

Rabies Surveillance, South Dakota, 2020–2021

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 from animals to people, rabies is endemic in certain wild animal species in the state. Rabies is almost uniformly fatal in people who are infected with the rabies virus but is successfully prevented by using post-exposure prophylaxis in people exposed to the rabies virus (see below). While the last human rabies case in South Dakota occurred in 1970, substantial resources are spent managing potential exposures to rabies because of its constant presence in the state.

Rabies Surveillance in South Dakota, 2020

In 2020, 10 animals tested positive for rabies (Table 1, Figure 1), a 38% decrease from 2019 (16 positives). This represents the lowest yearly number of rabid animals recorded in South Dakota (Figure 3). These 10 rabid animals included only 1 domestic animal (a cat), and 9 wild animals (8 bats and 1 skunk). No human rabies was reported.

During the year, 456 animals tested negative for rabies (Table 1). Bats were the species most often tested for rabies, accounting for 35% of rabies tests, followed by cats (24%). In 2020, 2.1% of South Dakota animals tested for rabies were positive.

Table 1. Rabies test results, South Dakota, 2020

	POSITIVE	NEGATIVE	TOTAL
Domestic Animals:			
CAT	1	110	111
DOG	0	61	61
CATTLE	0	25	25
HORSE	0	5	5
OTHER DOMESTIC*	0	4	4
Wild Animals:			
BAT	8	153	161
RACCOON	0	43	43
MUSKRAT	0	19	19
SQUIRREL	0	9	9
SKUNK	1	6	7
RABBIT	0	4	4
OTHER WILD**	0	17	17
Totals	10	456	466
*Other domestic includes 1 each donkey, ferret, goat, and sheep.			
**Other wild includes 3 opossum, 2 each badger, mink, mouse, and rat; and 1 each coyote, deer, fox, gopher, river otter, and woodchuck.			

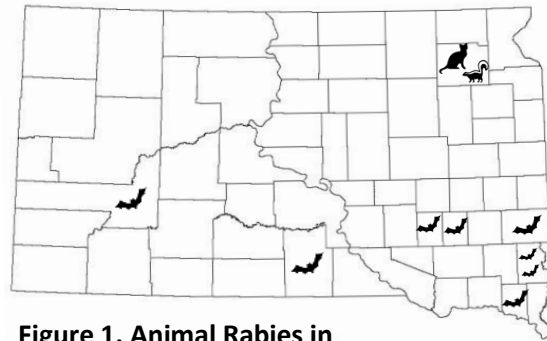


Figure 1. Animal Rabies in South Dakota, 2020

In 2020, animals from 60 of South Dakota’s 66 counties were submitted for testing, and animals from 8 of those counties were rabid. One county (Minnehaha) accounted for 38% of rabies tests, and 4 (Minnehaha, Brookings, Codington and Pennington) combined to account for 53% of tests.

Rabies Surveillance in South Dakota, 2021

In 2021, 15 animals tested positive for rabies in South Dakota (Table 2, Figure 2), a 50% increase from the 10 positives in 2020. These 15 rabid animals included only 1 domestic animal (a cat), and 14 wild animals (9 bats, 4 skunks, and 1 raccoon). No human rabies was reported.

During the year, 462 animals tested negative for rabies (Table 2). Bats were the species most often tested for rabies, accounting for 35% of all tests, followed by cats (24%). In 2021, 3.1 % of South Dakota animals tested for rabies were positive.

Table 2. Rabies test results, South Dakota, 2021

	POSITIVE	NEGATIVE	TOTAL
Domestic Animals:			
CAT	1	113	114
DOG	0	83	83
CATTLE	0	25	25
HORSE	0	6	6
SHEEP	0	2	2
Wild Animals:			
BAT	9	159	168
RACCOON	1	36	37
SKUNK	4	16	20
SQUIRREL	0	6	6
OTHER WILD*	0	16	16
Totals	15	462	477

*Other wild includes 3 opossum; 2 each mouse, muskrat, and rat; and 1 each chipmunk, coyote, fox, mink, mole, rabbit, and shrew.

