

Rabies surveillance, South Dakota, 2014

Rabies is an enzootic, nearly-always fatal, viral disease and a serious public health concern in South Dakota. In 2014, 588 animals were tested for rabies with 21 testing positive, 3.6%, a -25% decrease from the previous year. The 21 rabid animals included 3 domestic animals (1 bovine, 1 cat and 1 goat), and 18 wild animals (12 skunks and 6 bats). 2014 had the fewest rabid animals reported since 1960. No human rabies was reported. South Dakota's last human rabies case was in 1970 when a 3 year old Brule County child was bitten by a rabid skunk. Four years earlier, in 1966, a 10 year old Hamlin County boy also died from skunk rabies.

Animal rabies, South Dakota 2014



During 2014, 567 animals tested negative for rabies, including 161 bats, 154 cats, 90 dogs, 80 cattle, 24 raccoons, 13 skunks, 10 horses, 9 deer, 4 mice, 3 each coyotes, goats and opossums, 2 each woodchucks, muskrats, rabbits and squirrels, and 1 each llama, rat, sheep, shrew and weasel.

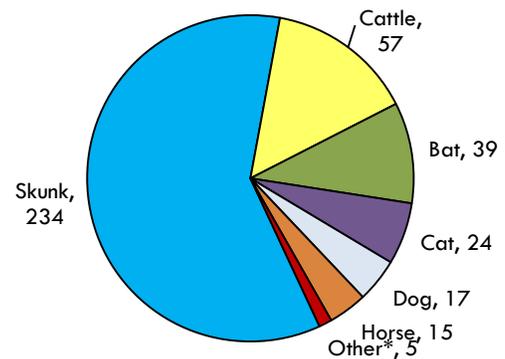
During 2014 animals were submitted for testing from 55 of South Dakota's 66 counties, and 17 counties reported rabid animals. Over the past decade, 2005-2014, rabid animals were reported from 61 of the state's counties, with every county, except Ziebach, submitting animals for testing. Over the decade 6,817 animals were tested and 391 (5.7%) were rabid.

During the past decade 30% of our 391 South Dakota rabies cases were domestic animals. The domestic animals included 24 rabid cats and 17 rabid dogs, many of which were unvaccinated strays or barn cats. Rabid livestock included 57 cattle, 15 horses and 3 goats.

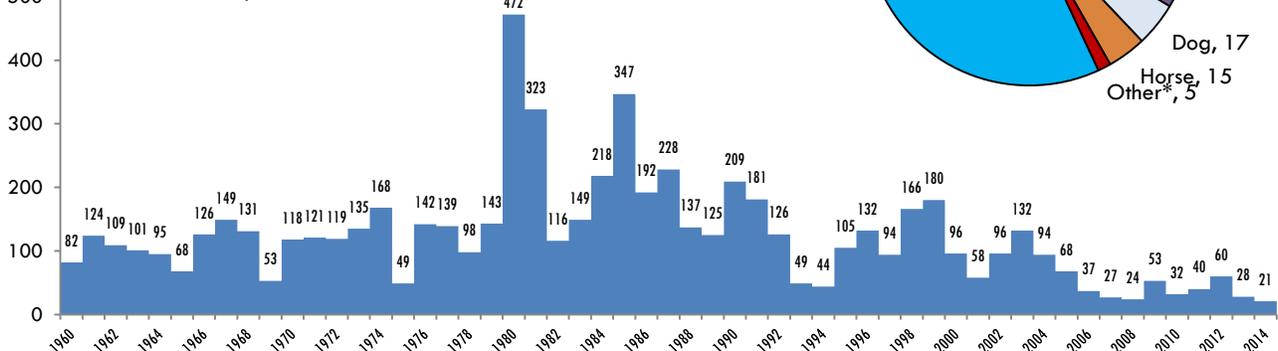
Skunks (*Mephitis mephitis*) are the primary rabies reservoir in South Dakota. Over the past decade 51% of skunks tested have been rabid. Bat rabies is also enzootic in South Dakota with 3% bats testing positive. The bats tested were not speciated. Although rabies is not enzootic in other South Dakota animals, during the past 10 years rabies was detected in 2 raccoons, likely spillover infections following exposure to rabid skunks.

