

TEACHERS GUIDE

TO “PECK, PLUCK, PROBE, PREEN”

Multidisciplinary classroom activities based on the Young Naturalists nonfiction story in *Minnesota Conservation Volunteer*, July-August 2019, www.mndnr.gov/mcvmagazine.

Minnesota Conservation Volunteer magazine tells stories that connect readers to wild things and wild places. Subjects include earth science, wildlife biology, botany, forestry, ecology, natural and cultural history, state parks, and outdoor life.

Education has been a priority for this magazine since its beginning in 1940. “One word—Education—sums up our objective,” wrote the editors in the first issue. Thanks to the MCV Charbonneau Education Fund, every public library and school in Minnesota receives a subscription. Please tell other educators about this resource.

Every issue now features a Young Naturalists story and an online Teachers Guide. As an educator, you may download Young Naturalists stories and reproduce or modify the Teachers Guide. The [student portion of the guide](#) includes vocabulary cards, study questions, and other materials.

Readers’ contributions keep *Minnesota Conservation Volunteer* alive. The magazine is entirely financially supported by its readers.

Find every issue online. Each story and issue is available in a searchable PDF format. Visit www.mndnr.gov/mcvmagazine and click on *past issues*.

Thank you for bringing Young Naturalists into your classroom!

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Multidisciplinary classroom activities based on the Young Naturalists nonfiction story in *Minnesota Conservation Volunteer*, July-August 2019, www.mndnr.gov/mcvmagazine.



SUMMARY. From flat duck bills to powerful eagle beaks, bird beaks and bills come in many shapes and sizes. This Young Naturalists feature story looks at how various bird species' beaks or bills correspond with how they are used, drawing on human tools as an analogy for the fit between structure and function.

SUGGESTED READING LEVELS. Third through middle school grades

MATERIALS. KWL organizer; optional resources include access to outdoors, art and craft supplies, variety of bill-making materials (popsicle sticks, tape, clothespins, tweezers, etc.) and “foods” (pipe cleaners, rice, dry beans, bits of fabric, etc.), 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 INSTRUCTION TIME. 30–60 minutes, not including extension activities

MINNESOTA ACADEMIC STANDARDS APPLICATIONS. “Peck, Pluck, Probe, Preen” activities described below may be used to support some or all of the following Minnesota Department of Education standards:

SCIENCE (GRADES 3-8) (*CODING IS BASED ON MAY 2019 3RD DRAFT OF MN ACADEMIC STANDARDS IN SCIENCE)

Strand 2 Looking at Data and Empirical Evidence to Understand Phenomena or Solve Prob-

lems (Benchmark 7L.2.2.1.1)

Strand 3 Developing Possible Explanations of Phenomena or Designing Solutions to Engineering Problems (Benchmarks 3L.3.2.1.1, 7L.3.2.1.1, 7L.3.2.1.4, Standard 3.2.2)

Strand 4 Communicating Reasons, Arguments and Ideas to Others (Benchmarks 3L.4.1.1.1, 3L.4.2.1.1, 4L.4.1.1.1, 4L.4.2.1.2)

MATH (GRADES 3–8)

Data Analysis (Benchmark 3.4.1.1, 5.4.1.1)

Geometry and Measurement (Benchmark 4.3.2.1)

Algebra (7.2.2.2)

ENGLISH LANGUAGE ARTS (GRADES 3–8)

Reading Benchmarks: Informational Text (Grades 3–8)

Key Ideas and Details (Benchmarks 3.2.1.1, 4.2.1.1, 5.2.1.1, 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 5.2.7.7, 5.2.9.9)

Writing Benchmarks (Grades 3–8)

Text Types and Purposes (Benchmarks 5.6.2.2, 6.7.2.2, 7.7.2.2, 8.7.2.2)

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 (Grades 3–8)

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 (Grades 6–8)

Key Ideas and Details (Benchmark 6.13.1.1)

Integration of Knowledge and Ideas (Benchmarks 6.13.8.8, 6.13.9.9)

Writing Benchmarks: Literacy in Science and Technical Subjects (Grades 6–8)

Research to Build and Present Knowledge (Benchmark 6.14.7.7)

For current, complete Minnesota Academic Standards, see www.education.state.mn.us. Teachers who find other connections to standards are encouraged to contact *Minnesota Conservation Volunteer*.