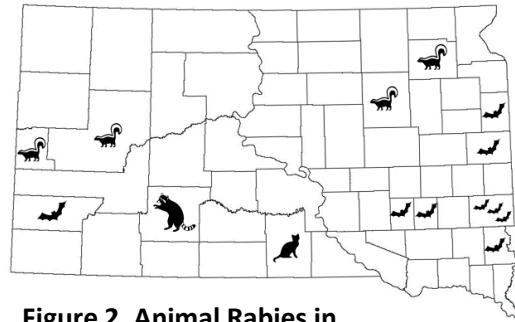
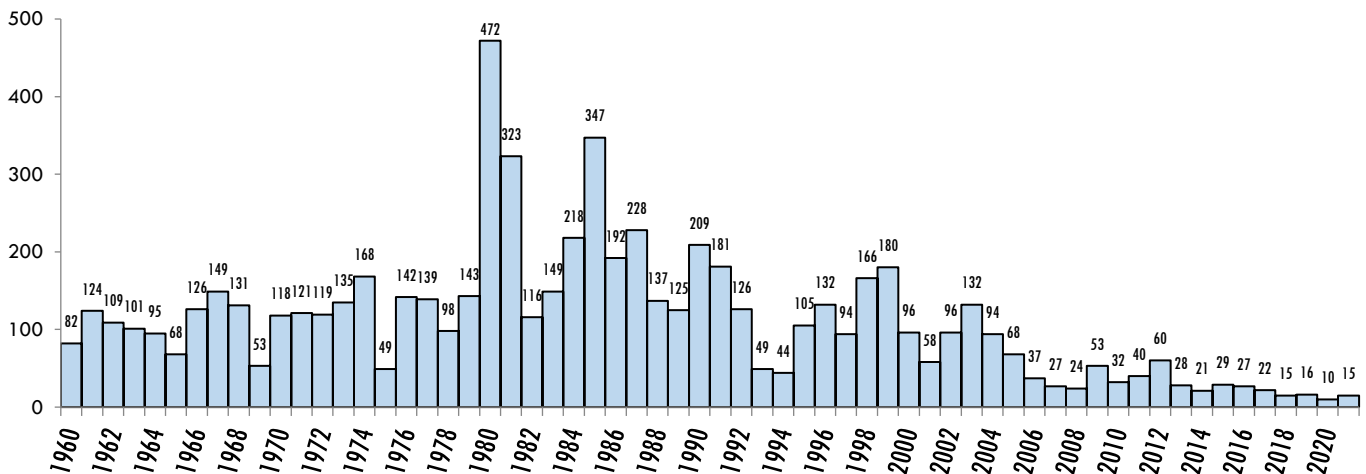


Figure 2. Animal Rabies in South Dakota, 2021

In 2021, animals from 54 of South Dakota's 66 counties were submitted for testing, and animals from 13 of those counties were rabid. One county (Minnehaha) accounted for 39% of rabies tests, and 4 (Minnehaha, Brookings, Pennington, and Davison) combined to account for 52% of tests.

Figure 3. Animal rabies, South Dakota, 1960–2021



Rabies Surveillance in South Dakota, 2012–2021

During the past decade, 5,955 animals originating from South Dakota were tested for rabies, with 243 positive rabid animals identified (Table 3). Domestic animals accounted for 25% of positive rabies cases, with 13 rabid cats and 7 rabid dogs identified. These animals were very likely unvaccinated; rabies in vaccinated pets is exceedingly rare. Rabid livestock included 35 cattle, 3 horses, and 2 goats. Rabies vaccines are available for these species, but except for horses, not commonly administered.

