Animal Disease Surveillance Report

Los Angeles County 2013 | Veterinary Public Health

County of Los Angeles Public Health

Los Angeles County Veterinary Public Health
Animal Disease Surveillance Report 2013

Los Angeles County Department of Public Health
Cynthia A. Harding, MPH, Interim Director
Jeffrey D. Gunzenhauser, MD, MPH, Interim Health Officer
Robert Kim-Farley, MD, MPH Director, Communicable Disease Control and Prevention

Veterinary Public Health Program
Karen Ehnert, DVM, MPVM, DACVPM, Director, Veterinary Public Health
Jamie Middleton, DVM, MPH, MS, Deputy Director, Veterinary Public Health

Veterinarians
Emily Beeler, DVM, MPH
Michelle Chang, DVM, MPH
Gaël Lamielle, DVM, MPH, DACVPM
Asundep Ntui, DVM, MS, DrPH
Tamerin Scott, DVM, MPH, DACVPM
Alexandra Swanson, DVM

Field and Investigative Staff
Jackaleen Chapman
Cornelious Chisom
Stacy Christianson
Thaddeus de la Cruz
Orlando Mangahis
Mark Rubalcava
Rafael Sepulveda

Administrative Staff
Yulya Ghazaryan
Marlon Chavez
Schannel Strong
Gabriela Trejo

Other contributors
Dennis Davis, DVM
Danielle Tack, DVM, MPVM, DACVPM
Marc Strassburg, DrPH

Veterinary Public Health Program, Los Angeles County Department of Public Health
313 N. Figueroa St, Rm 1127, Los Angeles, CA 90012
Tel: 213-989-7060, Fax: 213-481-2375
vet@ph.lacounty.gov,
www.publichealth.lacounty.gov/vet

TABLE OF CONTENTS

Message from the Director..... 5

Background

1. About Veterinary Public Health.....7
2. Abbreviations, Definitions and Technical Notes..... 8
3. Surveillance Methods.....10

2013 Data Highlights for LA County.....11

Diseases in Detail

1. Rabies.....13
2. Heartworm.....18
3. Leptospirosis 22
4. Parvovirus in Dogs.....26
5. Valley Fever (Coccidioidomycosis)..... 31
6. West Nile Virus (WNV).....35
7. Imported Pets and Public Health.....39
8. Other Diseases, Studies and Investigations 43

Helpful Resources.....50

References..... 51

Appendix

Priority List of Reportable Animal Diseases in Los Angeles County..... 54

Message from the Director

I am pleased to announce the publication of the first "Los Angeles County Veterinary Public Health Animal Disease Surveillance Report." This document is the product of years of data collection and analysis by the Los Angeles (LA) County Department of Public Health (DPH) Veterinary Public Health Program (VPH). It provides the reader with an analysis of the most commonly reported diseases affecting local pets and wildlife in LA County.

The concept that human, animal and environmental health are intricately linked is known as One Health.[1] It is crucial that these interactions be explored when protecting and promoting public health in a changing world. For example, three of every five new infectious diseases affecting humans originate in animals.[2] Therefore, tracking and controlling infections in pets and wildlife can help reduce the risk of certain diseases in humans.

Surveillance of diseases in animals is also vital for understanding the local ecology of diseases that can affect both people and animals. It is estimated that 40% of people in the county have at least one pet.[3] In addition, wildlife such as raccoons, opossums and skunks often live in close proximity to homes leading to increased interactions between wildlife, humans and domestic 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, the Centers for Disease Control and Prevention (CDC)'s Los Angeles Quarantine Station and many others.

This document represents a significant milestone for the integration of 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,

Cynthia A. Harding, MPH
INTERIM DIRECTOR

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.

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

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.[4] 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.[5] VPH re-instituted the legal requirement that local veterinarians report infectious diseases in animals, including pets (companion animals). To further improve disease tracking, VPH created in 2007 a Reportable Disease Priority List for the first time (Appendix).

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. This data informs 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, physicians may find this information useful when considering differential diagnoses and testing for zoonoses in their daily practice.

Pets imported from abroad. Imported animals may carry diseases that can subsequently infect people and other animals in the United States.[6] 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.39). Although the program does not currently participate in the inspection of species other than dogs and cats, VPH works closely with other agencies at LAX to maintain awareness of the number and types of animals being imported into LA County.

2. Abbreviations, Definitions and Technical Notes

Abbreviations

CDC – Centers for Disease Control and Prevention

CDPH – California Department of Public Health

DFA – Direct Fluorescent Antibody

DPH – Los Angeles County Department of Public Health

ELISA – Enzyme-linked immunosorbent assay

LA County – Los Angeles County

LAX – Los Angeles International Airport

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 LA County DPH. Additional data comes 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. A case definition categorizes cases as "confirmed", "probable" or "suspected". 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 most animal diseases described in this report.[7] Exceptions are: rabies, West Nile virus (WNV), and psittacosis. These diseases are also tracked by state and Federal programs, and case definitions already existed.[8-10] Case definitions for diseases tracked by VPH are available at: 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.[11] Examples from this report include rabies and brucellosis.

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 infectious 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 pandemic H1N1 influenza.

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 is reported as raw case counts instead of rates. Because the total number of animals in LA County is unknown, disease rates and percent cannot be accurately calculated.

Under-Reporting and Reporting Delays
Under-reporting is a problem that impedes 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 certain 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 for evaluation. 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 often remain undetected until they are overt or at an advanced stage.

Incidence versus Prevalence
Data in this report consist of new cases reported within the year (related to incidence), as opposed to the total number of cases present at a given time (prevalence).

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 likely locally-acquired.

VPH is the only program consistently tracking companion animal diseases in the country, 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.[12]

The majority of data in this report are derived from *passive surveillance*, which is dependent upon veterinarians reporting specific diseases. Animal health professionals submit case reports of animal diseases, which are then analyzed and summarized by VPH 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 go unreported. Thus, the data in this report describes the minimum amount of disease present locally. VPH occasionally performs active surveillance by conducting surveys; some of which are published elswhere.[13]

Lastly, VPH also engages in animal syndromic surveillance, which is the practice of analyzing data based on syndromes rather than specific diagnoses.[14] Data is collected on a daily basis from participating animal shelters in LA County. Syndromes tracked include animals with any evidence of: febrile, gastrointestinal, dermatologic, respiratory and 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.[14]

Veterinary practices are the eyes and ears of the community when it comes to animal diseases. 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.

In 2014, VPH began receiving reports directly from local diagnostic laboratories when animals test positive for the following diseases: heartworm disease, leptospirosis and coccidioidomycosis. Access to this data will continue to improve the program's ability to track new cases and detect patterns and trends for these three diseases. Results from laboratory reporting of animal diseases will be shared in future surveillance reports.

VPH also provides access to diagnostic testing of animal specimens in certain situations to enhance surveillance. For example, during 2013, the program continued to arrange for free rabies testing of neurologic or biting animals, as well as free WNV testing of dead birds. 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: http://publichealth.lacounty.gov/vet/.

2013 Data Highlights for LA County

Zoonotic Diseases

Rabies

34 Rabid bats detected in 2013.

10 People exposed to confirmed rabid bats.

5 Pets exposed to rabid bats and placed under quarantine.

Heartworm

117 Pets (105 dogs, 12 cats) were reported between 2005 and 2013.*

36% Did not travel outside of Southern California.

74% Were asymptomatic when diagnosed.

Leptospirosis

18 Dogs with leptospirosis were reported between 2005 and 2013.*

44% Likely exposed from wildlife contact in their own yard.

89% Not vaccinated against the disease.

* Excludes cities of Long Beach, Pasadena and Vernon. See page 7 for more information.

2013 Data Highlights for LA County continued from page 11

Sentinel Disease

Valley Fever (Coccidioidomycosis)

28 Pets (26 dogs, 2 cats) reported between 2005 and 2013.*

34% Did not travel outside of LA County.

45% Reported to frequently dig in the soil.

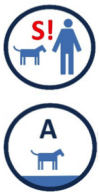
West Nile virus (WNV)

313 Wild birds and 3 tree squirrels positive for WNV.

60% Of total dead birds tested by VPH were positive for WNV.

61% Of WNV-positive birds came from the South Bay area.

Non-Zoonotic Disease



Parvovirus in Dogs

929 Cases of canine parvovirus reported in 2013.

2x Reported parvovirus cases doubled between 2012 and 2013.

19% Of parvovirus cases were in the Antelope Valley in 2013.

Diseases in Detail

1. Rabies

Background and Significance

Rabies is caused by a virus that infects the brain. The disease affects both humans and animals and has one of the highest fatality rates of any known infectious disease.[15] 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 rabies.

In the past 50 years, cases of human rabies in LA County were reported only in persons who had been bitten by rabid animals in other countries (Table 1.A). The last locally-acquired case of rabies in a dog occurred in 1978 from immunization with a live-type rabies vaccine that was discontinued in the 1980's. Prior to that, the last naturally- and locally-acquired case in a dog was in 1966 (Table 1.A). In 1979, the last rabid skunk was detected (Table 1.A). A rabid cat and a rabid dog were imported into LA County in 1987 and 2001, respectively (Table 1.A).

In LA County, cases of rabies in bats have been detected every year since bat testing began in 1961 (Fig.1.A). Insect-eating bats have been the primary reservoir for rabies locally for the past 35 years. 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.[16]

Although the majority of bats in nature are not infected with rabies and bat bites are rare, the risk of rabies exposure must be assumed to exist in all interactions with a bat. In situations where a person or pet is directly exposed to a bat, the bat should be contained and 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.

Other important reservoirs of rabies in the United States include skunks (primarily in northern California and the Midwest), foxes (primarily in Alaska, Arizona, New Mexico, and Texas), and raccoons (primarily the East Coast). In 2007, the United States was declared free of the dog strain of rabies.[17] 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 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 strains becoming established in local wildlife and increasing the risk for rabies. 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 bats throughout the county using these protocols.

Surveillance for rabies in animals is critical to evaluate the risk of the disease for the public as well as animals. Local rabies data support the importance of rabies prevention through vaccination in pets, and helps physicians make decisions on administration of rabies PEP to people bitten by animals.

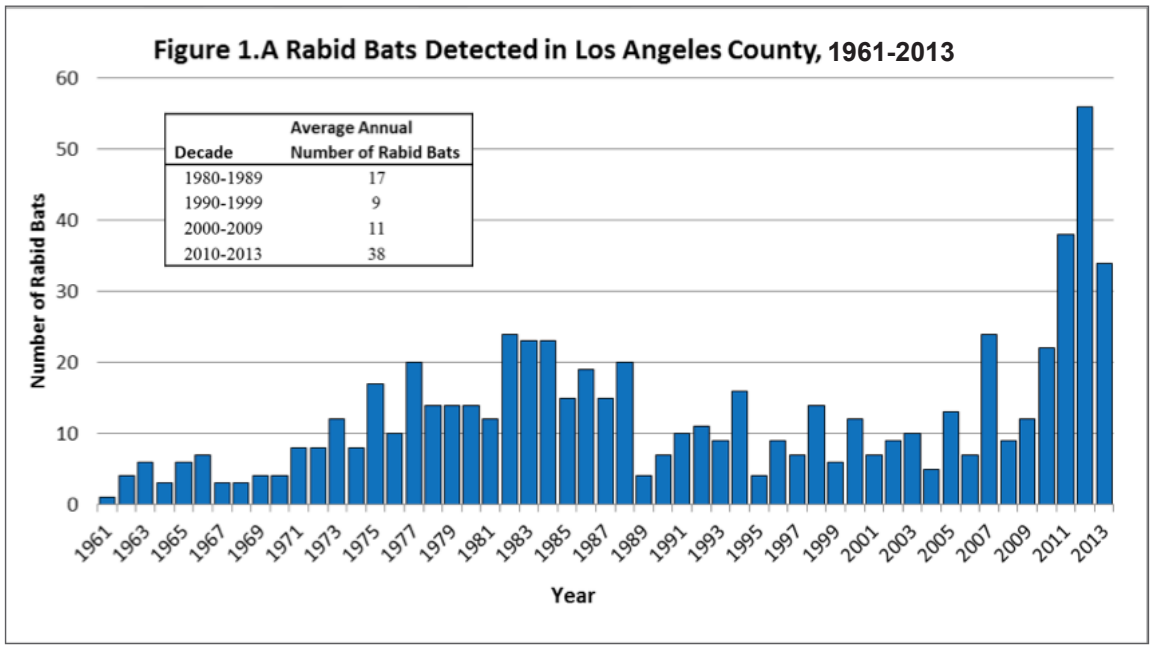
Data Sources

Reports of animal bites and contact with bats are received 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 the Long Beach, Pasadena and Vernon health departments are included in this report.

Findings

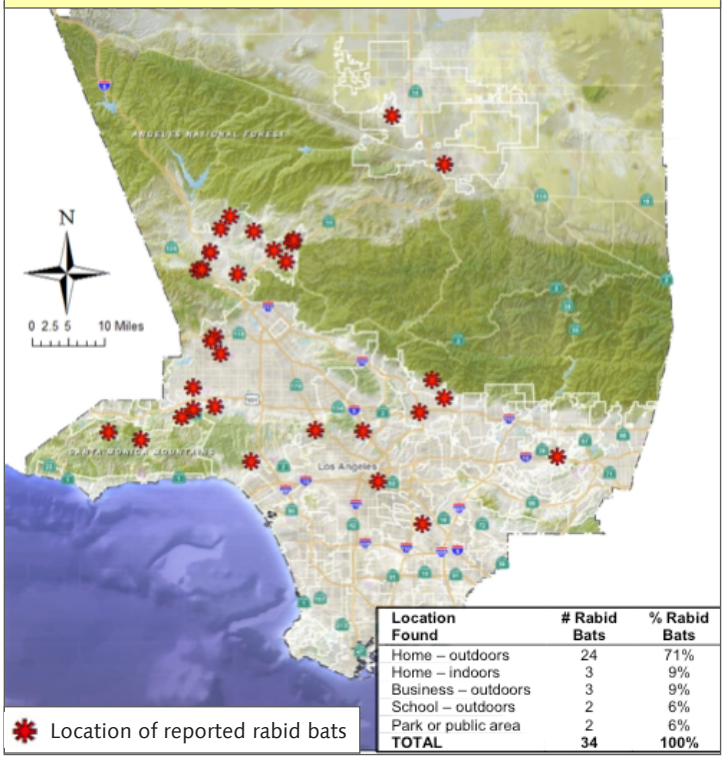
Data Results:

- Rabid Bats
  - 34 rabid bats were detected in LA County in 2013. This includes one bat in Pasadena, (jurisdiction of the Pasadena Department of Public Health).
  - 13% of bats submitted for diagnostic testing were positive for rabies. This is within the expected range of 10-15%.
  - The number of rabid bats in the past four years has been above the historical average. So far in this decade, an average number of 38 rabid bats have been detected per year. This number is higher than the average number in previous decades. The highest annual count of rabid bats ever recorded in LA County occurred in 2012, when 56 rabid bats were detected (Fig.1.A).



