

Rabies Surveillance, South Dakota, 2019

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.

In 2019, 16 animals tested positive for rabies (Table 1), a 7% increase from 2018. Rabid animals included 1 domestic animals (a dog) and 15 wild animals (13 bats and 2 skunks). The total was the second-lowest annual total on record (15 in 2018). No human rabies was reported.

During the year, 551 animals tested negative for rabies (Table 1, Figure 1), a 5% increase from 2018 (526 negatives). Bats were the species most often tested for rabies, accounting for 33% of rabies tests, followed by cats (29%). In 2019, 2.8% of South Dakota animals tested for rabies were positive.

Table 1. Rabies test results, South Dakota, 2019

	POSITIVE	NEGATIVE	TOTAL
Domestic Animals:			
CAT	0	164	164
DOG	1	83	84
CATTLE	0	43	43
GOAT	0	3	3
HORSE	0	2	2
SHEEP	0	2	2
DONKEY	0	1	1
Wild Animals:			
BAT	13	189	202
RACCOON	0	28	28
SKUNK	2	12	14
SQUIRREL	0	6	6
MUSKRAT	0	5	5
OTHER WILD*	0	13	13
Totals	16	551	567
*Other wild includes 3 each coyotes and opossum; 2 each mouse and woodchuck; and 1 each fox, mink, and rat.			

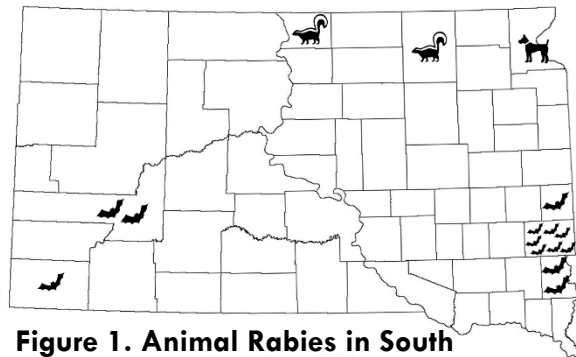


Figure 1. Animal Rabies in South Dakota, 2019

In 2019, animals from 59 of South Dakota's 66 counties were submitted for testing, and animals from 8 of those counties were rabid. One county (Minnehaha) accounted for 33% of rabies tests, and 5 (Minnehaha, Brown, Brookings, Codington, and Pennington) combined to account for 50% of tests

Rabies Surveillance in South Dakota, 2010–2019

During the past decade, 6,394 animals originating from South Dakota were tested for rabies, with 290 positive rabid animals identified (Table 2). Domestic animals accounted for 27% of positive rabies cases, with 18 rabid cats and 11 rabid dogs identified. These animals were very likely unvaccinated; rabies in vaccinated pets is exceedingly rare. Rabid livestock included 44 cattle, 4 horses, and 2 goats. Rabies vaccines are available for these species, but except for horses, not commonly administered.

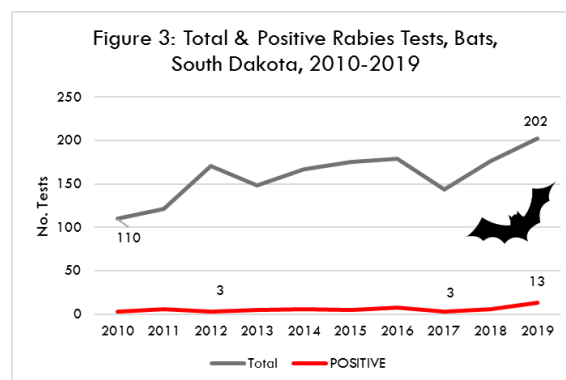
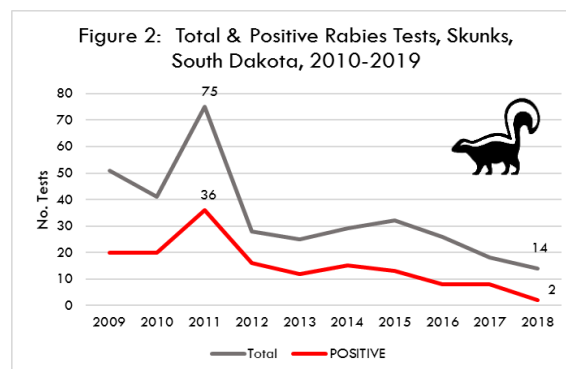
Table 2. Rabies test results, South Dakota, 2010-2019

