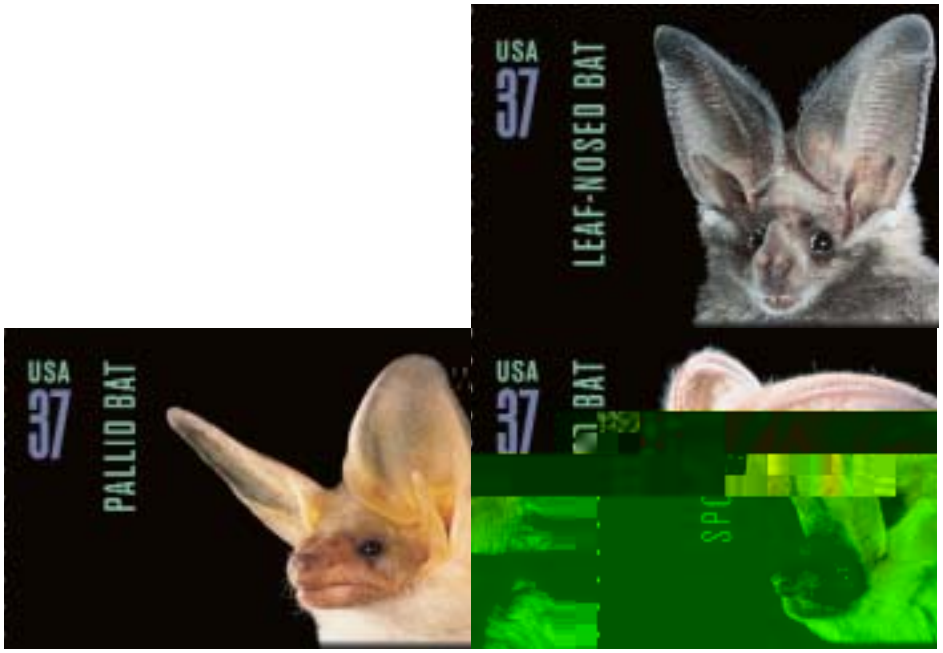
Night Friends- American Bats

On-line Activity Guide



BAT CONSERVATION INTERNATIONAL

several species are long-distance migrators, traveling from as far north as Canada to the Gulf states or Mexico for the winter. A few species can survive short-term exposure to sub-freezing temperatures, enabling them to overwinter in crevices in cliff faces or inside the outer walls of buildings.

Courtship and Reproduction

Most bats that live in temperate regions, such as the United States and Canada, mate in the fall just before entering hibernation. Ovulation and fertilization (through sperm that have been dormant in the female reproductive tract since the previous fall) occur in the spring as females emerge from hibernation. Pregnant females then move from hibernating sites to warmer roosts, where they form nursery colonies. Birth occurs approximately a month and a half to two months later. Young bats grow rapidly, often learning to fly within three weeks. While they are being reared, males and non-reproductive females often segregate into separate groups called bachelor colonies.

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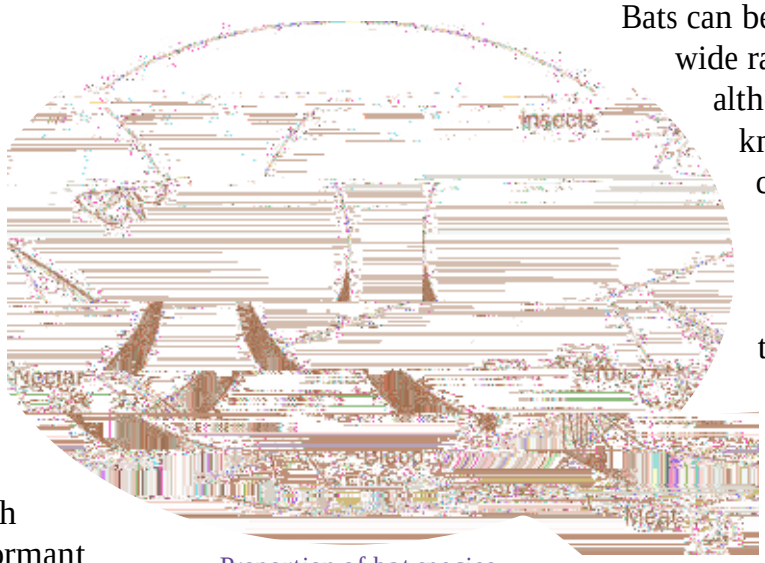

Proportion of bat species with each kind of bat diet.

