



ARIZONA-SONORA
**DESERT
MUSEUM**

All About Bats

A forty-five minute Desert Discovery Class program

To the Teacher:

Thank you for making the *All About Bats* Desert Discovery Class a part of your curriculum. During this exciting educational program, students will handle bat bio-facts and see live desert animals. The *All About Bats* program explores such topics as: bat characteristics and diversity, importance of bats to humans and to the larger ecosystem, threats to bat populations, and strategies for preservation. This Teacher Information Packet provides resources to help you integrate these themes and concepts into your classroom curriculum.

This packet contains resources for pre- and post- program information and activities along with a vocabulary list and suggested further resources. These materials were developed to help you extend this class topic with both introductory and follow-up lessons. The pre-program information will introduce students to some of the basic concepts presented in *All About Bats*, and help prepare them for the class. We hope you'll find this information useful and easy to incorporate into your science curriculum. For more information about the Desert Museum and the Sonoran Desert, visit our website at www.desertmuseum.org.

Sincerely,
ASDM Conservation Education and Science Department

ALL ABOUT BATS

Myths about bats are plentiful, but the facts about these fascinating creatures are far more interesting. The interrelationships between bats, plants, insects and other animals are vital to the function of this, and other ecosystems. Learn the truth about bats and discover just how important these creatures really are!

PROGRAM OBJECTIVES

Through the examination of hands-on artifacts, live animals, and interactive demonstrations, students will:

- Describe at least 5 characteristics of bats.
- Demonstrate understanding of bat diversity.
- Describe a variety of interrelationships between bats and other living and nonliving things within an ecosystem.
- Develop an appreciation for the importance/value of bats to humans and the ecosystem as a whole.
- Describe ways in which humans impact bat populations.
- Describe dangers to bats.
- Explain strategies for species preservation.

ARIZONA ACADEMIC STANDARDS IN SCIENCE CORRELATION

The *All About Bats* program and supplemental activities correlate to these Arizona Academic Science Standards. See each activity for specific standards and performance objectives.

SC03-S3C1-02	SC06-S3C2-01	SC03-S4C3-03,04&05
SC04-S3C1-01&02	SC07-S3C2-01	SC04-S4C3-01,03&04
SC05-S3C1-02&03	SC08-S3C2-01	SC07-S4C3-03,04&05
SC07-S3C1-01,02&03	SCHS-S3C2-01,04&05	SCHS-S4C3-01&02
SC08-S3C1-01&02	SC03-S4C1-01	SC03-S4C4-01
SCHS-S3C1-01,02,03,04&05	SC04-S4C1-02	SC04-S4C4-01&02
SC03-S3C2-01	SC05-S4C1-01	SC08-S4C4-01,05&06
SC04-S3C2-01&02	SC06-S4C1-06	SCHS-S4C4-02,04&06
	SC02-S4C2-02&03	

Arizona State Science Standards

Strand 3: Science in Personal and Social Perspectives

Concept 1: Changes in Environments

Concept 2: Science and Technology in Society

Strand 4: Life Sciences

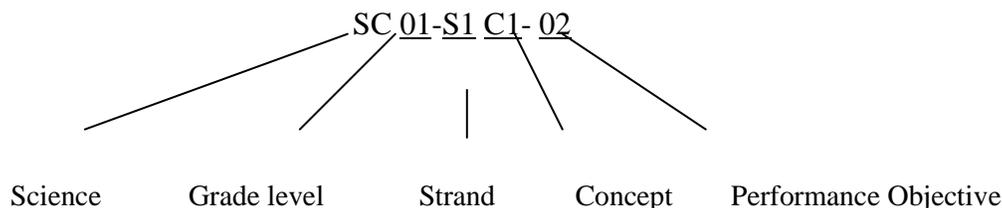
Concept 1: Characteristics of Organisms /Structure and Function of Living Systems

