



SOUTH DAKOTA DEPARTMENT OF HEALTH
**Rabies Surveillance in
South Dakota, 2023**

Background

Rabies is a serious public health and veterinary health concern in South Dakota, with cases in animals reported every year. A viral disease that can be transmitted between animals or from animals to people, rabies is endemic in certain wild animal species in the state. Rabies is almost uniformly fatal in people who show clinical signs of infection with the rabies virus. However, post-exposure prophylaxis is successful at preventing clinical disease in people exposed to the rabies virus. While a human rabies case has not occurred in South Dakota since 1970, substantial resources are spent managing potential exposures to rabies because of its constant presence in the state.

In 2022, the Advisory Committee on Immunization Practices (ACIP) issued formal guidance detailing several changes to rabies pre-exposure prophylaxis recommendations. The new recommendations are detailed in tables near the end of this report, but the changes include transitioning to a pre-exposure prophylaxis regimen of two doses of rabies vaccine (days 0 and 7) instead of the previous three dose regimen, and the formation of rabies-exposure risk categories with corresponding recommendations regarding ongoing vaccination/testing.

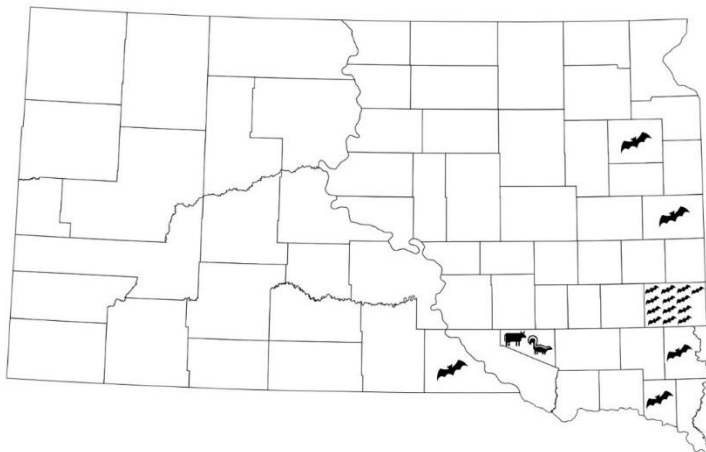
2023 Data

Currently, one South Dakota laboratory offers animal rabies testing services: the Animal Disease Research Diagnostic Laboratory (ADRDL) at SDSU in Brookings, which uses the direct fluorescent antibody (DFA) technique.

In 2023, 20 animals tested positive for rabies in South Dakota (Table 1), a 122% increase from 2022 (9 positives). The rabid animals included only one domestic animal (a cow) and 19 wild animals (18 bats and 1 skunk). No human rabies cases were reported in 2023. Of note, 2023 had the most rabid bats identified in the past decade, at 18 rabid bats. The single rabid bovine was reported from Douglas County; the last previously reported rabid bovine in South Dakota was in 2018.

During the year, 443 animals tested negative for rabies. Companion animals such as dogs and cats, which are commonly vaccinated for rabies in South Dakota, comprised 36% of samples submitted in 2023 for rabies testing. Of these samples, all tested negative for rabies.

Figure 1. Animal rabies in South Dakota, 2023.



In 2023, animals from 52 of South Dakota’s 66 counties were submitted for testing, and animals from 7 of those counties were rabid. Minnehaha County accounted for 38% of all animals submitted for rabies testing.

Table 1. Rabies test results, South Dakota 2023.

	Inconclusive	Negative	Positive	Total
Domestic Animals:				
Cat	4	107		111
Dog	4	65		69
Cow		18	1	19
Horse		4		4
Other Domestic*		2		2
Wild Animals:				
Bat	30	210	18	258
Skunk		5	1	6
Raccoon	3	19		22
Squirrel/Chipmunk		5		5
Other Wild**	2	8		10
Total	43	443	20	506
*Other Domestic includes 1 each goat, sheep.				
**Other Wild includes elk, mouse, opossum, rabbit/hare, rat, woodchuck, and other.				

Rabies Surveillance in South Dakota, 2014-2023

At times rabies testing has been performed at both the State Public Health Laboratory in Pierre and the South Dakota State University (SDSU) Animal Disease Research and Diagnostic Laboratory (ADRDL) in Brookings; however, during the COVID-19 Pandemic a modification was made, and rabies testing is now only performed in South Dakota at SDSU ADRDL.

Since the beginning of 2014, a total of 5,774 animals originating from South Dakota have been tested for rabies (Table 2). A total of 184 positive samples have been found, a 3.4% positivity rate when excluding inconclusive samples. Domestic animals accounted for 8.7% of positive rabies cases, including 10 cats and 6 dogs. Rabies in vaccinated companion animals is exceedingly rare, and it is very likely these were unvaccinated animals. Rabid livestock during this period included 15 bovine and two goats. Livestock species are not as commonly vaccinated for rabies as are canine and feline companion animals.

