

## Conservation of Bats in Florida<sup>1</sup>

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Bats are declining throughout North America, including Florida. This is worrisome because bats are an essential part of natural ecosystems throughout the world, serving as valuable allies to humans by consuming enormous quantities of night-flying insects, many of which are pests to humans and to crops. (See <http://edis.ifas.ufl.edu/> for more information on the role of bats in integrated pest management). In tropical countries, bats also play a vital role in pollinating flowers and dispersing seeds.

The primary causes of bat declines in Florida include loss of natural habitat and direct disturbance to bats and their roosts. Habitat is lost when upland forests are converted to housing developments, when trees that could serve as roosts are removed from urban and suburban areas, and when caves are sealed shut or filled in. Direct disturbance occurs at both natural roosts such as caves, and at manmade roosts such as bridges and abandoned buildings. Over-application of insecticides can also negatively impact bats by killing non-pest insects that could otherwise serve as bat food.

### Bats: Deserving of Fear or Reverence?

Curiously, bats have been feared and maligned by many human cultures, although they pose little threat to human health when left alone. Bats, like snakes, sharks, and spiders, seem to evoke fear and loathing beyond the harm they are likely to cause people. Some of this fear comes from the misconception that most bats carry rabies when, in fact, less than one half of 1 percent carry the disease.

Furthermore, rabies is not easily transmitted from an infected animal to a person. Rabies can be transmitted through two means: through saliva when an animal with the virus bites a person, or when saliva or brain tissue of an infected animal comes into direct contact with open wounds or mucous membranes (the eyes, nose, or mouth) of a person. Both routes of transfer are quite unlikely, especially since infected bats very seldom become aggressive as other infected mammals do. Bats with rabies are more likely to be found on the ground, and for this reason a bat on the ground should never be picked up.

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Unfortunately, many people destroy roosts out of fear of the spread of rabies, when there is no evidence that destruction of bats or their roosts would reduce the very low health hazard bats pose as vectors of this virus. A disease called histoplasmosis, caused by a fungus that lives in soil enriched by bat droppings, can be contracted in bat roosts. Florida's humid climate is especially favorable for the fungus. However, risk exists only for people who regularly breathe dust containing the fungus. The low likelihood of a person being regularly exposed to large quantities of soil enriched by bat droppings makes concern for this disease needless for most people.

Bats also suffer from bad public relations because Hollywood has long portrayed bats as vampires that suck blood from the necks of unsuspecting people. These movies are inaccurate in many respects. A very small proportion of bats consume blood (only 3 species of the 1,100 that exist worldwide), these bats are only found in Central and South America, and they feed by lapping the blood from small incisions made with their teeth rather than by sucking blood. The most common prey of most vampire bats is livestock, which generally do not even notice the presence of the bats.

In some cultures bats are considered in a much more positive light. Since the seventeenth century, Chinese culture has considered the bat a symbol of happiness and longevity. In a well-known stylized picture of five bats forming a circle, referred to as "the blessings," each bat signifies one of the greatest virtues (longevity, wealth, health, love of virtue, and natural death). In some African and the Pacific Island nations bats are considered sacred.

### Are Bats Helpful or Harmful?

In reality, bats are more helpful to humans than harmful. A single insectivorous bat can eat thousands of insects each night, greatly reducing numbers of insect pests. Given that 1 out of every 4 mammals is a bat, and 3 out of every 4 bats eat insects, the number of insects consumed by bats across the planet is difficult to comprehend. The world would be a very different place if there were no bats to keep nocturnal insect populations in check. Insect-eating bats also

provide a valuable fertilizer in the form of guano (bat droppings), which is a potent organic fertilizer rich in nitrogen. In the tropics, fruit-eating bats are essential for dispersal of seeds in rainforests, and nectar-eating bats contribute to the pollination of countless flowering plants.

One genuine nuisance problem that bats may create occurs when bats roost in large numbers in human dwellings. The accumulation of guano can create an unpleasant smell, and any accumulation of animal waste indoors is unhealthy to humans. This problem can be dealt with by carefully sealing the holes bats used to enter the building *after the bats have been excluded*. It is absolutely essential that bats are excluded before the entryways are sealed. (See <http://edis.ifas.ufl.edu/MG342> for more information on excluding bats from buildings).

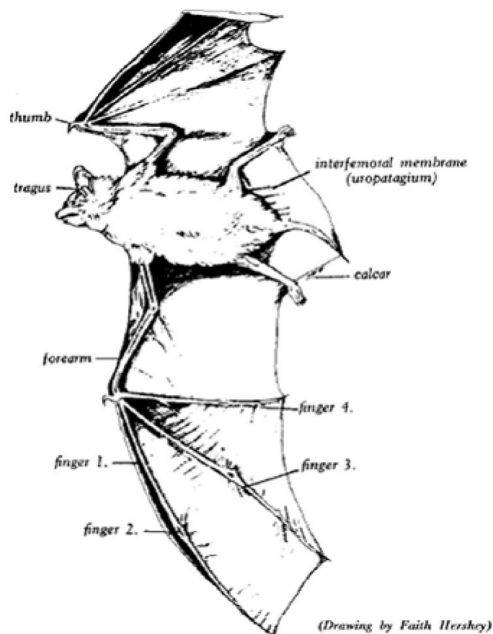
### Facts about Bats

Bats occur on every continent except Antarctica. Of the approximately 1,100 species of bats that occur worldwide, 47 are present in the United States. Eighteen species have been found in Florida, with 13 species considered resident year-round. There are more species of bat in northern Florida than southern, and most species of bat are more abundant in northern counties as well. (For details on specific species see <http://edis.ifas.ufl.edu/UW203>.)

