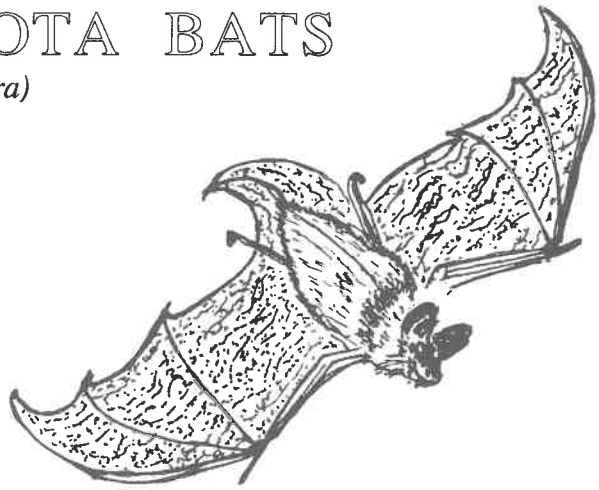
Status: Common, Native Residents and Migrants

SOUTH DAKOTA BATS

(Chiroptera)



Description

Although they fly, bats are not birds. And, although they have small, furry bodies, bats are not mice. They are an entirely separate group of mammals, the Chiroptera. Like all mammals, bats have hair, are warm-blooded, and nurse their young. Bats are the only mammals that truly fly. In South Dakota there are 11 species of bats (see Table 1).

All South Dakota bats are small, even though they appear large due to their wing span, which can be as great as 12 inches (30 cm) across. Most bats have bodies that are less than 4 inches (10 cm) long. The largest South Dakota bat, the hoary bat, has a length of only 4 to 6 inches (10-15 cm). Most of the species of bats in South Dakota are reddish brown but some are nearly black, one has silver-tipped fur (silver-haired bat), and one is *hoary* (hoary bat). All bat species that live in South Dakota have small eyes and poor eyesight, but have large ears and a keen sense of hearing.

Wings of bats are composed of two layers of skin stretched between long finger bones. The wing membrane extends from finger bones along the sides of the body to the hind legs. Wing membranes are often hairless and, in some species, are transparent. Another membrane extends between the two hind legs and includes the tail if there is one. These membranes may be used by the bat to capture prey. (Fly-fishing anglers report catching bats by the wing with their hooks. This occurs because bats were trying to capture the fake flies with their wing membrane.) Bats can beat their wings up to 20 times per second and maneuver as well as swallows.

Distribution

After the first hard frost of the South Dakota winter, there are no longer insects available to eat. There are two strategies bats can use to survive the winter. One strategy is to leave and the other is to hibernate. There are three species of bats that migrate to warmer climates during the fall: red bats, silver-haired bats, and hoary bats. These tree-roosting, solitary bats are found throughout the state only in the summer. Some travel

over a thousand miles to winter in warmer climates after spending the entire summer in South Dakota. Others travel from the Caribbean to Canada, with only brief stopovers in our state. All of the other species of bats in South Dakota hibernate in the winter. These permanent residents are social and hibernate in colonies, which can number from a few individuals to over a thousand. Many hibernate in caves, mines, buildings, and other protected locations where the temperature stays constant. The distribution of bat species within South Dakota are listed in Table 1.

Natural History

Bats have many unique adaptations. They can walk or climb with their wings folded, but cannot take off from the ground. At rest, they hang head downward, sometimes by one hind foot, using the other to groom their fur or clean their teeth. They can wrap their bodies with their wings.

All bats in South Dakota catch insects at night while in flight. Their eyes, ears and nose all have adaptations for accomplishing this. Insect-eating bats have small eyes and relatively poor eyesight. Echolocation is probably the most fascinating adaptation of bats. While flying, insect-eating bats emit, through their noses or slightly opened mouths, a continuous series of ultrasonic sounds that are inaudible to humans, (about 30 to 60 squeaks per second, ranging in pitch from about 30,000 to 100,000 cycles). These sounds bounce off objects and are picked up by the bat's complex ears. Muscles in the ears contract and relax in *synchronization* with the ultrasonic sounds, blocking emitted sounds and receiving the echoes. Many bats have large ears and noses with complex folds and ridges that aid in echolocation. Bats can determine size, location, density, and movement of the object they approach by interpreting the sound waves. They then catch insects in their mouths, or scoop them into their wing membrane. Most of the time the insect is eaten in flight.

