

Lesson 1: Mysterious Mammals

Candid Critters Background:

The North Carolina Wildlife Resources Commission (NCWRC, <http://www.ncwildlife.org>) is a state government agency that works to conserve and sustain the state's fish and wildlife resources through research, scientific management, wise use, and public input. Through a collaboration with the NC Museum of Natural Sciences and NC State University, the NCWRC launched North Carolina's Candid Critters (NCCC, nccandidcritters.org) a statewide camera trap survey run by citizen science volunteers of all ages and backgrounds. In this project, volunteers set motion-and-heat-triggered camera traps within all 100 counties in NC to further understand wildlife. Specifically, the objectives of NCCC are:

1. To engage NC citizens of all ages, backgrounds, and experience with the wildlife of their state through camera trapping
2. Collect wildlife data useful for management and conservation questions

The photos generated from camera traps turn into data, allowing volunteers and scientists to map where animals live, and when and where they are most active across NC. By discovering what wildlife lives near you and your students, you will be helping scientists learn more about the distribution of mammal species across the state. The NCWRC is most interested in using data to answer the following scientific questions:

1. Is the deer population in NC increasing, decreasing, or staying the same?
2. Where are coyotes and how abundant are they in NC?
3. Where are other species of concern in NC? Including bear, elk, weasels, fox squirrels, red squirrels, armadillos, woodrats, feral pigs, chipmunks, and skunks.

There are many interesting mammal questions to study and teachers are encouraged to allow their students to brainstorm other questions about wildlife. For example:

- Are mammals in urban areas more nocturnal than rural or wild areas? Why?
- Are all mammals found in all parts of the state? Your county?
- Are there more mammals in urban areas or rural areas?

Classifying Mammals Background:

In order to discover patterns and relationships between living things, scientists classify organisms on morphological characteristics and shared ancestry. Because there are so many, we use categories to sort organisms and information to discover patterns and relationships between living things. In order to place organisms in categories, we observe characteristics and seek answers on how closely related they are to one another.

Animals are divided into two main groups: “vertebrates” (phylum Chordata) & “invertebrates” (everything else). The basic difference between the two groups are that vertebrates have backbones while invertebrates do not. From there, vertebrates are further classified into five different classes:

- Mammals
- Bird
- Fish
- Reptiles
- Amphibians

In the Candid Critters Project, we are most interested in mammals – the animals our cameras are most likely to capture. Amphibians and reptiles are unlikely to be captured because of size and they are ectotherms (“cold-blooded”). While birds are endotherms (“warm-blooded” like mammals), they fly, and therefore camera traps are not the best tool to study birds.

Diet divides mammals into smaller groups:

One way to split mammals into smaller groups is to determine what they eat. For example, herbivores eat primarily plants, carnivores eat primarily meat, and omnivores eat a combination of both. However, formal animal classification uses many other criteria beyond diet to separate mammals into groups. As a result, animals classified in the same group do not always have the same eating style (i.e. coyotes are considered carnivores, but eat a lot of fruit).

Biotic and Abiotic Factors Background:

Living components of an ecosystem that affect the population of another organism, or the environment are known as biotic factors. These factors include predation by other organisms, diseases such as rabies, or competition for resources with other organisms. Non-living parts of the environment that influence or affect an ecosystem and the organisms in it are known as abiotic factors. Sunlight, temperature, water, and soil type are all examples of abiotic factors. Abiotic factors are able to restrict mammal populations (and other organism populations as well) because such factors are usually limited in ecosystems and are needed by all living organisms in the area. To study wildlife populations, it is critical to understand both the animals themselves and the ecosystems they inhabit. These factors interact to influence animals’ growth, survival, reproduction, and ultimately population health.

Supplemental Activities:

Social Studies

- Informational Essay: Students write about the history of wildlife management in the US. Students will learn how human activity has and continued to shape the United States.

Mammal Monitoring and Study Background:

Below is a summary of some of the methods to study mammals. Teachers may also use [eMammal Intro to Mammal Research](#) video to present in class or for further background information.

Direct Mammal Monitoring Methods		
Monitoring Method	Advantages	Disadvantages
Trapping	<ul style="list-style-type: none"> • Collect biological specimens (blood, DNA) and health data (parasites) • When GPS-tracked, fine-scale information on animal movements • If animal is sacrificed, can provide long-term data in museum collections 	<ul style="list-style-type: none"> • High cost for few animals • Can harm the mammal if not done correctly • Ethical issues when killing for specimens, especially for any species that is threatened
Camera Trapping	<ul style="list-style-type: none"> • Medium cost for cameras, can be used many times for many animals • Generates a great deal of data without major inconveniences • Not harmful to animals 	<ul style="list-style-type: none"> • Technology issues • Limited “window,” can only see right in front of the animal, need lots of cameras to get full picture of what is going on • Generates A LOT of data, can be difficult to manage (if you don’t have eMammal!)
Observations by eyesight	<ul style="list-style-type: none"> • Allows for more detailed observations to get a better understanding of animal behavior and in context (i.e. is it in a group? Where did it come from? Where is it going?) • If you follow animal, can get more complete picture 	<ul style="list-style-type: none"> • Limited to locations where visibility is high • Animals may be scared, alter behavior • Many animals nocturnal • Many animals have large home ranges requiring you to travel far to collect data • Detailed analysis on few individuals, harder to observe many
Historical Data Analysis (analysis of hunting records, museum specimens)	<ul style="list-style-type: none"> • Can get a large sample size without conducting field work • Can look at animals over time, trends over time • Some not harmful to animals (e.g. specimens collected from roadkill) or does not require new sacrifice 	<ul style="list-style-type: none"> • Data may be biased (hunters may be targeting certain types of animals, e.g. big males) • Data may not be standardized • Data can be biased to effort (e.g. how many hunters that year) • Cannot see animal behavior