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A Field Guide to South Dakota Amphibians

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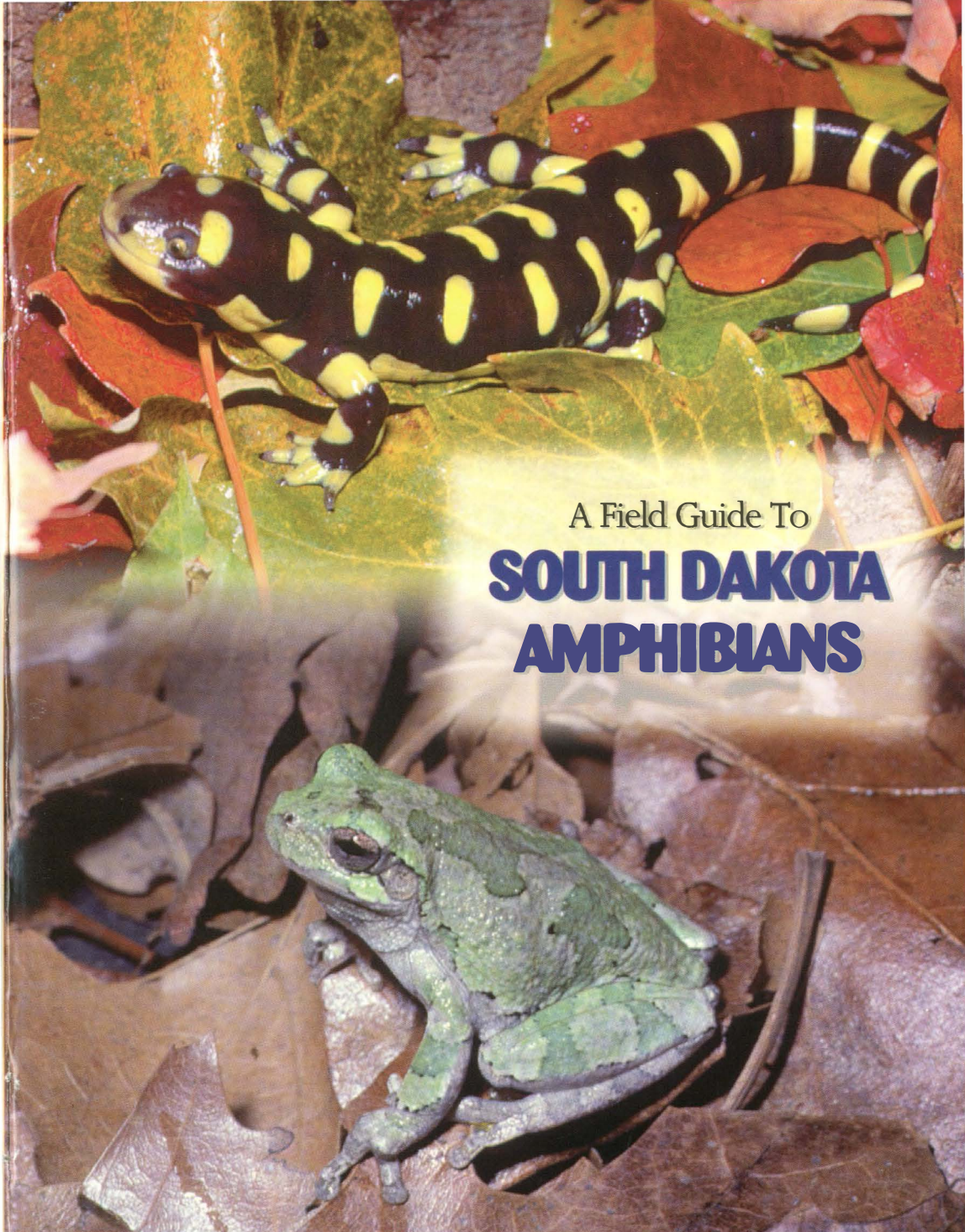
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The background of the cover features a black and yellow striped salamander in the upper half and a green tree frog in the lower half, both resting on a bed of autumn leaves in shades of green, yellow, and brown. The title text is overlaid on the right side of the image.

A Field Guide To
**SOUTH DAKOTA
AMPHIBIANS**

B733, JUNE 1999

U.S. FISH AND WILDLIFE SERVICE
U.S. GEOLOGICAL SURVEY/BIOLOGICAL RESOURCES DIVISION
SOUTH DAKOTA COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT
SOUTH DAKOTA DEPARTMENT OF GAME, FISH & PARKS
SOUTH DAKOTA STATE UNIVERSITY

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Cover photos: top—barred tiger salamander; bottom—Cope's gray treefrog (green coloration); both photos by Suzanne L. Collins

Back cover photos: top—northern leopard frog by Craig Bihrlé; middle—Canadian (Dakota) toad by Royce Ballinger; bottom—blotched tiger salamander by Suzanne L. Collins

A Field Guide To SOUTH DAKOTA AMPHIBIANS

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Introduction

Amphibians possess a unique combination of physical and biological characteristics which make them sensitive to environmental changes such as pollution and loss of aquatic habitat. Amphibians also play an important role in food chains where they may constitute large portions of other animals' diets. While small fishes or other amphibians prey upon larval amphibians, many mammals and birds rely on adult amphibians for food. Amphibians also are economically important locally and regionally. For example, local bait dealers sell frogs to anglers and schools buy frogs from biological supply companies for use in classroom dissection exercises.

Public interest in, and concern for, the welfare of our natural environment has increased during the past few decades. People are eager to learn and understand more about the plants, animals, and habitats that surround them. Frequently their initial interest is sparked by the ability to identify different species of plants and animals. Although several states have published books, field guides, or technical bulletins regarding amphibians, this is the first comprehensive publication regarding the amphibians of South Dakota.

This guide is meant to be useful to anyone wanting to learn more about these often secretive creatures. Included in this guide are tips for identification, brief life histories, and distribution maps of the species that currently or historically have been known to inhabit South Dakota. Distribution maps are based on current (Fischer 1998) and historical (Thompson 1976) distributional records.

Status of South Dakota amphibians

The following species of amphibians have been listed as Species of Special Concern by the South Dakota Department of Game, Fish and Parks Natural Heritage Program: mud-puppy, wood frog, plains leopard frog, Blanchard's cricket frog, Cope's gray treefrog, and eastern gray treefrog. Until recently, data showing the current distribution and populations of South Dakota amphibians were sparse and are still in need of further research. Several species have been found at only a few sites. In some cases, it is not known if some species still exist in the areas in which they historically occurred. Further studies of these species are needed to be more certain of their current status. The public is encouraged to contact the South Dakota Department of Game, Fish and Parks Natural Heritage Program at (605) 773-4345 with new information or new location sightings for the 15 species described in this guide or about any possible new species for the state.

General amphibian information

Amphibians usually have smooth, scaleless skin that is kept moist by mucous glands. While most amphibians are terrestrial (living on land), many, including all of South Dakota's species, must return to water to lay their eggs. The eggs have only a moderate amount of yolk, so amphibians must complete their embryonic development as free-living aquatic larvae.

Many of South Dakota's salamanders, frogs, and toads have venom glands which produce non-lethal skin secretions that act as a protection against predators. Toads in particu-

lar have skin glands concentrated in wart-like tubercles. These structures are unrelated to the warts that people sometimes get and are not passed from animals to humans by contact. The secretions act as irritants or toxins and are strictly a last-resort defense mechanism. The irritants may cause the predator to drop the animal from its mouth if the amphibian is picked up or bitten. Even if that particular animal is eaten or killed by the predator, the unpleasant experience may deter the predator from eating others of the same species.

Do not put the skin of any amphibian in contact with your lips or mouth because people's sensitivity to the animals' secretions vary. Use routine cleanliness and wash your hands after handling amphibians.

Taxonomy of South Dakota frogs and toads

Taxonomically, frogs and toads are in the order Anura (a word meaning without a tail). All of South Dakota's 13 anurans produce eggs that develop into tadpole-like larvae and eventually into 4-legged adults that lack gills. These 13 species of Anura are identified by using distinguishing features that can be differentiated when examining them (Fig 1, Appendix A). All anurans have bodies built for jumping or hopping. Some are quite terrestrial (the toads), while others move only short distances from water (bullfrogs). No species occurring in South Dakota is solely aquatic or terrestrial.

The order Anura is represented by four families in South Dakota: (1) Ranidae (true frogs), (2) Bufonidae (true toads), (3) Hylidae (treefrogs), and (4) Pelobatidae (spadefoots). The animal most people think of as a frog is probably a member of the family Ranidae. South Dakota has four species in this family and all are members of the genus *Rana* (pages 12-23).

The family Bufonidae consists of what most people consider the toads. Bufonids have a rough, warty skin that seems dry when compared to the skin of most amphibians. All toads have enlarged parotoid glands behind the eyes and tend to be short-legged and squatty. South Dakota has four toad species, all in the genus *Bufo* (pages 24-31).

Treefrogs are in the family Hylidae (pages 32-39). Members of this family have expanded toe pads enabling them to climb smooth surfaces such as the smooth bark or wet leaves of trees. South Dakota has four members of the Hylidae of which two are so much alike that they are sometimes grouped as a single species complex. These two species are considered true treefrogs and are in the genus *Hyla*. The other two treefrogs, one each in the genus *Acris* and *Pseudacris*, have become secondarily specialized for a non-arboreal existence and have much reduced toe pads.

The spadefoots are in the family Pelobatidae (pages 40-41). Sometimes recognized as toads, they differ from the true toads by having a smoother skin and lacking enlarged parotoid glands. Spadefoots are more subterranean than the true toads.

Life cycle of a South Dakota frog or toad

Throughout South Dakota, the arrival of spring is heralded by the call of the chorus frog (Fig 2). This frog is little more than an inch long, and is the smallest frog occurring in South Dakota. After holding one in your hand, it is hard to believe that an animal so

small could make so much noise. The familiar call is similar to the sound produced when running your finger down the teeth of a high-quality plastic comb.