Figure 2. Total positive rabies cases in South Dakota, 2014-2023.

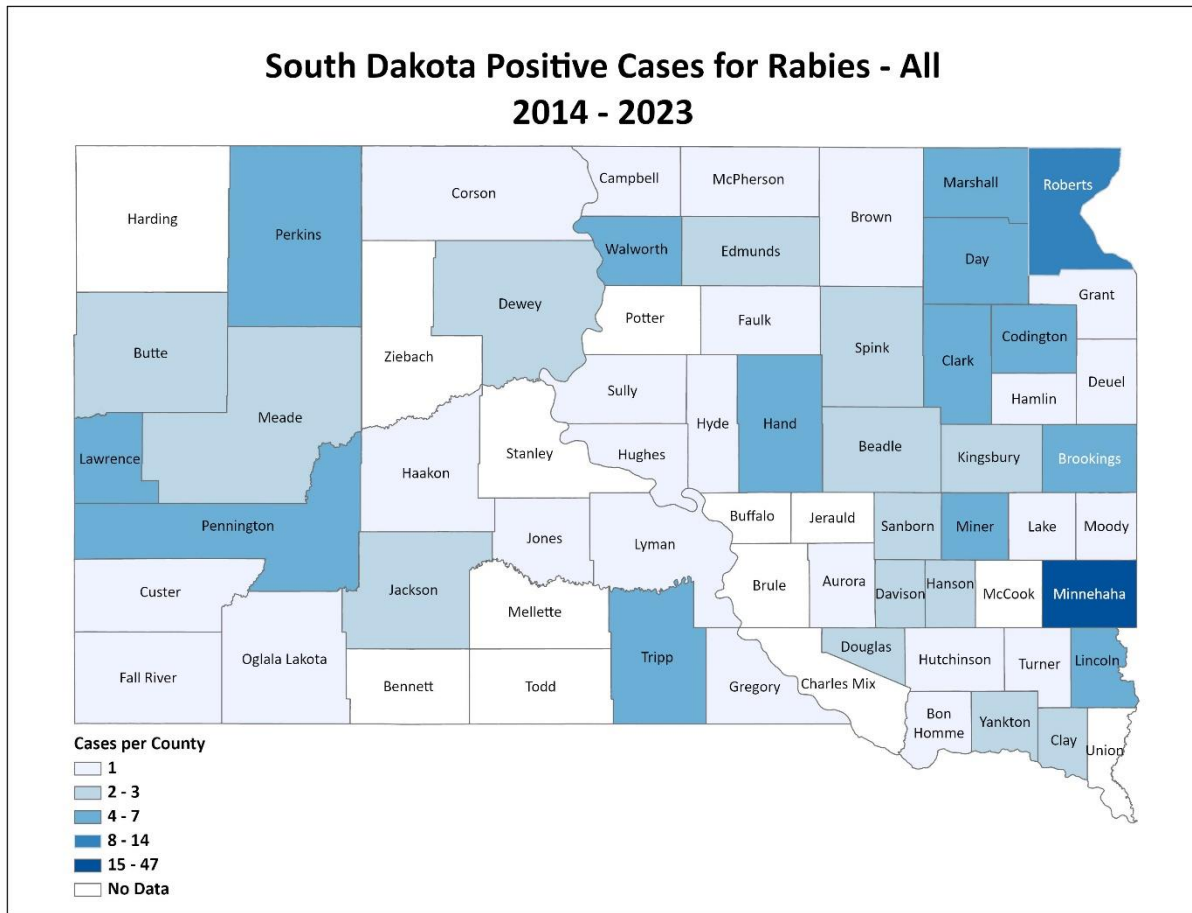


Table 2. Rabies test results, South Dakota 2014-2023.

	Positive	Negative	Inconclusive	Total
Domestic Animals:				
Cat	10	1418	44	1472
Dog	6	802	36	844
Cow	15	476	55	546
Horse		63	3	66
Sheep		22	1	23
Goat	2	25	1	28
Other Domestic*	0	8	0	8
Wild Animals:				
Bat	84	1682	138	1904
Skunk	65	122	23	210

Raccoon	2	329	41	372
Squirrel/Chipmunk		47	3	50
Deer		32	1	33
Muskrat		32	6	38
Opossum		20	5	25
Mouse		18	3	21
Coyote		16	1	17
Fox		13		13
Woodchuck		14	2	16
Rat		13	3	16
Rabbit/Hare		6	1	7
Gopher		5	1	6
Mink		6	2	8
Other Wild**	0	47	4	51
Total	184	5216	374	5774

*Other Domestic includes 3 each donkey and ferrets; 1 llama, and 1 pig.