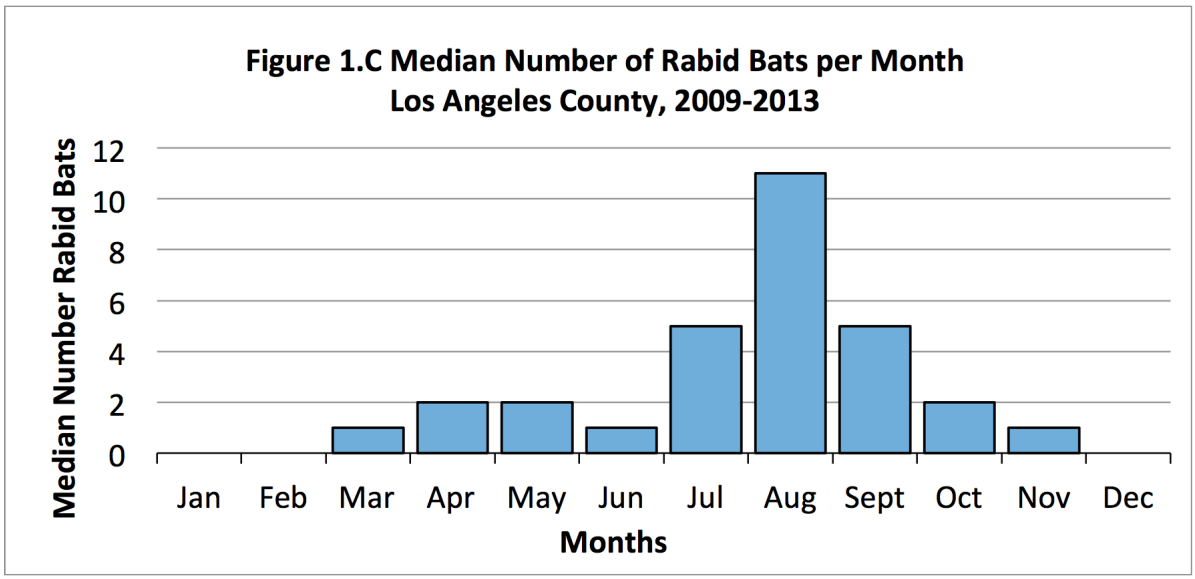
- Exposures
  - In 2013, 10 individuals and 5 pets were exposed, or potentially exposed, to rabid bats.
  - Humans exposed to rabid bats were referred to physicians for rabies PEP. None of the exposed individuals developed rabies.
  - Exposed pets were vaccinated, quarantined at home and observed for 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 Patterns
  - Rabid bats were found throughout LA County, including urban, suburban, and rural settings (Fig 1.B).
  - 14 (41%) of the rabid bats in 2013 were found in the Santa Clarita Valley. The reason for the clustering is unknown.

Figure 1.B Reported Cases of Bat Rabies (N=34), by Location where Found, Los Angeles County, 2013



Location Found	# Rabid Bats	% Rabid Bats
Home – outdoors	24	71%
Home – indoors	3	9%
Business – outdoors	3	9%
School – outdoors	2	6%
Park or public area	2	6%
TOTAL	**34**	**100%**

- Locations types
  - In 2013, 27 (80%) rabid bats were found at private homes.
  - 3 rabid bats were found indoors. Rabid bats found inside homes present an increased risk for people and pets for rabies exposure.
  - 2 rabid bats were found at schools. In both cases, the bats were found outdoors by custodial staff. No children were known to have been near the bats, and no adults reported any bare-handed contact with the bats.
  - NOTE: Figure 1.B shows locations of *reported* rabid bats only.
- Temporal pattern
  - Rabies in bats is seasonal (Fig.1.C). In 2013, most rabid bats were detected in late summer and in autumn, during the times when new young bats are learning to fly.



Limitations:

- Cases of rabies in animals are likely under-counted because:
  - Not all bites from, or encounters with, bats are reported to VPH.
  - Rabies may not always be considered in veterinary clinics because of its rare occurrence in pets in LA County.
  - Bats or other wildlife may escape before they can be tested for the disease.

Table 1. Selected Historical Rabies Cases in LA County

In Humans			
Year	**Age and Sex**	**Probable Virus Source**	**Comments**
2004	22 year old man	Dog bite in El Salvador	Imported case
1975	16 year old girl	Dog bite in Mexico	Imported case
1949	24 year old man	Bite from the patient's dog	Last locally-acquired rabies case in a human
In Companion Animals			
Year	**Species**	**Probable Virus Source**	**Comments**
2004	Dog	Dog bite in Thailand	Imported case. Stray dog rescued in Thailand by an American tourist. Dog flew into LA County, died in Santa Barbara County
1987	Cat	Dog bite in Mexico	Imported case. Stray cat rescued in Acapulco by an American tourist. Cat bitten by a rabid dog
1978	Dog	Live-type rabies vaccine	**Vaccine involved no longer used**. All rabies vaccines changed killed-type for 30+ years
1966	Dog	Local skunk bite	Last locally-acquired naturally-acquired rabies case in a dog

In Wild Animals			
Year	**Species**	**Probable Virus Source**	**Comments**
1979	Skunk	Local skunk bite	Last rabies case in a skunk. Many rabid skunks were diagnosed in the 1950s and 1960s, especially in the Malibu area
1973	Racoon	Skunk or bat	Likely raccoon had been bitten by a local rabid skunk or bat
1964	Foxes	Local skunk/bat bite	Four rabid foxes diagnosed during the year
1946	Coyote	Local dog bite	Rabid dogs were common in the 1940s
1944	Opossum	Local dog bite	Rabid dogs were common in the 1940s

Implications and Recommendations

- Local residents should be aware about the presence of rabies in animal populations in LA County.
- All dogs and cats should be vaccinated against rabies, including indoor-only animals. Three confirmed rabid bats were found indoors during 2013.
- Schools and camps should educate all staff about bats and rabies, including custodial staff. Children 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 aggressive and territorial and are more willing to bite.
- Bat encounters should be reported to VPH. This includes bats that have been found near pets, small children and sleeping or incapacitated adults.
    - 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 available at: http://www.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 another animal comes from another country, especially where rabies is endemic or common in dogs.

For More Information: 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.[18] 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.[19] Mosquitoes known to spread heartworm locally are most active between dusk and dawn. New, invasive mosquitoes that prefer to bite during the day were detected in LA County in recent years and are potential vectors for heartworm.[8]

After transmission, heartworm parasites mature in a pet's body over about 6 months, 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.[18] If untreated, an infected pet may develop severe heart failure, lung disease and even die.[19] Dogs are the animals most commonly diagnosed with heartworm disease; however the parasites can also infect cats, ferrets, wolves, coyotes and marine mammals.[20] The disease is maintained in areas where mosquitoes feed on infected coyotes and infected, untreated dogs. Infection in humans is rare[18] but data may be lacking.

In the past, heartworm was not thought to be present locally. There is evidence, however, that it may be emerging in LA County because locally-acquired cases have been reported. The presence and local transmission of this disease may be facilitated by a warming climate and movements of infected pets or wildlife into the County.

Epidemiological 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

Heartworm-positive dogs and cats are reported to VPH when diagnosed by local veterinarians. Diagnostic tests commonly done in veterinary clinics 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. Therefore, animals may have no overt clinical signs at the time testing is performed.

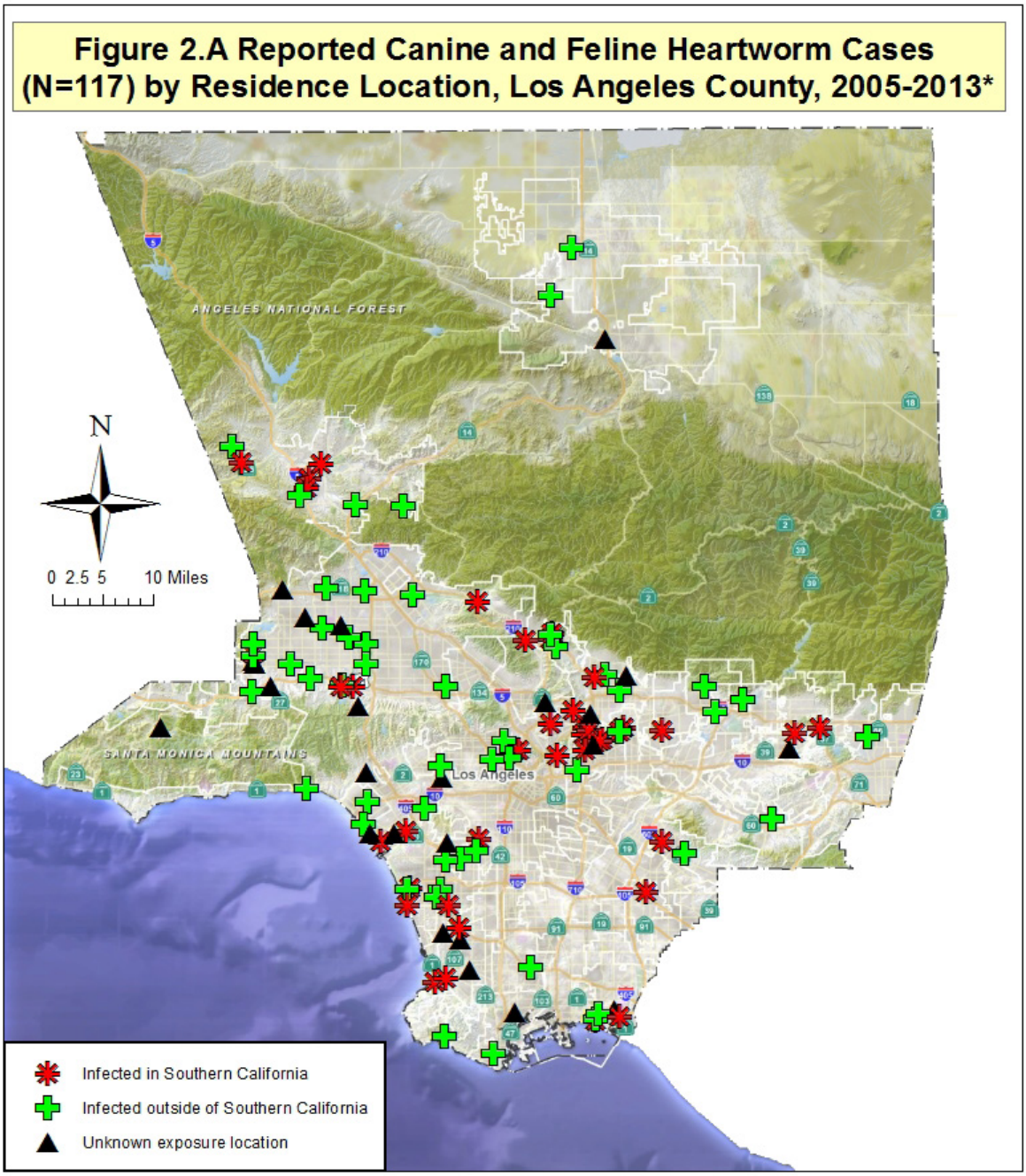
VPH investigated each case to obtain a thorough history on the animal, specifically relating to travel information, clinical signs (if any), and previous/current treatments. Cases in animals that did not travel outside of Southern California in the two years prior to diagnosis were considered locally-acquired. Cases were categorized as confirmed, probable or suspected based on the results of diagnostic tests performed*. The data excludes the cities of Long Beach, Pasadena and Vernon (see p.7 for more information).

* Case definition available at: http://publichealth.lacounty.gov/vet/HeartwormCaseDef.htm

Data results:

- Between 2005 and 2013, VPH received 117 reports of heartworm (12 cats, 105 dogs) (Fig.2.A).
  - 36% of cases were likely infected in Southern California based on their travel histories.
  - 50% were classified as confirmed, 41% as probable and 9% as suspected.
  - 89% were diagnosed on the basis of a positive antigen test and in 28%, microfilariae were seen in the blood (Table 2.A). In addition, 51% tested positive on multiple tests.
  - 16% of cases were reported as being untreated after diagnosis.

Figure 2.A Reported Canine and Feline Heartworm Cases (N=117) by Residence Location, Los Angeles County, 2005-2013*



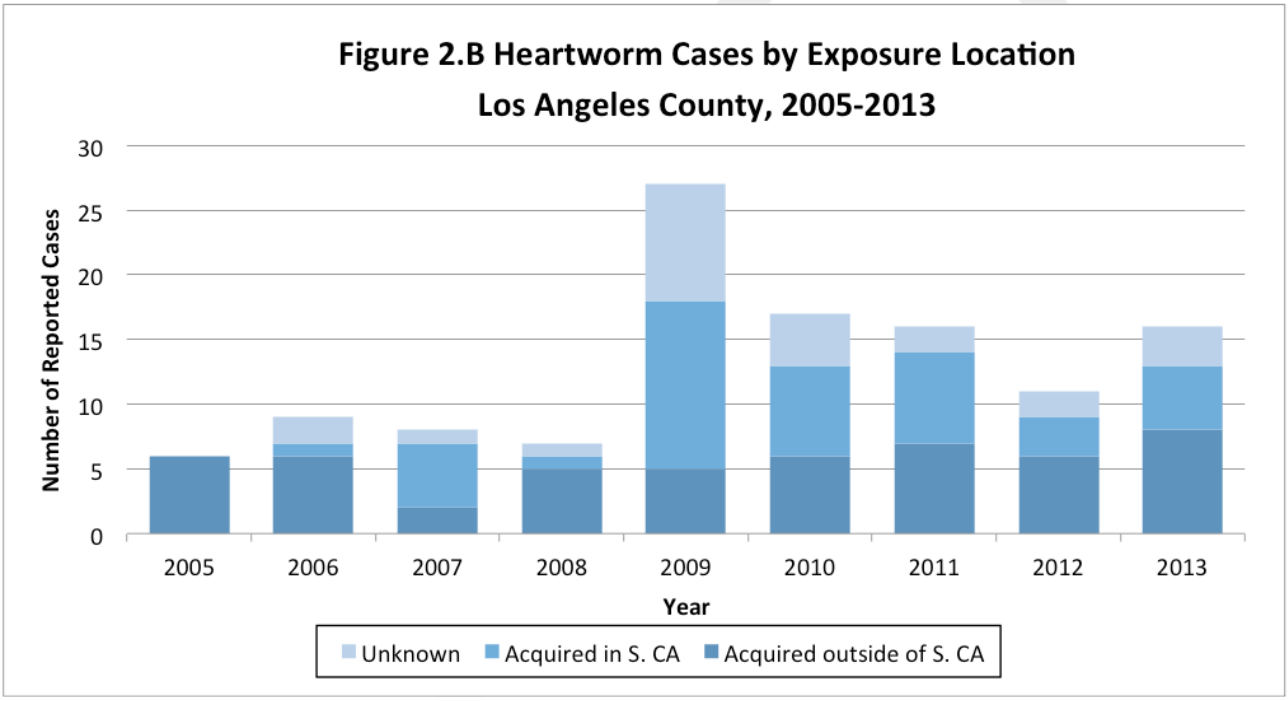
*Data does not include the cities of Long Beach, Pasadena and Vernon

- Most pets (74%) had no clinical signs of heartworm at the time of diagnosis. Pets with clinical signs (26%) showed evidence of cough (19%), fatigue (13%) and heart failure (6%).

- In 2009, a cluster of cases occurred in South Pasadena (Fig 2.B). All three affected dogs lived in the same household and did not travel outside of Southern California in the previous two years. They lived on a property with a decorative water fountain, which may have been a breeding source for infected mosquitoes.

Table 2.A Diagnostic Findings in Heartworm Positive Pets (N=117), LA County, 2005-2013

	Number of Pets	% of Pets
Positive antigen assay	104	89%
Abnormal radiographic findings	36	31%
Microfilariae seen in blood smear	33	28%
Parasites seen on echocardiogram	3	3%



Limitations:

- Identification of heartworm cases by VPH is affected by various steps during the reporting process. Under-reporting can occur if:
  - Owners do not bring their pets to the veterinarian.
  - The veterinarian is not able to test/screen the pet for the disease.
  - The veterinarian does not report the case to VPH.

- Identification of locally-acquired 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 years before diagnosis (recall bias).

- The total number of mosquitoes present in LA County is unknown, and change in this vector population may affect cases of heartworm detected by veterinary clinics.

Implications and Recommendations

Implications:

- Heartworm is found in low numbers in LA County. However, local transmission is known to occur based on cases in pets that had not travelled outside of the area.

- The majority of cases (74%) were diagnosed before developing clinical signs, most likely during routine heartworm testing.

- Untreated dogs (16% of reported cases) and coyotes may act as reservoirs for the disease.[21]

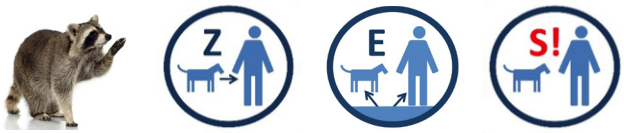
Recommendations:

- 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, WNV and other mosquito-borne diseases.
  - Monthly heartworm preventative 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.
    - Treatment of infected pets can be costly and presents some risk to their health, so prevention is advisable.

