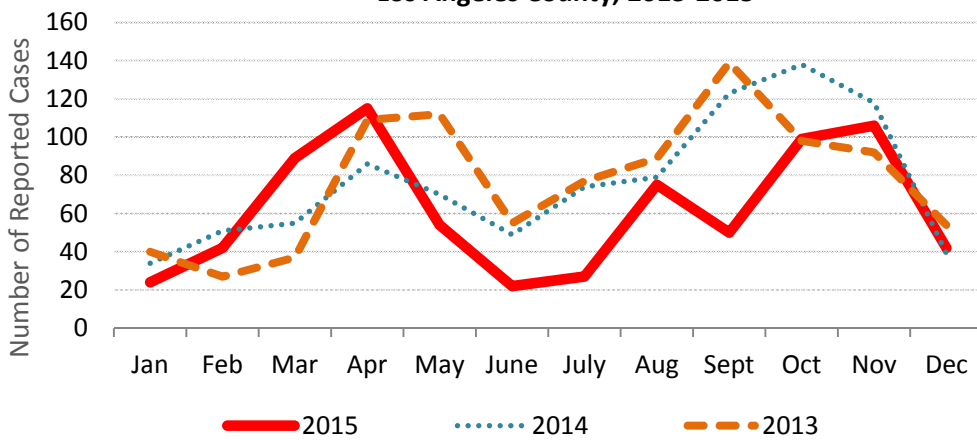
**Figure 4B. Parvovirus in Dogs - Days in Shelter Before Diagnosis (data from 13 shelters, n=1,962) Los Angeles County, 2013-2015**



**Seasonal Pattern**

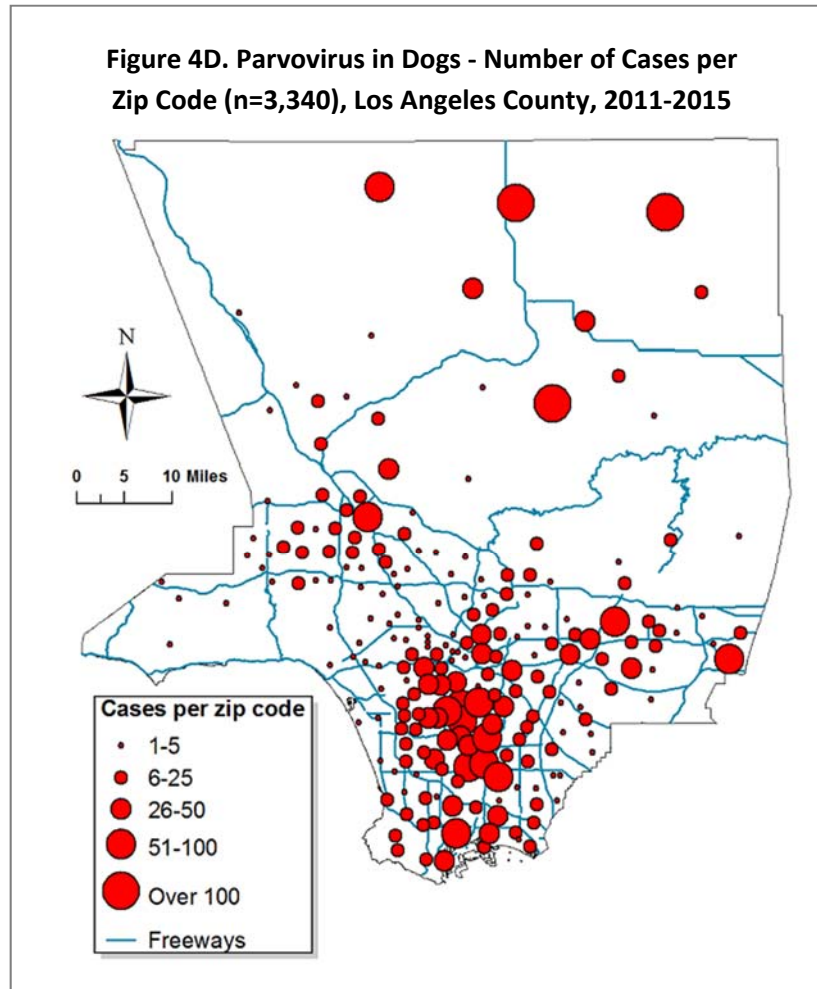
- Parvovirus infection in dogs followed a bimodal seasonal pattern, with increases in late spring and autumn (Figure 4C).

**Figure 4C. Parvovirus in Dogs by Month (n=2,590) Los Angeles County, 2013-2015**



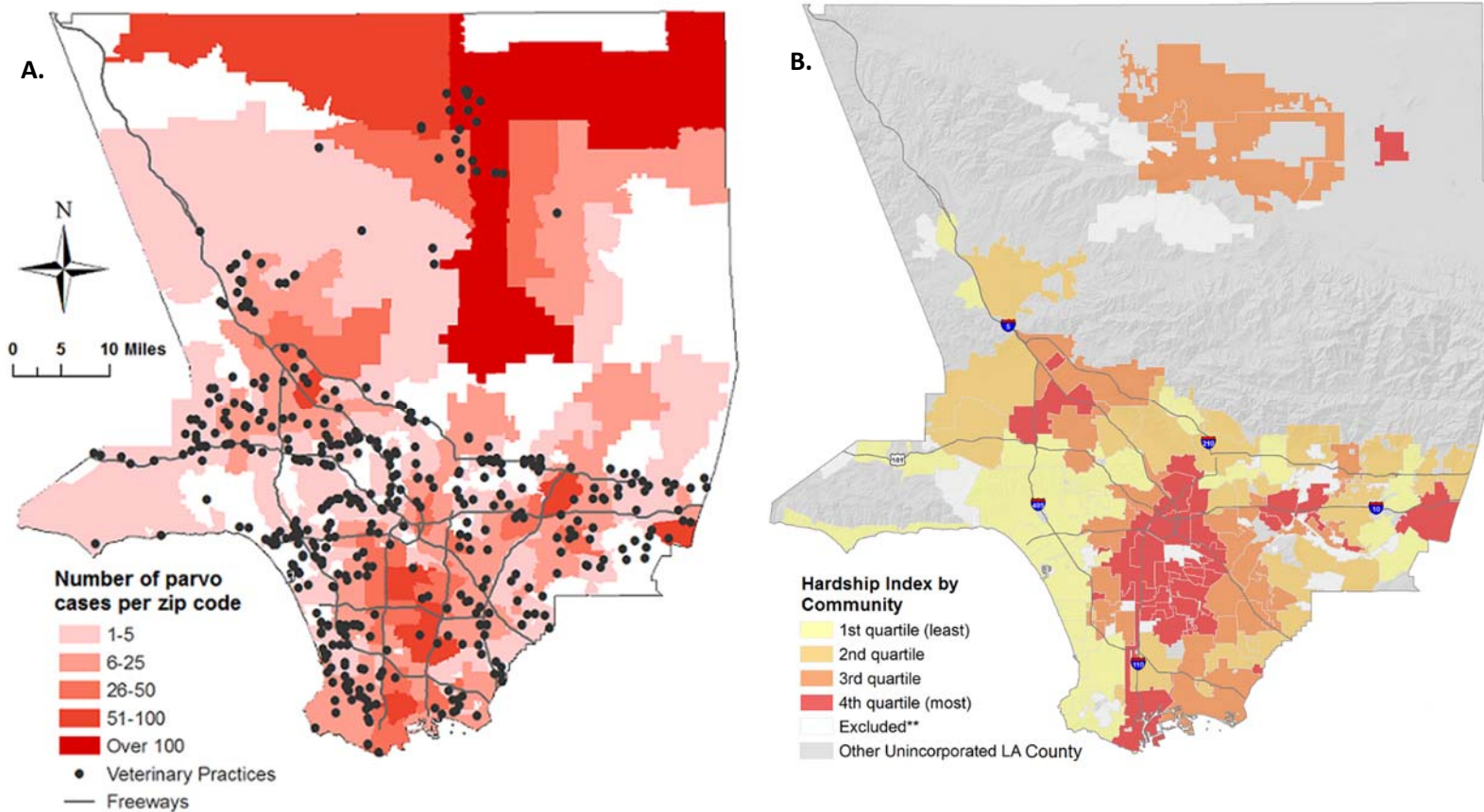
### Geographic Pattern

- Cases of parvovirus occurred all over the county.
- Cases clustered in the central part of the Los Angeles Basin, the northeastern part of the San Fernando Valley, the central and eastern parts of the San Gabriel Valley, and in the Antelope Valley (Figure 4D).



- The number of reported cases was higher in zip codes with fewer veterinary practices. Parvo cases tended to be higher in areas of the county known to face a higher level of economic hardship (Figure 4E).

**Figure 4E. Canine parvovirus, access to veterinary care, and economic hardship, Los Angeles County**



Canine parvovirus cases tended to appear in areas of Los Angeles County where economic hardship is greater.

**A.** Map of number of canine parvovirus cases reported per zip code between 2011 and 2015 (red shading), and the locations of private veterinary practices. **B.** Map of economic hardship index, by city and community. Hardship index based on American Community Survey 2012 5-year estimates. \*\*Population below 10,000. Data source – US Census Bureau. Map from the Office of Health Assessment and Epidemiology, Los Angeles County Department of Public Health.

## Limitations

Many parvovirus cases in dogs are likely unreported because veterinarians may not report all cases, and dog owners may lack of financial resources for, or access to, diagnostic testing for their dog.

## Implications and Recommendations

- Canine parvovirus data highlights areas in LA County where more veterinary preventive services are needed. Dogs that have not been vaccinated against parvovirus may be less likely to receive other vaccines, including rabies, as well as preventive care such as deworming and flea control. Therefore, people in areas with more canine parvovirus may also face a higher risk for rabies or other zoonotic diseases exposure if their pets become infected.
- Canine parvovirus data highlight areas of the county that have reduced access to, or utilization of, veterinary care. Improving surveillance of canine parvovirus in LA County allows VPH to focus outreach efforts on the most affected communities.
- Cases of parvovirus in dogs in LA County should be reported to VPH using the simplified Parvovirus Tracking Sheet.\*
- Non-profit, governmental, and community organizations working in animal health are strongly encouraged to use canine parvovirus data to guide the location and timing of their community outreach efforts to improve animal vaccination.
  - Education on vaccination of pets for the public is a critical part of outreach. Dog owners should be educated about the disease and the importance of vaccination schedules (including boosters). They should also be educated on zoonotic and vector-borne disease prevention.

**For More Information:** [publichealth.lacounty.gov/vet/parvo.htm](http://publichealth.lacounty.gov/vet/parvo.htm).

\* For veterinary practices: [publichealth.lacounty.gov/vet/docs/Forms/ParvoTrackingSheet\\_vet.pdf](http://publichealth.lacounty.gov/vet/docs/Forms/ParvoTrackingSheet_vet.pdf)

For animal shelters: [publichealth.lacounty.gov/vet/docs/Forms/ParvoTrackingSheet\\_shelter.pdf](http://publichealth.lacounty.gov/vet/docs/Forms/ParvoTrackingSheet_shelter.pdf)

## 5. Valley Fever (Coccidioidomycosis)



### Background and Significance

Valley fever (coccidioidomycosis) is caused by a fungus (*Coccidioides immitis*) that is common in dry climates of the southwestern United States, parts of Mexico, and Central and South America.<sup>29</sup> The fungus is found in the soil and spores can spread through the air, especially when the ground is disturbed such as during earthquakes, construction or excavations.<sup>30</sup> Disease occurs when fungal spores are inhaled by a person or animal.<sup>29</sup> Thus, exposure comes from the environment and, with extremely rare exceptions, *Coccidioides immitis* does not spread directly between people or between animals. Many people and pets that are exposed to the fungus do not get sick from Valley fever.<sup>31</sup> Symptoms of Valley fever in humans and animals are generally similar and include: fever, fatigue, cough and sometimes skin lesions.<sup>31</sup> Dogs may also suffer from weight loss and bone infections that appear similar to some types of bone cancers.<sup>32</sup>

Some pets, because of specific behaviors (living outdoors, digging into the ground), may be more likely to be exposed to Valley fever compared to people. Therefore, animals with Valley fever may act as sentinels for human disease in areas of LA County where the fungus is present.

### Data Sources

In Los Angeles (LA) County, cases of Valley fever in animals are reportable to VPH by local veterinarians. Starting in 2014, VPH began receiving electronic laboratory reports (ELR) from veterinary diagnostic laboratories for every positive antibody test result for Valley fever. Each report was investigated by a VPH veterinarian in order to obtain a full case report. As a result, the number of reports and completeness of data received increased significantly starting in 2014.

Diagnosis was accomplished by detection of antibodies against the disease (serology) and/or biopsy of lesions or affected tissues, plus recognition of specific clinical signs. Location of probable exposure was assessed by obtaining a travel history. Exposure location was recorded as LA County, southern California other than LA County (Imperial, Kern, Orange, Riverside, Santa Barbara, San Bernardino, San Diego, San Luis Obispo and Ventura Counties) or outside of southern California. If available, travel destinations for those cases outside of LA County were recorded. In addition, each report was categorized as confirmed, probable or suspected based on the case definition for Valley fever in animals in LA County.\* The data collected do not include any reports from veterinary practices in the cities of Long Beach or Pasadena (see p. 6).

