CDPH
California Department of Public Health

Rabies Surveillance in California Annual Report 2024

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Rabies Surveillance in California – Annual Report 2024

Introduction

Rabies is a severe zoönotic encephalitis caused by a Rhabdovirus of the genus *Lyssavirus*. All mammals, including humans, are susceptible to infection with rabies virus. Following an incubation period that can range from a few days to several years, early clinical signs and symptoms of rabies are non-specific and can be mistaken for more common conditions. The disease advances rapidly (within 1-2 weeks) to central and peripheral neurologic manifestations. Human rabies patients frequently experience altered mental status, hydrophobia, excessive salivation, and difficulty swallowing due to laryngeal spasms. Animals express classically either “furious” (hyperactivity, hyperexcitability, increased aggression) or “dumb/paralytic” (obtundation, lameness, immobility) forms of rabies. No treatment protocol has proven consistently effective for clinical rabies and all patients with rabies neurologic disease will die within a few days. (Reports of humans surviving clinical rabies are exceedingly rare.) If a person is exposed to the virus, prompt post-exposure prophylaxis (PEP) by administration of rabies immune globulin and vaccine can prevent progression to clinical rabies. There is no PEP protocol that has proven universally effective for animals; animals exposed to a known or suspected rabid animal are either quarantined for a specified period or euthanized.

Rabies has evolved into numerous virus variants (RVV) which are maintained in certain mammalian species; all RVVs are capable of infecting any mammal, including humans. In California, bat RVVs exist throughout the state, while the California skunk RVV is found mostly north of the Tehachapi mountain range. Domestic animals (dogs, cats, and livestock) can be infected with these RVVs through contact with rabid wildlife; but the current rarity of domestic animal rabies in California limits the potential for the virus to evolve and sustain transmission in these species.

Since the early 20th century, the California Department of Public Health (CDPH) has overseen a statewide rabies surveillance and control program. Local departments of public health and environmental health, animal control agencies and shelters, and medical and veterinary practitioners collaborate with CDPH to prevent rabies in California by:

- Providing reliable laboratory services for the diagnosis of rabies in humans and animals,
- Regulating, promoting, and providing rabies vaccination to dogs and other domestic animals to maintain a protective “firewall” that reduces the potential for human exposure,
- Investigating reports of animals that bite humans,
- Evaluating animals for rabies by confinement and observation for a specified period, or by euthanasia and testing,
- Offering recommendations on PEP to persons following a known or suspected exposure to rabies,
- Developing and disseminating preventive education on rabies, and

- Collecting, collating, and reporting surveillance data on rabies in humans and animals.

Reporting and Analysis

The California Code of Regulations (17 CCR §2500) lists rabies that is diagnosed in either humans or animals as a reportable disease. Health care providers, including physicians and veterinarians, having knowledge of a confirmed or suspected case of rabies are required to report this knowledge immediately to the local health officer. Diagnostic testing of human patients who have signs and symptoms suggestive of rabies is challenging, and no single test can accurately diagnose rabies ante-mortem. Therefore, several tests on multiple tissue samples are typically pursued. Diagnosis can be made by detection of virus antigen in nuchal skin biopsy, brain biopsy, or saliva by direct fluorescent antibody assay (DFA) or polymerase chain reaction; or by immunofluorescent antibody assay or Rapid Fluorescent Focus Inhibition Test (RFFIT) demonstration of rabies-specific antibodies in blood or cerebrospinal fluid of previously unvaccinated patients. Infection with rabies is confirmed post-mortem in humans and animals by detection of rabies virus antigen, typically in central nervous system tissue, by DFA performed by a certified public health microbiologist**.** In 2024, 26 local public health laboratories in California employed trained microbiologists and maintained resources to perform rabies testing in animals. The CDPH Viral and Rickettsial Diseases Laboratory (VRDL) provides primary and confirmatory testing for rabies in animals, diagnostic testing of human patients suspected to have rabies, and characterization of rabies viruses to RVV type. Local public health departments report confirmed cases of rabies in humans and animals to CDPH. This surveillance report summarizes information on confirmed cases of rabies in humans and animals reported to CDPH in 2024.

Rabies in Animals

In 2024, specimens from 5,308 animals in California were tested for rabies – approximately 5 percent greater than the annual average of 5,063 specimens tested during the previous ten years, 2014-2023. Of the 54 California counties that submitted at least one animal for rabies testing, the number of animals tested per county ranged from 1 to 700.

In 2024, rabies was confirmed in California in 229 bats, 19 skunks, 4 foxes, 1 coyote, and 1 cat.

Rabies was confirmed in 254 animals, roughly 26 percent higher than the 202 cases confirmed in 2023 and 10 percent above the annual average of 230 cases in 2014-2023 (Table A). One or more rabid animals were identified in 37 counties, which reported between 1 and 50 rabid animals each.

Wild Animals

Rabies was diagnosed in 253 wild animals in 2024, accounting for 99.6 percent of all rabid animals reported to CDPH. Bats (229, 90.5%) were the wild animal most frequently reported rabid, followed by skunks (19, 7.5%), foxes (4, 1.6%), and a coyote (1, 0.4%).

