

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

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Nocturnal (night time) habits, affinity for eerie places, and silent, darting flight have made bats the subjects of a great deal of folklore and superstition through the years. Given their ability to function in the dark when and where humans cannot, it is no wonder that bats have long been associated with the supernatural. Bats remain poorly understood even today.

Humans' general lack of understanding and appreciation of bats has contributed to alarming declines in bat populations. Some of the more important causes of these declines include destruction of habitat, use of harmful pesticides, disturbance of roost sites, proliferation of turbines used to generate wind power, and the spread of white nose syndrome. See <http://edis.ifas.ufl.edu/uw291> for more information on issues surrounding the conservation of bats in Florida.

Bats are the only mammals capable of true flight. Bats are not rodents. They are in the taxonomic order Chiroptera, which means "hand-wing." The forelimbs of bats have the same configuration as other mammals, but the bones of the fingers of bats are extremely elongated to support membranous

wings. The hind limbs are also modified to allow bats to hang, head-down, by their toes without expending energy.

Most bats are highly and uniquely adapted to catch night-flying insects. Nocturnal bats locate their food and navigate by uttering ultrasonic cries that return as echoes off solid objects. The large ears and oddly shaped nose and facial configurations of some bats assist in detecting these echoes. This form of navigation is termed "echolocation." This technique is also used by dolphins to detect prey and navigate in conditions of low visibility. Once bats detect prey, they use their wings, the wing membrane surrounding their tails, and their mouths to catch insects in flight or to pick them off vegetation. Although most bats are insect eaters, some bats specialize in eating other items such as fruit, nectar and pollen, vertebrates, and even blood. All bats resident in Florida eat insects, but a few of the species that occasionally show up in south Florida feed on fruit, nectar, and pollen.

All the bats of Florida rest during daylight hours, taking shelter in a variety of places such as caves, mines, buildings, bridges, culverts, rock crevices, under tree bark, and amongst foliage. Many species

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congregate in nursery colonies during the spring and disperse in July and August. The crowding of many bats into a nursery colony during spring and summer raises the temperature of the roost to more than 100 degrees (F). Because young bats have no fur, they need warm and humid conditions to survive.

Most bat species in Florida produce one offspring per year, although several species produce litters of two to four pups. Species that roost in caves, buildings, and tree hollows tend to be gregarious and have only one pup at a time. Foliage-roosting species tend to be solitary and have more than one pup at a time. Foliage-roosters often possess thicker and more colorful fur than colony-roosting bats. Like other mammals, all young bats are fed milk from their mothers until they are capable of foraging on their own.

Bats are an important part of natural ecosystems. They prey upon insects, some of which are agricultural or human pests. For example, the Brazilian free-tailed bat (*Tadarida brasiliensis*), consumes several species of moths that are agricultural pests, such as the fall armyworm (*Spodoptera frugiperda*), cabbage looper (*Trichoplusia ni*), tobacco budworm (*Heliothis virescens*), and corn earworm or cotton bollworm (*Helicoverpa zea*). The Brazilian free-tailed bat is common throughout Florida and typically lives in very large congregations. Recent research in south Georgia has demonstrated that these bats consume many of the insect pests that afflict pecan groves, suggesting that bats may play a role in integrated pest management (IPM) planning on pecan farms. (See <http://edis.ifas.ufl.edu/UW289> for more information on the role of bats in pest management). Bats also create nutrient-rich guano (feces) that acts as a fertilizer, supporting ground-dwelling life beneath roosts in caves and improving soil quality wherever bats defecate. Bats are important animals in scientific research, providing insights into such diverse topics as hibernation, sonar, and blood clotting.

This document describes the species of bats that occur in Florida and provides simple tips for their identification. Photos of all species can be found at the Bat Conservation International website (<http://www.batcon.org/>).