Concept 2: Life Cycles

Concept 3: Organisms and Environments/ Populations of Organisms in an Ecosystem/
Interdependence of Organisms

Concept 4: Diversity, Adaptation and Behavior

The shorthand for each standard is read this way:



RESOURCES

Websites/Organizations

- Arizona-Sonora Desert Museum: 2021 N. Kinney Rd., Tucson, AZ 85743. Phone: (520)883-3025. www.desertmuseum.org
- Bat Conservation International, Inc.: P.O. Box 162603, Austin, TX, 78716. Phone: 1-800-538-2287. www.batcon.org
- Desert USA: www.desertusa.com/animal.html (this site contains information and photos on many nocturnal desert creatures)
- The Nature Conservancy: www.tnc.org
- NASA, GSFC, USGS, NBII, MU-SPIN collaboration: “The Adventures of Echo the Bat” – story introduces the use of remote sensing to study big brown bat migration in Arizona <http://science.hq.nasa.gov/kids/imagers/intro/story.html>

Literature:

- Arizona-Sonora Desert Museum. *A Natural History of the Sonoran Desert*. Tucson: ASDM Press, 1999.
 - Bat Conservation International. *About Bats: Educator's Activity Book*. Austin: Bat Conservation International, Inc., 1991.
 - Cannon, Janell. *Stellaluna*. New York: Harcourt Brace & Company, 1993.
 - Greenaway, Frank. *Amazing Bats*. New York: Alfred A. Knopf, 1991.
 - Irbinskas, Heather. *Pauly, the Adventurous Pallid Bat*. Western National Parks Association, 2003.
 - Tuttle, Merlin D. *Discover Bats!* Austin: Bat Conservation International, Inc, 1998.
 - Wiedwandt, Thomas. *The Hidden Life of the Desert*. New York: Crown Publishers, 1990.
 - *Zoobooks: Bats*. San Diego: Wildlife Education Ltd, September 1994.
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VOCABULARY

Adaptation - A body part or behavior of an animal or plant that helps it survive in its environment (i.e. an eagle has sharp talons that help it grab and hold its prey)

Carnivore – animal that eats meat

Chiroptera - taxonomic order in which bats belong, translates to “hand-wing”

Desert - An area that is lacking in usable moisture most of the year

Endangered – An animal or plant that is so rare, it may become extinct

Endangered species – A listing given by the U.S. Fish and Wildlife Service to species of plants and animals whose population numbers have dropped so low that they are in danger of becoming extinct

Echolocation – The process by which some animals locate objects by emitting sounds and hearing them echoed

Endothermic – Describes an animal that controls its own body temperature internally

Frugivore – animal that eats fruit

Habitat – The place in which an animal or a plant lives that provides the food, water, shelter and space needed for its survival

Habitat Loss – The use of an animal's or plant's habitat by people, making it no longer usable by those animals and plants.

Hibernate – The slowing down of all body processes for the duration of winter, like going into a very deep sleep

Insectivore – animal that eats insects and arthropods

Megabat - Members of Megachiroptera - are commonly referred to as flying foxes because of their fox-like faces. They are found only in the Old World tropics.

Microbat – Members of Microchiroptera, which are highly varied in appearance but generally smaller than Megachiroptera. They occur worldwide.

Migrate – To travel from one area to another in search of resources to support feeding and reproduction, and /or to avoid unfavorable climactic conditions

Migration corridor – The route along which animals migrate between seasonal feeding and breeding grounds. Migration corridors are typically linear habitats surrounded by a wider matrix of less intact habitat.