Rabid animals, South Dakota 2005-2014

*Others include 3 goats and 2 raccoons



Animal rabies, South Dakota 1960 - 2014



Animal	2014		2005 - 2014		
	Positive	Total tested	Positive	Total tested	Percent Positive
Skunk	12	25	234	455	51.4%
Cattle	1	81	57	815	7.0%
Bat	6	167	39	1,214	3.2%
Cat	1	155	24	2,100	1.1%
Dog	0	90	17	1,343	1.3%
Horse	0	10	15	134	11.2%
Goat	1	4	3	26	11.5%
Raccoon	0	24	2	327	0.6%
Deer, elk, moose	0	10	0	88	0%
Rodents*	0	5	0	60	0%
Squirrel	0	2	0	45	0%
Muskrat	0	2	0	44	0%
Sheep	0	1	0	37	0%
Opossum	0	3	0	25	0%
Ferret/Weasel	0	1	0	22	0%
Coyote	0	3	0	21	0%
Fox	0	0	0	19	0%
Woodchuck	0	2	0	15	0%
Rabbit	0	2	0	7	0%
Badger	0	0	0	6	0%
Shrew, mole	0	1	0	5	0%
Beaver	0	0	0	3	0%
Donkey	0	0	0	3	0%
Pig	0	0	0	3	0%
Kangaroo	0	0	0	2	0%
Mountain lion	0	0	0	2	0%
Other animals*	0	0	0	4	0%
TOTAL	21	588	391	6,825	5.7%

*mice 24, rats 16, gopher 11, porcupine 2, prairie dog 2, gerbil 1, ground squirrel 1, guinea pig 1, hamster 1, vole 1.

**bison, llama, otter, tiger, wolf.

Thirty-four human rabies cases were reported nationally since 2003, including 31 deaths and 3 survivals, which is a 91% case fatality rate. Five of the human cases were attributed to organ transplantation. Twenty of the human cases (59%) were associated with bat-rabies virus, 9 (26%) had dog rabies virus (all foreign imports), 3 raccoon 1, fox, and 1 unknown. The 34 human rabies cases were from Texas (6), California (6), Indiana (2), Massachusetts (2), Wisconsin (2), Virginia (2) and 1 case each in Arkansas, Florida, Louisiana, Maryland, Michigan, Minnesota, Mississippi, Missouri, New Jersey, New York, North Carolina, Oklahoma, South Carolina and Puerto Rico.

Since 1960, 6,729 rabid animals have been reported in South Dakota. The most cases were reported in 1980 with 472 and the fewest in 2014 with 21 rabid animals.

The most recent national animal rabies surveillance data are reported for 2013 (Dyer, et al.). Nationally, there was a 4.8% decrease from the previous year with 5,865 rabid animals rabies reported (8% domestic and 92% wild animals). Nationally, rabid domestic animals included 247 cats, 89 dogs, 86 cattle, 31 horses/mules, 9 goats/sheep, 3 hogs and 2 llamas. Wild animals testing positive for rabies included 1,898 raccoons, 1,598 bats, 1,447 skunks, 344 foxes, 37 groundhogs, 16 bobcats, 5 coyotes, 4 deer, 3 otters 2 marmots, 2 opossums, 2 wolves, 1 fisher and 1 rabbit.