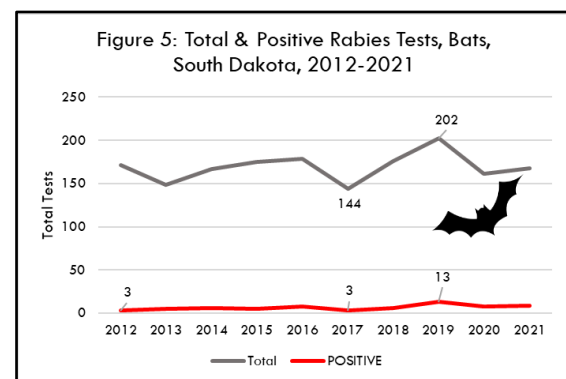
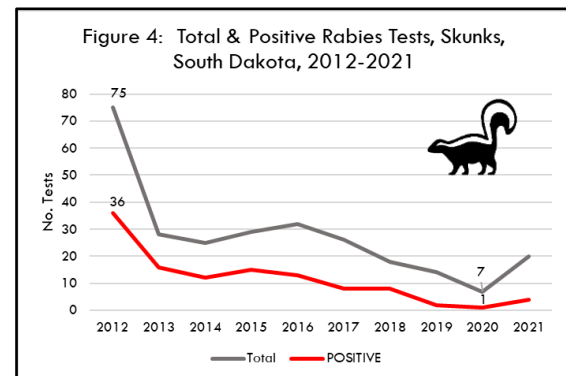
Table 3. Rabies test results, South Dakota, 2012–2021

	POSITIVE	NEGATIVE	TOTAL
Domestic Animals:			
CAT	13	1,617	1,630
DOG	7	906	913
CATTLE	35	595	630
HORSE	3	77	80
SHEEP	0	32	32
GOAT	2	27	29
OTHER DOMESTIC*	0	9	9
Wild Animals:			
BAT	66	1,625	1,691
RACCOON	2	362	364
SKUNK	115	159	274
DEER	0	50	50
SQUIRREL	0	45	45
MUSKRAT	0	41	41
MOUSE	0	25	25
OPOSSUM	0	22	22
COYOTE	0	18	18
FOX	0	15	15
WOODCHUCK	0	15	15
RAT	0	13	13
MINK	0	9	9
RABBIT	0	9	9
OTHER WILD**	0	41	41
Totals	243	5,712	5,955

*Other domestic includes 4 each donkeys and ferrets, and 1 llama.

**Other wild includes 7 gophers, 5 badgers, 4 each prairie dogs and shrews; 3 beavers; 2 each elk, groundhogs, moles, otters, and weasels; and 1 each bison, chipmunk, lemur, marmot, moose, mountain lion, porcupine, and vole.

In wild animals, skunks are the primary reservoirs of rabies in South Dakota. Over the past decade, 42% of tested skunks were rabid (Figure 4). In bats, another species in which rabies is endemic, 4% tested positive during the decade (Figure 5). Rabies testing for bats increased over the decade, while testing for skunks declined (Figures 4 & 5)



The 2 cases of rabies found in raccoons during the decade 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).

During 2012–2021, animals from each county were submitted for testing; rabid animals were diagnosed in every county except 8: Buffalo, Campbell, McCook, Lyman, Mellette, Potter, Union, and Ziebach (Table 5). Minnehaha County led the state in submissions for rabies testing (1,750) as well as the number of rabid animals identified (31; 30 of which were bats). Six counties accounted for nearly 50% of rabies test submissions (Minnehaha, Brookings, Pennington, Brown, Codington, and Davison).