PREVIEW. Do a [KWL activity](#). Divide students into small groups. Within the groups, have students describe what they already know (K) about bird beaks 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) 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

guess what they think they mean. Tell them you will be reading a story that will help them understand these words so they can use 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 describe what they learned about bird beaks and bills. 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 about burying beetles 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. Go outside and watch birds use their beaks and bills. Have students record their observations with notes and sketches in a field notebook, then gather at the end of the observation period to share notes and thoughts. Did they see different birds use their bills in different ways? Or see one bird use its bill to accomplish different tasks? Did anything from their observations surprise or puzzle them? Students could be asked to watch for variations in bill characteristics or uses of bills among birds of the same species, and then to construct a verbal or written explanation using evidence from their observations alongside internet research regarding how the variations they observed may provide an advantage in eating

or in other survival behaviors.

2. Charles Darwin's studies of the bills of finches on the Galapagos Islands offers a classical illustration of the concepts of mutation, adaptive radiation, and natural selection. Share the story of what Darwin observed and what he deduced from what he saw. Use internet resources to take a close look at the bill of each of the finch species he studied along with the type of food it eats. Discuss how the tool fits the job and note how variations in traits can exist in a group of similar organisms. NSTA has a Galapagos Finches Famous Beaks set of readings and activities (<http://static.nsta.org/extras/virus/Virus-Activity5.pdf>). These activities can be used to guide students in learning how variations in beak size influences finch survival and evolution through reading and interpreting information as well as measuring and graphing data and constructing explanations based on evidence. Older students could delve deeper into Darwin's finch studies toward mathematical explanations of trends in changes to populations over time and also toward an understanding of the differences among claims, evidence, reasoning, facts, and reasoned judgment.

3. Introduce the concept of design thinking to your students (see, for example, <https://www.sciencefriday.com/educational-resources/a-new-beak-evolution-lab/>). Provide a variety of bill-making materials (popsicle sticks, tape, clothespins, tweezers, etc.) and "foods" (pipe cleaners, rice, dry beans, bits of fabric, etc.). Invite students to use design thinking to make a bill-like structure well-suited to pick up a "food" item of their choice. Then let students try out their "bills." What worked well? What was a challenge? If time allows, let students modify their bills to make them better suited for a particular piece of "food" of their choice. (Adapted from [Washington State University Extension](#)).

4. Alliteration is a literary tool that uses similar starts to words to add style to writing. Like pepper on food, in small amounts it can make writing more interesting. One example in this story is the description of the barn swallow as an "aerial acrobat." Challenge students to come up with an alliterative phrase to accurately describe each of the other birds in the story. For example, they might call a hummingbird a "nectar nut" or a goldfinch a "seed snatcher."

5. In the 1990s, a Japanese railroad company had a big problem. It built a train that was so fast that it would create sonic booms when it went through tunnels. A birdwatching engineer finally solved the problem — using a kingfisher's beak for inspiration. Use Internet resources (e.g., <https://medium.com/design-voices/looking-deeper-into-bio-mimicry-how-nature-inspires-design-55c6f881241d>) to learn the story of Eiji Nakatsu and the bullet train. Another example is materials scientist Marc Meyers, who as a boy growing up in Brazil marveled at the lightweight toughness of toucan beaks, and has since applied what he has learned from toucan beaks to design ultralight aircraft and motor vehicles that better protect motorists during crashes. These stories can be used as a launching point for exploring the concept of biomimicry and providing students the opportunity to conceptualize biomimetic solutions to other challenges.

6. Many of the birds featured in the story hunt for food by themselves. But American

pelicans sometimes cooperate when feeding. They gather in large groups in wetlands and coordinate their swimming to drive schools of fish toward the shallows. The pelicans then scoop up the corralled fish from the water. But they also are known for stealing food from each other and even from other species of birds. Invite students to choose one of the birds from the story and research if that bird has group behavior that helps or hinders its survival. Using their research, have students construct an argument about group behavior strategies their birds use for survival.

7. A syntu is a five-line poem written about a natural feature of the Earth. The emphasis is on the five senses. Have students write syntu poems about one of the birds/bird beaks featured in this story.