Bats

A total of 1,980 bats from 52 counties were tested for rabies in 2024 (Figure A). The 229 rabid bats reported in 2024 were 18 percent higher than the annual average of 194 reported in the preceding ten years, 2014-2023 (Figure B). The greatest number of rabid bats (50) was reported in Los Angeles County, which reported the most rabid bats in each of the past ten years (Table A, Figure C). The six southern California counties of Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura collectively accounted for 118 (51.5%) of all rabid bats detected in California in 2024. Rabid bats were most frequently reported during the late summer and early autumn months; slightly more than half (124, 54%) of all rabid bats were reported in the three months of August, September, and October (Figure D). Species were identified for 213 rabid bats: 86 Mexican free-tailed bats (*Tadarida brasiliensis*), 71 western pipistrelle (*Parastrellus hesperus*), 16 big brown bats (*Eptesicus fuscus*), 12 California myotis (*Myotis californicus*), 6 Hoary bats (*Laisurus cinereus*), and 1 Western yellow bat (*Lasiurus xanthinus*). Thirteen bats could not be distinguished between little brown bats (*Myotis lucifugus*) and Yuma myotis bats (*M. yumanensis*).

Skunks

A total of 229 skunks (24 *Mephitis mephitis,* 205 unspecified) from 31 counties were tested for rabies in 2024, of which 19 from 6 counties were confirmed rabid (Figure A, B). The 19 rabid skunks in 2024 were fewer than the annual average of 30 in the preceding ten years, 2014-2023. The greatest number of rabid skunks (11; 58%) was reported in Sacramento County.

Foxes

A total of 25 foxes from 18 counties were tested for rabies in 2024. The four confirmed rabid foxes in 2024 were consistent with the annual average of four foxes reported in the previous 10 years, 2014-2023 (Figure B). Rabies virus variants recovered from the four foxes were characterized as *Myotis californicus* bat (Mendocino and Plumas counties) and California skunk (Monterey and Sacramento counties) variants.

Other wild animals

A total of 46 coyotes from nine counties were tested for rabies in 2024. Rabies was detected in a single coyote from Mariposa County. The RVV was consistent with the Mexican free-tailed bat (*Td brasiliensis*) variant.

Domestic Animals

In 2024, 2,794 domestic animals (dogs, cats, horses, cattle, goats, sheep, and swine) were tested for rabies in California. Rabies was confirmed in one domestic cat.

A 1.5 year-old spayed female American Shorthair cat in Sacramento County was noted to have onset of neurological signs in March 2024. The cat became unusually aggressive and bit two household members. The cat died four days after onset. Testing performed at the Sacramento County Public Health Laboratory confirmed rabies infection. The CDPH VRDL identified the RVV that infected the cat as consistent with

the Mexican free-tailed bat (*Td brasiliensis*) variant. The cat had not been vaccinated against rabies and resided mostly indoors but was allowed access to the outdoors. The owners reported observing the cat playing with a dead bat a few weeks prior to its onset of illness. Four household members received rabies PEP. Two other unvaccinated cats shared space with the rabid cat; both cats were vaccinated immediately and quarantined for six months.

Rabies in Humans

Rabies was diagnosed in one California resident in 2024. In November, an adult female resident of Fresno County developed tingling and spasms in her arm. After three days, she sought medical care and was hospitalized. The patient died four days after being hospitalized. VRDL and CDC's National Rabies Reference Laboratory confirmed rabies virus; viral sequencing identified a RVV consistent with the Mexican free-tailed bat (*Td brasiliensis*) variant. Interview of family and associates by local public health officials revealed that the case-patient had related handling a bat approximately four weeks prior to her onset of symptoms. The case-patient did not consult a medical provider or public health officials following the bat contact. Subsequent to the case-patient's diagnosis, local public health investigators identified no other persons who had contact with the bat in question.

Rabies in the United States

At the time of this report, United States rabies surveillance data for 2024 have not been published.

Discussion

Bats were the animals in which rabies was most frequently identified in 2024, constituting 90 percent of all rabid animals in California. In each of the last 20 years, bats have accounted for 62 to 95 percent of all rabid animals identified in California. Approximately 24 species of bats are permanent or seasonal residents of California. Unique RVVs have been identified for at least 10 of these species, with RVVs occasionally passed between bat species. While some bat species are rare, reclusive, and have limited geographic distribution, others such as the Mexican free-tailed bat are abundant, form colonies into the 100,000s, and are present throughout all of California. In addition, migratory bat species may be found in different parts of the state during different times of the year. Finally, some species may forage up to 50 miles around their roosts each night. It is because of the broad distribution of bat populations and expansive home ranges of individual bats, combined with the numerous RVVs adapted to efficient transmission between bats, that the CDPH Director has declared all of California endemic for rabies each year since 1987.

Rabid bats are the predominant cause of rare human rabies in the U.S. and have been the most frequently reported rabid animal in California since 2000.

In 2024, rabies was confirmed in a California resident for the first time in 12 years. Rabies in humans remains rare in California. The most recent previous human rabies case in California was a Contra Costa County resident who died of rabies in 2012. In the 25 years since 2000, 10 Californians have been diagnosed with rabies. Of these, four were infected by dog bites while outside the U.S., one case-patient's exposure could not be determined, and five were bitten by bats in California, including the 2024 case-patient. Bats are the leading source of exposure for human rabies cases in the U.S., representing approximately 70% of all human rabies cases acquired in the U.S. from 1960 to 2018 [Pieracci 2019]. Bats present a particular concern for rabies because of the large number of species of native bats that encompass a broad geography. Rabies virus variants have adapted to circulate efficiently in at least 20 different bat species. Many bat species are accustomed to roost in natural and constructed areas in cities and other places, bringing them into proximity where people are present.