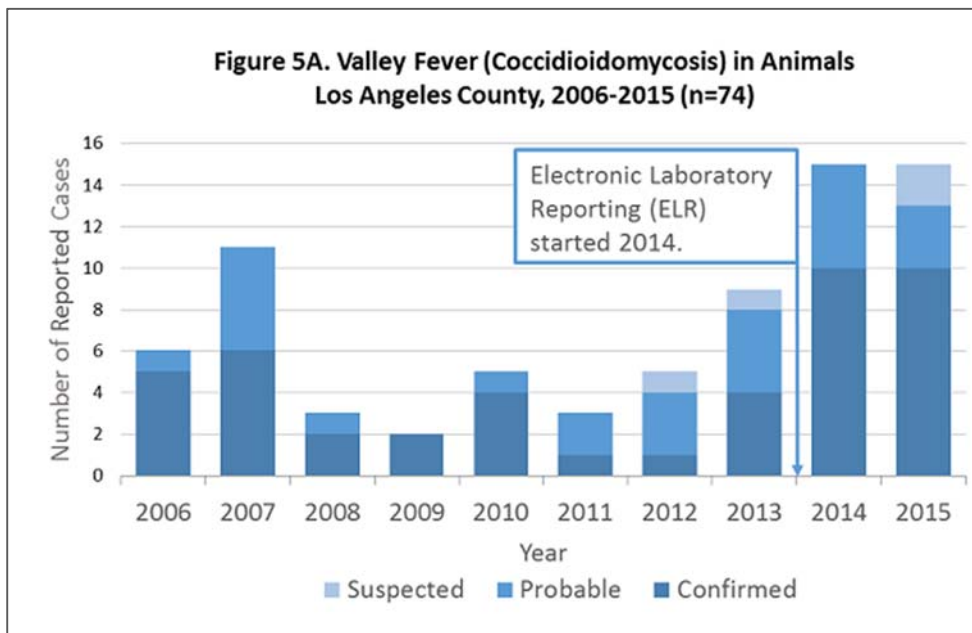
\*Case Definition available at: [publichealth.lacounty.gov/vet/CoccidioidomycosisCaseDef.htm](http://publichealth.lacounty.gov/vet/CoccidioidomycosisCaseDef.htm)



## Findings

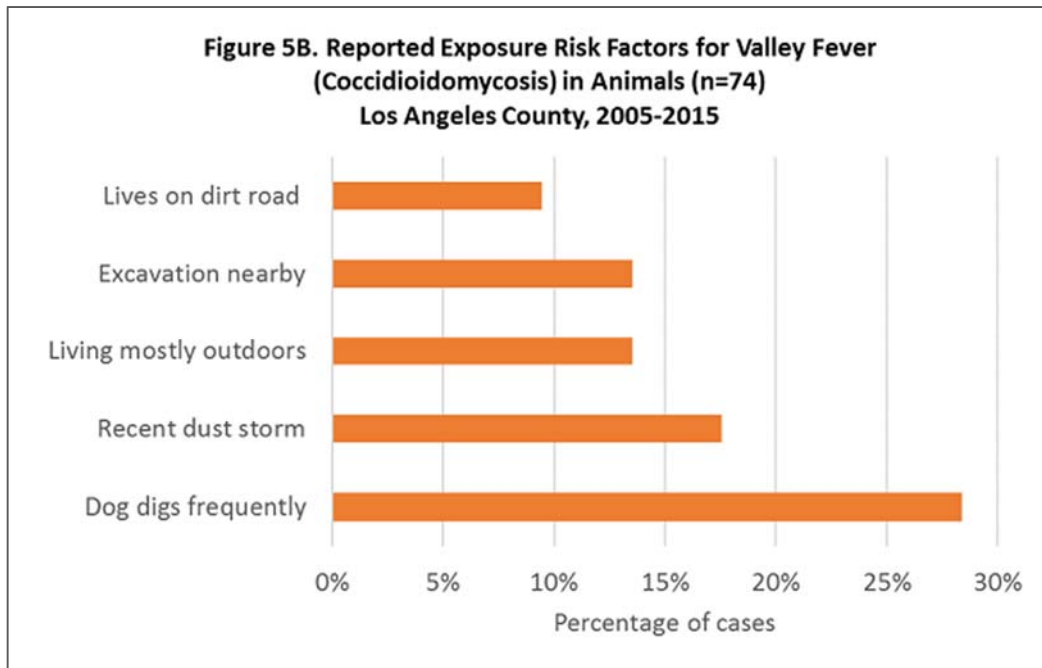
### Totals - Dogs and cats with Valley fever

- In 2015, 15 cases of coccidioidomycosis in dogs were reported. There were no cases reported in cats. This was the exact same number of cases in dogs reported in 2014.
  - In 2014, veterinary laboratories began to report cases electronically (ELR). The median number of cases reported during 2006 through 2013 was 3.5 per year. Between 2014 and 2015, the median number increased to 16 per year. Therefore, ELR likely improved surveillance, and it is unknown whether the true incidence of coccidioidomycosis increased in 2014.
- In the decade between 2006 and 2015, 74 cases of Valley fever in animals in LA County were reported in 71 dogs, 2 cats, and 1 Northern Elephant Seal.
  - 61% of cases were considered confirmed, 34% probable, and 5% suspected.



### Exposures and risk factors

- 30 cases (40% of reports) did not report travel outside of southern California.
- Other common areas of exposure included: Arizona, the Mojave Desert and Central California
- 22 animals (28% of total reports) were reported to dig in the soil frequently. Other exposure factors reported included: being in a dust storm, living mostly outdoors, and proximity to construction sites or other locations involving excavation (Figure 5B).

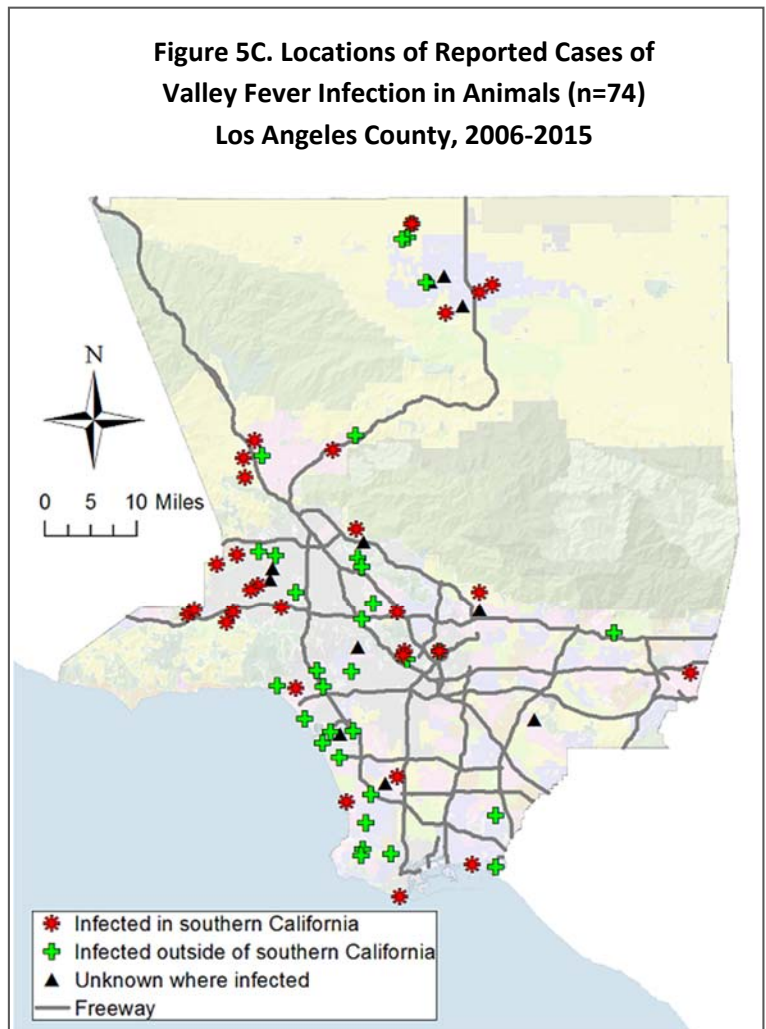


**Clinical Findings**

- Dog cases
  - 57% had cough
  - 54% had fever
  - 40% had pneumonia or lung lesions detected on radiographs
  - 37% had weight loss
  - 34% had lameness
  - 23% had bone lesion(s) detected on radiographs
  - 16% had enlarged lymph nodes
  - 1% had eye lesion(s)
- Cat cases
  - 1 had cough and weight loss
  - 1 had a non-healing fungal abscess
- Northern Elephant Seal case
  - Weight loss and failure to grow. Fungal lesions found throughout body after its death.

**Geographic pattern**

- Most southern California acquired cases were reported from the San Fernando Valley. Many imported cases were found on the western coastal area of LA County (Figure 5C).



## Limitations

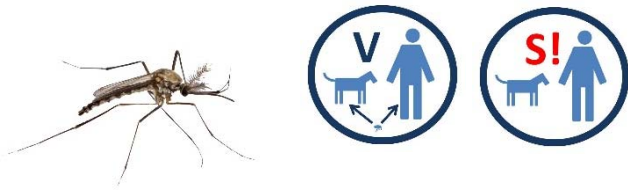
Classification of cases on the basis of exposure location may be affected by the ability of animal owners to remember travel with their pet prior to diagnosis (recall bias). Because antibody levels in affected animals can remain positive for a long time, it may be difficult to differentiate current infection compared to previous exposure.

## Implications and Recommendations

- In LA County, Valley fever is known to be endemic in the Antelope Valley and western San Fernando Valley. Most of the locally-acquired animal cases were reported from the San Fernando Valley. However, other areas of the county also have a low number of cases reported.
- Pets with Valley fever may act as sentinels for risk of exposure for the humans that live in the same area. Monitoring disease in animals may help identify cases in humans.
- Animal owners and their pets should limit outdoor activities during dust storms and nearby excavations. Dust control, such as by wetting down work areas with water, should always be performed during projects that involve excavation; this will reduce the likelihood of inhaling fungal spores. Pet owners should discourage their pets from digging in soil.
- Veterinarians suspecting Valley fever in their patients should obtain a thorough travel history, to help assess the local burden of the disease.
- Veterinarians should rule out Valley fever in local pets with proliferative bone diseases, especially in animals coming from endemic areas.

**For More Information:** [publichealth.lacounty.gov/vet/coccidioidomycosis.htm](http://publichealth.lacounty.gov/vet/coccidioidomycosis.htm).

## 6. West Nile Virus (WNV)



### Background and Significance

WNV virus is transmitted to people by the bite from an infected mosquito. Mosquitoes become infected when they bite an infected bird.<sup>33</sup> Although the virus has been found in a number of mosquito species, those from the *Culex* genus are the most important vector for WNV in the United States.<sup>34</sup> Mosquitoes breed in standing water. In humans, illness is usually mild and 80% of those infected do not show signs of disease. In some cases, infected people may experience flu-like symptoms. Less than 1% of infected people suffer from a serious neurological form of the disease.<sup>33</sup> Presently, there is no vaccine available for humans.

Several other animal species are susceptible to WNV, including squirrels, horses and some reptiles.<sup>35</sup> The disease is maintained in the environment by small birds which occasionally show clinical signs of WNV. In contrast, corvids (crows, ravens, jays) often die soon after being infected. Horses with the disease usually suffer from severe neurological signs, but can be protected by vaccination. Dogs and cats rarely get sick from WNV.<sup>35</sup> Horses and people are considered “dead end hosts” because, once infected, they are not expected to pass the virus to other mosquitoes after they get bitten.<sup>36</sup>

Originally from Africa and Europe, the West Nile virus was not found in the Americas until 1999, where it caused neurologic disease in birds, horses and people in the New York City area.<sup>37</sup> Within just 3 years, the disease spread across the United States and became established in California by the end of 2003.<sup>38</sup> Since then, integrated surveillance programs have been put in place to track WNV in domestic birds (sentinel chickens), wild birds, mosquitoes and people. Testing for the disease in deceased wild birds identifies outbreaks early and is one of the most cost-effective ways to track the virus in the community.<sup>39</sup> The location where a WNV-positive bird was found *may not be the same location where it originally acquired the infection*, since birds can fly large distances. However, a bird infected with WNV increases the risk of WNV in the area where it dies, since its will serve as a source of the virus for local mosquitoes while it is ill and weakened by the virus, up until the point of the bird’s death. Therefore mapping dead birds infected with WNV highlights areas of heightened WNV risk for humans. In LA County, cases of WNV occur every year in both humans and animals.

### Data Sources

Starting in 2004, animal control agencies, members of the public, and veterinarians began reporting dead birds to the California Department of Public Health (CDPH), local vector control agencies and VPH. During most years, fresh bird carcasses were collected for testing. This surveillance program was temporarily suspended in August 2013, when federal funding for much of the work was no longer available. The number of dead bird reports received, and the number tested, dropped considerably. The program was re-constituted with alterations in testing methodology. Throughout 2014, local vector control agencies

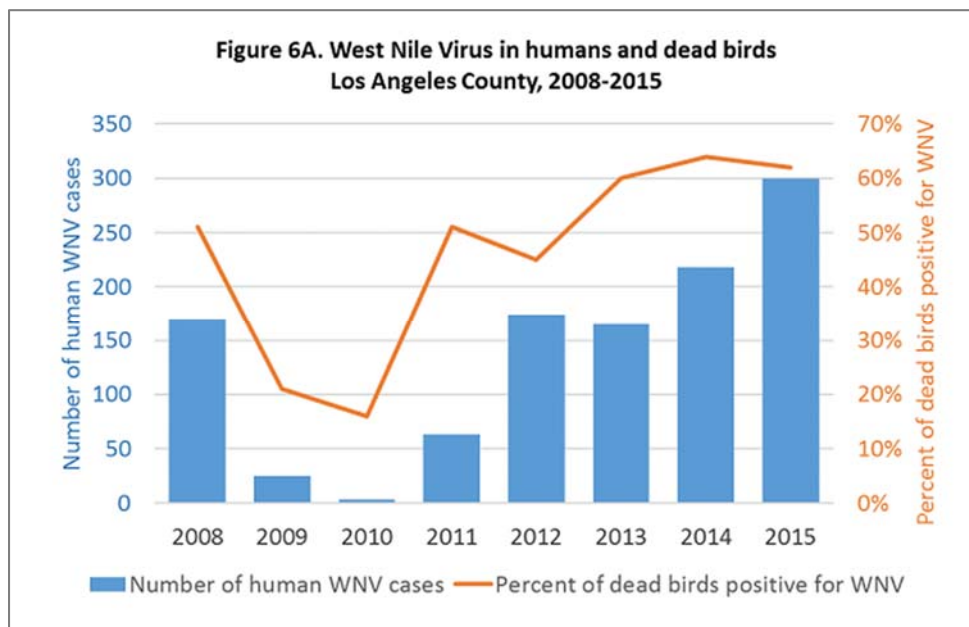
continued to collect and test birds, although at a much reduced level. In August 2015, VPH again began to participate in collecting and testing dead birds.

During 2013 and earlier years, multiple bird species and tree squirrels were accepted for testing. Since 2014, most testing is limited to crows, ravens, and jays (corvids) and birds of prey, with occasional testing of other species. The majority (95%) of bird carcasses were tested by polymerase chain reaction performed by the Center for Vectorborne Diseases at the University of California, Davis. Before 2013, an in-house rapid-antigen test strip (VecTest™, Medical Analysis Systems, Camarillo, CA) was periodically used on corvids. Using this procedure, animals testing positive were considered confirmed, and only confirmed cases were counted. The data reported here reflect the cumulative data for LA County, including tests arranged by both VPH and local vector-control agencies. These data includes reports from Long Beach, but none from Pasadena.

