

MAMMALOGY

LESSON PLAN

Potentially meets the following 5th Grade Science Standards:

Life Sciences:

2b: Students know how blood circulates through the heart chambers, lungs, and body. (one heart artery)

2g: Students know plant and animal cells breakdown sugar to obtain energy, a process resulting in carbon dioxide and water (respiration)

Meets the following 6th Grade Science Standards:

Ecology:

5a: Students know energy enters ecosystems as sunlight by producers into chemical energy through photosynthesis and then from organism to organism through food webs.

5b: Students know matter is transferred over time from one organism to others in the food web and between organisms and the physical environment. (mammals are high on the food chain)

5c: Students know populations of organisms can be categorized by the functions they serve in an ecosystem. (mammals are consumers of chemical energy; some are predators and scavengers)

5e: Students know the number of mammals depends on the resources available and on abiotic factors, such as quantities of light and water, a range of temperatures, and soil composition.

OBJECTIVES:

1. Define the term Mammal with its 6 unique characteristics.
2. Teach the difference between consumers and producers, and how energy is transferred from sunlight, to plant life, to animal life.
3. Introduce students to the concept of a food chain and a food web.
4. Study the balance of an ecosystem and how each mammal is necessary to maintain that balance.
5. Look at individual mammals that live here and find their role in the Palomar Mountain food web.
6. Teach specific characteristics and behaviors of the mammals of Palomar Mountain (specifically the Bobcat, Mountain Lion, Bat, Bear, Coyote and Deer)
7. Teach students that while mankind are mammals by definition, humans are different from any other creation because we are made in the image of God. (Gen 1:26-28).

BACKGROUND INFORMATION:

Mammals are consumers. Many of them are herbivores. In Genesis 1:29, God says He gave every green plant to be food for all the beasts of the earth and everything that has the breath of

life. Each mammal's existence is vital to maintain the balance of an ecosystem. Each mammal is created uniquely, not only for our enjoyment, to contribute to the ecosystem in which it lives. As an example, bats are active at night the same time many insects are active. Bats eat insects, helping to control insect populations. They are uniquely equipped with sonar, the best tool they could have to locate and catch flying night insects. Bats are only one example. Lions are crepuscular and hunt at dusk and dawn, the same time deer are active. Studying the characteristics, behavior, and feeding habits of each mammal helps us to understand how to preserve these mammals and protect their habitats.

PROCEDURES:

1. Play the "Oh Deer" game with students to begin class. Use this game to reflect on the balance of the ecosystem after procedure #4.
2. Define the term Mammal with its 6 unique characteristics.
3. Teach the difference between consumers and producers and discuss how energy is transferred from sunlight to plants, and how those plants are consumed for energy by mammals, and how dead mammals decompose, returning energy to the plants.
4. Explain the difference between a food chain and a food web by using student volunteers as visual examples depicting these two concepts. As each student represents a producer or creature, ask them "Are they a mammal?" and "How they get their food/energy."
5. Introduce the mammals of Palomar Mountain through pictures, furs, and mounted animals.
6. Look at each animal's unique behaviors and their roles in our ecosystem and food chain.
7. Familiarize the students with the tracks and scat of each mammal.
8. Teach students that humans are different than any other creature because they are created in the image of God and explain what it means to be created in the image of God.

At the completion of this class the student

- Should know
 - The 6 characteristics that define a mammal.
 - Energy is transferred within an ecosystem from sunlight, to plants, to mammals.
 - The difference between a food chain and a food web.
 - The mammals that live here on Palomar Mtn; and the description of each mammal.
 - What role each mammal plays in the balance of the ecosystem.
 - Each mammal's particular characteristics and behaviors.
 - The definitions of carnivore, herbivore, omnivore, nocturnal, diurnal, and crepuscular, producer and consumer.
- Should be able to
 - Give an example of a food chain using plants and animals living on Palomar Mtn.
 - Explain how energy is transferred from sunlight, to plant life, to animal life.
 - Identify the different mammals by sight.
 - Explain what it means to be made in the image of God and where the Bible teaches this concept.

