

TEACHERS GUIDE

to “A Slippery Mystery”

Multidisciplinary classroom activities based on the Young Naturalists nonfiction story in *Minnesota Conservation Volunteer*, March-April 2024, 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 words, study questions, and other materials.

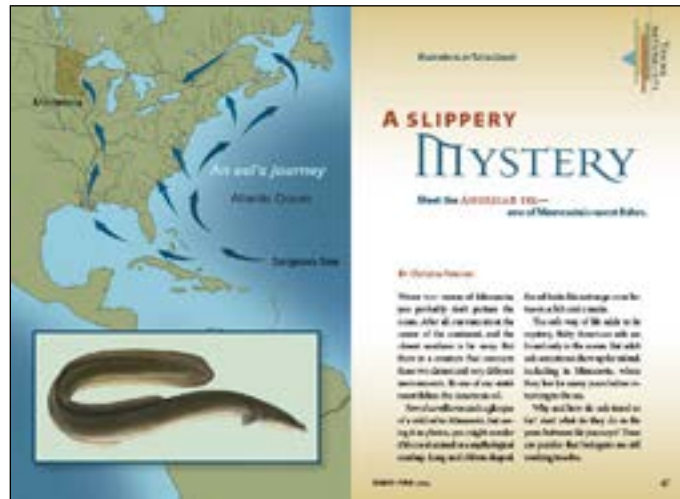
Readers’ contributions keep *Minnesota Conservation Volunteer* alive. The magazine is entirely financially supported by its readers.

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

Thank you for bringing Young Naturalists into your classroom!

“A Slippery Mystery”

Multidisciplinary classroom activities based on the Young Naturalists nonfiction story in *Minnesota Conservation Volunteer*, March-April 2024, mndnr.gov/mcvmagazine.



SUMMARY. The American eel is one of Minnesota’s rarest fish. It’s also one of the most mysterious. “A Slippery Mystery” introduces Young Naturalists to the life history of this unusual animal and poses questions scientists are still working to answer about its strange and wonderful lifestyle.

SUGGESTED READING LEVELS. Third through middle school grades

MATERIALS. KWL organizer; optional resources include dictionaries, video viewing equipment, Internet access and other print and online resources your media specialist may provide.

PREPARATION TIME. 10–15 minutes, not including time for extension activities.

Estimated instruction time. 30–60 minutes, not including extension activities.

MINNESOTA ACADEMIC STANDARDS APPLICATIONS. “A Slippery Mystery” 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:

ARTS

ARTISTIC PROCESS: CREATE OR MAKE (Benchmarks 0.2.1.5.1, 4.2.1.5.1)

ENGLISH LANGUAGE ARTS (GRADES 3-8)

Reading Benchmarks: Informational Text

Key Ideas and Details (Benchmarks 3.2.1.1, 3.2.2.2, 4.2.1.1, 4.2.2.2, 5.2.1.1, 5.2.2.2, 6.5.1.1, 7.5.1.1, 8.5.1.1)

Craft and Structure (Benchmarks 3.2.4.4, 3.2.5.5, 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, 4.2.7.7, 5.2.7.7, 5.2.9.9, 6.5.7.7, 7.5.7.7, 8.5.7.7)

LANGUAGE (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 (Benchmarks 6.13.1.1, 6.13.2.2)

Craft and Structure (Benchmark 6.13.8.8)

WRITING: LITERACY IN SCIENCE AND TECHNICAL SUBJECTS (GRADES 6-8)

Research to Build and Present Knowledge (Benchmark 6.14.7.7)

SPEAKING, VIEWING, LISTENING AND MEDIA LITERACY (GRADES 3-8)

Comprehension and Collaboration (Benchmarks 3.8.1.1, 3.8.3.3, 4.8.1.1, 5.8.1.1, 6.9.1.1, 7.9.1.1, 8.9.1.1)

SCIENCE (*CODING IS BASED ON THE 2019 COMMISSIONER APPROVED DRAFT OF MN ACADEMIC STANDARDS IN SCIENCE)