Although 70 percent of bats eat insects, many tropical species feed exclusively on fruit or nectar. A few are carnivorous, hunting small vertebrates such as fish, frogs, mice, and birds. Despite their notoriety, there are only three species of vampire bats, they do not attack humans, and they live only in Latin America. With the exception of three species of nectar-feeding bats that live along the Mexican border of Arizona and Texas, all bats in the United States and Canada are insectivorous.

Bats can be found roosting in a wide range of shelters, although they are best known for living in caves. Tropical species occupy an even wider range of roost sites than temperate species. For example, some make tent-like roosts by biting through the midribs of large leaves, and several species have suction discs on their wings and feet that enable them to live in the slick-walled cavities formed by unfurling leaves, such as those of the banana plant. Others live in animal burrows, flowers, termite nests, and even in large tropical spider webs. Despite the wide variety of roosts used by bats, many species have adapted to living in roosts of only one or a few types and cannot survive anywhere else.

Why Should I Care about Bats?

Worldwide, bats play essential roles in keeping populations of night-flying insects in balance. Just one bat can catch hundreds of insects in an hour, and large colonies catch tons of insects nightly, including beetle and moth species that cost American farmers and foresters billions of dollars annually, not to mention mosquitoes in our backyards. In a single mid-summer night, the 20 million free-tailed bats from Bracken Cave in central Texas eat more than 200 tons of insects!

Seeds dropped by bats can account for up to 95 percent of forest regrowth on cleared land.

Throughout the tropics, the seed dispersal and pollination activities of fruit- and nectar-eating bats are vital to the survival of rain forests, with some bats acting as "keystone" species. Each of these species of bats supports plants that are crucial to entire ecosystems. Many plants bloom at night, using unique odors and special flower shapes that attract bats. The famous baobab tree of the eastern African savannas is a good example. Only bats can approach from below in a manner likely to contact the flower's reproductive organs and achieve pollination.

Wild varieties of many of the world's most economically valuable crop plants also rely on bats for survival. Some of the better-known commercial products include fruits such as bananas, breadfruit, avocados, dates, figs, peaches, and mangoes. Others include cloves, cashews, carob, balsa wood, and even tequila.

We already know that more than 300 plant species in the Old World tropics alone rely on the pollinating and seed dispersal services of bats, and additional bat-plant relationships are constantly being discovered. These plants provide more than 450 economically important products, valued in the hundreds of millions of dollars annually. The value of tropical bats in reforestation alone is enormous. Seeds dropped by bats can account for up to 95 percent of forest regrowth on cleared land. Performing this essential role puts these bats among the most important seed-dispersing animals of both the Old and New World tropics.

Excerpted with permission from "The World of Bats" in America's Neighborhood Bats *by Merlin Tuttle, Copyright © 1988. Courtesy of the University of Texas Press.*

Just having large, but not overly large, feet would indicate a bat that catches insects from pond surfaces. If a bat is large and has strong jaws, long canine teeth, and a large tail membrane, it is probably a carnivore, adapted both to eating meat and to turning quickly while chasing prey. If it has strong jaws and long canine teeth, but has only a very small tail membrane, it is a fruit bat that does not need to chase prey, but is adapted for biting into tough-skinned fruit to squeeze the juice out. Both insect-eating and meat-eating bats always have long tails or tail membranes, but meat-eaters are the largest and have the strongest jaws.