- Screening tests
  - It is recommended that pets be screened for heartworm annually.[22, 23]

For More Information: www.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.[24] 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 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.[24] 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.[24] Signs in people can vary but most often present with: fever, headache, chills and muscle pain.[25] In dogs, vaccines are available that protect against 4 serovars.

Animals act as sentinels for the disease. Infected pets (dogs and cats) 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

Pets diagnosed with leptospirosis in veterinary clinics were reported to VPH. Diagnosis was typically made through serology or polymerase chain reaction (PCR) on urine or blood. Serology measures the level of antibodies against *Leptospira* and requires 2 blood samples taken at 2-4 week-intervals. It provides insight into the type of *Leptospira* (serovar) 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 report 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 excludes the cities of Long Beach, Pasadena and Vernon (see page 7 for more information).

Findings

Data results:

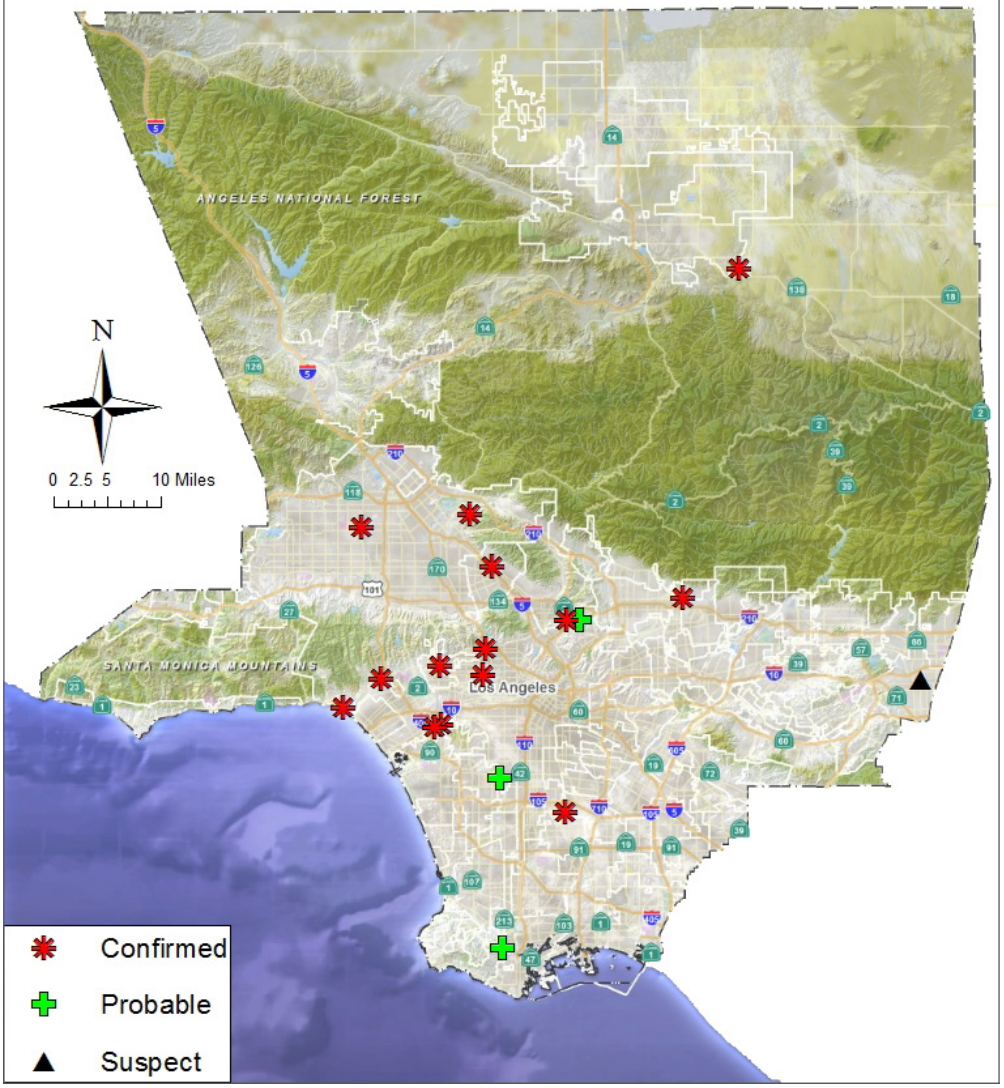
- Between 2005 and 2013, 18 cases in dogs were reported (Fig. 3.A).
  - 72% of cases were confirmed, 22% were probable, and 6% were suspected. A peak of leptospirosis was seen in 2006. The number of reported cases appeared to increase once again between 2008 and 2013 (Fig. 3.B).
  - 72% of cases were diagnosed by serology alone, 17% by PCR alone and 11% by both methods.
- In 44% of leptospirosis cases, dog owners reported seeing wildlife in their yard. These included raccoons, mice, rats, opossums and skunks (Fig.3.C).
- Azotemia (elevated blood urea nitrogen) was the most common laboratory test finding (94% of cases). Azotemia typically indicates involvement of the kidneys, dehydration, or both (Table 3.A).

* Case definition available at: http://publichealth.lacounty.gov/vet/LeptospirosisCaseDef.htm

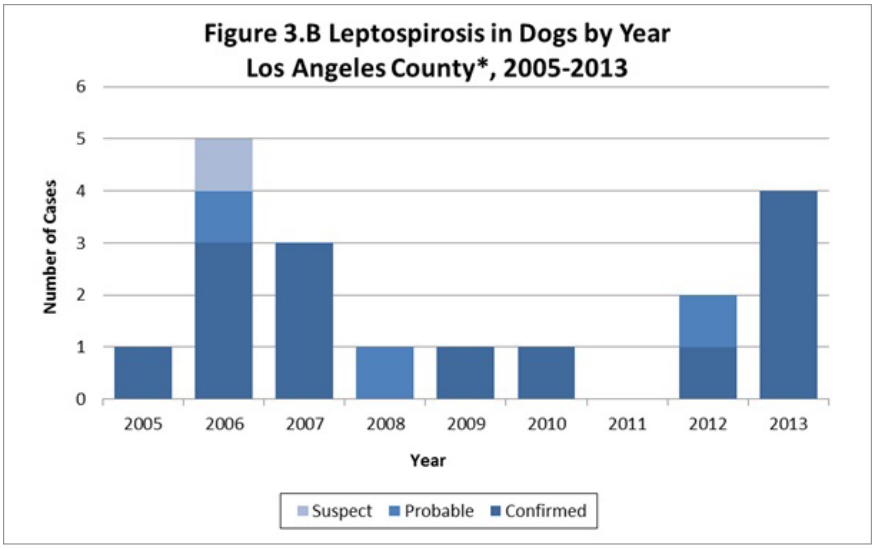
- Autumnalis (13 cases) was the most common suspected *Leptospira* serovar in reported cases (Fig. 3.D). In some instances, 2 suspected serovars were present within the same dog.

- The disease was also seen in marine mammals. Between 2005 and 2011, 10 animals (2 Northern elephant seals and 8 California sea lions) were also reported.

Figure 3.A Reported Canine Leptospirosis Cases in Animals (N=18) by Residence Location, Los Angeles County, 2005-2013*



*Data does not include the cities of Long Beach, Pasadena and Vernon



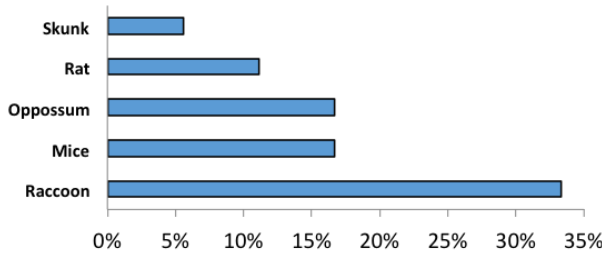
*Data does not include the cities of Long Beach, Pasadena and Vernon

Table 3.A Most common clinical findings in reported leptospirosis cases in dogs* (N=18), LA County, 2005-2013. Cases often had more than one clinical finding.

	Number affected	% from reported cases
Azotemia	17	94%
Acute renal failure	11	61%
Elevated liver enzymes	11	61%
Vomiting	10	56%
Thrombocytopenia	8	44%
Anemia	5	28%
Death	4	22%
Icterus	4	22%
Leukocytosis	4	22%
Elevated amylase	4	22%
Oliguria/Anuria	3	17%
Fever	3	17%
Elevated lipase	3	17%
Diarrhea	1	6%

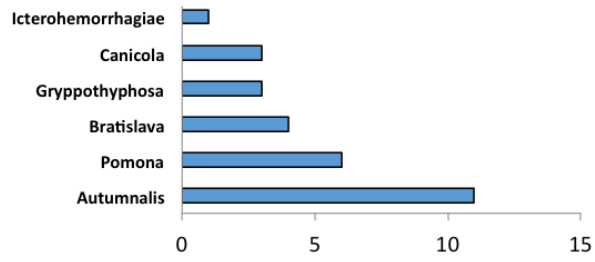
* Includes suspected, probable and confirmed cases

Figure 3.C Most Common Wildlife Exposure in Reported Leptospirosis cases (N=18) in Los Angeles County, 2005-2013*



* Data excludes the cities of Long Beach, Pasadena and Vernon

Figure 3.D Most Likely Serovars of Canine Leptospirosis Cases (N=18) in Los Angeles County, 2005-2013*



* Data excludes the cities of Long Beach, Pasadena and Vernon

Limitations:

- Some cases may not be reported. The data represents the minimum number of local cases.
  - Veterinarians who are not aware that leptospirosis is present in LA County may not test for it.
  - Cases of leptospirosis in dogs without azotemia present may be missed.
  - The cost of testing may be a barrier for some pet owners and testing for the disease may not always occur in dogs with signs of the disease.
- Some cases of leptospirosis could not be confirmed because:
  - Only one serologic test was performed or reported.
  - Lack of vaccine history. Vaccination may increase antibodies detected through serology.
- Due to cross-reactivity among Leptospira serovars in standard diagnostic testing, the serovar responsible for infection is rarely identified.

Implications and Recommendations

Implications:

- Leptospirosis is present in LA County. Although the total number of cases remains low, local pets may be at risk of infection.
- Backyard wildlife is a suspected source of leptospirosis in dogs of LA County. Wildlife likely contaminate backyard sources of water (water bowls, fountains) consumed by dogs.
- Epidemiological 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.

Recommendations:

- Consider vaccinating dogs against leptospirosis.
  - Especially important in dogs that share an environment with wildlife such as raccoons or rodents.
  - Four-way leptospirosis vaccines protect against more serovars, compared to the older 2-way vaccine. The Pomona serovar is likely present in LA County, and is not covered by the 2-way vaccine.
- Pets 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 and pick up fallen fruits and other potential food sources in a yard.
- Prevent leptospirosis infection in people. Reduce contact to potentially infected urine by:
  - Washing hands frequently.
  - Cleaning potentially infected areas using gloves.
  - Contacting an exterminator if rat infestations are present.

For More Information: 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.[26] The diarrhea is often severe and bloody, and contributes to rapid dehydration, as well as loss of protein and electrolytes.[26] Cases of parvovirus in dogs are often fatal without hospitalization and intensive support.[26] Parvovirus in dogs is commonly diagnosed with a rapid enzyme-linked immunosorbent assay (ELISA) test on feces that can be easily done in most veterinary clinics.[26]

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.[26] Vaccination against parvovirus can prevent infection and for over 30 years has been a part of the standard vaccine recommendations for dogs. 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.[27]

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 the community where access to, or utilization of, basic veterinary preventive health care is low. Lack of basic veterinary care can increase the risk of exposure to zoonotic diseases.

Data Sources

Surveillance for parvovirus in dogs began in 2007, when it was listed as a priority reportable disease by VPH. Sixteen animal shelters and 41 veterinary hospitals reported cases to VPH between 2008 and 2013. 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 reported during the 2008-2013 period, 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*. This report includes data received from Long Beach for years 2010-2013 and from Pasadena for years 2010-2011. No data was received from Vernon.

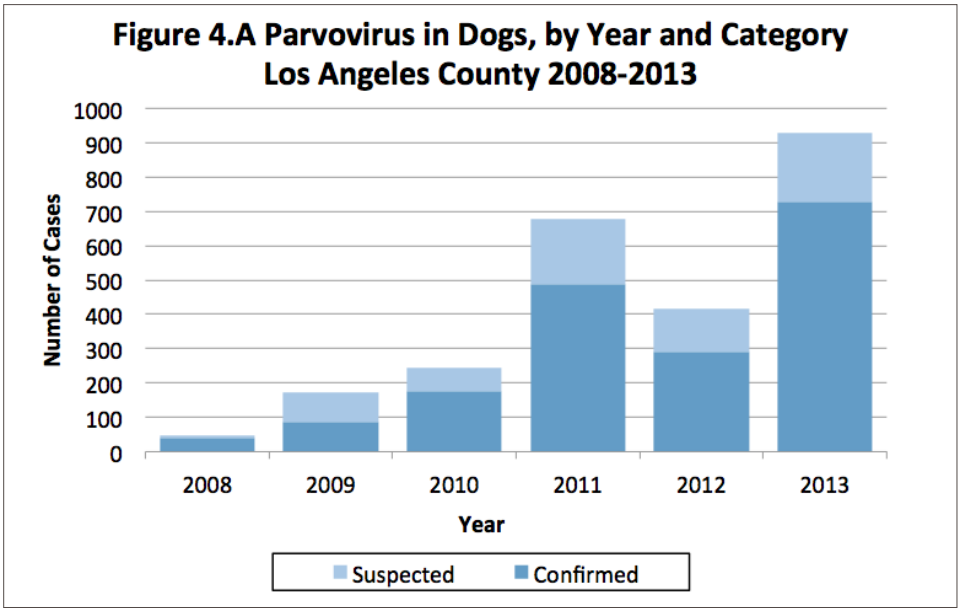
Confirmed canine parvovirus cases are those that had compatible clinical signs and a positive ELISA or PCR test on feces. Because of the minimal amount of data available on cases, no cases are categorized as probable. Suspected cases are those that had compatible clinical signs and/or epidemiologic links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

* Case definition available at: http://publichealth.lacounty.gov/vet/parvocasedef.htm

Findings

Data results:

- 2,482 canine parvovirus cases reported between 2008 and 2013
  - 929 were reported in 2013, which is greater than twice the number of cases (n = 417) reported in 2012 (Fig 4.A).
  - 1,808 (72.8%) were confirmed cases, and 674 were suspected cases.
  - Animal shelters contributed the most to surveillance, reporting 2,081 cases (83.8%)
    - For 1,796 of the cases reported by shelters between 2010-2013, dates of entry and diagnosis were available
      - 63% had clinical signs on the day of entry
      - 86% were diagnosed within 4 days of entry, and were therefore likely infected before entry into the shelter (i.e. community acquired) (Fig 4.B).
- Parvovirus infection in dogs followed a bimodal seasonal pattern. In most years, there was an initial increase in late spring and followed by a much larger peak in early autumn (Fig 4.C).
- Cases of parvovirus occurred all over the county.
  - Cases originated from 214 out of the 311 zip codes within LA County
  - Cases tended to cluster in areas of higher economic hardship. (See map on page 11 of report *How Social and Economic Factors Affect Health*, available at http://publichealth.lacounty.gov/epi/docs/socialD_final_web.pdf)
  - Cases also clustered in areas with fewer veterinary practices.
  - In 2013, 19% of cases originated from the Antelope Valley
  - Note: Cases acquired inside animal shelters were not displayed in the map in Figure 4D.



