YOUNG NATURALISTS

TEACHERS GUIDE

TO "WHAT KIND OF FISH IS THAT?"

Multidisciplinary classroom activities based on the Young Naturalists nonfiction story in *Minnesota Conservation Volunteer*, May–June 2020, 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!

"What Kind of Fish Is That?"

Multidisciplinary classroom activities based on the Young Naturalists nonfiction story in *Minnesota Conservation Volunteer*, May–June 2020, www.mndnr.gov/mcvmagazine.

Summary. As small as your thumb and bigger than you, round and flat or long and fat, Minnesota fish come in many shapes and sizes. This Young Naturalists feature has everything you need to know to be able to correctly identify the next big one you pull out of a Minnesota lake or stream.

Suggested reading levels. 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 instruction time. 30–60 minutes, not including extension activities

Minnesota academic standards applications. "What Kind of Fish Is That?" activities and extensions 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 June commisioner approved draft of MN Academic Standards in Science)

Science and Engineering Practices

2. Developing and using models
5. Using mathematics and computational thinking
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

Crosscutting Concepts
11. Structure and function

Disciplinary Core Ideas
Life Sciences 2: Ecosystems: Interactions, energy, and dynamics
Life Sciences 4: Biological Evolution: Unity and diversity
Earth and Space Sciences 3: Earth and human activity
Engineering, Technology, and the Applications of Science 2: Links among Engineering, Technology, Science, and Society

Social Studies

Geography (Benchmarks 3.3.1.1.1; 4.3.1.1.1; 4.3.1.2.2; 4.3.4.9.1; 5.3.1.1.1; 6.3.1.1.1; 7.3.1.1.1; 8.3.1.1.1; 8.3.1.1.2)

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, 4.2.9.9, 5.2.7.7, 5.2.9.9, 6.5.7.7)
Writing Benchmarks
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)
Speaking, Viewing, Listening and Media Literacy Benchmarks
Comprehension and Collaboration (Benchmarks 3.8.1.1, 4.8.1.1, 5.8.1.1, 6.9.1.1, 7.9.1.1, 8.9.1.1)
Presentation of Knowledge and Ideas (Benchmark 5.8.4.4, 6.9.4.4, 7.9.4.4, 8.9.4.4)
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)

Arts

Artistic Process: Create or Make (Benchmarks 0.2.1.5.1, 4.2.1.5.1, 6.2.1.5.1)

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

Preview. View the video Minnesota Fish Underwater. Then ask students if they've ever seen a fish up close. Allow plenty of time, because your students may have lots of "fish tales" up their sleeves. Ask them what kinds of fish they saw, and make a list of answers on the board. Ask how many different kinds of fish they think there are in Minnesota. Then divide them into small groups to do a KWL activity. Within the groups, have students describe what they already know (K) about the different kinds of Minnesota fish 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.

Curricular adaptations. Read aloud or otherwise adapt as appropriate for 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 Minnesota fish. 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. The walleye is Minnesota's state fish. What other animals and plants have a special place in our Minnesota heritage? Learn about Minnesota's state symbols and why each is considered special to our state.
2. Learn about dichotomous identification keys and how to use them. Have students work in small groups to create a key that includes all of the fish in this story. Share the various keys and talk about how and why they are similar and different. Explore the internet to find examples of other keys students might use to identify insects, trees, and other living things found in nature.
3. Have each student choose a fish species from the ones in the story. Use internet and other resources to learn more about that fish and its niche—the unique position it occupies with respect to, and how it interacts with, other living and nonliving things. Use watercolors to create scenes that depict what each learned about their chosen fish, its habitat, its behavior, and its interaction with other organisms.
4. Map time! Using a large map of Minnesota, have students locate and highlight the various water bodies mentioned in the story. Invite volunteers to identify and mark other bodies of water that are familiar to them as well—ones near their home, ones they have visited, and so on. You can use the Minnesota DNR's Lake Finder to help identify the location of lakes students are familiar with but for which they don't know the location. Students could work together to create a classroom story map about their fishing, lake, or other nature experiences. Story mapping allows students to connect stories and experiences to particular geographic locations through online software and GIS technology. To get started, see Classic Story Maps.
5. Invite a DNR representative to your classroom to talk about fish and fishing, or use the MinnAqua Leader's Guide to offer lessons and activities on your own.
6. If possible, take a field trip to a zoo or aquarium to watch fish in action. Have students take notes about what intrigues them. Then, when you return to your classroom, invite them to think back on the experience and write a poem about it.
7. Provide families with information about the Minnesota DNR's "I Can Fish!" program and encourage them to give fishing a try together.

8. In the article, the coloring of fish can be a clue for identifying the species of fish. The coloring of fish is also related to age in some species. Minnesota's native bigmouth buffalo fish is not very well known, but very fascinating. Can you guess what city in Minnesota is named after this fish? This news story highlights this remarkable fish, which is one of the longest-lived vertebrates, and it also shows one way scientists determine the age of fish. After watching the video clip (the first half is most relevant), encourage students to learn more about fish coloration. Older students can research chromatophores and factors that influence distribution of color pigments; they might also learn more about bomb radiocarbon dating. This video can also spark further research into the important role this lesser-known fish plays in keeping the local ecosystem healthy. Students could be asked to use the information they gather through their research to communicate an argument, stemming from the evidence they collected, regarding the need for conservation of this unusual fish.

9. Many aspects of wildlife are the source of inspiration for scientists seeking to improve human life. Fish are no exception! One aspect of fish that has captivated scientists and engineers is their locomotion. Over time, fish have evolved to move easily and quickly through the aquatic environments. Some of the same waters fish travel easily through pose challenges for human vehicles and robots, particularly dark, murky waters. Fish are often used as a source of inspiration to design vehicles and robots that can skillfully navigate water environments. Studying fish locomotion is even guiding the design of robots that can be used for space exploration! For example, students might find it interesting to learn about the research at Cornell University, where movement of lamprey is guiding robot design for investigating the oceans of Jupiter's moon, Europa. Older or more advanced students could be prompted to investigate how researchers are using computer simulations to analyze the movement of fish through their environments. This can prompt discussions regarding the value of developing and using models, as well as using math and computational thinking, in science.

Web Resources

Red-Winged Blackbirds

Minnesota DNR Teachers' Resources
DNR Kids Page

Fish Identification

Fishes of Minnesota
Fish Images by Category

Videos

Minnesota Fish Underwater
Minnesota Fish Underwater II

Related MCV articles

Mirrors of Minnesota (state symbols)
Hundreds and Thousands and Millions of Fish
One Fish, Two Fish, Three Fish, Go Fish!

Study questions answer key

1. What three things can provide useful clues for identifying a fish? **1) Where you find it 2) How big it is 3) What it looks like**

2. What is Minnesota's state fish?
a. bluegill
b. walleye
c. sauger
d. northern pike

3. Match the species of fish with the water body in which you would be most likely to find it:
Rainbow trout – Lake Superior
Sauger – St. Croix River
Walleye – Mille Lacs Lake

4. Name three clues you could use to tell a sauger from a walleye. **Answers may vary but could include a white tip on the walleye's tail fin, a black spot on the walleye's front dorsal fin, rows of black spots on a sauger's front dorsal fin, brown splotches on a sauger's side.**

5. How did the walleye get its name? **It's named for its milk-colored eye that helps it hunt at night or in murky water.**

6. What's the best way to tell the three most common sunfish species apart? **Look at the flap of skin on the gill cover. A bluegill's flap is solid blue. A green sunfish's flap is dark blue with a light rim. A pumpkinseed's flap has a bright red patch.**

7. Why might you see a sunfish that has traits of different species? **Sometimes different species breed with each other, creating hybrids.**

8. Match the trout species with its identifying trait:
brook trout – white edge on the front if its fins
rainbow trout – a pink or red band
rainbow trout – forked tail
brook trout – red spots inside blue rings

brown trout – gold color

9. Which trout species are native to Minnesota?
a. brook trout
b. brown trout
c. rainbow trout
d. a and b
e. all of them
f. none, Minnesota does not have native trout

10. True or false: A catfish got its name because it purrs like a cat. **False. It got its name because it has whiskers like a cat.**

11. Which of these are you least likely to find in the Mississippi River?
a. smallmouth bass
b. brown trout
c. channel catfish
d. sauger

12. Where is one of the best places in North America to catch a big channel catfish? **The Red River of the North.**

CHALLENGE: If a bluegill weighs two pounds and a green sunfish weight 8 ounces, how many sunfish would it take to weigh the same as three bluegills? **12**

Minnesota comprehensive assessments answer key.

1. Why does Minnesota have so many fish species? **Because there are so many different kinds of places for them to live.**

2. Match each trait with the species of fish:
Spoon-shaped bill – paddlefish
Found in 1,700 Minnesota lakes – walleye
Flecks of bright orange on its sides – pumpkinseed
Dark lines radiating from its eye – smallmouth bass
Shaped like a football – largemouth bass
Eats mammals – muskie
Not native to Minnesota – rainbow trout
Whiskers – channel catfish

3. Name three clues you can use to tell a northern pike from a muskie. **Color of markings, tail shape, cheek scales. Northern pike have light spots on a dark body while**

muskies have dark marks on a lighter-colored body. A northern pike's tail tips are rounded while a muskie's tail tips are pointed. A northern pike has scales all over its cheek, while a muskie has scales only on the top part.

4. Name three fish you might find in the St. Croix River. **Sauger, flathead catfish, channel catfish**

5. Name three fish with whiskers. **Flathead catfish, channel catfish, bullhead**

6. True or false: A largemouth bass's mouth is larger relative to its body size than a smallmouth bass's mouth is. **True**

Vocabulary list

angler – a person who tries to catch fish with a hook
backwaters – quiet part of a river away from the main flow
flecks – spots
hybrid – offspring of two different varieties or species
protruding – sticking out
radiate – extend or move out
sleek – smooth and shiny
stocked – created a supply
vertical – up and down