## Findings

### Totals – Birds and Humans with WNV

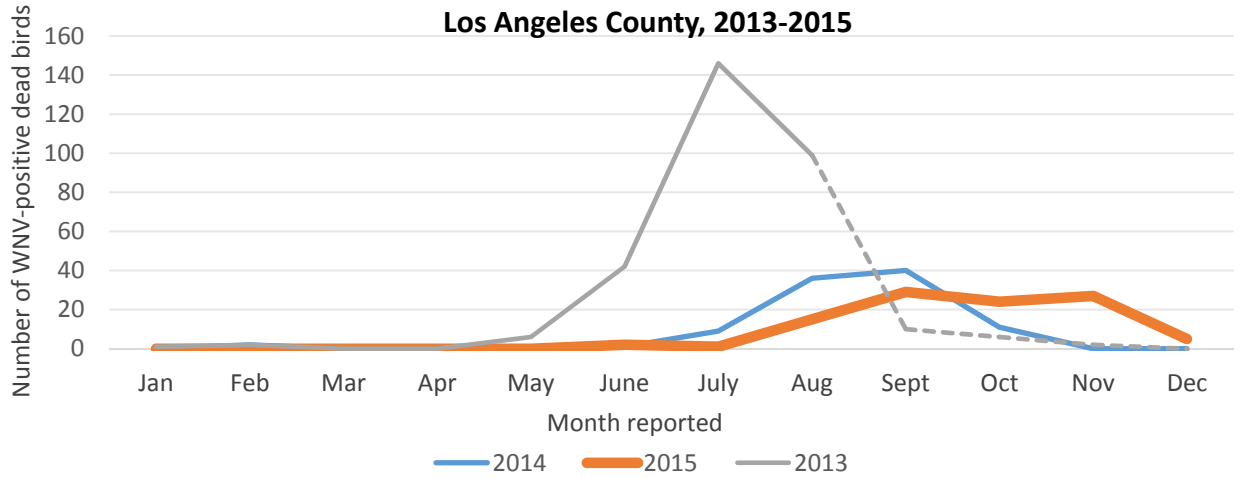
- In 2015, WNV was detected in 103 dead wild birds in LA County. A total of 62% of dead birds tested were WNV positive. There were 300 people infected with the virus during 2015, the highest number of human cases since 2004 (the first full year after the virus arrived in LA County).<sup>40</sup>
- Although the number of birds tested in 2014 and 2015 was reduced compared to previous years, the percent of birds testing positive correlated with the number of human cases during most years, except in 2011 (Figure 6A).



### Seasonal Pattern

- WNV activity has typically peaked in the summer; however, recent data have shown that the peak may occur in the fall, and the season can extend as late as November. In 2014, about half (52%) of WNV-positive birds were detected in September, October and November. In 2015, the proportion of WNV-birds detected in the autumn months increased to 78% (Figure 6B).

**Figure 6B. West Nile Virus in Dead Birds  
Los Angeles County, 2013-2015**

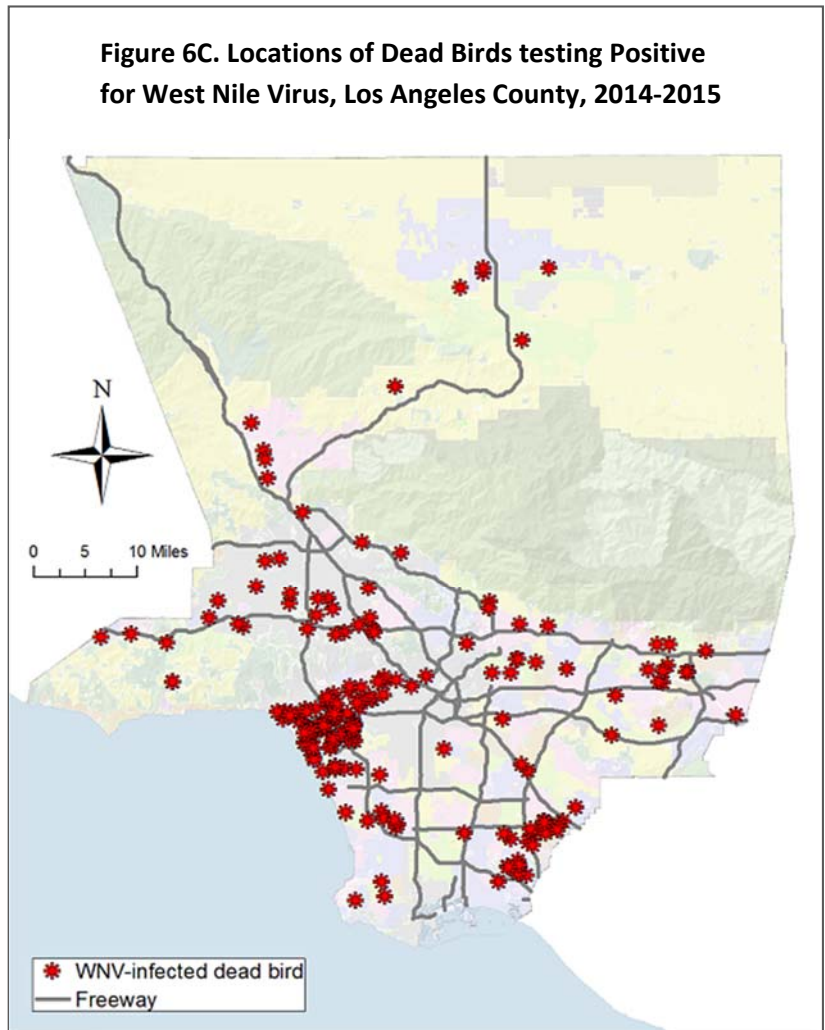


Note: Federal funding for West Nile Virus surveillance was significantly reduced August 2013, leading to a steep reduction in dead bird testing countywide. Vector control agencies continued to test birds in 2014, but the LA County Veterinary Public Health program (VPH), did not resume testing until late August 2015.

**Geographic pattern**

- During 2014 and 2015, WNV-positive dead birds were detected in multiple areas in LA County.
- Significant numbers were reported from the Santa Monica and West LA area, with a second cluster in the southeast region of the county (Figure 6C). Most human cases were not in these areas. Possible explanations include:
  1. Residents in these areas were more likely to report dead birds
  2. The intensity of WNV activity was high in those areas but human cases were avoided by preventive measures
  3. Some combination of 1. and 2.

**Figure 6C. Locations of Dead Birds testing Positive for West Nile Virus, Los Angeles County, 2014-2015**



## Limitations

The total number of wild crows in LA County is unknown; therefore, it is impossible to calculate the percent of birds affected by WNV.

Due to the reduction of federal funding for WNV surveillance for the State of California in 2013, VPH discontinued testing of birds for WNV in late August 2013, during peak virus activity. With other funding, local vector control agencies continued testing in birds, but the amount of dead bird testing performed in LA County decreased significantly. It began to increase again slightly in 2015, as VPH restarted testing.

## Implications and Recommendations

- Monitoring WNV in dead birds offers several benefits to public health.
  - The severity of WNV varies each year. Bird testing can help identify changes of WNV exposure risk in a changing climate.
  - Areas within LA County most severely affected by WNV-positive birds correspond to areas of increased human risk.
    - Years in which bird cases are high (i.e. elevated risk in environment) and human cases are low may reflect success in human WNV prevention programs.
  - Bird cases occur about one month before human cases, acting as an early-warning system.
  - WNV cases have a strong seasonal pattern and exposure risk rises in late summer and fall.
- Reduce exposure to mosquitoes through mosquito control.
  - Mosquitoes breed in standing water. Areas of standing water around a property (such as fountains, bird baths, pet water bowls, buckets, gutters, etc.) should be identified and emptied 1-2 times weekly. This helps protect people and animals from WNV, heartworm disease and other mosquito-borne diseases.
  - Wearing long-sleeved clothing and avoiding outdoor areas between dusk and dawn can reduce risk.
  - Large bodies of stagnant water, such as neglected swimming pools, should be reported to the local vector control agency.\*
- Report dead birds in LA County to VPH at 213-989-7060. Only birds that are freshly dead, and collected and put aside in a secure place, can be tested.
- There are no reports of a person getting infected from handling live or dead infected birds. However, the public should avoid bare-handed contact when handling any dead animal. Birds that are to be collected for WNV testing, or are to be discarded, should be picked up using gloves or a shovel, before placing the bird's carcass in a bag. The hands of the person bagging the dead bird should be washed thoroughly afterward.
- Communities should engage in targeted interventions to prevent WNV infections between mid-spring and late fall.

**For More Information:** [publichealth.lacounty.gov/vet/WNV.htm](http://publichealth.lacounty.gov/vet/WNV.htm)

## 7. Methicillin-Resistant Staphylococcal Infections and Co-infections



### Background and Significance

When antibiotics were first discovered in the 1900s, their use greatly reduced illness and death from bacterial infections.<sup>41</sup> Bacteria may develop resistance to antibiotics naturally; however, continuous overuse and misuse of these products have facilitated the development of widespread resistance.<sup>42</sup> Today, bacteria that are resistant to antibiotics, such as methicillin-resistant *Staphylococcus aureus* (MRSA), represent a major threat to public health, especially in healthcare settings.<sup>43</sup>

Antibiotic resistance has been a concern in food-producing animals for many years.<sup>44</sup> Antibiotic resistance is increasingly a concern in small animal veterinary medicine as well. Unlike humans, dogs and cats do not usually harbor *Staphylococcus aureus*.<sup>45</sup> In fact, it is thought that any MRSA diagnosed in these species is the result of reverse zoonosis – in which the animals became temporarily colonized through contact with humans harboring the bacteria.<sup>45</sup> However, dogs and cats do commonly carry a related species of bacteria called *Staphylococcus pseudintermedius*, which may also become resistant to antibiotics.<sup>46</sup>

Laboratory tests such as bacterial culture and antibiotic sensitivity are useful in determining the most efficient treatment against a specific infection. However, due to cost, veterinarians are not always able to submit every suspect bacterial infection for culture and sensitivity testing, and may resort to empirical use of antibiotics. This can contribute to an increase in resistant bacteria in pets.

While some antibiotic-resistant bacteria do not cause disease in people and animals, severe infections can occur if the bacteria enter open wounds (e.g. surgical sites) or when they infect individuals with depressed immune systems.<sup>47</sup> Collecting data on antibiotic resistance from small animal veterinary clinics may help uncover trends of antibiotic resistance in LA County.

### Data Sources

Methicillin-resistant *Staphylococcus* infections in animals are reportable in LA County to VPH by local veterinarians. In many cases, reports were also received for infections with non-methicillin-resistant *Staphylococci* that were resistant to other antibiotics, as well as co-infections with other species of bacteria. Resistance to methicillin was not directly recorded by the veterinary diagnostic laboratories examining the bacteria; however, an assessment of resistance to methicillin was based on resistance to another antimicrobial in the same class, oxacillin.



## Findings

### Totals – Dogs, cats, and birds with staphylococcal infections

- Between 2008 and 2015, 190 animals (175 dogs, 12 cats, and 3 birds) with antibiotic-resistant staphylococcal infections were reported. Some animals were infected with multiple species of *Staphylococcus*, bringing the total number of staphylococcal isolates reported to 195.
  - The most common antibiotic-resistant bacteria was *Staphylococcus pseudintermedius*, with 130 cases reported (Table 7).
  - 64% of *Staphylococcus* isolates that were resistant to at least one antibiotic were methicillin-resistant.
  - The most common conditions associated with resistant staphylococcal infections included: dermatitis/abscesses (148 cases), otitis externa (31 cases), urinary tract infections (20 cases) and post-operative infections (11 cases) (Table 7).

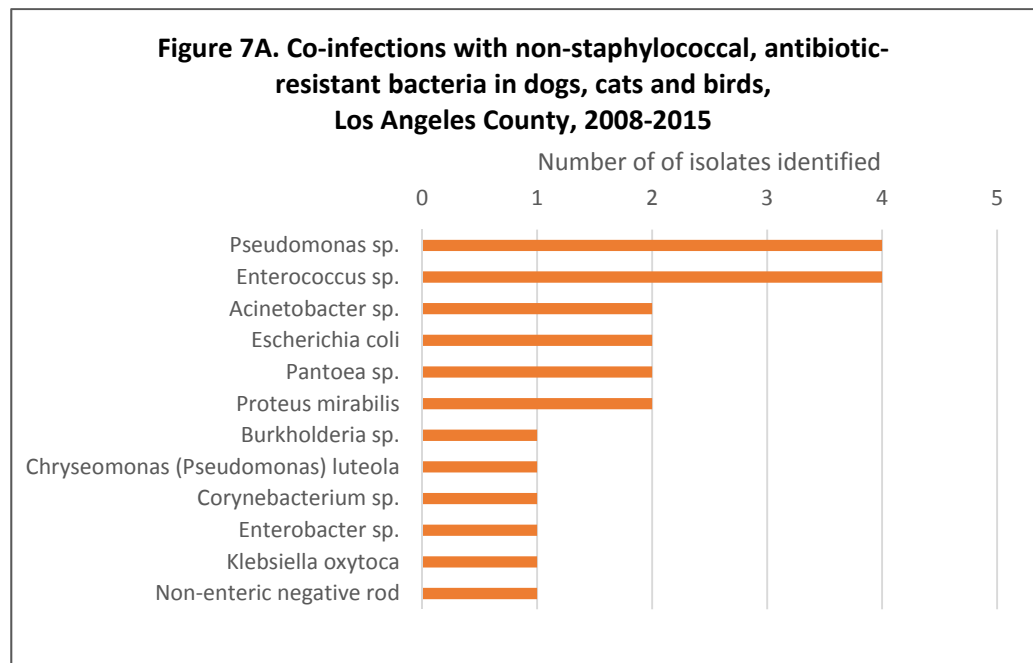
**Table 7. Reported antibiotic-resistant *Staphylococci* and lesion type Los Angeles County, 2008-2015 (n=195)**

Species isolated	Number of isolates	Number (%) methicillin-resistant*	Culture Source			
			Dermatitis/abscess	Otitis externa	Urinary tract infections	Post-operative
<i>S. pseudintermedius</i>	130	87 (67%)	99	20	14	7
<i>S. schleiferi</i>	27	16 (59%)	21	7	2	1
<i>S. aureus</i>	20	10 (50%)	14	1	2	2
Unspecified	15	8 (53%)	12	2	2	1
Other**	3	3 (100%)	2	1	0	0
<b>Total</b>	<b>195</b>	<b>124 (64%)</b>	<b>148</b>	<b>31</b>	<b>20</b>	<b>11</b>

\* Based on resistance to oxacillin  
 \*\* Other includes: *S. haemolyticus*, *S. saprophyticus*, *S. sciuri*