Nectarivore – animal that eats nectar

Nocturnal – Active at night

Piscivore – animal that eats fish

Pollination – The spreading of pollen from the male parts (anther) to the female parts (stigma) of a flower, either between flowers of the same kind or within the same flower, resulting in the production of seeds and fruits

Pollinator – An animal that carries pollen from one flower to another, aiding in pollination

Roost – A place for birds and bats to rest; to land or rest in a roost

Sanguivore – animal that eats blood

Seed dispersal – The spreading of seeds

Vertebrate – animal with a backbone

PRE-PROGRAM INFORMATION & ACTIVITIES

ANTICIPATORY ACTIVITIES: GRADES 3-12

A variety of activities to hook student interest in bats and issues surrounding bats

Benefits of Bats

Students investigate products (manipulatives and pictures) to explore the importance of bats for humans and nature.

Bats: Maligned or Malicious?

Students explore views and myths about bats, and present their findings.

Species Profiles

Pictures and information for North American Bat Species

POWERPOINT PRESENTATIONS

Grades 3-6 Bats A to Z: An Alphabet Book About Bats

Information and pictures about bats

Grades 7-12 Why Care About Bats

Information and pictures about bats, with teacher notes in the notes section

EXPLORATION ACTIVITIES

A variety of activities for students to explore characteristics and diversity of bats

Grades 3-8 The Wing's the Thing (Bat Anatomy)

Students identify and label bat anatomy on a diagram.

Grades 3-8 **Indiana Bats and Me – Measurement Activity** (adapted from BCI)
Students compare bat and human structure and function.

Grades 3-6 (adaptable for Grades 7/8) **Investigating Bat Adaptations**
Students investigate adaptations that increase a bat's chance of finding food and surviving in a particular habitat.

Grades 9-12 (adaptable for Grade 8) **Bats of Arizona – Classification**
Using a glossary of Scientific Names given to bats, students translate names into descriptive characteristics.

Grades 3-12 **Bat Echolocation Song by Jumpstart**
Students view an educational animated video clip.

Grades 3-4 **Echolocation Activity**
Students play a game to simulate echolocation.

Grades 5-8 **Bats and Echolocation** (adaptable for Grades 9-12)
Students experiment with reflected sound waves in order to analyze echo return time and calculate the distance of the reflecting surface.

POST-PROGRAM INFORMATION & ACTIVITIES

APPLICATION/ELABORATION ACTIVITIES

A variety of activities for students to apply program concepts and elaborate on the importance of bats to humans and to the larger ecosystem, threats to bat populations, and strategies for preservation.

Grades 3-8 **Bats: A Creativity Book for Young Conservationists**
Students engage in various creative thinking activities to review characteristics, importance and issues about bats.

Grades 3-8 **Pest Control - It All Adds up – Word Problems**
Students solve word problems about bats' eating habits and impacts on crops.

Grades 3-8 **Make and Play Game**
Students play a situational dice game to simulate a year in the life of a bat and the obstacles it faces.

Grades 3-8 **Bats: Need Nectar, Will Travel**
Students role play as nectar-feeding bats on their annual migration, and try to avoid various hazards that hinder their progress.

Grades 7-12 Threats to Bats (article)

Students read an article regarding impacts threatening bat populations world-wide.

Grades 7-12 Decades of Decline – graph interpretation

Students analyze graphs for trends in bat populations.

Grades 3-12 Speak up for Bats

Students engage in letter-writing campaign to lawmakers requesting support for white-nose syndrome research.

Grades 3-12 Build a Bat House

Students build bat houses for roosting bats.

FURTHER RESOURCES

Bats Live – A Distance Learning Adventure

http://www.batslive.pwnet.org/resource/lesson_plans.php

Resource Center for K-8 curricula

Mathwire – Math Activity Themes- Bats <http://mathwire.com/themes/themebat.html>

Standards-based math activities that incorporate bat themes

ASDM Bat Research Simulation Lab Teacher Information Packet

<http://www.desertmuseum.org/center/edu/resources.php>

More Bat Resources for Grade 6-12 curricula

ASDM Sonoran Desert Bat Fact Sheets <http://www.desertmuseum.org/kids/bats/>

Pictures and Information for some of the Sonoran Desert Bat species