Bats are the only mammal that can truly fly. Although they may appear similar to birds, the wings of bats are very different from those of birds, and built upon the same general pattern as the limbs of other mammals. Bats are able to maneuver more quickly and precisely than birds because their wings are much thinner. The wing is composed of an upper arm, forearm, wrist, and hand with thumb and four fingers (Figure 1). The hand and fingers are greatly elongated in order to spread and control the wing. The hind limbs of the bat are modified for landing and hanging upside down by their toes.

Many people wrongly believe bats are flying mice or rats. In fact, scientists believe bats are more closely related to monkeys than to rodents.

Although most bat species mate during the fall or winter, fertilization does not take place until spring



**Figure 1.** Bat wing structure

with birth occurring in late spring or summer. The litter size is usually one but some species can have two, three, or four young. Females of most species gather in congregations called nursery colonies. These colonies can range in size from a few individuals to several million individuals! Very young bats remain attached to their mother while in the roost during the day, but are left behind when the female leaves to feed at night. Mothers periodically return during the night to nurse their young. Most bats can fly when they are three weeks old. As they learn to catch their own food and become less dependent on the mother, the nursery colonies disperse.

## Bat Conservation

Two habitat components are essential to bats: roosting structures and feeding areas. Declines in bat abundance are largely a result of habitat loss and persecution of bats at their roosts by people who are not aware of the beneficial activities of bats. However, there are things you can do to improve conditions for bats (Table 1).

**Table 1.** Actions you can take to promote bat conservation.

<p><u>Provide Roosting Habitat</u></p> <ol style="list-style-type: none"> <li>1. Do not remove dead and dying trees, live trees with cavities, or dead palm fronds</li> <li>2. Do not disturb bats roosting in bridges, abandoned buildings, or other man-made structures</li> <li>3. Do not alter caves or mines used by bats and do not disturb the bats that use them</li> <li>4. Install an artificial bat house</li> </ol>
<p><u>Provide Foraging Habitat</u></p> <ol style="list-style-type: none"> <li>1. Plant native vegetation that attracts non-pest insects for bats to feed on</li> <li>2. Reduce insecticide use</li> <li>3. Allow access to open water where bats can drink and feed on aquatic insects</li> </ol>
<p><u>Raise public awareness about bats</u></p> <ol style="list-style-type: none"> <li>1. Educate others on the ecological services bats provide</li> <li>2. Dispel untrue rumors about bats</li> <li>3. Discourage inhumane removal of bats from buildings</li> </ol>

## Roosting Habitat

Bats spend the day sleeping (roosting) in dark, quiet, secluded locations. Many species prefer small, poorly ventilated spaces that heat up during the day. In Florida, tree cavities, snags, unpruned cabbage palm trees, and even the foliage and branches of trees are important roost sites. Due to increasing urbanization, the number of these natural roosting sites has been reduced and window shutters, drain pipes, billboards, roof tiles, attics, and various other nooks and crannies have become popular roosting site substitutes.

During the day the body temperature of bats approaches that of the surrounding environment, and their metabolism is reduced. Bats are relatively inactive during periods of cool temperatures, but on warm days the entire group may be noisy and active. As evening approaches bats become more active and vocal, leaving their roosts shortly after dark.

In cool climates, most bats hibernate during cold weather. In Florida, bats become less active during the dry season (December to April or May), not only as a result of cooler weather, but also because of low food (insect) supply. Bats survive these periods of low activity by using deposits of fat stored when food was abundant.

You can help bat populations directly by providing them with roosting habitat. Snags (dead trees) and live trees with cavities can provide important bat roosting habitat. Cabbage palms are a popular landscape tree that is tremendously valuable as a home to bats and other wildlife when left unpruned. You can also build or purchase a bat house. (For details on building and installing bat houses see <http://edis.ifas.ufl.edu>.)

### Feeding Habitat

Bats emerge from roosts at dusk and spend much of the night feeding on night-flying insects. Bats locate insects in the dark using a very sophisticated sonar system called echolocation. Bats emit ultrasonic sounds and determine the location of insects by judging the distance of the potential prey through the time delay when echoes bounce back. Insects are captured with the mouth, wings, and tail membrane. Bats can eat small insects in flight, but must land to devour large ones.

Bats are most frequently seen on warm nights feeding over bodies of water, around buildings or forest edges, or around lights. Many species are attracted to water, and a quick stop for a drink after emerging from a roost is a common behavior. After an early evening drink, taken in flight, bats feed for a period of time and then rest once their stomachs are filled. They may feed again one or several more times before dawn, returning to their roost by daybreak.

Creating your own wildlife habitat through creative landscaping with native plants can benefit bats by providing native insects the bats can feed on. (See <http://edis.ifas.ufl.edu/UW175> for additional information on landscaping for wildlife). Wetlands are also important foraging habitat, especially when open areas allow bats to access the surface of the water to drink while in flight.

### Raising Public Awareness

Bats are a mysterious and fascinating group of animals that can generate great interest from both children and adults. By sharing your knowledge about bats you can dispel untrue rumors about bats and increase awareness of the valuable contributions bats make to the natural world and to humans. Schools,

nature centers, museums, and summer camps are good locations for lectures on bats. An activity that can be used to actively engage audiences in bat conservation is the construction of artificial bat houses.

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