MAMMALOGY

TEACHER'S NOTES

Scripture References:

Genesis 1:24-25 – God creates mammals – *“And God said, “Let the earth bring forth living creatures according to their kinds—livestock and creeping things and beasts of the earth according to their kinds.” And it was so. And God made the beasts of the earth according to their kinds and the livestock according to their kinds, and everything that creeps on the ground according to its kind. And God saw that it was good.”*

Genesis 1:26-28 – God created man in His own image, and made us rulers of earth – *“Then God said, “Let us make man in our image, after our likeness. And let them have dominion over the fish of the sea and over the birds of the heavens and over the livestock and over all the earth and over every creeping thing that creeps on the earth.” So, God created man in his own image, in the image of God, he created him; male and female he created them. And God blessed them. And God said to them, “Be fruitful and multiply and fill the earth and subdue it, and have dominion over the fish of the sea and over the birds of the heavens and over every living thing that moves on the earth.””*

Genesis 1:29 – God initially gave plants to be consumable energy for the creatures. – *“And God said, “Behold, I have given you every plant yielding seed that is on the face of all the earth, and every tree with seed in its fruit. You shall have them for food.”*

I. The “Oh Dear” Game.

- A. This activity is designed for students to learn that:
 - 1. Good habitat is the key to wildlife survival.
 - 2. Limiting factors (such as a drought or lack of food) contribute to fluctuations in wildlife populations.
 - 3. Predators help keep various populations under control thus maintaining a healthy, balanced ecosystem.
 - 4. Nature is never in "balance," but is constantly changing.
- B. Begin by telling students that they are about to participate in an activity that emphasizes the most essential things that animals need in order to survive.
- C. Briefly discuss the essential components of habitat for animals to survive: food, water, shelter, and space in a suitable arrangement.
- D. Our activity focuses on the first three. Students should:
 - 1. Put their hands **over their stomach** to represent **food**.
 - 2. Put their hand **over their mouth** to represent **water**.
 - 3. Put their hands **over their head forming a teepee** to represent **shelter**.
- E. Number the students 1-4. Have the **ones** stand in one line to represent **deer** and have the **two through fours** stand in another line 20 feet apart to represent the **elements**.

- F. Students will turn their backs toward each other and select which element they need to survive (as a deer) or which element they are (as an element).
- G. When everyone is ready, give the students a signal. The elements will turn around and stand where they are. The deer will turn around, run to the element they need, and tag that person.
- H. The “deer” who get the element they need survive will live and the element they tagged will now become a deer.
- I. The “deer” who fail to acquire the element they need die and become an element along with the remaining elements who were not tagged.
- J. Do this for 5-10 rounds keeping track of how many deer there are each round.

II. What makes a mammal a mammal (6 characteristics)

- A. Ask students what they think of when they think of mammals.
- B. Describe the six characteristics that define what a mammal is. All mammals:
 - 1. **Have fur.**
 - a. Hair on humans is considered to be fur. Also, whales and dolphins meet this qualification because they are born with a mustache!
 - 2. **Nurse their young.**
 - a. Female mammals use mammary glands, which is like a sweat gland, to produce milk to nurse their young. Mammals (class mammalia) are named after the mammary gland.
 - 3. **Have a diaphragm.**
 - a. After the heart, the diaphragm is the primary muscle used to inhale/breathe. It is located by the lower ribs and separates the lungs from your stomach and intestines. Exercising your diaphragm can help you breathe and sing better,
 - 4. **Have one heart artery that goes to the left.**
 - a. Deoxygenated blood enters the right side of the heart through veins, while the left side of the heart is responsible for pumping oxygenated blood through its singular artery to deliver oxygen to all the tissues of the body.
 - 5. **Have 3 bones that make up the middle ear.**
 - a. The 3 bones in your middle ear are the smallest bones in your body. While they are called the ossicles, they are nicknamed the hammer, anvil, and stirrup because they look like those objects. These three bones form a short chain as the vibrations caused by sound waves are transmitted from the eardrum membrane through these bones to the liquid of the inner ear.
 - 6. **Have 2 lower jaw bones.**
 - a. The 2 lower jaw bones connect to form the chin. People who have dimples in their chin have them because their two lower bones did not fuse properly

in the womb. This is a genetic facial characteristic and can be passed on to your offspring.

III. Food Chain

- A. Mammals are **consumers** and can be herbivores, carnivores, or omnivores.
 - 1. As consumers, mammals get energy from the plants and animals they consume.
 - 2. Herbivores are animals that only (or mainly) eat plants.
 - 3. Carnivores are animals that only eat meat.
 - 4. Omnivores are animals that eat both meat and plants.
- B. A food chain is a pecking order of what eats what. It follows a single path/ different levels of living things, each of which feeds on the one below.
 - 1. **Plants transfer energy** from **sunlight** through photosynthesis into consumable units of energy. (Genesis 1:29)
 - 2. **Energy and matter are transferred between different organisms** through the chain and food web.
 - 3. As consumers, mammals are usually on the second, third or fourth level of the food chain, placing them towards the top.
- C. A food web is interlocking food chains within an ecological community.