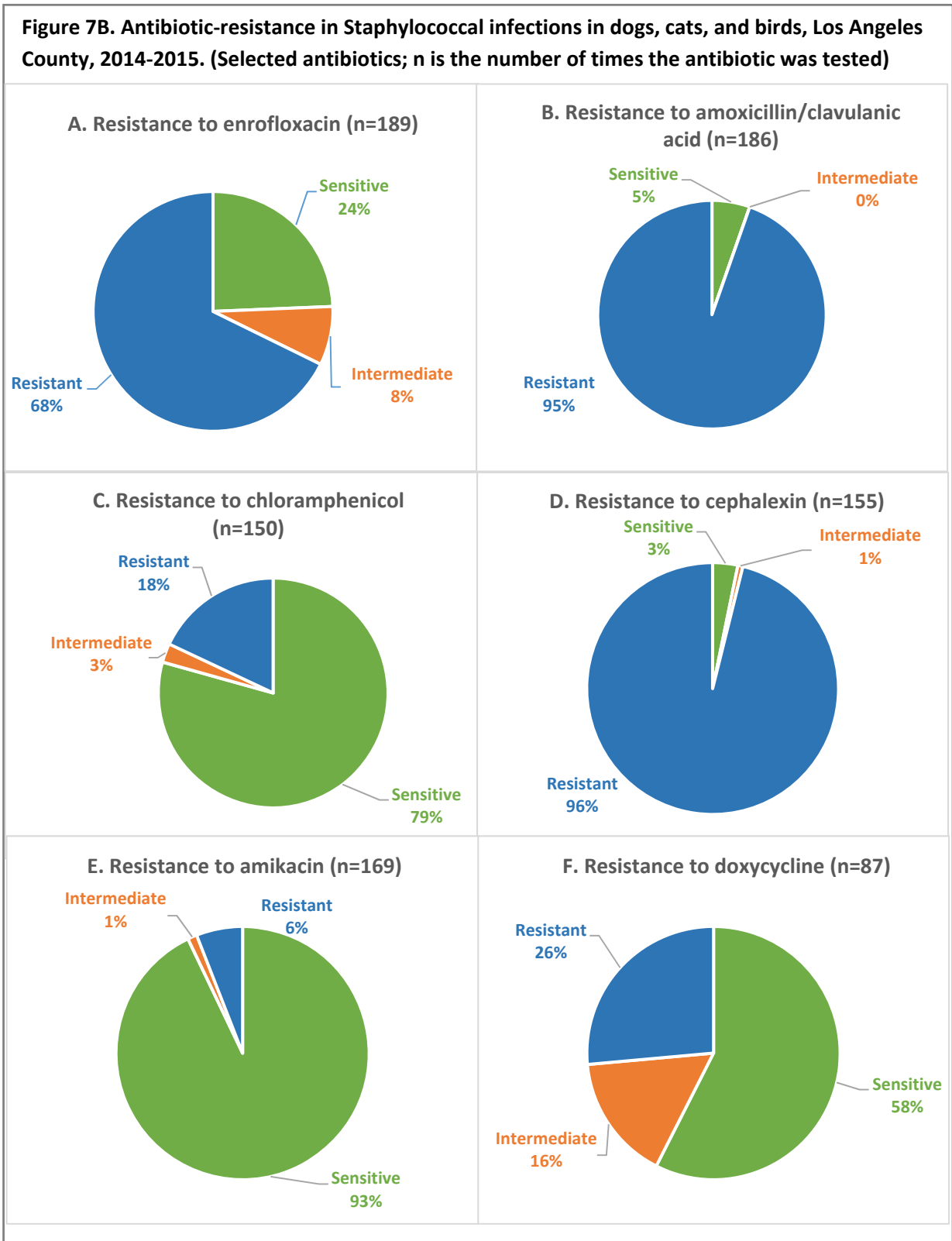
### Co-infections with non-staphylococcal bacteria

- The most common resistant bacteria reported as co-infection included: *Pseudomonas* sp. and *Enterococcus* sp., each with 4 isolates (Figure 7A).



**Antibiotic-resistance patterns**

- Staphylococcal resistance to antibiotics commonly used in veterinary practice were variable (Figure 7B).



### Human exposure to infections in animals

- Veterinarians reported three cases in which animal owners faced concerns about possible human infection with antibiotic-resistant bacteria from their pets.
  - One owner was diagnosed with MRSA and subsequent testing of the dog also revealed MRSA.
  - One dog owner was under treatment for cancer. The dog was diagnosed with methicillin-resistant *Staphylococcus pseudintermedius*. Due to reduced immunity associated with chemotherapy, this owner may be at an increased risk of antibiotic-resistant bacterial infection.
  - Another report indicated that the dog owner had previously been diagnosed with MRSA; the dog was found to harbor resistant *Staphylococcus pseudintermedius* and *Staphylococcus schleiferi*. However, both isolates were sensitive to methicillin.

### Limitations

These data only account for the limited number of reports received by VPH and may not be an accurate representation of antibiotic-resistant staphylococcal infections in animals of LA County. Veterinarians may not be able to sample all bacterial infections for culture and antibiotic sensitivity analysis. Veterinarians may fail to report all cases of antibiotic resistance to VPH or may only report severe, extreme or recurring cases. Many reports come from veterinary dermatologists, which may over-estimate cases of dermatitis from resistant bacteria. Antibiotic sensitivity tests at veterinary laboratories may not always test for the same antibiotics; therefore, the number of times each antibiotic is assessed is different (see sample sizes in Figure 7B).

The relationships between antibiotic-resistant infections in humans and animals remain unclear. Veterinarians do not typically ask medical history of animal owners and it is therefore difficult to link cases in pets to health backgrounds of owners.

Some isolates may reflect environmental flora rather than a true disease-causing organism.

### Implications and recommendations

- Antibiotic-resistant staphylococcal infections are detected in small animal veterinary clinics of LA County.
- The most commonly isolated resistant bacteria seen in veterinary clinics is *Staphylococcus pseudintermedius*, which is commonly harbored by dogs and cats.
- Antibiotic-resistant bacteria can cause severe opportunistic infections if they enter a wound in humans or animals with depressed immune systems.
- Treating bacterial infections without first performing culture and sensitivity testing may promote more resistant bacteria in the environment.
- Veterinarians should perform bacterial culture and antibiotic sensitivity testing as much as possible prior to administering antibiotics to pets. Several guidelines are available:
  - Judicious uses of antimicrobials <sup>48,49</sup>
  - Antimicrobial use guidelines for treatment of urinary tract infections (UTIs) <sup>50</sup>

- Pet owners should be educated about antimicrobial-resistant bacteria.
  - Owners may become colonized by MRSA during visits to human healthcare settings and temporarily infect their pets.
  - Owners with a history of surgery, open wounds or immune-suppressive conditions should prevent infection with resistant organisms by exercising proper hygiene around their pets (e.g. frequent handwashing, avoid licks to the face, hands or wounds).

**For More Information:** [publichealth.lacounty.gov/vet/AMR.htm](http://publichealth.lacounty.gov/vet/AMR.htm).

## 8. Imported Pets and Public Health

### Background and Significance

In recent years, the pet trade has increased both locally and globally. Between 2002 and 2005, the number of puppies being imported into the United States tripled. In California, the majority of puppy imports occur in LA County.

There are numerous documented animal welfare issues related to some international pet traders, including poor sanitation and lack of immunization of the animals.<sup>51, 52</sup> Imported animals may pose a significant disease risk to LA County, as evidenced by the importation of two separate rabid pets while they were visibly sick. In 1987 a rabid cat was imported from Mexico and in 2004 a rabid dog was imported from Thailand (see p.13).<sup>7</sup> Other animals imported into the United States have been diagnosed with Monkey Pox, leishmaniasis, screwworm infestations, canine distemper and canine parvovirus.<sup>7, 53, 54</sup>



The Centers for Disease Control and Prevention (CDC) is the federal agency in charge of regulating imported dogs and cats.<sup>7</sup> Since 2013, CDC regulations state that imported dogs from countries listed as “non-rabies free” were required to be vaccinated for rabies no earlier than 3 months of age, and could legally enter the United States one month after the rabies vaccination was given. Therefore, in 2013, the minimum age at which a dog could legally enter the United States from a country where rabies was present was 4 months.<sup>55</sup> Dogs that arrived from rabies endemic (i.e. non-“rabies free”) countries without being vaccinated against rabies were required to be confined at the importer’s address until one month after the rabies vaccine was given, with the importer signing a confinement agreement. Pets taken out of the United States were subject upon return to the same regulations as those entering for the first time.

On August 11, 2014, the CDC published new guidance regarding the importation of dogs. It reaffirmed the requirements that all imported dogs, including puppies and service animals, must be healthy on arrival and vaccinated for rabies at least 30 days prior to their arrival into the United States; the earliest legal age of rabies vaccination is 3 months. The new guidance also reaffirmed that dogs from countries considered to be “rabies-free” by the CDC may be imported without proof of rabies vaccine if the dog lived in that country for at least 6 months prior to importation; however, the CDC may deny any dog entry into the United States if it does not meet these requirements. Confinement agreements for unvaccinated imported dogs may still be issued but only if specific requirements are met.

For more information visit: <http://www.cdc.gov/importation/bringing-an-animal-into-the-united-states/dogs.html>

For pet cats, neither a general health certificate nor rabies vaccination is required by the CDC for entry into the United States, although some airlines or states may have different requirements. However, cats may still

be subject to inspection. If a cat appears to be ill, further examination by a licensed veterinarian at the owner's expense may be required at the port of entry.<sup>56</sup>

Note that federal pet importation regulations may change over time. Updated recommendations may be available on websites of the CDC and United States Department of Agriculture Animal and Plant Health Inspection Service (USDA APHIS). For more information visit: [aphis.usda.gov/aphis/pet-travel/](http://aphis.usda.gov/aphis/pet-travel/)

During the past several years, VPH has assisted the CDC with inspections of selected shipments of dogs at Los Angeles International Airport (LAX) to verify the health status of animals and their ages. VPH compares the physical age of the animal with the age stated on the accompanying paperwork and also enforces local dog importation quarantines within LA County. Not all shipments could be inspected, so larger shipments were prioritized.

### Data Sources

In 2011, VPH and CDC worked with airlines at LAX to create an Advance Notification System for dog imports. Airlines at LAX notify both agencies in advance when a dog is imported. VPH performs live inspections of selected dog shipments, and maintains a database that contains relevant data, including:

- Advance Notifications received from airlines
- Live animal inspections performed by VPH staff
- Information on animals under federal importation quarantines in LA County

### Findings

#### Totals - Advanced Notifications on imported dogs between 2014 and 2015:

- 1,185 Advance Notifications were received from 32 airlines. This was a notable decrease compared to 763 Advance Notifications received in 2013 alone.
  - An average of 50 dog shipments were reported each month. This was lower than the 100 dog shipments per month reported in 2013.
  - Dogs were imported from 24 different countries. This was a decrease from the importations from 44 countries seen in 2013.
  - 63% of dog shipments originated from rabies-endemic countries. The most common rabies-endemic regions of origin were East Asia, Eastern Europe and South America.
  - 19 shipments of dogs were inspected by VPH staff
    - In 2015, VPH issued one Health Order for a shipment of two dogs, requiring the importer to seek immediate veterinary care. One dog was dead upon arrival into LAX and the other dog was dehydrated and having trouble breathing.
    - In 2015, two dogs arrived dead at LAX and both tested negative for rabies.
    - Some puppies arriving through LAX had **fraudulent paperwork** falsely stating the dogs were 4 months of age when they were found to be much younger on examination. This is presumably done to avoid mandatory federal quarantine and confinement laws.
  - Over 400 shipments were not inspected because they arrived after regular work hours or on the weekends. A total of 66% of these after-hours shipments were from rabies-endemic countries.
  - 76% of all shipments listed a California-based consignee (i.e. importer).
  - French Bulldogs continued to be one of the most popular imported breeds.

## Limitations

The Advance Notification System relies on airlines to report upcoming dog importation shipments to VPH and the CDC. Airlines might not report all imported dogs. VPH does not have access to a master list of all dog shipments; therefore, the total number of dogs imported through LAX is not known.

VPH only collects importation data on dogs coming from other countries through LAX. Dogs coming through neighboring international airports and then driven to LA County are not tracked by the program. Animals traveling into LA County from elsewhere within the United States are not tracked and may have originally come from abroad.

The dog's country of origin is typically assumed to be the country where the dog boarded the flight, as additional information about the animal's origin is usually not available. Prior to the flight, dogs may have travelled from another country that may or may not be considered "rabies-free" by the CDC.

Targeting larger, multiple-dog shipments for inspection may lead to underrepresentation of health issues related to shipments of single animals.

Diagnostic workups are not required for imported animals that are ill; many diseases may be missed by a brief physical exam.

## Implications and Recommendations

- Collaborative outreach to airlines at LAX by VPH and the CDC has helped to maintain the number of Advance Notifications received by both agencies.
- Many of the puppies that are imported in LA County come from rabies-endemic countries.
- Some frequent importers have websites that advertise the puppies as being bred domestically. As a result, new owners purchasing these dogs may not know that their new puppy is from abroad.
- Pet owners and veterinarians should inquire about the origin of puppies. If the owner of a new puppy did not see the dog's parents, it could be imported.
- Veterinarians should ask pet owners for copies of any paperwork associated with puppies, check the teeth to verify the age of puppies, and match the description of a dog to any available paperwork. If the paperwork seems questionable, veterinarians should consider giving vaccine boosters.
- If the puppy is sick, veterinarians should consider foreign animal diseases, including rabies. Suspected rabies or any other infectious disease in an imported animal must be reported to VPH immediately.
- Dog owners should pick up and discard feces immediately, not let the puppy mingle with other animals until it is confirmed to be healthy and fully vaccinated, and always wash their hands after handling their puppy or any other animal.
- Pets coming from Mexico by land may be missed and a federal or local inspector should be tasked with examining dogs arriving at California's border with Mexico.

**For More Information:** [publichealth.lacounty.gov/vet/PetImport.htm](http://publichealth.lacounty.gov/vet/PetImport.htm)

## 9. Animal Syndromic Surveillance

### Background and Significance

Syndromic surveillance involves the collection of reports of illness based on the presenting clinical syndrome rather than on confirmed diagnoses.<sup>15</sup> The goal of syndromic surveillance is to collect information on disease clusters that could be indicative of an emerging disease or terrorism threat, before having a specific confirmed diagnosis. Diagnosis might not be possible in some cases - testing may not always be available for animals, or may be declined for budgetary reasons by pet owners and shelters. Similar to humans, animals are likely to be vulnerable to weaponized bioterrorism agents and animal cases may serve as warnings or sentinels. In some cases, animals may become ill before humans do, or may be exposed to an infectious agent more intensively, due to ingestion via grooming, and because of lack of daily bathing.

In addition to uncovering bioterrorism threats, syndromic surveillance at animal shelters can also be used to better assess general trends in syndromes, such as clusters of respiratory disease. The syndromes that are typically monitored include: gastrointestinal (GI), respiratory (R), neurological (N), dermatological (D), and febrile (F) cases.

### Data Sources

The Los Angeles County Department of Public Health (DPH) has been collecting human syndromic surveillance from emergency department data and other sources in an effort to capture potential infectious disease outbreaks or bioterrorist events. Using DPH's human syndromic surveillance as a template, in 2008 VPH began developing a system to monitor syndromes in animals residing at local animal shelters as a marker of the general health of companion animals in the surrounding geographical regions.

Seven animal shelters contributed syndromic data. Each case was counted only on the first day that symptoms were documented in the animal. Syndromic surveillance data were captured by each shelter's software database, and manually extracted by VPH staff. Daily shelter animal census data were provided to VPH by the shelters electronically or by fax.