1966 rabies death in South Dakota *(archives)*

“A Bryant youth, who was bitten by a rabid skunk August 3 (1966), died at a Sioux Falls hospital Monday. CS, 10 (years), seemed to be recovering from the bites until Saturday when he began suffering headaches and was rushed to Sioux Falls. CS was bitten while sleeping out with friends. The skunk entered the sleeping bag which CS had received a week before as a birthday gift. He was bitten on about 6 places on the ear, arm, hand and leg. The animal was found 5 blocks away and was killed and sent to Brookings for tests. The lad underwent treatment at the DeSmet Hospital for rabies before being transferred to Sioux Valley Hospital.” *(Argus Leader, 6 Sept 1966)*

“The skunk was chased down and killed with a baseball bat 5 blocks away. The animal’s brain was brought to the veterinary science department at SDSU where fears were confirmed; it was rabid. CS was treated at DeSmet Hospital, received 21 rabies shots, and returned home, then later returned to the hospital. He died over a month after he was bitten. Dr. Keith Van Steenberg (SDSU) tested the skunk. The skunk’s brain contained “negri bodies”” *(Brookings Register, 10 Sept 1966)*

Rabid animals reported by county, South Dakota 1993-2014

County	Positive	Total tested	Rabid animals reported: 438 domestic. 1,201 wild.
South Dakota	1,639	17,451	190 bovine, 89 dogs, 88 cats, 59 horses, 6 sheep, 5 goats, 1 pig. 1,085 skunks, 101 bats, 6 fox, 4 raccoons, 2 badgers, 2 bison, 1 woodchuck.
Aurora	20	117	1 bovine, 2 dogs, 1 cat. 15 skunks, 1 fox.
Beadle	42	322	5 bovine, 6 dogs, 2 cats, 2 horses, 1 sheep. 25 skunks, 1 raccoon.
Bennett	5	28	5 skunks.
BonHomme	16	127	1 horse. 14 skunks, 1 bat.
Brookings	64	903	9 bovine, 5 dogs, 1 horse. 47 skunks, 1 bat, 1 raccoon.
Brown	74	682	5 bovine, 1 dog, 5 cats, 6 horses, 1 goat. 55 skunks, 1 bat.
Brule	16	184	1 horse. 15 skunks.
Buffalo	3	25	1 cat. 2 skunks.
Butte	42	394	4 bovine, 1 dog, 4 cats, 3 sheep. 29 skunks, 1 bat.
Campbell	15	61	2 bovine, 1 horse. 12 skunks.
CharlesMix	40	328	5 bovine, 4 cats, 4 horses. 27 skunks.
Clark	32	173	6 bovine, 2 dogs, 5 cats, 2 horses. 16 skunks, 1 bat.
Clay	10	191	1 bovine, 1 horse. 5 skunks, 3 bats.
Codington	48	509	7 bovine, 2 dogs, 2 cats, 1 horse. 36 skunks.
Corson	9	38	1 bovine, 1 dog, 1 cat, 1 horse, 5 skunks.
Custer	4	56	2 bovine, 1 cat, 1 bat.
Davison	36	605	6 bovine, 3 dogs, 3 cats, 1 horse, 1 goat. 21 skunks, 1 bat.
Day	44	233	5 bovine, 3 dogs, 1 cat, 2 horses. 31 skunks, 1 badger, 1 woodchuck.
Deuel	32	288	3 bovine, 2 dogs, 1 cat. 26 skunks.
Dewey	16	111	2 bovine, 1 cat, 2 horses. 11 skunks.
Douglas	16	106	3 bovine, 2 dogs, 1 cat, 1 horse. 9 skunks.
Edmunds	18	148	4 bovine, 1 dog, 1 horse. 12 skunks.
Fall River	5	227	1 bovine, 4 bats.
Faulk	21	97	2 bovine, 3 dogs. 16 skunks.
