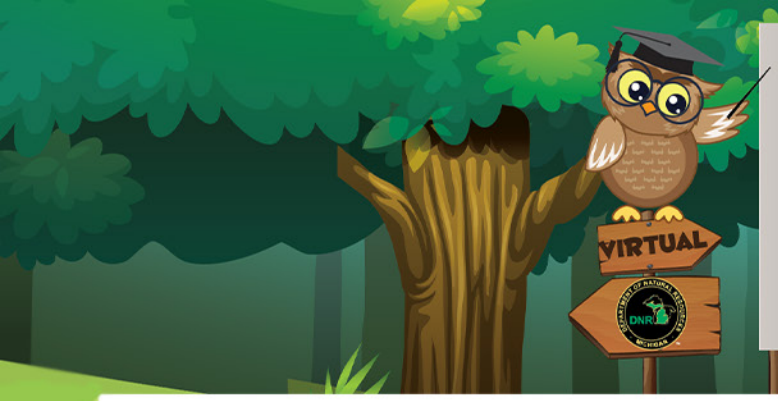


Nature at School
Pre-lesson
Skulls are the Key

Learning outcomes:

Join DNR educator Edward Shaw to discover the physiological differences used to identify a variety of Michigan mammals. Unique characteristics can give students clues to what animals eat and what might eat them. During our 30-minute lesson we will meet the following objectives:

- Using a dichotomous key, students will be able to describe physical features that can be used to identify animal skulls.
- By observation of certain skull characteristics, students will be able to describe whether an animal is predator or prey, what it prefers to eat (herbivore, carnivore, omnivore) and other details and features about the animal.
- Students will learn about who owns our wildlife resources and the importance of wildlife management.

Background information:

Michigan is home to more than 60 species of terrestrial mammals. Each animal can be categorized by recognizing a set of key characteristics found in the skull. These same characteristics also tell a story about what the animal ate, if it was predator or prey, which senses were most important to the animal's survival and other information about the way it lived.

By looking at each clue, we can use these characteristics to identify skulls using a dichotomous key. This basic scientific method is a tool that can be applied to the identification of other organisms in the natural world. By answering simple questions and using the process of elimination, students will learn how to apply this skill to identify and classify other organisms.

This program will bring scientific process, natural history, and natural resource management together to help bring students closer to the great resources of Michigan.

Resources:

- Cornell Institute for Biology Teachers: Skulls
- Mammals of Michigan Quizlet
- Community Science Observations
- iNaturalist

Suggested pre-activity:

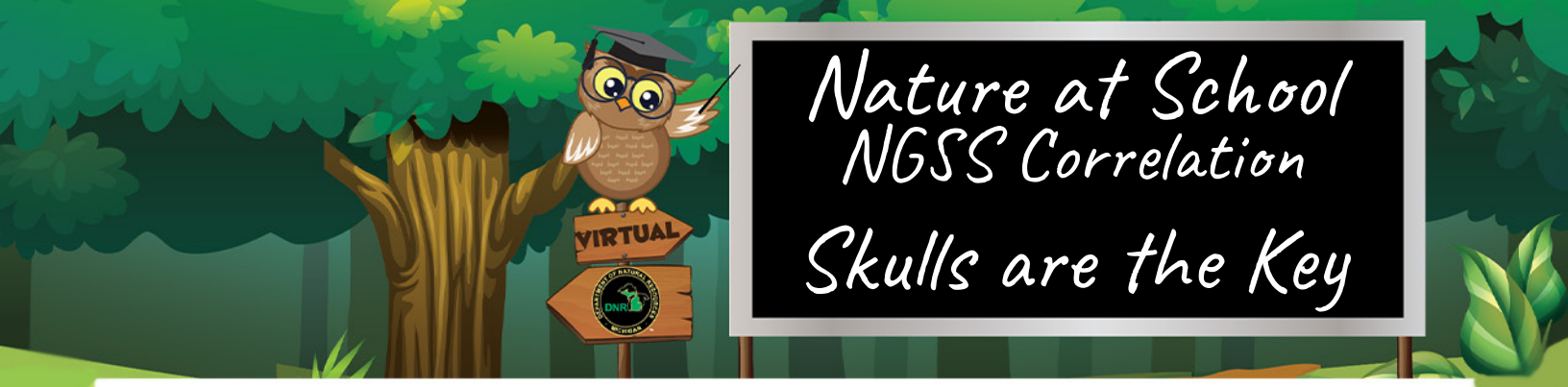
- How to identify a skull
- Animal skull worksheets and ID activities

Directions for your *DNR Nature at School* virtual program:

1. You will receive a reminder email from SignUp Genius three days prior to your scheduled *DNR Nature at School* program. Please read and follow the directions, so we all can have a successful program.
2. At least one day prior to your lesson, send your instructor the link to your Zoom/Google Meet/Skype/Teams for your lesson time. Starting 10 minutes early with just your instructor is encouraged.

