

Mammals: Mammals and Their Ways

Teachers: This lesson contains three classroom activities with discussion questions related to the AFG video clips about mammals, their habitats and their behavior. These parts may be used individually or together, depending on the needs of your class.

Note: You can access and view the video clips used in this lesson in the Teacher Resources section of the AFG Web site (www.pbs.org/americanfieldguide/teachers).

Grade Level: 9-12

Background Information

A biome is a large group of ecosystems that share the same type of climax community. The animals that make up the climax community — more specifically the mammals, our focus in this set of activities — are all adapted for living in each ecosystem. However, what do those adaptations look like? How do we recognize an adaptation? Is there a reason behind a particular adaptation and if so, what is it?

We also consider behavior of mammals. Why do dogs circle before they lie down? Where does this behavior come from?

In this set of activities, we use observations and discussions and seek to distinguish between innate behaviors and learned behaviors. This may not be an exact science, but through observation we can come to a better understanding of the adaptations and behaviors of mammals that we see everyday.

Related Oregon Standards

This lesson addresses the following Oregon Science Standards found at:
<http://www.ode.state.or.us/cifs/>

- Explain how humans and other species can impact an ecosystem
- Explain how the balance of biotic and a-biotic resources will change with the introduction of a new species in an ecosystem
- Understand the characteristics, structure and functions of organisms
- Understand that any collection of things that can have an influence on one another can be thought of as a system

Related National Standards

This lesson addresses the following National Content Standards found at:
<http://books.nap.edu/html/nse>

Grades 9-12

Content Standard C: As a result of activities in grades 9-12, all students should develop an understanding of

- Biological evolution
 - Species evolve over time. Evolution is the consequence of the interactions of (1) the potential for a species to increase its numbers, (2) the genetic variability of offspring due to mutation and recombination of genes, (3) a finite supply of the resources required for life, and (4) the ensuing selection by the environment of those offspring better able to survive and leave offspring.
- Behavior of organisms
 - Like other aspects of an organism's biology, behaviors have evolved through natural selection. Behaviors have an adaptive logic when viewed in terms of evolutionary principles.
- Interdependence of organisms
 - Organisms both cooperate and compete in ecosystems. The interrelationships and interdependencies of these organisms may generate ecosystems that are stable for hundreds or thousand of years.
 - Living organisms have the capacity to produce populations of infinite size, but environments and resources are finite. This fundamental tension has profound effects on the interactions between organisms.

Extension Web sites from PBS

- **Journey Into Amazonia**
<http://www.pbs.org/journeytoamazonia/>
This Web site includes information on the world's largest rainforest. It covers the jungle from the ground up, making it an excellent resource for learning more about rainforests.
- **Animal Einsteins: If Only They Could Talk!**
http://www.pbs.org/safarchive/4_class/44_guides/guide_903/4493_talk.html
Learn more about the ability of animals to communicate. This site includes activities for students and extensions for teachers to help students understand animal communication.
- **Kakadu - Australia's Ancient Wilderness**
<http://www.pbs.org/edens/kakadu/index.html>
At this site, both students and teachers can learn more about this amazing reserve of animals in Australia. Kakadu is a biological wonderland, teeming with mammal, reptile, bird and insect life. Both students and teachers can use this site as a resource.
- **PRIME-TIME PRIMATES: Chimp Manners**
http://www.pbs.org/safarchive/4_class/45_pguides/pguide_504/4554_chimp.html
Have students study the behaviors of animals guided by this site. It includes both teacher information and activities for students to better understand the behavior of animals and how researchers study that behavior.

Activity 1: Where Are Mammals Found?**Time Allotted:**

20 minutes for video and discussion, 45-minute period activity

Materials:

- List of Biomes (attached)
- Biology Text
- Access to the Internet

Objectives:

- Students will compare mammals found in each biome.
- Students will analyze how climate influences the mammals in a biome.
- Students will compare and contrast mammalian adaptations.

