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A CHECKLIST AND DISTRIBUTION MAPS OF THE AMPHIBIANS AND REPTILES OF SOUTH DAKOTA

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ABSTRACT

Fourteen species of amphibians and 30 species of reptiles are documented from South Dakota, based on the examination of 7,361 museum specimen records. No species of the herpetofauna is endemic to the state, which contains a mixture of species from especially the southern and western regions of the United States. Four amphibians (*Ambystoma tigrinum*, *Bufo cognatus*, *Pseudacris triseriata*, and *Rana pipiens*) and three reptiles (*Chrysemys picta*, *Heterodon nasicus*, and *Thamnophis radix*) occur statewide in appropriate habitats. Three amphibians and 11 reptiles reach their northern distributional limits in the state, and two amphibians reach their southern limits. Two amphibians and five reptiles reach their eastern range boundary, and two amphibians attain their western distributional limits. Based on an analysis of county records compared to potential species occurrences within the 66 counties in the state, only 55.5% of the species-by-county records exist in the museum-specimen voucher records. One species of salamander, *Necturus maculosus*, lacks specific voucher specimens from the state, although it has been recorded on the Minnesota side of the Minnesota River in northeastern South Dakota. This paper provides information that is intended to aid in the discovery of additional distributional data of South Dakota's herpetofauna.

† † †

A recent comprehensive checklist of the amphibians and reptiles of South Dakota is not available, and this is the first attempt to map distributions of herpetiles in the state, based on museum specimens. The South Dakota Department of Game, Fish, and Parks has published recent semi-technical pamphlets on the snakes (Thompson and Backlund 1998) and amphibians (Fischer et al. 1999) of South Dakota. Over (1923, 1943) and Fishbeck and Underhill (1959) are the only papers that considered all herpetiles of the entire state. These papers are out of date and did not present map data of distributions. Timken (1968) provided an excel-

lent treatise on the distribution and ecology of the turtles of the state in an unpublished dissertation. Several other authors (Dunlap 1963, 1967, O'Roke 1926, Peterson 1974, Smith 1963a, 1963b, 1966, Underhill 1958) provided additional information on selected species or regions, and several notes on distributions have appeared over the years. Various field guides (e.g. Conant and Collins 1998) report distributions of amphibians and reptiles at a very general level and without documentation. For a state in the central region of the country, field guides focusing either to the east or west are not always careful with the details of distributions in the plains. This is in part due to a paucity of technical literature, and this paper is intended to fill that gap.

Occurring within South Dakota are two species of salamanders, 12 species of frogs or toads, seven species of turtles, seven species of lizards, and 16 species of snakes. No species is restricted to South Dakota, and most are typical of the Great Plains region. Many species have at least one of their distributional limits within the state. Seven species occur throughout the state (*Ambystoma tigrinum*, *Bufo cognatus*, *Pseudacris triseriata*, *Rana pipiens*, *Heterodon nasicus*, *Thamnophis radix*, and *Chrysemys picta*). Distributional records are still minimal for several regions of the state, especially the north-central area. One purpose of this report is to generate interest in documenting herpetiles in counties where they are almost certainly present but for which no scientific documentation is currently available. Records in this report are based on museum collections of actual specimens, rather than simply on sight records, which are occasionally erroneous and not subject to definitive verification.

In the accounts below, species are arranged in alphabetical order (by scientific name) within popularly recognized taxonomic groups or orders. Common names

conform to those recognized by Collins (1997). Information given is generally limited to descriptions necessary for identification, as well as size, habitat, and notes on behavior or ecology that might assist future collectors in obtaining new distributional records. We encourage such records to include the deposition of specimens in museum research collections.

MATERIALS AND METHODS

We obtained records of herpetiles from 32 museums in the U.S. that represent national collections or from those likely to contain specimens from South Dakota. Most museums had fewer than a hundred specimens from South Dakota, and the largest collection, containing 4549 specimens, came from the collections made by researchers at the University of South Dakota, especially through the efforts of the late Professor Don Dunlap. That collection, which was in need of curation, has now been transferred to the University of Nebraska State Museum, in Lincoln. All museum data combined provided records of 7,361 specimens. We plotted localities based on documentation provided in the museum records. We also checked specimens with suspected errors, in particular examining those of two species-pairs that are easily confused (*Rana pipiens* and *R. blairi*; *Thamnophis sirtalis* and *T. radix*) to

verify identifications. Some errors may still exist, but it is unlikely that we included data outside the probable range of a particular species. We are confident that the documented distributions provided here are reasonably accurate. Locality records are noted with dots on the maps, except that in cases where the only record for the county had no specific locality data, a square was placed in the center of the county.

Museums and associated personnel that provided data included: Academy of Natural Sciences, Philadelphia (Ted Daeschler and Tom Uzzell); American Museum of Natural History, New York City (Darrel Frost); Strecker Museum, Baylor University, Waco (Hobart Smith); Carnegie Museum of Natural History, Pittsburgh (John Wiens); California Academy of Sciences, San Francisco (Joe Slowinski and Barbara Stein); Field Museum of Natural History, Chicago (Harold Voris, Alan Resetar, and Peter Lowther); Florida Museum of Natural History, Gainesville (David Auth); Illinois Natural History Survey, Champaign (Chris Phillips); Iowa State University, Ames (Bruce Menzel); James Ford Bell Museum of Natural History, University of Minnesota, Minneapolis (John Moriarty and Andrew Simons); Louisiana Museum of Natural History at Louisiana State University, Baton Rouge (Doug Rossman); Natural History Museum of Los Angeles County, Los Ange-

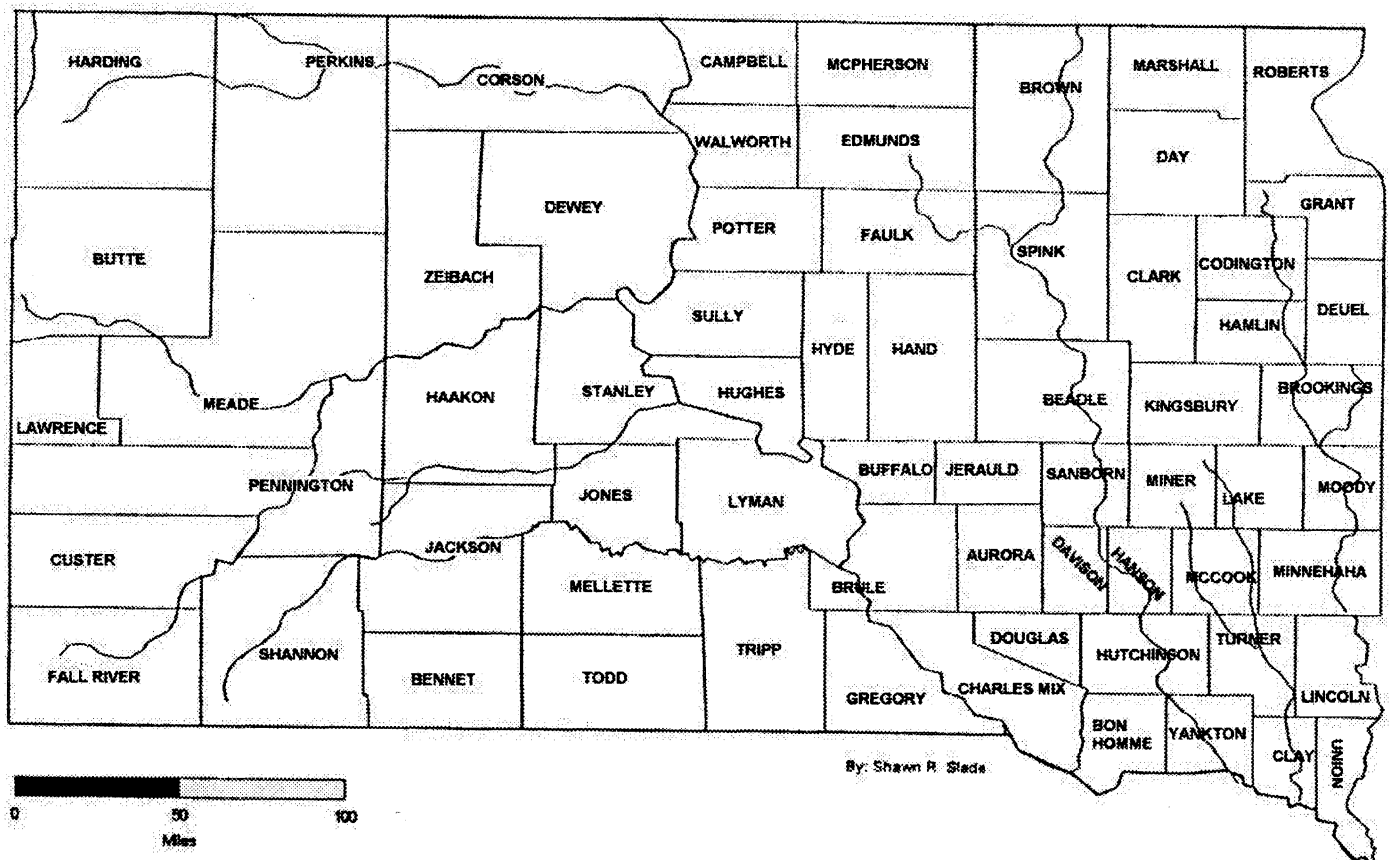


Figure 1. Map of South Dakota showing names of counties.

les (David Kizirian); Milwaukee Public Museum (Robert Henderson); Museum of Comparative Zoology, Harvard University, Cambridge (Jose Rosado); The University of Kansas Natural History Museum, Lawrence (John Simmons); Museum of Southwestern Biology, University of New Mexico, Albuquerque (Howard Snell and Tom Giermakowski); Museum of Vertebrate Zoology, University of California, Berkeley (David Wake); Smithsonian National Museum of Natural History, Washington, DC (Ron Heyer and Ron Crombie); The Sam Noble Oklahoma Museum of Natural History, Norman (Laurie Vitt); Royal Ontario Museum, Toronto (Robert Murphy and Ross MacCulloch); San Diego Natural History Museum (Paisley Cato); Sternberg Museum of Natural History, Ft. Hays State University, Hays (Jerry Choate and Korrie Chapman); Texas Cooperative Wildlife Collection, Texas A&M University, College Station (Lee Fitzgerald and Kathryn Vaughan); Museum of Texas Tech University, Lubbock (Richard Monk); University of Colorado Museum, Boulder (Hobart Smith and Rosanne Humphrey); University of Illinois Museum of Natural History, Urbana (Aine Shiozaki); University of Michigan Museum of Zoology, Ann Arbor (Arnold Kluge and Greg Schneider); University of Nebraska at Kearney (Dudley Friskopp and Clayton True); University of Nebraska State Museum, Lincoln (Tom Labeledz and Trish Freeman); University of Texas at Arlington (Jonathon Campbell); University of Texas at El Paso (Carl Leib); and University of Texas Natural History Collection, Austin (David Cannatella and Allison Anderson). We greatly appreciate the assistance of the museum personnel in providing specimen data from their collections and to several of these individuals for checking identifications or loaning specimens for us to examine. We are especially grateful to Dr. Karen Olmstead, Biology Department Chair at the University of South Dakota, for locating the Dunlap collection catalog and then arranging for that collection to be transferred to the collections in the University of Nebraska State Museum, Lincoln.