## Identification of Florida Bats

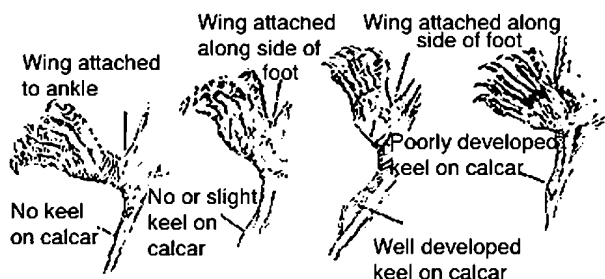
Thirteen species of bats live in Florida year-round (Tables 1 and 2). Three other species occasionally occur along the northern border of the state (Indiana myotis – *Myotis sodalis*, northern long-eared myotis – *Myotis septentrionalis*, and silver-haired bat – *Lasiorycteris noctivagans*), and four others occasionally occur in south Florida (buffy flower bat – *Erophylla sezekorni*, Cuban flower bat – *Phyllonycteris poeyi*, Jamaican fruit-eating bat – *Artibeus jamaicensis*, and Cuban fig-eating bat – *Phyllops falcatus*). These twenty species represent 3 families. Family Vespertilionidae (twilight bats) are the best represented with 13 species, whereas three species are present from family Molossidae (free-tailed bats), and four species from family Phyllostomidae (New World leaf-nosed bats).

All twilight and free-tailed bats that occur in eastern North America are insect eaters and can be divided into two groups: those that spend at least a portion of the year in caves (Table 1) and those that roost in other types of structures (Table 2). When caves and trees are scarce, bats may roost in man-made structures such as buildings, culverts, bridges, or bat houses.

Historically, caves provided safe environments with stable temperatures ideal for bat colonies. Because cave-roosting bats may congregate in large numbers (hundreds of thousands) and because cave habitats suitable for bats are limited in number, cave-dependent bat species are extremely vulnerable to human disturbance. Human disturbance, such as that caused by recreational caving activities, stresses bats and causes them to waste valuable energy, which may result in abandonment and mortality of young. Destruction of suitable cave habitat through vandalism, commercialization, flooding by reservoirs, and other causes has resulted in population declines to the point that several species face the threat of extinction. The need for cave conservation and protection of bat colonies (natural and urban) from human disturbance is critical for the continued survival of these fascinating animals.

Knowledge of the roost site preferences coupled with the physical characteristics of each species can

help in distinguishing among species of bats (Tables 1 and 2). The three species of free-tailed bats are the only bats with tails that extend well beyond the tail membrane, resembling the tail of a mouse. The four species of leaf-nosed bats are the only bats with a fleshy flap or noseleaf on the snout. Other characteristics important to the identification of Florida bats include the color of fur on the back (including whether or not the color changes from the base to the tip of each hair), shape of the fleshy part of the ear (the tragus), position of attachment of the tail membrane, length of hairs on the toes, and the presence or absence of a fleshy keel on the calcar (a cartilaginous structure on the rear edge of the tail membrane – see Figure 1).



**Figure 1.** Diagram of bat wing attachment and calcar keel combinations. Used with permission from Missouri Conservation Commission.

See Tables on pages 4 and 5.

## Additional Information

### Websites

Bat Conservation International, Austin, TX;  
<http://www.batcon.org/>

Florida Bat Conservancy, Bay Pines, FL;  
<http://floridabats.org>

Lubee Bat Conservancy, Gainesville, FL;  
<http://www.batconservancy.org/>

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**Table 1.** Cave-roosting bats resident to Florida

<b>Number of bats at roosts</b>	<b>Physical description</b>	<b>Species</b>
Large colonies (hundreds or thousands); smaller numbers in FL roosts	Fur on back uniformly gray; wing membrane attached to ankle; tragus narrow and pointed; calcar not keeled	<b>Gray bat</b> ( <i>Myotis grisescens</i> )
Large colonies (hundreds or thousands)	Fur on back short and wooly; fur brownish gray with dark roots; ears short and gray; tragus short, narrow, and pointed; calcar not keeled	<b>Southeastern bat</b> ( <i>Myotis austroriparius</i> )
Singles or relatively small groups (fewer than 100)	Ears longer than 25mm; lumps on either side of the nose; toe hair extending beyond the claws	<b>Rafinesque's Big-eared bat</b> ( <i>Corynorhinus rafinesquii</i> )
Singles or very small groups (fewer than 20 individuals)	Fur on back tricolored (dark at base and tip, yellow-brown in middle); tragus short, blunt, and curved; calcar not keeled; forearm pink and wing membrane black	<b>Tricolored bat</b> ( <i>Pipistrellus subflavus</i> )