The small size of many bats' teeth renders little physical evidence of a wound following a bite; the 2024 California rabies case-patient reportedly felt a possible bite while handling a bat but did not seek medical attention when she saw no evidence of a bite wound [Ireland, in press]. Rabies was diagnosed in a Minnesota resident in 2024 who had a similar history of contact with a bat but did not seek medical care. Rabies is fully preventable if PEP is initiated soon after exposure. Any person who experiences a known or possible bite from a bat should immediately discuss with a healthcare provider, in consultation with public health professionals, whether rabies PEP is indicated.

Skunks continued in 2024 to be the second most frequently reported rabid mammal in California. In 2023, 642 rabid skunks were reported nationwide—second only to raccoons (1085) as the most commonly identified terrestrial mammal with rabies [Boutelle 2025]. A RVV circulates in California skunks that is distinct from the North Central and South Central skunk RVVs present in the central U.S., from Texas to North Dakota. The California skunk RVV is maintained chiefly along the western Sierra Nevada foothills including Madera, Mariposa, Tuolumne, Calaveras, Amador, El Dorado, and Placer counties. These seven counties, plus neighboring Sacramento and San Joaquin counties, have accounted for 259 (90%) of 289 rabid skunks detected in the last ten years (2015-2024). Eleven rabid skunks were identified in Sacramento County in 2024; this was more than a two-fold increase from the annual average of five rabid skunks from Sacramento County from 2015-2023, and the first year that the number of rabid skunks in Sacramento County exceeded the combined total (7) from the seven foothill counties. The 11 Sacramento skunks were collected from 10 different zip codes, generally along the American River corridor between Folsom Lake and downtown Sacramento. The 5-10 mile shortest distances between collection sites suggest that these rabid skunks represent widespread enzooticity of rabies and not evidence of an outbreak localized to one or two skunk populations. It is unclear if the relative abundance of skunk rabies in Sacramento and paucity of skunk rabies in

western Sierra foothills in 2024, where it has been historically recognized as enzootic, represents a decisive shift of skunk rabies epizootiology in California toward the valley.

Foxes are the most commonly identified rabid animal species in California for which there is not an adapted RVV. Rabies cases in California foxes represent transmission of virus from other maintenance species, most likely via oral mucous membrane during predation. The four rabid foxes in California in 2024 were infected with either a bat RVV or the California skunk RVV. The rabid fox identified in Sacramento County was collected less than 0.5 mile from where one of the 11 rabid skunks was found. The rabid fox in Monterey County was collected less than two miles from one of the rabid skunks.

In contrast to foxes, coyotes with rabies are infrequently detected in California. The rabid coyote identified in Mariposa County in 2024 was one of only five coyotes in California confirmed with rabies in the last 30 years. Despite being uncommon, rabid coyotes present an elevated risk to humans and domestic pets because they are highly adaptable predators, tolerant of human activities, and adapt and adjust rapidly to perturbations and changes in their environment. Along with opossums, raccoons, and skunks, coyotes are common urban wildlife in my communities, bringing them into close proximity with people and pets. The 2024 rabid coyote was observed to enter a campground with difficulty walking and navigating (colliding with objects) before collapsing and dying. This “dumb/paralytic” form of rabies contrasts with the “furious” form displayed by the rabid coyote reported in Calaveras County in 2015 which was killed after it attacked a domestic dog. As with foxes, coyotes are most likely to become infected with rabies through predation, ie. oral contact with a rabid animal. Typical diet for coyotes are mice and small rodents; a bat with rabies encephalitis that is unable to fly could easily be mistaken for a rodent to a coyote searching for food.

References

Boutelle C, Bonaparte S, Orciari LA, et al. Rabies surveillance in the United States during 2023. *J Am Vet Med Assoc* 2025; 263(10):1310-1317. http://doi.org/http://doi.org/10.2460/javma.25.05.0344

Pieracci EG, Pearson CM, Wallace RM, et al. Vital Signs: Trends in Human Rabies Deaths and Exposure – United States, 1938-2019.M*orb Mortal Wkly Rep* 2019; 68:524-528.

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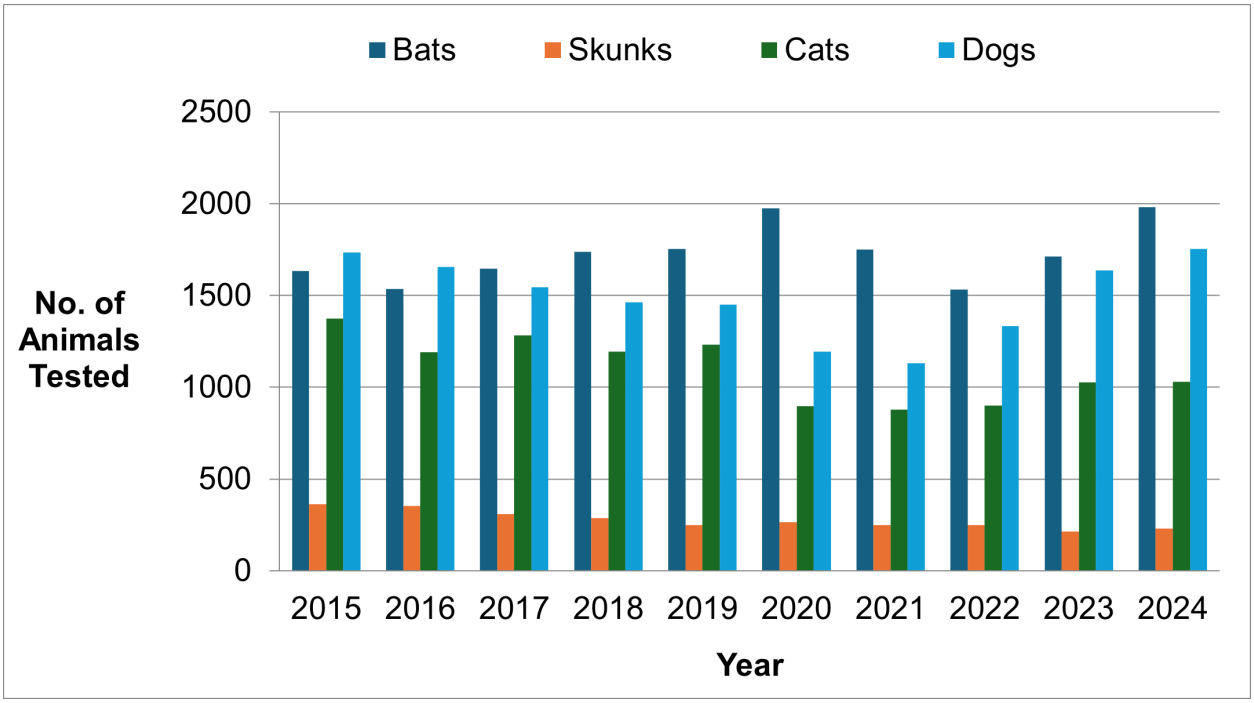
Table A. Reported cases of rabies in animals, California, 2024.

County	Bat	Skunk	Cat	Dog	Coyote	Fox	Horse	Sheep	Cattle	Raccoon	Total
Total	**229**	**19**	**1**	**0**	**1**	**4**	**0**	**0**	**0**	**0**	**254**
Alameda	3	0	0	0	0	0	0	0	0	0	3
- Berkeley City	2	0	0	0	0	0	0	0	0	0	2
Alpine	0	0	0	0	0	0	0	0	0	0	0
Amador	1	2	0	0	0	0	0	0	0	0	3
Butte	3	0	0	0	0	0	0	0	0	0	3
Calaveras	1	0	0	0	0	0	0	0	0	0	1
Colusa	0	0	0	0	0	0	0	0	0	0	0
Contra Costa	6	0	0	0	0	0	0	0	0	0	6
Del Norte	0	0	0	0	0	0	0	0	0	0	0
El Dorado	4	2	0	0	0	0	0	0	0	0	6
Fresno	3	0	0	0	0	0	0	0	0	0	3
Glenn	1	0	0	0	0	0	0	0	0	0	1
Humboldt	0	0	0	0	0	0	0	0	0	0	0
Imperial	0	0	0	0	0	0	0	0	0	0	0
Inyo	0	0	0	0	0	0	0	0	0	0	0
Kern	3	0	0	0	0	0	0	0	0	0	3
Kings	0	0	0	0	0	0	0	0	0	0	0
Lake	0	0	0	0	0	0	0	0	0	0	0
Lassen	0	0	0	0	0	0	0	0	0	0	0
Los Angeles	49	0	0	0	0	0	0	0	0	0	49
- Long Beach City	0	0	0	0	0	0	0	0	0	0	0
- Pasadena City	1	0	0	0	0	0	0	0	0	0	1
Madera	0	0	0	0	0	0	0	0	0	0	0
Marin	10	0	0	0	0	0	0	0	0	0	10
Mariposa	8	0	0	0	1	0	0	0	0	0	9
Mendocino	0	0	0	0	0	1	0	0	0	0	1
Merced	1	0	0	0	0	0	0	0	0	0	1
Modoc	0	0	0	0	0	0	0	0	0	0	0
Mono	0	0	0	0	0	0	0	0	0	0	0
Monterey	2	2	0	0	0	1	0	0	0	0	5

County	Bat	Skunk	Cat	Dog	Coyote	Fox	Horse	Sheep	Cattle	Raccoon	Total
Napa	0	0	0	0	0	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0	0	0	0	0
Orange	13	0	0	0	0	0	0	0	0	0	13
Placer	5	0	0	0	0	0	0	0	0	0	5
Plumas	0	0	0	0	0	1	0	0	0	0	1
Riverside	15	0	0	0	0	0	0	0	0	0	15
Sacramento	5	11	1	0	0	1	0	0	0	0	18
San Benito	1	0	0	0	0	0	0	0	0	0	1
San Bernardino	20	0	0	0	0	0	0	0	0	0	20
San Diego	13	0	0	0	0	0	0	0	0	0	13
San Francisco	2	0	0	0	0	0	0	0	0	0	2
San Joaquin	3	1	0	0	0	0	0	0	0	0	4
San Luis Obispo	8	0	0	0	0	0	0	0	0	0	8
San Mateo	0	0	0	0	0	0	0	0	0	0	0
Santa Barbara	6	0	0	0	0	0	0	0	0	0	6
Santa Clara	10	0	0	0	0	0	0	0	0	0	10
Santa Cruz	3	0	0	0	0	0	0	0	0	0	3
Shasta	0	0	0	0	0	0	0	0	0	0	0
Sierra	0	0	0	0	0	0	0	0	0	0	0
Siskiyou	0	0	0	0	0	0	0	0	0	0	0
Solano	2	0	0	0	0	0	0	0	0	0	2
Sonoma	4	1	0	0	0	0	0	0	0	0	5
Stanislaus	3	0	0	0	0	0	0	0	0	0	3
Sutter	0	0	0	0	0	0	0	0	0	0	0
Tehama	0	0	0	0	0	0	0	0	0	0	0
Trinity	1	0	0	0	0	0	0	0	0	0	1
Tulare	2	0	0	0	0	0	0	0	0	0	2
Tuolumne	0	0	0	0	0	0	0	0	0	0	0
Ventura	6	0	0	0	0	0	0	0	0	0	6
Yolo	8	0	0	0	0	0	0	0	0	0	8
Yuba	1	0	0	0	0	0	0	0	0	0	1

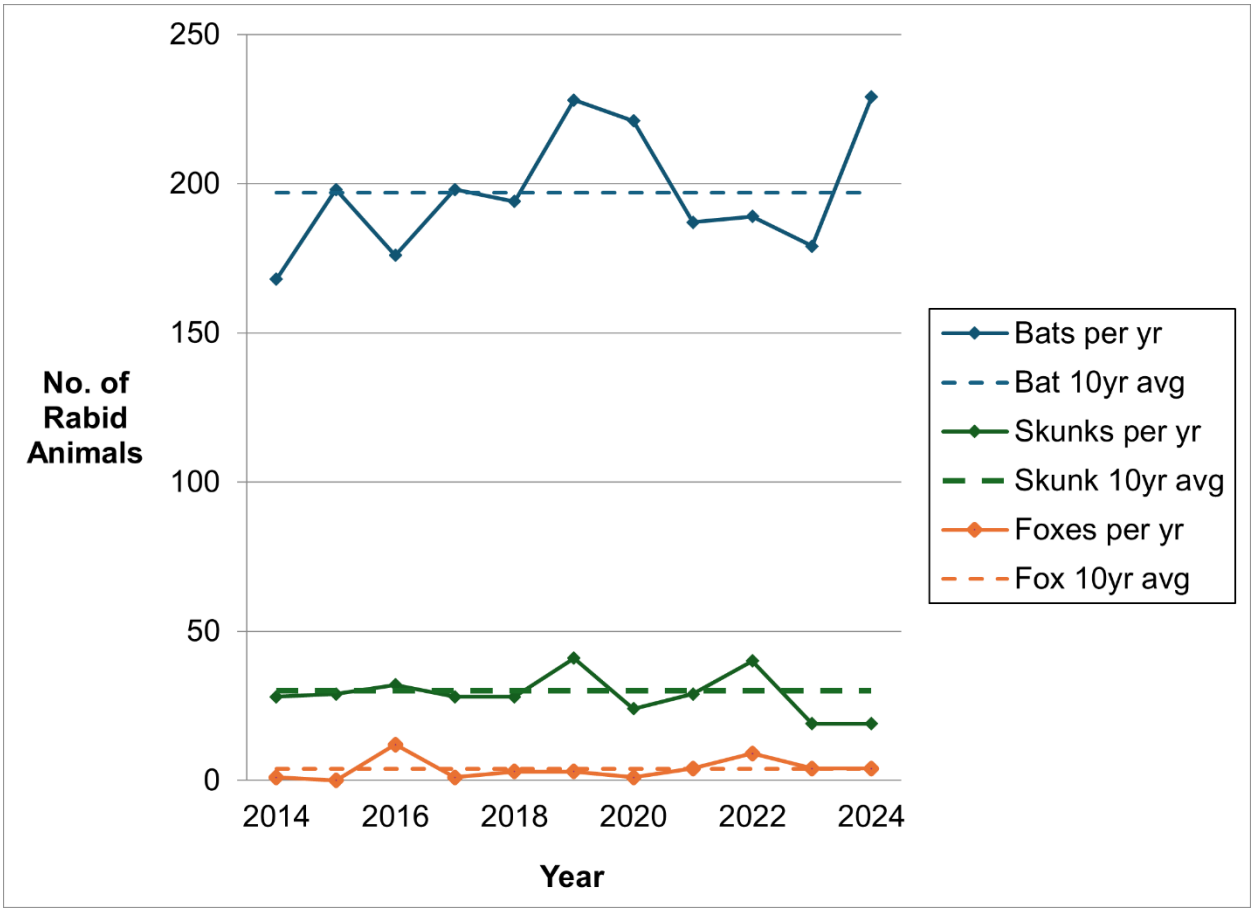
Source: California Department of Public Health, Veterinary Public Health Section

Figure A. Selected wild and domestic animals tested for rabies in California, 2015-2024.