Special adaptations allow bats to find and eat certain kinds of food with little or no competition from other species. This is very successful as long as their unique food type is abundant, but such specialization is risky, because the kinds of prey, fruit, or flowers a bat eats might die out, leaving the bat to starve. Animals that eat a variety of foods can switch types if one disappears, but they cannot compete well with specialized animals for any one food. Most specialists, such as the huge-footed fishing bats, or long-nosed nectar bats, live only in tropical areas where climates and food sources are the most predictable. Bats that live in northern climates, where changes are frequent and unpredictable,

Extensions

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ACTIVITY 1

TEACHER REFERENCE SHEET

1. WHO AM I?

Clue: My toes and claws are exceptionally long, and the sides of my toes and claws are flat.

Bonus Questions:

What is the advantage of having long toes and claws? What is the advantage of having flattened toes and claws?

Answers:

1. I am a fish-eating bat. Can reach into water without submerging body. To glide easily through water.

2. WHO AM I?

Clue: My legs are extra strong and my kidneys work quickly so I can eliminate water as fast as I eat.

Bonus Questions:

How do fast-working kidneys help a blood-eating bat? What is the advantage of extra strong legs?

Answers:

2. I am a blood-eating bat.To get rid of the water, so the bat won't be too heavy to fly. To walk on the ground while stalking large prey or to jump away quickly if the prey wakes.

3. WHO AM I?

Clue: I am a large, strong bat with large ears and broad wings.

Bonus Questions:

Why does a carnivorous bat need big ears? What is the advantage of having broad wings?

Answers:

3. I am a meat-eating bat. To listen to and find prey. To better lift heavy prey.

4. WHO AM I?

Clue: I fly fast over quiet water, searching for tiny moving objects. My fur is oily.

Bonus Questions:

What is the advantage of flying over calm water? What is the advantage of oily fur?

Answers:

4. I am a fish-eating bat. To easily detect tiny fin tips using echolocation. To shed water, keep bat fur dry, and avoid getting cold.

5. WHO AM I?

Clue: My short, broad wings and my large tail membrane allow me to dart in and out of branches.

Bonus Questions:

What is the advantage of being able to dart in and out of branches? What is the advantage of being able to catch insects on the ground or in bushes?

Answers:

5. I am an insect-eating bat that catches prey on the ground or on plants. To avoid obstacles and catch prey. To avoid competing for food with other bats that feed in the open.

6. WHO AM I?

Clue: I have sharp teeth and strong jaws that can cut or crush big meals, I also have a big tail membrane.

Bonus Questions:

What is the advantage of having sharp teeth and strong jaws? What is the advantage of a big tail membrane?

Answers:

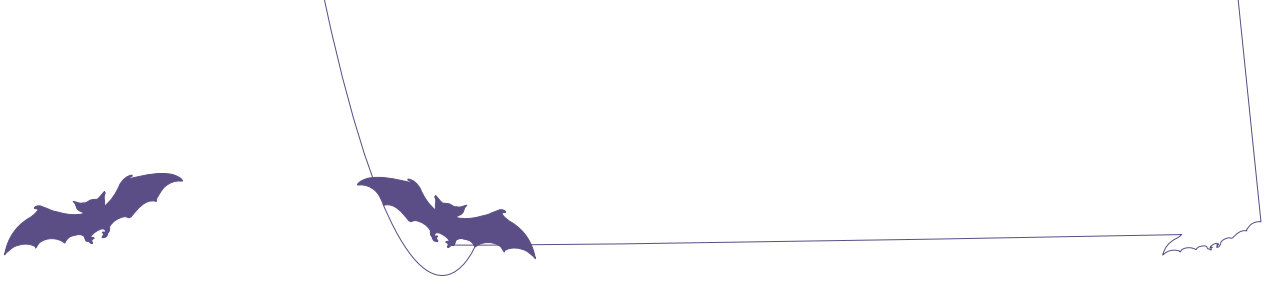
6. I am a meat-eating bat. To quckily kill and cut up large prey and break bones. To maneuver better when chasing prey.

larger and more easily seen in their habitats, they are not feared.