Day of:

3. Make sure students have their sound muted and their cameras on to participate (with thumbs up, number on fingers).
4. If you use the chat feature, we encourage the students to ask their questions there, and the teacher can ask them at the end of the program.
5. See further directions in your SignUp Genius confirmation.



Nature at School NGSS Correlation

Skulls are the Key

Live from the Carl T. Johnson Hunting and Fishing Center: Discover the physiological differences and charateristics in skulls that allow identification of Michigan mammals using a dichotomous key.

Guiding question/phenomenon:

What characteristics make a carnivore differ from an herbivore, or predators differ from prey?

Science and Engineering Practice	Disciplinary Core Idea	Cross-Cutting Concepts
Analyzing and Interpreting Data Analyze data using tools, technologies, and/or models in order to make valid and reliable scientific claims or determine an optimal design solution. • Students will learn how to use a dichotomous key to sort and classify skulls.	**LS1.A: Structure and Function** Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. • Students will learn skull anatomy, physiology and how and why they have certain adaptations. **LS3.B: Variations of Traits** Different organisms vary in how they look and function because they have different inherited information. The environment also affects the traits that an organism develops. • Students understand adaptations allow different species to survive in their particular habitat, and what those adaptations mean for their survival.	**Patterns** Similarities and differences in patterns can be used to sort and classify natural phenomena. (3-LS3-1) • Students will be able to predict what an animal eats, and thereby what habitat it may live in, through skull anatomy.

Recommended grade band(s): Early elementary through middle school
All Nature At School virtual programs have been created to introduce students at any grade level to life and/or earth science core ideas, when used with pre- and post-activity suggestions.

Nature at School
Post-lesson
Skulls are the Key

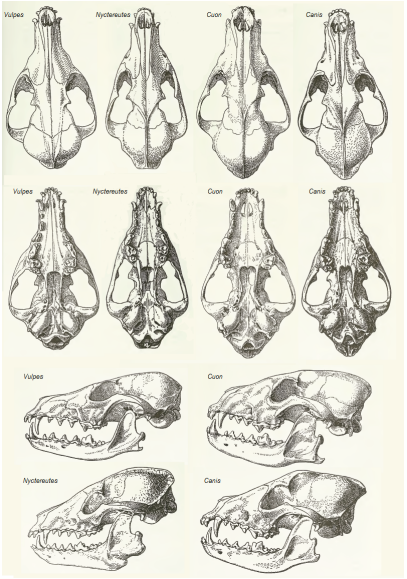
Activity wrap-up:

Mammals can be categorized by common characteristics. Skulls can tell us a lot about the animal that once inhabited them and can be identified using a dichotomous key. By observing the general shape, eye placement, teeth, and other features, we can understand the animal's characteristics and adaptations that helped it survive. Teeth can tell us whether the animal is a carnivore, herbivore, or omnivore. The size and location of the eye sockets also can explain much about an animal. Large eyes allow for greater light perception and may indicate a nocturnal animal with sharp eyesight. Eyes located in the front of the skull allow an animal to focus on an object with both eyes and have a degree of depth perception. These are useful physical features for a predator to use in tracking and hunting prey. Eyes that are located towards the side of the skull indicate an animal that can see well in all directions, making it better able to watch out for predators. Length and size of nasal passages can indicate whether an animal had a good sense of smell. The size and placement of the hole at the base of the skull can indicate whether the animal was a biped or quadruped.

In learning more about Michigan's mammals, we can also learn about wildlife management for both game and nongame species. This process balances the needs of wildlife with the needs of people, using the best available science to promote biodiversity using conservation methods and habitat improvement.

Resources:

- "Key-Guide to Mammal Skulls and Lower Jaws" by Aryan I. Roest
- "Field Guide to Skulls and Bones of Mammals of the Northeastern United States: Skulls and Mandibles" by Richard Wolniewicz
- "Mammals of Michigan Field Guide" by Stan Tekiela
- DNR Michigan mammal species



Connect to Home:

- Name at least three different mammals that live in your area. By looking at their physical features, decide if each animal is a predator or prey. Then decide if it is an herbivore, carnivore or omnivore.

Post-activities:

- Create a dichotomous key to identify or classify another category of items.

Connect with DNR content:

For a daily dose of nature, like MiNatureDNR on Facebook.

Visit the DNR Nature at Home page for educational video series, resources, lessons, virtual tours and more.