IV. Balance of our Ecosystem

- A. **Limiting Factors:** Review the “Oh Deer” game by asking students what they learned from the game.
 - 1. For example, they saw a small herd of deer (4 students in a class size of 16) begin by finding more than enough of its habitat needs. The population of deer expanded over two to three rounds of the activity until the habitat was depleted and there was not sufficient food, water and shelter for all the members of the herd. At that point, deer starved or died of lack of thirst or shelter, and they returned to as a part of their habitat. **Define this lack of needed elements for survival as limiting factors.**
- B. **Abiotic Factors:** The number of mammals an ecosystem can support depends not only on the resources available, but also on **abiotic** factors such as quantities of light and water, range of temperature, and soil condition. All of these factors plant life which in turn affects animal life.
- C. **Predators:** Many mammals are **predators**. They play a vital role in a balanced ecosystem.
 - 1. For example, if deer were allowed to overrun and overgraze this area, we would first lose many plants. Plants are both food and home to many insects, birds and mammals. The loss of plant life in this area would bring about the loss of animal life in this area. Species of birds, insects and other mammals would begin to disappear. Since plant life also protects water and streams, an

overpopulation of deer can destroy a riparian habitat as well. When a lion eats a deer, it is helping to keep an **ecosystem balanced**.

V. **Mammals at Angeles Crest**

A. The San Gabriel Mountains are home to many mammals.

1. Most of the mammals here are **nocturnal**, and include both **carnivores** and **omnivores**. Some examples are the bobcat and bat (which is a carnivore that is an insectivore).
2. We have a few mammals that are **crepuscular**, such as the bat, deer, and the mountain lion. The rest are primarily nocturnal.
3. Ask students questions to teach them about the mammals who live at Angeles Crest. Also, have students figure out where they would fit on the food chain based on what they eat.
4. Here are some key characteristics and behaviors to cover for each mammal:
 - a. Bobcat
 1. They are called a bobcat because of their bobbed tail.
 2. They are about 2 ft tall and 2 ft long, but we have some closer to 3ft tall on Palomar Mountain.
 3. They are nocturnal. They do still move around during the day and may be seen then, too.
 4. Their territory ranges from 5 to 25 sq miles depending on the type of habitat they are in and how available food is.
 5. Female bobcats will not share territory with other females.
 6. They sleep in dens that they find. They do not dig their own. The den may be in a rock crevice, cave, brush thicket, or a tree hollow.
 7. Their lifespan is 12-13 years in the wild and 25 years in captivity.
 8. They are carnivores. They eat things like rabbits, rodents, birds, bats, and occasionally an adult deer.
 9. They have 2-3 cubs at a time. The cubs stay with their mother for 1 year.
 - b. Mountain Lion
 1. The Mountain Lion is also called a cougar, puma, and panther amongst over names as well.
 2. With a running jump, they can jump horizontally 20-40 feet (40 feet = length of a school bus).
 - c. Bear
 1. **FIND INFO**
 - d. Coyote
 1. **FIND INFO**
 - e. Bat

1. The smallest bat is the bumble bee bat of Thailand weight less than a dime.
 2. The largest bat is the Giant Flying Fox of Indonesia with a wing span of 6 feet, while only weighing 3 pounds.
 3. They use echolocation to fly and find their prey.
- f. Deer
1. Our deer are called mule deer because they have huge ears like a mule.
 2. They can smell water up to 3 feet underground and will use their front hooves to dig up the water.
- g. **Mention Wildlife Safety info on last page of section**

VI. Made in God's Image

- A. Ask students **why** we as humans differ from mammals, or for that matter, from anything else that God has created.
1. Students will generally provide answers that address the **how we are different**: we are smarter; we can talk.
- B. Eventually guide them toward the answer, which is that God has created us in His image and made us rulers of earth and everything in it. (Gen 1:26-28).
- C. Being made in the image of God means that we reflect who God is. We are not God! However, who we are provides an imperfect reflection of who God is.
1. Our ability to talk reflects God's ability to communicate.
 2. Our ability to make cell phones reflects God's ability as Creator.
 3. Our ability to love reflects God's perfect, sacrificial love for us.
 4. God's call for us to rule earth reflects His position as the Ruler of everything.
 5. Finally, our ability to have a relationship with God reflects the relationship within the Trinity.