**Table 2.** Tree- and building-roosting bats resident to Florida

<b>Number of bats at roosts</b>	<b>Physical description</b>	<b>Species</b>
Large colonies (hundreds or thousands)	Tail extends past tail membrane; total length longer than 90mm; broad, rounded ears not obviously joined; stiff toe hairs extend beyond the claws	<b>Brazilian Free-tailed bat</b> ( <i>Tadarida brasiliensis</i> )
Large colonies (hundreds or thousands)	Tail extends past tail membrane; total length longer than 90mm; ears joined at the midline of the head	<b>Velvety free-tailed bat</b> ( <i>Molossus molossus</i> )
Relatively small groups (fewer than 30)	Tail extends past tail membrane; gray-brown bicolored fur on back with lighter fur on belly; short funnel-like ears join at the top of the head; total length longer than 130mm	<b>Florida bonneted bat</b> ( <i>Eumops floridanus</i> )
Moderately sized groups (up to 1000)	Tail encased in membrane; fur on back dark brown; dark ears and membranes; naked muzzle; keeled calcar	<b>Big Brown bat</b> ( <i>Eptesicus fuscus</i> )
Relatively small groups (fewer than 100)	Tail encased in membrane; body fur short, sparse, and dull brown; tragus short, blunt, and curved; forearm dark; calcar not keeled	<b>Evening bat</b> ( <i>Nycticeius humeralis</i> )
Singles	Tail encased in membrane; more than a third of tail membrane furred; body fur yellowish	<b>Northern Yellow bat</b> ( <i>Lasiurus intermedius</i> )
Singles	Tail encased in membrane; more than a third of tail membrane furred; body fur red; face light red to yellow; white shoulder patch on males	<b>Eastern red bat</b> ( <i>Lasiurus borealis</i> )
Singles	Tail encased in membrane; more than a third of tail membrane furred; body fur mahogany with white frosting; face red to mahogany	<b>Seminole bat</b> ( <i>Lasiurus seminolus</i> )
Singles	Tail encased in membrane; more than a third of tail membrane furred; body fur multi-colored with white frosting; ears white or yellow with black rim; total length longer than 120mm	<b>Hoary bat</b> ( <i>Lasiurus cinereus</i> )

**Table 3.** Geographic range, abundance, and roost site preference of bat species resident to Florida.

Taxa	Florida Range	Abundance	Roosting Habitat	Comments
<b>Twilight Bats</b>				
Big brown bat ( <i>Eptesicus fuscus</i> )	Statewide except Keys	Uncommon	Buildings, bridges, bat houses, tree cavities	Forages year-round in FL
Eastern red bat ( <i>Lasiurus borealis</i> )	Northern 1/2	Common	Tree foliage, leaf litter	Sexually dimorphic; can have 1–4 pups
Hoary bat ( <i>Lasiurus cinereus</i> )	Northern 1/3	Rare	Foliage, tree cavities, tree trunks, Spanish moss	Large bat; can have 1–4 pups
Northern yellow bat ( <i>Lasiurus intermedius</i> )	Statewide except Keys	Common	Palm fronds, Spanish moss	Can have 1–4 pups
Seminole bat ( <i>Lasiurus seminolus</i> )	Statewide except Keys	Common	Pine trees, Spanish moss	Can have 1–4 pups
Southeastern bat ( <i>Myotis austroriparius</i> )	Northern 2/3	Common	Caves, tree cavities, buildings, bridges, culverts, bat houses	Roosts with other species; can have 1–2 pups
Gray bat ( <i>Myotis grisescens</i> )	Panhandle	Rare (Endangered)	Caves only	Extremely sensitive to cave conditions
Evening bat ( <i>Nycticeius humeralis</i> )	Statewide except Keys	Common	Tree cavities, beneath bark, buildings, bridges, bat houses	Roosts with other species
Tricolored bat ( <i>Pipistrellus subflavus</i> )	Statewide except Keys	Common	Caves, tree foliage, tree cavities, rock crevices, Spanish moss	Florida's smallest bat; uses caves in winter in FL
Rafinesque's big-eared bat ( <i>Corynorhinus rafinesquii</i> )	Northern 3/4	Uncommon	Tree cavities, beneath bark, buildings	Prefers cypress tree cavities
<b>Free-tailed Bats</b>				
Florida bonneted bat ( <i>Eumops floridanus</i> )	Southern 1/4	Rare (threatened at the state level)	Rock crevices, tree cavities, buildings, bat houses	Florida's largest bat
Velvety free-tailed bat ( <i>Molossus molossus</i> )	Keys	Rare	Buildings	Tropical species
Brazilian free-tailed bat ( <i>Tadarida brasiliensis</i> )	Statewide except Keys	Common	Buildings, bridges, bat houses	Roosts with other species