As evenings become progressively warmer, calling of frogs and toads becomes more vigorous and higher in pitch, with the majority of the species calling by late June (Fig 2). In all South Dakota species only male frogs and toads call, usually from clumps of vegetation in wetlands that have been filled by spring runoff and snowmelt. Each male moves away from its calling neighbors to establish a few square feet of marsh to call his own, at least for the evening. This territorialism occurs, perhaps, to ensure that each frog or toad will have its own uncontested food supply, and more importantly, to disperse eggs over a wide area of the marsh. This increases the likelihood that at least a few eggs will survive.

Females, also feeling the effects of hormonal differences due to progressively warmer water temperatures, are attracted to the persistent calls of males. Often, several inspired females will move through a wetland toward a single calling male. A female swollen with eggs is readily noticed by a male who may waste little time in wrapping his “arms” around her from behind (amplexus). This clasping may facilitate movement of the eggs through the oviducts of the female and aid the male in maintaining his position so he can deposit sperm on the eggs as they leave the cloaca. This activity generally diverts the male’s attention and calling stops. Other females that may have been attracted to this male suddenly realize that he is not the only frog or toad in the pond and seek out other calling males. One male may mate with several females in a single breeding season. Most females then attach their egg masses to submerged grass or twigs.

South Dakota’s frogs do not provide parental care for their eggs or offspring. The adults, after completing their reproductive activities, spend the remainder of the year feeding and storing energy for maintenance, growth, and the next reproductive season. While some individuals survive, many others may become food for other animals. Most frogs and toads only live a few years. Some frogs and toads remain closely associated with water during the summer months, but others resort to life on land, living in trees or even underground.

Frog and toad eggs hatch in a few days, their development is accelerated by the warming effects of the sun on shallow water. Tadpoles have internal gills instead of branching external gills typical of salamander larvae. Tadpoles grow rapidly, primarily eating algae that grow on submerged objects. By June, most tadpoles have sprouted legs, their gills have closed, and they have the appearance of small froglets. Most froglets will become food for other animals, but some survive until fall, deep in animal burrows and other protected areas where they hibernate until a hint of another spring brings them to the surface. Tadpoles of the bullfrog are the only species which overwinter in wetlands, delaying their metamorphosis until their second summer.

Taxonomy of South Dakota salamanders and mudpuppies

Salamanders are also amphibians; however, they differ from anurans in many ways (Fig 1, Appendix A). Salamanders are in the order Caudata (animals with tails) and are considered the most primitive of living amphibians. Some forms have changed very little from those that roamed the earth 270 million years ago.

Two species of salamanders are known to occur in South Dakota. These species represent two families: (1) Proteidae (mudpuppies) and (2) Ambystomatidae (smallmouth and tiger salamanders). The mudpuppies, family Proteidae (pages 42-43), remain aquatic their entire life. They are the largest of South Dakota's salamanders and even though they develop lungs, they retain three pairs of feathery gills extending outward into the water.

Our second group of salamanders is in the family Ambystomatidae (pages 44-47). The only representative of this family is the tiger salamander for which some herpetologists recognize four subspecies in South Dakota: (1) *Ambystoma tigrinum tigrinum*, (2) *A. t. melanostictum*, (3) *A. t. diaboli* and (4) *A. t. mavortium*. These four subspecies are very similar in appearance, and often a microscope is needed to differentiate between them. Other herpetologists, including Collins (1997), consider the eastern tiger salamander as a separate species, *Ambystoma tigrinum*. Under this taxonomic scheme, there are two species of tiger salamanders in South Dakota. The other subspecies formerly considered subspecies of *Ambystoma tigrinum* are now under the resurrected name of *Ambystoma mavortium*. The subspecies are *A. m. mavortium* (barred tiger salamander), *A. m. diaboli* (gray tiger salamander), and *A. m. melanostictum* (blotched tiger salamander). All family Ambystomatidae members have costal grooves, lack external gills as adults (Fig 1), and are limited to North America.

Life cycle of South Dakota salamanders and mudpuppies

Early in March, when most frogs and toads are immobilized by winter's cold and while ice still covers many of South Dakota's prairie potholes, salamanders are already engaged in courtship activities. Underwater, sometimes beneath the ice, male and female tiger salamanders perform a ritual of dance-like movements, often with many males clustered around a single female. The male deposits a neatly packaged packet of sperm called a spermatophore from his cloaca which the female picks up with her cloaca. The gelatinous package dissolves within the reproductive tract of the female, permitting the sperm to fertilize the eggs in her oviducts. Afterward, the female will deposit the eggs, usually on submerged twigs and other objects.

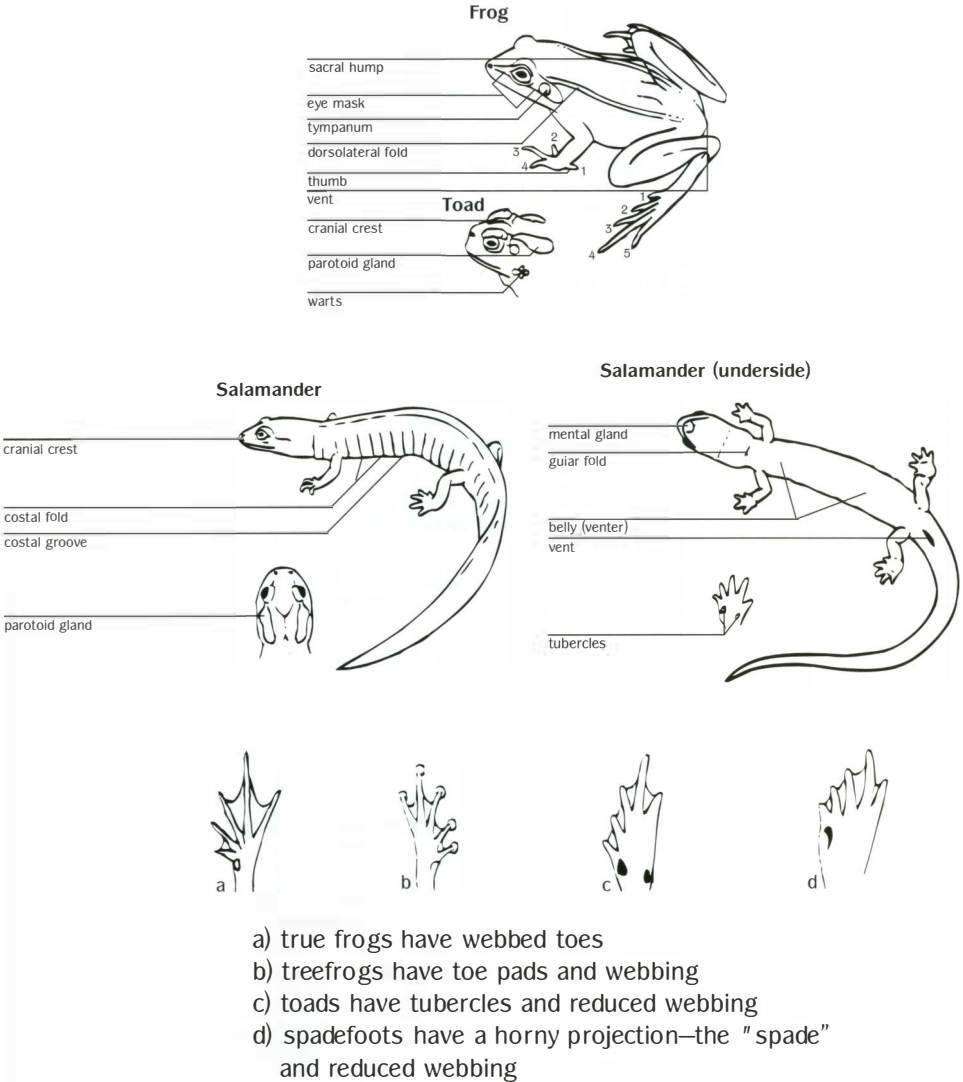
Such early breeding activity underwater might seem unlikely for an animal with no gills. However, despite low water temperature, the absorbent skin of salamanders allows enough dissolved oxygen to diffuse into the salamander's body to permit longer periods of submersion.

Within a few days or weeks, depending on the water temperature, a tiny, transparent larva emerges from the egg. Filamentous gills extend into the water from each side of the larva's head for exchange of oxygen and carbon dioxide. The larva grows rapidly, eating water fleas, insect larvae, other invertebrates, and sometimes even litter mates or the larvae of smaller species of salamanders.

Tiger salamander larvae spend most of the summer growing in wetlands and water-filled roadside ditches. They begin metamorphosis into terrestrial adults in July and August. When the gills are reabsorbed, the animals leave the water and burrow into soft soil and under logs. Mudpuppies, however, retain their gills throughout life and never leave the water. In the fall, tiger salamanders may move considerable distances, sometimes ending up in basements and window wells. Winter finds them deep in moist mammal burrows, buried in the earth, or hiding in abandoned wells or similar protected areas below the frost line.