**Other Wild includes 4 shrews; 3 prairie dogs; 2 each beaver and badger; 1 each elk, vole, weasel, and wolf; 36 'other' species.

The two cases of rabies found in raccoons during 2014-2023 were spillover exposures from skunks. Rabies is not endemic in raccoons in South Dakota as it is in other parts of the US (eastern states, for example). Skunks are the primary terrestrial reservoirs of rabies in South Dakota. During the 2014-2023 time, 35% of skunks have been positive for rabies, excluding inconclusive samples (Figure 2). The other primary reservoir of rabies in South Dakota is bats; from bats tested during 2014-2023, the known positivity rate has been 4.8%.

Figure 3.

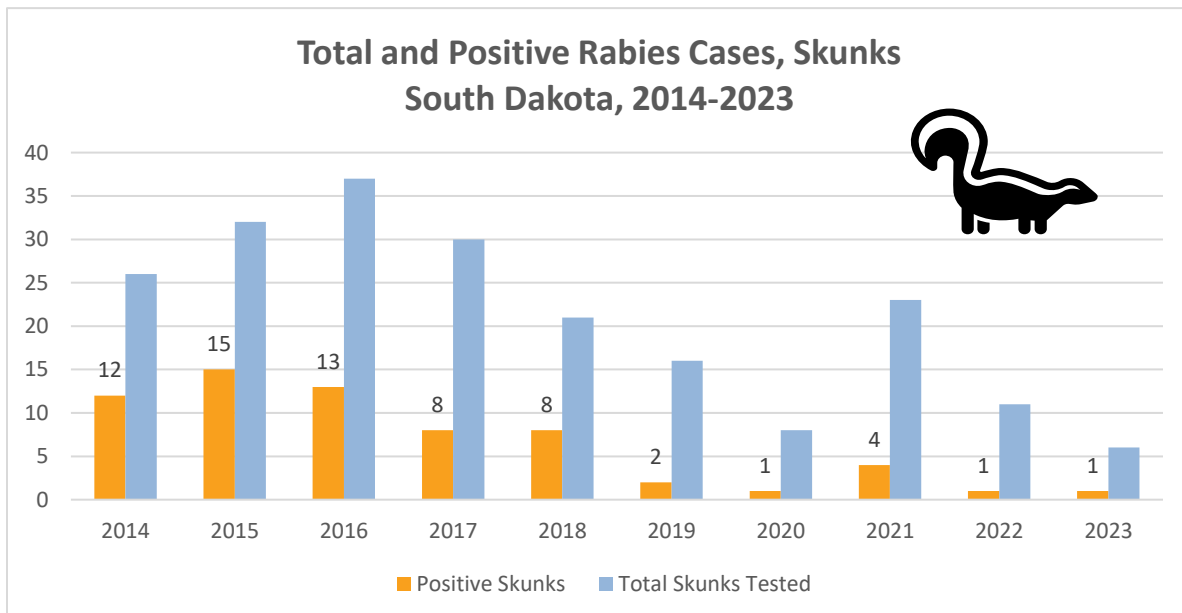


Figure 4. Total positive skunk rabies cases in South Dakota, 2014-2023.