TAXONOMIC CHECKLIST

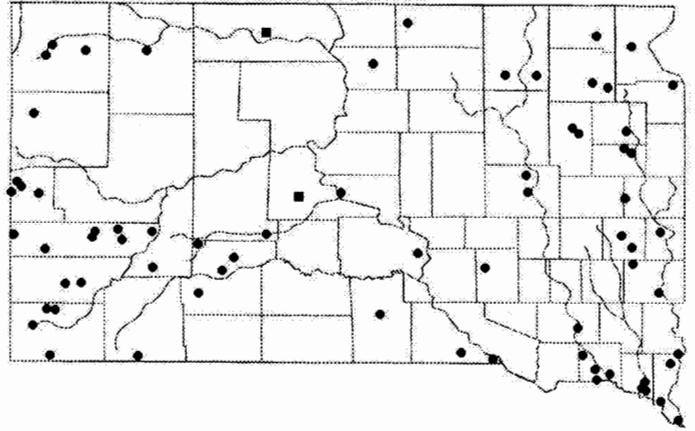
In the following checklist, distribution maps are placed with each species. The names of South Dakota counties are given in Fig. 1.

Salamanders (Order Caudata)

Salamanders are amphibians with a typical quadruped body form and are occasionally mistaken for lizards. However, like other amphibians, salamanders have a soft, moist skin and most (all in South Dakota) are dependent on water to complete the larval stage of life history. Two species of salamanders that occur in South Dakota are very distantly related and represent two families, Ambystomatidae and Proteidae. Larvae

of the tiger salamander are occasionally incorrectly referred to as mudpuppies but are considerably different in most of their biology as well as appearance.

1. *Ambystoma tigrinum* (Tiger Salamander)



The tiger salamander is widely distributed across the northern United States and occurs throughout South Dakota, although a few counties lack museum records. Adults (head-body length 15–18 cm) can be found above ground during the spring and fall, as they migrate to and from breeding ponds, marshes, or lakes. Occasional specimens turn up in window wells, basements or swimming pools. Most tiger salamanders observed are larval sightings or neotenic individuals which fail to metamorphose. These individuals usually lack a color pattern and range from cream to black. Neotenic animals exhibit three pairs of feathery gills extending from the neck and a membranous fin extending along the back and tail. These neotenic forms are often confused with the mudpuppy (*Necturus maculosus*), but the five toes on the hind foot of tiger salamanders, compared to four in the mudpuppy, easily distinguishes them.

Recent research (Irschick and Shaffer 1997, Shaffer and McKnight 1996) has questioned the taxonomic status of *Ambystoma tigrinum*, suggesting that the eastern tiger salamander is a distinct species separate from the other recognized forms. If further research verifies these hypotheses, then two species would occur in South Dakota (*Ambystoma tigrinum* and *A. mavortium* with two subspecies in the state). More work would need to be done to delineate the ranges of these forms in the state, and in particular to determine if the ranges of the two species overlap. Until such work is done, we have taken a conservative approach by following the most recent monograph on U.S. salamanders (Petranka 1998), which retained the classical recognition of tiger salamanders, including three subspecies in South Dakota. These subspecies include the blotched tiger salamander (*A. t. melanostictum*), which has a dull yellow network on a dark brown to black ground color. This subspecies occurs in the western half of the state. The gray tiger salamander (*A. t. diaboli*) is olive to dark brown, with dark spots on its back and sides. It is found in the northeastern corner of the state. Occurring in the extreme southeastern corner of the state is the eastern tiger salamander (*A. t. tigrinum*), which is dull black with light yellowish brown spots.

2. *Necturus maculosus* (Mudpuppy)

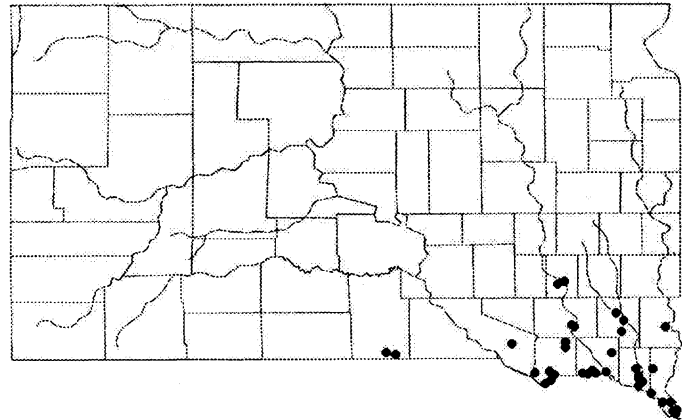
The mudpuppy is permanently aquatic and retains many larval characteristics as an adult (a condition known as neoteny) including external gills and thin fins bordering the edges of the tail. This species is large, reaching body lengths that may exceed 30 cm. General coloration is gray to rusty-brown or black usually with round spots that vary from blue to black. There is a dark stripe through the eye that sometimes extends onto the body as a dorsolateral stripe, which may be yellowish in young. The tail fin is often orange or reddish. The mudpuppy lives in large rivers and permanent bodies of water. There are no specific museum records for the state, but museum specimens known from the Minnesota side of Big Sioux Lake in Big Stone County (Oldfield and Moriarty 1994), along with a specimen collected in the Red River near Grand Forks, North Dakota (Wheeler and Wheeler 1966), indicate that this species occurs at least in the drainage system bordering the northeast corner of South Dakota. There are three known sightings in the South Dakota Natural Heritage data base (Backlund, personal communication), but whether these represent the mudpuppy or neotenic examples of the tiger salamander is uncertain. Two of these records date to 1924 and 1927, from Day County, and the third record is from Marshall County in 1972. Perhaps these older records explain why the South Dakota Natural Heritage database lists this species as "historically known, may be rediscovered." Of several bait dealers we talked with in northeastern South Dakota in May of 2000, most only knew the tiger salamander, and only one definitely knew the difference between true mudpuppies and larval tiger salamanders, and he said he was unaware of where these could be found except farther east in Minnesota. Specimens of this species are needed to confirm its presence in the state. We retain it here because specimens from the drainage bordering the northeast of the state are known from nearby North Dakota and Minnesota, so there is no reason to doubt its occurrence in the state.

Frogs and Toads (Order Anura)

Twelve species of frogs and toads, representing four anuran families, occur in South Dakota. These include four species of true toads (Bufonidae), three species of tree frogs (Hylidae), four species of true frogs (Ranidae), and one species of spadefoot toads (Pelobatidae). The bufonids are highly terrestrial and are recognized by the parotid glands located just behind and above the ear drum, and most species have cranial crests (ridges on the head) and a rough and dry, warty-appearing skin. Hylids are distinguished by the intercalary cartilage, an extra phalangeal element that separates the distal end of the toe, which may contain an expanded pad. This character is not easily seen except in arboreal species, of which only one, the gray treefrog, occurs in South Dakota. Other hylids (*Acris crepitans* and *Pseudacris triseriata*) in the state resemble small true frogs in general appearance. Ranids are typical aquatic frogs or so-called "true frogs" with large hind legs and fully webbed hind feet. A single spadefoot (Pelobatidae) in South Dakota can be recognized by its vertical pupil.

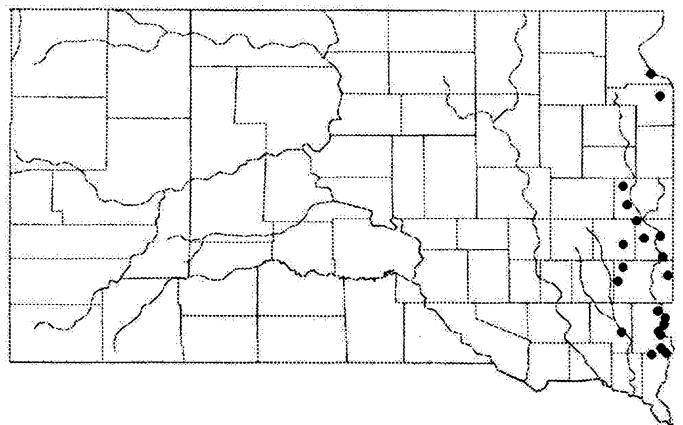
Frogs are well known for their mating calls, which are different in each species. Although most species have very distinctive calls that have proven convenient in monitoring population status, call variation due especially to temperature, which particularly affects the pulse rate, can lead to erroneous identification in closely related species.

3. *Acris crepitans* (Northern Cricket Frog)



Cricket frogs are small (2–3.5 cm), with webbed hind feet and a warty back lacking dorsolateral folds. There is an irregularly shaped black line on the posterior surface of the thigh. The dorsum is gray to brown, sometimes with darker blotches. Most individuals have a green or brown triangle between the eyes. These frogs are frequently observed around the edge of permanent ponds and, after jumping into the water, quickly swim back to shore to the cover of emergent vegetation or grass. Breeding occurs in mid-summer, stimulated by rains, when breeding males produce a characteristic cricket-like call consisting of several clicks. Tadpoles are easily recognized by their black-tipped tail. Cricket frogs can be found along sluggish streams as well as lakes and ponds with emergent vegetation. In South Dakota, these frogs occur only in the southeastern part of the state.

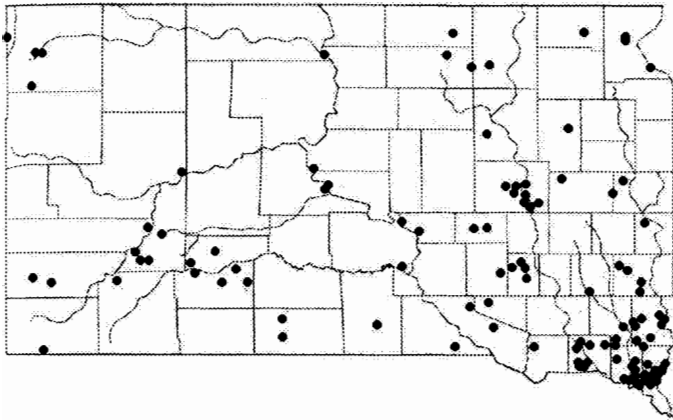
4. *Bufo americanus* (American Toad)



The American toad (5–9 cm in length) occurs in eastern South Dakota and is characterized by its brown color, with

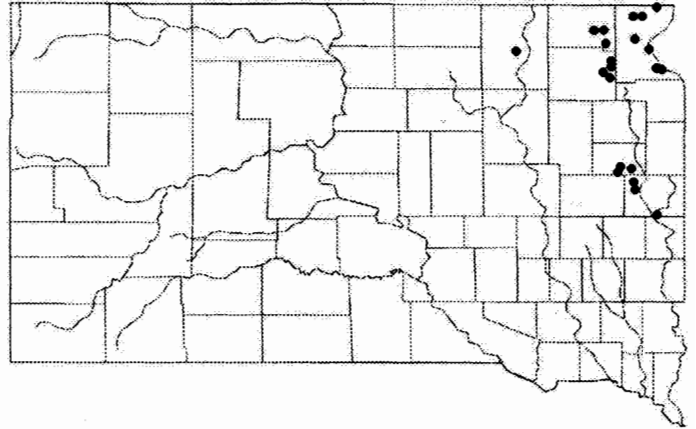
variable black and white spots having 1-2 warts per spot. The kidney-shaped parotid glands do not contact the postorbital crests, unless by a short spur. This species is often confused with Woodhouse's toad, with which it readily hybridizes, but can be distinguished by the warts on the shank, which are larger in *B. woodhousii*. Also, the venter of the American toad is boldly spotted, whereas Woodhouse's toad lacks spots or has only a few small spots on its chest. Like other toads, the American toad is terrestrial and may be found in yards, woods, or open areas during the summer months but only in abundant numbers in breeding aggregations in temporary ponds, following late spring and early summer rains. Breeding males have dark brown nuptial pads on their thumbs and a darker colored vocal sac under the chin, characteristics found in other toads as well. American toads occur along the eastern edge of South Dakota.