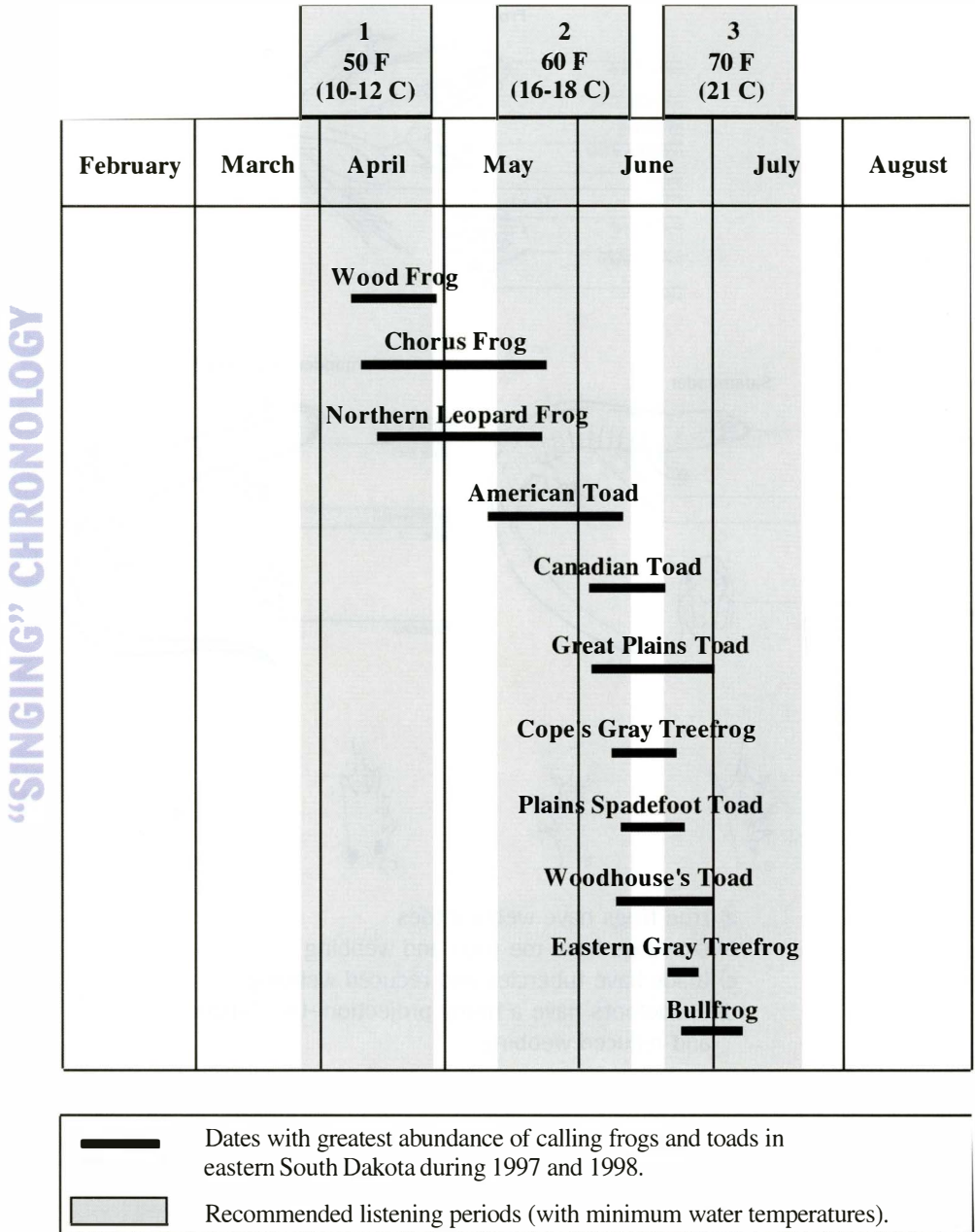
Figure 1. External anatomy of amphibians

Line drawings reproduced with the permission of Sy Barlowe.



EXTERNAL ANATOMY OF AMPHIBIANS

Figure 2. "Singing" chronology for breeding frogs and toads in eastern South Dakota



Amphibian habitats

Most people envision that typical amphibian habitat is a semipermanent wetland which holds water year-round and is ringed with cattails. While semipermanent wetlands are important to amphibians, diverse wetland types support breeding and wintering amphibian populations in South Dakota. From temporary wetlands in agricultural fields to stock dams and dug-outs, amphibians are likely to be present without your even know-



photo: Tate Fischer

Temporary wetland in agricultural field

ing it! Sheet water in agriculture fields supports most of the spadefoots and Great Plains toads that occur in South Dakota. Temporary wetlands, which usually contain water for only a couple of weeks in spring or early summer, provide habitat for 10 different amphibian species. Temporary wetlands are home to chorus frogs, northern leopard frogs, and Great Plains toads. Seasonal wetlands, which usually hold water until mid-June, and semipermanent wetlands, which usually contain water year-round, support the



photo: Tate Fischer

Seasonal wetland in grazed pasture

photo: Tate Fischer



Semipermanent wetland

highest amphibian species diversity in South Dakota including American and Woodhouse's toads, northern leopard frogs, chorus frogs, treefrogs, and tiger salamanders. Larger, more permanent types of water bodies (lakes and rivers) in South Dakota also support amphibian life. Mudpuppies, bullfrogs, and to a lesser extent Canadian toads rely on these more permanent water bodies to support their lifestyles.

photo: Tate Fischer



Large open-water wetland

Vegetative characteristics also affect the occurrence of these critters. Wood frogs and treefrogs depend on semipermanently flooded timber in or around the wetlands they occupy, whereas species such as the Great Plains toad and plains spadefoots often occur in shallow wetlands that are often devoid of vegetation. Bullfrogs and, to a lesser extent, northern leopard frogs and American toads prefer wetlands that have a ratio of about 50% open water and about 50% emergent cover, while others such as Canadian toads prefer wetlands that are surrounded by vegetation yet have a large opening of deeper water in the center.

Despite the associations between amphibian occurrence and water permanency and vegetation, no one is certain of the environmental requirements that each species of amphibian needs for the best reproduction and survival. Although more research needs to be conducted, we do know that amphibians, frogs and toads particularly, move between different types of wetlands for overwintering and breeding. The majority of amphibians



photo: Craig Milewski

Riparian wetland

winter in deeper, more permanent wetlands and breed in more seasonal and temporary ponds. This is important since many of the wetlands most vulnerable to drainage are those used as breeding sites by amphibians. We must keep in mind that regardless of the type of wetland we are looking at, it may be capable of supporting amphibian life. Therefore, wetland protection and enhancement should continue to focus on all types of wetlands to ensure the survival of any and all kinds of frogs, toads, mudpuppies, and salamanders.



photo: Tate Fischer

Dugout

Northern Leopard Frog

Rana pipiens

Average Adult Size: 2 to 5 inches (snout to vent)

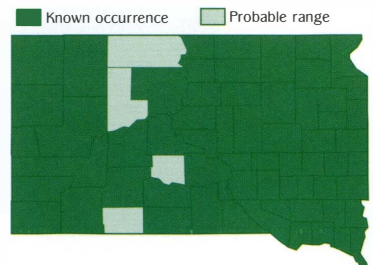
Similar Species: plains leopard frog

Identification: Skin color is green or brown with two or three rows of irregu-

larly-sized dark spots on the back with smaller spots appearing on the sides. These spots are light-edged and conspicuously placed between the light-colored dorsolateral ridges (fold). Dorsolateral ridges are continuous to the groin. The legs have dark bars, the belly is white, and there is an indistinct light stripe on the upper jaw. There is no distinct spot on the tympanum, which helps differentiate it from the plains leopard frog. Occasionally there is a light yellow tint on the undersides of the legs. Vocal sacs in males are visible only when the frog is calling.

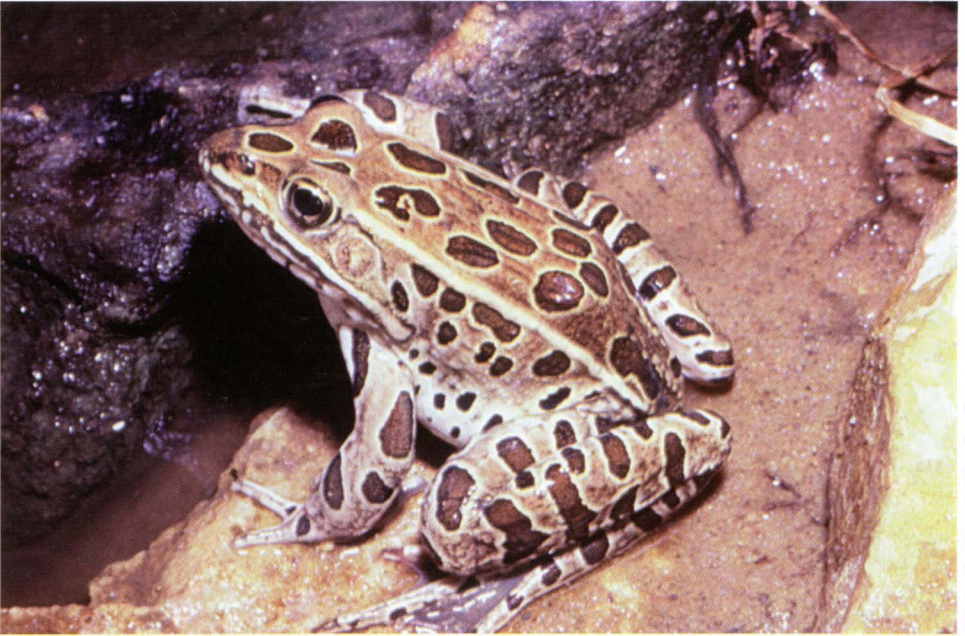
Life History: The northern leopard frog is the frog most familiar to South Dakotans. There are two variant phases of the northern leopard frog, the Burnsi and the Kandiyohi forms. Burnsi phase frogs lack spots although the legs may be barred in some individuals. Kandiyohi phase animals have extra black pigment between spots. These two phases were originally described as separate species (Weed 1922) but were subsequently recognized as *Rana pipiens*, differing from normal northern leopard frogs by a single gene (Breckenridge 1944). Kandiyohi phase are very rare, only two or three are found per year in Minnesota (Oldfield and Moriarty 1994), while Burnsi phase frogs are more common and often occur in eastern counties of South Dakota which border Minnesota. Northern leopard frog adults overwinter in wetlands and become active as water temperatures begin to rise in the spring. Spring overland movements occur during the day, since evening temperatures are often too cool (Merrell 1977). They may travel approximately 100 meters (109 yards) each night from mid-September to the end of October before overwintering (Dole 1965). Male northern leopard frogs begin calling when water temperatures are above 20 C (68 F), usually in April, with calls peaking from mid-April to late May (Fig 2). The call is a low guttural snore lasting about 3 seconds, mixed with resonant grunts and squeals, followed by several clucking notes. The eggs are laid in a mass attached to twigs or other objects, usually where the water is at least 15 centimeters (6 inches) deep (Christiansen and Bailey 1991).

Distribution and Habitat: Northern leopard frogs are in all types of habitats throughout South Dakota including, but not limited to, small creeks, large lakes, temporary wetlands, farm ponds, and back yards. They may be found great distances from water during the summer.



