



Bats are among the most beneficial yet misunderstood mammals. They control insect populations, pollinate cacti and tropical fruit trees, and are important to medical and scientific advances. Sadly, bat colonies throughout the world are declining drastically as humans, intentionally and unintentionally, endanger bats and disturb their habitats.

## Fascinating Fliers

Bats are extraordinary in a number of ways. They are the only mammals to have developed true flight. They are also among the few mammals that use a specialized, highly sophisticated echolocation system, similar to sonar, to navigate and locate food. Whales and dolphins also echolocate. Bats are members of the order *Chiroptera*, which means “hand-wing”. More than 1,100 species have been identified, making up a fifth of all known species of mammals. Despite what people may assume, bats are more closely related to primates than they are to rodents. Found throughout the world, except in the polar regions, bats are shy creatures that feed at night and return to quiet, dark homes to roost during the day. Different species have developed individual preferences for roosts, including caves, abandoned mines, bridges, buildings, wells, culverts, foliage, tree hollows, cliff crevices, and even beneath stones. Most bat species produce only one pup each year and like all mammals, female bats nurse their young. Insects, centipedes, spiders, frogs, fish, lizards, mice, birds, other bats, fruit, nectar, and pollen make up the wide variety of food on which bats may feed. However, each type of bat has specialized to feed on just a few of these foods. Only three uncommon bat species in Latin America feed on animal blood.

## Echolocation

Although bats have good eyesight, they rely on echolocation to navigate in the dark and to search for food. After emitting high-frequency sound waves, the bats listen for the sound to bounce off objects in their flight path. This ability is so advanced that some species of bats can locate and capture tiny insects in total darkness while flying through a forest. Their hearing is so sensitive that bats can hunt entirely by listening for the sounds made by their prey. Fruit-eating bats rely more on their eyesight and keen sense of smell than on echolocation.

## Benefits to Humans

Nearly all North American bat species are insect eaters, and the quantity of insects they consume is astounding. For example, scientists estimate that the bat colony in Bracken Bat Cave in Texas eats **more than 200 tons of insects every night.**



Fruit-eating bats control insect populations as well, by eating over-ripened fruit that otherwise attracts destructive fruit flies. These bats also disperse seeds, helping sustain desert and tropical ecosystems. Nectar-feeding bats play a critical role in pollinating tropical cash crops such as bananas, cashews, mangos, and figs, as well as key desert plants, including agave, saguaro, and organ-pipe cactus. Bats are important to farmers and foresters for controlling insect pests. Crop and timber losses as well as the need for expensive pesticides are reduced by bats, which also helps to lessen environmental pollution. Throughout the world farmers use bat guano for an effective and valuable organic fertilizer. Finally, bats supply essential nutrients and food resources critical to cave life, such as microbes, invertebrates, fish, and salamanders.

## Advancing Science and Medicine

The study of bats has led to significant medical advances including: sonar-type devices to assist blind people; anti-clotting drugs for stroke and cardiac patients; and techniques used by fertility clinics. In addition, bacteria discovered in bat guano have amazing cleansing potential, and are proving valuable for many uses, from creating new detergents to cleaning up oil spills.

## Home Sweet Cave

At some point in their life cycles, two-thirds of the 46 species of bats in the United States use caves, or cave-like structures, such as abandoned mines. Inside caves, bats give birth and rear their young in the summer months, and hibernate in the winter. Even quiet groups of cavers with dim lights can disturb hibernating bats, causing them to waste the limited energy stores they need to survive the winter. Disturbing pregnant females can cause them to lose their young. Human interference also may force bats to abandon their homes for less suitable roosts, causing further declines in bat populations. Conscientious cavers avoid important bat caves in the winter to protect hibernating bats, and in the summer to protect mothers and pups. Caves with large entrances may be used by bats to train their offspring and to socialize, while other caves are used temporarily as bachelor roosts. However, during their active season, some species of bats select temporary roosts other than caves for rearing young and resting during foraging. These are called night roosts. Some bats migrate, visiting caves along their routes.