The legend that bats fly into people's hair is based on the fact that they often fly very close to humans, seeking the insects that sometimes swarm about people's heads. Bats consume hundreds of thousands of tons of insects annually. A bat may consume 1/3 of its body weight in insects each night. A myotis may eat 600 mosquitoes in one hour.

Bat behavior is dictated by the seasons. With summer, migrating bats return and hibernating bats become active as their prey becomes available. Bats leave their daytime roosts about dusk and usually fly to a stream, pond, or lake where they dip their lower jaws into the water to drink. They then begin foraging for insects. Solitary bats roost during the day in trees where they hang upside down by their feet and look very much like leaves. During the day, social bats roost in caves, hollow trees, under tree bark or in buildings. Many species may cluster together in their roosts. The Black Hills contains many roosts where bats *hibernate.* during the winter.

Both hibernating and migratory bats must store up fat and energy reserves for winter. Migratory bats may travel over a thousand miles to warmer climates. Hibernating bats need fat to last for up to 7 months of hibernation. During hibernation their body temperatures drop and they fall into a *torpor*. If bats are disturbed while hibernating, they awaken rapidly as a protection against danger. Being disturbed during hibernation may not bother some species, but for others this can speed up their metabolism so that they may burn up their stored body fat and may actually starve to death. Hibernating bats die if the temperature drops below freezing, and a too-warm cave can speed up their metabolism to the point that all stored body fat is burned up.

Bats *molt* their fur each year. This occurs in July and August for most species in South Dakota. Most bats mate in fall prior to hibernation. Sperm is stored in the female over the winter and fertilization is delayed until the spring. This

adaptation prevents birth during the unfavorable winter months and allows the bat pups to be born in late June or early July. The hibernating, social species form large maternity roosts in caves, mine tunnels, and buildings. These are often in different locations than their hibernation roosts. Some species avoid man-made structures while others seem to prefer buildings. There may be large colonies of females and their young, sometimes of several species. The males stay away from the maternity roosts and tend to have solitary day roosts. Hibernating bats give birth to one offspring annually, while tree bats may have two. All members of a bat colony will give birth at the same time in a maternity roost. The pups are born feet first and are caught in the leg membrane. They then crawl to a nipple and attach themselves, where they nurse. The young are born hairless and pinkish with their eyes open. The young are left hanging in clusters in the maternity roosts while the mothers forage and come back to nurse. By about 20 days of age the young have reached adult size and can fly. They are usually weaned at 3 to 6 weeks of age. Bats may live up to 20 years.

When the young bats are first on their own, they may roost in very exposed places, such as tree trunks and porches or in buildings that are not usually occupied by bats. This leads to most human encounters with these confused youngsters. When alarmed, bats emit a hissing warning sound. Bats have a mouthful of sharp teeth. Sick, injured, or roosting bats that are encountered should not be handled. They can carry diseases, such as rabies, which are dangerous to humans.

As with all animals, bats live where food, water, space, and shelter can be found in the best arrangement. Many bats have become specialized to live in a certain niche in the environment. Each bat species has found its own niche within the many habitats available in South Dakota. The silver-haired bat forages in or near deciduous or mixed coniferous forests on a wide variety of insects. They have a slow, erratic flight with short glides. Big brown bats are probably the most numerous bats in South Dakota, and prey on flying beetles over open meadows, along tree-lined city streets, and around farms and ranches. Hoary bats hunt for moths over shortgrass prairies and aspen-pine forests. Fringed myotis capture flying beetles at tree canopy height in grasslands and woodlands. The northern myotis forages at shrub level along the Missouri River breaks and to the east, but there is also an isolated population in the Black Hills. The little brown myotis specializes in feeding over water. Townsend's big-eared bats are moth specialists, selecting moths 3 to 10 mm long.