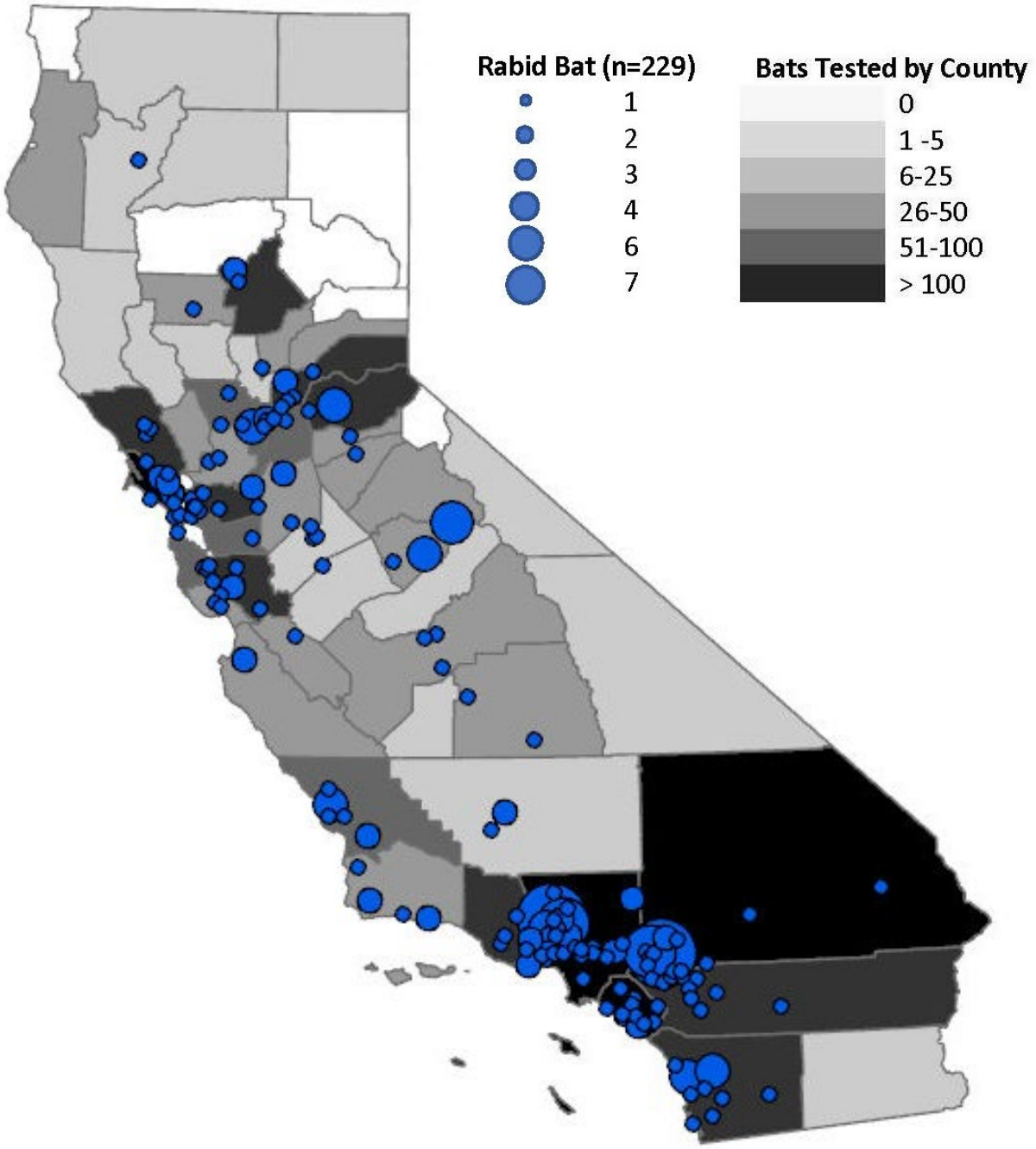
Source: California Department of Public Health, Veterinary Public Health Section

Figure B. Cases of rabies in wild animals in California, 2014-2024. (Ten-year averages represent 2014-2023 data.)