Pre-Teaching Activity:

Ask students to journal for five minutes about the question "What are mammals and where do they live?" Keep these entries in their journals to be used at the end of the activity set. Students will compare their pre-activity journals to journals completed after activities and discussions about mammalian adaptations and behavior.

Viewing the Video:

View the following videos and answer the questions as a way to introduce the activities about the adaptations and behavior of mammals.

**Watch the AFG Video Segment: "Prairie Dogs"**

Note: You can access and view the video clips used in this lesson in the Teacher Resources section of the AFG Web site (www.pbs.org/americanfieldguide/teachers).

Discussion Questions for Video Segment:

- In what habitat do you find prairie dogs?
- How does this habitat fulfill the needs of the prairie dogs?
- What role do prairie dogs serve in the ecosystem they inhabit?

Classroom Activity:

1. Divide students into groups (two or three members each). Each group will investigate the mammal distribution in one of the biomes from the List of Biomes (attached).
2. Working as a team, each group is to answer the questions on the Mammal Distribution Worksheet (attached). The worksheet asks the students to create a summary for each of the biomes listed and generate a list of 10 to 15 mammals present in each biome. Each student will need to fill out a Mammal Distribution Worksheet for use in the next activity.

Discussion Questions:

- What mammals were present in your biomes?
- Did you find anything you did not expect?
- Can you draw any generalizations about mammal distribution based on this activity?

Activity 2: Mammal Adaptation**Time Allotted:**

45-minute period

Materials:

- Mammal Distribution Worksheet from Part 1
- Access to the Internet

Objectives:

- Students will recognize mammal adaptations.
- Students will explain various mammalian adaptations.
- Students will determine similarities and differences among mammalian adaptations.

Pre-Teaching Activity:

Use wrap up discussion or writing from Activity 1 to lead into a discussion about mammal adaptations. What is an adaptation? Why have animals had to adapt to their surroundings? What are some examples of adaptations that mammals have? (It may be helpful to create a class list of adaptations on a chalkboard. Encourage students to develop a list of adaptations that they are familiar with and apply that information to mammals found in the biomes they studied.) Why do certain mammals have the adaptations they do? Are they for feeding? Are they for survival (hiding, escaping prey, etc.)?

For help with adaptations see the following Web sites:

- **Animal Adaptations**
<http://www.cotf.edu/ete/modules/msese/earthsysflr/animal.html>
- **Adaptations and Environments**
<http://www.cotf.edu/ete/modules/msese/earthsysflr/natural.html>
Use the above links to help students obtain a better understanding of what adaptations are and why they play an important role in animal survival. Both students and teachers can benefit from investigating these websites.
- **Animal Adaptation**
http://www.teachervision.com/tv/curriculum/weeklywebadventures/animal_adapt/t_home.html
This is a valuable site for teachers looking for activities and resources for teaching adaptation and behavior of animals. It also contains a number of further links for teacher resources.

Classroom Activity:

1. Again, with the groups used in Activity 1, have students generate a list of three to five adaptations for each mammal they recorded on the Mammals Distribution Worksheet. Record this information on page 1 of the Mammals Distribution Worksheet (attached).

2. After each group has generated its list, have the groups from Activity 1 split up and pair with students from different biomes. Students will compare and contrast the mammals and adaptations they found in their respective biomes.
3. Have students record similarities and differences present on their lists. Have the students record this information on page 2 of the Mammals Distribution Worksheet. Students are also looking for reasons for these adaptations. They should generate a list of possible explanations or interpretations for each adaptation they have and record this on page 3.
4. Lead a discussion on adaptations to help summarize this activity. What adaptations did the students discover? What similarities were there in adaptations among biomes? What were the differences? What reasons did they come up with for the adaptations?



Watch the AFG Video Segment: "Oregon Bats"

Note: You can access and view the video clips used in this lesson in the Teacher Resources section of the AFG Web site (www.pbs.org/americanfieldguide/teachers).

