ACTIVITY 2

BATS: MALIGNED OR MALICIOUS?

Summary:

Students explore their views of a threatened bat and present their findings.

Grade Levels:
3-8; K-2

Time:
Two or more class periods, depending on the presentations.

Subjects:
science, reading, presentation, social studies

Skills:
analysis, application, classification, comparison, description, evaluation, research, synthesis

Learning Objectives:
Students will be able to:

- ✔ Describe several views people hold about bats.
- ✔ Identify misconceptions about a threatened species.
- ✔ Reflect on changes in their attitudes about wildlife.
- ✔ Share natural history and conservation knowledge about bats.

Materials:

- ✔ Copies of "Threatened: The Indiana Bat" readings (whichever one is more appropriate for your students' reading level). Each student will need one reading.
- ✔ Craft materials (optional)
- ✔ Props (optional)

Background

Humans tend to find some animals naturally compelling, while others are not so appealing. For example, many of us would much rather see moose, loons, and rabbits on a jaunt in the woods than snakes, spiders, and bats. Because of the way these animals have been portrayed in myths, folklore, books, and movies, many of us are biased towards cute, furry animals, even though all species play important roles in their ecosystems. Although some of our responses to certain wildlife help protect us from danger, logic does not always guide our beliefs and behaviors. Furthermore, we tend to overlook the benefits some species offer humans and other wildlife. For example, spiders and bats help control 'nuisance' insects and provide food for other animals. Many snakes control some rodent populations. Yet, many of our beliefs about animals are not based on scientific facts.

Beneficial Bats

Bats often suffer from negative, Halloween-like associations. Many people think of Dracula, blood-sucking fangs, disease, or bats tangled in the hair. Are these perceptions fair? Do bats drink blood? Only three out of the more than 1,000 species of bats are actually 'vampire bats,' and these species all live only in Latin America. Virtually all U.S. bats are insect-eaters (There are a few bats in the Southwest that live on nectar and a few species eat fish). *Do bats carry disease?* Like all animals, bats can carry diseases. Yet public-health worries about bats are exaggerated. The probability of catching a disease from a bat is far less than the risk of being struck by lightning. For anyone who simply leaves bats alone, and never attempts to handle them, they are invaluable allies that need not be feared. However, as with other wild animals, those that can be caught are most likely to be sick, and, because these may bite in self-defense, and can transmit potentially dangerous diseases, they never should be handled.

Most of our fears about wildlife are generated from some level of primal fear based simply on the unknown. Bats are small, mysterious creatures of the night that spend time in caves and other dark places. Interestingly, in the tropics, where many of the bats are much

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. Mention that Indiana bats are threatened species in the United States. There are also many other species of bats throughout North America.
5. Give students time to read about bats.
6. If possible, head outside to evaluate your school grounds or a local area as habitat for bats. *Is there a forest nearby? Are there any caves or streamside trees where bats could roost and feed? Are there trees with peeling bark for bats to hide under?*
7. Back in the classroom, divide the class into small groups of two to three students. Explain that each group will be responsible for designing and sharing a presentation about bats.
8. Give students the following guidelines for their presentations. The presentations might be in the form of a newscast (perhaps interviewing a biologist), skit, radio show, documentary, song, poster, mural,

diorama, or other medium. The final presentation should last roughly five minutes. In addition to being fun and creative, the presentations should also convey key, accurate information about bats. One important role of the presentation is to educate people about myths they may have heard about bats. *For example, are bats really blood suckers? What kinds of benefits do bats provide to people and ecosystems?*

9. Let students know they will be evaluated on their presentations. As a class, develop a list of criteria for judging the presentations. Record the ideas on the board. Encourage students to think about what they believe makes a good presentation. For example: *Did the presentation demonstrate how bats really behave? Did it show us why bats are important? Were the facts correct? Was the information clearly presented? Was the presentation interesting? Creative? Did it change the way classmates think about bats?*

10. Give students time to work in their groups to prepare their presentations. Have additional research materials available, particularly on bat pollination if possible. Also, consider having props available, or put students in charge of finding what they need for their presentations. If time allows, this can develop into a more involved project taking several class periods.