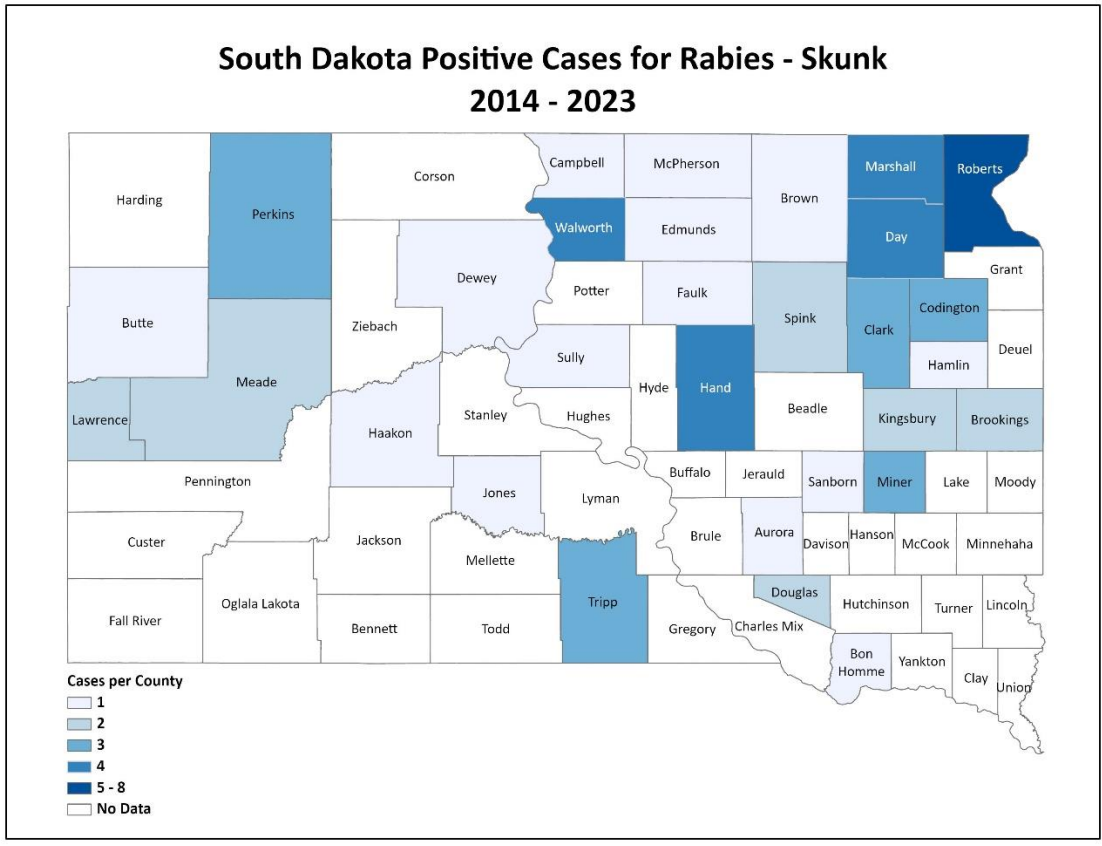


Figure 5.

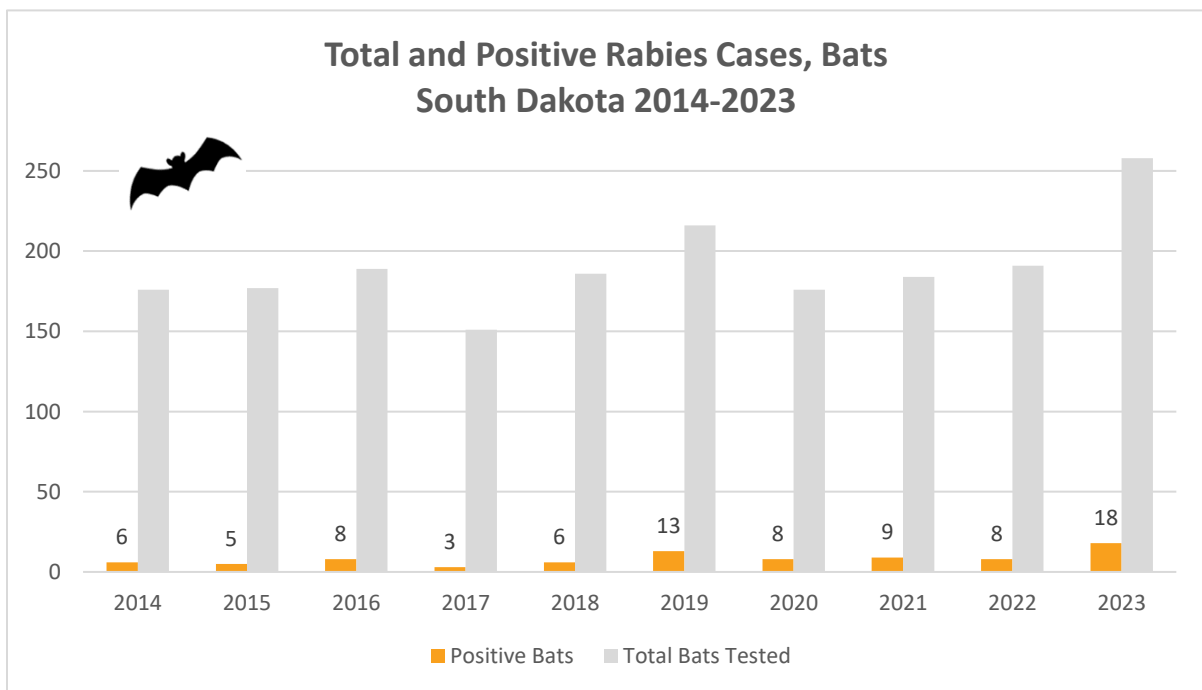
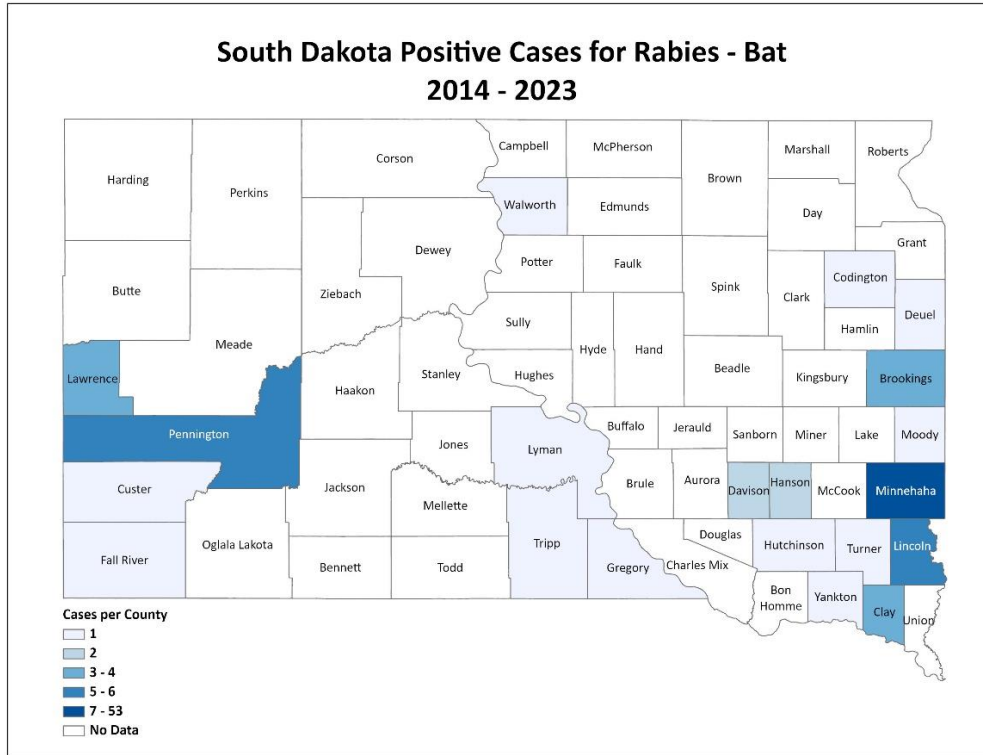