Discussion Questions for Video Segments:

- What are five bat adaptations that you are able to identify in this video segment?
- Where are do we find bats when they are resting? How is this an adaptation?
- Why do bats have a negative image in humans' eyes?
- What service do bats provide to humans?

Activity 3: How do Mammals Behave? Why Do They Do What They Do?**Activity Length:**

- 45-minute period for introduction
- 1 week of observations
- 45-minute period for wrap-up

Materials:

- None

Objectives:

- Students will observe and record mammalian behaviors.
- Students will analyze mammalian behaviors.

Pre-Teaching Activity:

Before you watch the videos below, lead a discussion using the following questions: What is innate behavior? What is learned behavior? What is the difference and how can we tell?

For help with adaptations see the following Web sites:

- **Animal Behavior**

<http://www.academicpress.com/anbehav>

This publication is a well respected and widely used resource for teachers seeking a more thorough understanding of animal behavior. It may also be a research resource available for advanced students.

- **The Wonderful World of Animal Behavior**

<http://www.sandi.net/uhs/AP.BIOLOGY/1997-98/Behavior/Behav1.html>

This site contains a wealth of information for both teachers and students regarding the study of animal behavior. Though it is largely a compilation of vocabulary terms, it includes examples of behaviors with succinct, clear definitions.

**Watch the AFG video segments: "Border Collies" and "Oregon Coyotes"**

Note: You can access and view the video clips used in this lesson in the Teacher Resources section of the AFG Web site (www.pbs.org/americanfieldguide/teachers).

Discussion Questions for Video Segments:

- Both canines display learned and innate behaviors; what are some examples of each?
- Why are both types of behaviors important?
- How do we distinguish between voluntary learning of behaviors and involuntary learning of behaviors?

Classroom Activity:

1. Each student is to choose a mammal that he/she can observe for a minimum of eight hours during a week. This may be a classroom pet, a family pet, a friend's pet, or wildlife in a nearby park. The students should get teacher approval of the mammal before they begin their observations.
2. The mammals may be observed in a natural setting or in as many settings as possible. (With a pet, observations may be recorded inside a home, outside a home, in a new place, etc.) Observations should be made of the mammal in its many activities as well as when sleeping (sleeping position, place of sleeping, etc.). The observations should be as detailed as possible, including duration of activity. (Time can be estimated if needed.) Record observations on the Behavior Data Sheet (attached). Encourage students to record questions that they have on the bottom of the data sheet.
3. The observations should include an interpretation of the behavior as learned or innate.
4. The final product should include the above information gathered on the Behavioral Data Sheet. The specifics of the information are up to each student.
5. When the data has been collected by each student, have the students merge their data together with another classmate. Have them answer the discussion questions below and prepare to share their answers with the class.
6. Lead a discussion with the class in which the students develop and clarify their understandings of behaviors and also ask questions that were raised during their observations.

Discussion Questions:

- What types of behavior were observed by the students?
- How was each type of behavior determined to be innate or learned?
- How many behaviors of each type did they collect?
- How difficult was it to determine the nature of the behavior observed?

Post-Activity Journaling:

Have the students take a look at the journal entries (So it is assumed they have been journaling? Only mentioned once in the lesson plans) they have made during these exercises. Have them describe what they have learned throughout these activities and how their perceptions of mammalian behavior has changed.

Assessment

Assessment of the Activities 1-3 can take many forms.

- Informal assessment should take place during the discussions of each of these lessons. Are the students reaching the objectives stated?
- Reading the students' journal entries provides a way to address the questions and topics discussed.
- Assessment that is more formal may take place by having the students present their information to the class in graded presentations. Making use of the Mammal Presentation Scoring Guide (attached) would be appropriate when assessing these presentations.
- Small quizzes may also be an option for teachers who choose to assess as they proceed during this series of lessons.