5. *Bufo cognatus* (Great Plains Toad)



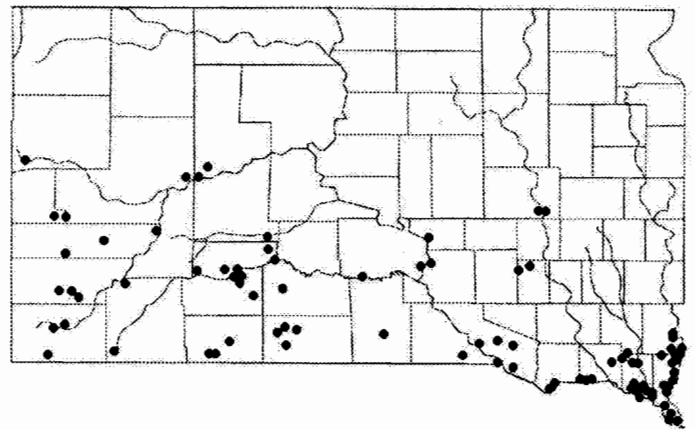
Bufo cognatus is generally larger than other toads in the region (to about 9 cm in body length). It has irregularly shaped large spots or patches that are dark green, edged by a light cream color. The interorbital crests converge anteriorly, forming a boss on the snout. This species ranges widely across the state but is not well documented in the north central region. Found in prairies after spring rains, it quickly forms choruses that can be heard for great distances, but a particular breeding event may last only one to a few days, after which it disperses and is infrequently found at other times of the year in burrows of mammals. The vocal sac in males is sausage-shaped, extending above and in front of the head when inflated.

6. *Bufo hemiophrys* (Canadian Toad)



Distributed in the northeast corner of South Dakota, this toad is distinguished by cranial crests that fuse to form a boss between the eyes. This is a medium-sized toad (7–8 cm) whose coloration is dark brown to dark green, with a light middorsal stripe and dark spots with 1 or 2 warts per spot. These toads are easily confused with the American toad, to which they are closely related, but the parotid gland of the Canadian toad is larger both in length and width. The breeding calls of these two species are also similar, which has led to some suggestion, based on calling surveys (Fischer 1998, Fischer et al. 1999), that the Canadian toad occurs southward to the Nebraska border. We reject this view, given the lack of museum specimens that confirm this distribution. As with other toads, this species is common after late spring and early summer rains, when it breeds in temporary aquatic habitats. It occurs in woodlands and wetlands.

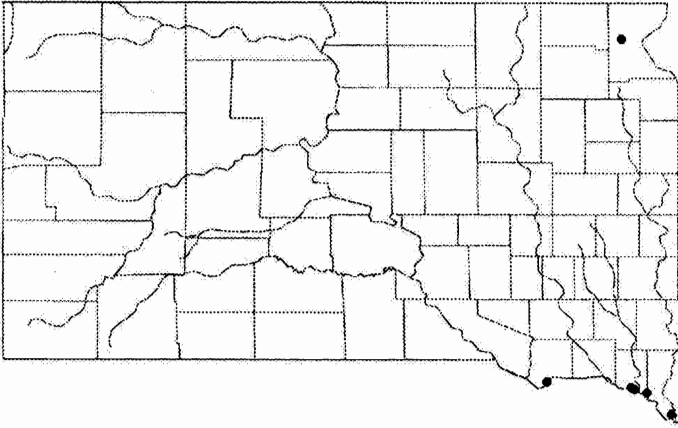
7. *Bufo woodhousii* (Woodhouse's Toad)



Woodhouse's toad is frequently found crossing roads to breeding sites during spring rains. In the summer, it can be found in yards and gardens or foraging around yard lights at night. Whether because of behavior or abundance, *B. woodhousii*, which reaches body lengths of 7–9 cm, is typically more often observed than other species of toads. This species presumably occurs throughout the state, except for the extreme northeastern corner, but museum records are limited to the southern half of South Dakota. It is characterized by its white venter, which lacks markings except for

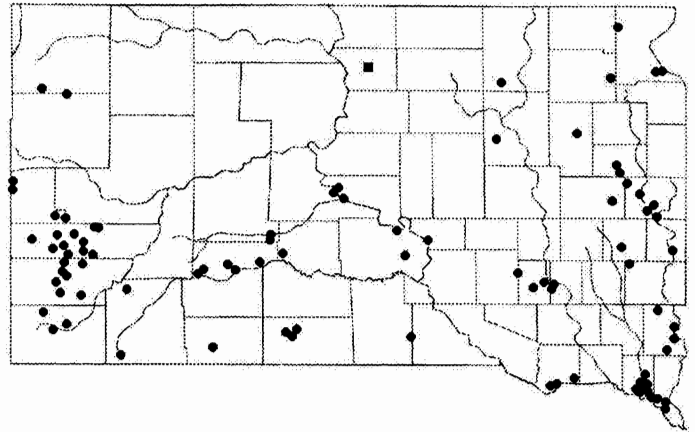
occasional flecks on the chest. The elongated parotid glands touch the rather prominent cranial crests. A light stripe exists on the middle dorsum, which is brown with small darker brown to black spots having one wart per spot. These toads occur in a wide variety of habitats and use temporary ponds, ditches and flooded areas as breeding sites.

8/9. *Hyla versicolor* (Gray Treefrog) and/or *Hyla chrysoscelis* (Cope's Gray Treefrog)



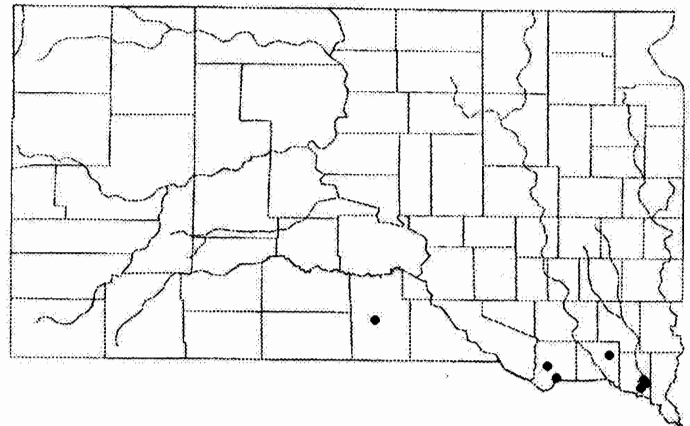
This is the only arboreal frog in the state. Its body (3–5 cm) is gray with black bordered blotches. The skin color may change to green, but the black borders remain visible even though the blotches may fade from sight. The inner surface of the thighs is bright yellow and the back is rough. Individuals are extremely cryptic against the bark of trees. Pads are evident on the tips of the toes. Tree frogs occur in woodland habitats, being found in trees and bushes and rarely on the ground except during the breeding season. Males can be found calling near temporary ponds in woodlands. There are actually two species of gray treefrog that are indistinguishable except from an analysis of the chromosomes. In most general treatments, these species are considered together because insufficient research has been done to delineate the distributions and ecology that may distinguish each. The second species *Hyla chrysoscelis* has a slightly different call, having a higher trill rate, and a diploid number of chromosomes (24) whereas *H. versicolor* is a tetraploid, having 48 chromosomes. Work remains to be done to delineate the natural ranges of these two species, so it is unknown if both species occur in South Dakota. Lynch (1985) noted that “all Nebraska populations have the high pulse rate of *H. chrysoscelis*” and thus should be considered Cope’s gray treefrog. If this hypothesis proves correct, it is likely that the same might apply to South Dakota populations, but we have retained the conservative approach of listing both species until research in South Dakota confirms this fact. Jaslow and Vogt (1977) noted that Cope’s gray treefrog is a prairie-associated species and the gray treefrog is a forest-associated species. Thus, on several lines of evidence we might expect that if research proves that only one of these species occurs in South Dakota, which is likely given that this is on the edge of the distribution, then it would likely be *H. chrysoscelis*. Museum records indicate that “gray treefrogs” are found in the northeast and southeast corners of the state, but more records are needed to document the extent of the range of this species complex.

10. *Pseudacris triseriata* (Western Chorus Frog)



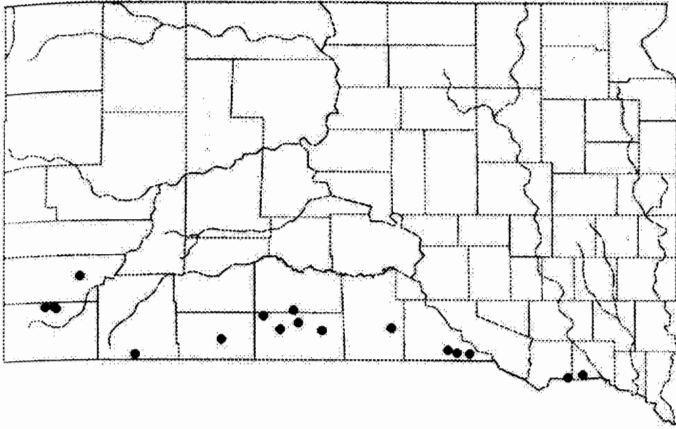
This small (2–4 cm) terrestrial treefrog ranges from gray to light brown with dark brown dorsolateral stripes. The middle strip may split into two stripes posteriorly. A stripe also runs through the eye. This is one of the most common species of frogs in South Dakota, emerging in early spring and breeding during the cooler months of the year. The frogs have been known to form breeding choruses as late as August, following thunderstorms and during periods of cooler temperatures. Calling from roadside ditches and marshes, their insect-like trill sounds much like the sound obtained when running your thumb across the teeth of a comb.

11. *Rana blairi* (Plains Leopard Frog)



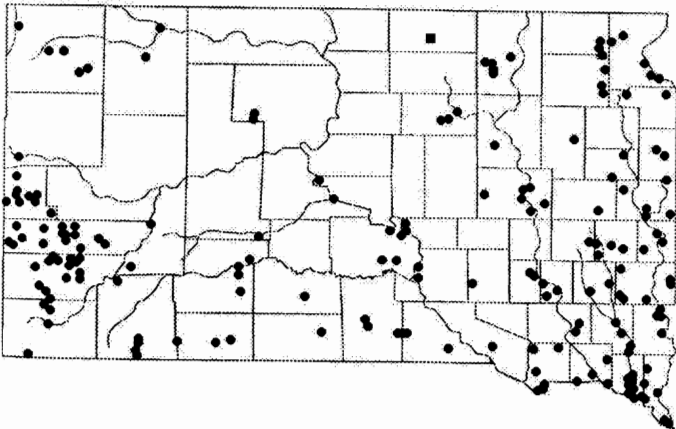
The plains leopard frog is tan, with numerous brown spots on the dorsum, light colored dorsolateral stripes on an elevated fold of skin, and usually a small light spot on its tympanum. The brown spots are distinctly round, compared to the more elongate spots in its close relative, the northern leopard frog (*R. pipiens*), with which this species is often confused. In addition to the shape of the spots, the dorsolateral fold in *R. blairi* is broken posteriorly, with the broken fragment inset slightly medially. Dorsolateral folds of *R. pipiens* are not broken. The plains leopard frog is 5–9 cm long and occurs only in extreme southern and southeastern South Dakota. Like other *Rana*, it is commonly found in association with permanent ponds, streams and adjacent wetlands.

12. *Rana catesbeiana* (Bullfrog)



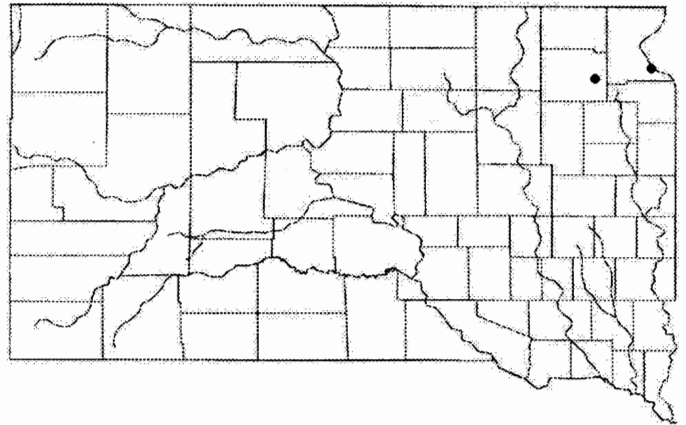
As South Dakota's largest anuran (body length to 15 cm in adults), the bullfrog is territorial, with only a handful of adult males occupying a particular pond or breeding site. Color varies from light to dark green, and the belly is white or tinted with a gray reticulum. They have no dorsolateral folds, as found in other *Rana* in the state. They have well-developed webbing on the hind foot, except for the distal end of the fourth toe. Males exhibit a large tympanic membrane that is larger than the eye, whereas the eye of females is about the same size as the tympanum. Males begin calling in late June with a deep guttural baritone call. Records for the bullfrog occur across the southern part of South Dakota. These frogs have been frequently introduced in farm ponds and are sufficiently large to be a game species.