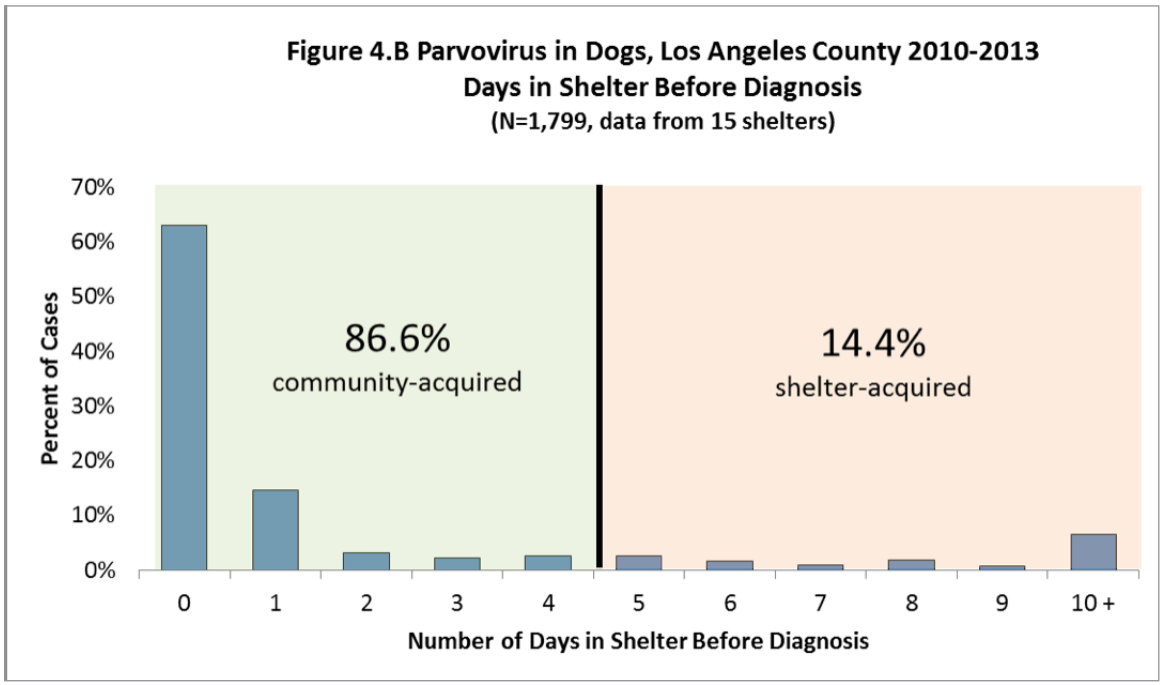


Figure 4.B Parvovirus in Dogs, Los Angeles County 2010-2013
Days in Shelter Before Diagnosis
(N=1,799, data from 15 shelters)
70%
60%
50%
40%
30%
20%
10%
0%
Percent of Cases
86.6%
community-acquired
14.4%
shelter-acquired
0
1
2
3
4
5
6
7
8
9
10+
Number of Days in Shelter Before Diagnosis

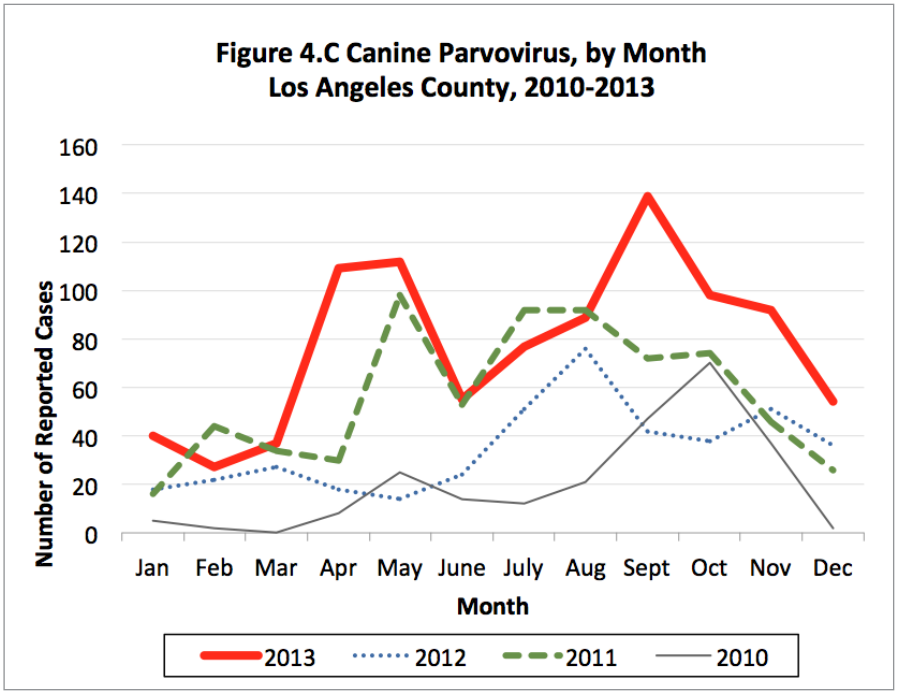
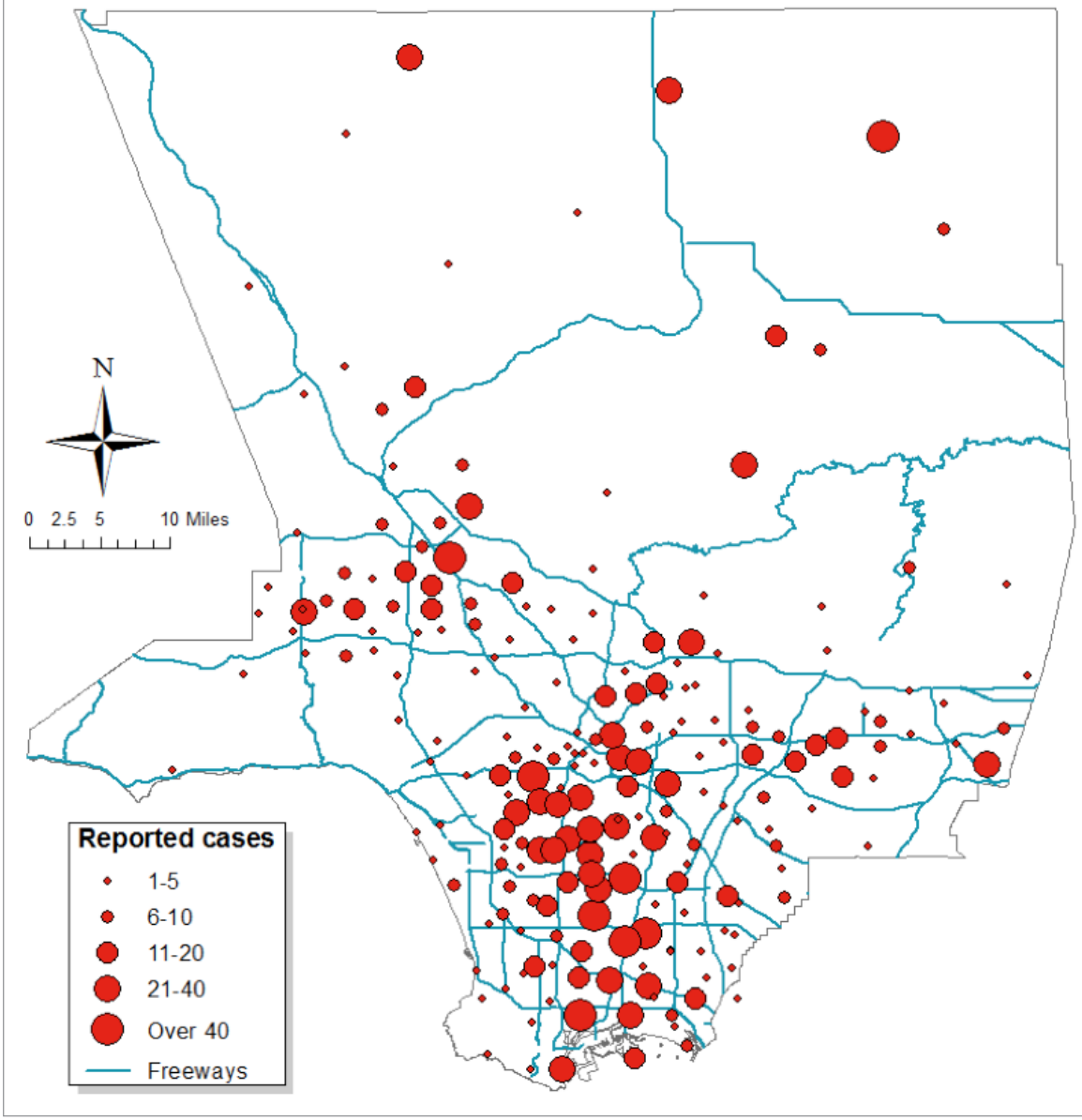


Figure 4.C Canine Parvovirus, by Month
Los Angeles County, 2010-2013
160
140
120
100
80
60
40
20
0
Number of Reported Cases
Jan
Feb
Mar
Apr
May
June
July
Aug
Sept
Oct
Nov
Dec
Month
2013
2012
2011
2010

Figure 4.D Canine Parvovirus, Los Angeles County, 2008-2013

Circles are centered on the zip code of the animals' residence. Cases acquired inside animal shelters (Fig.4.B) are not displayed.



Limitations:

- Many parvovirus cases in dogs are unreported because:
  - Veterinarians may not report all cases.
  - Lack of financial resources for, or access to, diagnostic testing for some cases.

Implications and Recommendations

Implications:

- 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, areas with more parvovirus may also face a higher risk for rabies exposure, should their pets become infected with rabies or other zoonotic diseases.

- Improving surveillance of canine parvovirus in LA County allows VPH to focus outreach efforts on the most affected communities.

Recommendations:

- Cases of parvovirus in dogs 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.

- 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).
  -Dogs should also receive anti-parasitic medication and other preventive care.

For More Information: http://publichealth.lacounty.gov/vet/parvo.htm.

* For veterinary practices: http://publichealth.lacounty.gov/vet/docs/Forms/ParvoTrackingSheet_vet.pdf
For animal shelters: 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*) which is common in dry climates of the southwestern United States, parts of Mexico and Central and South America.[28] The fungus is found in the soil and spores can spread through the air, especially when the ground is disturbed such as during earthquakes, dust storms or excavations.[29] Disease occurs when fungal spores are inhaled by a person or animal.[28] Thus, exposure comes from the environment and, with extremely rare exceptions, *Coccidioides immitis* does not spread directly between people or between animals. The majority of people and pets do not get sick from Valley fever.[30] Symptoms of Valley fever in humans and animals are generally similar and include: fever, fatigue, cough and sometimes skin lesions.[30] Dogs may also suffer from weight loss and bone infections that appear similar to some types of bone cancers.[31]

Some pets, because of specific behaviors (living outdoors, digging into the ground), may be more likely to be infected with 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

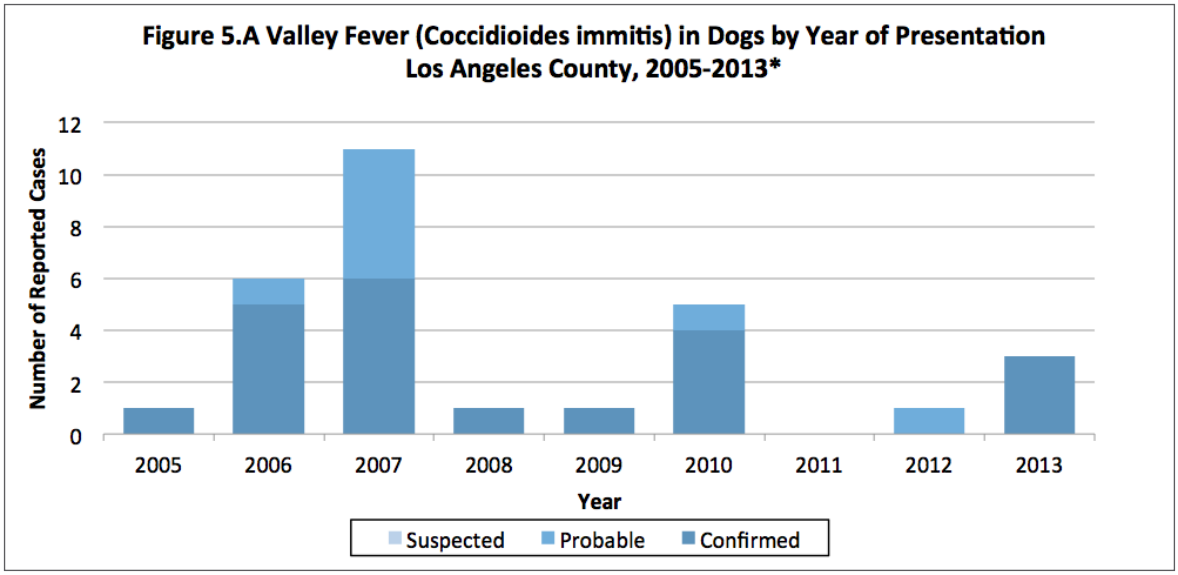
Veterinary clinics diagnosing Valley fever in dogs and cats report cases to VPH. Diagnosis is most commonly done by a combination of: assessing the level of antibodies against the disease (serology), biopsies and specific clinical signs. VPH veterinarians then investigate each case in order to assess exposure history. This includes previous travel to other endemic areas and environmental conditions. Cases are classified as imported if the pet had travelled to any area of the southwestern US outside of LA County, as well as Mexico. In addition, each report is categorized as confirmed, probable or suspected based on tests results and clinical signs in animals*. The data collected does not include any data from the cities of Long Beach, Pasadena or Vernon (see p.7 for more information).

Findings

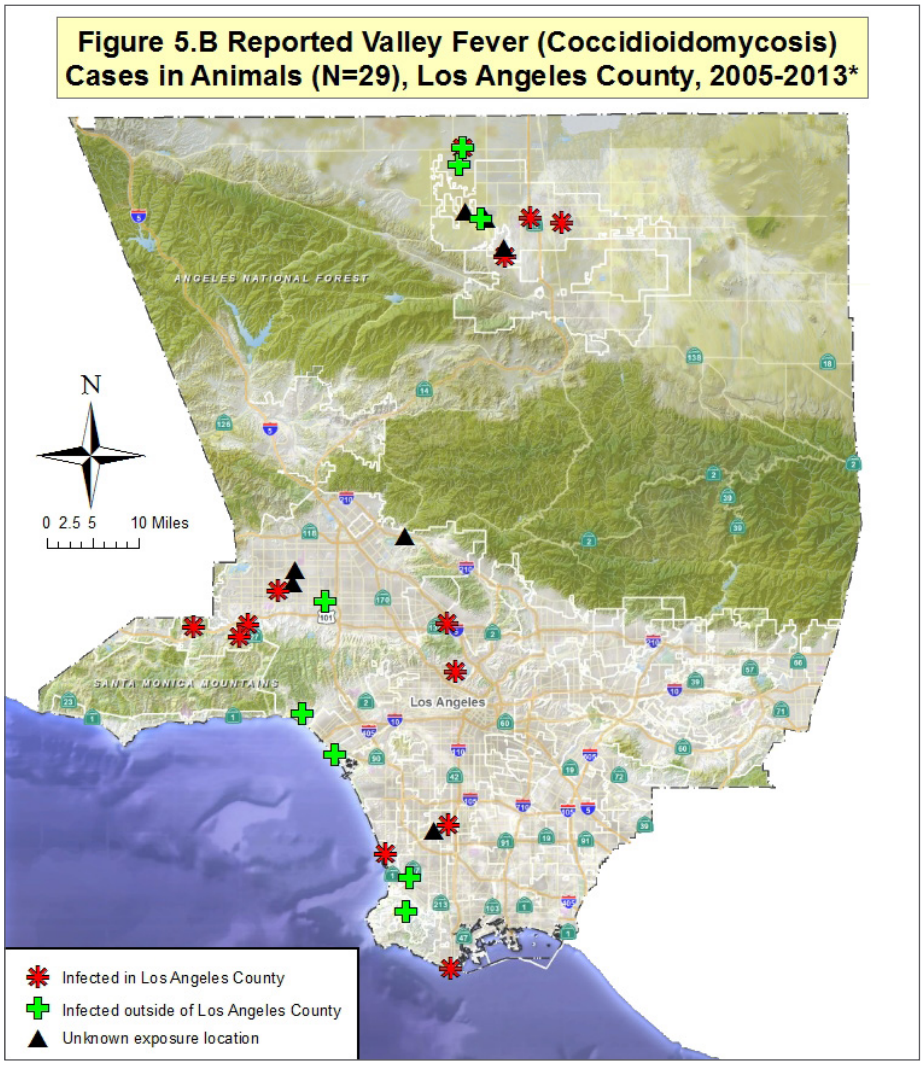
Data results:

- Between 2005 and 2013, 29 animals with valley fever were reported to VPH. These included 26 dogs, 2 cats and 1 Northern elephant seal.
- A peak in cases occurred in 2007. A total of 11 pets were reported that year alone, accounting for 38% of all Valley fever reports over the nine year period (Fig 5.A).
- Most cases of Valley fever were reported from the San Fernando and Antelope Valley areas. Other cases were found on the western coastal area of LA County (Fig 5.B).