### Findings

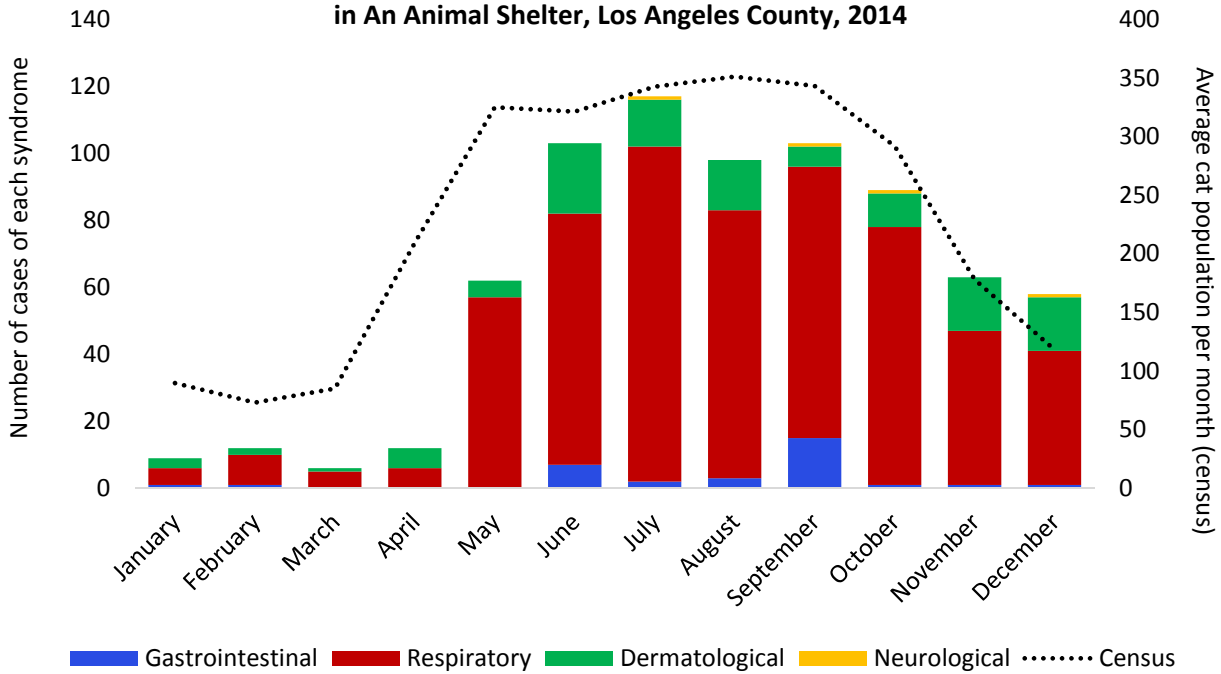
No clear evidence of a novel emerging disease threat was documented while syndromic surveillance was in effect between 2008 and 2015. However, the data had distinct patterns showing seasonal shifts in disease syndromes, as well as a connection between shelter population and disease. A subset of data from one shelter in 2014 illustrates an example of syndrome patterns in the participating shelters.

- In cats, counts of respiratory syndromes were far more common than the other syndromes. Figure 9A shows syndromic surveillance in cats from one shelter in 2014.
  - There was a distinct seasonal fluctuation in the number of cats in the shelter (i.e. the cat census). The shelter had an average of 350 cats during the summer and fall; this number declined to around 100 cats by the end of the year.
  - As the number of cats in the shelter increased, there was a corresponding increase in the number of respiratory cases. Specifically, the total number of respiratory cases in July was 20 times that seen in January (100 respiratory cases in July versus 5 respiratory cases in January).

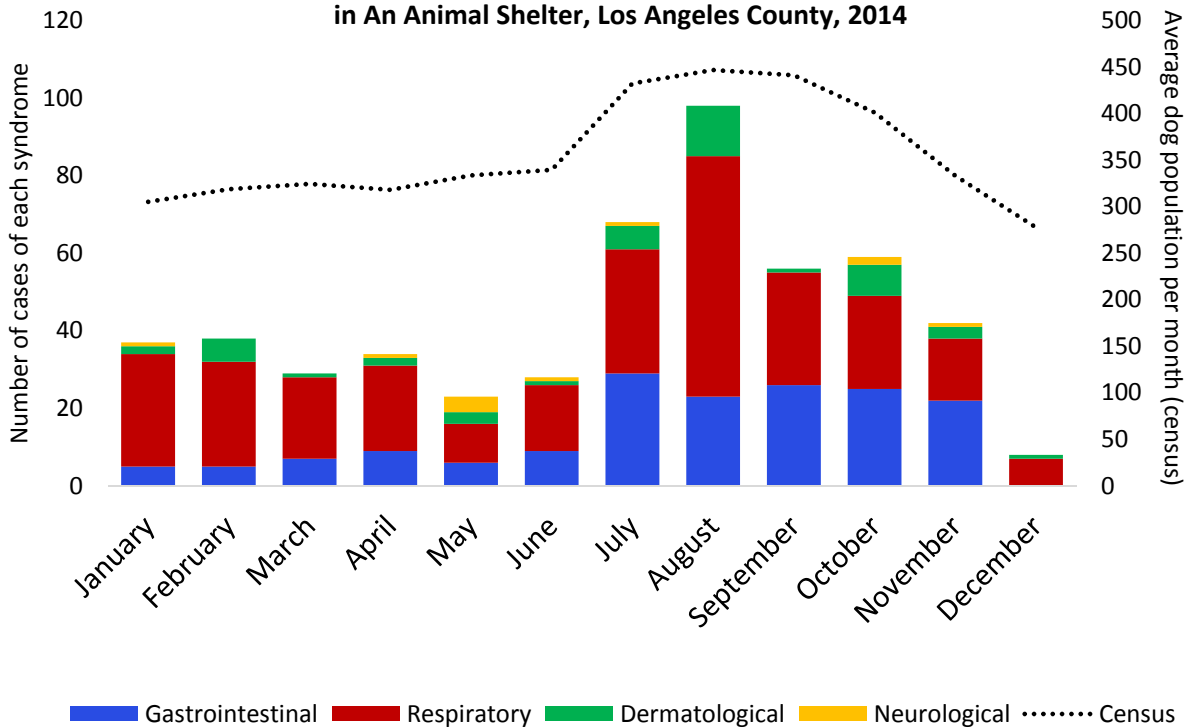


- The increase in respiratory cases in the summer months may have been due to either:
  - An increase in the intake of cats with respiratory disease from the community. In such a case, these data may aid in identifying geographical areas within LA County in need of educational outreach about cat vaccination and other veterinary care. Feline viral rhinotracheitis and calicivirus are two upper respiratory viruses in cats that can be prevented with commonly-used vaccinations. Both diseases can cause fever, sneezing, a runny nose and eyes.
  - Increased transmission within the shelter because of the increased cat population. In this case, the increase in respiratory infections in cats should trigger the shelter to perform heightened vaccination, cleaning and disinfection procedures when the population increases, to help prevent the spread of disease.
  
- In dogs, syndrome data also showed seasonal patterns. Figure 9B shows the canine syndromic surveillance and population data from another shelter in LA County during 2014.
  - The average canine population increased in spring, with peak levels in summer, and then declined in mid-fall. The dog population census averaged about 300 in each month for the first half of the year and dramatically increased to an average of 450 by August, before declining to 300 at the end of the year.
  - Gastrointestinal clusters were more evident in dogs compared to cats, and were more common during the summer months.
  - In August 2014, this shelter had 62 respiratory cases in dogs. It was the busiest time of year for the shelter, with additional syndromes including 13 skin cases and 23 GI cases. Gastrointestinal cases varied between 22-29 total/month during July through November.
  - Canine respiratory clusters were ongoing throughout the year, with a peak respiratory occurrence on one day in mid-August, in which respiratory syndromes caused illness in 2.5% of the 463 dogs present in the shelter.
  - The increase in cases of respiratory and gastrointestinal disease in the summer and autumn months may have been due to either:
    - An increase in the intake of dogs with these syndromes from the community. In such a case, these data may aid in identifying geographical areas within LA County in need of educational outreach about dog vaccination and other veterinary care. *Bordetella bronchiseptica* and parainfluenza are two pathogens that can cause coughing in dogs, and infection with both can be partly prevented with commonly-used vaccinations.
    - Increased transmission within the shelter because of the increased dog population. In this case, the increase in respiratory and gastrointestinal infections in dogs should trigger the shelter to perform heightened vaccination, cleaning and disinfection procedures when the population increases, to help prevent the spread of disease.

**Figure 9A. Syndromic Surveillance Counts in Cats, and Average Cat Population in An Animal Shelter, Los Angeles County, 2014**



**Figure 9B. Syndromic Surveillance Counts in Dogs, and Average Dog Population in An Animal Shelter, Los Angeles County, 2014**



## **Limitations**

Underreporting of syndromes may occur. Animals with very mild clinical signs may not be examined and therefore may not be counted. When data are collected, the primary presenting complaint (i.e. gastrointestinal, respiratory, neurological, dermatological, or febrile syndrome) is captured; if two or more syndromes are present in the animals, only one syndrome is counted. It is unclear whether the data more strongly reflect infections transmitted within shelters or infections originating in the surrounding community. Weaponized biological agents may cause either common or atypical clinical signs, therefore it is unclear how quickly a biological attack could be distinguished from more common disease outbreaks.

## **Implications and Recommendations**

- Animal syndromic surveillance may help detect clusters of syndromes, which may lead to further investigation for potential detection of emerging threats and/or infectious disease outbreaks in animals.
- Timely collection and analysis of syndromic surveillance data is key for triggering investigations into potential bioterrorism or emerging disease threats.
- Syndromic surveillance may help track the incidence of vaccine-preventable diseases in a community, and therefore may help guide targeted community outreach.
- Frequent in-person and virtual communication between VPH staff and shelter staff increase the likelihood that outbreaks, die-offs or unusual diseases will be detected and investigated in a timely manner.

## 10. Other Diseases, Studies and Investigations

### 2005 – 2015 Canine influenza



Canine influenza is a highly contagious respiratory infection in dogs caused by an influenza virus. There are two strains: H3N8 and H3N2. Both strains cause fever, coughing, sneezing, nasal discharge, and occasionally pneumonia and death. To date, neither strain has been known to be transmissible to humans. Infected dogs transmit the virus through coughing and sneezing. Other dogs become infected by breathing in aerosolized droplets from the infected dog, through direct contact, or through contact with contaminated surfaces. The virus is shed by infected dogs for 2-4 days before the start of symptoms, and for 4-26 days after. The disease is diagnosed either by finding evidence of the virus in the throat or nasal cavities early in the disease (PCR testing) or by detecting increasing antibody levels against the virus in the blood (serologic testing). As of 2015, there are vaccines available to help protect dogs from getting sick with both viruses.<sup>57,58</sup>

In 2004, the very first strain of influenza shown to spread in dogs was reported - canine influenza H3N8. It was first discovered in Florida, after it jumped species from horses to dogs, possibly through the practice of feeding raw horse meat to racing dogs.<sup>59</sup> The virus has not been reported to cause illness in people or cats. Canine influenza H3N8 was first reported in dogs in LA County in 2005.

In 2006, the second strain of influenza shown to spread between dogs was reported – canine influenza H3N2. It was first discovered in South Korea in 2006, where it likely emerged through the direct transfer of an avian virus into dogs. Canine influenza H3N2 first appeared in dogs in the United States in 2015, in the Chicago area, where it caused a large outbreak. The canine influenza H3N2 virus is able to infect cats, although cases appear to be relatively rare. Infected dogs shed the virus for two days before the start of symptoms, and occasionally for up to 26 days after onset of symptoms.<sup>58</sup> The virus was first reported in a dog in LA County in 2015.

#### *2005-2011 Canine influenza H3N8 cases in LA County*

- In 2011, our emaciated puppies in the South Bay area were turned in to a local animal shelter where they were vaccinated with multiple vaccines, including the canine influenza H3N8 vaccine. They were then transferred to a veterinary practice and developed slight fevers and a mild cough a week after the move. Conjunctival and pharyngeal swabs were collected from the puppies on the day the coughing began, and tested positive for canine influenza H3N8 by PCR testing. A consultation with the vaccine manufacturer suggested the test was not a false positive, despite earlier vaccination. Illness was mild and recovery was seen within days. There was no indication of a larger outbreak at the clinic or shelter. While vaccination against canine influenza H3N8 did not completely prevent infection in these dogs, it may have lessened the severity of the disease and helped the animals recover more rapidly.

- In 2007, a San Gabriel Valley veterinary practice reported a cluster of cases in the dog boarding section of their facility. Approximately 40 dogs became ill over 3 weeks. Multiple cases were confirmed by serologic testing. Most of the dogs were mildly sick, although four dogs suffered from pneumonia. This outbreak may have been triggered after a puppy with pneumonia was imported from Colorado.
- In 2005, a veterinarian in Inglewood confirmed four cases of canine influenza H3N8 by serologic testing in dogs that had been at a boarding facility in which one died from pneumonia. Extensive surveillance was then performed by VPH to identify more cases for six months afterwards. A total of 129 suspected cases were reported during this time. VPH arranged testing on 126 of these cases, primarily by serologic testing, some by PCR, and virus isolation; all were negative.

#### *2015 - Canine influenza H3N2 case in LA County*

- In early July 2015, an adult Labrador mix dog in southern LA County was diagnosed with canine influenza H3N2 infection. The dog began coughing on June 30, but had no fever or nasal discharge. H3N2 canine influenza was diagnosed by PCR testing on swabs of the throat and of the conjunctiva (tissue under the eyelids). The dog was treated with antibiotics for potential secondary bacterial infection and recovered. No other cases were reported, and there was no evidence of a larger outbreak. The dog stayed in a kennel for about a week, and began coughing the day after it arrived home. It did not visit any other dog parks or other facilities while it was ill. The dog stayed isolated at home for three weeks after the illness. Three other dogs developed coughing or sneezing after visiting the facility around the same time period, but all three tested negative for both canine influenza viruses by PCR testing.

Dog owners can help protect their own dogs by washing their hands after handling other pets, by keeping their dog away from public areas, by consulting a veterinarian when their dog is sick, and by keeping their dog up-to-date on vaccinations recommended by their veterinarian. Veterinarians may or may not recommend vaccination for canine influenza, depending upon whether the virus appears to be active in LA County at the time.