13. *Rana pipiens* (Northern Leopard Frog)



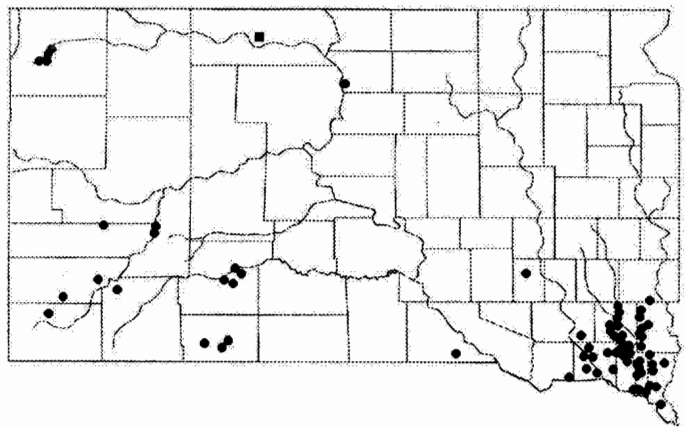
Rana pipiens is a moderate sized frog (5–9 cm) with a green or brown dorsum and elongated darker spots. The dorsolateral folds are light cream to yellow and not broken posteriorly. There is no light spot on the tympanum. This species occurs throughout the state, although a number of central counties lack museum voucher specimens. Like other *Rana*, the northern leopard frog occurs in the vicinity of permanent water but can also be observed crossing roads or land, enroute to a new pond.

14. *Rana sylvatica* (Wood Frog)



The wood frog has been recorded in only two counties in the northeastern part of the state. This northerly distributed frog of moderate size (4–7 cm) is found in semi-permanently flooded woodlands or wetlands and is known for its terrestrial inclinations. It wanders considerable distances from water after a very short, explosive (all individuals breed within a very short period of time of a week or two) breeding period in early spring. Some calling males may be heard even before the ice clears the pond. Color varies greatly from pink to tan and brown to almost black. There is a dark patch extending backward from the eyes, giving the appearance of a black "robber's mask."

15. *Spea bombifrons* (Plains Spadefoot Toad)



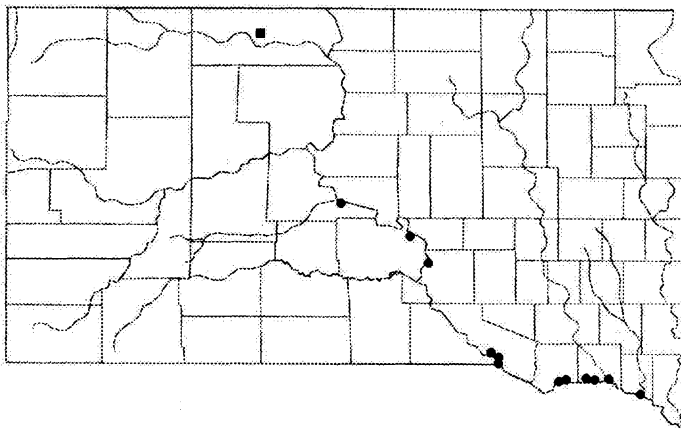
The plains spadefoot (4–5 cm) is gray to brown with orange warts. It is readily identified by its vertical pupils and a boss between the eyes. The inner edge of the hind foot has a sharp keratinized tubercle used for digging. The venter is white. Spadefoot toads breed in temporary pools, following late spring and early summer rains. Also an explosive breeder, they are usually present only during a few nights after thunderstorms, after which they presumably move back to the prairie, where they burrow into the ground until the next breeding season. These toads are noted for the extremely rapid developmental rate compared to other frogs and toads, thus they are able to breed in smaller temporary pools that would dry up too quickly for other species to complete their larval development.

Turtles (Order Chelonia)

Seven species of turtles representing three families occur in South Dakota. These include a single species of snapping turtle (Chelydridae), two softshell turtles (Trionychidae) and four pond turtles (Emydidae). Turtles are unique among reptiles in having a shell-like structure covering the upper (carapace) and lower body (plastron). In softshell turtles, this covering is fleshy rather than a hardened keratin material of distinct plates. Snapping turtles have long tails and a plastron that is greatly reduced to form a cross-shaped ventral plastron. Emydid turtles may be aquatic or terrestrial and have typical turtle shells with 25 marginal scutes.

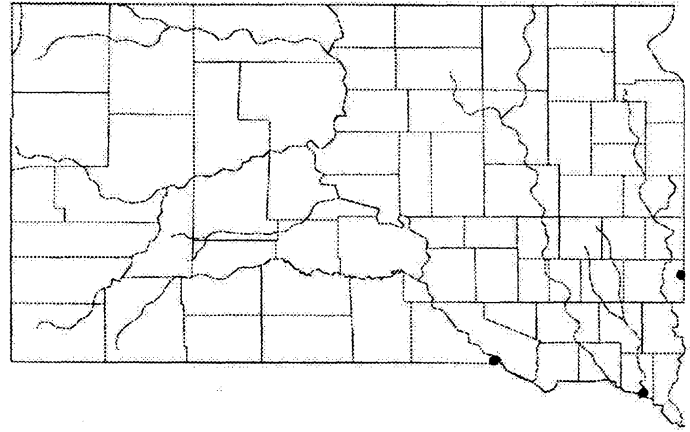
Timken (1968) examined the distribution and ecology of turtles in South Dakota in a dissertation. To our knowledge, his excellent study of South Dakota turtles was not published in the peer-reviewed literature, but anyone wishing detailed information on the turtles of South Dakota will find much of value in his 1968 dissertation, completed at the University of South Dakota under Don Dunlap's supervision. Turtles in general are large and bulky to store, thus museum collections tend to have fewer specimens of turtles than of other herpetile groups.

16. *Apalone mutica* (Smooth Softshell)



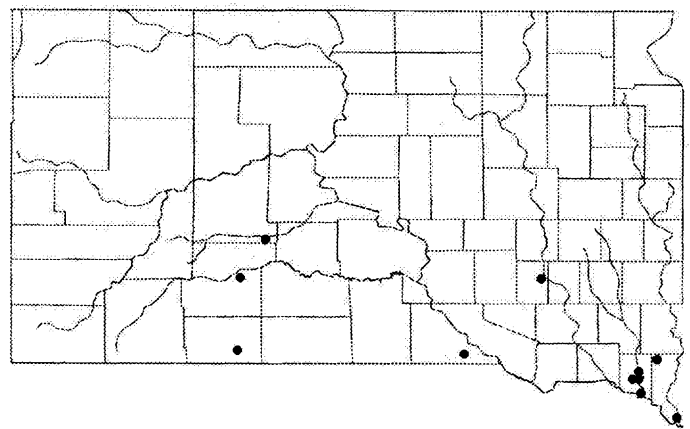
This is a common species in the Missouri River and associated large reservoirs and is expected to occur in the tributaries of the Missouri River, at lower densities. As the name implies, the carapace of this species is smooth as well as round, and flat. Specimens range 15–25 cm long and are tan in color, sometimes with a mottled brown pattern that characterizes juvenile specimens. The plastron is white. There is a light yellow line from the back of the eye that runs onto the throat on both sides of the neck. These are almost entirely aquatic, rarely coming on land except to lay eggs.

17. *Apalone spinifera* (Spiny Softshell)



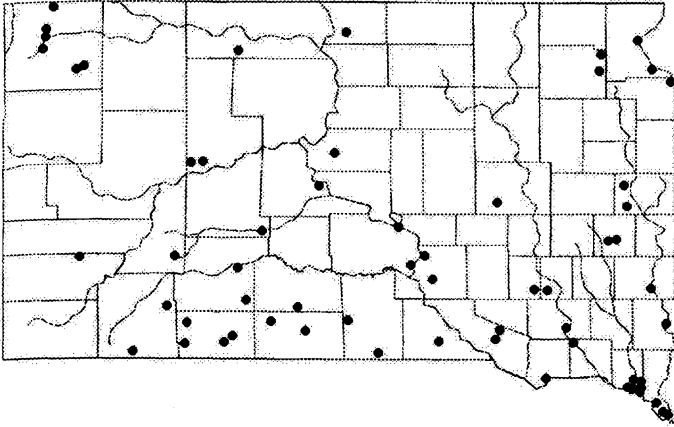
The spiny softshell is known to occur only in the lower Missouri River of the state, where it is common in backwater habitats as well as the main channel. The olive-gray carapace is bordered by a dark line, and there are dark circular spots, termed ocelli, scattered over the dorsal surface, although females generally lack these ocelli and may have a mottled irregular pattern. The plastron is white. The carapace has small but sharp tubercles on its surface giving it a texture similar to sandpaper. Males range up to about 17 cm in length, and females may range to over twice as long (to 42 cm). Spiny softshells are aquatic but will occasionally bask along a sandy shore or in shallow water.

18. *Chelydra serpentina* (Common Snapping Turtle)



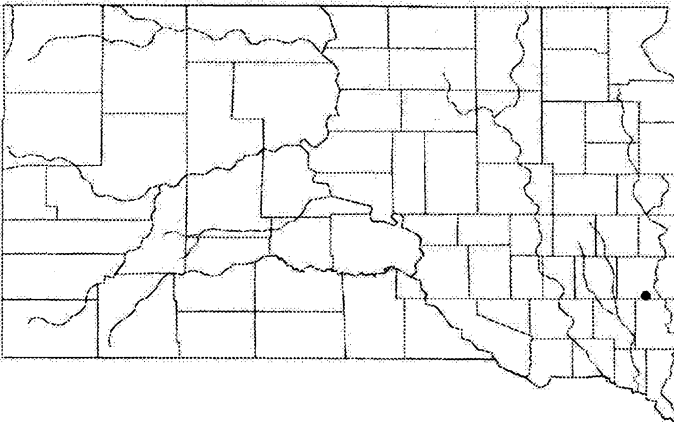
The common snapping turtle presumably occurs throughout the state in rivers and large ponds or lakes of permanent water, but museum records exist only for the southern half of the state. They can be large, heavy-bodied turtles, up to 50 cm long and 15 cm thick. They have long tails and a large head. The rough carapace, with three prominent ridges or keels, is dark green or brown and the plastron is greatly reduced. Although largely aquatic and typically found in deep water, snapping turtles occasionally wander on land between ponds. They are also frequently caught on fishing lines. Large specimens can inflict a serious wound with their powerful jaws.

19. *Chrysemys picta* (Eastern Painted Turtle)



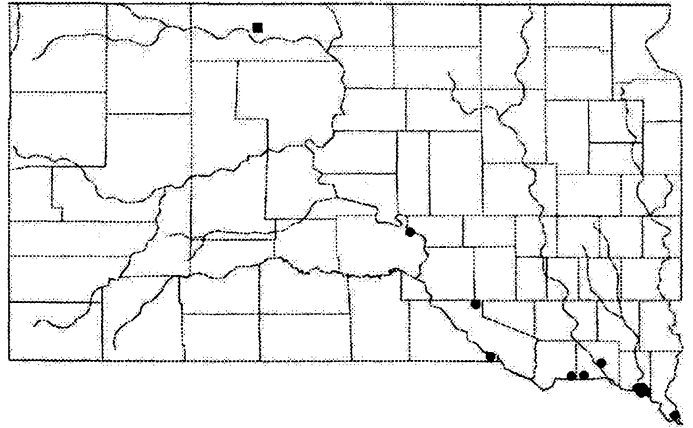
Painted turtles occur throughout the state in permanent aquatic habitats, generally in ponds and lakes but more rarely in rivers. The carapace is smooth, with an olive or brown coloration and a network of darker lines. The reddish colored plastron (brighter in juveniles) gives the species its common name. Yellow lines occur on the side of the head, extending onto the neck. Adults can range up to about 20 cm in length, and the depth of the of the shell is 8–10 cm.