* Case definition available at: http://publichealth.lacounty.gov/vet/CoccidioidomycosisCaseDef.htm



* Data excludes the cities of Long Beach, Pasadena and Vernon

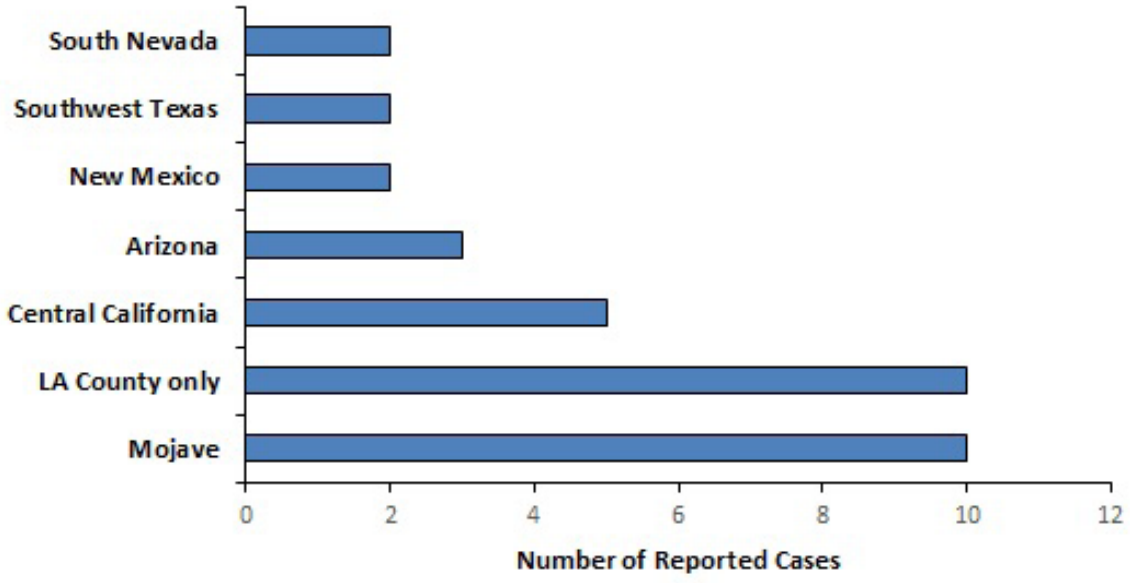


* Data excludes the cities of Long Beach, Pasadena and Vernon

- 10 cases (34% of total reports) did not report travel outside of LA County. These animals acquired the disease locally. Other common areas of exposure included: Mojave, Central California, and Arizona (Fig 5.C).

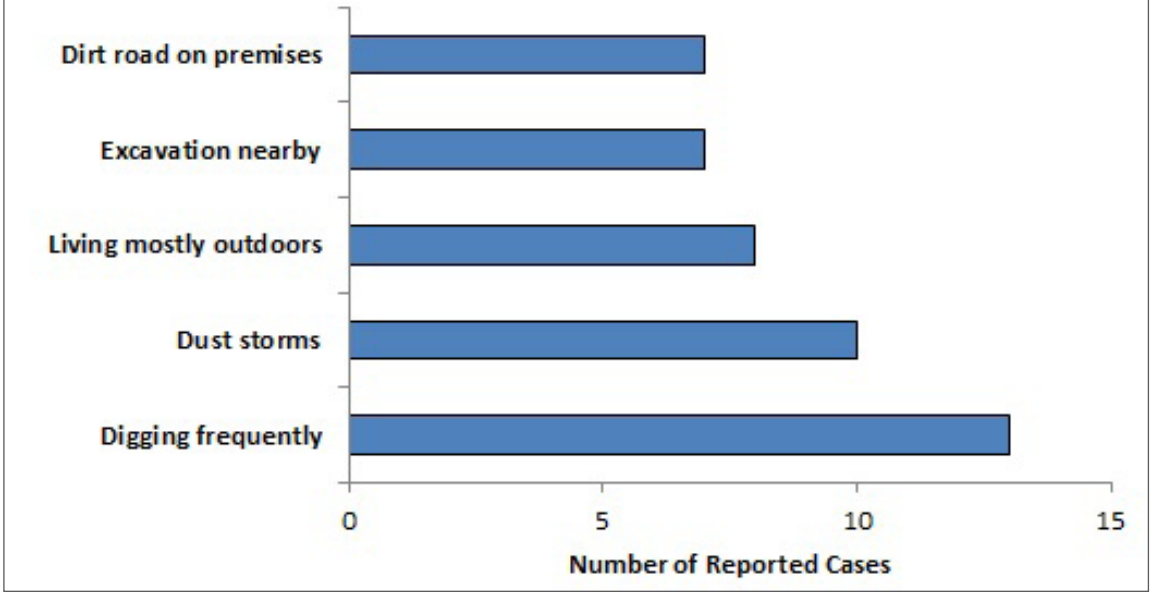
- 13 animals (45% of total reports) were reported to dig in the soil frequently. Other exposure factors reported included: being in a dust storm, living mostly outdoors and proximity to constructions sites or other locations involving excavation (Fig. 5.D).

Figure 5.C Reported Exposure Risk Factors for Valley Fever (Coccidioidomycosis), Los Angeles County, 2005-2013 (N=29)*



* Data excludes the cities of Long Beach, Pasadena and Vernon

Figure 5.D Reported Exposure Risk Factors for Valley Fever (Coccidioidomycosis), Los Angeles County, 2005-2013 (N=29)*



* Data excludes the cities of Long Beach, Pasadena and Vernon

Limitations:

- Classification of cases as locally-acquired vs. imported into the area 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

Implications:

- In LA County, Valley fever appears to be endemic in Antelope Valley and 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.

Recommendations:

- Animal owners and their pets should limit outdoor activities during dust storms and nearby excavations. Dust control should always be performed during projects that involve excavation. This will reduce chances of inhaling fungal spores.
- 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: http://publichealth.lacounty.gov/vet/coccidioidomycosis.htm.

6. West Nile Virus (WNV)

Background and Significance

WNV is transmitted through bites from infected mosquitoes and can affect both humans and animals.[32] While 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.[33] Mosquitoes breed in standing water and most are active between dusk and dawn. There are no reports of people in the community getting infected from handling live or dead infected birds. In humans, illness is usually mild and 80% of those infected do not show signs of disease. In some cases, sick individuals may experience flu-like symptoms. Less than 1% of infected patients suffer from a serious neurological form of the disease.[32] Presently there is no vaccine available for humans.

Several other animal species are susceptible to WNV including squirrels, horses and some reptiles.[34] 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. [34] Horses with the disease usually suffer from severe neurological signs, but can be protected by vaccination.[34] Dogs and cats rarely get sick from WNV.[34] Horses and people are considered "dead end hosts" because, once infected, they are typically do not pass the virus to other mosquitoes when they get bitten.[35]

Originally from Africa and Europe, the 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.[36] Within just 3 years, the disease spread across the United States and became established in California by the end of 2003.[37] Since then, integrated surveillance programs have been put in place to track WNV in domestic birds (sentinel chickens), wild birds, mosquitoes and people. Monitoring the disease in wild birds provides especially valuable information that can help predict outbreaks of WNV in people.[38] **In LA County, cases of WNV occur in both humans and animals every year.**

Data Sources

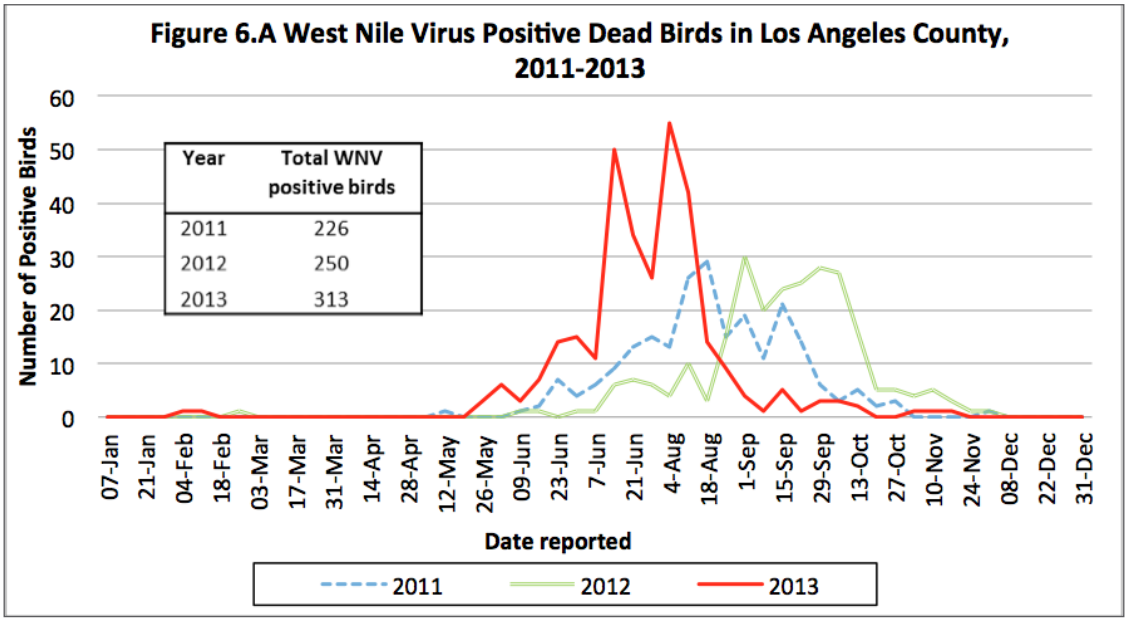
Animal control agencies, members of the public, and veterinarians reported dead birds and squirrels to the California Department of Public Health (CDPH), local vector control agencies and VPH. Fresh carcasses were collected for testing. The majority (95%) of birds and all squirrel carcasses were tested by polymerase chain reaction (PCR) performed by the Center for Vectorborne Diseases at the University of California, Davis. A small amount of in-house testing was performed in crows using rapid-antigen test strips (VecTest™, Medical Analysis Systems, Camarillo, CA) provided by CDPH. Animals testing positive were considered confirmed. Only confirmed cases were counted. The data reported here reflects the cumulative data for LA County, including tests arranged by both VPH and local vector-control agencies.

Findings

Data results:

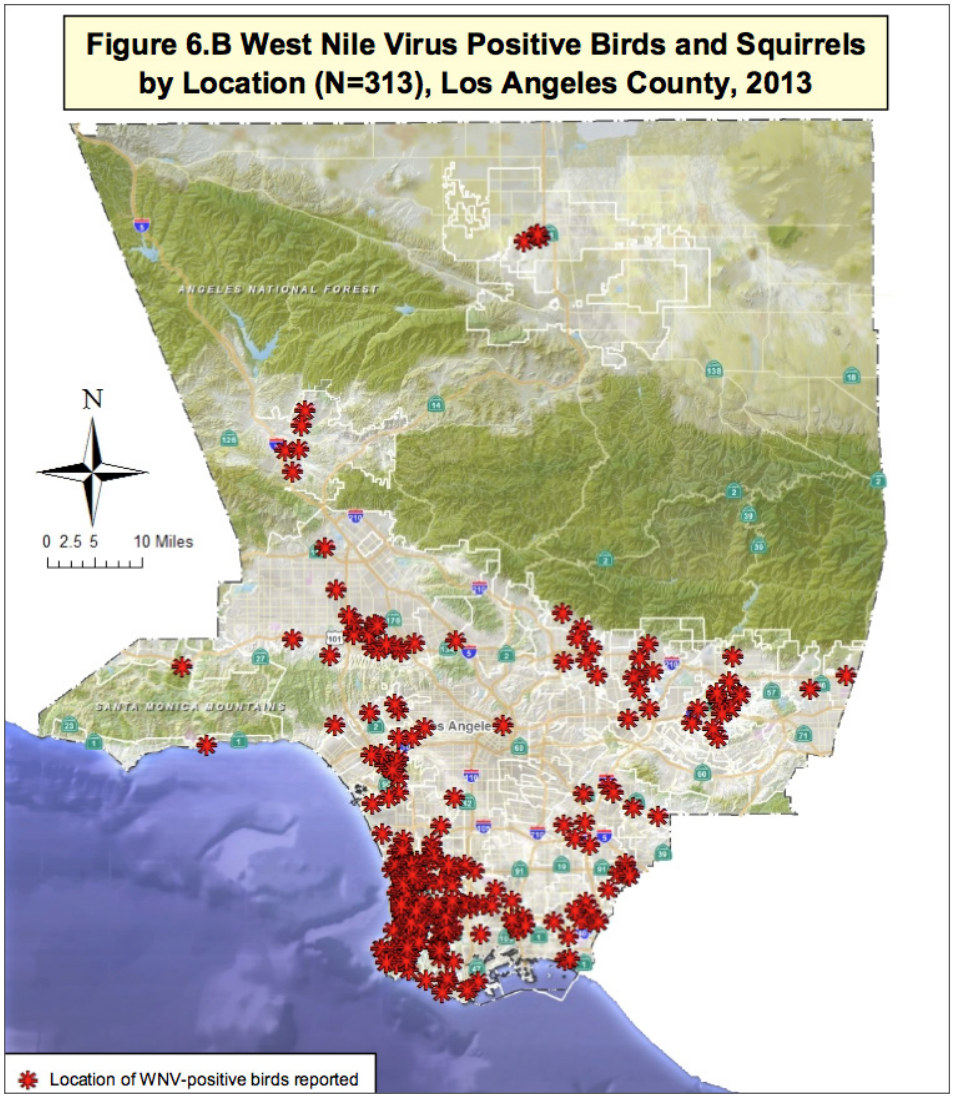
In 2013, WNV was detected in 313 wild birds in LA County. A total of 60% of dead birds tested were WNV positive. Only 3 dead tree squirrels tested positive. This represented an increase in WNV positive birds compared to the two previous years (Fig.6.A). There were 165 people infected with the virus during 2013.[39] West Nile activity peaked in late summer in both animals and people.

- Cases of WNV occur throughout LA County. However, a heavy concentration (61%) of cases was seen in the South Bay area in 2013 (Fig.6.B).



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 and squirrels for WNV in late August 2013, during peak virus activity. A few local vector control agencies continued testing in birds with other funding, accounting for some WNV-positive dead birds in September and December 2013.



Implications and Recommendations

Implications:

- Monitoring WNV in dead birds offers several benefits to public health.
  - The severity of WNV varies each year. Bird testing can help predict 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 before human cases, acting as an early-warning system for human infections. A cluster of positive birds in South Bay in 2009 led to an alert distributed by DPH to inform physician about WNV locally.
  - WNV cases have a strong seasonal pattern and exposure risk rises in late summer and fall.

Recommendations:

- Reduce exposure to mosquitoes through mosquito control.
  - Mosquitoes breed in standing water. Areas of standing water around a property should be identified and removed 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 clusters of dead wild birds to VPH. While testing of individual birds for WNV was discontinued in 2013, a cluster of 3 or more dead birds of any species in the same area and at the same time may represent an outbreak and could be tested for a number of diseases, including WNV.
- 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. Pick up dead birds using gloves or an inverted plastic bag to place the bird's carcass in a garbage bag.
- Communities should engage in targeted interventions to prevent WNV infections between mid-spring and late fall.