Figure 6. Total positive bat rabies cases in South Dakota, 2014-2023.



During the 2014-2023 period, rabid animals were identified in South Dakota during each calendar month (Figure 7). More rabid animals were detected during the month of August, at 33, than any other month. January contained the fewest rabies diagnoses, at three.

Figure 7.

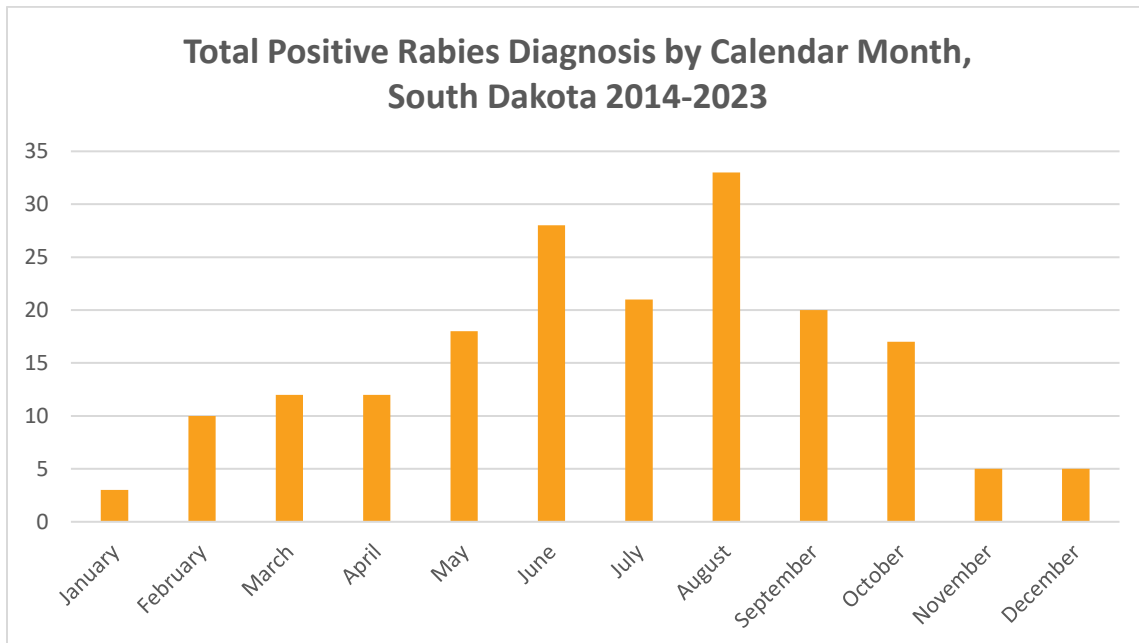
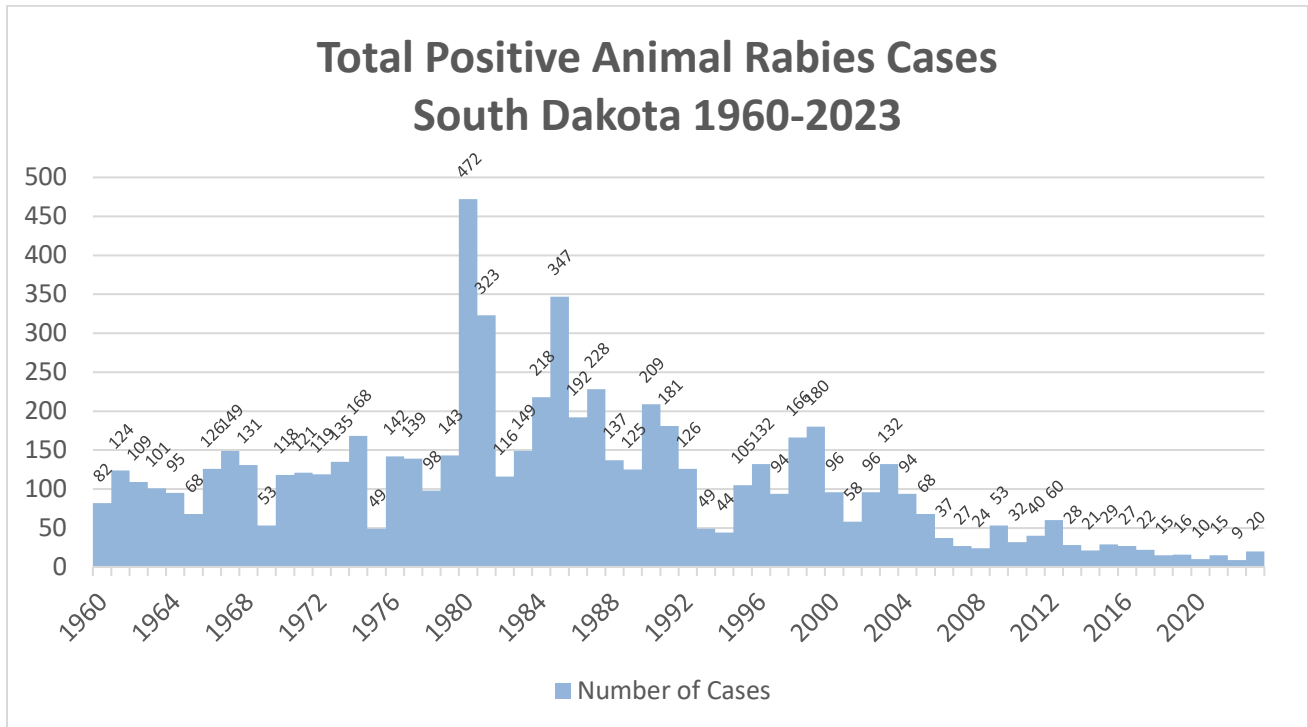