Biome List

- Ice
- Tundra
- Taiga
- Temperate Forest
- Tropical Rain forest
- Grassland
- Desert
- Marine
- Freshwater

Suggested Internet sites for information about animals and biomes:

- **General Information on Biomes**
[http://biology.about.com/library/weekly/aa061297.htm?once=true&iam=dpile&terms="+biomes](http://biology.about.com/library/weekly/aa061297.htm?once=true&iam=dpile&terms=)
This site contains a very basic description of biomes from around the world.
- **Biome Basics**
<http://www.richmond.edu/~ed344/webunits/biomes/biomes.html>
Visit here for a more detailed description of biomes as well as a number of links for further information about the biomes. This is useful to both teachers and students.
- **Tour of Biomes**
<http://www.cotf.edu/ete/modules/mse/earthsysflr/biomes.html>
Visit this site for a visual and descriptive tour through the biomes on Earth
- **Aquatic Communities**
[http://biology.about.com/library/weekly/aa061997.htm?once=true&iam=dpile&terms="+biomes](http://biology.about.com/library/weekly/aa061997.htm?once=true&iam=dpile&terms=)
This site provides a succinct description of aquatic communities: both marine and freshwater.
- **Biomes of Our World**
http://www.thinkquest.org/library/lib/site_sum_outside.html?tname=2988&url=2988/ecosystems.htm
This site was created by middle and high school students and includes basic information about biomes.
- **Bright Edges of the World**
<http://drylands.nasm.edu:1995/drylands.html>
Visit here for a description of the drylands from around the world. It also contains several activities that would be useful for younger students or adapted to serve older students.

- **Biomes**

<http://mbgnet.mobot.org/index2.htm>

This site contains detailed information about biomes but is created for students of middle school age.

- **Introduction to Biomes**

<http://curriculum.calstatela.edu/courses/builders/lessons/less/biomes/introbiomes.html>

This extensive site includes information on biomes as well as activities for classroom use. Teacher will find ideas and activities for teaching and students will find detailed information for their own research.

Mammal Distribution Worksheet

Your assignment is to describe your assigned biome and create a list of the mammals present in your assigned biome. First, fill in the information that is requested below. It may be useful to use your biology text, texts provided by your teacher and the Internet. Second, list 10 to 15 mammals found in the biome.

Biome:

What is the annual precipitation in this biome?

What are the average high and low temperatures for this biome?

Do temperature and rainfall help to determine which mammals you will find in this biome?

Where is your biome located? (Where could we travel to visit this biome?)

List of mammals found in _____ biome:

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.

Mammals Distribution Worksheet (page 2)

Biomes being compared:

Biome 1:

Biome 2:

List of similar adaptations:

List of different adaptations:

Interpretation of adaptations:

Adaptation	Interpretation (Reason)

Mammal Adaptation/Behavior Presentation Scoring Guide

Topic: _____

Student Names:

Points	Required components:	Group participation and involvement in presentation	Demonstration or visual aid	Knowledge or understanding of the adaptation/behavior
	Includes all required components; content is clear and focused	All members contribute and participate in presentation	Visual tools help explain and describe the action	Clear main ideas, carefully selected details, complex connections and insights
	Missing one or two required components; content is less organized	Some members do not contribute	Visual aid is present but lacks focus or is not connected to presentation	Main idea is present; limited supported details; limited understanding
	Includes only part of necessary components; presentation is unclear and unorganized	One group member dominates presentation; other members make no effort to contribute	Visual aid is missing or unrelated to topic	Unclear main idea; few or no details; presentation is a list of facts with no understanding of topic.

Behavior Data Sheet

Record your mammalian observations below. Remember to include as many details as possible. Note the durations of the observations as well as record whether the behavior is innate or learned.

Mammal: _____

Observations:

Behavior description:	Duration:	<input type="checkbox"/> Innate <input type="checkbox"/> Learned
Behavior description:	Duration:	<input type="checkbox"/> Innate <input type="checkbox"/> Learned
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Questions about the behaviors observed: