

## **“Hole Sweet Hole” Multidisciplinary Classroom Activities**

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Teachers guide for the [Young Naturalists article](#) “Hole Sweet Hole” by Mary Hoff. Published in the May–June 2021 *Minnesota Conservation Volunteer*, ([www.mndnr.gov/young\\_naturalists/hole](http://www.mndnr.gov/young_naturalists/hole)).

**Summary.** Some people think trees full of holes are eyesores. In reality, tree cavities offer valuable shelter to a wide variety of animals. This feature introduces young naturalists to some of them and describes how creatures from insects to owls use cavities for protection from weather and predators.

**Suggested Reading Level.** Third through middle school grades

**Materials:** KWL organizer; optional resources for extension activities include dictionaries, video viewing equipment, Internet access and other print and online resources your media specialist may provide.

**Preparation Time:** 15–30 minutes, not including time for extension activities

**Estimated Instructional Time:** 30–60 minutes, not including extension activities

### **Minnesota Academic Standards Applications:**

“Hole Sweet Hole” activities described below may be used to support some or all of the following Minnesota Department of Education standards for students in grades 3–8:

## Science

*\*coding is based on the 2019 Commissioner approved draft of MN Academic Standards in Science and focuses on the three dimensions from the Framework for K-12 Science Education (NRC, 2012)*

### Science and Engineering Practices

1. Asking questions and defining problems
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations and designing solutions
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

### Crosscutting Concepts

2. Cause and effect
3. Scale, proportion, and quantity
6. Structure and function
7. Stability and change

### Disciplinary Core Ideas

Life Sciences 2: Ecosystems: Interactions, energy, and dynamics; 4: Biological Evolution: Unity and Diversity

Earth and Space Sciences 3: Earth and human activity

## Math

Data Analysis (Benchmark 4.4.1.1)

## Social Studies

Economics (Benchmark 4.2.1.1.1)

Geography (Benchmark 4.3.4.9.1)

## English Language Arts

### Reading Benchmarks: Informational Text

Key Ideas and Details (Benchmarks 3.2.1.1, 3.2.3.3, 4.2.1.1, 4.2.3.3, 5.2.1.1, 5.2.3.3, 6.5.1.1, 7.5.1.1, 8.5.1.1)

Craft and Structure (Benchmarks 3.2.4.4, 4.2.4.4, 5.2.4.4, 6.5.4.4, 7.5.4.4, 8.5.4.4)

Integration of Knowledge and Ideas (Benchmarks 3.2.7.7, 3.2.8.8, 4.2.7.7, 5.2.7.7, 6.5.7.7)

### Writing Benchmarks

Text Types and Purposes (Benchmarks 3.6.3.3, 4.6.3.3, 5.6.3.3, 6.7.1.1, 6.7.3.3, 7.7.1.1, 7.7.3.3, 8.7.1.1, 8.7.3.3)

Research to Build and Present Knowledge (Benchmarks 3.6.7.7, 4.6.7.7, 5.6.7.7, 6.7.7.7, 7.7.7.7, 8.7.7.7)

## Language Benchmarks

Vocabulary Acquisition and Use (Benchmarks 3.10.4.4, 4.10.4.4, 5.10.4.4, 6.11.4.4, 6.11.6.6, 7.11.4.4, 7.11.6.6, 8.11.4.4, 8.11.6.6)

## Reading Benchmarks: Literacy in Science and Technical Subjects

Key Ideas and Details (Benchmark 6.13.1.1)

## Writing Benchmarks: Literacy in Science and Technical Subjects

Text Types and Purposes (Benchmark 6.14.1.1)

Research to Build and Present Knowledge (Benchmark 6.14.7.7)

For current, complete Minnesota Academic Standards, see the [Department of Education's website](#). Teachers who find other connections to standards are encouraged to contact *Minnesota Conservation Volunteer*.

**Preview:** Ask your students if they have ever seen an animal go into or come out of a hole in a tree. What kind of an animal was it? If needed, supplement with a question about what kinds of animals they think might live in holes in trees. Then divide students into small groups to do a **KWL activity**. Within the groups, have students describe what they know (**K**) about cavity nesters and what they wonder (**W**) about them. Give each student a copy of the organizer (see [www.teach-nology.com/web\\_tools/graphic\\_org/kwl](http://www.teach-nology.com/web_tools/graphic_org/kwl)) and encourage each to make notes during the group discussion. As you read and discuss the article you can compile a list of what they learn (**L**) while reading the article and related materials and participating in extension activities.

**Vocabulary Preview:** You can find a copy-ready vocabulary list at the end of this guide. Feel free to modify it to fit your needs. Share the words with you students and invite them to share what they think they mean. Tell them you will be reading a story that will help them understand these words so they can own them in the future! As your students encounter these vocabulary words in the story, you may want to encourage them to infer meaning using context clues, such as other words in the sentence or the story's illustrations. Students also could be encouraged to compare their inferences as to what the words mean with their earlier guesses and with the definitions from the vocabulary list.