For More Information: http://publichealth.lacounty.gov/vet/WNV.htm

* List of local vector control agencies available at: http://publichealth.lacounty.gov/acd/VectorWestNile.htm

7. 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 has tripled. In California, the majority of puppy imports occur in LA County.[6]

There are numerous documented animal welfare issues related to some international pet traders. These include poor sanitation and lack of immunization of the animals.[40, 41] Because of this, 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 (2004 – dog from Thailand; 1987 – cat from Mexico, see p.16 for more information).[6] Other animals imported into the United States have been diagnosed with Monkey Pox, leishmaniasis, screwworm infestations, canine distemper and canine parvovirus.[6, 42, 43]

During 2013, the CDC was the federal agency in charge of regulating imported dogs and cats.[6] Based on CDC regulations,[44] imported dogs were required to receive rabies vaccinations at three months of age in the country of origin, unless the dog is coming from a country listed as "rabies-free" by the CDC.[45] Dogs from non "rabies-free" areas were allowed to enter the country one month after rabies vaccination. Therefore, in 2013, the minimum age at which a dog was allowed to legally enter the United States from a country where rabies was present was 4 months.[44] Dogs that arrived without being vaccinated against rabies were required to be confined at the importer's address until one month after the rabies vaccine was given. Pets taken out of the United States were subject upon return to the same regulations as those entering for the first time.

Neither a general health certificate nor rabies vaccination was required by CDC for entry of pet cats into the United States, although some airlines or states may have had different requirements. Cats could still be subject to inspection, however. If a cat appeared to be ill, further examination by a licensed veterinarian at the owner's expense could be required at the port of entry.[46]

VPH assisted the CDC with inspections of some animals at LAX to verify the health status of animals and their ages. VPH compared the age with the accompanying paperwork, and also enforced local dog importation quarantines within LA County.

Federal pet importation regulations may change over time. Updated recommendations may be available on websites from the CDC and United States Department of Agriculture (USDA).

Data Sources

In 2011, VPH and CDC initiated a system to generate Advance Notifications for dog imports. Airlines at LAX were required to notify both agencies if a dog was imported from abroad through the airport. That same year, VPH created a database to collect data about the dogs being imported into LAX, including:

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

During that time, VPH also engaged in selected inspections of imported dogs at LAX.

Findings

Data results

- Advance Notifications received by VPH from airlines of dog imports into LAX increased between 2012 and 2013. VPH received 315 Advance Notifications in 2012 versus 763 in 2013.
- Over 100 dogs arrived at LAX every month.
- From 2011-2013, VPH inspected 458 shipments for a total of 1054 animals inspected.
  - 51 *shipments* contained three or more dogs.
  - 354 *individual dogs* were under four months of age.
  - 40 *individual dogs* were between four and 6 months of age.
- The most commonly imported breeds were Yorkshire terrier, Maltese, and English and French bulldogs.
- In 2013, dogs were imported from 44 different countries around the world (Fig. 7.A).
  - Approximately 30% of dog shipments from 2011-2013 originated in a rabies-endemic country.
  - The most common rabies endemic regions of origin were East Asia, Eastern Europe and South America.
  - The most common countries of origin were Germany, Hungary, Ukraine, South Korea and the Czech Republic.
- Throughout 2011-2013, shipments of 3 or more dogs were much more likely to have fraudulent paperwork overstating the dog's age, presumably to avoid federal quarantine laws. Approximately 40% (n=20) of shipments of three or more dogs had fraudulent paperwork compared to less than 10% of all dog shipments.
- In 2013, VPH issued three Health Orders for large shipments in which severely sick dogs were found. The Health Orders required that the importer seek immediate veterinary care for the dogs.
  - Several of the dogs arrived dehydrated and hypoglycemic. Other conditions seen during inspections included gastrointestinal parasites, parvovirus, dermatophytosis (ringworm), or other infectious diseases.

Limitations

- Animals traveling into LA County from elsewhere within the United States are not tracked and may have originally come from abroad.
- Determining if a dog comes from a rabies-free country is based on the country where the dog boarded the flight. Animals may have travelled from another country prior to the flight, which may be endemic for rabies.
- Targeting multiple-dog shipments for inspection may lead to under-representation of health issues related to shipments of single animals.
- The Advance Notification system relies on the airlines to report any upcoming dog importation shipment to VPH and CDC. 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 through LAX. Dogs coming through neighboring international airports and then driven to LA County are not tracked by the program.

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

Implications and Recommendations

Implications:

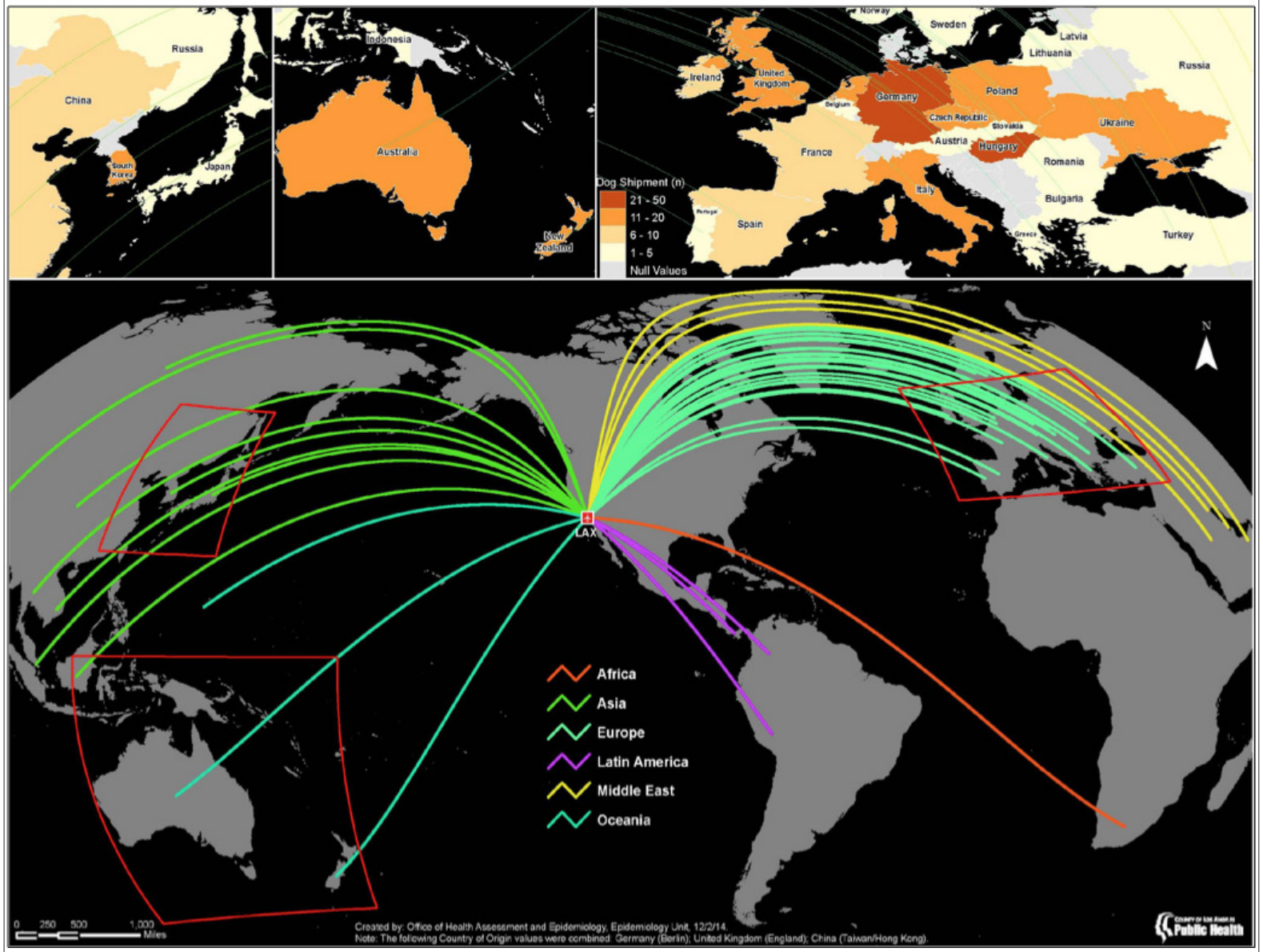
- Collaborative outreach to airlines at LAX between VPH and CDC has increased the number of Advance Notifications received by both agencies.
- Canine rabies is endemic in many of the countries of origin for the puppies imported into LA County.
- Some of imported puppies arriving through LAX have **fraudulent paperwork** falsely stating the dogs were 4 months of age when they were found to be much younger on examination, presumably to avoid federal quarantine laws.
- 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.

Recommendations:

- 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 check the teeth to verify the age of puppies, and ensure that the real age matches the paperwork. This is especially important before vaccinating against rabies.
- 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 wash their hands after handling their puppy, pick up and discard feces immediately, and not let the puppy mingle with other animals until it is confirmed to be healthy and fully vaccinated.
- Animals coming from Mexico 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: http://publichealth.lacounty.gov/vet/PetImport.htm

Figure 7.A Dog Shipments into Los Angeles International Airport (LAX) by Country of Origin, 2013.



8. Other Diseases, Studies and Investigations

2013 – Melioidosis in a pet iguana


In January 2013, a pet iguana from the San Fernando Valley was diagnosed by a local veterinarian with an abscess over the left proximal humerus. Culture of the lesion revealed bacteria called *Burkholderia pseudomallei*. The disease does not naturally occur in the United States but is found in many parts of the world, including Southeast Asia, Australia, and Central America. This organism is also considered a "Category B" potential bioterrorism agent by the CDC because it is moderately easy to spread and can cause significant disease.[47] The iguana's infection returned after removal of the mass and antibiotic therapy, so the pet was euthanized. Necropsy showed pulmonary and hepatic abscesses. This case is one of few iguanas that have been diagnosed with this disease in California.[48] Melioidosis can be associated with very long incubation periods. Therefore, the iguana may have been infected at a very young age, before importation into the United States.

This organism could potentially contaminate the environment and thereafter become a source of infection for people and other animals. It is unknown whether this disease is present in other iguanas or reptiles. Veterinary staff and owners should always wear gloves and follow careful hygiene and disinfection practices when handling reptiles with abscesses.

2013 – Trichomoniasis in sparrows in Whittier


A resident of Whittier reported 7 dead sparrows in their yard between April and July 2013. The resident had been placing seeds along the top of a wall, for birds and squirrels to eat. Necropsy of one bird revealed yellow, crumbly cheese-like (caseous) masses in the oral cavity and esophagus, and confirmed infection with the protozoan parasite *Trichomonas gallinae*.

This parasite can spread directly between birds, or indirectly through contamination of feed or water.[49] Outbreaks can occur at bird feeding stations when infected animals contaminate the feed with their saliva. Trichomonas in local birds has not been shown to spread to people. However, *Trichomonas gallinae* is closely related to trichomonads that commonly infect people: *T. vaginalis*, one of the most common causes for sexually transmitted diseases, and *T. tenax*, causing periodontal disease in both humans and animals.[50] Infected birds should be handled with gloves, and hands washed afterward, as a precaution.

In order to stop this small outbreak, the resident was advised to: 1) stop feeding birds for two weeks, 2) scrub the top of the wall clean and let it dry, 3) use a bird feeder, and 4) empty and clean the bird feeder weekly.

2013 – Avian botulism die-offs

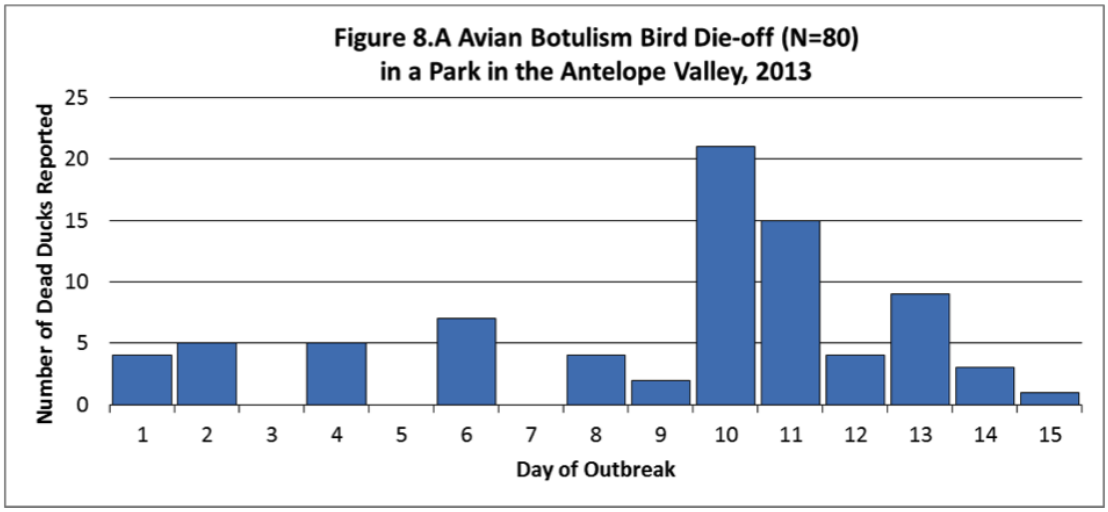
In a park in Downtown Los Angeles

In May 2013, authorities of a park in Downtown Los Angeles contacted VPH to report numerous dead and dying birds on the premises. A site investigation by VPH staff revealed that the majority of the affected birds were ducks around a lake in the park. About 20 dead birds were seen during the visit and some live ducks showed signs of flaccid paralysis in the legs, head, and wings (i.e. signs of "limber neck"). Testing was done on 3 deceased animals, which revealed the cause of the die-off to be avian botulism (Type C). Avian botulism is commonly caused by the bacteria *Clostridium botulinum* which produces toxins that can cause paralysis when ingested.[51] Warm days and low water oxygen in lakes promote this anaerobic bacteria to grow in decaying materials.[51] Ducks may become ill after feeding on maggots that thrive on bird carcasses.[51] The type of toxin (Type C) affecting waterfowl is typically different from the toxins that affect people[51] so there was very little risk of human disease associated with the park die-off. Recommendations were made to remove all bird carcasses promptly to reduce the spread of the disease among other birds and to oxygenate the lake's water.

Outbreak in a park in the Antelope Valley

In July 2013, a veterinarian at an animal shelter contacted VPH to report a duck die-off at a lake in a park in the Antelope Valley. The veterinarian kept two mallard duck carcasses for testing. Blood (serum) from both animals tested positive for avian botulism (Type C).

The event lasted 2 weeks, affecting at least 80 ducks (Fig.8.A). Park officials successfully stopped the outbreak by: 1) increasing patrols to collect and remove dead birds, 2) requesting an increase of water flow into the lake from water authorities and 3) installing sprinklers to help aerate the lake.



2013 – Cryptococcosis in three cats in one home – San Gabriel Valley


Three cats in one home in San Gabriel Valley were diagnosed with a fungal infection called cryptococcosis. This fungus usually infects the sinuses or lungs, but can affect many other areas, including the brain.[52] *Cryptococcus* is a common fungus that is found naturally in the environment throughout the world.

The three cats were part of a group of 30 belonging to a rescue organization. All were diagnosed in the second half of 2013. One cat appeared healthy, but suffered from lesions in the lungs. The second cat's illness was more advanced, which included blindness, swollen hocks, enlarged lymph nodes on the back legs, and large ulcerated areas on the abdomen. The third cat had rhinitis (nasal infection). The severely ill cat was euthanized, and the other two were treated with an antifungal medication (fluconazole).

Humans, dogs and cats can all become infected with two species of this fungus: *Cryptococcus neoformans* and *Cryptococcus gattii*. The source of the fungus is environmental, either in bird feces (*C. neoformans*) or in the bark of certain trees (*C. gattii*).[53] Infected pets can serve as sentinels and indicate that the fungus is present in their environment. Therefore people in the same environment could potentially be exposed. Immunosuppressed individuals may be at increased risk of infection with this fungus; however disease is very rare in people (and cats) who are otherwise healthy.

The veterinarian recommended that the cat caretaker check the property for accumulation of bird droppings, and remove them if found. They also advised the caretaker to have excess vegetation trimmed in order to increase sunlight exposure to all areas to prevent fungal overgrowth and to avoid stirring up dust. Finally, keeping the environment clean and avoiding inhaling any dust when cleaning was also recommended.