NORTHERN LEOPARD FROG

photo: Royce Ballinger



Northern leopard frog

photo: Suzanne L. Collins, The Center for N.A. Amphibians & Reptiles



Northern leopard frog eggs

NORTHERN LEOPARD FROG

NORTHERN LEOPARD FROG



photo: Tate Fischer

Northern leopard frog of the Burnsii variety



photo: Barney Oldfield

Northern leopard frog of the Kandiyohi variety

photo: Chad & Brenda Kopplin



Northern leopard frogs in habitat (note color difference)

photo: Craig Bihrie



Northern leopard frog in habitat (dark coloration)

NORTHERN LEOPARD FROG

Wood Frog

Rana sylvatica

Average Adult Size: 2 to 2¾ inches (snout to vent)

Similar Species: chorus frog, Blanchard's cricket frog

Identification: The wood frog has a distinctive black face mask resembling that of a raccoon ending abruptly behind the tympanum. Its skin color ranges from pink to light tan to dark brown and there is a light stripe on the upper jaw and sometimes a light stripe down the middle of the back. Solid or dashed dark brown lines may follow along the prominent dorsolateral folds. The belly is white with a dark blotch on the chest near the base of each front leg.

Life History: Wood frogs winter under leaf litter, downed logs, and other ground cover and begin breeding in eastern South Dakota soon after the ice disappears from small ponds in late March or early April. In some years breeding is postponed due to a cold spell or late season snow (Fishbeck 1968). At breeding ponds, males call while floating on the water's surface, vocalizing during the day or night. The call is a hoarse, duck-like quacking which only can be heard when in near proximity to the calling male.

Distribution and Habitat: In eastern South Dakota, wood frogs have only been found in the coulees at the northern-most edge of the Minnesota River in Roberts County. In South Dakota it appears that wood frogs prefer permanently to semipermanently flooded wetlands interspersed with flooded trees, particularly hardwoods. Confirmed sightings should be reported to South Dakota Natural Heritage Program, South Dakota Department of Game, Fish and Parks, 523 East Capitol-Foss Building, Pierre, SD 57501.

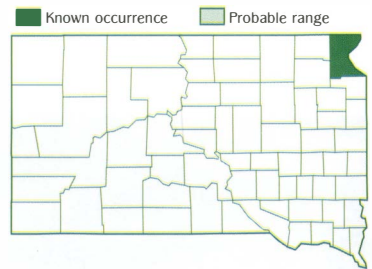
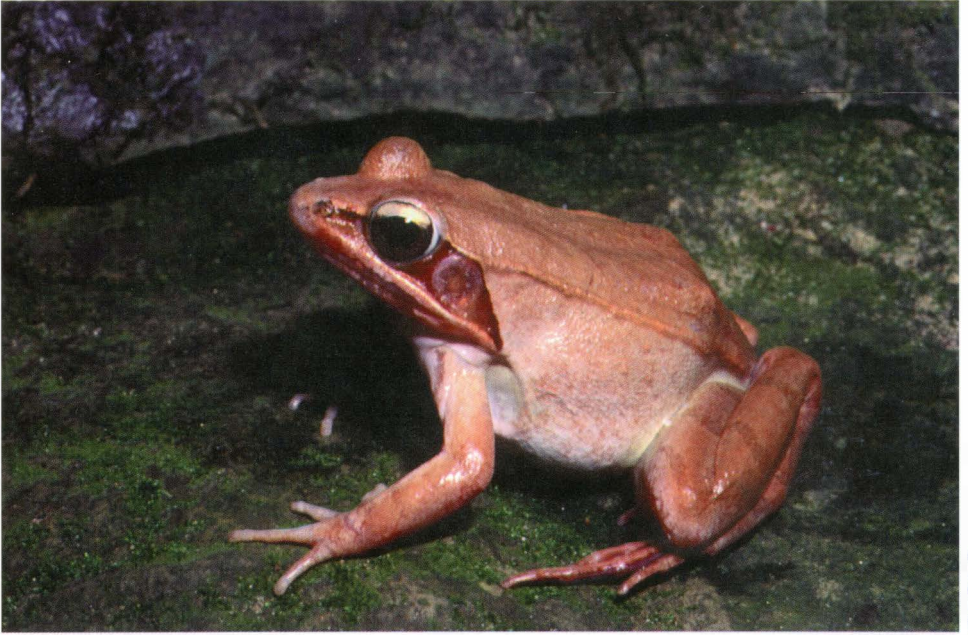


photo: Suzanne L. Collins. The Center for N.A. Amphibians & Reptiles



Wood frog

photo: Pete Bergmann



Wood frog habitat

WOOD FROG

Bullfrog

Rana catesbeiana

Average Adult Size: 3½ to 8 inches (snout to vent)

Similar Species: none in South Dakota

Identification: The bullfrog is the largest anuran in South Dakota. The

greenish skin color of the bullfrog varies in shade depending on the frog's size and the air temperature. Warmer temperatures cause lighter shades of skin color. Adult males tend to be darker in color and sometimes a mottled green and brown. The belly is white with a gray to yellow tint, especially under the chin, and often mottled with white splotches. Bullfrogs lack dorsolateral ridges (folds) and have webbing on the hind feet which is complete except for the last joint of the longest toe. Males have large, convex tympanic membranes, larger than their eyes, while females have flat tympanic membranes about the same size as their eyes.

Life History: Bullfrogs have small home ranges, the radius varying from 0.6 to 11.3 meters (2 to 37 feet) with an average of 2.6 meters (8 feet) (Bury and Whelan 1984).

Bullfrog tadpoles may take 2 to 3 years of growing before they transform into adults (Wright 1920), longer than any other frog in eastern South Dakota. After metamorphosis, young bullfrogs need an additional 2 to 5 years to become sexually mature (DeGraaf and Rudis 1983). Bullfrogs breed later than other frogs in South Dakota. They emerge from winter dormancy which is spent in deep ponds, lakes, and wetlands in early May, and males start the well-known deep baritone "jug-a-rum" call in late June and continue into July (Fig 2). Humans have been responsible for introducing bullfrogs into many areas outside of the natural distribution. Bullfrogs have ferocious appetites, which enable them to rid areas of all other small vertebrate and invertebrate life. The bullfrog provides the majority of the frog legs for gourmet meals in restaurants.

Habitat and Distribution: Bullfrogs are associated with the floodplains of the Missouri River in the southern portion of eastern South Dakota and southern counties west of the Missouri River. These areas support the majority of the bullfrog population since bullfrogs are dependent on water that is deep enough to support tadpoles through the winter. These areas include large expanses of mudflats interspersed with flooded cattails and floating vegetation mats.

Although bullfrogs are closely associated with the permanent waters of the Missouri River and are native to Fall River County, due to their reputation for gourmet eating and making good pets, they have been introduced to many counties in southern South Dakota. This, however, may cause concern due to their voracious appetites which could contribute to habitat damage and loss of life for other small animals.

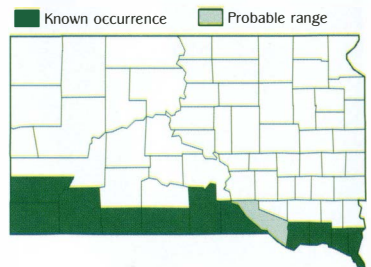
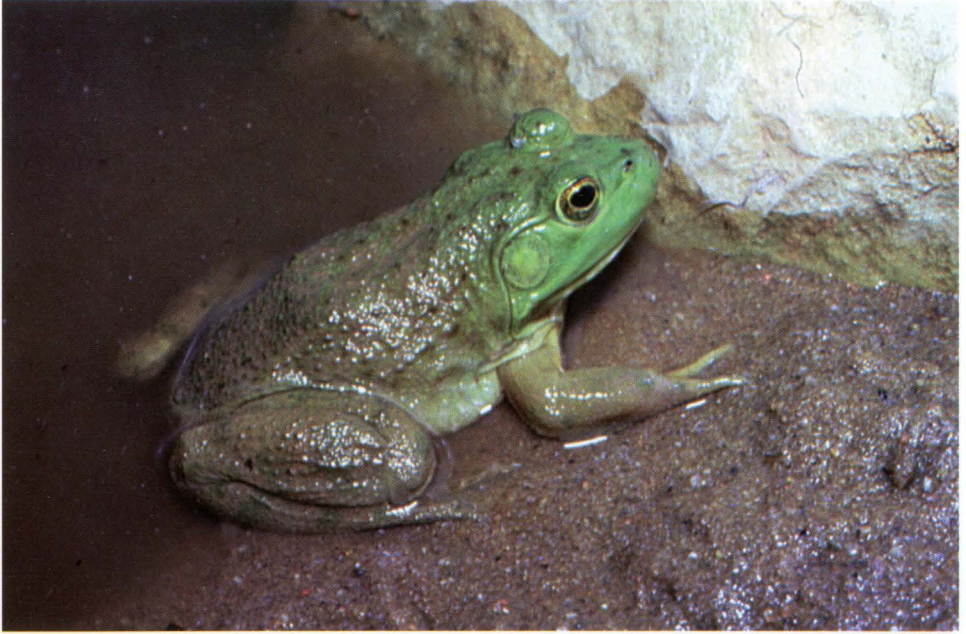


photo: Royce Ballinger



Bullfrog (light green coloration, lacks barring on hind legs)

photo: Suzanne L. Collins, The Center for N.A. Amphibians & Reptiles



Bullfrog (dark green coloration, barring on hind legs)

BULLFROG

BULLFROG



photo: Tate Fischer

Mottled green and brown coloration on an adult male bullfrog



photo: Suzanne L. Collins, The Center for N.A. Amphibians & Reptiles

Bullfrog tadpole

photo: Tate Fischer



Yellow coloration with white splotches on the throat area of a bullfrog

photo: Tate Fischer



Bullfrog habitat along Missouri River near Springfield, South Dakota

BULLFROG

Plains Leopard Frog

Rana blairi

Average Adult Size: 2 to 4¾ inches
(snout to vent)

Similar Species: northern leopard frog

Identification: The plains leopard frog is a greenish to brown frog and is quite

similar in appearance to the northern leopard frog. On average, the plains leopard frog is stockier, with a relatively shorter head than the northern leopard frog. It has large dark spots between yellow dorsolateral ridges which are broken near the hind legs. Unlike the northern leopard frog, the plains leopard frog has a prominent light-colored jaw stripe, a distinct light spot on the tympanum, and a dark snout spot. The groin and underside of the thighs are yellow.