20. *Emydoidea blandingii* (Blanding's Turtle)



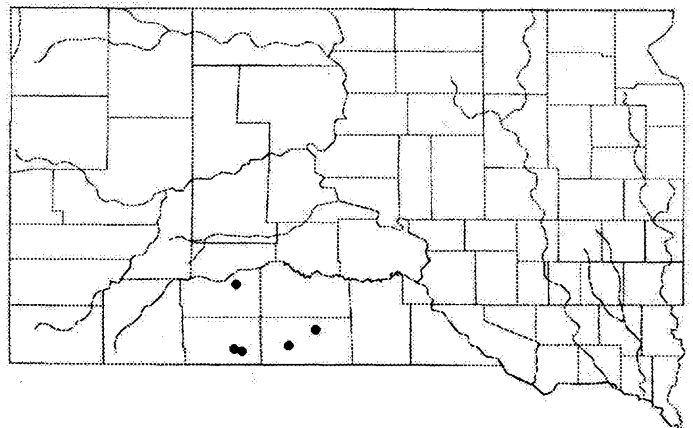
This is the rarest turtle in South Dakota, with a single museum record from Minnehaha County. It is known to occur in western Iowa and northern Nebraska and is expected to be found in the southern part of South Dakota, in ponds and associated permanent aquatic habitats. This tends to be a secretive species that often escapes the attention of collectors. Adults range up to 30 cm in Nebraska, and the carapace has a higher shell (to 10 cm) than the painted turtle. The carapace is black or brown, with numerous small yellow spots and short dashes. The yellow plastron is hinged and has large black blotches. The species is listed as endangered in South Dakota, but little data exist to evaluate this listing.

21. *Graptemys pseudogeographica* (False Map Turtle)



The false map turtle is a common turtle of the upper Missouri River, although museum records are limited. It is found mostly in backwater habitats but can be found in the main channel as well as flooded floodplains or occasionally in reservoirs. Adults range to about 25 cm long but are typically less than 20 cm. The carapace is brown to green, with light reticulations of yellow or orange, which may be obscured in some individuals. The plastron is variable but generally yellow with dusky lines, usually along the joints of the scutes but occasionally forming a more extensive pattern of alternating dark and light lines. The legs and neck are marked with yellow lines, and there is a yellow spot behind the eye. There are prominent knobs or enlarged keels on the middorsal (vertebral) scutes especially in males and juveniles. These knobs are much reduced in older females. The posterior margin of the carapace is saw-toothed. The false map turtle is listed by South Dakota as a state-threatened species, primarily because of habitat deterioration. Timken (1968) commented on this situation.

22. *Terrapene ornata* (Ornate Box Turtle)



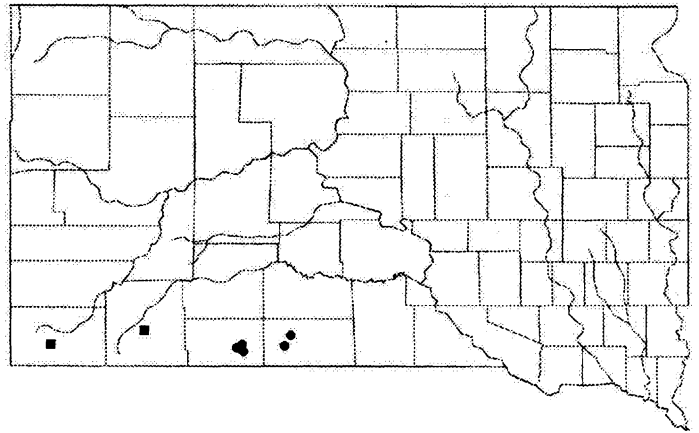
Box turtles are terrestrial and occur in the sandy areas of southern and southwestern South Dakota. Adults range 12–15 cm in length, with a high shell and hinged plastron capable of entirely enclosing the head and legs. The carapace is brown or black with prominent yellow lines or reticulations. The plastron is yellow with brown blotches. Males have a red

eye whereas females have a green or yellowish brown eye. Males develop an orange or reddish coloration to the scales on the forelimbs and neck, early in the season. This color gradually fades after breeding occurs. These turtles are often persecuted by the public because of the myth that they eat eggs of game birds. There is little evidence that this occurs because they feed mostly on vegetation and some insects, so the myth may simply justify the urge of a hunter to practice on an easy target.

Lizards (Order Lacertilia)

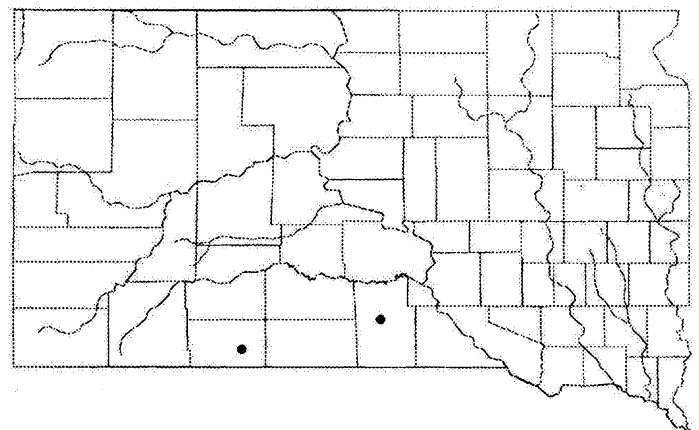
Lizards are closely related to snakes and usually grouped in a single order, Squamata, in which case Lacertilia and Serpentes (snakes) are considered suborders. The seven species of lizards occurring in South Dakota are all terrestrial and represent three families. There are two species of skinks (Family Scincidae) and four species (earless, short-horned, fence and sagebrush lizards) belonging to the family Phrynosomatidae, a group of North American lizards formerly included within the Iguanidae. A single species (racerunner) belongs to the family Teiidae. In South Dakota, lizards can be defined as reptiles having a typical quadruped body form and a skin covered with small scales, which may be either granular or overlapping. Skinks have smooth, shiny dorsal scales, teiids have tiny granular dorsal scales and large quadrangular ventral scales, and the phrynosomatids have granular or rough scales but not quadrangular ventrals. All of the species in South Dakota except the horned lizard will lose their tail to escape from predators. The tail regenerates, but because total length can vary considerably between individuals with whole tails versus those with regenerated tails, body length of lizards is typically expressed as SVL, the distance from the tip of the snout to the vent, or cloacal opening, at the base of the tail. Four of the lizards reach their northernmost distributional limit in southern South Dakota.

23. *Cnemidophorus sexlineatus* (Six-lined Racerunner)



Racerunners have elongate bodies (SVL to 6–9 cm), long tails (about twice the length of the body), and stout arms and legs. These lizards run fast and use the tail as a counterbalance, which if broken greatly reduces their agility and speed (Ballinger et al, 1979). There are six light stripes over a dark brown back that run longitudinally from the head to base of the tail. Males have a distinct greenish appearance which can be very bright and conspicuous on the sides and head. This bright green coloration is characteristic of the Prairie Racerunner subspecies (*C. s. viridis*) that occurs in the central Great Plains and extending into southwestern South Dakota. This lizard has fine granular scales on its dorsum and quadrangular ventral plates. Racerunners are almost always on the move in search of food, and they are frequently observed scratching the surface or turning over twigs and debris with their forelegs. These lizards typically occur in sandy soils and are active during the hottest part of the day, when other lizards may have retreated to the shade.

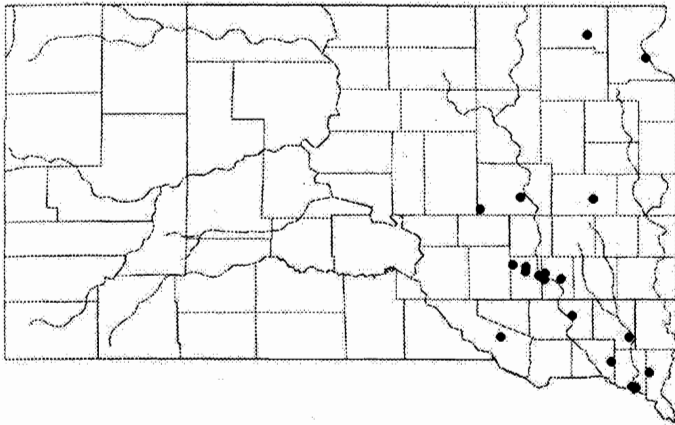
24. *Eumeces multivirgatus* (Many-lined Skink)



Skinks have shiny smooth scales, and the many-lined skink is usually striped with alternating dark and light stripes, although a patternless morph (lacking stripes) of cream to gray color is known in certain locations. This rarer form has been reported in western Nebraska, but it has not been reported in South Dakota. The body (SVL of 6–8 cm) is cylindrical, with small, frail legs, and the tail is likewise

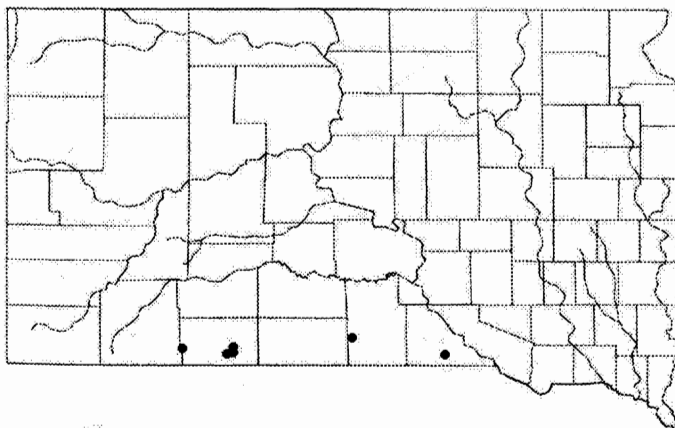
broad, tapering to a point and slightly longer than the body when whole. However, the tail is easily broken to escape predators and is gradually replaced through regeneration. The regenerated part has a different appearance in color and texture. This species occurs in the sandhills of the extreme southern part of South Dakota, but museum specimens exist only for Tripp and Bennett counties. Many-lined skinks are typically secretive and not easily observed, often being found under rocks or other cover.

25. *Eumeces septentrionalis* (Northern Prairie Skink)



The northern prairie skink (SVL 7–8.5 cm) occurs in the tallgrass prairies from Texas to Canada. It occurs in the eastern quarter of South Dakota, but several counties lack museum records. It has stripes and a broad brown dark band along its sides. Like other skinks, the scales are smooth and shiny. Its body form is similar to the many-lined skink, although the legs may appear a bit stouter. It occurs in grassy areas but is most frequently encountered in areas where rock outcrops provide cover, under which it hides.