Grant	31	278	6 bovine, 2 dogs, 1 cat. 21 skunks, 1 fox.
Gregory	19	155	1 bovine, 1 dog, 1 cat. 16 skunks.
Haakon	12	102	3 bovine, 5 dogs. 4 skunks.
Hamlin	53	263	4 bovine, 2 dogs, 3 cats, 1 horse. 41 skunks, 2 bats.
Hand	25	149	3 bovine, 3 cats, 4 horses. 15 skunks.
Hanson	13	81	1 bovine, 2 dogs, 1 cat. 9 skunks.
Harding	16	53	2 bovine, 2 dogs, 1 cat, 1 sheep. 9 skunks, 1 bat.
Hughes	28	452	1 bovine, 2 dogs, 2 cats. 18 skunks, 3 bats, 1 fox, 1 bison.
Hutchinson	52	452	11 bovine, 3 dogs, 2 horses, 1 pig. 33 skunks, 2 bats.
Hyde	21	141	4 bovine, 2 dogs, 1 cat, 1 horse. 13 skunks.
Jackson	2	105	1 sheep. 1 bat.
Jerauld	13	83	2 bovine. 11 skunks.
Jones	3	34	3 skunks.
Kingsbury	58	356	5 bovine, 2 dogs, 6 cats, 44 skunks, 1 bison.
Lake	40	392	4 bovine, 1 dog, 2 cats, 1 horse. 31 skunks, 1 bat.
Lawrence	22	270	1 dog, 1 cat, 1 goat. 16 skunks, 3 bats.
Lincoln	15	357	1 bovine, 1 dog, 2 cats, 4 horses. 7 skunks.
Lyman	4	78	2 dogs, 1 horse. 1 skunk.
Marshall	34	191	6 bovine, 1 cat, 3 horses. 24 skunks.
McCook	35	278	4 bovine, 2 dogs, 1 cat, 1 horse. 27 skunks.
McPherson	29	159	5 bovine, 2 cats, 1 goat. 21 skunks.
Meade	40	391	6 bovine, 1 dog, 1 cat. 28 skunks, 4 bats.
Mellette	4	21	2 bovine. 1 skunk, 1 bat.
Miner	23	160	3 bovine, 1 dog. 18 skunks, 1 bat.
Minnehaha	109	3846	7 bovine, 3 dogs, 3 cats, 2 horses. 40 skunks, 54 bats.
Moody	36	255	3 bovine, 1 dog, 1 cat, 1 goat. 28 skunks, 1 bat, 1 raccoon.
Oglala Lakota	0	62	None
Pennington	45	1408	3 bovine, 2 dogs, 6 cats, 2 horses. 24 skunks, 7 bats, 1 raccoon.
Perkins	11	61	5 bovine, 1 dog, 1 cat. 4 skunks.
Potter	7	50	2 cats, 2 horses. 3 skunks.
Roberts	27	336	4 bovine, 1 dog, 2 cats. 20 skunks.
Sanborn	18	121	3 bovine, 2 dogs, 1 cat. 12 skunks.
Spink	25	203	3 bovine, 2 dogs, 1 cat, 14 skunks, 2 fox.
Stanley	6	57	1 bovine, 1 cat. 4 skunks.
Sully	4	17	1 dog. 3 skunks.
Todd	1	90	1 skunk.
Tripp	34	251	1 dog, 4 cats, 2 horses. 27 skunks.
Turner	33	417	2 bovine, 1 dog, 1 cat, 1 horse. 27 skunks, 1 bat.
Union	6	190	1 dog, 1 cat. 3 skunks, 1 bat.
Wailworth	45	504	11 bovine, 4 dogs, 1 cat, 3 horses. 23 skunks, 1 bat, 1 fox, 1 badger.
Yankton	12	264	2 dogs. 7 skunks, 3 bats.
Ziebach	0	4	None

Two South Dakota laboratories provide rabies testing services: (1) Animal Disease Research Diagnostic Laboratory (ADRDL) in Brookings; (2) State Public Health Laboratory (SDPHL) in Pierre. During 2014, 67% of rabies tests were done at ADRDL and 33% at SDPHL. Both laboratories use the direct fluorescent antibody (DFA) technique. Human serum rabies antibody titers may be ordered through SDPHL.

The case definition of a confirmed animal rabies case is a positive DFA test, performed preferably on central nervous system tissue, or isolation of the rabies virus in cell culture or in a laboratory animal.