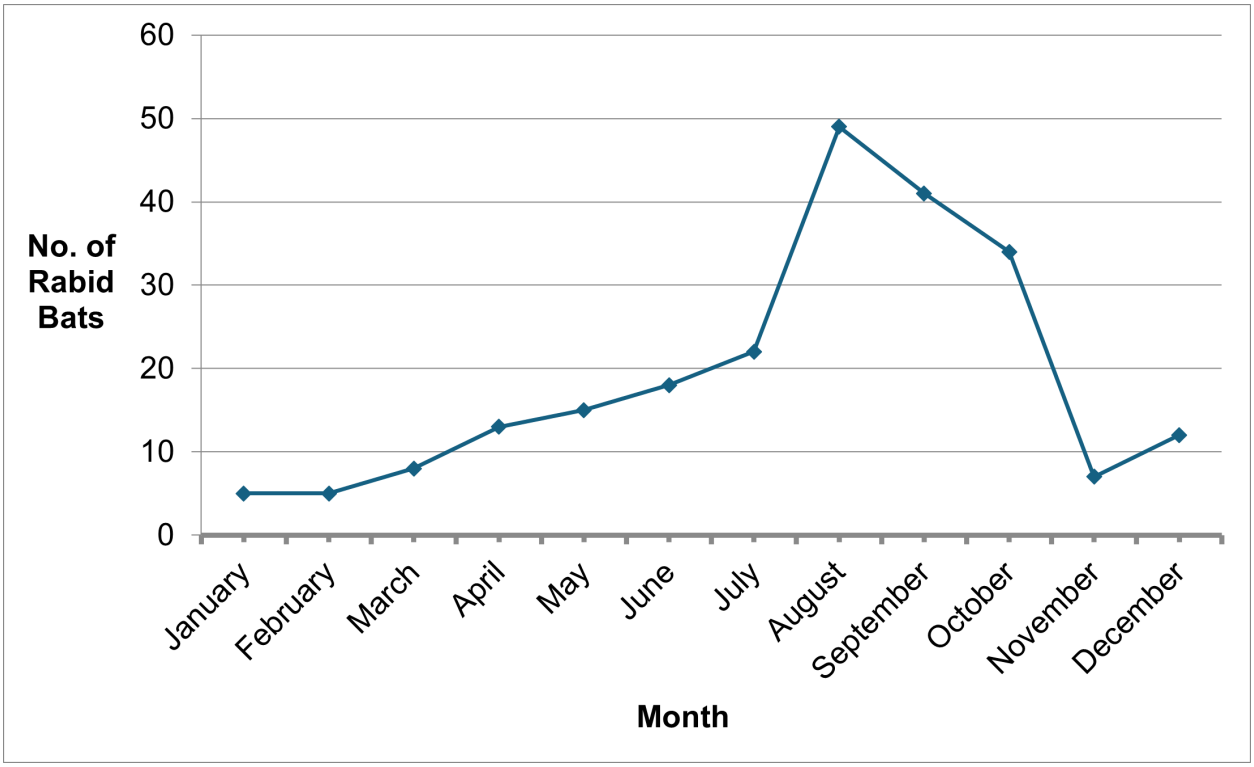
Source: California Department of Public Health, Veterinary Public Health Section

Figure C. Bats tested for rabies by county with positive cases by zip code of collection site, California, 2024.



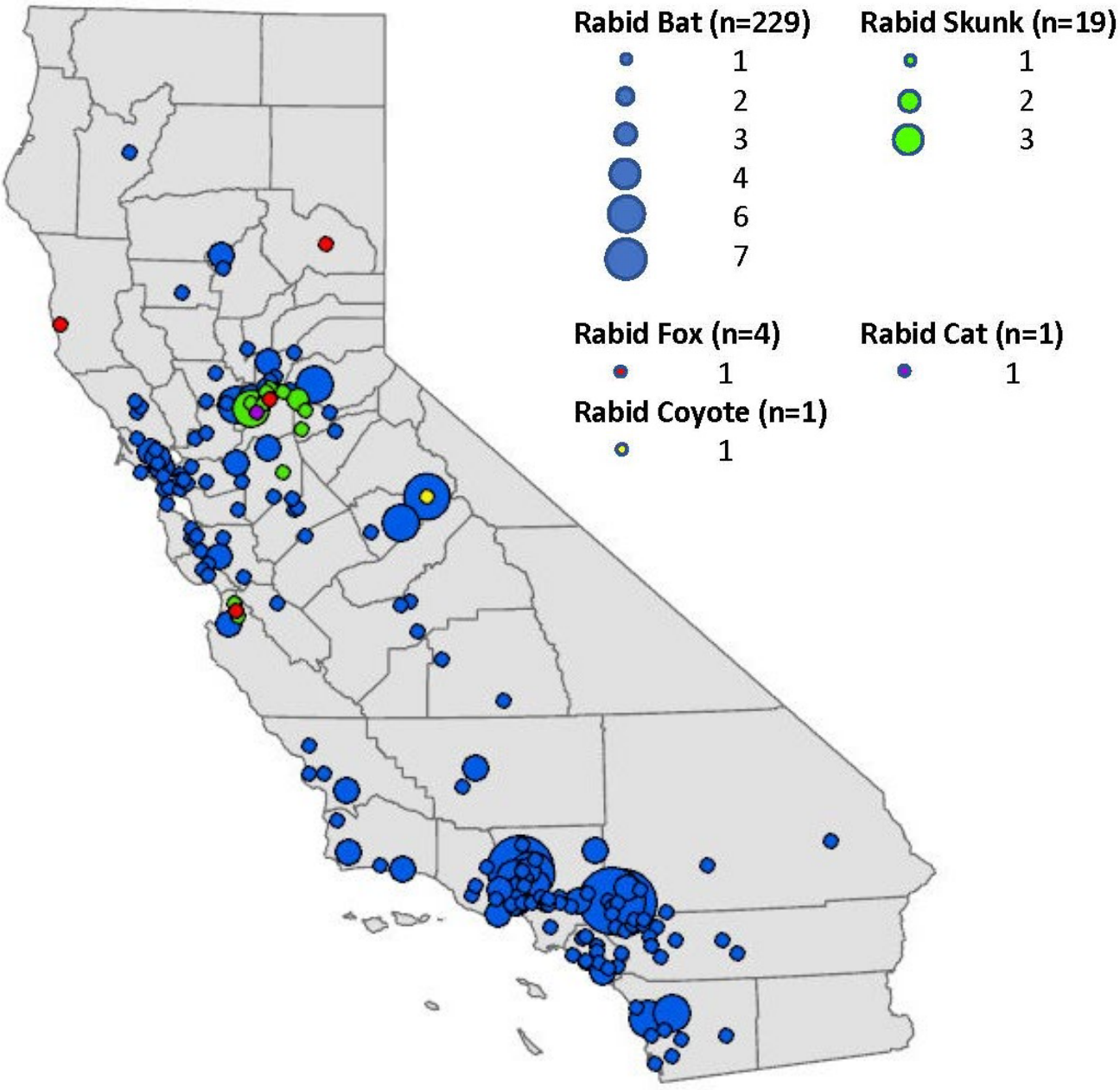
Source: California Department of Public Health, Veterinary Public Health Section

Figure D. Cases of rabies in bats by month of testing, California, 2024.