You might wish to use the study cards (adapted from [Strategic Tutoring](#)) found at the end of the study questions for this Young Naturalists feature. On one half of the card, in large letters, is a key vocabulary word with smaller letters framing the word in a question or statement. On the other half is the answer to the question or the rest of the statement. Cut along the horizontal line, fold in the middle, and tape or staple, then use like flash cards. We've included a few blanks so you or your students can add new words or phrases if you'd like.

**Study Questions Overview:** Preview the study questions with your class before you read the article. Then read the story aloud. Complete the study questions in class, in small groups, or as an independent activity, or use them as a quiz.

**Adaptations:** Read aloud to special needs students. Abbreviate the study questions or focus on items appropriate for the students. Adapt or provide assistance with extension activities as circumstances allow.

**Assessment:** You may use all or part of the study guide, combined with vocabulary, as a quiz. Other assessment ideas include: (1) Ask students to name six things they learned about cavity nesters. See the “learned” list from your KWL activity. (2) Have students write multiple-choice, true-false, or short-answer questions based on the article. Select the best items for a class quiz. (3) Have students create posters, podcasts, or videos to share their new knowledge with others.

**Extension Activities:** Extensions are intended for individual students, small groups, or your entire class. Young Naturalists articles provide teachers many opportunities to make connections to related topics, to allow students to follow particular interests, or to focus on specific academic standards.

1. Find a web camera that’s monitoring the nest of a cavity-nesting bird (a source like [View Nesting Birds](#) is a good place to start) and follow it over time. Invite students to record what they see daily to sharpen their observation skills. Students could use these observations toward developing models (diagrams, drawings, or physical models) of the unique and diverse life cycles of birds.
2. Build a nest box. Artificial nest boxes can help cavity dwellers thrive in places where natural holes are scarce. Use [All About Birdhouses](#) or a similar source to build a nest box for a wood duck, bluebird, or other cavity-nesting animal. Do research to learn what kinds of habitat are best for the intended occupant, then install it in a suitable location. Monitor the box to see what happens. The success of students’ nesting boxes could be used to encourage students to evaluate the merit of artificial nesting boxes to declining populations of cavity-nesting birds as a result of environmental changes. Have students brainstorm or research other solutions that have been proposed (such as creating starter holes) and evaluate the merit of these other ideas to help cavity dwellers thrive.
3. A number of Minnesota’s cavity-nesting species declined in the 1900s (e.g., wood ducks, eastern bluebirds) as forests were cut down and forest managers viewed dead and rotting trees as undesirable. Research one of them to learn what people have done to help it recover. If data are available, create a chart showing change in population over time. This research could be oriented toward constructing evidence-based explanations for how environmental factors influence the growth of populations (or, for older students, constructing arguments supported by empirical evidence that changes in biological components of an ecosystem affect populations).

4. Woodpeckers have a number of adaptations that allow them to drill holes in trees, from an especially tough beak to special cushioning around its brain. Use various information sources to gather information about as many such traits as you can. Use this information to support the contention that animals have internal and external structures that support survival. Then brainstorm: How might we apply this to inventing something to meet human needs? For example, the cushioning might inspire the design of a better bicycle helmet.

5. We learn in the story that often a cavity made by one animal ends up being adopted by others. What does this tell us about how decline in one species might reverberate through the ecosystem? Take the example of the pileated woodpecker. What other animals use the holes it makes? If pileated woodpeckers became extinct, what might that mean for these animals? And what might *that* mean for other plants and animals? For example, a decline in pileated woodpeckers could lead to a decline in martens, which in turn could lead to a population boom in squirrels, mice, and other marten prey. In addition to speculating about the ripple effects of cavity nesters on other species in the ecosystem, older students could be asked to find evidence through online research to construct an argument that change in components of ecosystems affect populations. Older students also could design an investigation that would allow biologists to collect evidence regarding the impact of a decline in a particular cavity nester on other species in the ecosystem.

6. Some animals, like fishers, have a small number of young but spend a lot of time and energy caring for them. Other animals, like wood ducks, have many young but few live to adulthood. Explore the concepts of [r selection and K selection](#). What other familiar animals fit into one category or another? What conditions might favor one or the other?

7. The story mentions that the cedar bark red squirrels use to line their nests has a strong smell that deters parasites. What are some other plants that possess insect-repellent properties? Ask students to design a backyard that uses plants or plant material to deter insects, ticks, fleas, etc. Older students could think about the pros and cons of using these plants instead of chemical repellents (cost, availability, potential harm to pets or small wildlife, etc.) and factor those considerations into the backyard design.

8. If you were a bird, would you rather be a primary excavator or a secondary user? Why? Students could write an opinion piece on their preference, supporting their point of view with well-argued reasons.