2012 – *Onchocerca lupi* – ocular parasite in dogs and cats


In 2012, a veterinarian in the San Fernando Valley reported an ocular parasite in a boxer dog. 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* inside it. The dog had lived in LA County all of its life, confirming that it acquired the infection locally. This parasite is related to *Onchocerca volvulus*, which causes "river blindness" in Africa, Central and South America.[54]

This newly-recognized, zoonotic parasite can form nodules anywhere in and around the eyes and cause a variety of ocular symptoms.[55] Dogs and wild canids are thought to be the reservoirs. It has been seen in dogs in the southwestern United States, in Europe, in 2 cats in Utah, in one child in Arizona and several people in the Middle East and Europe.[55] A review of the literature revealed that this parasite had caused sporadic cases of disease in LA County dogs since at least 1991, but those cases had been initially thought to be a type of parasite originating from livestock.

The life cycle of the *O. lupi* is not known, but a recent collaborative investigation by DPH and partners implicated one species of black fly as the local vector. [55] Cases of *O. lupi* infection in local dogs illustrate how animals can serve as sentinels for the disease. This confirms that the parasite exists in LA County, and that it is possible for more dogs, people or cats to become infected locally. No human or feline cases of *Onchocerca lupi* have been detected in LA County to date.

2005, 2007, 2011 – Canine influenza – three outbreaks

Three clusters of canine influenza (H3N8) were reported to VPH between 2005 and 2013. Canine influenza H3N8 was first reported in dogs in Florida in 2004, after it jumped species from horses to dogs, possibly through the practice of feeding raw horse meat to racing dogs.[56] Clinical signs in dogs include fever, coughing, sneezing, nasal discharge, and occasionally pneumonia and death.[57]

Canine influenza H3N8 has not been reported to cause infection in people or cats. However, the changeable nature of influenza viruses and their ability to infect multiple species highlights the importance of monitoring influenza outbreaks in all species. In 2009, a vaccine became available to help protect dogs from the H3N8 strain of canine influenza.

Canine Influenza H3N8 outbreaks in LA County

- **2005**. An Inglewood veterinarian confirmed four cases of canine influenza H3N8 by serologic testing in dogs that had been at a boarding facility. One died from pneumonia. VPH then performed extensive surveillance to identify more cases for 6 months afterwards. A total of 129 suspected cases were reported during this time. VPH arranged testing on 126 of these case primarily by serologic testing, with some PCR, and virus isolation – all were negative.
- **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.
- **2011**. Four 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 vaccine. They were then transferred to a veterinary practice and developed slight fevers and a mild cough a week after the move. PCR testing on conjunctival and pharyngeal swabs on the day the coughing began were positive for canine influenza. 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 did not completely prevent infection in these dogs, it may have lessened the severity of the disease and helped the animals recover more rapidly.

2006-2011 – Brucellosis in dogs

Between 2006 and 2011, five cases of brucellosis were reported in LA County dogs. This disease is likely under-reported since infected dogs may not always show sign of infection. The disease is caused by bacteria *Brucella canis* and is primarily sexually transmitted between unneutered (intact) dogs. Most infected dogs suffer from stillbirths and abortions (in non-spayed females), and may have enlarged lymph nodes, a dull coat or epididymitis (in unneutered males).[58] Other clinical signs of canine brucellosis include diskospondylitis (infection of intervertebral discs in the spine), lameness, fatigue and appetite loss.[58]

Canine brucellosis is usually transmitted between dogs through breeding. The bacteria can also spread by contact with urine or placenta from a sick dog. Infected dogs may shed the bacteria in their urine, semen or milk (nursing dogs) for up to a year.[58] It is estimated that 1-8% of dogs in the USA are infected with brucellosis.[59] Treatment can often help alleviate clinical signs in dogs, but does not necessarily prevent the disease from spreading, because treatment failures and relapses are common.[60]

Human infection with canine brucellosis is rare, however cases in people can be difficult to diagnose. Diagnostic tests for brucellosis in people are designed to detect other species of *Brucella* bacteria (such as *Brucella melitensis*), which can have significantly different laboratory characteristics than canine brucellosis.[58] People may be exposed to *Brucella canis* through contact with contaminated urine or placenta from infected dogs. Symptoms in people may include, nighttime fever, headaches, chills, enlarged lymph nodes, and occasionally more serious signs such as joint, heart valve, bone, or brain infections.[58]

The five cases reported to VPH included:

- An 8-year old neutered male Labrador with repeated episodes of diskospondylitis. The dog likely acquired the disease through living with an infected unneutered dog.
- A 2-year old female Maltese and 7-year old Yorkshire terrier. The female aborted a litter of three puppies.
- A 6-year old unspayed (intact) female German shepherd with vaginal bleeding before giving birth early to seven puppies. The puppies survived and were bottle-fed.
- A 1-year old Yorkshire terrier mix with fever and diskospondylitis that had been neutered 6 months prior to illness. The dog was a rescue case so it was unknown if it had bred at an earlier time. One of the treating veterinarians became infected with the bacteria.

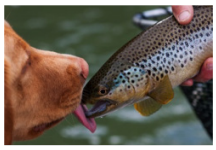
People caring for dogs infected with *Brucella canis* should be advised to wear gloves when cleaning up urine and wash their hands after handling the dog. Infected dogs should not be allowed to mate with other dogs, and should be spayed or neutered. Breeders should routinely test their dogs for brucellosis before breeding.

2009 – Pandemic H1N1 Influenza in a cat

In December 2009, an 8 year-old spayed female domestic shorthair cat was presented to a local veterinarian with mild respiratory signs (sneezing, mild ocular discharge, and mild lethargy). The cat's owner had been sick several days prior and tested positive for pandemic H1N1 influenza. Since the cat had very close contact with the owner during the owner's convalescence, the owner became concerned when the cat started exhibiting mild signs of respiratory disease. Swab samples (deep pharyngeal and conjunctival pooled together) were submitted by the veterinarian to laboratories for a panel of PCR tests for feline upper respiratory disease at a commercial veterinary laboratory. The cat tested positive on PCR for both H1N1 influenza virus and for *Mycoplasma felis*. The virus was confirmed to be the same as the H1N1 pandemic influenza virus that spread globally in 2009. Another companion animal in the household (dog) never became ill and the cat fully recovered with supportive treatment.

This case is an example of a reverse zoonosis, showing how diseases can jump across species, including from humans to animals. This presents a practical reminder to practice good hygiene and minimize contact with pets to prevent disease transmission.

2006-2013 – Salmon Poisoning Disease



Between 2003 and 2013, 15 dogs with salmon poisoning disease (SPD) were reported in LA County. SPD causes fever, lethargy, vomiting, bloody diarrhea, enlarged lymph nodes, which may lead to shock and death in dogs.[61] SPD is not known to cause illness in people or cats.

Despite its name, SPD is not caused by a poison and most cases are associated with trout, not salmon. Dogs with SPD become infected with a parasite called *Nanophyteus salmincola*, by consuming raw infected trout.[61] These parasites carry bacteria called *Neorickettsia helminthoeca*, which cause the disease.[61] Dogs are diagnosed by finding the microscopic eggs from the parasite in a stool sample.

Interestingly, the parasite and bacteria do not cause illness in the trout themselves. Trout become infected with the parasite in places where fisheries are infested with certain types of snails, primarily in Northern California, Oregon, and Washington.[61] Trout from these fisheries are used to stock lakes in Southern California for sport fishing.

Because of the severity of the illness, hospitalization with aggressive intravenous fluid therapy is often needed to treat affected dogs.[61] Dogs must be treated with very specific types of antibiotics and anti-parasitic medications to treat both the parasitic and bacterial parts of the infection.[61]

Of the 15 cases reported:

- 13 were confirmed by detecting the *Nanophyteus* parasite eggs in a stool sample, and 2 were suspected based on clinical signs and a history of consuming raw trout.

- The majority (12 cases) lived in the Antelope Valley area.
- The disease can be transmitted when dogs ingest even the slime layer from infected fish. One dog was infected after licking water on the ground where a raw trout had been rinsed off with a hose.

Helpful Resources

Priority List of Reportable Animal Diseases
http://publichealth.lacounty.gov/vet/docs/AnimalReportList2013.pdf

Disease reporting forms
http://publichealth.lacounty.gov/vet/Forms.htm

Animal Diseases, Conditions and Data
http://www.publichealth.lacounty.gov/vet/AnimalDiseaseList.htm

Consultation with a Public Health Veterinarian
For any questions or something unusual.
During working hours (8:00am-5:00pm Monday-Friday), a Veterinarian-On-Duty can be reached at 213-989-7060. Or email us at vet@ph.lacounty.gov.

Overview of Animal Disease Reporting in Los Angeles County
http://www.publichealth.lacounty.gov/vet/disintro.htm

Animal Health Alert Network
The Animal Health Alert Network is an email system 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.

Articles in Pulse Magazine the official publication of the Southern California Veterinary Medical Association (SCVMA)
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.

Summary Table of Animal Diseases in Pulse
Each month, the SCVMA provides space in Pulse for VPH to share total case count of several diseases, including heartworm, parvo, and more.

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

References

1. Centers for Disease Control and Prevention. One Health. October 18, 2013. Available from: http://www.cdc.gov/onehealth/.
2. Centers for Disease Control and Prevention. CDC and Zoonotic Disease. January 22, 2015. Available at: http://www.cdc.gov/about/facts/cdcfastfacts/zoonotic.html.
3. Office of Assessment and Epidemiology, Los Angeles County Department of Public Health. 2007 Los Angeles County Health Survey Background Summary & Methodology. Available at: http://www.publichealth.lacounty.gov/ha/LACHSBackMeth2007.htm.
4. Veterinary Public Health Program, Los Angeles County Department of Public Health. Important animal laws and regulations. December 10, 2014. Available at: http://publichealth.lacounty.gov/vet/Laws.htm.
5. Khan A. Public health preparedness and response in the USA since 9/11: a national health security imperative. The Lancet. 2011; (378)(9794):953-956.
6. Ehnert K, Galland GG. Who's guarding the gate? Veterinary Clinics of North America. 2009; 39(2):359-371.
7. Veterinary Public Health Program, Los Angeles County Department of Public Health. Animal Disease Surveillance. Available at: http://www.publichealth.lacounty.gov/vet/surveillance.htm.
8. Centers for Disease Control and Prevention. Rabies, animal. 1997 Case Definition. April 29, 2015. Available at: http://wwwn.cdc.gov/nndss/conditions/rabies-animal/case-definition/1997/.
9. California Department of Public Health. California mosquito-borne virus surveillance & response plan. April 2015. Available at: http://www.cdph.ca.gov/programs/vbds/Documents/2015CAResponsePlan.pdf.
10. National Association of State Public Health Veterinarians. Compendium of Measures To Control *Chlamydophila psittaci* Infection Among Humans (Psittacosis) and Pet Birds (Avian Chlamydiosis), 2010. Available at: http://www.nasphv.org/Documents/Psittacosis.pdf.
11. Centers for Disease Control and Prevention. Zoonotic Diseases. October 18, 2015. Available at: http://www.cdc.gov/onehealth/zoonotic-diseases.html.
12. California Department of Public Health. Epidemiology and Surveillance. 2013. Available at: http://www.cdph.ca.gov/programs/hai/Documents/Slide-Set-6-Basics-of-Epidemiology-and-Surveillance.pdf.
13. Ehnert K, Beeler E, Coelho L, *et al*. Healthy Pets, Healthy Families Initiative. February 2014. Available at: http://publichealth.lacounty.gov/vet/docs/2014HPHFCommunityReport.pdf.
14. Henning KJ. Overview of Syndromic Surveillance – What is Syndromic Surveillance? MMWR. 2004;53(Suppl):5-11.
15. Banyard AC, Horton DL, Freuling C, Müller T, and Fooks AR. Control and prevention of canine rabies: The need for building laboratory-based surveillance capacity. Antiviral Research 2013; 98:357-364.
16. Davis A, *et al*. Naturally-acquired rabies virus infections in wild-caught bats. Vector-borne Zoonot. 2012; 12(1):55-60.
17. Centers for Disease Control and Prevention. US Declared Canine-Rabies Free. September 7, 2007. Available at: http://www.cdc.gov/news/2007/09/canine_rabies.html.
18. Companion Animal Parasite Council. Heartworm – Canine Heartworm. July 2014. Available at: http://www.capcvet.org/capc-recommendations/canine-heartworm/.
19. American Heartworm Society. Heartworm Basics. 2015. Available at: https://www.heartwormsociety.org/pet-owner-resources/heartworm-basics.
20. Sacks BN, Chomel B, and Kastens RW. Modeling the distribution and abundance of the non-native parasite, canine heartworm, in California coyotes. Oikos Journal. 2004;105:415-425.
21. Sacks BN, Caswell-Chen EP. Reconstructing the spread of *Dirofilaria immitis* in California coyotes. J. Parasitol. 2003;89(2):319-323.

22. American Heartworm Society. Summary of the Current Canine Guidelines for the Prevention, Diagnosis, and Management of Heartworm (Dirofilaria immitis) Infection in Dogs. 2014. Available at: https://heartwormsociety.org/images/pdf/Canine-Guidelines-Summary.pdf.

23. American Heartworm Society. Summary of the Current Feline Guidelines for the Prevention, Diagnosis, and Management of Heartworm (Dirofilaria immitis) Infection in Cats. 2014. Available at: https://heartwormsociety.org/images/pdf/Feline-Guidelines-Summary.pdf.

24. Greene CE. Infectious Diseases of the Dog and Cat, 3rd Edition. Chapter 44: Leptospirosis. Elsevier Ed. St. Louis, MO.

25. Centers for Disease Control and Prevention. Leptospirosis – Signs and Symptoms. January 13, 2013. Available at: http://www.cdc.gov/leptospirosis/symptoms/index.html.

26. Mitchell, KD. Canine Parvovirus. The Merck Veterinary Manual. February 2015. Available at: http://www.merckvetmanual.com/mvm/digestive_system/diseases_of_the_stomach_and_intestines_in_small_animals/canine_parvovirus.html?qt=canine%20parvovirus&alt=sh.

27. Welborn LV, *et al*. 2011 AAHA Canine Vaccination Guidelines. Journal of the American Animal Hospital Association. 2011. Available at: https://www.aaha.org/public_documents/professional/guidelines/caninevaccineguidelines.pdf.

28. Centers for Disease Control and Prevention. Valley Fever (Coccidiomycosis). November 20, 2014. Available at: http://www.cdc.gov/fungal/diseases/coccidioidomycosis/.

29. Centers for Disease Control and Prevention. Ten Things to Know about Valley Fever. May 22, 2014. Available at: http://www.cdc.gov/features/valley-fever-10-things/.

30. Centers for Disease Control and Prevention. Symptoms of Valley Fever (Coccidioidomycosis). November 20, 2014. Available at: http://www.cdc.gov/fungal/diseases/coccidioidomycosis/symptoms.html.

31. Greene CE. Infectious Diseases of the Dog and Cat, 3rd Edition. Chapter 62: Coccidioidomycosis and Paracoccidioidomycosis. Elsevier Ed. St. Louis, MO.

32. Centers for Disease Control and Prevention. West Nile virus. February 15, 2015. Available at: http://www.cdc.gov/westnile/.

33. Centers for Disease Control and Prevention. West Nile Virus in the United States: Guidelines for Surveillance, Prevention, and Control, 4th Revision. June 14, 2013. Available at: http://www.cdc.gov/westnile/resources/pdfs/wnvGuidelines.pdf.

34. Center for Food Safety and Public Health. West Nile Virus Infection. August 2013. Available at: http://www\.cfsph.iastate.edu/Factsheets/pdfs/west_nile_fever.pdf.

35. Centers for Disease Control and Prevention. West Nile Virus Transmission Cycle. Available at: http://www.cdc.gov/westnile/resources/pdfs/13_240124_west_nile_lifecycle_birds_plainlanguage_508.pdf.

36. Nash D, *et al*. The outbreak of West Nile virus infection in the New York City area in 1999. The New England Journal of Medicine. 2001;344(24):1807-1814.