Due to killing stemming from carelessness or the fear of bats, and continued habitat loss, bat populations have suffered. Bats reproduce slowly, typically rearing only one young per year, making population recovery a slow process. Instead of spreading myths, we should consider bats' real roles in ecosystems. Bats are important to the natural world. Feeding at night, they catch billions of insects. Nature's bug-zappers are wonderfully efficient, catching as many as 600 mosquitoes an hour. Bats also eat a number of crop pests, helping farmers and reducing the need for harmful pesticides. Many tropical bats feed on fruit or nectar and in the process pollinate plants and disperse seeds, helping to regenerate the forest. Any number of familiar plants depend on bats, including figs, bananas, avocados, cloves, and cashews.

Procedure

1. Tell your students that they will be learning about bats. For fun, ask them to practice making a special sound made by a bat called the "body buzz." The body buzz is a low sound bats make when they are resting and seem contented before they go to sleep. The bat's whole body vibrates.
2. What do your students know about bats, important animals throughout North America? Instruct students to create a concept map for bats. A concept map is a diagram representing thoughts and ideas associated with a certain subject, in this case a bat. (See diagram for an example, done for wolves.) Encourage students to record their own ideas and then share with their group; there are no right or wrong answers.
3. Review the concept maps as a class and discuss any commonalities. *How are bats generally perceived by the class? In a positive light? A negative light? Why?*
4. Distribute copies of ' Threatened: The Indiana Bat' to each student. (Note: two versions are provided; pick the version with the reading level most appropriate for your students.) Another option is to have students conduct the research themselves. '*-0adin 8 mp Tc()T



diorama, or other medium. The final presentation should last roughly five minutes. In addition to being fTg. etion to

Schoolyard Habitats® site for bats. Bats are declining in part due to a loss of roosting sites. Providing a place for bats to roost and raise their young can be an exciting project to benefit bats, and a great lead-in to the Schoolyard Habitats project. For details, and more information about bats and bat research projects, consult Bat Conservation International's (BCI) website at www.batcon.org. BCI is a nonprofit organization dedicated to bat conservation, research, and public education. BCI sells ready-made bat houses and offers detailed instructions on how to build inexpensive bat houses. See pages 20-23 of this guide for a lesson plan using these instructions. The estimated cost of materials to build a BCI bat house that can host over 100 bats is less than $20.

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it. Superior quality bat houses are available through the Bat Conservation International catalogue at 1-800-538-BATS in the U.S. and Canada.

Looking for additional or other ways to provide better bat habitat? You can try these other simple actions to attract bats to your Backyard Wildlife Habitat or Schoolyard Habitats site, by providing the insects to eat, water to drink, and places to hide that bats need for their habitat.

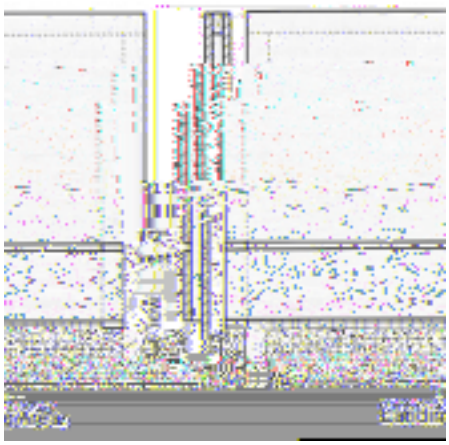
- ✔ Got an anti-bug zapper in your yard? You might want to think about getting rid of it! Zappers are useless on most biting insects and only kill light-attracted moths, which are good food for bats.
- ✔ Trees and shrubs, even dead ones left standing, are excellent hideouts for bats—and birds.
- ✔ Bats need water to drink. If you build a mini-pond, you'll also attract frogs and many other water creatures. Find out how to do this on NWF's website: www.nwf.org/backyard-wildlifehabitat/ or at a garden center or library.
- ✔ Close up any holes in your attic to ensure that your neighborhood bats use your outdoor wildlife habitat, and not your house!