SCIENCE AND ENGINEERING PRACTICES

1. Asking questions and defining problems
2. Developing and using models
3. Planning and carrying out investigations
8. Obtaining, evaluating, and communicating information

CROSS CUTTING CONCEPTS

2. Cause and effect
5. Energy and matter: flows, cycles, and conservation
6. Structure and function

DISCIPLINARY CORE IDEAS

Life Sciences 2: Ecosystems: Interactions, energy, and dynamics

Earth and Space Sciences 3: Earth and human activity

Engineering, Technology, and the Application of Science 2: Links among Engineering, Technology, Science and Society

SOCIAL STUDIES

Geography (Standard 4.3.4.9)

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. What do your students know about eels? Give them a chance to share their thoughts and observations. Then divide them into small groups to do a KWL activity. Give each student a copy of the organizer (see www.teach-nology.com/web_tools/graphic_org/kwl). Within the groups, have students describe what they already know about eels and what they wonder about them and encourage each to write down their thoughts on the organizer. As you read and discuss the article and carry out extension activities, they can then record what they learn. If you'd like to try something different, you might wish to check out the [THC and KLEW](#) frameworks.

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.

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.

ASSESSMENT. You may use the study guide, combined with vocabulary, as a quiz. Other assessment ideas include: (1) Have students write multiple-choice, true-false, or short-answer questions based on the article. Select the best items for a class quiz. (2) Have students write 6–12 diary entries for an American eel that covers its various life-cycle stages from hatching to death. Encourage them to use their imagination and be as descriptive and specific as they can. Where in Minnesota did they live? What was it like traveling up the Mississippi River?

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. The American eel is one of the rarest fish in Minnesota, and is listed with the International Union for Conservation of Nature (IUCN) as an endangered species. What does it mean to be rare? Endangered? Why do we use designations like these? Look into the IUCN system.

2. Animals that migrate use a variety of senses to find their way to their destination, including sight, smell, and the ability to sense magnetic fields. What do scientists know already about how American eels navigate? What don't they know? Design an experiment scientists might use to answer one of the unanswered questions about how eels find their way to Minnesota and back to the Sargasso Sea. Alternatively, students interested in technology could investigate pop-up satellite archival tags (PSATs) that are used to track movements of migratory marine animals, to learn more about the technology and how it is being used to track and reconstruct the migration routes of eels to the Sargasso Sea (see <https://www.nature.com/articles/ncomms9705> for context).

3. What kinds of scientists get to help solve the eel mysteries that remain? Invite a fisheries biologist to talk with your students about their career. Students could be prompted to ask and answer questions about information from a speaker, offering appropriate elaboration and detail. Older students could be asked to identify the reasons or evidence a speaker provided to support their particular points or be asked to summarize the points a speaker made, distinguishing between a speaker's opinions and verifiable facts.

4. Why are American eels endangered? Use resources like those listed below to explore the threats humans pose. Talk about how students could help reduce these threats. Students might investigate the American eel restoration work the U.S. Fish and Wildlife Service is doing. Or students could be provided an opportunity to communicate, through a method of their choosing, the importance of the American eel in keeping rivers clean and ecologically intact.

5. Compare and contrast eels and snakes. How many similarities and differences can you find? Create a list as a class and then divide into groups to group the similarities and differences according to organizational schemes of their invention. Compare organizational schemes to illustrate the variety of ways to sort things.

6. American eels are among the species of animals that live in freshwater at one phase of their life and in saltwater at another. What are the changes in an eel's body that allow it to move from saltwater to freshwater and back again? Students can then explore the physiological adaptations that allow animals to thrive in high salt concentrations. (Younger students might be prompted to find examples in the story of the adaptations eels have.) Students also can be asked to use this information to support and communicate an argument (either written or oral) that animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

7. American eels are catadromous, meaning they spend most of their adult lives in freshwater rivers and streams and return to the oceans where they were first born to spawn. What other fish are catadromous? Invite students to investigate the difference between catadromous and anadromous, identifying examples of each type. Then ask students to develop two models (i.e. diagram, drawing, physical model, or computer-based model) that communicate the difference between catadromous and anadromous life cycles, while reflecting that both share similar stages of birth, growth, reproduction, and death. Students also could investigate other categories scientists use to classify the varying types of migrational movements used by fish.