	POSITIVE	NEGATIVE	TOTAL
Domestic Animals:			
CAT	18	1,784	1,802
DOG	11	1,067	1,078
CATTLE	44	683	727
HORSE	4	93	97
GOAT	2	33	35
SHEEP	0	34	34
OTHER DOMESTIC*	0	15	15
Wild Animals:			
BAT	58	1,535	1,593
RACCOON	3	352	355
SKUNK	150	189	339
DEER	0	70	70
SQUIRREL	0	39	39
MUSKRAT	0	38	38
MOUSE	0	26	26
COYOTE	0	20	20
OPOSSUM	0	19	19
FOX	0	17	17
WOODCHUCK	0	16	16
RAT	0	13	13
GOPHER	0	10	10
MINK	0	9	9
OTHER WILD**	0	42	42
Totals	290	6,104	6,394

*Other domestic includes 5 donkeys, 4 ferrets, 3 pigs, and 1 each guinea pig, hamster, and llama.

**Other wild includes 6 rabbits, 5 badgers, 4 each elk and prairie dogs; 3 each beavers, shrews, and moles; 2 each groundhogs, moose, porcupines, and weasels; and 1 each bison, lemur, marmot, mountain lion, otter, and vole.

In wild animals, skunks are the primary reservoirs of rabies in South Dakota. Over the past decade, almost half (44%) of tested skunks were rabid (Figure 2). In bats, another species in which rabies is endemic, 4% tested positive during the decade (Figure 3). Rabies testing for bats increased over the decade, while testing for skunks declined.



The 3 cases of rabies found in raccoons during the decade were spillover exposures from other animals. Rabies is not endemic in raccoons in South Dakota as it is in other parts of the US (eastern states, for example).

During 2010–2019, animals from each county were submitted for testing; rabid animals were diagnosed in every county except 7: Buffalo, Campbell, Custer, Hanson, Potter, Union, and Ziebach (Table 3). Minnehaha County led the state in submissions for rabies testing (1,695) as well as the number of rabid animals identified (35; 31 of which were bats). Eight counties accounted for over 50% of rabies test submissions (Minnehaha, Brookings, Pennington, Brown, Codington, Davison, Meade, and Turner).

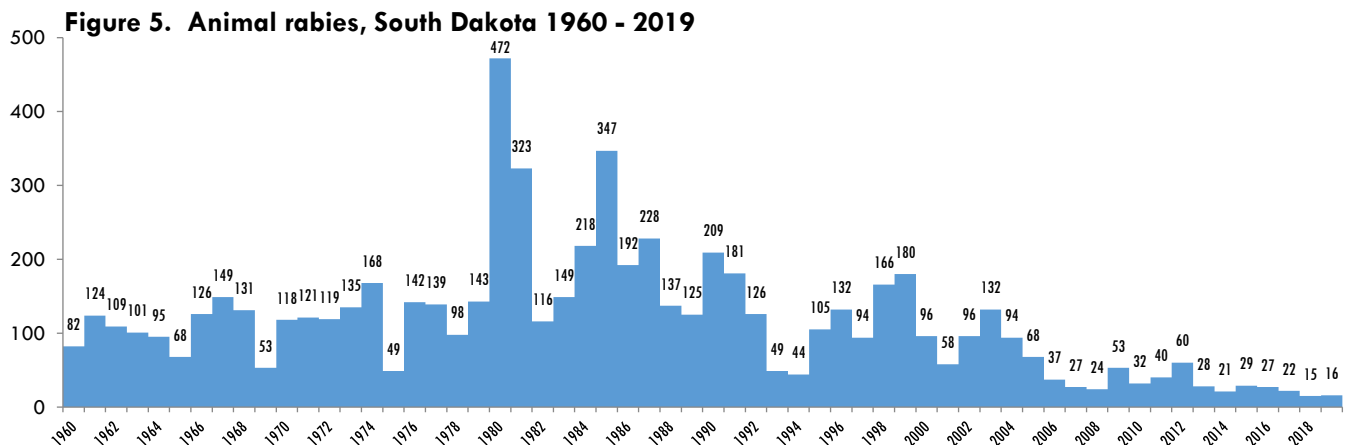
County	Total tests (Positives)	Most common species tested	Most common positive species	County	Total tests (Positives)	Most common species tested	Most common positive species
Minnehaha	1,695 (35)	Bat	Bat	Clark	53 (5)	Cat	Skunk
Brookings	347 (14)	Cat	Skunk	Deuel	52 (1)	Raccoon	Skunk
Pennington	310 (5)	Cat	Bat	Marshall	52 (7)	Cattle	Skunk
Brown	224 (2)	Cat	Bat	Gregory	51(3)	Cat	Skunk
Codington	205 (6)	Cat	Skunk	Fall River	50 (2)	Cat	Bat
Davison	204 (4)	Cat	Skunk	Miner	49 (7)	Cat	Skunk
Meade	146 (5)	Dog	Skunk	Sanborn	46 (4)	Cat	Cat
Turner	135 (6)	Cat	Skunk	Hand	45 (6)	Cat	Skunk
Butte	134 (6)	Cat	Cat/Skunk	Bon Homme	37 (1)	Cat	Skunk
Hutchinson	130 (6)	Cat	Cattle	Faulk	36 (3)	Cattle	Skunk
Lincoln	128 (4)	Bat	Bat	Aurora	30 (1)	Cat	Skunk
Lake	124 (3)	Cat	Skunk	Haakon	29 (5)	Cat	Skunk
Hughes	112 (2)	Cat	Cat/Skunk	Jackson	28 (1)	Cat	Cat
Yankton	111 (5)	Bat	Bat	Perkins	28 (7)	Cat	Skunk
Dewey	110 (5)	Dog	Cattle/Skunk	Custer	24	Cat	
Tripp	110 (20)	Cat	Skunk	Hyde	24 (2)	Cattle	Cattle/Skunk
Roberts	104 (16)	Cat	Skunk	Lyman	24 (2)	Dog	Dog/Skunk
Charles Mix	97 (7)	Dog	Skunk	Corson	19 (3)	Dog	Cattle/Dog/Skunk
Walworth	92 (8)	Dog	Skunk	Jerauld	19 (1)	Cat/Dog	Skunk
Kingsbury	91 (8)	Cattle	Skunk	Douglas	18 (1)	Cattle	Skunk
Lawrence	89 (5)	Dog	Bat	McPherson	17 (2)	Cattle	Cattle/Skunk
Day	88 (11)	Cat/Cattle	Skunk	Hanson	15	Cattle	
Hamlin	88 (7)	Dog	Skunk	Harding	15 (3)	Cat	Bat/Cat/Skunk
Beadle	80 (3)	Cat	Cattle/Racc./Skunk	Potter	15	Cat	
Grant	70 (6)	Cat	Skunk	Ogl. Lakota	14 (1)	Dog	Dog
Brule	69 (2)	Deer	Horse/Skunk	Bennett	13 (5)	Skunk	Skunk
Moody	68 (1)	Cattle	Bat	Jones	12 (1)	Cat	Skunk
Stanley	68 (1)	Cat	Cat	Todd	11 (1)	Cat	Skunk
Clay	65 (2)	Bat	Bat/Skunk	Campbell	9	Cat	
McCook	66 (1)	Cat	Skunk	Buffalo	7	Raccoon	
Union	66	Bat		Mellette	7 (2)	Cat/Cattle/Skunk	Cattle/Skunk
Edmunds	58 (5)	Cattle	Skunk	Ziebach	4	Dog	
Spink	55 (1)	Cat	Skunk	Sully	2 (1)	Cat/Skunk	Skunk

Over the past decade, rabid animals were identified in each calendar month (Table 4). More rabid animals were detected in June (47) than any other month, with skunks the predominant affected species. Low months for rabies diagnoses were November (9) and January (12). Rabies diagnoses in bats and cats (as well as testing of these species) peaked in August.

Table 4. Positive Rabies Diagnoses by Calendar Month, South Dakota, 2010-2019.

MONTH	BAT	CAT	CATTLE	DOG	GOAT	HORSE	RACCOON	SKUNK	TOTAL
JAN	0	2	2	0	0	0	0	8	12
FEB	0	2	2	2	1	0	0	8	15
MAR	1	2	3	1	0	0	1	12	20
APR	0	1	0	0	0	2	0	27	30
MAY	5	0	9	0	0	0	1	15	30
JUN	10	2	9	0	1	1	1	23	47
JUL	8	0	2	1	0	0	0	14	25
AUG	17	5	3	3	0	0	0	11	39
SEP	14	2	2	0	0	0	0	9	27
OCT	2	0	7	0	0	1	0	11	21
NOV	0	2	3	1	0	0	0	3	9
DEC	1	0	2	3	0	0	0	9	15
TOTAL	58	18	44	11	2	4	3	150	290

Recent years have represented historic lows for animal rabies diagnoses in South Dakota (Figure 5). Eight of the lowest 10 years for rabies diagnoses in the state have occurred in this past decade. Despite this, rabies remains endemic in the state and represents a continual risk to the state's citizens and their animals.



Two South Dakota laboratories offer rabies testing services: the Animal Disease Research Diagnostic Laboratory (ADRDL) at SDSU in Brookings, and the State Public Health Laboratory (SDPHL) in Pierre. During 2019, 58% of the state's rabies tests were performed at the ADRDL.

Rabies Prevention and Interventions

(Reference: Compendium of Animal Rabies Prevention and Control, 2016. National Association of State Public Health Veterinarians. <http://nasphv.org/Documents/NASPHVRabiesCompendium.pdf>)

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 14 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 Public Health Laboratory (SDPHL; Department of Health)
615 East Fourth Street
Pierre, SD 57501-1700
Phone: 800-592-1861 or 605-773-3368
<http://doh.sd.gov/Lab/rabies.aspx>

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 www.cdc.gov/mmwr/preview/mmwrhtml/rr5703a1.htm	
Treatment	Regimen
Primary	Human diploid cell vaccine (HDCV) or purified chick embryo cell vaccine (PCECV); 1.0 mL (deltoid area), one each on days 0, 7, and 21 or 28
Booster	HDCV or PCECV; 1.0 mL (deltoid area), day 0 only
Notes	<ul style="list-style-type: none"> • Persons in the continuous-risk category* should have a serum sample tested for rabies virus neutralizing antibody every 6 months. • Persons in the frequent-risk category** should be tested every 2 years. • 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 complete neutralization at a 1:5 serum dilution by rapid fluorescent focus inhibition test. <p>* Rabies research laboratory workers; rabies biologics production workers. ** Rabies diagnostic laboratory workers, cavers, veterinarians and staff, and animal-control and wildlife workers in areas where rabies is enzootic. All persons who frequently handle bats.</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 Previously Immunized 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™ S/D	Local infusion at wound site, with additional amount intramuscular at site distant from vaccine	Post-exposure

References and resources

*CDC. Human rabies prevention – United States, 2008 (ACIP). MMWR 2008; 57 (RR-3).

www.cdc.gov/mmwr/preview/mmwrhtml/rr5703a1.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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<https://avmajournals.avma.org/doi/pdf/10.2460/javma.256.2.195>

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