Life History: Plains leopard frogs are known to breed throughout the year from late March to early June, depending on rainfall to initiate breeding activity. The male's call is two or three distinctly spaced, abrupt, guttural notes per second, resembling a chuckle-like laugh similar to that of the northern leopard frog. To distinguish the calls between the species, you need to hear both species calling from the same location. Some ponds may support populations of both species. This situation also can exist when a "new" wetland is colonized by both species without enough time to permit one species to out-compete the other (Christiansen and Bailey 1991).

Distribution and Habitat: Plains leopard frogs have been known to occur in only two counties (Yankton and Clay) in the extreme southeast portion of eastern South Dakota and only in Tripp County west of the Missouri River. Little is known about the habitat preferences of plains leopard frogs in South Dakota; however, some herpetologists consider their habitat needs to be much like that of other leopard frog species.

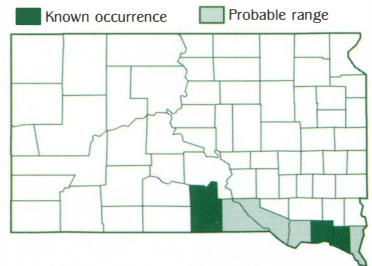


photo: Suzanne L. Collins, The Center for N.A. Amphibians & Reptiles



Plains leopard frog (dark coloration)

photo: Royce Baillinger



Plains leopard frog (light coloration)

PLAINS LEOPARD FROG

Great Plains Toad

Bufo cognatus

Average Adult Size: 2 to 3½ inches (snout to vent)

Similar Species: none in South Dakota

Identification: The Great Plains toad has distinctive large, symmetrical, greenish

spots with light tan borders on its back, each spot containing a number of small warts. The belly is a uniform white or ivory with no black flecking; however, the throat may be dark in some males. The male's vocal sac is oblong and extends beyond the snout when inflated. A flap of skin conceals the vocal sac when deflated. The cranial crests are reduced and form a V between the eyes, converging to form a bony hump on the snout. Behind the eyes, the cranial crests meet elongate parotoid glands; however, the oval parotoid glands are not as prominent as those of the American toad or Canadian toad.

Life History: The Great Plains toad is a very rapid burrower. Emergence and breeding are triggered by early summer thunderstorms after which the toads immediately move to the breeding ponds. Breeding takes place anytime between mid-May and mid-July with mating calls peaking throughout June (Fig 2). After breeding, their movements to feeding sites range for 300 to 1,300 meters (1,000 to 4,000 feet). Daily movements are approximately 30 meters (100 feet) (Ewert 1969). Great Plains toads estivate (stay in one place) in the summer during dry, hot weather. During the fall, if weather conditions are not favorable, this toad may remain underground through the winter without coming out of hibernation (Oldfield and Moriarty 1994). The mating call of the Great Plains toad is a harsh, pulsating, chugging-like call, in contrast to the steady musical trill of the American toad (Breckenridge 1944). Individual calls last for 20 to 50 seconds (Conant and Collins 1991).

Distribution and Habitat: The Great Plains toad is widespread throughout South Dakota, occurring in almost every county. Great Plains toads appear to be associated with shallowly flooded seasonal wetlands in pastures and grasslands statewide that are devoid of heavy vegetation.

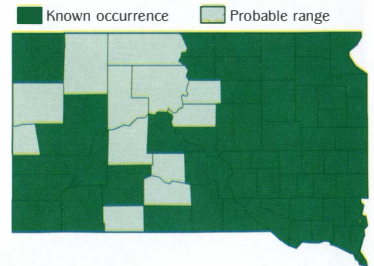
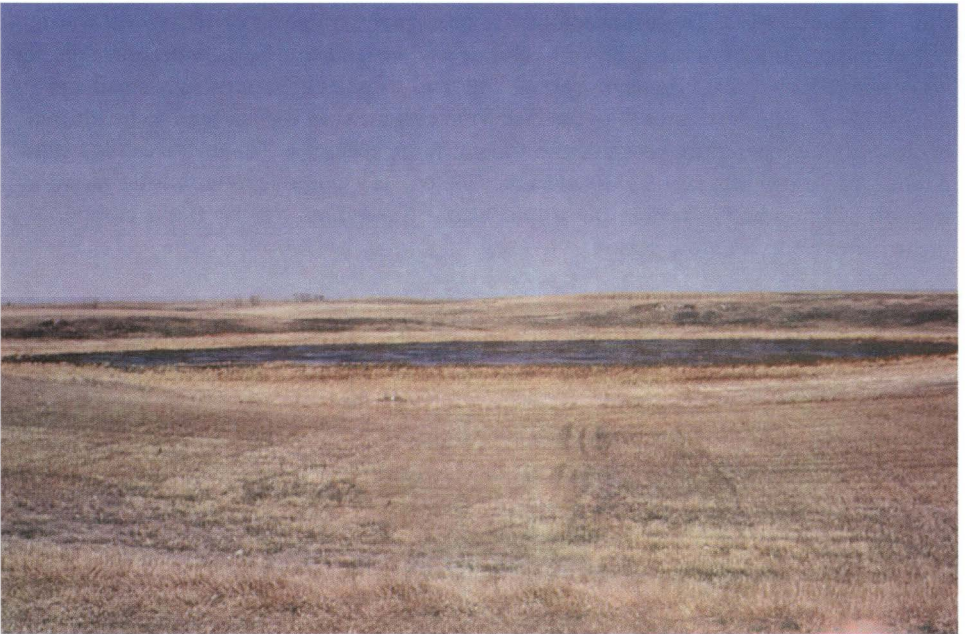


photo: Suzanne L. Collins, The Center for N.A. Amphibians & Reptiles



Great Plains toad

photo: Michael Kjellsen



Great Plains toad habitat

GREAT PLAINS TOAD

American Toad

Bufo americanus

Average Adult Size: 2 to 3½ inches (snout to vent)

Similar Species: Woodhouse's (Rocky Mountain) toad, Canadian (Dakota) toad

Identification: The body color of this toad is normally brown to brick-red to olive, with variable lighter colored mottling containing dark spots on the back. The majority of the black spots have one or two "reddish warts" in each of the larger spots. The belly is white with black flecking, especially in the throat area, and the male has a dark throat. The elongate parotoid glands are separated from the prominent cranial crest or attached by a narrow spur. Males have a single round vocal sac.

Life History: The American toad is the common "back yard" toad of eastern South Dakota. American toads overwinter by burrowing into well-drained, preferably sandy soils. Winter dormancy normally begins in early October, but toads have been seen in Minnesota as late as 24 October (Oldfield and Moriarty 1994). They burrow deep enough to stay below the frost line (Ewert 1969, Tester et al. 1965), which varies from approximately 12 to 58 centimeters deep (5 to 23 inches). Burrow depths are adjusted as the frost line shifts. When conditions are extremely dry during the summer, shallow burrows are used for estivation. American toads emerge from winter dormancy in late April, but movements to breeding ponds do not occur until May to mid-June. Postbreeding movements have been recorded up to 1,000 meters (3,300 feet), but most are much shorter (Ewert 1969). These movements are nocturnal with peaks of activity on warm, wet evenings. American toads breed in almost any wetland that holds water through July, when the tadpoles usually metamorphose. All toad tadpoles are surprisingly small and usually black. Movements back to the overwintering areas in the fall tend to be diurnal because cool temperatures preclude movement in the evenings. The male's call is a high-pitched, rapid trill that lasts 20-30 seconds. The trill is a single note with little variation in pitch. Calling begins at dusk but may continue throughout the day if it is cloudy, raining, or late in the breeding season.

Distribution and Habitat: American toads appear to be limited to the eastern portion of South Dakota and none occur west of the Missouri River. American toads use a variety of habitats in South Dakota, all of which are not only important to the American toad but other toads as well. These habitats include creeks, temporary wetlands, garden ponds, and lake shorelines.

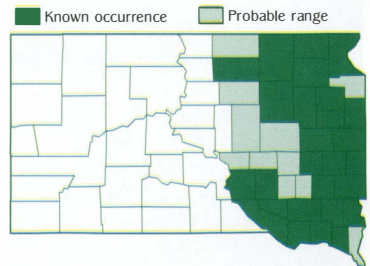


photo: Suzanne L. Collins, The Center for N.A. Amphibians & Reptiles



American toad

photo: Suzanne L. Collins, The Center for N.A. Amphibians & Reptiles



American toad tadpoles

AMERICAN TOAD

Canadian (Dakota) Toad

Bufo hemiophrys

Average Adult Size: 2 to 3½ inches
(snout to vent)

Similar Species: American toad,
Woodhouse's (Rocky Mountain) toad

Identification: The distinguishing feature of Canadian toads, also referred to as Dakota toads, is a large raised bump, or boss, between the eyes created by the fusion of the cranial crest. The body color is different shades of brownish-red with one or two brownish-red warts per black spot and a light middorsal stripe. The belly is white with gray and black flecking, especially on the throat. Parotoid glands are oval and somewhat indistinct.

Life History: Canadian toads are primarily nocturnal, and they are strong swimmers. Canadian toads overwinter communally, whereas American toads overwinter individually (Oldfield and Moriarty 1994). They congregate in small earth mounds 3 to 12 meters (9 to 39 feet) in diameter and 1 meter (3 feet) high (Breckenridge and Tester 1961). Like other toads, they burrow during the winter to stay just below the frost line (Tester 1981, Tester and Breckenridge 1964). The breeding habits of Canadian toads are similar to those of American toads, with calling being prevalent throughout June (Fig 2). Males have a rather soft, low-pitched call similar to that of the American toad, except that the trill length is shorter (2 to 8.5 seconds) and more rapid (Preston 1982).