Animals that feed on bats include hawks and snakes. An important predator of tree roosting bats, the red, silver-haired, and hoary bats, is the blue jay. Bat skulls are occasionally found in owl pellets, indicating that bats also serve as a food source for those predators.

Management Considerations

More than half of the 44 species of bats in the United States are threatened or endangered. Many bat populations are dwindling for a variety of reasons. Misunderstanding and fear of bats has led to mass killings and destruction of bat roosts. Other causes of the decline may be destruction of habitat. Camping and building fires in caves can disturb and injure bats. Pesticides have changed the balance of insect life. Bats no longer have a reliable supply of insects over much of their former habitat. Because they only have one baby a year, bat populations increase slowly.

Bats are very beneficial animals. They consume enormous quantities of insects and in the tropics, pollinate many types of fruits. Bats are an important part of our ecosystem. Such organizations as Bat Conservation International and South Dakota Department of Game, Fish and Parks are working to educate people about the importance of bats. Bat populations can be protected by restricting hu-

man access to bat colony roosting and hibernating sites in mines and caves in the Black Hills. It is especially important to leave hibernating bats undisturbed. People wishing to increase bat roosting habitats can provide bat boxes in their backyards.

Table 1. Bat Species Known From South Dakota. * Denotes social, colony-roosting species that are permanent residents. ** Denotes tree-roosting species that migrate.

Common Name	Scientific Name	Distribution in S.D.
* Western Small-footed Myotis	*Myotis ciliolabrum*	Black Hills, West River
* Little Brown Myotis	*Myotis lucifugus*	East River, Black Hills
* Long-legged Myotis	*Myotis volans*	Black Hills, West River
* Fringe-tailed Myotis	*Myotis thysanodes*	Black Hills, West River
* Northern Myotis	*Myotis septentrionalis*	Statewide
* Long-eared Myotis	*Myotis evotis*	Black Hills, West River
* Townsend's Big-eared Bat	*Corynorhinus townsendii*	Statewide
* Big Brown Bat	*Eptesticus fuscus*	Statewide
** Red Bat	*Lasiurus borealis*	Statewide
** Hoary Bat	*Lasiurus cinereus*	Statewide
** Silver-haired Bat	*Lasionycteris noctivagans*	Statewide

Glossary

Hoary - covered with gray or white hair, as if from age.
Hibernate - to pass the winter in a dormant state with lowered metabolism and heart rate.
Molt - to periodically shed hair or feathers that are soon after replaced by new growth.
Nocturnal - active at night.
Roost - a place where animals rest, rear young or hibernate.
Synchronization - at the same time, simultaneous.
Torpor - a dormant, inactive state.

References

Clark, Tim W. and Mark R. Stromberg, 1987. Mammals in Wyoming. Lawrence: University of Kansas, Museum of Natural History.

Jones, Jr., J. Knox, and others, 1983. Mammals of the Northern Great Plains. Lincoln: University of Nebraska.

Whitaker, Jr., John O., 1980. The Audubon Society Field Guide to North American Mammals. New York, Alfred A. Knopf.

Selected Resources for Teachers

Bat Conservation International. Educator's Activity Book About Bats. Austin, Texas: Bat Conservation International, 1991.

Cooper, Ann C. Bats, Swift Shadows in the Twilight. Denver Museum of Natural History, Wonder Series. Niwot, CO: Roberts Rinehart Publishers. 1994.

Jarrell, Randall. The Bat Poet. New York: Macmillan Company. 1963.

Lundberg, Kathryn. Bat Magic for Kids. Milwaukee: Garth Stevens Publishers. 1996.

Pringle, Laurence. Batman, Exploring the World of Bats. New York: Charles Scribner's Sons. 1991. Biography of Merlin Tuttle.

South Dakota's AcroBats of the Night. Activity Booklet. S.D. Dept. of Game, Fish and Parks.

Bat Conservation International has a web page on bats on the Internet that includes educators' resources. In addition there are many bat pages on the Internet for students, including coloring pages, word search, and sound recordings.

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