Source: California Department of Public Health, Veterinary Public Health Section

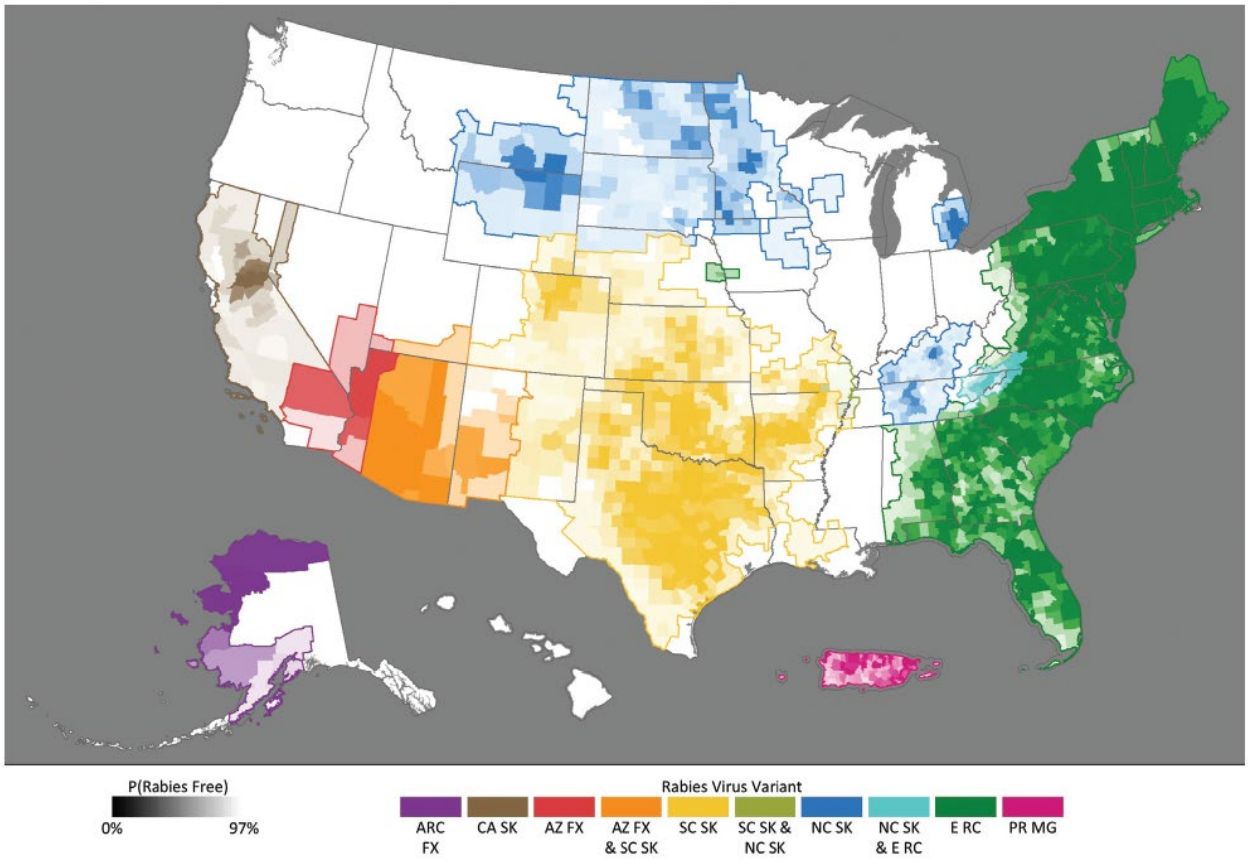
Figure E. Reported cases of rabies in wild animals by zip code of collection site, California, 2024.



Source: California Department of Public Health, Veterinary Public Health Section

Figure F. Distribution of major rabies virus variants (RVVs) among mesocarnivores in the U.S., including Puerto Rico, for 2015 through 2023. Darker shading indicates counties with confirmed animal rabies cases during those nine years. Lighter shading indicates a higher probability of terrestrial rabies freedom as determined by a county-level terrestrial rabies freedom model. Counties with a probability of ≥ 97% are considered terrestrial rabies free (no color). ARC FX = Arctic fox RVV, AZ FX = Arizona gray fox RVV, CA SK = California skunk RVV, E RC = Eastern raccoon RVV, PR MG = Puerto Rico dog-mongoose RVV, NC SK = North Central skunk RVV, SC SK = South Central skunk RVV.

[Note: In 2022, a fox collected at the border of Arizona and California tested positive for the Arizona fox RVV; CDC maps highlight incident and adjacent counties, which can give the appearance that a larger geographic area is at higher risk of terrestrial rabies.]



Source: Boutelle C, Bonaparte S, Orciari LA, et al. Rabies surveillance in the United States during 2023. *J Am Vet Med Assoc* 2025; 263(10):1310-1317.