Distribution and Habitat: Like American toads, Canadian toads are limited to the eastern third of the state. Although Canadian toads occupy a variety of different habitats, these toads appear to prefer margins of larger bodies of more permanent water such as lakes and larger semipermanent wetlands that have open water surrounded by aquatic vegetation.

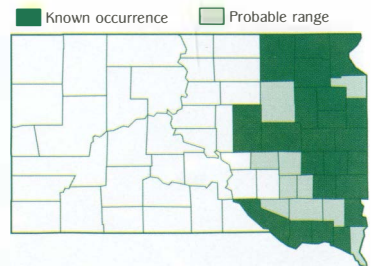


photo: Suzanne L. Collins, The Center for N.A. Amphibians & Reptiles



Canadian (Dakota) toad

photo: Charles Berry



Canadian toad habitat

CANADIAN (DAKOTA) TOAD

Woodhouse's (Rocky Mountain) Toad

Bufo woodhousei

Average Adult Size: 2½ to 5 inches (snout to vent)

Similar Species: American toad, Canadian toad

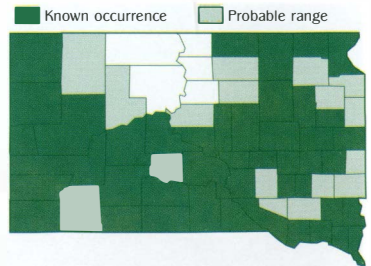
Identification: Woodhouse's Toad,

sometimes called Rocky Mountain toad, can easily be confused with two other Bufo species occurring in South Dakota: the American toad and the Canadian toad.

Woodhouse's toad is a large, olive to brown colored toad with a distinctive light stripe down the middle of its back. The body color may include variable patterns of dark greens and browns. The belly is white and completely unmarked but often displays a dark breast spot near the sternum and dark flecks between the forelegs. The white underside of Woodhouse's toad is the best single feature to separate it from American and Canadian toads. Prominent cranial crests are present and touch elongated parotoid glands. Males have a single round vocal sac.

Life History: Breeding begins in early March and extends into early August. This toad species is primarily nocturnal, when it is commonly encountered catching insects near lights. It is occasionally active during the day but more frequently remains in its burrow during daylight hours, as do other toads in this genus. The call of Woodhouse's Toad is referred to as a nasal w-a-a-a-h lasting 1 to 2½ seconds, resembling the sound of a bleating lamb in the distance.

Distribution and Habitat: Woodhouse's toad is found throughout South Dakota and occurs in all types of wetlands within its range. Woodhouse's toads are commonly found concentrated near heavily vegetated wetlands in the vicinity of yard lights around farmyards or rural housing where insects are abundant.



WOODHOUSE'S (ROCKY MOUNTAIN) TOAD

photo: Suzanne L. Collins, The Center for N.A. Amphibians & Reptiles



Woodhouse's (Rocky Mountain) toad (dark coloration)

photo: Suzanne L. Collins, The Center for N.A. Amphibians & Reptiles



Woodhouse's (Rocky Mountain) toad (light coloration)

WOODHOUSE'S (ROCKY MOUNTAIN) TOAD

Eastern Gray Treefrog

Hyla versicolor

Average Adult Size: 1¼ to 2 inches (snout to vent)

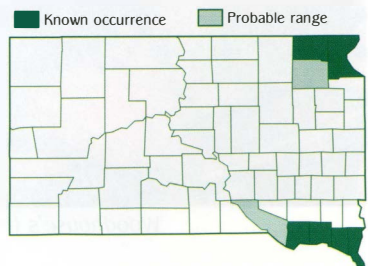
Similar Species: Cope's gray treefrog

Identification: The eastern gray treefrog is one of two "true" treefrogs of the *Hyla*

genus found in eastern South Dakota; the other is Cope's gray treefrog (*Hyla chrysoscelis*). These look-alike species also sound alike (Conant and Collins 1991); however, it is possible to use inconspicuous markings to differentiate them (Oldfield and Moriarty 1994). Eastern gray treefrogs are grayish to pearly white with dark blotches that have black borders. This frog may have green skin; however, the black borders will always be seen on adults. In both species there is a discernible light spot beneath the eye. The eastern gray treefrog has rough skin, whereas Cope's gray treefrog has smooth skin. The inner surfaces of the thighs and shanks are brilliant yellow. Gray treefrogs have large toe pads, which enable them to adhere to any surface.

Life History: Eastern gray and Cope's gray treefrogs spend their winters in a partially frozen state under leaf litter, rocks, or logs (Schmid 1982). Glycerol is accumulated in their body fluids during the fall when the temperature begins to cool. This process protects the cells from rupturing when the frog partially freezes. When the frog begins to freeze, the liver converts the glycerol into glucose. Glucose is then circulated to the major organs so that ice crystals will not form in the organ tissues. Ice forms in the body cavity around the organs and in between the muscle cells (Oldfield and Moriarty 1994). After emerging from their "frozen" state, gray treefrogs move to breeding ponds in mid-May and breed through June. Males call from perches as high as 10 meters (30 feet) up in surrounding trees during the day or early evening (Vogt 1981). Vogt (1981) also stated that any treefrog calling from above 3 meters (10 feet) is a gray treefrog because Cope's gray treefrog apparently does not call from above that height. During the day, both *Hyla* species prefer the shade and protection of trees and shrubs near water. The call is a melodic flute-like trill which is slower than that of Cope's fast metallic trill. The trill rate is affected by the ambient temperature at the breeding pond, the trill rate being faster in warmer temperatures (Jaslow and Vogt 1977). Although some herpetologists believe females of the *Hyla* species are able to differentiate between calls and the two species do not interbreed (Christiansen and Bailey 1991), recent literature suggests that the two species may hybridize under natural conditions (Gerhardt et al. 1994).

Distribution and Habitat: Eastern gray treefrogs occur in the northeast and southeast corners of South Dakota. As the name implies, treefrogs are associated with semipermanent wetlands that contain flooded trees or shrubs.



EASTERN GRAY TREEFROG

photo: Suzanne L. Collins, The Center for N.A. Amphibians & Reptiles



Eastern gray treefrog

photo: Tate Fischer



Treefrog habitat

EASTERN GRAY TREEFROG

Cope's Gray Treefrog

Hyla chrysoscelis

Average Adult Size: 1¼ to 2 inches (snout to vent)

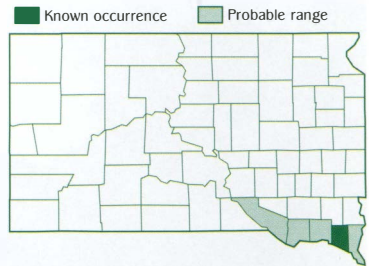
Similar Species: eastern gray treefrog

Identification: Cope's gray treefrog is a medium-sized treefrog and like all

treefrogs, it has well developed and easily visible toe pads. The skin is smooth (Vogt 1981) and changes color from gray to green depending on temperature and habitat. Green coloration normally occurs in warmer temperatures and when the treefrogs are on green vegetation. During the breeding season, adults tend to be green without any blotches. When the frogs are gray, large dark blotches are visible on the back. Unlike those of eastern gray treefrogs, these blotches are not bordered by black (Vogt 1981). The insides of the thighs and shanks are brilliant yellow.

Life History: The life history of Cope's gray treefrog is similar to the eastern gray treefrog. Cope's gray treefrog also spend their winter in a partially frozen state under leaf litter, rocks, or logs (Schmid 1982). After emergence they move to breeding ponds in mid-May and breed through June. At breeding ponds, the males call from surrounding trees and emergent vegetation during the day or early evening. The calling perches of Cope's gray treefrog range up to 3 meters (10 feet) above pond level in trees (Vogt 1981). The male's call is a fast metallic trill, compared to the gray treefrog's slower, more melodic trill. During dry periods, juveniles and adults will estivate in hollow logs (Oldfield and Moriarty 1994).

Distribution and Habitat: Cope's gray treefrogs may only occur in the extreme southeast corner of South Dakota; however, they may also be present in the northeast corner of the state, similar to the distribution of the eastern gray treefrog. Like eastern gray treefrogs, Cope's gray treefrogs primarily use semi-permanently flooded wetlands that are interspersed with flooded trees and shrubs.



COPE'S GRAY TREEFROG

photo: Royce Ballinger



Cope's gray treefrog (gray coloration)

photo: Tate Fischer



Yellow coloration on the thighs and shanks of a gray treefrog

COPE'S GRAY TREEFROG

Chorus Frog (Western and Boreal)

Pseudacris triseriata triseriata
and *P.t. maculata*

Average Adult Size: ¾ to 1½ inches
(snout to vent)

Similar Species: wood frog,
Blanchard's cricket frog

Identification: Chorus frogs are small, smooth skinned, greenish-gray to brown colored frogs. Three dark stripes, which may be broken, reduced, or absent, are present on the back. These stripes generally run from the snout to groin, with the middle stripe often forking into two parts posteriorly. There is also a dark stripe through the eye and a light line along the upper lip.

Life History: Platz (1989) and other herpetologists currently recognize the western and boreal chorus frogs as two separate species. Due to the similarity of breeding calls and since no distinction can be made unless the individual is collected, we have chosen to present them as two subspecies of the chorus frog, and refer to them both as "chorus frog." Chorus frogs are among the first frogs to emerge in the spring, appearing from late March through early April. Breeding activity begins in early April and continues into late May. The familiar call is a clicking sound similar to that made by running your thumb down the small teeth of a high-quality, plastic comb and is surprisingly loud for such a small frog. These frogs call from flooded grassy areas which have a few inches of water. The speed of the 1- to 2-second call varies with temperature, speeding up as the temperature becomes warmer (Oldfield and Moriarty 1994). Although chorus frogs have small adhesive discs on their toes like tree frogs, they do not climb (Hoberg and Gause 1992).

Distribution and Habitat: Chorus frogs are prevalent throughout the entire state. They inhabit any wet areas but prefer shallow, grassy wetland sites.