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*. We strive to recommend appropriate rabies prevention measures and to minimize unnecessary and inappropriate testing and post-exposure prophylactic treatment.

Addresses, telephone numbers and websites

Department of Health (rabies consultations)

615 East Fourth Street
Pierre, SD 57501-1700
Phone: 800-592-1861 or 605-773-3737;
after hours 800-592-1861 or 605-773-3737
<https://doh.sd.gov/diseases/infectious/diseasefacts/rabies.aspx>

Department of Health, Public Health Laboratory (rabies testing)

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 Bat Group <http://sdbwg.org>

Animal Disease Research and Diagnostic Laboratory (rabies testing)

North Campus Drive
South Dakota State University
Brookings, SD 57007-1396
Phone: 605-688-5171
www.sdstate.edu/vs/adrdl

SD Animal Industry Board (livestock and animal veterinary and regulatory issues)

441 S. Fort Street, Pierre, SD 57501
Phone: 605-773-3321
<http://aib.sd.gov>

CDC Rabies: www.cdc.gov/rabies

Rabies Prevention

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 an animal bites your pet, take it to a veterinarian for a rabies booster vaccination.

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 an animal, consult your physician.
- Post-exposure prophylaxis: rabies immune globulin and 4 doses of rabies vaccine over 14 days.

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. Also, 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.

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 (PCEC)	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

References and resources

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

CDC. Compendium of animal rabies prevention and control, 2011. National Association of State Public Health Veterinarians. www.cdc.gov/mmwr/pdf/rr/rr6006.pdf

Compendium of measures to prevent disease associated with animals in public settings, 2013: National Assoc of State Public Health Veterinarians. Journal of the American Veterinary Medical Association 243: 1270-1288.

<http://avmajournals.avma.org/doi/pdf/10.2460/javma.243.9.1270>

Dyer J, P. Yager, L. Orciari, L. Greenberg, R. Wallace, C. Hanlon, and J. Blanton. 2014. Rabies surveillance in the United States during 2013. Journal of the American Veterinary Medical Assoc 245: 1111-1123.

<http://avmajournals.avma.org/doi/pdf/10.2460/javma.245.10.1111>

South Dakota Rabies Control Laws

RABIES CONTROL STATUTE: Chapter 40-12 (Section 12-1, 2, 3, 4, 5, 6)

40-12-1. Confinement of animals required in localities where rabies exists -- Neglect as misdemeanor. In localities where rabies exists, the animal industry board may require that any animal deemed likely to spread such disease shall be muzzled, caged, tied or confined in any manner that may be deemed necessary. It is a Class 1 misdemeanor for any owner or person in charge of any animal so ordered to be muzzled, caged, tied or confined, to refuse or neglect to carry out such order.

40-12-2. Destruction of rabid animal required. If the animal industry board determines that rabies exists in any animal, the board may kill such animal and any animal there is reason to believe has been bitten by any animal affected with rabies.

40-12-4. Definition of terms. Terms used in this chapter mean:

- (1) "Department," the department of health;
- (2) "Owner," any person who has a right of property in a pet, keeps or harbors a pet or who has it in his care or acts as its custodian, or permits a pet to remain on or about any premises occupied by him;
- (3) "Pet," any dog, cat or other species of carnivore kept for domestication or display.

40-12-5. Confinement of pet after attack upon person -- Violation as misdemeanor. The department may serve written notice upon the owner of any dog or cat which has attacked or bitten a person to confine the animal at the owner's expense upon his premises or at a city pound or other place designated in the notice for a period of at least ten days after the animal has attacked or bitten any person. The department may examine the animal at any time within the ten-day period of confinement to determine whether such animal shows symptoms of rabies. In the case of any pet other than a dog or cat, which has attacked or bitten a person, the department may serve written notice upon the owner of such animal that the owner shall have the animal euthanized immediately and submit the brain to an approved laboratory for rabies examination. Any owner who fails to comply with a written notice served pursuant to this section is guilty of a Class 1 misdemeanor.

