

SUGGESTED REFERENCES

- *Bat Conservation International*
<http://www.batcon.org/>
- *Bat World Sanctuary*
<http://www.batworld.org/>
- *U.S. Fish and Wildlife Service – White Nose Syndrome*
<http://www.fws.gov/WhiteNoseSyndrome/>
- *Organization for Bat Conservation*
<http://www.batconservation.org/>

NATIONAL SCIENCE EDUCATION STANDARDS

Grades 9 - 12

Life Science

Interdependence of organisms
Behavior of organisms

Grades 9 - 12

Science in Personal & Social Perspectives

Personal and community health
Population growth
Natural resources
Environmental quality
Natural and human-induced hazards
Science and technology in local, national, & global challenges

*Source: *National Science Education Standards, 1996, National Academy Press*

CREDITS

EDUCATOR ADVISORY PANEL

Patricia Heydet-Kirsch, Ed.D.
John A. Murnan III, M.S.
Debra A. Murnan, B.A.

PRODUCTION CREDITS

WRITER/PRODUCER: Jon Glassman
ASSOCIATE PRODUCER: Judi Sitkin
EDITOR: Stuart Scoon
NARRATOR: J.J. Wilson



SCIENCE SCREEN REPORT is a proud participant in the Presidential Awards for Excellence in Mathematics and Science Teaching for twenty-seven years. For information visit: www.nsf.gov/pa



1000 Clint Moore Road, Suite 108, Boca Raton, FL 33487
tel: 1.800.232.2133 email: info@ssrvideo.com
www.ssrvideo.com

COPYRIGHT © 2011 Allegro Productions, Inc. All rights reserved.

Science Screen Report

Presented As A
Public Service By

VOLUME 41 ISSUE 2

ECOLOGY - *Bats: Creatures of the Night*

SYNOPSIS

The Mexican free-tailed bat is one of the most abundant mammals in North America. Outside of San Antonio, Texas there is a cave that is home to over 40 million of these bats. Roosting in large numbers in relatively few areas makes them especially vulnerable to human disturbance and habitat destruction. Documented declines at some roosts are cause for concern because there is a delicate balance in the ecosystem that depends on the bats. There is also cause for concern among other bat species that are falling victim to white nose syndrome, which is a condition named for a distinctive fungal growth around the muzzles and on the wings of affected animals. It is a cold-loving fungus that grows at temperatures below 20 °C (68 °F). It grows on bats when they are hibernating in winter. The fungus appears to disrupt the normal patterns of hibernation, causing bats to arouse too frequently from torpor and starve to death.

This issue goes deep into the caves where the Mexican free-tailed bats roost and shows a glimpse into their behavior, reproductive habits, diet, and how they utilize echolocation.

CURRICULUM UNITS

- BIOLOGY
- ECOLOGY
- ENVIRONMENTAL SCIENCE

RUNNING TIME

17 minutes



electric sky

BACKGROUND

It plays out like a scene from a movie when millions of Mexican free-tailed bats leave Bracken Cave, Texas in a loud flurry to feed at night. Over 40 million bats inhabit the cave, which is owned and protected by Bat Conservation International. Exploring the cave is dangerous for humans because of the high level of bat guano which contains strong concentrations of ammonia and phosphorus. The guano was once a resourceful mineral export that could be used as fertilizer before more efficient chemical alternatives were developed.

The cave is the perfect place for the Mexican free-tailed bats because it provides high humidity and very stable temperatures. Roosting in large numbers helps regulate their temperatures. The warmth and humidity is necessary for raising bat pups. The pups are often born within a few days of each other as they synchronize their births.

You may have heard the term “blind as a bat.” For the Mexican free-tailed bat, that term is not entirely accurate, they do have good vision. However, they mostly rely on sound and echolocation for flying and feeding. Echolocation is a sonar-like system that bats use to locate and detect objects by emitting sounds that reflect off objects and return to their ears. Bats are often in environments of total darkness and use echolocation to navigate and forage. They can tell the size, shape, and even texture of objects using this system.