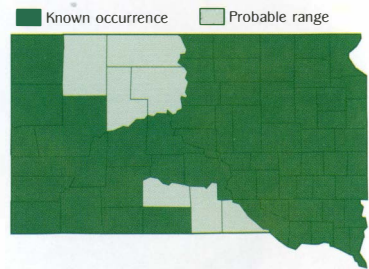
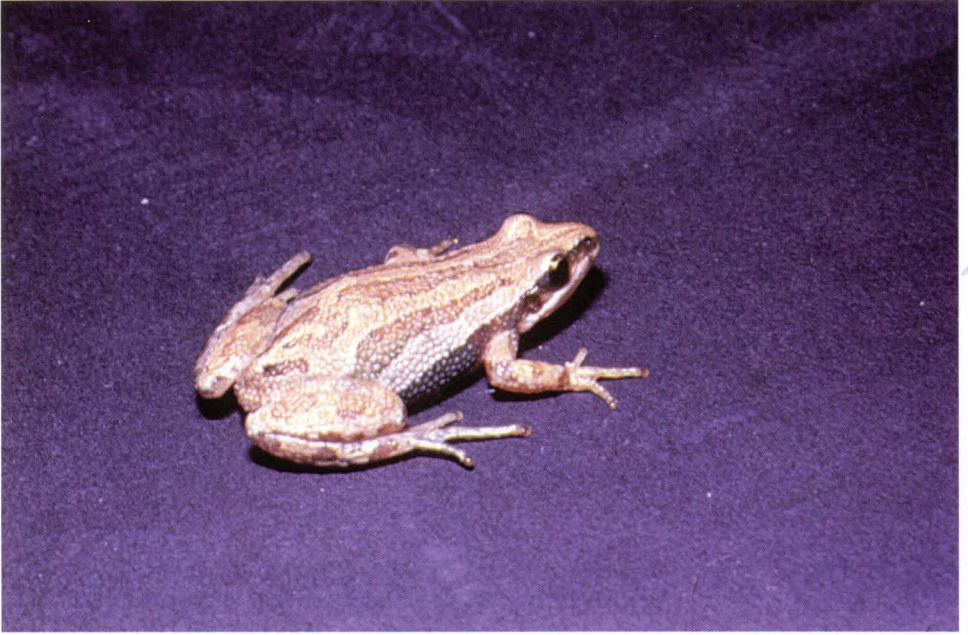


photo: Royce Ballinger



Western chorus frog

photo: Suzanne L. Collins, The Center for N.A. Amphibians & Reptiles



Boreal chorus frog

CHORUS FROG (WESTERN AND BOREAL)

Blanchard's Cricket Frog

Acris crepitans blanchardi

Average Adult Size: $\frac{5}{8}$ to $1\frac{1}{2}$ inches (snout to vent)

Similar Species: wood frog, chorus frog

Identification: Blanchard's cricket frog, a subspecies of the northern cricket frog, is a small frog with a skin color that is greenish-brown ranging from gray to black. Darker-colored warts are also present. Most cricket frogs have a green or dark brown triangle between the eyes, a lighter middorsal stripe, and longitudinal dark stripes on the back of the thigh. Coloration of Blanchard's cricket frog tends to be uniform, in contrast to the wide variety of strongly contrasting color patterns that are prevalent in other subspecies (Conant and Collins 1991). Hind feet have extensive webbing, reaching the tip of the first toe and the next-to-last joint of the longest toe. They lack enlarged toe pads but do have terminal disks on their toes. The sexes are similar in appearance, but males develop gray spotting on their vocal pouch (Oldfield and Moriarty 1994).

Life History: Blanchard's cricket frogs emerge from winter dormancy in late April and breed from late May into July. Breeding choruses are stimulated by rain events. The male's call is a glick, glick, glick sound in rapid succession, similar to the clicking together of ball bearings or rocks.

Distribution and Habitat: Blanchard's cricket frogs were formerly common in Tripp County and in the extreme southeastern corner of South Dakota; however, they are now considered very rare or have even been extirpated from their natural range in South Dakota. Confirmed sightings should be reported to South Dakota Natural Heritage Program, South Dakota Department of Game, Fish and Parks, 523 East Capitol-Foss Building, Pierre, SD 57501.

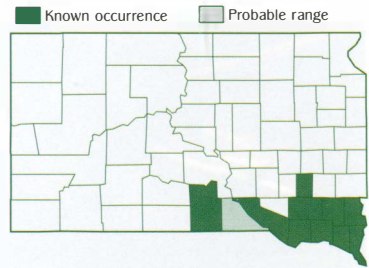


photo: Suzanne L. Collins, The Center for N.A. Amphibians & Reptiles



Northern cricket frog (dark coloration)

photo: Suzanne L. Collins, The Center for N.A. Amphibians & Reptiles



Northern cricket frog (note dark triangle between eyes)

BLANCHARD'S CRICKET FROG

Plains Spadefoot

Scaphiopus bombifrons

Average Adult Size: 1½ to 2½ inches (snout to vent)

Similar Species: none in South Dakota

Identification: The plains spadefoot is the only species of the *Scaphiopus* genus

found in South Dakota. It has a stout body with characteristic elongated wedge-shaped spades on the hind feet. Other characteristics which distinguish this species are a vertically elliptical pupil and a prominent boss bump between the eyes. The skin is relatively smooth like that of a frog with scattered small orange tubercles. The skin color is grayish to brown, often with overtones of green. There are usually four rather vague, longitudinal light stripes on the back. The belly is white with no markings and the throat of males is bluish-gray on the sides.

Life History: Spadefoots are prolific breeders with breeding taking place from May to August following heavy rainfall. During these warm summer months they emerge in the evening after a heavy rain to quickly breed in shallow pools. By morning adults are back underground awaiting the next heavy rain. The characteristic elongated wedge-shaped spades on the hind feet are used as a digging spur to burrow into the soil. Spadefoots may burrow up to 2 feet underground until they hit a layer of moist soil. Skin secretions of true toads appear to be toxic only to the many animals that might eat them; however, spadefoots have skin secretions that may produce severe allergic reactions or cause asthma attacks in some people. The male's call is a blaring, rasping bleat repeated at intervals of ½ to 1 second. It may also give a low-pitched, descending, hoarse trill, lasting ½ to ¾ second.

Distribution and Habitat: Spadefoots inhabit areas which have sandy or loose soil in the extreme southeastern corner of South Dakota and are also sporadically distributed throughout the western portion of the state. Their lifestyle associates them with large temporary wetlands easily flooded after heavy rains. In eastern South Dakota such wetlands may be prevalent in areas tilled for agricultural uses or that have been grazed by livestock. Plains spadefoots prefer wetlands that are void of heavy vegetation.

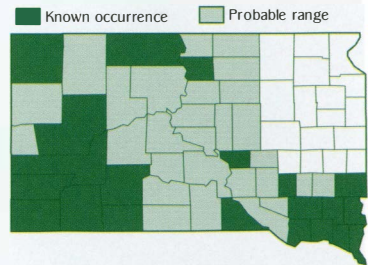


photo: Suzanne L. Collins, The Center for N.A. Amphibians & Reptiles



Plains spadefoot

photo: Tate Fischer



Plains spadefoot habitat

Mudpuppy

Necturus maculosus

Average Adult Size: 13 to 16 inches (snout to end of tail)

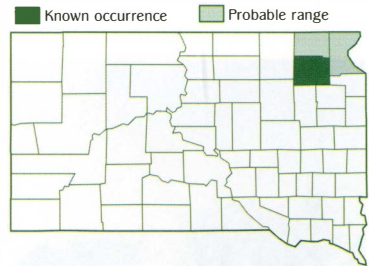
Similar Species: larval tiger salamander

Identification: Mudpuppies are brownish with dark blotches and deep red,

clumped gills. They are distinguishable from larval tiger salamander by the number of toes on the hind feet: tiger salamanders have five toes on the hind feet, mudpuppies only have four. The males are separable from females during the breeding season by the presence of a crescent-shaped groove anterior to the cloacal opening.

Life History: Mudpuppies are aquatic throughout their life. Activity is year-round, and these salamanders do not enter into winter dormancy. Breeding occurs in fall and early winter. The following spring, females lay eggs in silt-free areas among rocks or submerged trees and guard the eggs until hatching. Eggs hatch in 1-2 months. Mudpuppies do not reach sexual maturity for 4-6 years. They feed on nearly any animal that is small enough to eat, including aquatic crustaceans, insects, worms, small fish, tadpoles, and other salamanders. Mudpuppies are often caught by ice fishermen. Some people believe that mudpuppies are poisonous, bite, or are otherwise harmful. In reality, these creatures are completely harmless to people. Captives have lived as long as 4 years.

Distribution and Habitat: This salamander can probably be found in northeastern South Dakota (Marshall, Day, and Roberts counties) in most permanent lakes and the larger rivers and streams. Little is known about the distribution of this salamander in South Dakota. The only verifiable report is from Waubay Lake in Day County. Most reports of mudpuppies may actually be tiger salamanders. Confirmed sightings should be reported to South Dakota Natural Heritage Program, South Dakota Department of Game, Fish and Parks, 523 East Capitol-Foss Building, Pierre, SD 57501.



MUDPUPPY

photo: Suzanne L. Collins. The Center for N.A. Amphibians & Reptiles



Adult mudpuppy

photo: Barney Oldfield



Larval tiger salamander

MUDPUPPY

Tiger Salamander

Ambystoma tigrinum tigrinum,
A.t. melanostictum, *A.t. diaboli*,
and *A.t. mavortium*

Average Adult Size: 6 to 9 inches (snout to end of tail)

Similar Species: Larval tiger salamanders may be confused with the mudpuppy. In South Dakota, however, this is the only terrestrial salamander and adults

cannot be confused with any other species. Larval tiger salamanders are often referred to as mudpuppies, but true mudpuppies have four toes on the hind feet while tiger salamanders have five.

Subspecies Identification: There are at least three subspecies of tiger salamander in South Dakota, and some evidence indicates a fourth subspecies may occur in the Black Hills (Peterson 1974). Although there are striking differences in appearance among these subspecies, where two subspecies occur in the same area, many intergrades may also be found, making identification difficult. During the last few years some herpetologists, including Collins (1997), now consider the eastern tiger salamander (*Ambystoma tigrinum tigrinum*) and the barred tiger salamander (*Ambystoma tigrinum mavortium*) as separate species with appropriate subspecies as previously discussed (page 5). Since no taxonomic distinction has been made in South Dakota, we will address each as subspecies of the tiger salamander *Ambystoma tigrinum*.