9. It's raining ducklings! Students can write and illustrate narratives or other creative texts of imagined experiences based on wood ducks' usual exit from their nest.

**Web Resources:** Check out the following if you'd like to dive deeper into some of the topics covered by this Young Naturalists feature.

**Cavity Nesters**

[Cavity Nesting Birds of North America and Their Babies](#)

[Barred Owl](#)

[Black-Capped Chickadee](#)

[Black Carpenter Ant](#)

[Fisher](#)

[Kestrel](#)

[Pileated Woodpecker](#)

[Red Squirrel](#)

[Wood Duck](#)

**Minnesota DNR Web Pages**

**General Teacher and Student Resources**

[Minnesota DNR Teachers' Resources](#)

[DNR Kids Page](#)

**Related Minnesota Conservation Volunteer Articles\***

[Winter's Woodpeckers](#)

[The Hole Story](#) (Young Naturalists)

[New Dens for Fishers](#)

\*All *Minnesota Conservation Volunteer* articles, including past Young Naturalists stories and accompanying teachers guides, are [available online](#) in searchable PDF.

**Study Questions**

"Hole Sweet Hole" by Mary Hoff. Published in the May–June 2021 *Minnesota Conservation Volunteer*, or visit [www.mndnr.gov/young\\_naturalists/hole](http://www.mndnr.gov/young_naturalists/hole).

Name \_\_\_\_\_ Date \_\_\_\_\_

1. True or false: The wood at the center of a tree is called heartwood. **True**
2. Put a "P" next to the primary excavators. Put an "S" next to the secondary users.

Pileated woodpecker – **P**

Marten – **S**

Barred Owl – **S**

Chickadee – **S**

American kestrel – **S**

Carpenter ant – **S & P**

3. Describe the three main steps in the development of a cavity nest. **1. A tree is injured. 2. A fungus starts degrading the wood. 3. An animal chips away at the rotting wood to enlarge the hole.**

4. List as many items mentioned in the article as you can recall that cavity dwellers use to line their nests. **Answers will vary but may include wood chips, moss, rabbit fur, shredded bark, grass, downy feathers.**

5. What is a barred owl's main predator?

- a. fisher
- b. great horned owl**
- c. marten
- d. coyote

6. Name two things carpenter ants eat. **Insects, food scraps**

7. Match the animal with the trait:

Wood duck – **may lay up to 16 eggs**

Pileated woodpecker – **uses its 2-inch-long beak to hollow out a cavity**

Fisher – **needs its nest tree to be at least 60 years old**

Barred owl – **sometimes stores food in the cavity for later**

Red squirrel – **likes to nest in pine, spruce or fir trees.**

8. Name two ways a male kestrel helps his family. **He finds a home for them, and he brings the female food while she sits on the eggs.**

9. True or False. Years ago forest managers often didn't recognize the importance of trees with broken branches and rotten insides as part of a healthy habitat. **True**

10. Red squirrels sometimes line their cavity nests with cedar bark. In addition to serving as insulation, what other advantage does the cedar bark provide? **The smell of the cedar serves to repel (keep away) insects**

11. Which describes the relationship between kestrels and squirrels?

- a. Kestrels create the cavities for nesting squirrels.
- b. Kestrels are predators to newborn squirrels.
- c. Squirrels disrupt nesting kestrels by taking over their nesting cavities.
- d. Kestrels may kick out a nesting squirrel and claim the cavity as their own.**

12. Which of the species featured in the story has the most offspring? **Black carpenter ants**

Challenge: You notice a wood duck has used the artificial nesting box you made to lay her eggs! You count 12 eggs in the nest. About how many baby ducklings might you expect to live into the summer

months? **As few as 10% survive more than two weeks; one to two baby ducklings may actually survive!**

### **Minnesota Comprehensive Assessments Practice Items**

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1. Why might an animal prefer a cavity nest to a nest out in the open? **The wood around the nest provides shelter from weather and helps the animal hide and protect itself from predators.**
2. True or false: Most old trees have cavities. **False**
3. What are two ways cedar bark might help red squirrels? **By repelling nest parasites and providing insulation in winter.**

### **Vocabulary**

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arboreal – related to trees

incubates – sits on eggs to warm them

insulation – something that separates one thing from another

parasites – living things that live on, in, or with other living things and use their resources

premier – top, first

pterodactyl – a flying dinosaur-like animal

rodents – animals like mice, rats, and rabbits

An **arboreal** animal does things that are  
an animal that does things **related to trees** is known as

When a duck **incubates eggs**, it

When a duck **sits on eggs to warm them**, it

**Insulation** is

**Something that separates one thing from another** is called

**Living things that live on, in, or with other living things and use their resources** are called

**Parasites** are

A **premier** location is one that is

A location that is **top or first** is a



A **pterodactyl** is

A **flying dinosaur-like animal** is called a

**Animals like mice, rats, and rabbits** are known as

**Rodents** are

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