

# Rabies Surveillance, South Dakota, 2017 & 2018

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.

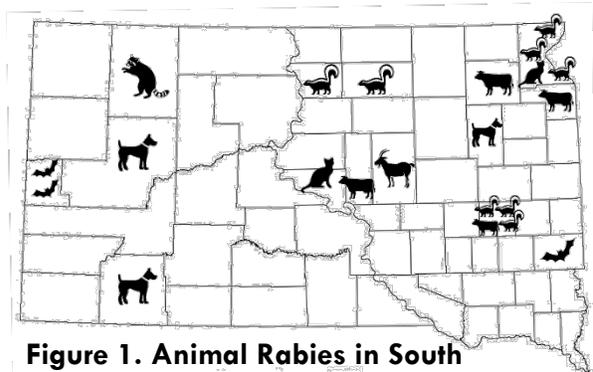
## Rabies Surveillance in South Dakota, 2017

In 2017, 22 animals tested positive for rabies (Table 1), a 19% decrease from 2016 (27 positives). These 22 rabid animals included 10 domestic animals (4 cattle, 3 dogs, 2 cats, and 1 goat) and 12 wild animals (8 skunks, 3 bats, and 1 raccoon). No human rabies was reported.

During the year, 535 animals tested negative for rabies (Table 1, Figure 1). Cats were the species most often tested for rabies, accounting for 29% of rabies tests, followed by bats (26%). In 2017, 3.9% of South Dakota animals tested for rabies were positive.

**Table 1. Rabies test results, South Dakota, 2017**

	POSITIVE	NEGATIVE	TOTAL
<b>Domestic Animals:</b>			
CAT	2	158	160
DOG	3	71	74
CATTLE	4	59	63
HORSE	0	12	12
GOAT	1	4	5
SHEEP	0	4	4
OTHER DOMESTIC*	0	2	2
<b>Wild Animals:</b>			
BAT	3	141	144
RACCOON	1	36	37
SKUNK	8	18	26
DEER	0	5	5
OPOSSUM	0	4	4
OTHER WILD**	0	21	21
Totals	22	535	557
*Other domestic includes 1 donkey and 1 ferret.			
**Other wild includes 3 each fox, muskrat, rat, squirrel, and woodchuck; 2 coyotes; and 1 each gopher, marmot, mouse, and rabbit.			



**Figure 1. Animal Rabies in South Dakota, 2017**

In 2017, animals from 56 of South Dakota's 66 counties were submitted for testing, and animals from 15 of those counties were rabid. One county (Minnehaha) accounted for 26% of rabies tests, and 7 (Minnehaha, Brookings, Pennington, Codington, Hutchinson, Turner, and Yankton) combined to account for 53% of tests.

## Rabies Surveillance in South Dakota, 2018

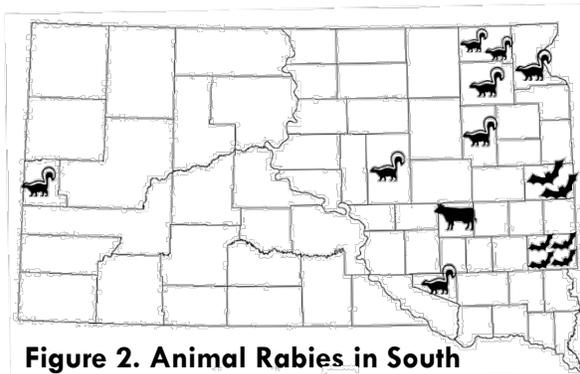
In 2018, 15 animals tested positive for rabies in South Dakota (Table 2, Figure 2), a 32% decrease from the 22 positives in 2017. This represents the lowest yearly number of rabid animals recorded in South Dakota (Figure 3). These 15 rabid animals included only 1 domestic animal (a cow), and 14 wild animals (8 skunks and 6 bats). No human rabies was reported.

During the year, 526 animals tested negative for rabies (Table 2). Bats were the species most often tested for rabies, accounting for 32% of all tests, followed by cats (28%). In 2018, 2.8% of South Dakota animals tested for rabies were positive.

**Table 2. Rabies test results, South Dakota, 2018**

	POSITIVE	NEGATIVE	TOTAL
<b>Domestic Animals:</b>			
CAT	0	151	151
DOG	0	87	87
CATTLE	1	55	56
HORSE	0	7	7
GOAT	0	3	3
SHEEP	0	2	2
FERRET	0	1	1
<b>Wild Animals:</b>			
BAT	6	170	176
RACCOON	0	24	24
SKUNK	8	10	18
SQUIRREL	0	6	6
OTHER WILD**	0	10	10
<b>Totals</b>	<b>15</b>	<b>526</b>	<b>541</b>

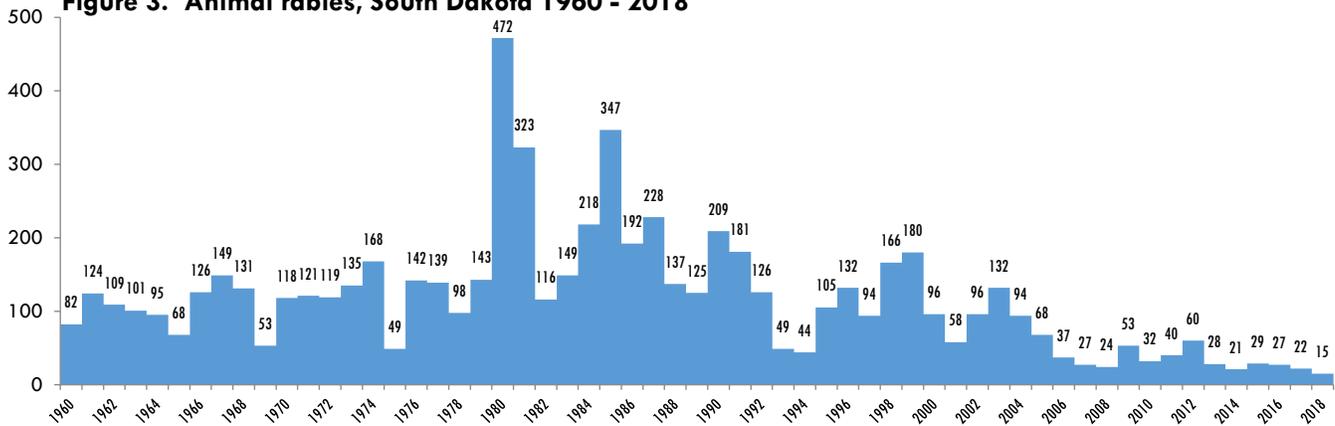
\*\*Other wild includes 2 each mink and mouse; and 1 each fox, muskrat, opossum, rat, shrew, and vole.



**Figure 2. Animal Rabies in South Dakota, 2018**

In 2018, animals from 60 of South Dakota's 66 counties were submitted for testing, and animals from 10 of those counties were rabid. One county (Minnehaha) accounted for 29% of rabies tests, and 5 (Minnehaha, Brown, Pennington, Brookings, and Lincoln) combined to account for 48% of tests.

**Figure 3. Animal rabies, South Dakota 1960 - 2018**



## Rabies Surveillance in South Dakota, 2009–2018

During the past decade, 6,546 animals originating from South Dakota were tested for rabies, with 327 positive rabid animals identified (Table 3). Domestic animals accounted for 29% of positive rabies cases, with 22 rabid cats and 17 rabid dogs identified. These animals were very likely unvaccinated; rabies in vaccinated pets is exceedingly rare. Rabid livestock included 48 cattle, 6 horses, and 3 goats. Rabies vaccines are available for these species, but except for horses, not commonly administered.

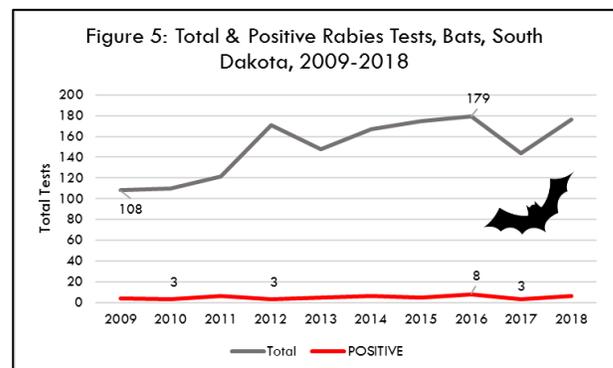
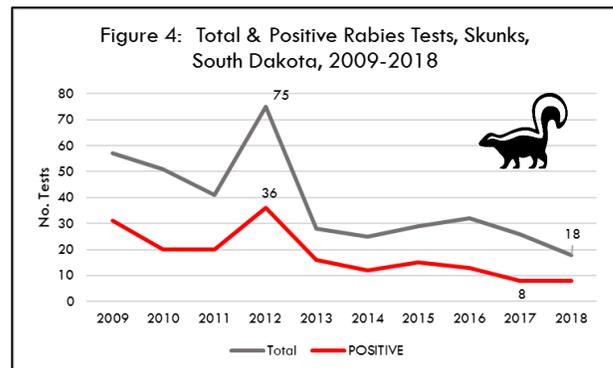
**Table 3. Rabies test results, South Dakota, 2009-2018**

	POSITIVE	NEGATIVE	TOTAL
<b>Domestic Animals:</b>			
CAT	22	1,854	1,876
DOG	17	1,137	1,154
CATTLE	48	715	763
HORSE	6	103	109
GOAT	3	33	36
SHEEP	0	35	35
OTHER DOMESTIC*	0	16	16
<b>Wild Animals:</b>			
BAT	49	1,450	1,499
SKUNK	179	203	382
RACCOON	3	351	354
DEER	0	83	83
SQUIRREL	0	38	38
MUSKRAT	0	37	37
MOUSE	0	25	25
OPOSSUM	0	18	18
COYOTE	0	17	17
FOX	0	17	17
RAT	0	17	17
WOODCHUCK	0	16	16
GOPHER	0	11	11
MINK	0	8	8
OTHER WILD**	0	42	42
Totals	327	6,219	6,546

\*Other domestic includes 6 ferrets, 4 donkeys, 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 (47%) of tested skunks were rabid (Figure 4). In bats, another species in which rabies is endemic, 3% tested positive during the decade (Figure 5). Rabies testing for bats increased over the decade, while testing for skunks declined (Figures 4 & 5)



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 2009–2018, animals from each county were submitted for testing; rabid animals were diagnosed in every county except 7: Buffalo, Campbell, Custer, Moody, Potter, Union, and Ziebach (Table 5). Minnehaha County led the state in submissions for rabies testing (1663) as well as the number of rabid animals identified (32; 26 of which were bats). Eight counties accounted for over 50% of rabies test submissions (Minnehaha, Brookings, Pennington, Brown, Davison, Codington, Meade, and Hutchinson).

<b>Table 5: Rabies Submissions by County, South Dakota, 2009-2018</b>							
<b>County</b>	<b>Total tests (Positives)</b>	<b>Most common species tested</b>	<b>Most common positive species</b>	<b>County</b>	<b>Total tests (Positives)</b>	<b>Most common species tested</b>	<b>Most common positive species</b>
Minnehaha	1663 (32)	Bat	Bat	Spink	59 (4)	Cat	Skunk
Brookings	348 (15)	Cat	Skunk	Deuel	54 (1)	Cat	Skunk
Pennington	337 (5)	Cat	Bat	Hand	53 (7)	Cat	Skunk
Brown	217 (4)	Cat	Skunk	Marshall	52 (7)	Cattle	Skunk
Davison	213 (4)	Cat	Skunk	Gregory	51(4)	Cat	Skunk
Codington	205 (8)	Cat	Skunk	Miner	50 (7)	Cat	Skunk
Meade	150 (7)	Dog	Skunk	Fall River	47 (1)	Cat	Bat
Hutchinson	146 (9)	Cat	Cattle	Sanborn	45 (4)	Cat	Cat
Turner	138 (9)	Cat	Skunk	Faulk	36 (3)	Cat	Skunk
Lake	134 (9)	Cat	Skunk	Bon Homme	35 (1)	Cat	Skunk
Butte	128 (6)	Cat	Cat/Skunk	Haakon	30 (5)	Cat	Skunk
Lincoln	126 (3)	Bat	Cat/Dog/Skunk	Hyde	30 (3)	Cattle	Skunk
Hughes	123 (3)	Cat	Cat	Aurora	30 (2)	Cat	Skunk
Yankton	119 (5)	Bat	Bat	Jackson	29 (1)	Cat	Cat
Tripp	114 (20)	Cat	Skunk	Perkins	27 (7)	Cat	Skunk
Charles Mix	110 (9)	Dog	Skunk	McPherson	25 (5)	Cattle	Skunk
Walworth	108 (7)	Dog	Skunk	Lyman	22 (2)	Cat/Dog	Dog/Skunk
Dewey	108 (5)	Dog	Cattle/Skunk	Corson	21 (3)	Dog	Cattle/Dog/Skunk
Roberts	103 (16)	Cat/Cattle	Skunk	Douglas	21(2)	Cattle	Dog/Skunk
Day	102 (13)	Cat	Skunk	Jerauld	21(1)	Cat	Skunk
Kingsbury	92 (10)	Cattle	Skunk	Harding	19 (5)	Cat	Skunk
Beadle	88 (3)	Cat	Cattle/Racc./Skunk	Custer	18	Cat	
Hamlin	86 (7)	Cat	Skunk	Hanson	17 (1)	Cattle	Dog
Lawrence	82 (5)	Dog	Bat	Ogl. Lakota	16 (1)	Dog	Dog
Brule	74 (2)	Deer	Horse/Skunk	Jones	14 (1)	Cat	Skunk
Clay	73 (3)	Bat	Bat/Horse/Skunk	Potter	14	Cat	
Grant	72 (7)	Cat	Skunk	Bennett	13 (5)	Cat	Skunk
Union	72	Bat		Todd	10 (1)	Cat	Skunk
Moody	70	Cattle		Mellette	7 (2)	Cat/Cattle	Cattle/Skunk
Stanley	68 (1)	Cat	Cat	Buffalo	7	Cattle	
McCook	65 (1)	Cat	Skunk	Campbell	6	Cat/Cattle	
Clark	64 (7)	Cat	Skunk	Ziebach	3	Bat/Dog/Horse	
Edmunds	64 (5)	Cat/Cattle	Skunk	Sully	2 (1)	Cat/Skunk	Skunk

Over the past decade, rabid animals were identified in each calendar month (Table 6). More rabid animals were detected in June (52) than any other month, with skunks and cattle the predominant affected species. Low months for rabies diagnoses were January and November, with 13 each. Rabies diagnoses in bats and cats (as well as testing of these species) peaked in August.

**Table 6. Positive Rabies Diagnoses by Calendar Month, South Dakota, 2009-2018.**

MONTH	BAT	CAT	CATTLE	DOG	GOAT	HORSE	RACCOON	SKUNK	TOTAL
JAN	0	2	2	0	0	0	0	9	13
FEB	0	2	2	2	1	0	0	9	16
MAR	1	2	3	1	0	0	1	15	23
APR	0	1	0	0	0	3	0	34	38
MAY	5	1	10	0	0	0	1	19	36
JUN	7	2	11	0	1	1	1	29	52
JUL	7	1	3	2	0	0	0	18	31
AUG	15	5	3	3	0	1	0	10	37
SEP	11	2	2	1	0	0	0	10	26
OCT	2	1	7	2	1	1	0	13	27
NOV	0	3	3	3	0	0	0	4	13
DEC	1	0	2	3	0	0	0	9	15
<b>TOTAL</b>	49	22	48	17	3	6	3	179	327

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 2018, each laboratory performed 50% of the state's rabies testing, with 13 of the 15 positive tests found at the ADRDL. Both laboratories use 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/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.
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## 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](http://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](http://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](http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5703a1.htm)

Treatment	Regimen
<b>Primary</b>	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
<b>Booster</b>	HDCV or PCECV; 1.0 mL (deltoid area), day 0 only
<b>Notes</b>	<ul style="list-style-type: none"> <li>• Persons in the continuous-risk category* should have a serum sample tested for rabies virus neutralizing antibody every 6 months.</li> <li>• Persons in the frequent-risk category** should be tested every 2 years.</li> <li>• Human serum rabies antibody titers may be ordered through SDPHL</li> <li>• 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.</li> </ul> <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](http://www.cdc.gov/rabies/medical_care/index.html)

Treatment	Regimen
<b>Wound cleansing</b>	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.
<b>RIG</b>	If possible, the <b>full dose</b> 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.
<b>Vaccine</b>	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
<b>Wound cleansing</b>	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.
<b>RIG</b>	RIG should <b>not</b> be administered.
<b>Vaccine</b>	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
<b>Human Diploid Cell Vaccine (HDCV)</b>	Imovax® Rabies	Intramuscular	Pre-exposure or Post-exposure
<b>Purified Chick Embryo Cell Vaccine (PCECV)</b>	RabAvert®	Intramuscular	Pre-exposure or Post-exposure
<b>Human Rabies Immune Globulin (RIG)</b>	Imogam® Rabies-HT	Local infusion at wound site, with additional amount intramuscular at site distant from vaccine	Post-exposure
<b>Human Rabies Immune Globulin (RIG)</b>	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](http://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>

Ma, X., B. Monroe, J. Cleaton, L. Orciari, Y. Li, J. Kirby, R. Chipman, B. Peterson, R. Wallace, and J. Blanton. 2018. Rabies surveillance in the United States during 2017. Journal of the American Veterinary Medical Assoc 253: 1555-1568. <https://avmajournals.avma.org/doi/pdf/10.2460/javma.253.12.1555>

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