Table 5: Rabies Submissions by County, South Dakota, 2012-2021

County	Total tests (Positives)	Most common species tested	Most common positive species	County	Total tests (Positives)	Most common species tested	Most common positive species
Minnehaha	1750 (31)	Bat	Bat	Brule	54 (1)	Cat	Horse
Brookings	332 (11)	Cat	Skunk	Sanborn	48 (3)	Cat	Cat/Cattle/Skunk
Pennington	280 (5)	Cat	Bat	Gregory	48 (2)	Cat	Cattle/Skunk
Brown	192 (2)	Cat	Bat/Skunk	Spink	47 (2)	Cat	Skunk
Codington	182 (5)	Cat	Skunk	Fall River	44 (2)	Cat	Bat
Davison	180 (5)	Cat	Bat/Skunk	Miner	42 (5)	Cat	Skunk
Meade	131 (6)	Dog	Skunk	Hand	40 (6)	Cattle	Skunk
Butte	120 (4)	Cat	Skunk	Marshall	39 (5)	Cat	Skunk
Hutchinson	120 (4)	Cat	Cattle	Bon Homme	34 (1)	Cat	Skunk
Lake	117 (2)	Cat	Cat/Skunk	Haakon	33 (5)	Cat	Skunk
Lincoln	116 (5)	Bat	Bat	Faulk	31 (2)	Cattle	Skunk
Dewey	109 (5)	Dog	Cattle/Skunk	Perkins	27 (7)	Cat	Skunk
Yankton	103 (4)	Bat	Bat	Custer	26 (1)	Cat	Bat
Turner	98 (1)	Bat	Bat	Jackson	24 (2)	Cat	Cat/Raccoon
Tripp	95 (15)	Cat	Skunk	Aurora	21 (1)	Cat/Dog	Skunk
Hughes	94 (1)	Cat	Cat	Lyman	19	Cat	
Roberts	90 (16)	Cat	Skunk	Douglas	18 (1)	Cattle	Skunk
Day	84 (10)	Cat	Skunk	Jerauld	18 (1)	Cat	Skunk
Hamlin	84 (2)	Dog	Bat/Skunk	Hyde	16 (2)	Cattle	Cattle/Skunk
Kingsbury	82 (6)	Cattle	Skunk	Hanson	15 (2)	Cat	Bat
Charles Mix	80 (4)	Dog	Skunk	Jones	14 (1)	Cat	Skunk
Lawrence	78 (5)	Dog	Bat	Harding	13 (1)	Cat	Cat
Beadle	73 (2)	Cat	Cattle/Skunk	McPherson	13 (1)	Cat	Cattle
Edmunds	63 (5)	Cattle	Skunk	Potter	13	Cat	
Union	63	Bat		Bennett	12 (5)	Cat	Skunk
Walworth	61 (8)	Dog	Skunk	Campbell	11	Cat/Cattle	
Grant	61 (3)	Cat	Skunk	Corson	10 (3)	Dog	Cattle/Dog/Skunk
Stanley	59 (1)	Cat	Cat	Oglala Lakota	10 (1)	Dog	Dog
Moody	58 (1)	Dog	Bat	Todd	10 (1)	Cat	Skunk
McCook	58	Cat		Mellette	9	Cat	
Clark	57 (5)	Cat	Skunk	Buffalo	8	Raccoon	
Clay	57 (2)	Bat	Bat	Ziebach	4	Dog	
Deuel	55 (2)	Bat	Bat/Skunk	Sully	2 (1)	Cattle	Skunk

Over the past decade, rabid animals were identified in each calendar month (Table 6). More rabid animals were detected in June (38) than any other month, with bats and skunks the predominant affected species. Low months for rabies diagnoses were January and December, with 9 each.

Table 6. Positive Rabies Diagnoses by Calendar Month, South Dakota, 2012-2021.

MONTH	BAT	CAT	CATTLE	DOG	GOAT	HORSE	RACCOON	SKUNK	TOTAL
JAN	0	0	2	0	0	0	0	7	9
FEB	0	3	1	1	1	0	0	5	11
MAR	1	1	3	0	0	0	0	10	15
APR	0	0	0	0	0	2	1	26	29
MAY	6	0	8	0	0	0	1	12	27
JUN	14	2	8	0	1	1	0	12	38
JUL	10	0	1	1	0	0	0	9	21
AUG	18	2	3	1	0	0	0	8	32
SEP	13	3	2	0	0	0	0	8	26
OCT	4	0	5	0	0	0	0	9	18
NOV	0	2	1	1	0	0	0	4	8
DEC	0	0	1	3	0	0	0	5	9
TOTAL	66	13	35	7	2	3	2	115	243

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

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 so they won't be bitten by a rabid animal.
- Call local Animal Control to remove wild or stray animals, especially if acting strangely.
- If a wild animal bites your pet, contact your veterinarian.
 - Euthanize and submit the wild animal for rabies testing if possible.
 - If the wild animal tests positive, or is not available for testing but suspicious of being rabid:
 - Booster previously vaccinated pets
 - Euthanize non-vaccinated pets and test for rabies

Human rabies prevention:

- Never touch stray, unfamiliar or wild animals, especially skunks and bats.
- 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.
 - 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 should be monitored for 10 days and euthanized and tested for rabies if signs of illness develop during that time.
- Post-exposure prophylaxis: rabies immune globulin and 4 doses of rabies vaccine over 28 days.

To get answers to questions about:

1. 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/infectious/diseasefacts/rabies.aspx>

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.