11. Presentation time! Invite student groups to deliver their presentations to the rest of the class. After each presentation, review the criteria listed on the board as a class and evaluate the presentation. Remind students of the difference between constructive and destructive criticism. Encourage students to begin with positive comments and add suggestions for improvement.

12. To conclude, have students develop a second concept map for bats. Then have students compare their pre- and post-concept maps to reflect on their new understanding of these animals. Discuss some of their results.

Modifications for Younger Students (Grades K-2)

For younger students, introduce the book *Stellaluna*, by Janell Cannon. This delightful story portrays bats in a positive light, following the antics of the young bat Stellaluna as she spends time with a family of birds and discovers her true identity.

Modifications for (Grades 5-8)

Older students can research different species of bats on their own, instead of relying on the readings provided. They could conduct comparisons among different kinds of bats, their diets, habitat requirements, and what plants they may pollinate.

Extensions

- ✔ Have students deliver their presentations for other audiences. For example, invite another class, or parents. Or share the presentations with a parent or teacher association.
- ✔ *Do bats live in your region? If so, which ones?* Build (or order) bat boxes to make a

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.

✔ *What other animals suffer from human misconceptions?* Investigate and find out. One example is raptors, such as eagles and hawks. Although they are protected by law, magnificent animals such as eagles were once shot as pests and for sport. Compare the views that various cultures, including Native American nations, have toward eagles and other wildlife species. *Which wildlife species do they like and dislike? Why?*

✔ Examined up close, bats have beautifully complicated faces and bodies. As a class project, feature a bat beauty contest. Students can find pictures of bats and create detailed drawings of their features.

✔ Think of common phrases that refer to bats. For example, "blind as a bat" and "going batty." Can you think of others? Have students investigate the origin and meaning of these phrases, as well as whether they are fair statements based on bats' true behaviors and characteristics.

Assessment

✔ Compare the perceptions various cultures have regarding bats today and historically. Students might divide into groups (perhaps by region of the world or era) to investigate how these bats are portrayed in myths, stories, art, phrases, and folk tales. Consider a trip to an art or natural history museum to search for information on bats. As follow-up, students can investigate whether the portrayal is fair given the animal's true behavior.

✔ For young students, encourage them to list as many adjectives as they can think of that begin with the letters 'b' to describe bats. *Which of the* 'b' *adjectives accurately describe the bat? Do people ever use some of the other adjectives to describe the animals? Which ones? Why? For example, are bats blind and bold or beautiful and beneficial?*

✔ Pre- and post-concept maps described in the lesson offer a great assessment tool.

ACTIVITY
WORKSHEET 2

Indiana Bat

Is a bat a mouse with wings? No, bats are not rodents. Instead, bats belong to their own special group of mammals, Chiroptera. There are more than 1,000 different kinds or species, of bats in the world. Forty-five different species live in the United States.

Some bats eat nectar, fruit, or even fish, but almost all of the bats in the United States eat insects. In fact, they eat lots and lots of insects. One bat can eat more than 600 flying insects such as mosquitoes in one hour! They find their food by "echolocation." They make sounds (which humans can't hear) that bounce off other objects and return to their ears. These sounds help them to fly safely and locate their prey.

Many people don't like bats. People think bats can get tangled in their hair or spread disease. In fact, bats can see and are very good at finding their way around in the dark. A bat can "see" something as fine as a human hair using echolocation. The chance of a bat giving someone a disease is less than the chance of being struck by lightning. In fact, bats are very useful to people. They eat insects that might damage farmers' plants and help pollinate our crops.