Bar boxes (shown left) provide great roosting sites to offset the loss of natural roosting sites.



photo by John Gantner



## Threats to Bats

Although their night-time activity, remote habitats, and ability to fly help protect bats, they do have natural predators, including raccoons, snakes, opossums, foxes, house cats, hawks, and owls. However, humans are responsible for the most devastating bat kills by eliminating habitat and food sources. For example, land development destroys wildlife habitat throughout the world, and outdoors enthusiasts disturb cliffs, caves, and other rock formations that once served as quiet bat roosts. What's more, farming and forestry worldwide may alter native ecosystems, and reduce insect populations on which bats feed. Timber management techniques harvest trees before a forest can regenerate the mature trees suitable for bat roosts. Even old, uninhabited buildings where some bats live are disappearing. Worst of all, sometimes bats are killed deliberately by people who don't know any better.

## Our Endangered Friends

Without help, bats may be heading for extinction. Almost half of the 46 bat species in the United States are listed as Endangered or Threatened, or are being considered for such status. Even relatively common species are vulnerable because of their migration patterns, roost preferences, or colonial behavior.

## Bats Need Your Help

✈ Spread the word that bats need friends. You can pass along copies of this brochure (available free from the National Speleological Society (NSS) or Bat Conservation International (BCI), and on the NSS Web site). If you belong to a Scouting, outdoors, or conservation group, or a church or civic organization, arrange for a presentation about bats. Your school or local nature center is a perfect place to encourage an appreciation of the world of bats.

✈ Avoid visiting caves with large bat populations, especially during winter hibernation or summer maternity seasons.

✈ Encourage the installation of well-placed bat houses to help offset the loss of natural roosts. Bat houses also offer a focal point for further educational efforts.

✈ Partner with local wildlife management agencies to assist biologists in roost surveys and other bat research and conservation work. Training workshops are offered at NSS Conventions and from BCI.

Bats remain mysterious in many ways, which is part of their appeal. By encouraging careful observations, working with land managers and researchers, and taking an active stewardship role, we help ensure that these valuable animals survive well into the future.

SANCTUARY FOR  
ENDANGERED GRAY BATS  
BATS CANNOT SURVIVE HUMAN DISTURBANCE AND  
SEVERE RECENT DECLINES ARE NOW PROTECTED  
BY THE FEDERAL ENDANGERED SPECIES ACT.  
NO TRESPASSING OR ENTRY WITHIN THIS FENCE, OR ANY  
VIOLATION OF THESE BATS IS STRICTLY PROHIBITED.  
VIOLATION IS PUNISHABLE BY FINES OF UP TO  
\$500 AND POSSIBLE IMPRISONMENT.  
FOR MORE INFORMATION CONTACT TVA,  
OFFICE OF NATURAL RESOURCES, NORRIS, TN 37828

### Suggested Reading

Available from the NSS Bookstore

*America's Neighborhood Bats*, by Merlin D. Tuttle  
*Bats*, by M. Brock Fenton

*The World of Bats*, by Klaus Richarz and Alfred Limbrunner

*The Bat House Builder's Handbook*,  
by Merlin D. Tuttle and Donna L. Hensley

*Bats in Question*, by Don E. Wilson

*Walker's Bats of the World*, by Ronald M. Nowak  
*Bat Ecology*

Available on line from Bat Conservation International and the NSS Bookstore,  
Edited by Thomas Kunz and M. Brock Fenton

### For educators

*Educator's Activity Book About Bats*, by Bat Conservation International

*Discover Bats!*, by Bat Conservation International

### On the Internet

*Bat Conservation International:*  
[www.batcon.org](http://www.batcon.org)

*National Speleological Society*  
[www.caves.org](http://www.caves.org)

*Echo the Bat interactive site:*  
[www.imagers.gsfc.nasa.gov/echohome.html](http://www.imagers.gsfc.nasa.gov/echohome.html)

The National Speleological Society (NSS) has more than 12,000 members dedicated to protecting, conserving, exploring, and studying caves. Bat Conservation International (BCI) is the world's foremost organization devoted to conservation, education, and research initiatives involving bats and the ecosystems they serve.

### National Speleological Society

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