Preparation

1. Measure and cut plywood into three pieces for each group: 26 1/2" x 24" for the back board, 16 1/2" x 24" for the front top, 5" x 24" for the front bottom.
2. Pre-drill 11 screw holes on the back board, four on each side and three across the top.
3. Pre-drill nine screw-holes on the front top board, three on each side and three across the top.
4. Pre-drill four screw holes on the front bottom board, two on each side.

Procedure

1. Ask students, *What do you know about bats?* Make a list on the board. *What would you like to know?* Make a parallel list. Discuss some of the major characteristics of bats (from background) with the students, and refer back to their list for later explorations.
2. Explain to students that many bats are highly endangered (*What does that mean?*) due to habitat destruction and disturbance. *If you live in an area bats use for habitat (check www.enature.com if you need to check), what could you do to help them?* One idea is to build a bat house to provide additional habitat for them.
3. Divide your students into small groups to make bat houses, or make one together as a large group. Make sure to use all appropriate safely considerations, equipment, and adult supervision for use of tools.
4. Roughen inside of backboard and landing area by cutting horizontal grooves with sharp object or saw. Space grooves about 1/2" apart, cutting 1/32" to 1/16" deep. Ask students, *why you might want to do this?* (The bats need such texture for climbing and roosting.)



9. Caulk around all outside joints to further seal roosting chamber.

10. Attach a 1" x 3" x 28" board to the top as a roof, if desired (optional, but highly recommended).

11. Paint or stain exterior three times (use primer for first coat).

12. Where will you put up your new bat house? Ask students to identify criteria for good placement, based on what they know about bats. Consider:
- permission to put it up,
- close to a pond, stream, or lake where bats feed and drink,
- diverse habitat that supplies a variety of insects,
- lots of sunshine to warm the house (at least six hours daily in hot climates, more in cool locations, so young stay warm and grow fast),
- facing east, west, or south (avoiding west in exceptionally hot climates)
- on a pole or the side of a building),
- about 12-15 feet above ground,
- in an open area at least 20 feet away from nearest trees or other obstacles. For each of these factors, ask students to consider how it contributes to successful bat habitat.

13. Install your bat house and observe it! *What do you discover?*

Assessment

✔ Write a letter to Ranger Rick Raccoon at the National Wildlife Federation about your bat house, explaining what you learned about building and planning your bat house. Ask any bat-related questions you have. Be sure to use Bat Stamps on your envelope!

✔ Design a brochure

For more information on bats and Backyard Wildlife Habitat projects, check out: **www.nwf.org/backyardwildlifehabitat/** and **www.batcon.org**.

For articles and activities on all kinds of wildlife, subscribe to: *Ranger Rick*, *Your Big Backyard*, or *Wild Animal Baby* by visiting **www.nwf.org/kids/**.

Resource Information
For independent study, answering questions, and educating others, go to **www.batcon.org/discover/layout-discovery.html**.

To delve deeper into special topics and research about bats

- ✔ Search *BATS Magazine* back Issues and access all text and photos from *BATS Magazine* archives at **www.batcon.org/batsmag/index.html**.
- ✔ Search bibliographic database of scientific literature about bats and browse bibliographic references for 6,000 entries about bats and bat research at **www.batcon.org/bibsearch.html**.
- ✔ Link to other bat conservation resources and over 150 different bat conservation and resource sites at **www.batcon.org/home/batlinks.html**.
- ✔ For information on which species are present in your area, visit **www.enature.com**.
- ✔ Check out *Bats of the United States* by Michael Harvey, J Scott Altenbach, and Troy L. Best, 1999. Published by the Arkansas Game and Fish Commission in cooperation with the U.S. Fish and Wildlife Service, this 64-page color paperback book has large photos, range map and descriptions for each U.S. bat species and lots of general bat information.

Teacher and Student Activities—Free Stuff!

- ✔ Download activities from the "Educator's Activity Book" (elementary age students) at **www.batcon.org/topedu.html**.
- ✔ Download an activity from "Discover Bats!" (middle-school age students) at **www.batcon.org/disco/intro.html**.
- ✔ Download bat house plans and secrets to successful bat houses at **www.batcon.org/bhra/index.html**.