



# NOCTURNAL ANIMALS at WOODLAND PARK ZOO

## Pre-Visit Information for Teachers

If you are planning a zoo field trip and wish to have your students focus on nocturnal animals during their visit, this pre-visit sheet can help them get the most out of their time at the zoo. We have put together an overview of key concepts related to nocturnal animals, a list of basic vocabulary words, and a checklist of animal species found around Woodland Park Zoo that are nocturnal. Knowledge and understanding of these main ideas will enhance your students' zoo visit.

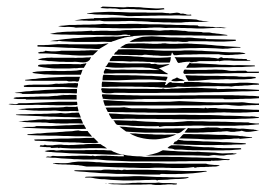
### OVERVIEW:

A large percentage of animals are nocturnal, or active at night, due to the huge advantages that nocturnal behavior affords. These animals have many fascinating adaptations that allow them to survive with little or no light. Woodland Park Zoo exhibits a wide variety of nocturnal animal species. A field trip centered on nocturnal animals could focus on the diversity of nocturnal animals (see "Concepts" below), comparing and contrasting different nocturnal animals or learning about biomes and observing the physical characteristics of nocturnal animals in different biomes.

### CONCEPTS:

#### Many species are nocturnal

- Most species of spiders are nocturnal
- Many amphibians and reptiles are nocturnal
- Some mammals are nocturnal:
  - all of the approximately 1,000 species of bats
  - 80% of marsupials
  - 60% of carnivores
  - 40% of rodents
  - 20% of primates



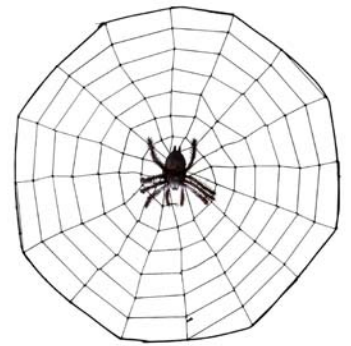
#### There are many advantages to nocturnal behavior

- Reduce competition for basic needs, including food, water, shelter and space
- Many animals that live in extremely hot and arid places avoid the heat of the day and water loss by being active at night.
- Many animals are active at night to avoid predators that are diurnal (active during the day). On the flip side, many predators are active during the night to match the activity level of their prey.

Nocturnal animals are well adapted for fulfilling their basic needs in the dark of the night.

Although many nocturnal species have adaptations for better night vision, the other senses are often much more developed in nocturnal species than in diurnal species.

- Vision (seeing) adaptations
  - Many nocturnal animals have larger eyes to capture more light. The eyes of owls and tarsiers are so large that they cannot move in the socket!
  - Wide pupils also capture more light. Some nocturnal animals have slit pupils, which are easier to contract than round pupils.
  - High concentrations of rod cells in retinas allow nocturnal animals to create a visual image in low light, but the image is not as clear as a cone cell-created image.
  - Many nocturnal animals have tapetum lucidum, which is a layer of reflective cells just behind the retina. This layer reflects photons that were not captured by rod cells or cone cells back at these photoreceptors for a second chance. This is the reason that some animals' eyes glow red at night.
- Auditory (hearing) adaptations
  - Special auditory adaptations allow for excellent hearing in many nocturnal species
  - Offset ears in owls and “moveable” ears in big cats allow these animals to pinpoint sound
- Olfactory (smelling) adaptations
  - Scent-marking is an important communication tool for nocturnal mammals.
  - Many nocturnal animals have highly developed olfactory systems. Most birds have poor senses of smell; some nocturnal birds are the exception.
  - Many nocturnal animals have a Jacobson's organ in the roof of their mouth, which improves their sense of smell. Often, these animals employ the flehmen response, which is a facial expression that enhances the sensitivity of the Jacobson's organ. It consists of the animal pulling their lips back, which makes them appear to be grimacing.
- Gustatory (tasting) adaptations
  - Many nocturnal animals, especially snakes, use their tongues as a primary sense for navigation and location of prey.
  - In invertebrates, taste and smell are very closely related and are collectively termed chemoreception. Taste receptors are located on the feet and mouthparts. Olfactory receptors are usually located on the antennae.
- Tactile (touching) adaptations
  - Many animals have hairs with sensory receptors that aid in navigation and finding food. In mammals, these take the form of whiskers. In arthropods, they take the form of hairs covering the animal's body.
  - Spiders also use webs as sensory tools to tell when prey have been caught.
- Extrasensory adaptations
  - Echolocation: Bats use this sensory system to navigate and locate food. They emit high-pitch sounds that bounce off nearby objects, including prey. The echoes of the sounds are used to determine the distance and direction of those nearby objects.
  - Pit vipers, boas and pythons have heat-sensing pits that contain heat-sensitive sensory receptors. These receptors help these predators sense and locate prey.



## VOCABULARY:

**\*Adaptation:** Evolutionary change in body structure, function or behavior that helps an organism to survive in its environment.\*

**Carnivore:** An animal that obtains nutrition by eating other animals.

**Crepuscular:** Active during dawn and dusk.

**Diurnal:** Active during daylight hours.

**Echolocation:** A sensory system used by bats and other animals to locate objects by emitting high-pitched sounds and determining the time for an echo to return and the direction from which it returns.