40-12-6. Confinement of pet bitten by animal suspected of having rabies -- Violation as misdemeanor. The department may serve written notice upon the owner of a dog or cat known to have been bitten by an animal known or suspected of being affected by rabies, requiring the owner to confine such dog or cat for a period of not less than six months. However, if such dog or cat had been properly treated with an antirabic vaccine, confinement shall be for a period of not less than three months. In the case of any pet other than a dog or cat, the department may serve written notice upon the owner of such animal that the owner shall have the animal euthanized immediately. Any owner who fails to comply with a written notice served pursuant to this section is guilty of a Class 1 misdemeanor.

SHERIFF: Chapter 7-12 (Section 7-12-29) Taking and holding animal suspected of being dangerous -- Formal determination -- Disposal of dangerous animal. The sheriff may take possession of any animal suspected of being dangerous. The sheriff may hold such animal until a formal determination can be made of the extent of the danger such animal poses. If the animal has attacked or bitten a human or an animal pet, the formal determination shall include consultation with the Department of Health for the purposes of rabies control. The sheriff may dispose of any animal so determined to be dangerous.

REPORTABLE DISEASES: Administrative Rule 44:20:01:03 Category I reportable diseases have a potential for epidemic spread or require rapid application of public health measures to prevent a serious threat to public health or safety. Category I reportable diseases include: Rabies, human and animal.

CONTROL MEASURES: Administrative Rule 44:20:03:10 Application of public health measures to animals. The department may instruct a person who owns or is in possession of an animal known or suspected to be a carrier of an infectious agent in public health measures for preventing infection and spread of disease. If the department knows or has reason to believe, because of testing or epidemiological information, that an animal is infected with an infectious agent and is a threat to the public health, it may issue a public health notice directing the person who owns or is in possession of the animal to take one or more of the following actions:

- (1) To examine or test the animal to determine whether it is infected with an infectious agent capable of causing human disease
- (2) To report to an authorized department representative for counseling on methods for preventing transmission of the infectious agent;
- (3) To confine or quarantine the animal for the duration of the incubation period or contagious period;
- (4) To destroy the animal or provide treatment until it is cured or free from the infection and to follow measures for preventing reinfection;
- (5) To cease from specific activities involving the infected animal that endanger the health of others;
- (6) To cooperate with the department in implementation of reasonable public health measures.

Health requirements for dogs and cats on exhibit: Administrative Rule 12:02:10:03 All dogs for exhibition must be accompanied by a health certificate signed by a licensed accredited veterinarian within 30 days before entry to the South Dakota State Fair. The health certificate shall indicate the dates of vaccination for rabies, canine distemper, and canine parvovirus. All vaccines must be current. All cats for exhibition must be accompanied by a health certificate signed by a licensed accredited veterinarian within 30 days before entry to the South Dakota State Fair. The health certificate shall indicate the dates of vaccination for rabies and feline distemper. All vaccines must be current.

Importation of imported cats and dogs: Administrative Rule 12:68:06:09 No person may import any dog or cat over three months of age without certification of a current rabies vaccination. If a dog or cat is imported from an area that is quarantined for rabies, a certifying statement is required from an accredited veterinarian that the dog or cat has not been exposed to rabies. No person may import any dog or cat less than three months of age from an area under quarantine for rabies. A certificate of veterinary inspection is not required for dogs and cats entering the state unless: (a) The animal originates from an area quarantined for rabies; (b) The animal originates from a foreign county; (c) The animal is to remain in the state for 30 days or more; (d) A resident travels with an animal to another state or province and does not return within 30 days; or (e) The state veterinarian determines that it is necessary based on disease information for a time period not to exceed the term of the threat; (3) It is not a violation of this section to bring a dog or cat into the state from a bordering state for the purpose of obtaining any vaccination or other health care from a licensed veterinarian.