8. There are about 800 species of eels. While some are drab grays and black, other species are colorful and patterned. Inspired by different photos of eel species students find online, students could pick one species to paint, and then share their painting (and information about their species) with their classmates.

WEB RESOURCES

MINNESOTA DNR WEB PAGES

[Anguilla rostrata](#)

[Minnesota Profile: American Eel](#)

[Fantastic Fish](#)

GENERAL TEACHER AND STUDENT RESOURCES

[Minnesota DNR Teachers' Resources](#)

THREATS TO EELS

[Save the Eels! \(University of Michigan\)](#)

[Are American Eels Endangered?](#)

YOUNG NATURALISTS STORIES

[Seven Natural Champions](#)

[The Magic of Morphing](#)

OTHER MATERIALS

[American Eel \(University of Minnesota\)](#)

[American Eel \(National Park Service\)](#)

[American Eel \(U.S. Fish and Wildlife Service\)](#)

STUDY QUESTIONS ANSWER KEY

1. How does the American eel connect Minnesota with the ocean? **It lives in both Minnesota lakes and rivers and in the Atlantic Ocean.**

2. What organs does an eel use to take up oxygen? Circle all correct answers.

a. Lungs

b. Gills

c. Kidneys

d. Skin

e. Heart

3. True or false: Eels are active mainly during the day. **False.**

4. Where do most Minnesota eels spend their lives? Put the following in order from the day they hatch to the day they produce their own young. Note that some of the options may be used more than once!

Sargasso Sea

Atlantic Ocean outside the Sargasso Sea

Gulf of Mexico

Mississippi River

Other Minnesota rivers

Mississippi River

Gulf of Mexico

Atlantic Ocean outside the Sargasso Sea

Sargasso Sea

5. What eats eels? **Hérons, otters, sharks, swordfish, people**

6. How does producing electricity harm eels? **Power plants that change the energy of flowing water into electricity can injure eels or prevent them from moving up-stream or downstream.**

7. What five kinds of animals does the story tell us use Sargasso Sea seaweed for food or shelter? **Eels, shrimp, seabirds, turtles, whales**

8. What are the four life stages of an eel, from youngest to oldest?

Larva, elver, glass eel, adult

Elver, larva, adult, glass eel

Glass eel, larva, elver, adult

Larva, glass eel, elver, adult

9. How long do adult eels live in Minnesota? **Up to 20 years**

10. How do eels help keep Minnesota's lakes and rivers clean? **They carry water-cleansing mussel larvae to new locations.**

11. True or false: There are no male American eels in Minnesota. **True**

12. A single female eel can lay up to how many eggs?

a. 20

b. 2 million

c. 20 million

d. 200 million

Challenge question: Most eels found in Minnesota arrive via the Mississippi River. What is another way some eels get here? **They come in from Canada via the Great Lakes.**

MINNESOTA COMPREHENSIVE ASSESSMENTS ANSWER KEY.

1. What two things cover an eel's skin? **Mucus and scales.**

2. Name three adaptations that help an eel swim. **Answers may vary but could include mucus, flexible body, many vertebrae, fins, tiny scales, slender shape.**

3. True or false: Male eels are bigger than female eels. **False. Females grow to be almost twice as long as males.**

4. How does an eel's color change help protect it? **The see-through larvae and elvers are hard for predators to spot because they are almost invisible. While in Minnesota, its greenish-gold color helps it hide in murky water. The silvery color it develops as it returns to the Sargasso Sea provides camouflage in the clear open ocean water.**

5. Which of these borders the Sargasso Sea?

a. The Gulf of Mexico

b. ocean currents

c. Denmark

d. Minnesota

e. a, c, and d

VOCABULARY LIST

canal – a narrow place through which water travels

debris – garbage

epic – extraordinary

inland – part of a country not near the border

inlet – a small outpouching of a water body

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