Eastern tiger salamander (*A. t. tigrinum*): background color dark olive to black with 15-58 yellow or olive spots, bars, or blotches on the back and sides between the front and rear limbs. Found in southeast South Dakota.

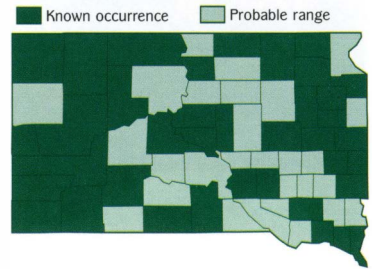
Blotched tiger salamander (*A. t. melanostictum*): typically with irregular yellow or olive blotches or spots on the back and sides. The markings are generally smaller and less distinct than in the eastern and barred subspecies. Common to western and central South Dakota.

Gray tiger salamander (*A. t. diaboli*): light green overall with small dark spots scattered over the body. Found in northeast South Dakota.

Barred tiger salamander (*A. t. mavortium*): similar to the blotched and eastern tiger salamander but with 6-36 yellow or olive bars or blotches between the front and rear limbs. Background color is dark olive to black. Reported only from the Black Hills.

Life History: Warm spring rains stimulate movement of tiger salamanders to the breeding ponds. Here the animals go through an elaborate courtship before the male expels a spermatophore which the female then takes in with her cloacal lips. After fertilization, the female lays her eggs, sometimes numbering in the hundreds. Eggs are attached to submerged vegetation where they hatch after a few weeks. Larvae may undergo metamorphosis that same summer, may overwinter as larvae, or, in some instances, may become sexually mature while remaining in the larval form (neoteny). Neotenic tiger salamanders remain in the larval form their entire lives. Tiger salamanders are carnivorous, feeding on any small animals they can catch and swallow. A typical diet consists of insects, earthworms, small crustaceans, small mice, and small amphibians. Adults overwinter in animal burrows, caves, and other underground refuges. Tiger salamanders excrete substances from their skin that can be irritating to some people, especially to the eyes. Otherwise, tiger salamanders are harmless. These salamanders reportedly do well in captivity and may live up to 25 years.

Distribution and Habitat: Tiger salamanders are found statewide wherever suitable habitat occurs. Refer to subspecies identification for specific distributions.



TIGER SALAMANDER



Eastern tiger salamander

photo: Suzanne L. Collins, The Center for N.A. Amphibians & Reptiles



Blotched tiger salamander

photo: Suzanne L. Collins, The Center for N.A. Amphibians & Reptiles

photo: W.B. Preston



Gray tiger salamander

photo: Suzanne L. Collins, The Center for N.A. Amphibians & Reptiles



Barred tiger salamander

TIGER SALAMANDER

Appendix A

Identification key to salamanders and adult frogs and toads of South Dakota

- 1A. Animal has a tailGo to Key 1 (Salamanders)
 1B. Animal does not have a tail.....Go to Key 2 (Frogs and Toads)

Key 1

- 1A. Gills absenttiger salamander (page 44)
 1B. Gills presentGo to 2
 2A. Gills feathery, not red; 5 toes on hind feet.....larval tiger salamander (page 44)
 2B. Gills clumped, red; 4 toes on hind feet.....mudpuppy (page 42)

Key 2

- 1A. Skin dry and wartyGo to 2
 1B. Skin smooth and moist.....Go to 5
 2A. Warts small and uniform.....Great Plains toad (page 24)
 2B. Warts vary in size and clumped.....Go to 3
 3A. Underside is completely white.....Woodhouse's toad (page 30)
 3B. Underside with heavy black/grey flecking.....Go to 4
 4A. Cranial ridges separate (see Fig 1).....American toad (page 26)
 4B. Cranial ridges form single raised bump between eyes (boss).....Canadian toad (page 28)
 5A. Suction cups on toes, can stick to vertical surfaceGo to 6
 5B. No suction cups on toes (see Fig 1)Go to 9
 6A. Suction cups as wide as toes.....Go to 7
 6B. Suction cups wider than toesGo to 8
 7A. Striped pattern on backchorus frog (page 36)
 7B. Dark green or brown triangle on head.....Blanchard's cricket frog (page 38)
 8A. Dark borders present around dark spots.....eastern gray treefrog (page 32)
 8B. Dark borders absent around dark spotsCope's gray treefrog (page 34)
 9A. Dorsolateral folds present (see Fig 1)Go to 11
 9B. Dorsolateral folds absent.....Go to 10
 10A. Extensive webbing on hind feet, green body colorbullfrog (page 18)
 10B. Hard, dark colored "spade" on hind feetplains spadefoot (page 40)
 11A. Spots on body and legs.....Go to 12
 11B. Body uniform brownish colorwood frog (page 16)
 12A. Dorsolateral folds (see Fig 1) complete and unbroken.....northern leopard frog (page 12)
 12B. Dorsolateral folds interrupted and broken near ventplains leopard frog (page 22)

Recommended sources and tools

Sound recordings of frog and toad calls

- Bogert, C. M. Sounds of North American frogs: the biological significance of voice in frogs. (Record or cassette; 92 calls of 50 species of frogs and toads; accompanied by an illustrated essay on the subject.) Produced by Folkways Records, N.Y. Distributed by Rounder Records, Cambridge, Mass., and Smithsonian Folkways Records, Rockville, Md.
- Johnson, T. R. Talking toad and frog poster and cassette. (20 minute cassette of 20 kinds of Missouri toads and frogs.) Jefferson City: Missouri Department of Conservation.
- Kellogg, P. P., and A. A. Allen. Voices of the night. Sounds of Nature Series. (Record; calls of 34 kinds of toads and frogs of eastern North America.) Boston: Houghton Mifflin for Cornell Laboratory of Ornithology.

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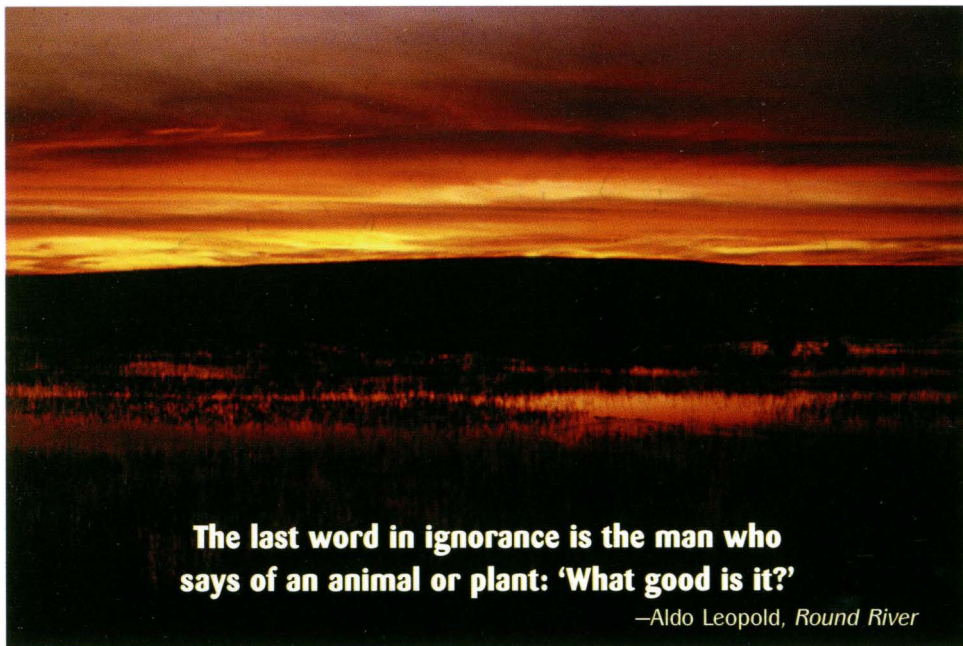
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**The last word in ignorance is the man who
says of an animal or plant: 'What good is it?'**

—Aldo Leopold, *Round River*

Other field guides from the South Dakota State University

Department of Ag Communications:

- Trees of South Dakota, SDCES EC 903
- Guide to the Common Fishes of South Dakota, SDCES EC 899
- Plants of the Black Hills and Bear Lodge Mountains, SDAES B732, available fall 1999
- Plants of the South Dakota Grasslands, SDAES B566, revision available fall 1999

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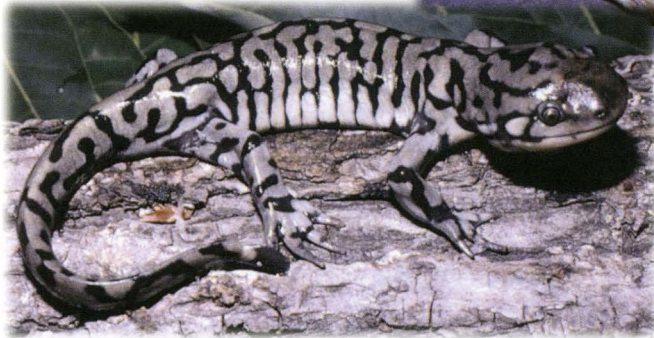
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**Northern
leopard
frog**



**Canadian
(Dakota)
Toad**



**Blotched
tiger
salamander**

Frogs, toads, and salamanders...

...sound like the ingredients for a witch's brew. Humor and an undeserved reputation for raising warts on humans aside, these amphibians are as important to us as life itself.

They signal a potential environmental problem that is affecting their health—and possibly our own. This is cause for alarm: Amphibians, due to their lifestyle, are indicator species that are useful for monitoring the health of our surroundings. They are, essentially, an early warning system of approaching environmental events.

Many of us need a realistic introduction to the amphibians of South Dakota, an introduction untainted by tales and mythology. As always, we need to know where we are before we can know where we, and these interesting little creatures, are going. May our frogs, toads, and salamanders always be part of the countryside, the wetland, the flowerbed, and the future of South Dakota.