Figure 8.



Rabies Prevention and Interventions

Reference: **Compendium of Animal Rabies Prevention and Control, 2016.** National Association of State Public Health Veterinarians

<http://nasphv.org/DocumentsCompendiaRabies.html>

Pet rabies prevention

- Vaccinate pet dogs, cats, and ferrets.
- Keep pets away from wildlife to decrease their chance of being bitten by a rabid animal.
- Call local Animal Control to remove stray animals, or SD Game Fish and Parks for wild animals, especially if acting strangely.
- If a wild animal bites your pet, contact your veterinarian or SD Animal Industry Board.
 - Euthanize the wild animal in a manner such as to not destroy the brain tissue and contact your veterinarian to submit the wild animal for rabies testing if possible.
 - If the wild animal tests positive, or is not available for testing but is suspicious of being rabid:
 - Recommendations from your veterinarian or the SD Animal Industry Board may include the following:
 - Booster the rabies vaccination for previously appropriately vaccinated pets and quarantine and observe pet for 45 days.
 - Euthanize non-vaccinated pets immediately and test for rabies.

Human rabies prevention

- Never touch stray, unfamiliar, or wild animals, especially skunks and bats.
 - Consult your physician or SD Department of Health immediately if you find a bat in your house or if you or a family member are otherwise potentially exposed to a bat.
 - Don't adopt wild animals or bring them into your home.
 - Keep your trash cans tightly closed and don't leave pet food out to attract skunks.
 - If you are bitten by a wild animal or a suspect rabid animal, consult your physician immediately.
 - Euthanize and submit the animal for rabies testing if possible (in most cases, waiting for test results is preferable to starting unnecessary post-exposure prophylaxis).
 - If the animal tests positive or is not available for testing but suspicious of being rabid, post-exposure prophylaxis will be recommended.
 - If you are bitten by a pet or owned animal, the animal may need to be monitored for 10 days and euthanized and tested for rabies if signs of illness develop during that time.
 - Contact your physician or SD Department of Health immediately.
 - Post-exposure prophylaxis
 - For those not previously vaccinated for rabies:
 - Rabies immune globulin and 4 doses of rabies vaccine over 15 days (additional immunization/testing may be needed for immunocompromised individuals).
 - For those previously vaccinated for rabies:
 - Two doses of rabies vaccine over 4 days.
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To get answers to questions about:

Whether post-exposure prophylaxis is warranted after exposure to a potentially rabid animal:

South Dakota Department of Health (rabies consultations)

Phone: 800-592-1861 or 605-773-3737 (24 hours)

<https://doh.sd.gov/diseases/rabies/>

Rabies consultations by the South Dakota Department of Health are available seven days a week. Consultations are based on Centers for Disease Control and Prevention (CDC) recommendations.