## **2007-2015 Distemper in Raccoons and Other Wildlife**



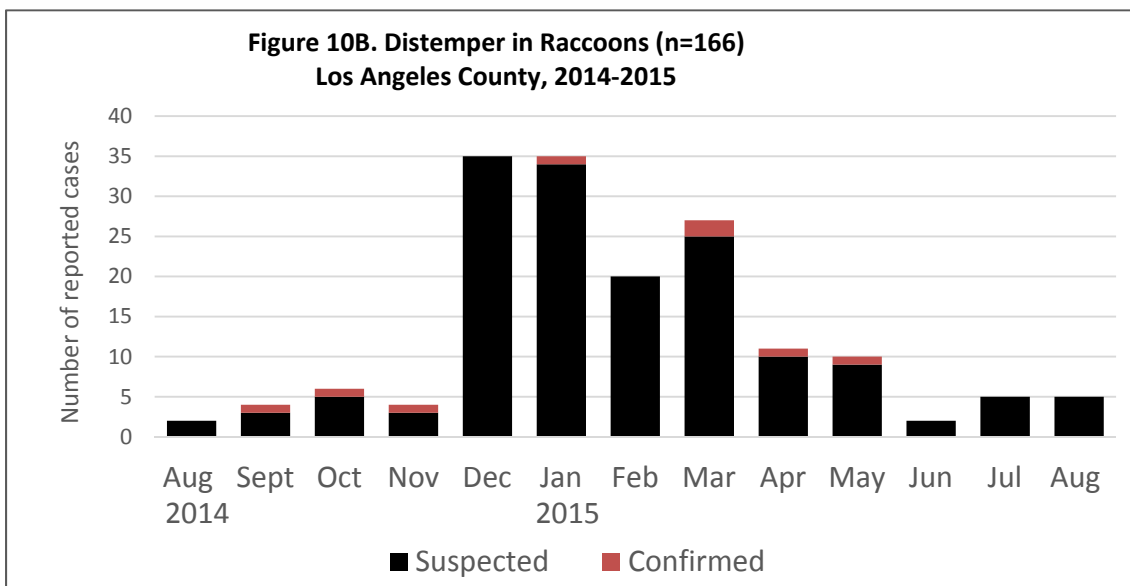
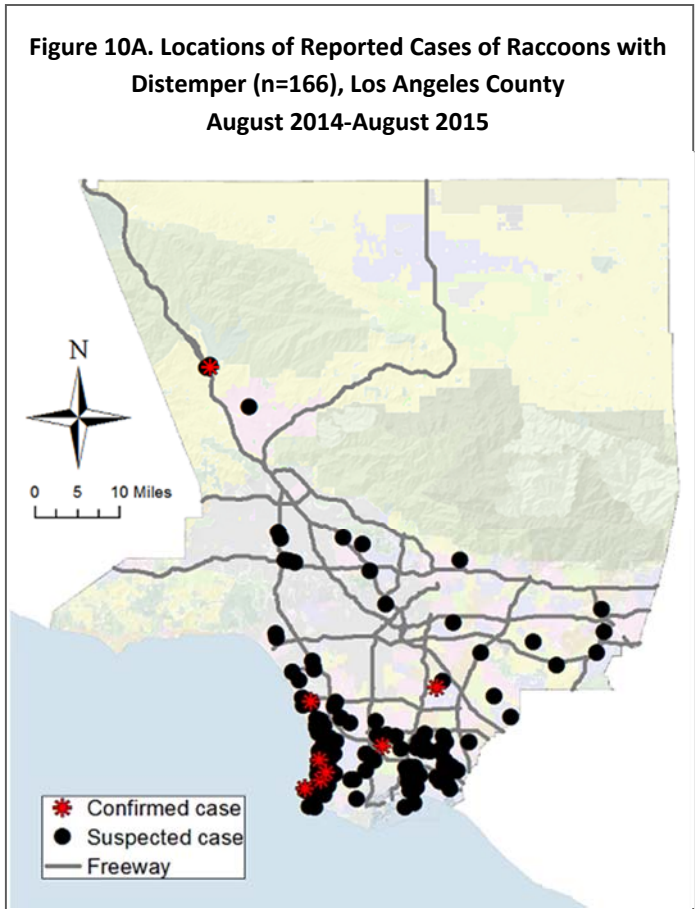
Canine distemper is a highly contagious viral disease that causes a two-phase fever, coughing, nasal and ocular discharges, vomiting and diarrhea. In many cases, neurologic signs such as tremors and seizures also appear. The disease is often fatal in animals. Although this disease does not cause illness in people, it is related to the virus that causes measles. Multiple other species are susceptible to distemper including raccoons, skunks, foxes, ferrets, lions and tigers. Distemper does not cause illness in domestic cats.

Animals infected with distemper can transmit the virus through direct contact with other animals or by contaminating the environment with infectious discharges. Once the virus infects an animal, it spreads throughout the body, suppressing the immune system as well as infecting most body systems. The disease is suspected based on the clinical signs, and confirmed by having either a PCR-positive test on urine or blood, or by having immunohistochemical testing that is positive for the virus in fixed tissues.<sup>60,61</sup>

LA County data show that large outbreaks of distemper occur in local raccoons every few years. The virus can infect other local species, such as skunks, foxes, and dogs.

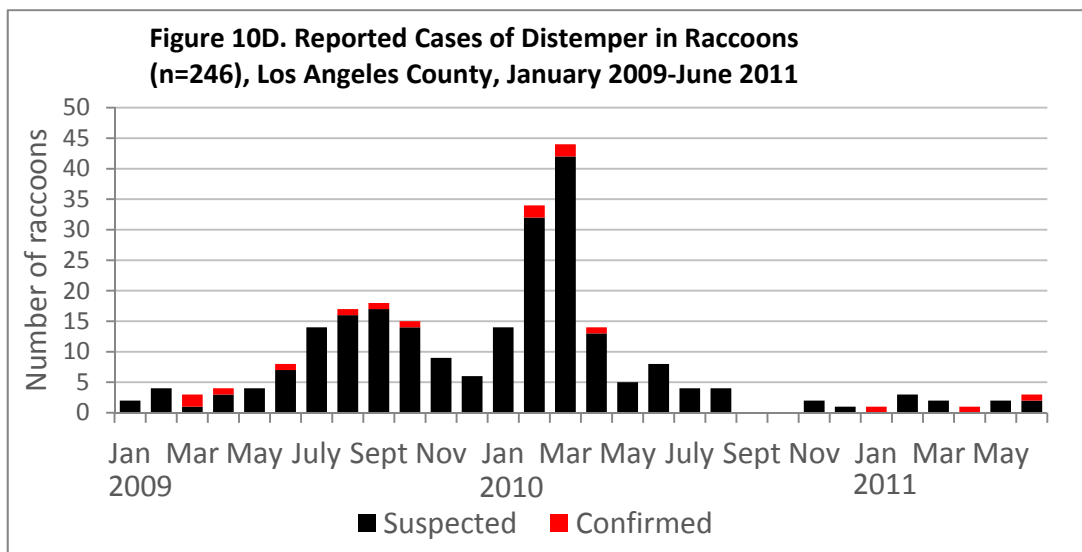
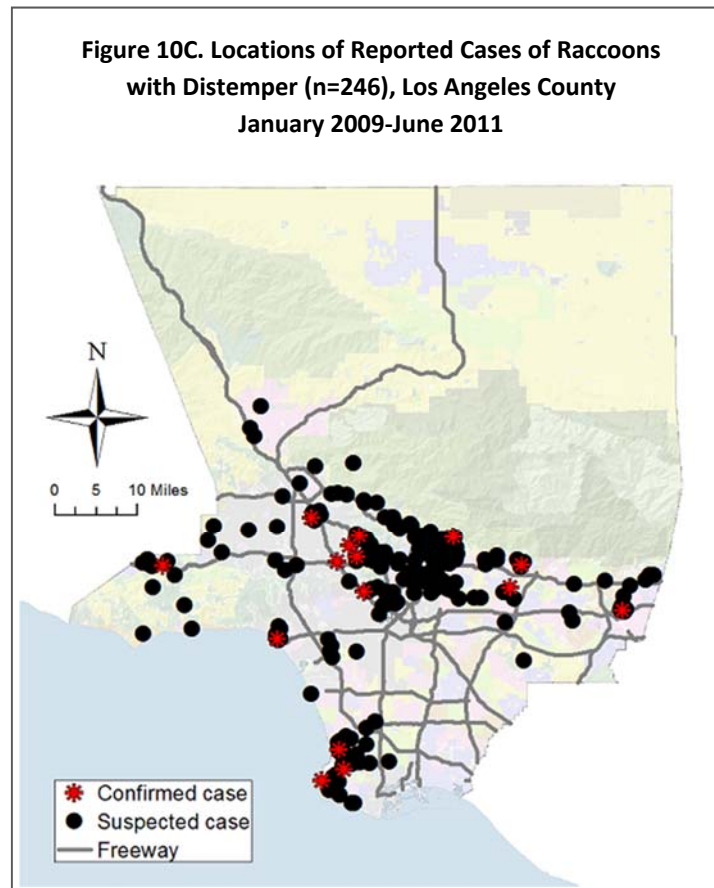
*2014 - 2015 Large outbreak of distemper in raccoons*

- Between August 2014 and August 2015, animal control agencies reported 166 raccoons signs of distemper.
  - 8 cases were confirmed by necropsy.
  - 20 raccoons were tested for rabies – all were negative.
  - 2 skunks with signs of distemper were reported, both were negative for rabies.
  - The initial reports were from the South Bay area. Eventually reports were received from as far north as Castaic (Figure 10A).
  - The outbreak started in the summer, peaked in the winter months, and then subsided by the following summer (Figure 10B).



2009 - 2011 Large outbreak of distemper in raccoons and other wildlife

- Between January 2009 and June 2011, animal control agencies reported 246 raccoons with signs of distemper
  - 15 cases were confirmed by necropsy.
  - 171 raccoons were tested for rabies, and all 17 were negative.
  - Signs of distemper were also reported in 6 coyotes, 6 foxes (one confirmed by necropsy) and 14 skunks (one confirmed by necropsy).
  - 1 coyote, 4 foxes and 3 skunks were also tested for rabies and were negative.
  - The cases clustered in the South Bay and in the areas just north of downtown LA (Figure 10C).
  - The outbreak started in early 2009, with the number of reports peaking in the winter of 2009-2010, before tapering off in 2011 (Figure 10D).



#### 2007 - 2008 Outbreak of distemper in gray foxes in Monrovia

- Between November 2007 and April 2008, Monrovia Animal Control and the Pasadena Humane Society reported 34 gray foxes with clinical signs compatible with distemper, with one case being confirmed by necropsy. The foxes were found along the foothills of the Angeles National Forest. The other 33 gray foxes were considered to have been suspected cases.

#### 2005-2006 Outbreak of distemper raccoons in Glendora

- Between October 2005 and January 2006, Glendora Animal Control reported 18 severely ill raccoons with signs including green oculonasal discharge, diarrhea, dehydration, depression, and lethargy. One case was confirmed as having distemper by necropsy.

Outbreaks of distemper in wildlife serve as a good reminder that wildlife, pets and people may come into close contact and serve as conduits for disease transmission. The public can help reduce the distemper burden in LA County through the following preventive measures: make sure dogs are properly vaccinated against distemper, keep all pet food indoors, keep trash in sealed containers, and never feed wildlife. It is unclear whether dogs or wild animals are the reservoirs for distemper. However, taking preventative measures is essential for protecting animals in the community from this virus.

### 2012-2015 – *Onchocerca lupi* – ocular parasite of dogs, cats, and humans



*Onchocerca lupi* is a worm that can infect the eyes of dogs, cats and humans. It is related to *Onchocerca volvulus*, which causes “river blindness” in humans in Africa, Central and South America.<sup>62</sup> This recently recognized zoonotic parasite can form nodules anywhere in and around the eyes and cause a variety of ocular symptoms.<sup>62</sup> In humans, the parasite is occasionally found in other areas of the body such as the spinal canal.<sup>63,64</sup> Dogs and wild canids are thought to be the reservoirs. It has been reported in the southwestern United States, Europe, and the Middle East. As of 2015, the number of infections reported globally have included 208 dogs, 2 cats, and 23 humans. Cases in the United States have been primarily in southern California, Arizona, New Mexico, Utah, and Texas.<sup>63,64</sup> This parasite has caused sporadic cases of disease in LA County dogs since at least 1991.

The life cycle of the *Onchocerca lupi* is not known, but a recent collaborative investigation by VPH and partners implicated one species of black fly, *Simulium tribulatum*, as a potential local vector.<sup>65</sup> Cases of *Onchocerca lupi* infection in local dogs confirm that the parasite is active in LA County, and that it is possible for more dogs, people or cats to become infected locally. To date, no human or feline cases of *Onchocerca lupi* have been detected in LA County.



### 2015 – Two cases of *Onchocerca lupi* in Dogs

- An 11-year-old Dachshund from the northern areas of the San Fernando Valley had a history of inflammation (uveitis) in both eyes associated with problems with the lenses. The left eye had already been removed earlier. The right eye was removed, and an *Onchocerca lupi* worm was found inside an inflamed mass on the sclera of the eye.
- A 10-year-old Chesapeake Bay Retriever from an area east of Santa Clarita developed a small mass adhered to the sclera of the left eye. Surgical removal revealed that the mass contained an *Onchocerca lupi* worm. The dog had already had another *Onchocerca lupi* worm removed from the right eye five years earlier, in 2010. The other two dogs in the home showed no signs of infection.

### 2012 – One case of *Onchocerca lupi* in a dog

- An 8-year-old Boxer dog in the San Fernando Valley developed an ocular parasite. The animal was seen for severe bilateral corneal ulcers and a 10 millimeter mass on the side of one eye. Surgical removal of the mass ultimately revealed it contained a parasitic worm called *Onchocerca lupi*. The dog had lived in LA County all of its life, confirming that it acquired the infection locally.<sup>65</sup>

### 2006 – One case of *Onchocerca lupi* in a dog

- A 10-year-old, spayed female Labrador Retriever mix from the Hollywood Hills area of Los Angeles developed a mass on the sclera of the left eye that was surgically removed. An *Onchocerca lupi* worm was found inside the mass.<sup>65</sup>

It is unclear how to prevent infection with *Onchocerca lupi*, since the life cycle of the parasite is still not completely known. However, given current knowledge, prevention of black fly bites is advised. Black flies (aka “buffalo gnats”) are very small flying insects that inflict a painful bite. The bite often bleeds after the fly leaves. Black flies prefer to bite in daytime, and they breed in running water. Pets should be kept indoors in daytime to prevent bites in areas where black flies are active. Prevent black fly breeding in fountains by keeping them clean and by turning off the flow of water for 24 hours (i.e. one full day) per week; be sure to keep the water flowing vigorously the other 6 days per week to prevent mosquito breeding.