2. 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

3. Rabies in animals; domestic animals exposed to rabid animals:

SD Animal Industry Board
Phone: 605-773-3321
<http://aib.sd.gov>

4. Other information sources:

CDC Rabies: www.cdc.gov/rabies
South Dakota Bat Working Group: <http://sdbwg.org>

Pre-exposure Prophylaxis for People with Frequent Potential Rabies Exposures https://www.cdc.gov/mmwr/volumes/71/wr/mm7118a2.htm	
Treatment	Regimen
Primary Series	Human diploid cell vaccine (HDCV) or purified chick embryo cell vaccine (PCECV); 1.0 mL (deltoid area), one each on days 0 and 7.
Notes	<ul style="list-style-type: none">• Persons in Risk Category 1* should have a serum sample tested for rabies virus neutralizing antibody every 6 months.• Persons in Risk Category 2** should be tested every 2 years.• Persons in Risk Category 3*** should be tested once between 1 and 3 years following the primary series• Human serum rabies antibody titers may be ordered through SDPHL• An intramuscular booster dose of vaccine should be administered if the serum titer falls to maintain a value of at least 0.5 IU/ml by rapid fluorescent focus inhibition test. <p>* Elevated risk for unusual, unrecognized, and recognized rabies exposures (e.g., rabies virus researchers, vaccine production workers). ** Elevated risk for unrecognized and recognized rabies exposures (e.g. workers performing animal necropsy examinations, those in frequent contact with bats). *** Elevate risk for recognized rabies exposures (e.g., most veterinarians).</p>

Post-exposure Prophylaxis for Non-immunized Individuals www.cdc.gov/rabies/medical_care/index.html	
Treatment	Regimen
Wound cleansing	All postexposure prophylaxis 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.
RIG	If possible, the full dose should be infiltrated around any wound(s) and any remaining volume should be administered IM at an anatomical site distant from vaccine administration. RIG should not be administered in the same syringe as vaccine. Because RIG might partially suppress active production of antibody, no more than the recommended dose should be given.
Vaccine	HDCV or PCECV 1.0 mL, IM (deltoid area), one each on days 0, 3, 7, and 14.
Post-exposure Prophylaxis for <i>Previously Immunized</i> Individuals	
Treatment	Regimen
Wound cleansing	All postexposure prophylaxis 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.
RIG	RIG should not be administered.
Vaccine	HDCV or PCECV 1.0 mL, IM (deltoid area), one each on days 0 and 3.

Human Rabies Vaccines and Immunoglobulin Available in the United States			
Type	Name	Route	Indications
Human Diploid Cell Vaccine (HDCV)	Imovax® Rabies	Intramuscular	Pre-exposure or Post-exposure
Purified Chick Embryo Cell Vaccine (PCECV)	RabAvert®	Intramuscular	Pre-exposure or Post-exposure
Human Rabies Immune Globulin (RIG)	Imogam® Rabies-HT	Local infusion at wound site, with additional amount intramuscular at site distant from vaccine	Post-exposure
Human Rabies Immune Globulin (RIG)	HyperRab TM S/D	Local infusion at wound site, with additional amount intramuscular at site distant from vaccine	Post-exposure
Human Rabies Immune Globulin (RIG)	KEDRAB TM	Local infusion at wound site, with additional amount intramuscular at site distant from vaccine	Post-exposure

References and resources

Human rabies prevention – United States, 2008 (ACIP). MMWR 2008; 57 (RR-3).
www.cdc.gov/mmwr/preview/mmwrhtml/rr5703a1.htm

Use of a Modified Preexposure Prophylaxis Vaccination Schedule to Prevent Human Rabies: Recommendations of the Advisory Committee on Immunization Practices — United States, 2022. MMWR 2022; 71:619. <https://www.cdc.gov/mmwr/volumes/71/wr/mm7118a2.htm>

Compendium of animal rabies prevention and control, 2016. National Association of State Public Health Veterinarians. <http://nasphv.org/Documents/NASPHVRabiesCompendium.pdf>

Compendium of measures to prevent disease associated with animals in public settings, 2017: National Association of State Public Health Veterinarians. <http://nasphv.org/documentsCompendiumAnimals.html>

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