Testing an animal for rabies:

South Dakota Animal Disease Research and Diagnostic Laboratory (ADRDL; SDSU)

1155 North Campus Drive

South Dakota State University

Brookings, SD 57007-1396

Phone: 605-688-5171

www.sdstate.edu/vs/adrdl

Rabies in animals; domestic animals exposed to rabid animals:

SD Animal Industry Board

Phone: 605-773-3321

<http://aib.sd.gov>

Other information sources:

CDC Rabies: www.cdc.gov/rabies

TABLE. Rabies preexposure prophylaxis recommendations — United States, 2022

Risk category	Nature of exposure	Typical population*	Relevant disease biogeography†	Recommendations	
				Primary PrEP [§] immunogenicity	Long-term immunogenicity [¶]
1. Elevated risk for unrecognized** and recognized†† exposures including unusual or high-risk exposures	Exposure, often in high concentrations, might be recognized or unrecognized, might be unusual (e.g., aerosolized virus)	Persons working with live rabies virus in research or vaccine production facilities or performing testing for rabies in diagnostic laboratories	Laboratory	IM rabies vaccine on days 0 and 7	Check titers every 6 months; booster if titer <0.5 IU/mL ^{§§}
2. Elevated risk for unrecognized** and recognized†† exposures	Exposure typically recognized but could be unrecognized; unusual exposures unlikely	Persons who frequently 1) handle bats, 2) have contact with bats, 3) enter high-density bat environments, or 4) perform animal necropsies (e.g., biologists who frequently enter bat roosts or who collect suspected rabies samples)	All geographic regions where any rabies reservoir is present, both domestic and international	IM rabies vaccine on days 0 and 7	Check titers every 2 years; booster if titer <0.5 IU/mL ^{§§}
3. Elevated risk for recognized†† exposures, sustained risk ^{¶¶}	Exposure nearly always recognized; risk for recognized exposures higher than that for the general population and duration exceeds 3 years after the primary vaccination	Persons who interact with animals that could be rabid***; occupational or recreational activities that typically involve contact with animals include 1) veterinarians, technicians, animal control officers, and their students or trainees; 2) persons who handle wildlife reservoir species (e.g., wildlife biologists, rehabilitators, and trappers); and 3) spelunkers Selected travelers. PrEP considerations include whether the travelers 1) will be performing occupational or recreational activities that increase risk for exposure to potentially rabid animals (particularly dogs) and 2) might have difficulty getting prompt access to safe PEP (e.g., rural part of a country or far from closest PEP clinic)	All domestic and international geographic regions where any rabies reservoir is present International geographic regions with rabies virus reservoirs, particularly where rabies virus is endemic in dog populations	IM rabies vaccine on days 0 and 7	1) One-time titer check during years 1–3 after 2-dose primary series; booster if titer <0.5 IU/mL ^{§§} or 2) booster no sooner than day 21 and no later than year 3 after 2-dose primary series†††

TABLE. (Continued) Rabies preexposure prophylaxis recommendations — United States, 2022

Risk category	Nature of exposure	Typical population*	Relevant disease biogeography†	Recommendations	
				Primary PrEP [§] immunogenicity	Long-term immunogenicity [¶]
4. Elevated risk for recognized†† exposures, risk not sustained ^{¶¶}	Exposure nearly always recognized; risk for exposure higher than for general population but expected to be time-limited (≤3 years from the 2-dose primary PrEP vaccination series)	Same as for risk category 3 (above), but risk duration ≤3 years (e.g., short-term volunteer providing hands-on animal care or infrequent traveler with no expected high-risk travel >3 years after PrEP administration)	Same as for risk category 3 (above)	IM rabies vaccine on days 0 and 7	None
5. Low risk for exposure	Exposure uncommon	Typical person living in the United States	Not applicable	None	None

Abbreviations: IM = intramuscular; IU = international units; PEP = postexposure prophylaxis; PrEP = preexposure prophylaxis.