37. Centers for Disease Control and Prevention. West Nile virus - Final Annual Maps & Data for 1999-2013. April 24, 2015. Available at: http://www.cdc.gov/westnile/statsMaps/finalMapsData/index.html.

38. Eidson M, et al. Dead Bird Surveillance as an Early Warning System for West Nile Virus. Emerg. Infect. Dis. 2001;7(4).

39. Acute Communicable Disease Control Program, Los Angeles County Department of Public Health. Annual Morbidity Report and Special Studies Report. 2013. Available at: http://publichealth.lacounty.gov/acd/reports/annual/2013Annual.pdf.

40. International Fund for Animal Welfare. How much is that doggie on my browser – The truth behind online puppy sales. Available at: http://www.ifaw.org/sites/default/files/ifaw-report-how-much-is-that-doggie-on-my-browser.pdf.

41. Dogs Trust. The puppy smuggling scandal – An investigation into the illegal entry of dogs into Great Britain under the Pet Travel Scheme. 2014. Available at: https://www.dogstrust.org.uk/press-materials/dt_puppy_smuggling_report_v12_web(1).pdf.

42. Ehnert K, Kim-Farley R. Health Practice: What Works. Chapter 18: Reducing Zoonoses: Controlling Animal Importation. Oxford Press.

43. Centers for Disease Control and Prevention. Multistate Outbreak of Monkeypox – Illinois, Indiana, and Wisconsin, 2003. Morbidity and Mortality Weekly Report. June 13, 2003;52(23):537-540.

44. Centers for Disease Control and Prevention. Bringing a Dog into the United States. December 22, 2014. Available at: http://www.cdc.gov/importation/bringing-an-animal-into-the-united-states/dogs.html.

45. Centers for Disease Control and Prevention. Animal Importation – Rabies-Free Countries and Political Units. March 3, 2015. Available at: http://www.cdc.gov/animalimportation/rabies-free-countries.html.

46. Centers for Disease Control and Prevention. Bringing a Cat into the United States. November 1, 2011. Available at: http://www.cdc.gov/importation/bringing-an-animal-into-the-united-states/cats.html.

47. National Institute of Allergy and Infectious Diseases, National Institute of Health. Biodefence and Emerging Infectious Diseases. February 25, 2015. Available at: http://www.niaid.nih.gov/topics/biodefenserelated/biodefense/pages/cata.aspx.

48. Zehnder AM, *et al. Burkholderia pseudomallei* Isolates in 2 Pet Iguanas, California, USA. Emerging Infectious Diseases. February 2014;20(2).

49. United States Geological Survey. Field Manual of Wildlife Disease – General Field Procedures and Diseases of Birds. Chapter 25: Trichomoniasis. 1999. Available at: http://www.nwhc.usgs.gov/publications/field_manual/chapter_25.pdf.

50. Maritz JM, Land KM, Carlton JM, and Hirt RP. What is the importance of zoonotic trichomonads for human health? Trends Parasitol. 2014;30(7):333-341.

51. United States Geological Survey. Field Manual of Wildlife Disease – General Field Procedures and Diseases of Birds. Chapter 38: Avian Botulism. 1999. Available at: http://www.nwhc.usgs.gov/publications/field_manual/chapter_38.pdf.

52. Center for Food Safety and Public Health. Cryptococcosis. August 2013. Available at: http://www.cfsph.iastate.edu/Factsheets/pdfs/cryptococcosis.pdf.

53. Greene CE. Infectious Diseases of the Dog and Cat, 3rd Edition. Chapter 61: Cryptococcosis. Elsevier Ed. St. Louis, MO.

54. World Health Organization. Onchocerciasis. March 2015. Available at: http://www.who.int/mediacentre/factsheets/fs374/en/.

55. Hassan KH, et al. Isolation of Onchocerca lupi in Dogs and Black Flies, California, USA. Emerging Infectious Diseases. May 2015;21(5).

56. Harder TC and Vahlenkamp TW. Influenza virus infections in dogs and cats. Vet Immunol Immunopathol. 2010;134(1-2):54-60.

57. Center for Food Safety and Public Health. Influenza. June 2014. Available at: http://www.cfsph.iastate.edu/Factsheets/pdfs/influenza.pdf.

58. Center for Food Safety and Public Health. Canine Brucellosis: *Brucella canis*. April 2012. Available at: http://www.cfsph.iastate.edu/Factsheets/pdfs/brucellosis_canis.pdf.

59. Council of State and Territorial Epidemiologists. Enhanced Laboratory Capability and Public Health Reporting for *Brucella canis* infections. Available at: http://c.ymcdn.com/sites/www.cste.org/resource/resmgr/PS/12-ID-03FINAL.pdf.

60. Greene CE. Infectious Diseases of the Dog and Cat, 3rd Edition. Chapter 40: Canine Brucellosis. Elsevier Ed. St. Louis, MO.

61. Greene CE. Infectious Diseases of the Dog and Cat, 3rd Edition. Chapter 27: Salmon Poisoning Disease. Elsevier Ed. St. Louis, MO.

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

DISEASE PRIORITY LIST 2013

✉ All Diseases on the Reportable Disease List of the California Department of Food and Agriculture (CDFA)	☎ Hemorrhagic Fevers, viral(Crimean-Congo, Ebola, Lassa, Marburg)	✉ West Nile Virus
☎ Anthrax	✉ Influenza (any type)	✉ Yersiniosis
✉ Babesiosis	⑦ Leptospirosis	☎ Unusual disease
☎ Botulism	✉ Listeriosis	☎ Outbreak of any disease
✉ Bovine Spongiform Encephalopathy	⑦ Lyme Disease	
☎ Brucellosis (any type)	✉ Methicillin-resistant *Staphylococcus* spp	
☎ *Burkholderia pseudomallei*	✉ Mycobacterium spp	
✉ Calicivirus, feline virulent	⑦ *Onchocerca lupi*	
⑦ Campylobacteriosis	⑦ Parvovirus	
⑦ Chagas Disease	⑦ Panleukopenia	
✉ Chronic Wasting Disease	☎ Plague	
⑦ Coccidioidomycosis	✉ Psittacosis	
☎ Contamination of food product-suspected	✉ Pseudorabies	
⑦ Distemper	☎ Q Fever	
✉ Domoic Acid Poisoning	☎ Rabies	
⑦ Ehrlichiosis	⑦ Rocky Mountain Spotted Fever	
☎ Exotic Newcastle Disease	✉ Salmonellosis	
☎ Foot-and-Mouth Disease	⑦ Salmon Poisoning Disease	
⑦ Giardia	☎ Screw worm myiasis	
☎ Glanders	✉ *Streptococcus equi* (Strangles)	
⑦ Heartworm	⑦ Tetanus	
⑦ Hemorrhagic gastroenteritis (HGE) of dogs	☎ Tularemia	
	☎ Viral Encephalitis (EEE, WEE, VEE, Japanese Enceph)	

In Los Angeles County, report all diseases in this list **and the list of the California Department of Food and Agriculture (CDFA)** to the Los Angeles County Veterinary Public Health office.

We will forward reports to the CDFA as needed.

NOTE: Ringworm and roundworm are not reportable

Report to VPH by:

Phone: (213) 989-7060 or toll free in Los Angeles County (877) 747-2243
Fax: (213) 481-2375. **E-mail:** vet@ph.lacounty.gov **Web:** publichealth.lacounty.gov/vet

CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE
ANIMAL HEALTH BRANCH

January 2013

LIST OF REPORTABLE CONDITIONS FOR ANIMALS AND ANIMAL PRODUCTS*

*Pursuant to Section 9101 of the California Food and Agricultural Code 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). In addition, report any regulatory control program disease or monitored disease.***

EMERGENCY CONDITIONS
Report to AHB or VS Employee within 24 Hours of Discovery

MULTIPLE SPECIES
- **Anthrax (*Bacillus anthracis*)**[1]
- **Crimean Congo Haemorrhagic Fever**[1]
- Foot-and-mouth disease
- Glanders (Farcy) [*Burkholderia mallei (formerly Pseudomonas mallei)]*
- Heartwater [*Ehrlichia ruminantium* (formerly *Cowdria ruminantium)]*
- **Rabies of livestock**[1]
- Screwworm myiasis (*Cochliomyia hominivorax* or *Chrysomya bezziana*)
- Surra (*Trypanosoma evansi*)
- Theileriosis (*Theilera parva parva* or *T. annulata*)
- Vesicular stomatitis
- Livestock exposed to toxic substances that may threaten public health
- Unexplained mortality or diseased animals

BOVINE
- African trypanosomiasis (Tsetse fly diseases)
- Bovine babesiosis (Cattle Tick Fever)
- Bovine spongiform encephalopathy
- Contagious bovine pleuropneumonia (*Mycoplasma mycoides mycoides* small colony)
- Foot-and-mouth disease
- Heartwater [*Ehrlichia ruminantium* (formerly *Cowdria ruminantium)]*
- Hemorrhagic septicemia (*Pasteurella multocida B/Asian or E/African*)
- Lumpy skin disease
- Malignant catarrhal fever (African type)
- Rift Valley fever
- Rinderpest
- Schmallenberg virus
- Theileriosis (*Theilera parva parva* or *T. annulata*)

CAPRINE/OVINE
- Contagious agalactia *(Mycoplasma agalactiae)*
- Contagious caprine pleuropneumonia *(Mycoplasma capricolum capripneumoniae)*
- Foot-and-mouth disease
- Heartwater [*Ehrlichia ruminantium* (formerly *Cowdria ruminantium)]*
- Nairobi sheep disease
- Peste des petits ruminants (Goat plague)
- Rift Valley fever
- *Salmonella abortusovis*
- Schmallenberg virus
- Sheep and goat pox

PORCINE
- African swine fever
- Classical swine fever
- Foot-and-mouth disease
- Japanese encephalitis
- Nipah virus
- Swine vesicular disease
- Vesicular exanthema of swine virus (VESV)

AVIAN SPECIES
- Avian influenza (H5 or H7)
- Exotic Newcastle disease
- Turkey rhinotracheitis (Avian metapneumovirus)

EQUINE
- African horse sickness
- Dourine (*Trypanosoma equiperdum*)
- Glanders (Farcy) [*Burkholderia mallei (formerly Pseudomonas mallei)]*
- Hendra virus (Equine morbillivirus)
- Japanese encephalitis
- Surra (*Trypanosoma evansi*)
- Venezuelan equine encephalomyelitis
- Vesicular stomatitis

CERVIDS/LAGOMORPHS/CAMELIDS
- Viral hemorrhagic disease of rabbits (calicivirus)

REGULATORY CONDITIONS
Report to AHB or VS Employee within Two Days of Discovery

MULTIPLE SPECIES
- ***Brucellosis (B. melitensis, B. abortus, B. suis)***[1]
- *Mycobacterium bovis*
- Pseudorabies (Aujeszky's disease)
- **Tularemia**[1]
- West Nile Virus

BOVINE
- **Bovine brucellosis (*Brucella abortus*)**[1]
- Bovine tuberculosis (*Mycobacterium bovis*)
- Cattle scabies (multiple types)
- Epizootic hemorrhagic disease (EHD)
- Trichomonosis (*Tritrichomonas fetus*)

CAPRINE/OVINE
- **Caprine and ovine brucellosis**[1] (excluding *Brucella ovis)*
- Scrapie
- Sheep scabies (Body mange) (*Psoroptes ovis)*

PORCINE
- **Porcine brucellosis (*Brucella suis*)**[1]
- Pseudorabies (Aujeszky's disease)

AVIAN SPECIES
- Ornithosis (Psittacosis or avian chlamydiosis) (*Chlamydophila psittaci*)
- Pullorum disease (Fowl typhoid) (*Salmonella gallinarum* and *S. pullorum)*

EQUINE
- Contagious equine metritis (*Taylorella equigenitalis*)
- Eastern equine encephalomyelitis
- Equine herpesvirus myeloencephalopathy (EHM)
- Equine infectious anemia
- Epizootic lymphangitis
- Equine piroplasmosis (*Babesia caballi or Babesia equi*)
- West Nile Virus
- Western equine encephalomyelitis

CERVIDS/LAGOMORPHS/CAMELIDS
- **Brucellosis in cervids**[1]
- Chronic wasting disease in cervids
- Hemorrhagic diseases of deer (bluetongue, adenovirus, and epizootic hemorrhagic disease)
- Tuberculosis in cervids

WHERE TO REPORT:

CA Department of Food and Agriculture
Animal Health Branch (AHB)
District Offices:

Redding	**530-225-2140**
Modesto	**209-491-9350**
Tulare	**559-685-3500**
Ontario	**909-947-4462**

AHB Headquarters
CDFA-Animal Health Branch
1220 N St.
Sacramento, CA 95814
Telephone 916-900-5002

OR

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

Remember to call if you see:
Vesicles, Unusual or Unexplained Illness, CNS Signs, Mucosal Diseases, Hemorrhagic Septicemias, Larvae in Wounds, Uncommon Ticks, High Morbidity or Mortality

MONITORED CONDITIONS
Report by Monthly Summaries from Diagnostic Facilities

MULTIPLE SPECIES
- Avian tuberculosis of livestock (*Mycobacterium avium*)
- Echinococcosis/Hydatidosis (*Echinococcus* species)
- Johne's disease (Paratuberculosis) (*Mycobacterium avium paratuberculosis*)
- Leishmaniosis
- Leptospirosis
- Novel influenza virus

BOVINE
- Anaplasmosis (*Anaplasma marginale* or *A. centrale*)
- Bluetongue
- Bovine genital campylobacteriosis (*Campylobacter fetus venerealis*)
- Bovine viral diarrhea
- Enzootic bovine leukosis (Bovine leukemia virus)
- Infectious bovine rhinotracheitis (Bovine herpesvirus-1)
- Johne's disease (Paratuberculosis) (*Mycobacterium avium paratuberculosis*)
- Malignant catarrhal fever (North American)
- Q Fever (*Coxiella burnetii*)
- Taeniasis (*Taenia saginata*)

CAPRINE/OVINE
- Bluetongue
- *Brucella ovis* (Ovine epididymitis)
- Caprine arthritis/encephalitis
- Enzootic abortion of ewes (Ovine chlamydiosis) (*Chlamydophila abortus*)
- Johne's disease (Paratuberculosis) (*Mycobacterium avium paratuberculosis*)
- Maedi-Visna (Ovine progressive pneumonia)
- Q Fever (*Coxiella burnetii*)

PORCINE
- Novel influenza virus
- Porcine cysticercosis (*Taenia solium*)
- Porcine reproductive and respiratory syndrome
- Transmissible gastroenteritis (coronavirus)
- Trichinellosis (*Trichinella spiralis*)

AVIAN SPECIES
- Avian infectious bronchitis
- Avian infectious laryngotracheitis
- Duck viral hepatitis
- Infectious bursal disease (Gumboro disease)
- Mycoplasmosis (*Mycoplasma synoviae* and *Mycoplasma gallisepticum*)

EQUINE
- Equine influenza
- Equine rhinopneumonitis (excluding EHM)
- Equine viral arteritis

CERVIDS/LAGOMORPHS/CAMELIDS
- Camelpox in camels
- Myxomatosis in commercial rabbits

FISH, AMPHIBIAN, CRUSTACEAN, BEE, AND MOLLUSK
- **The list is compatible with the OIE list.**

http://www.oie.int/en/animal-health-in-the-world/oie-listed-diseases-2013/

In LOS ANGELES COUNTY, these conditions are also reportable to Veterinary Public Health at 213-989-7060.

1 Bold type diseases, seen in any species, are reportable to California Department of Public Health
For additional information contact CDFA at: Email cavet@cdfa.ca.gov /website at: www.cdfa.ca.gov/ahfss/ah or USDA at: http://www.aphis.usda.gov/animal_health

Notes

Los Angeles County
Department of Public Health
Veterinary Public Health Program

313 N. Figueroa St. Rm 1127
Los Angeles, CA 90012

Suggested Citation: Veterinary Public Health, Los Angeles County Department of Public Health. 2013 Animal Disease Surveillance Report.
Publication #: LACO-DPH-CDD-VET-2014.1
http://publichealth.lacounty.gov/vet/reports/2013LACountyAnDisSurvReport.pdf
Published: January 2016