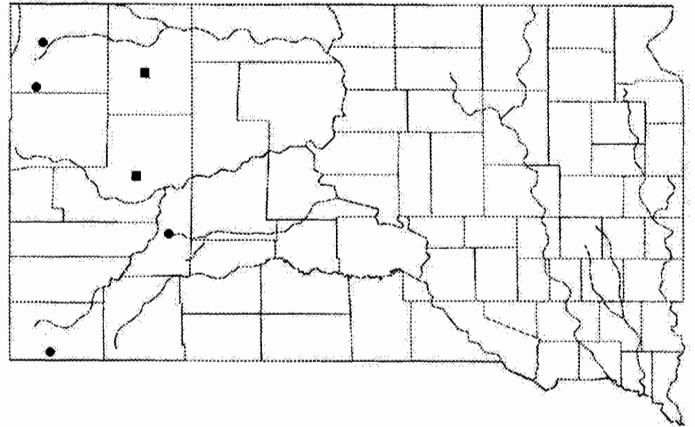
26. *Holbrookia maculata* (Lesser Earless Lizard)



As its common name suggests, this species lacks an external ear opening. It has very small granular scales on the dorsum with slightly larger, flat and overlapping scales on the venter. The body form (SVL of 4–6 cm) is unremarkable, and the legs tend to be long to support its agile and rapid running habit. The tail is relatively short (about the length of

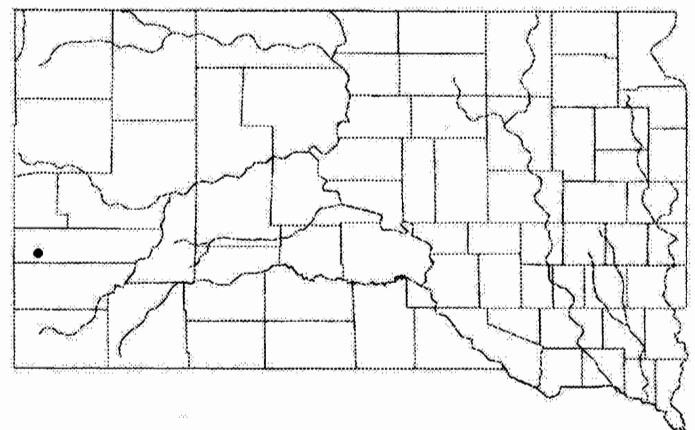
the body). The body is cryptically colored, with a mottled pattern of cream and tan with darker brown, indistinct blotches on the back. The underside is white, with two darker blue or black spots (reduced or absent in females) just behind the forearms. Females carrying eggs or having recently bred develop a diffuse orange coloration on the head and body. Earless lizards occur in sandy soils with open areas along the south-central border counties of the state.

27. *Phrynosoma douglasii* (Short-horned Lizard)



Horned lizards have a robust rounded body (SVL 6–9 cm) and a distinctly knob-like head bearing spines. The body scales are varied in size, including some appearing spike-like and others almost granular. These are relatively slow moving lizards that depend more on cryptic coloration than speed and agility to escape predation. Like other horned lizards, this species prefers ants but will eat other insects as needed. This species is recorded in four western South Dakota Counties, where it is found in arid short-grass plains usually in open, rocky or rough terrain. Zamudio et al. (1977) proposed taxonomic reforms that would change the name of this species in South Dakota to *P. hernandezii*. However, all forms of *P. douglasii* were not represented in their study, so we have retained *douglasii* here until the full taxonomy of the species is resolved.

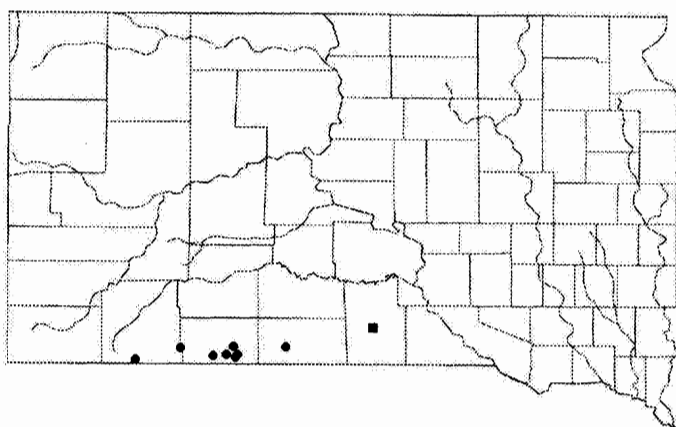
28. *Sceloporus graciosus* (Sagebrush Lizard)



Sagebrush lizards (SVL 5–7 cm) occur broadly across the western United States but extend into the central Great

Plains in only isolated areas of suitable, typically rocky, habitat. Museum records exist only for western Pennington County, but they may occur elsewhere as the lizards are known from isolated locations in both western Nebraska and North Dakota. In the plains, insufficient information has been collected to describe their natural history. In the west they are ground dwelling but will perch on rocks or low branches of trees and bushes. The scales are smaller than those of the fence lizard and almost granular, but not nearly so small as the racerunner or earless lizard. The back is pale gray to light brown, with few or no distinct markings. Males have blue patches on their venter.

29. *Sceloporus undulatus* (Fence Lizard)



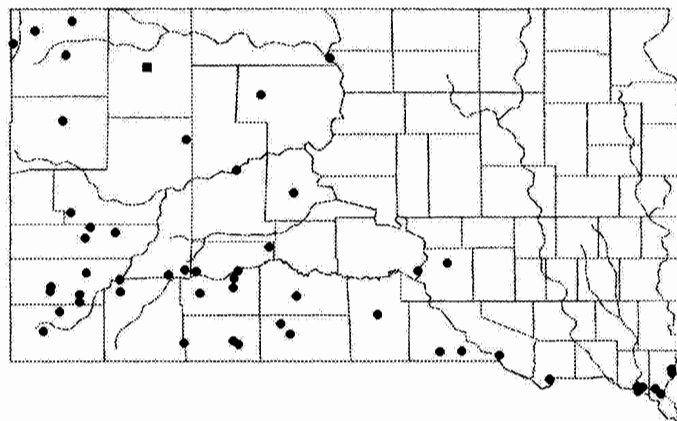
This lizard is 5–7 cm in SVL and brown to gray, with a pair of cream-colored stripes on either side of the dorsum. Flecks or blotches of light or dark color are scattered between these lines. The sides tend to be darker brown, but the venter is white except for the blue patches occurring in males. The scales are rough and large enough to be seen easily by the naked eye, and they overlap such that it is possible to run one's finger along the back from front to rear without being caught by the scales, but it is impossible to do the reverse without being stuck by the scales. These lizards occur in a variety of habitats, from open grassland (often associated with yucca plants) to rocky or wooded areas. They are frequently observed basking or perched in wait of suitable insect prey and are especially fond of sitting on wooded fence posts, from which their common name derives. In South Dakota, they are known from sandy areas in four southern counties.

Snakes (Order Serpentes)

Closely related to lizards and often included in the same order (Squamata), snakes are elongate reptiles without legs. They have smooth or keeled dorsal scales and large transverse scutes on the ventral surface. Most snakes shed the entire skin in one piece, whereas lizards typically shed the skin in many small pieces. Color patterns vary greatly, from uniform to striped or banded or blotched. The sixteen snake species recorded in South Dakota represent two families. The prairie rattlesnake belongs to the Crotalidae, has large fangs with which it delivers a deadly poison, and has a rattle on the end of the tail. All other species, of which some

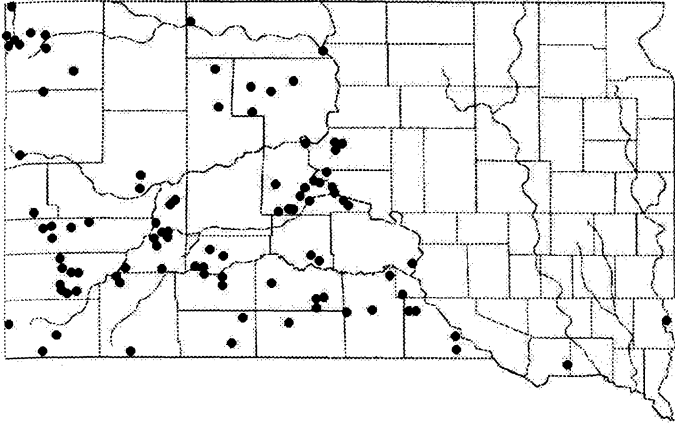
may superficially resemble the rattlesnake and thus may be confused with it, belong to the large snake family Colubridae. Some of these colubrids contain small fangs in the rear of their mouth, with which they inject their prey with a venom to subdue it, but none of the South Dakota ones are poisonous to humans. Lengths in snakes vary with age of individuals, so it is not infrequent to find specimens that are larger or smaller than the typical lengths given in the species accounts below.

30. *Coluber constrictor* (Eastern Racer)



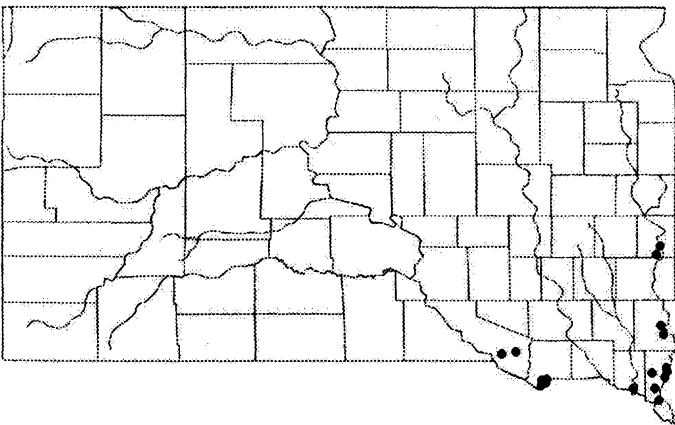
The racer, often called the blue racer, is one of the most common snakes in the northern Great Plains. The subspecies (*C. c. flaviventris*) in the plains states east of the Rocky Mountains is also known as the yellow-bellied racer, owing to its yellowish ventral coloration. This snake is found generally west of the Missouri River in South Dakota, although there are a few records of specimens in the floodplain east of the river. Adult racers are uniformly bluish green or gray on the dorsum and cream to yellow on the venter. Juveniles have a very different pattern of blotches along the back and smaller ones on the sides with many small spots on the venter. This is a moderately sized species reaching lengths of 80 to 90 cm, but it is thin rather than heavy bodied. The dorsal scales are smooth. This species can be found in open grassland and prairies or pastures.

31. *Crotalus viridis* (Western Rattlesnake)



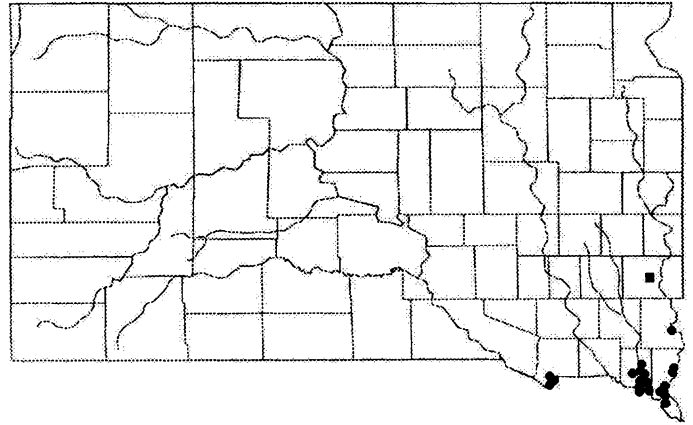
The western rattlesnake or prairie rattlesnake, as the subspecies (*C. v. viridis*) occurring in South Dakota is known, also occurs west of the Missouri River. This snake has a light-bordered blotched dorsal pattern on a generally tan or brownish background that can be quite cryptic. The tail is lightly banded and terminates with a rattle representing modified scutes. There is a pit organ between the nostril and eye, just above the upper lip, that is a heat-sensing organ. The head is triangular and the dorsal scales are keeled. There are two prominent fangs in the canine position in the upper jaw that are capable of delivering venom. Prairie rattlesnakes are heavy bodied and can attain lengths greater than 120 cm. This species may be found in prairies and grasslands but is especially common in areas with rock outcroppings.