**\*Ecosystem:** An area of any size, from very large to very small, in which living and non-living components are interacting and exchanging nutrients and energy.

**\*Energy:** The amount of work that can be done by a force.

**Food chain:** The system of feeding (trophic) levels in a community of living things.

**\*Food web:** The complex eating relationships among species within an ecosystem. In a diagram of a food web organisms are connected to the organisms they consume by arrows representing the direction of energy transfer.

**\*Habitat:** The area that supplies an organism or group of organisms with all their basic needs for survival including food, water, shelter, air and space.

**Herbivore:** An organism that obtains nutrition by eating living plant material.

**Insectivore:** An organism that obtains nutrition by feeding on insects.

**\*Niche:** An organism's ecological role in its environment.

**Nocturnal:** Active at night.

**Omnivore:** An organism that obtains nutrition by feeding on plant and animal matter.

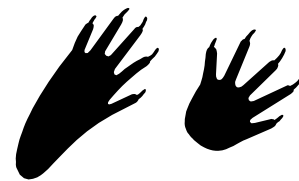
**\*Organism:** A living thing such as an animal, plant, fungus, or microorganism. In at least some form, all organisms are capable of reacting to stimuli, reproduction, growth and maintenance as a stable whole.

**Predator:** An animal that obtains food by killing and eating other animals.

**Prey:** An animal that is killed and eaten by other animals.

## PRE- AND POST-ASSESSMENT:

The following activity will provide you with an understanding of your students' current knowledge of nocturnal animals. In order to encourage their creativity and expression, remind students that the accuracy of the information is not important. They are not being tested on what they know. Rather, this exercise is a way to reveal our preconceptions and often misconceptions about a topic. After your students have participated in their zoo field trip focusing on nocturnal animals, repeat the activity and compare student work from before and after.



### Nocturnal Animals KWHL Chart

**Materials:** paper, pencils

Draw a KWHL chart on the board (see example below). Ask students to take out one sheet of paper and a pen or pencil. Have them draw a KWHL chart on their paper. Now, allow them at least five to 10 minutes to fill in the first three columns about the chart using nocturnal animals as a subject. They can write down factual information they believe to know about the subject, memories about the subject, questions about the subject, or impressions about the subject.

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\* Vocabulary words marked with an asterisk are included in the Washington State Science Standards.

What do we already <u>k</u> now?	<u>W</u> hat do we want to find out?	<u>H</u> ow can we find out what we want to learn?	What did we <u>l</u> earn?

Have students write their names and the date on their pages and turn them in to you. After your zoo visit or at the end of your study of nocturnal animals, return the KWL charts to your students. Have them fill in the final column of the chart. Ask students to share what they filled in about what they learned. Discuss as a class what ideas were confirmed or possibly changed or corrected for students as a result of this unit.

## Nocturnal Animals of Woodland Park Zoo

There are many nocturnal animals at Woodland Park Zoo, including most of the cat species and most of the owl species. This checklist highlights some of the nocturnal animals represented in several biomes at Woodland Park Zoo.

### **African Savanna**

- ☐ African lion
- ☐ Hippopotamus

### **Australasia**

- ☐ Snow leopard

### **“Bug” World**

*Species change frequently.*

- ☐ American cockroach
- ☐ Cross orbweaver
- ☐ Desert hairy scorpion
- ☐ Flamboyant flower beetle
- ☐ Golden orbweaver
- ☐ Goliath bird-eater tarantula
- ☐ Polyphemus flower beetle
- ☐ Red swamp crayfish
- ☐ Sowbug
- ☐ Western black widow
- ☐ White-eyed assassin bug
- ☐ Yellow-spotted millipede

### **Day Exhibits**

- ☐ Brazilian cockroach
- ☐ Three-banded Armadillo

### **Northern Trail**

- ☐ Barred owl
- ☐ North American porcupine
- ☐ River otter
- ☐ Snowy owl

### **Raptor Center**

*(\*usually not on display, but may be brought out by staff or volunteers or used in the Raptor Program)*

- ☐ Barn owl\*
- ☐ Great horned owl\*
- ☐ Spectacled owl
- ☐ Saw-whet owl\*
- ☐ Screech owl\*

### **Temperate Forest**

- ☐ Red panda

### **Family Farm**

- ☐ Barn owl

### **Northwest Owl Exhibit**

- ☐ Great gray owl

### **Temperate Wetlands**

- ☐ Black-crowned night heron

### **Trail of Adaptations**

- ☐ Rodrigues fruit bat
- ☐ Springhaas
- ☐ Two-toed sloth
- ☐ Tamandua anteater

### **Tropical Asia**

- ☐ Sloth bear
- ☐ Sun bear
- ☐ Malayan tapir

**Tropical Rain Forest**

**Jaguar Cove**

- ☐ Jaguar

**Tropical Rain Forest building**

- ☐ Ocelot
- ☐ Pinktoe Tarantula

**Tropical Rain Forest—African primate exhibits**

- ☐ Red ruffed lemur
- ☐ Red-flanked duiker

*Note: This list is current as of September 2010. The zoo's collection is subject to change.*  
**Questions about this information or your zoo visit? Please call 206-548-2424.**