## 2012-2015 – *Thelazia californiensis*– ocular parasite of dogs, cats, and humans



*Thelazia californiensis* is a worm that can infect the eyes of multiple species, including dogs, cats, and humans. The adult worms typically live under the eyelids, and do not usually invade inside the eye. The worms release larvae into the tears. The larvae are ingested by certain species of non-biting flies when they land on the eyelids to ingest the tears. The worms mature further inside the fly, and are then transmitted to another animal when the fly lands on that animal to ingest tears. Multiple animals, such as dogs, may serve

as definitive hosts. People who spend a large amount of time outdoors, such as transients, may be more vulnerable to exposure. Removal of the worms from under the eyelids is the primary mode of treatment.<sup>66</sup>

- 2015 – A 12-year-old Boxer dog from the southeast area of LA County experienced two months of irritation in the left eye before being presented to a veterinarian. The dog had an ulcer on the surface of the eye. While performing cleaning (debridement) of the edges of the ulcer, the veterinarian found a wiggling worm stuck in the edge of the ulcer, under the ridges. The worm was examined and diagnosed as *Thelazia*. The dog improved.
- 2013 – A 12-year-old Standard Poodle in the West LA area developed irritation and thickening of tissue in the conjunctiva in the left eye. Closer examination revealed numerous wiggling worms under the eyelids. The worms were removed and confirmed as being *Thelazia californiensis*.

People and pets can be protected from this parasite by protecting the eyes from flies, and by covering trash and removing animal feces daily to prevent breeding of flies.

## 2001-2014 Psittacosis in pet birds



Psittacosis is primarily a disease of birds, but humans can also become infected. The disease is caused by the bacterium *Chlamydophila psittaci*. In birds, the disease is known as avian chlamydiosis, psittacosis, or ornithosis. Infections in most birds are usually asymptomatic. However, when stressed, infected birds shed the bacteria in feces and nasal discharges. Some clinical signs in birds are lethargy, weakness, anorexia, and weight loss.<sup>67</sup>

In humans, psittacosis is often called “parrot fever.”<sup>67</sup> More than 70% of human cases occur as a result of exposure to infected caged birds. Infection from other poultry and free-ranging wild birds like pigeons and doves have also been reported.<sup>68</sup> Aerosolized fecal and nasal discharges are the primary source of infection. Other modes of infection are mouth-to-beak contact and handling of infected plumage and tissues. Illness usually occurs 1-4 weeks after exposure to an infected source. Infected people often exhibit flu-like symptoms which could result in severe pneumonia.<sup>67</sup> As is the case with most infectious diseases, people with immune deficiencies are particularly susceptible.

In LA County, cases are reportable both in humans and in birds. All cases reported to the VPH program are investigated, and 45-day quarantines are imposed upon infected birds until they are treated. Psittacosis in both birds and humans is rare, with about 1-4 cases reported per year during most years in LA County. Occasionally larger clusters or outbreaks are reported.

### 2001 to 2014 - Psittacosis in birds in LA County

171 cases of psittacosis in birds reported

- The majority of cases 95% (162 cases) were small pet birds such as parakeets, cockatiels, budgerigars, and rosellas. Only 5% (8 cases) were parrots and two were hawks.
- Numerous cases were a result of interstate trade in pet birds. For example, in 2009, a shipment of 185 birds from LA County to Wisconsin was tested for psittacosis on arrival. More than half (55%) of the birds in the shipment tested positive for the infection.

Physicians should be informed of any contact with birds in an event of a human illness. To prevent infection, people caring for birds should wear gloves and a mask when cleaning and disinfecting bird cages. Consult with a veterinarian if your bird becomes sick. Suspected sick birds especially in pet stores should be removed from exhibition to minimize infection.

### 2009-2015 – Histoplasmosis in twelve pets



In the US, most cases of histoplasmosis are found in moist areas of the country, especially in the Mississippi and Ohio River valleys. The disease is considered to be very rare in LA County; however, the infecting fungal organism *Histoplasma capsulatum* is known to be found worldwide. Cases detected in LA County animals confirm that local histoplasmosis infection can occur, despite our generally dry climate.

The fungus grows best in soil enriched by bird or bat manure, and can infect many animal species, including cats, dogs, and humans. Most individuals that are exposed to the fungus do not get sick. Histoplasmosis is acquired by breathing in dust that contains the fungus. Clinical signs include difficulty breathing, fever, weight loss, bone lesions, eye lesions, and disseminated disease.<sup>69</sup>

#### 2009 to 2014 – twelve cases of histoplasmosis in cats and dogs

- **2014 to 2015 - Cluster of 4 cases in cats in one home.** At one household in the San Gabriel Valley, 4 out of 8 cats on one property became ill and died over a three month period; one with confirmed histoplasmosis and the other three suspected. Three of the cats were indoor-only, but were allowed to go out onto a screened-in patio. Two of the cats developed progressive signs of weakness in the hind legs and signs of constipation before developing breathing difficulty, including the confirmed case. The owners reported that a very dense tree had been trimmed in the month in which the first cat died. The tree had been a nesting place for pigeons, and the trimming may have aerosolized dry pigeon feces, allowing fecal dust to be transmitted over the yard and into the screened-in porch.

- 2014 - A cat in the San Gabriel Valley developed watery eyes, sneezing, and progressively severe breathing problems that did not respond to antibiotic treatment. The cat subsequently died and the case was confirmed by necropsy.
- 2009 to 2013 - *Cluster of three cases in cats in one home.* Over four years, 3 cats in one home in southern Los Angeles developed histoplasmosis. All were confirmed – the first and third by necropsy, and the second by urine antigen testing. All were kept primarily indoors, but were allowed outdoors onto a screened-in patio. Two cats became ill in 2009; the first one developed asymmetrical pupils, watery eyes, constipation, then progressively worsening breathing problems and vomiting before dying and the second cat developed very similar signs as the first case, and was treated with anti-fungal medications and recovered. In 2013, a third adult cat developed severe breathing problems, and extensive nodules in the lungs. Cancer was initially suspected because of the cat’s advanced age. The cat was euthanized. A site visit and inspection in 2009 revealed no bird or bat roosts on the property. The owners reported that a nearby tree had been extensively trimmed in 2009 in the month before the first two cats became ill. The same tree was trimmed again in 2013 before the second cat became ill. Potentially the trimming aerosolized bird fecal dust infected with the fungus.
- 2011 - A cat on the Palos Verdes peninsula developed fever, breathing problems, an enlarged liver and spleen, swollen lymph nodes, and swellings on the face and toes. The cat was extensively treated for at least six months with anti-fungal medication and showed some improvement despite having severe disease. The case was confirmed by biopsy.
- 2009 - An adult Golden Retriever in the West LA area developed bloody urine, loss of appetite, breathing problems, swelling of the abdomen (ascites), and then bruising on the underside of the belly. The dog died despite extensive treatment. The case was confirmed by necropsy.
- 2009 - Two cats in the Crescenta Valley area, in two separate households, developed rapid weight loss, severe breathing problems and eventually died. Both cases confirmed by necropsy.

Risk of exposure to histoplasmosis can be reduced by eliminating pigeon-nesting areas near people or pets, and by excluding bat roosts. Dust should be controlled through wetting with water during activities that may aerosolize soil, dust, or animal feces, to prevent people and animals from breathing it in.

## 2014 – Salmonellosis in a dog at a dog swimming pool

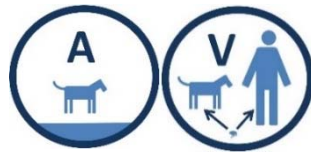


*Salmonella* is a kind of bacteria that can cause intestinal disease in many species, including humans. *Salmonella* infection in dogs can be asymptomatic or cause clinical signs such as diarrhea. *Salmonella* is found in the feces of infected animals and people. Infected animals can contaminate feed, water, and fresh or processed meats.<sup>70</sup>

In 2014, a 1 year old large breed dog residing in the west side of the LA Basin was tested for *Salmonella* after developing diarrhea. The dog initially had tested positive on a Giardia ELISA test, and was treated for giardiasis with fenbendazole for five days. However, when the dog’s diarrhea did not resolve, the veterinarian ordered a PCR test panel for several bacteria and viruses on a fecal sample from the dog. The results were PCR-positive for *Salmonella*. At the time of diagnosis the dog was consuming a raw food diet, including raw ground beef. The dog had been visiting a community swimming pool specifically for dogs. The dog swam in the pool both immediately before and after the diagnosis of salmonellosis. There were no reports of incidents of fecal contamination at the pool, and no other cases of salmonellosis were reported in dogs that had visited the pool. It is unclear where the dog acquired the infection, although the raw hamburger diet was suspected.

For human swimmers, the CDC recommends not swimming if you have diarrhea.<sup>71</sup> In the event of a formed-stool or diarrheal fecal incident, the pool should close until disinfection is complete.<sup>72</sup> Such policies are recommended for pools for dogs as well.

## 2014 – Scaly leg mites, sticktight fleas, and two intestinal parasites in chickens



In 2014, VPH received a report of live chickens being secretly dumped at a property in the western end of the San Fernando Valley. Reportedly over 100 chickens had been dumped at that property over the course of a year. Most of the chickens were bantams, and some were likely fighting cocks. Twenty-five adults and three chicks were dumped all in one night in July 2014, and were then delivered to Los Angeles Animal Services by the property owner.

- Of the 25 adult chickens, 17 had extensive scaling of the feet and legs (see Figures 10E and 10F)
- Multiple birds were missing toes
- At least two chickens had severe infestations of numerous small, tightly-adhered arthropods on the head, with most concentrated around the eyes
- Necropsy of two chickens revealed:

**Figure 10E. Feet of a chicken with Scaly Leg Mite infestation, Los Angeles County, 2014**



- Scaly leg mite acariasis (*Knemidokoptes* sp). This is similar to scabies in dogs and cats, and causes pain, inflammation, and thickening of the skin in birds. Severe cases result in loss of toes.<sup>73</sup>
- Sticktight fleas (*Echidnophaga gallinacea*). These fleas often stay tightly attached to an infested chicken for days or weeks. These fleas will occasionally attach to dogs, cats, rats, and humans.<sup>74,75</sup>
- Two intestinal parasite infections specific to birds: ascarids and *Heterakis* (helminths). These parasites are spread between birds via fecal oral transmission.<sup>76</sup>

**Figure 10F. Feet of a chicken with Scaly Leg Mite infestation, Los Angeles County, 2014**



Control of all four of these parasites in chickens involves extensive and thorough environmental cleaning to remove all dander, flea eggs, and worm eggs, as well as repeated treatment of all animals with appropriate anti-parasitic medications under the care of a veterinarian. In cases of large populations of chickens, treatment may not be possible, and depopulation may be required to stop the outbreak.

## 2010- 2011 – Two clusters of brain infections of *Baylisascaris* in animals



Baylisascariasis is most commonly caused by *Baylisascaris procyonis*, an intestinal roundworm of raccoons. It can infect other species (including humans) when the parasite eggs in raccoon feces are accidentally ingested. The worms often migrate to the brain, causing severe neurological damage. There is no effective blood or fecal test for diagnosing raccoon roundworm infection in people.<sup>77</sup>

In 2011, three ground squirrels with neurological signs were seen on a residential property in the western San Fernando Valley. The squirrels were treated without success at a wildlife rehabilitation facility for one week before being euthanized. Necropsy of one revealed *Baylisascaris* in the brain and the lungs. The resident had been feeding tree squirrels, ground squirrels, and raccoons. A large raccoon latrine (collection of feces) was found on one corner of the property. A few raccoon feces were also seen mixed with bird seed in an area below where the resident had been feeding squirrels. The ground squirrels most likely ingested seed contaminated by raccoon feces. The resident was advised to stop feeding wildlife and to have the raccoon latrine safely removed.

In 2010, thirty-four out of 35 cockatiels in an outdoor aviary in a city on the west side of the LA Basin developed neurological signs over a two-month period. Most died within days to weeks after onset of clinical signs. *Baylisascaris* roundworm larvae were found in the brains of five birds. A raccoon latrine was found on the roof of the aviary. It was suspected that raccoon feces had contaminated the cockatiels' food or water. The case was published in an article in 2012.<sup>78</sup>

Raccoons form latrines in areas where they frequently visit and raccoon roundworm eggs can remain infective in the environment for years.<sup>78</sup> In order to help prevent raccoon latrines and exposure to raccoon roundworms, attractants for raccoons should be removed from yards. Pet food and water should be kept indoors, and trash cans securely sealed. Fallen fruit from fruit trees and any other edible items should be picked up and discarded daily.

## Helpful Resources

### **Overview of Animal Disease Reporting in Los Angeles County**

<http://www.publichealth.lacounty.gov/vet/disintro.htm>

### **Los Angeles County - Priority List of Reportable Animal Diseases**

<http://publichealth.lacounty.gov/vet/docs/2016LACountyAnimalReportableDiseaseList.pdf>

### **Los Angeles County Animal Disease Reporting Forms**

<http://publichealth.lacounty.gov/vet/Forms.htm>

### **Los Angeles County Animal Diseases, Conditions and Data**

<http://www.publichealth.lacounty.gov/vet/AnimalDiseaseList.htm>

### **Consultation with a Los Angeles County Public Health Veterinarian**

All professionals and the public are encouraged to call with questions or a request for a consultation. During working hours (8:00am-5:00pm Monday-Friday), the Veterinarian-On-Duty can be reached at 213-989-7060. Or email us at [vet@ph.lacounty.gov](mailto:vet@ph.lacounty.gov).

### **Los Angeles County Animal Health Alert Network**

The Animal Health Alert Network is an email system that keeps Veterinarians informed about local animal disease problems or outbreaks. Any animal health worker in Los Angeles County can join. Those interested in joining may contact: [vet@ph.lacounty.gov](mailto:vet@ph.lacounty.gov).

### **Articles in *Pulse* Magazine - publication of the Southern California Veterinary Medical Association**

Past articles covered local cases of rabies, canine parvovirus trends, flea-borne typhus (a.k.a murine typhus) in humans, avian influenza, and much more. To learn more about the SCVMA, visit <http://www.scvma.org>.