32. *Diadophis punctatus* (Ringneck Snake)



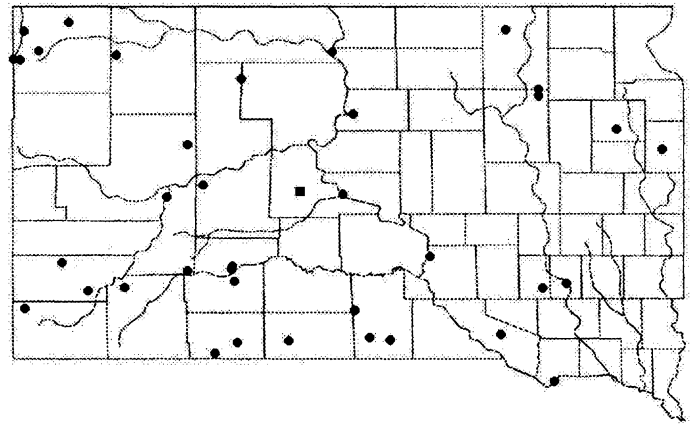
This is a small snake (to about 30 cm) with a uniform dark brown or grayish black dorsum and a prominent yellow or orange ring around the neck. The venter is yellow to orange, with black flecks. The venter of the tail is brighter orange or reddish and is curled upward to expose this coloration when the snake is disturbed. The dorsal scales are smooth. This species occurs only in southeastern South Dakota, along the Missouri and Big Sioux rivers, where it can be found in woodlands or on rocky hillsides.

33. *Elaphe vulpina* (Western Fox Snake)

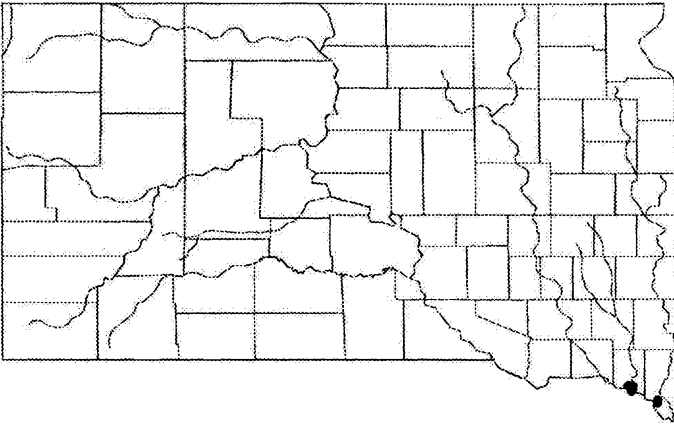


Western fox snakes are relatively heavy bodied snakes that can reach up to 130 cm. The dorsal pattern is spotted with large brown blotches along the middle and smaller spots on the sides on a tan or brown ground color. The belly is yellowish cream with darker blotches. The dorsal scales are weakly keeled and the anal plate is divided. Fox snakes are found in open prairie or riparian woodlands in extreme southeastern South Dakota. Unlike most snakes in South Dakota whose distributions extend southward, the fox snake occurs in the north-central U.S., from northern Missouri to Michigan.

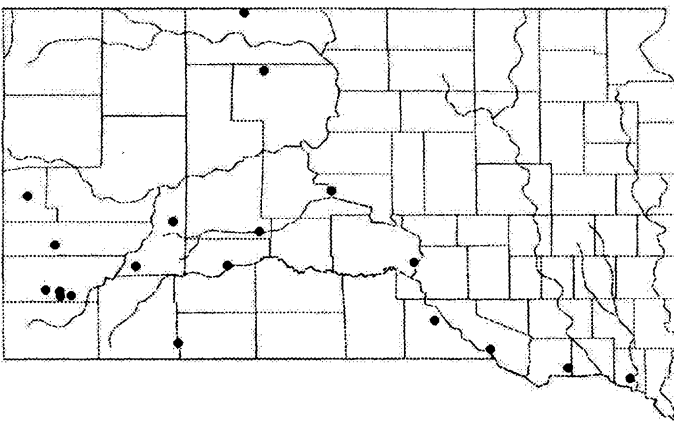
34. *Heterodon nasicus* (Western Hognose Snake)



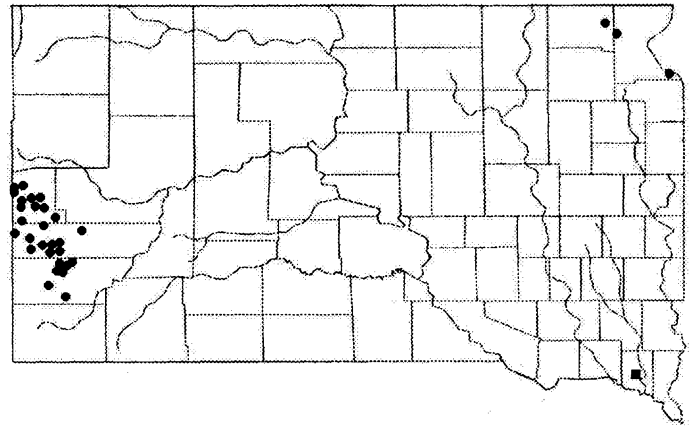
This species is relatively heavy-bodied for its length, being shorter (40–60 cm) than the other moderately sized snakes mentioned above. The snout is sharply up-turned giving this genus its common name. The dorsum is brown, with distinct darker brown spots on the midline and sides forming 4–6 rows across the back. The venter is black, with occasional lighter spots of cream or yellow. The dorsal scales are keeled. The snake has rear fangs and is mildly venomous to its prey. It occurs throughout the state in prairies and especially on sandy soils, although its distribution is not well documented in the east central area. Hognose snakes are well known for feigning death or “playing dead” when captured.

35. *Heterodon platirhinos* (Eastern Hognose Snake)

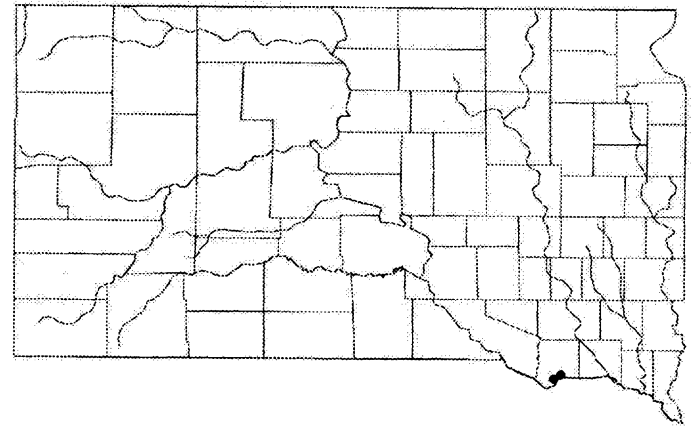
The eastern hognose is slightly larger than its western relative, reaching total lengths of 80–90 cm. It has dark blotches on the mid-dorsum that alternate with blotches on the sides. The ground color is variable but generally brownish black to reddish or tan. The belly is uniformly gray. The snout is pointed and only slightly upturned, much less so than in the western species. The dorsal scales are keeled and it is rear-fanged. This species is found in sandy areas of open prairies or woodlands. Museum records are known only for Union and Clay Counties in extreme southeastern South Dakota. This species is listed by the state as a threatened species.

36. *Lampropeltis triangulum* (Milk Snake)

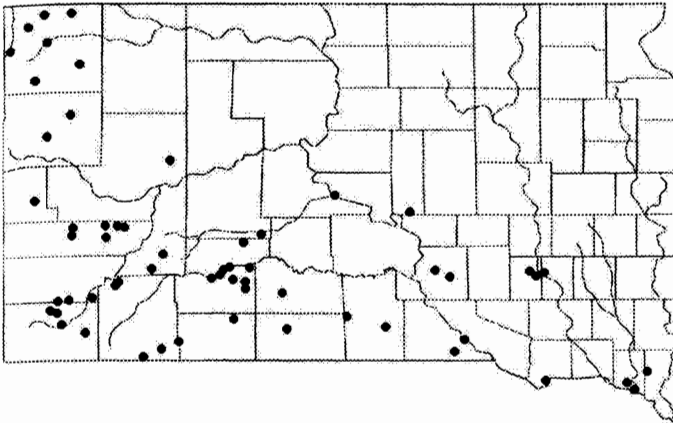
The milk snake is distinctly round in cross-section, with a bright pattern of red-orange blotches separated by black and white or cream bands. The belly is white with irregular black markings. There are two subspecies of milk snake in South Dakota with slightly different color patterns. The red milk snake (*L. t. sypila*) has a red head and snout, and the pale milk snake (*L. t. multistriata*) has an orange head with black flecks. The scales are smooth and body sizes approach 60–70 cm. Harmless milk snakes are occasionally mistaken for poisonous coral snakes, which do not occur in South Dakota. The red milk snake occurs in extreme southeastern counties, and the pale milk snake occurs generally west of the Missouri River and may be found in open prairies, especially in sandy areas and on rocky hillsides.

37. *Liochlorophis vernalis* (Smooth Green Snake)

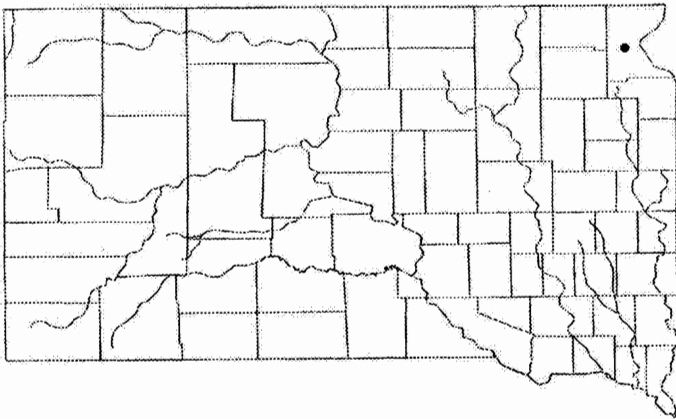
The smooth green snake is distinctly thin-bodied reaching lengths of 50–70 cm. It is uniformly green above, with a whitish venter. The dorsal scales are smooth. This species has an unusual distribution in South Dakota that is difficult to explain. It is common in the Black Hills region but also occurs in extreme northeastern counties, and there is a single record in Clay County in the southeast. It has not been collected in intervening regions. The species is found in moist prairies and meadows.

38. *Nerodia sipedon* (Northern Water Snake)

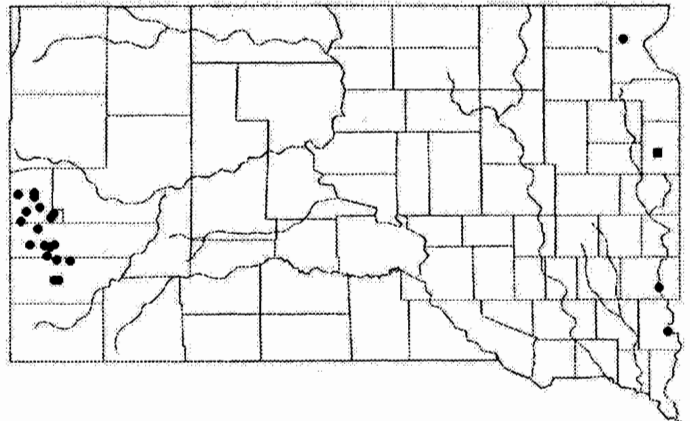
This snake is known only from two localities along the Missouri River in southern Bon Homme County, near Springfield. These are robust snakes reaching lengths of 70–100 cm. They have dark brown bands that change to dorsal blotches, which alternate with smaller blotches on the sides of the body, before mid-body, and then become bands again near and extending onto the tail. The ground color varies from tan to gray or reddish brown and will sometimes be dark enough to obscure the banding/blotched pattern. The venter is spotted with black and brown markings. The dorsal scales are strongly keeled. This species is generally associated with permanent water and occurs in marshes or along streams and rivers.