* Nature of exposure and type of work performed are the most important variables to consider when determining a person's risk category. The examples provided are intended to be a guide, but ultimately categorizations should be done on a case-by-case basis with nature of exposure considered. Some persons might be categorized into a different risk group from those suggested by the provided examples. For example, most veterinarians are in risk category 3 because they are at risk for recognized exposures after direct contact with animals. However, a veterinary pathologist who often performs necropsies on mammals suspected to have had rabies might have risk for rabies virus exposure that is more consistent with risk category 2 than risk category 3; such persons should follow the recommendations for the risk category with which their activities best fit. Similarly, most spelunkers do not often enter high-density bat caves; those who do may follow the recommendations for risk category 2 rather than risk category 3. Persons involved in the diagnosis of rabies virus, but for whom the frequency of handling rabies virus–infected tissues is low, or the procedures performed do not involve contact with neural tissue or opening of a suspected rabid animal's calvarium could consider following the recommendations for risk category 2 rather than those for risk category 1.

† Local or state health departments should be consulted for questions about local disease biogeography.

§ Primary immunogenicity refers to immunogenicity that peaks 2–4 weeks after completing the recommended primary vaccination schedule. Persons without altered immunity are expected to mount appropriate responses, and checking titers is not routinely recommended. Persons with altered immunity are advised to confirm, through laboratory testing, a rabies antibody titer ≥0.5 IU/mL ≥1 week after booster vaccination (but ideally, 2–4 weeks after completing the recommended schedule) and before participating in high-risk activities. Individual laboratories set facility-specific rules about whether acceptable antibody titers should be laboratory-confirmed for all personnel, regardless of whether personnel have altered immunity.

¶ Long-term immunogenicity refers to the ability to mount an anamnestic response to rabies virus >3 years after completion of the primary rabies vaccination series.

** Unrecognized exposures are those that recipients might not know occurred; for example, a small scratch during an inconspicuous personal protective equipment breach might not be noticed by persons testing neural tissue from a rabid animal or persons conducting ecologic studies on bats in the field.

†† Recognized exposures are bites, scratches, and splashes that are usually registered by a person because the exposure is unusual (e.g., contact with a bat) or painful (e.g., bite or scratch from a raccoon).

§§ When rabies antibody titers are <0.5 IU/mL, a booster vaccination should be provided. Antibody titers to verify booster response need not be checked after these boosters are administered to persons who are immunocompetent. For persons who are immunocompromised, the indicated antibody titer should be verified ≥1 week (ideally, 2–4 weeks) after administration of every booster vaccination.

¶¶ Sustained risk is elevated risk for rabies >3 years after the completion of the primary rabies PrEP vaccination schedule.

*** Rabies virus is unlikely to persist outside a deceased animal's body for an extended time because of virus inactivation by desiccation, ultraviolet irradiation, and other factors. Risk from transmission to persons handling animal products (e.g., hunters and taxidermists) is unknown but presumed to be low (risk category 5); direct skin contact with saliva and neural tissue of mammals should be avoided regardless of profession.

††† Checking titers after recommended booster doses is not indicated unless the recipient has altered immunity.

Rabies postexposure prophylaxis (PEP) schedule --- United States, 2010

Vaccination status	Intervention	Regimen*
Not previously vaccinated	Wound cleansing	All PEP should begin with immediate thorough cleansing of all wounds with soap and water. If available, a virucidal agent (e.g., povidine-iodine solution) should be used to irrigate the wounds.
	Human rabies immune globulin (HRIG)	Administer 20 IU/kg body weight. If anatomically feasible, the full dose should be infiltrated around and into the wound(s), and any remaining volume should be administered at an anatomical site (intramuscular [IM]) distant from vaccine administration. Also, HRIG should not be administered in the same syringe as vaccine. Because RIG might partially suppress active production of rabies virus antibody, no more than the recommended dose should be administered.
	Vaccine	Human diploid cell vaccine (HDCV) or purified chick embryo cell vaccine (PCECV) 1.0 mL, IM (deltoid area [†]), 1 each on days 0, [§] 3, 7 and 14. [¶]
Previously vaccinated**	Wound cleansing	All PEP should begin with immediate thorough cleansing of all wounds with soap and water. If available, a virucidal agent such as povidine-iodine solution should be used to irrigate the wounds.
	HRIG	HRIG should not be administered.
	Vaccine	HDCV or PCECV 1.0 mL, IM (deltoid area [†]), 1 each on days 0 [§] and 3.

* These regimens are applicable for persons in all age groups, including children.

[†] The deltoid area is the only acceptable site of vaccination for adults and older children. For younger children, the outer aspect of the thigh may be used. Vaccine should never be administered in the gluteal area.

[§] Day 0 is the day dose 1 of vaccine is administered.

[¶] For persons with immunosuppression, rabies PEP should be administered using all 5 doses of vaccine on days 0, 3, 7, 14, and 28.

** Any person with a history of pre-exposure vaccination with HDCV, PCECV, or rabies vaccine adsorbed (RVA); prior PEP with HDCV, PCECV or RVA; or previous vaccination with any other type of rabies vaccine and a documented history of antibody response to the prior vaccination.

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