In recent years, there has been an outbreak of a fungal growth on some bat species called white nose syndrome. It has not affected the Mexican free tailed bats because the fungus tends to thrive in cooler conditions. However, the fungus has been associated with the deaths of more than a million bats since it was identified. It tends to grow on the muzzles, wings and ears of the bats. The fungus disrupts a bat’s hibernation pattern. Instead of sleeping for long periods before waking, the bat is constantly waking up and falling back into torpor. This causes the bat to burn more calories than it has stored and it can starve to death.

White Nose Syndrome is decimating bat colonies throughout the northeastern United States. The reduced number of bats is a major ecological issue because bats are a valuable natural pesticide as they consume large quantities of insects. If the insect populations rapidly increase, they could devastate agricultural production. Several species of bats, including the Indiana bat and the big-eared bats are on the endangered species list and are suffering in population because of the fungus.

There is ongoing critical research, monitoring, and management of bats affected by this powerful fungus. Many small skin samples have been submitted for testing. The fungus, *Geomyces destructans*, has also had its genome sequenced. This allows geneticists the ability to identify the virulent determinants, the genetic history, and possibly identify genetic markers for the development of improved diagnostic tests.

CRITICAL THINKING EXERCISES

1. How are bats linked to the food web in your local community?
2. Construct a chart to describe the different issues bats in warm environments, and those living in colder environments must face to survive. What specific issues threaten their existence?
3. Predict what would happen if bats were not able to survive the impact of white nose syndrome.

CAREER POSSIBILITIES

- BIOLOGIST
- ECOLOGIST
- ENVIRONMENTALIST
- ZOOLOGIST

ADVANCED ORGANIZERS

Prior to viewing this program, students should have some understanding of the following Benchmarks for Science Literacy, Oxford University Press which are excerpted and, in some cases, abbreviated below. Refer to the Benchmarks for more information.

Benchmark 5. The Living Environment

Section A: Diversity of Life, Grades 9-12

- The variation of organisms within a species increases the likelihood that at least some members of the species will survive under changed environmental conditions.
- A classification system is a framework created by scientists for describing the vast diversity of organisms, indicating the degree of relatedness between organisms, and framing research questions.

Section D: Interdependence of Life, Grades 9-12

- Human beings are part of the earth's ecosystems. Human activities can, deliberately or inadvertently, alter the equilibrium in ecosystems.

Section F: The Evolution of Life, Grades 9-12

- Natural selection leads to organisms that are well-suited for survival in particular environments
- The continuing operation of natural selection on new characteristics and in diverse and changing environments, over and over again for millions of years, has produced a succession of diverse new species.

**Benchmarks can be found at www.project2061.org/tools/benchol/bolintr.htm*

VOCABULARY

- Ammonia** A colorless alkaline gas that is lighter than air and has a strong, pungent odor. It is used as a fertilizer and refrigerant, in medicine, and in making dyes, textiles, plastics, and explosives. Chemical formula: NH₃
- Chiropterologist** One who studies the order Chiroptera.
- Echolocation** The general method of locating objects by determining the time for an echo to return and the direction from which it returns, as by radar or sonar.
- Guano** A substance composed mainly of the dung of sea birds or bats, accumulated along many coastal areas or in caves and used as fertilizer.
- Phosphorus** A highly reactive, poisonous nonmetallic element occurring naturally in phosphates, especially in the mineral apatite. It exists in white (or sometimes yellow), red, and black forms, and is an essential component of protoplasm. Phosphorus is used to make matches, fireworks, and fertilizers and to protect metal surfaces from corrosion. Atomic number 15.
- Emaciation** Abnormal thinness caused by lack of nutrition or by disease.
- Hibernacula** A protective case, covering, or structure, in which an organism remains dormant for the winter.
- Torpor** 1. Sluggish inactivity or inertia. 2. A state of suspended physical powers and activities.
- White Nose Syndrome** A condition named for a distinctive fungal growth around the muzzles and on the wings of affected animals. It is a cold-loving fungus that grows at temperatures below 20 °C (68 °F). It grows on bats when they are hibernating in winter. The fungus appears to disrupt the normal patterns of hibernation, causing bats to arouse too frequently from torpor and starve to death. The symptoms associated with WNS include loss of body fat, unusual winter behavior, damage and scarring of the wing membranes, and death.