39. *Pituophis catenifer* (Gopher Snake)

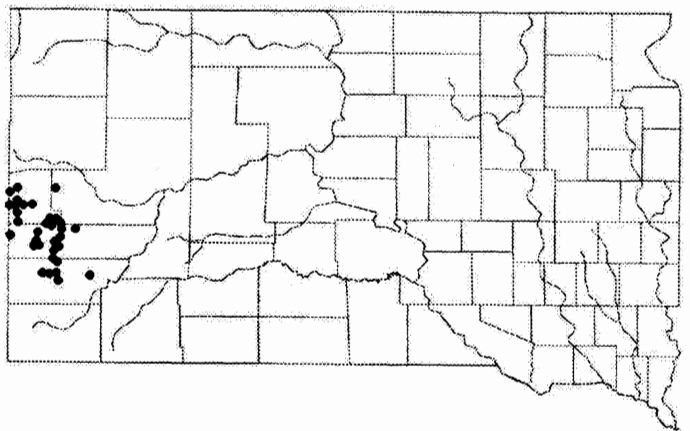
This species is relatively large (exceeding 150 cm) and heavy-bodied. It probably occurs throughout most of the state, with the exception of the northeast corner, but museum records are lacking in the central and east central areas. Dorsal scales are keeled, and the color is tan to yellowish brown, with brown to black blotches and spots which form brown rings on the tail. The belly is cream to white, with dark spots along its border. Gopher snakes are common and occur in a wide variety of habitats including farmland, roadsides, as well as native prairies and woodlands. They are well known for producing a hissing sound when disturbed and vibrating the tail as a defensive posture and thus are sometimes mistaken for rattlesnakes. The subspecies (*P. c. sayi*) occurring in South Dakota is known as the Bull Snake.

40. *Storeria dekayi* (Brown Snake)

Brown snakes are small (maximum to 30–35 cm) terrestrial snakes with keeled dorsal scales. They are tan to brown with faint brown blotches and a very faint light stripe on the mid-dorsum. The venter is cream to pinkish. There is a single museum record from Big Stone Lake in Roberts County that was collected by W. Over in 1922. Additional specimens are needed to verify its distribution in South Dakota. The species occurs in mesic woodlands in other parts of its range but nothing is known about its habitat in South Dakota.

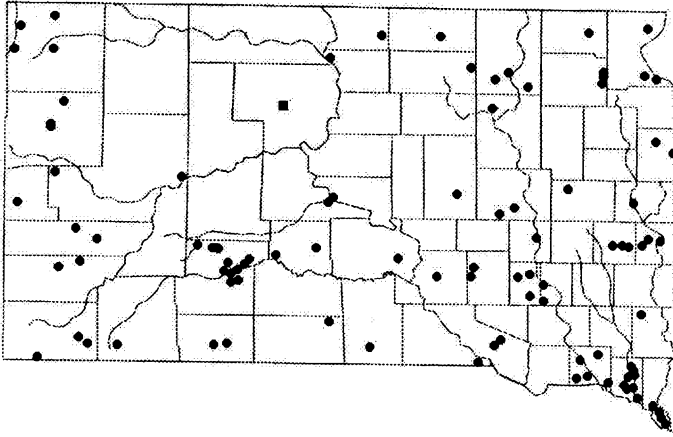
41. *Storeria occipitomaculata* (Northern Redbelly Snake)

These are slender, small bodied snakes that are 20–25 cm in length. Ground color is reddish brown to gray with faint brown stripes on the sides and/or a lighter stripe along the mid-dorsum. The venter is red or pink generally bordered by cream or lighter color as on the chin. There may be 2–4 light/white spots on the neck immediately behind the head, although these are absent in some specimens and populations. The species is known from the Black Hills and along the eastern border. It occurs in woodlands and moist meadows. The subspecies occurring in the Black Hills, *S. o. pahasapae* (Smith, 1963a), is the only endemic form of herpetile in the state, but it may occur westward into Wyoming.

42. *Thamnophis elegans* (Northern Terrestrial Garter Snake)

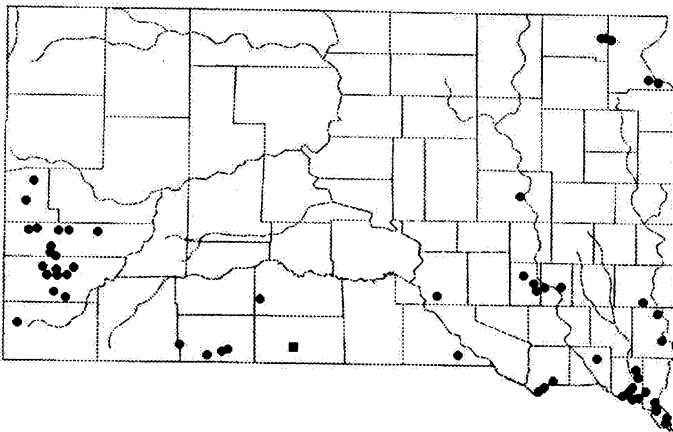
This western garter snake is known from the Black Hills region, where it is common near ponds and streams. It is greenish to grayish brown with small darker but sometimes faint blotches along its dorsum and lighter middorsal and lateral stripes varying from yellow to orange. There are black bars on its lips and the lateral light stripe involves the lower second and third scale rows (counting from the venter). The belly is suffused with gray and black. The dorsal scales are keeled. Garter snakes are relatively light-bodied but not thin, and this species ranges up to about 45–55 cm in length. The subspecies in South Dakota is *T. e. vagrans*, the Wandering Garter Snake.

43. *Thamnophis radix* (Plains Garter Snake)



The plains garter snake occurs across the entire state, but few museum records exist for north-central South Dakota. The dorsal and lateral stripes are much bolder in color, bright orange or yellow, than those of the northern terrestrial garter snake, and the lateral stripe involves scale rows 3 and 4. There are alternating rows of dark spots on the sides of the body and no dark bars on the lips. The venter is cream with no markings. The dorsal scales are keeled. This species occurs in grassy areas near ponds, streams or other wetlands, where it is frequently observed during the day as it actively searches for food. The plains garter snake reaches sizes of 45–50 cm. This species tends to occur in drier habitats than the other two species in South Dakota.

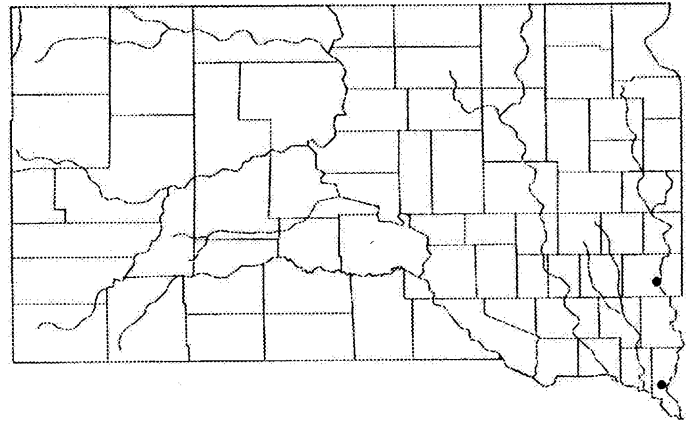
44. *Thamnophis sirtalis* (Common Garter Snake)



The common garter snake is expected to occur throughout South Dakota, although museum records are lacking for most of the northern areas. The subspecies (*T. s. parietalis*) occurring in South Dakota is known as the red-sided garter snake because of the red ground color below its alternating black spots on its side. The red coloration is a characteristic easily observed and its dorsal and lateral yellow to orange stripes are prominent as well. The lateral stripe occurs on scale rows 2 and 3. As in other garter snakes, the scales are keeled. Ventral coloration is uniformly light, without dark markings. This species is generally longer (50–70 cm) than the other two garter snakes in the state. Common garter snakes are found in grassy areas near ponds and wetlands but especially streams and rivers. This species typically does

not co-occur with *T. radix* but it does co-occur with *T. elegans* in the Black Hills.

45. *Tropidoclonion lineatum* (Lined Snake)



There are only two museum records for the lined snake in South Dakota. Presumably these records in Minnehaha and Union counties represent the northern limit of the distribution of this species. Lined snakes are small (to about 35 cm) and have alternating thin light and thicker dark brown stripes. The venter is cream to white with a distinctive double row of half-moon shaped dark spots on each side of the belly. The scales are keeled and the head is noticeably smaller than that of garter snakes. This species occurs on prairie hillsides and woodlands, where it is often found under rocks, logs or debris. Although it is common in states as far south as Texas, it is uncommon in South Dakota and is listed as a state-endangered species.

COMMENTS ON POTENTIAL AND REJECTED SPECIES RECORDS

We have rejected the occurrence of *Pseudacris crucifer* (spring peeper) in the state, although Busack (1977) reported it from Bon Homme County. The specimen on which that report was based (USNM 068719) has been identified by staff at the U.S. National Museum as a juvenile *Hyla versicolor*. Although the spring peeper is known from northwestern Minnesota, it is more likely to turn up in North Dakota than South Dakota because populations of this species in southern Minnesota do not extend westward into the prairie region. There is a specimen record of a horned lizard (*Phrynosoma*) from Union County in southeastern South Dakota that almost certainly represents a pet release.

There are two species of snakes (*Elaphe obsoleta*, the pilot blacksnake, and *Lampropeltis calligaster*, the prairie kingsnake) not now known from South Dakota that may yet be discovered in the state. These species may follow the Missouri River northward from Nebraska. *Elaphe obsoleta* is especially expected, because it is known to occur farther north than southern South Dakota in the Mississippi River drainage of eastern Minnesota (Oldfield and Moriarty, 1994).

The yellow mud turtle (*Kinosternon flavescens*) is known from northern Cherry County in Nebraska and will probably be found in the sand hills area of adjacent southern South Dakota, perhaps in Bennett or Todd counties.

One lizard (*Eumeces fasciatus*, the five-lined skink) is known from Yellow Medicine County, Minnesota, which borders South Dakota. However, this record is from the eastern part of the county, along the limestone bluffs of the Minnesota River, and although the lizard may follow the river northwestward toward South Dakota, suitable habitat of forested limestone outcrops are generally not found in South Dakota.

PROBABILITIES OF ADDITIONAL RECORDS (MAP ACCURACY)

As noted in many of the species accounts above, much work remains to be done to document the distributions of reptiles and amphibians in South Dakota. Although there are additional records of sightings of some species by such efforts as the "Natural Heritage Database" and "GAP Analysis," and additional hypotheses of distributions based on large-scale field guides, these informal records remain unconfirmed until actual voucher specimens are obtained. In an attempt to assess the status of our knowledge of the distribution of herpetiles in the state, and thus to judge the probability of obtaining additional records, we followed the approach outlined by Reichard et al. (1995) for Kansas and Duncan et al. (1996) for Colorado. This method compares the county records for each species compared to the predicted distributions of species for each county.

We tabulated the number of species recorded for each county in the state, based on records reported above, as well as the numbers of additional species that might be expected to occur in each county, based on general distributions outlined in Conant and Collins (1998). This revealed that of the 502 species-by-county records likely to represent the full knowledge of the herpetofaunal distributions in South Dakota, only 279 (55.5%) of such occurrences have been documented. This compares to 77.5% for Kansas (Reichard et al., 1995) and 72% for Colorado (Duncan et al., 1996). Clearly the knowledge of the South Dakota herpetofauna is much less complete, and an expected 223 county records remain to be documented. Among the 66 counties in South Dakota, there is a great range in the number of species recorded (1–25) as well as in the additional records of species that are expected to occur in a particular county (1–12). Based on our enumeration of museum specimen records, the percentage of species known to occur is high for a few counties such as Davison (92%), Bennett (90%), Pennington (90%), and Clay (89%). Fewer than ten per cent of the ex-

pected species have been documented in two counties, Potter (1 of 12 species or 7.6%) and Hand (1 of 11, 9%) counties. Five counties (Faulk, Hyde, Jerauld, Miner, and Sanborn) had only 10%, all with 1 of 10 of the expected species recorded, and Douglas County had 11% (1 of 9). The average percentage of recorded species for all 66 counties was 49.7%, and only 11 counties had higher than 75%, whereas 13 counties had less than 25%.

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