### **World Health Organization (WHO): Veterinary Public Health**

<http://www.who.int/zoonoses/vph/en/>

### **Centers for Disease Control and Prevention (CDC): One Health**

<http://www.cdc.gov/onehealth/>

### **California Department of Public Health (CDPH): Veterinary Public Health Section**

<https://www.cdph.ca.gov/programs/vphs/Pages/default.aspx>



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## Appendix – Priority List of Reportable Animal Diseases

### REPORTING ANIMAL DISEASES / DEATHS


#### Always report as soon as possible:

- Occurrence of any unusual disease
- Outbreak or cluster (3 or more cases) of animal disease/deaths of any cause
- Animal illness concurrent with human illness
- Disease not endemic to area
- Illness in animal recently imported from another country





















































#### Urgency Reporting Requirements

 = Report **immediately** by telephone

 = Report within **1 working day** of identification

 = Report within **7 calendar days** from time of identification

### DISEASE PRIORITY LIST 2016

<ul style="list-style-type: none"> <li> All Diseases on the Reportable Disease List of the California Department of Food and Agriculture (CDFA)</li> <li> Anaplasmosis</li> <li> Anthrax</li> <li> Babesiosis</li> <li> Blastomycosis*</li> <li> Botulism</li> <li> Bovine Spongiform Encephalopathy</li> <li> Brucellosis (any type)</li> <li> <i>Burkholderia pseudomallei</i></li> <li> Calicivirus, feline virulent</li> <li> Campylobacteriosis</li> <li> Chagas Disease</li> <li> Chronic Wasting Disease</li> <li> Coccidioidomycosis</li> <li> Contamination of food product-suspected</li> <li> Cryptococcosis*</li> <li> Distemper</li> <li> Domoic Acid Poisoning</li> <li> Ehrlichiosis</li> <li> Exotic Newcastle Disease</li> <li> Foot-and-Mouth Disease</li> <li> Giardia</li> <li> Glanders</li> <li> Heartworm</li> </ul>	<ul style="list-style-type: none"> <li> Hemorrhagic gastroenteritis (HGE) of dogs</li> <li> Hemorrhagic Fevers, viral (Crimean-Congo, Ebola, Lassa, Marburg)</li> <li> Histoplasmosis*</li> <li> Influenza (any type)</li> <li> Leptospirosis</li> <li> Listeriosis</li> <li> Lyme Disease</li> <li> Methicillin-resistant <i>Staphylococcus</i> spp</li> <li> <i>Mycobacterium</i> spp</li> <li> <i>Onchocerca lupi</i></li> <li> Parvovirus</li> <li> Panleukopenia</li> <li> Plague</li> <li> Psittacosis</li> <li> Pseudorabies</li> <li> Q Fever</li> <li> Rabies</li> <li> Rocky Mountain Spotted Fever</li> <li> Salmonellosis</li> <li> Salmon Poisoning Disease</li> <li> Screw worm myiasis</li> <li> <i>Streptococcus equi</i> (Strangles)</li> <li> Tetanus</li> <li> Tularemia</li> </ul>	<ul style="list-style-type: none"> <li> Viral Encephalitis (EEE, WEE, VEE, Japanese Encephalitis)</li> <li> West Nile Virus</li> <li> Yersiniosis</li> <li> Unusual disease</li> <li> Outbreak of any disease</li> </ul> <p>In Los Angeles County, report all diseases in this list <b>and the list of the California Department of Food and Agriculture (CDFA)</b> to the Los Angeles County Veterinary Public Health Program.</p> <p>We will forward reports to the CDFA as needed.</p>
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\*Added to list in 2016

NOTE: Ringworm and roundworm are not reportable. **Reporting Forms:**

<http://www.publichealth.lacounty.gov/vet/Forms.htm>

**Phone:** (213) 989-7060 **Email:** [vet@ph.lacounty.gov](mailto:vet@ph.lacounty.gov) **Fax:** (213) 481-2375.

2016



**LIST OF REPORTABLE CONDITIONS FOR ANIMALS AND ANIMAL PRODUCTS\***

\*Pursuant to Section 9101 of the California Food and Agricultural Code, Title 3 California Code of Regulations § 797 and Title 9 Code of Federal Regulations Section 161.4(f)

**WHO MUST REPORT:** Any licensed veterinarian, any person operating a diagnostic laboratory, or any person who has been informed, recognizes or should recognize by virtue of education, experience, or occupation, that any animal or animal product is or may be affected by, or has been exposed to, or may be transmitting or carrying any of the following conditions, must report that information.

**WHAT TO REPORT:** Immediately report any animal disease not known to exist in the United States, any event with increased mortality and/or morbidity of unknown cause or source and any toxicology condition likely to contaminate animals or animal products (meat, milk or eggs). Report any emergency condition or regulatory condition. All monitored diseases should be reported by diagnostic facilities.

**CALL IF YOU SEE:** Vesicles, Unusual or Unexplained Illness, CNS Signs, Mucosal Diseases, Hemorrhagic Septicemias, Larvae in Wounds, Uncommon Ticks, High Morbidity or Mortality. Some diseases are listed under the major species of concern; if you see compatible signs for such conditions in another species, please report!

EMERGENCY CONDITIONS Report within 24 Hours of Discovery	REGULATORY CONDITIONS Report within Two Days of Discovery	MONITORED CONDITIONS Report within 30 Days of Discovery
<p><b>MULTIPLE SPECIES</b></p> <ul style="list-style-type: none"> <li>• Anthrax (<i>Bacillus anthracis</i>)<sup>1</sup></li> <li>• Crimean Congo Haemorrhagic Fever<sup>1</sup></li> <li>• Foot-and-Mouth Disease</li> <li>• Heartwater (<i>Ehrlichia ruminantium</i>)</li> <li>• Japanese Encephalitis</li> <li>• Rabies of livestock<sup>1</sup></li> <li>• Rift Valley Fever</li> <li>• Screwworm Myiasis (<i>Cochliomyia hominivorax</i> or <i>Chrysomya bezziana</i>)</li> <li>• Surra (<i>Trypanosoma evansi</i>)</li> <li>• Vesicular Stomatitis</li> <li>• Livestock exposed to toxic substances</li> <li>• Unexplained high mortality or diseased animals</li> </ul> <p><b>BOVINE</b></p> <ul style="list-style-type: none"> <li>• African Trypanosomiasis (Tsetse fly diseases)</li> <li>• Bovine Babesiosis (Cattle Tick Fever)</li> <li>• Bovine Spongiform Encephalopathy</li> <li>• Contagious Bovine Pleuropneumonia (<i>Mycoplasma mycoides mycoides</i> small colony)</li> <li>• Foot-and-Mouth Disease</li> <li>• Hemorrhagic Septicemia (<i>Pasteurella multocida</i> B/Asian or E/African)</li> <li>• Lumpy Skin Disease</li> <li>• Malignant Catarrhal Fever (African type)</li> <li>• Rinderpest</li> <li>• Schmallenberg Virus/ Akabane</li> <li>• Theileriosis (<i>Theileria parva parva</i> or <i>T. annulata</i>)</li> </ul> <p><b>CAPRINE/OVINE</b></p> <ul style="list-style-type: none"> <li>• Contagious Agalactia (<i>Mycoplasma agalactiae</i>)</li> <li>• Contagious Caprine Pleuropneumonia (<i>Mycoplasma capricolum capripneumoniae</i>)</li> <li>• Foot-and-Mouth Disease</li> <li>• Nairobi Sheep Disease</li> <li>• Peste des Petits Ruminants (Goat Plague)</li> <li>• Schmallenberg Virus/ Akabane</li> <li>• Sheep and Goat Pox</li> </ul> <p><b>PORCINE</b></p> <ul style="list-style-type: none"> <li>• African Swine Fever</li> <li>• Classical Swine Fever</li> <li>• Foot-and-Mouth Disease</li> <li>• Japanese Encephalitis</li> <li>• Nipah Virus</li> <li>• Senecavirus A</li> <li>• Swine Vesicular Disease</li> <li>• Vesicular Exanthema of Swine Virus (VESV)</li> </ul> <p><b>AVIAN SPECIES</b></p> <ul style="list-style-type: none"> <li>• Avian Influenza (H5 or H7)</li> <li>• Exotic Newcastle Disease</li> <li>• Turkey Rhinotracheitis (Avian Metapneumovirus)</li> </ul> <p><b>EQUINE</b></p> <ul style="list-style-type: none"> <li>• African Horse Sickness</li> <li>• Dourine (<i>Trypanosoma equiperdum</i>)</li> <li>• Glanders (Farcy) (<i>Burkholderia mallei</i>)</li> <li>• Hendra Virus (Equine morbillivirus)</li> <li>• Japanese Encephalitis</li> <li>• Melioidosis (<i>Burkholderia pseudomallei</i>)</li> <li>• Venezuelan Equine Encephalomyelitis</li> <li>• Vesicular Stomatitis</li> </ul> <p><b>CERVIDS/LAGOMORPHS/CAMELIDS</b></p> <ul style="list-style-type: none"> <li>• Viral Hemorrhagic Disease of Rabbits (Calicivirus)</li> </ul>	<p><b>MULTIPLE SPECIES</b></p> <ul style="list-style-type: none"> <li>• Brucellosis (<i>B. melitensis</i>, <i>B. abortus</i>, <i>B. suis</i>)<sup>1</sup></li> <li>• Tuberculosis (<i>Mycobacterium bovis</i>)<sup>1</sup></li> <li>• Pseudorabies (Aujeszky's Disease)</li> <li>• Tularemia<sup>1</sup></li> </ul> <p><b>BOVINE</b></p> <ul style="list-style-type: none"> <li>• Bovine Brucellosis (<i>Brucella abortus</i>)<sup>1</sup></li> <li>• Bovine Tuberculosis (<i>Mycobacterium bovis</i>)<sup>1</sup></li> <li>• Trichomonosis (<i>Trichomonas fetus</i>)</li> </ul> <p><b>CAPRINE/OVINE</b></p> <ul style="list-style-type: none"> <li>• Caprine and Ovine Brucellosis<sup>1</sup> (excluding <i>Brucella ovis</i>)</li> <li>• Scrapie</li> <li>• Sheep Scabies (Body Mange) (<i>Psoroptes ovis</i>)</li> </ul> <p><b>PORCINE</b></p> <ul style="list-style-type: none"> <li>• Porcine Brucellosis (<i>Brucella suis</i>)<sup>1</sup></li> <li>• Pseudorabies (Aujeszky's Disease)</li> <li>• Swine Enteric Coronavirus Diseases, excluding Transmissible Gastroenteritis</li> </ul> <p><b>AVIAN SPECIES</b></p> <ul style="list-style-type: none"> <li>• Ornithosis (Psittacosis or avian chlamydiosis) (<i>Chlamydophila psittaci</i>)</li> <li>• Pullorum Disease (Fowl Typhoid) (<i>Salmonella gallinarum</i> and <i>S. pullorum</i>)</li> </ul> <p><b>EQUINE</b></p> <ul style="list-style-type: none"> <li>• Contagious Equine Metritis (<i>Taylorella equigenitalis</i>)</li> <li>• Eastern Equine Encephalomyelitis</li> <li>• Equine Herpesvirus Myeloencephalopathy (EHM)</li> <li>• Equine Infectious Anemia</li> <li>• Epizootic Lymphangitis</li> <li>• Equine Piroplasmosis (<i>Babesia caballi</i> or <i>Theileria equi</i>)</li> <li>• Western Equine Encephalomyelitis</li> <li>• West Nile Virus</li> </ul> <p><b>CERVIDS/LAGOMORPHS/CAMELIDS</b></p> <ul style="list-style-type: none"> <li>• Chronic Wasting Disease in Cervids</li> </ul> <p><b>WHERE TO REPORT:</b></p> <p>CA Department of Food and Agriculture Animal Health Branch (AHB) District Offices:</p> <p><b>Redding 530-225-2140</b> <b>Modesto 209-491-9350</b> <b>Tulare 559-685-3500</b> <b>Ontario 909-947-4462</b></p> <p>CDFA- Animal Health Branch Mailing Address: 1220 N Street Sacramento, CA 95814 Physical Address: 2800 Gateway Oaks Sacramento, CA 95833 Telephone 916-900-5002</p> <p>OR</p> <p>US Department of Agriculture Animal and Plant Health Inspection Services Veterinary Services (VS) 10365 Old Placerville Road, Suite 210 Sacramento, CA 95827-2518 Toll free at 1-877-741-3690</p>	<p><b>MULTIPLE SPECIES</b></p> <ul style="list-style-type: none"> <li>• Bluetongue</li> <li>• Echinococcosis/Hydatidosis (<i>Echinococcus</i> species)</li> <li>• Hemorrhagic Diseases (Bluetongue, Adenovirus, and Epizootic Hemorrhagic disease)</li> <li>• Influenza</li> <li>• Johne's Disease (Paratuberculosis) (<i>Mycobacterium avium paratuberculosis</i>)</li> <li>• Leishmaniasis</li> <li>• Q Fever (<i>Coxiella burnetii</i>)</li> </ul> <p><b>BOVINE</b></p> <ul style="list-style-type: none"> <li>• Anaplasmosis (<i>Anaplasma marginale</i> or <i>A. centrale</i>)</li> <li>• Bovine Genital Campylobacteriosis (<i>Campylobacter fetus venerealis</i>)</li> <li>• Bovine Viral Diarrhea</li> <li>• Enzootic Bovine Leukosis (Bovine leukemia virus)</li> <li>• Infectious Bovine Rhinotracheitis (Bovine herpesvirus-1)</li> <li>• Malignant Catarrhal Fever (North American)</li> <li>• Bovine Cysticercosis (<i>Taenia saginata</i>)</li> </ul> <p><b>CAPRINE/OVINE</b></p> <ul style="list-style-type: none"> <li>• <i>Brucella ovis</i> (Ovine epididymitis)</li> <li>• Caprine Arthritis/Encephalitis</li> <li>• Enzootic abortion of ewes (Ovine chlamydiosis) (<i>Chlamydophila abortus</i>)</li> <li>• Maedi-Visna (Ovine progressive pneumonia)</li> <li>• <i>Salmonella abortusovis</i></li> </ul> <p><b>PORCINE</b></p> <ul style="list-style-type: none"> <li>• Porcine Cysticercosis (<i>Taenia solium</i>)</li> <li>• Porcine Reproductive and Respiratory Syndrome</li> <li>• Swine Erysipelas (<i>Erysipelothrix rhusiopathiae</i>)</li> <li>• Transmissible Gastroenteritis (Coronavirus)</li> <li>• Trichinellosis (<i>Trichinella spiralis</i>)</li> </ul> <p><b>AVIAN SPECIES</b></p> <ul style="list-style-type: none"> <li>• Avian Infectious Bronchitis</li> <li>• Avian Infectious Laryngotracheitis</li> <li>• Duck Viral Hepatitis</li> <li>• Infectious Bursal Disease (Gumboro Disease)</li> <li>• Mycoplasmosis (<i>Mycoplasma synoviae</i> and <i>Mycoplasma gallisepticum</i>)</li> </ul> <p><b>EQUINE</b></p> <ul style="list-style-type: none"> <li>• Equine Rhinopneumonitis (excluding EHM)</li> <li>• Equine Viral Arteritis</li> </ul> <p><b>CERVIDS/LAGOMORPHS/CAMELIDS</b></p> <ul style="list-style-type: none"> <li>• Camelpox in camels</li> <li>• Myxomatosis in rabbits</li> </ul> <p><b>FISH, AMPHIBIAN, CRUSTACEAN, BEE, AND MOLLUSK</b></p> <ul style="list-style-type: none"> <li>• The list is compatible with the OIE list. <a href="http://www.oie.int/en/animal-health-in-the-world/oie-listed-diseases-2015/">http://www.oie.int/en/animal-health-in-the-world/oie-listed-diseases-2015/</a></li> </ul>

<sup>1</sup> Diseases in green, seen in any species, are also reportable to California Department of Public Health





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