At least nine bat species in the United States are endangered. Many bats are disappearing because people misunderstand them or try to get rid of them, and they are losing their habitat. Bats suffer because we disturb the caves and forests they need. The Indiana Bat is one species in trouble. This bat lives in parts of Maine, Vermont, New Hampshire, and New York, as well as states farther south and west. In winter, Indiana bats hibernate in caves with a temperature of 37-43° F. The caves were once filled with bats, but now many of the bats are gone. For example, one cave in Kentucky had at least 100,000 bats in the 1960s, but only 250 by 1987.

Why are bats disappearing? Some people like to explore caves, which may disturb bats while they are hibernating. If bats wake up from hibernation and have to move around, they will use too much energy and not have enough to survive the winter. Other times, people build cave gates that lock the bats out of their winter homes. Some gates trap air in the caves and make it too hot for the bats. Humans are also changing forests and causing problems for Indiana bats in their summer habitat. Bats like to feed and roost in trees near waterways. But in some areas, these important trees are cleared by logging, driving away the bats. In other places, dams have been constructed, removing the trees near the waterways that bats prefer.

But there is hope! In some places, people have built bat-friendly gates. For example, in Tennessee, people built a special gate that weighs 23 tons. The gate lets bats into their natural habitat but keeps people out of this important place for bats.

Many other animals also like to live and feed in forests next to streams. So, if we protect trees next to waterways, we're protecting habitat for bats and other animals.

What do you think about saving bats?

ACTIVITY
WORKSHEET 2

Indiana Bat

Bats look like mice with wings, but they are not rodents. In fact, they belong to their own group within the class of mammals, and this group is among mammals' most successful. Of the approximately 4,000 species of mammals, nearly a quarter-over 1,000 species-are bats.

A few bats feed on nectar or fruit, but most feed on insects. They have large appetites. A single bat, flying through the night sky in pursuit of prey, may eat more than 600 flying insects in one hour. A bat that lives for 30 years may consume several million insects.

Bats are high on the list of animals that are victims of human myths and misunderstandings. Well-adapted to flying at night, bats can navigate in total darkness across a room crisscrossed with strings. They do it by sending out sounds that bounce off of objects and return to the bats' ears, which read them like radar. One myth, that bats generally carry the disease rabies, is also false. Only one-half of one percent (0.5%) of healthy-looking bats examined in one U.S. study was found to be rapid.

On the other hand, bats are useful to people. Some bat species are pollinators of useful plants, eating nectar from blossoms and carrying pollen from flower to flower. Agaves, plants of the desert Southwest used in making fiber ropes and other products, are bat-pollinated. Bats not only help people by eating huge numbers of insects, but bat studies have been important in the development of low-temperature surgery, vaccines, and navigational aids for the blind.

In recent decades, several U.S. bat species have had population declines. In 1973, the Indiana bat became the first of nine U.S. bat species to appear on the Endangered Species List. The story of the Indiana bat shows the problems faced by many of the 45 bat species in the United States.
The Indiana bat is roughly the size of a house sparrow, with gray-brown fur and pink to cinnamon underparts. It eats insects, which females and juveniles snatch from the air over streams and trees. Males look for food at treetop level over dense woods. The species can be found in the Midwest and eastern United States, from the western Ozarks of Oklahoma north to southern Wisconsin, east to Vermont, and south to Florida.

In winter, the Indiana bat hibernates in limestone caves, especially caves in which temperatures average 37° to 43° F with a relative humidity averaging 74 percent. In summer, Indiana bats live in hilly countryside, along riverbanks, and on low plains. The bats roost under the bark of dead and dying trees in these areas.

The Indiana bat population has been falling since at least the 1960s. For example, in the 1960s, Kentucky had five caves in which more than 150,000 Indiana bats hibernated. By 1988, the total winter population in the five caves was only 49,000. Today, nearly 90 percent of all Indiana bats hibernate in only seven caves.

One of the main reasons that bat numbers are falling is the loss of cave habitat, especially caves used for hibernation. Some caves have been made into tourist attractions. Others have been destroyed by vandals or disturbed by spelunkers (people who explore caves). Since 1950, these and other causes have eliminated and degraded major winter bat colonies of West Virginia, Indiana, and Illinois.