WEB RESOURCES

GENERAL TEACHER AND STUDENT RESOURCES

[Minnesota DNR Teachers' Resources](#)

[DNR Kids Page](#)

RELATED MCV ARTICLES

[Winter's Woodpeckers](#)

[Wild Ideas, Wild Inventions](#)

[Cool Critters](#)

[Let's Go Birding!](#)

GENERAL BURYING BEETLE INFORMATION

[Project Beak](#)

VIDEO

[Bird Feeding Adaptations](#)

STUDY QUESTIONS ANSWER KEY

1. Name four activities a bird uses its beak or bill for. **Answers may vary but may include pecking, plucking, probing, preening, eating, finding food, grooming its feathers, communicating, building their nests, cooling off, turning its eggs, feeding its young, hatching, etc.**

2. How does rhynekinesis help a hummingbird survive? **We don't know for sure, but it might help them capture insects.**

3. Match the bird beak to its corresponding human tool:

barn swallow – butterfly net

common loon – needle-nose pliers

hummingbird – soda straw
pelican – scoop
goldfinch – nutcracker
peregrine falcon – scissors
great blue heron – spear
yellow-rumped warbler – tweezers
mallard – sieve
hairy woodpecker – chisel
snipe – toothpick

4. The bumps on a loon's bill that help it grasp food are called

- a. rynchokinesis
- b. denticles**
- c. gular sacs
- d. talons

5. True or false: A pelican uses its bill to scoop fish from a lake or river. **True**

6. What is a mallard's nail? **A point on its top bill that helps it capture small bits of food and tear plants.**

7. How do the hairlike feathers around the base of a hairy woodpecker's bill help it survive?

- a. They help the bird attract mates.
- b. They help the bird keep wood chips out of its nostrils.**
- c. They help prevent headaches.
- d. They let the bird know when it has chiseled far enough into wood.

8. What do the nerves in a snipe's bill allow it to do? **Sense the motion of its prey.**

9. Why can't a snipe see its food?

- a. because the food is underground.**
- b. because its eyes are on the sides of its head
- c. because its bill gets in the way
- d. because it shuts its eyes when it eats

10. Match the bird beak or bill to the special feature:

snipe – nerve-containing dents at the tip
hairy woodpecker – hairlike feathers where the bill meets the rest of the head
mallard – comblike structures called lamellae
peregrine falcon – tomial tooth
goldfinch – crevice on the top bill for cracking open seeds

CHALLENGE: The article states that birds in cold climates tend to have smaller bills than those in warmer climates. How might a smaller bill help a bird survive in cold? **We learned from this story that some birds, such as the American white pelican, use their bills to help cool off. That means bills give off heat. A smaller bill might help a bird retain more heat, which could help it survive in a cold climate. If, however, for some bird species, it is the opposite, with a larger bill helping them survive in cold climates (for example, in the case of the raven, the further north you go the bigger their bills are; they need the bigger bill to chip into frozen carcasses in the winter).**

MINNESOTA COMPREHENSIVE ASSESSMENTS ANSWER KEY.

1. What two birds described have been known to use their bills like spears?
 - a. hummingbird and barn swallow
 - b. pelican and peregrine falcon
 - c. snipe and hairy woodpecker
 - d. loon and great blue heron**

2. The article calls the barn swallow's bill "versatile." What evidence does it provide to support this? **It describes a wide variety of functions: capturing insects, feeding young, drinking, making nests, making noises.**

3. Place the thistle seed-eating steps for a goldfinch in the right order:
remove the seed from the thistle
use tongue to place the seed between the top and bottom bill
close mouth
use top bill to separate the hull and the seed
spit out the hull
swallow the seed

4. Animals that mainly eat other animals are called carnivores. Animals that eat plant materials are called herbivores. Animals that commonly eat both are called omnivores. Based on the information in this story, classify the birds in this story:
Carnivore: loon, barn swallow, pelican, peregrine, great blue heron, hairy woodpecker, Wilson's snipe
Herbivore: goldfinch
Omnivore: hummingbird, yellow-rumped warbler, mallard

5. True or False: Birds have tongues. **True**

VOCABULARY LIST

aerial related to or taking place in the air

crevice crack

grubs insect larvae

morsel tiny bit of food

preen to groom feathers with bill

probe search with a pointed object

striking [feature] draws attention

supplement added feature

versatile can serve different purposes