

TEACHERS GUIDE

TO “A TREE FOR ALL SEASONS”

Multidisciplinary classroom activities based on the Young Naturalists nonfiction story in *Minnesota Conservation Volunteer*, March-April 2022, 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.

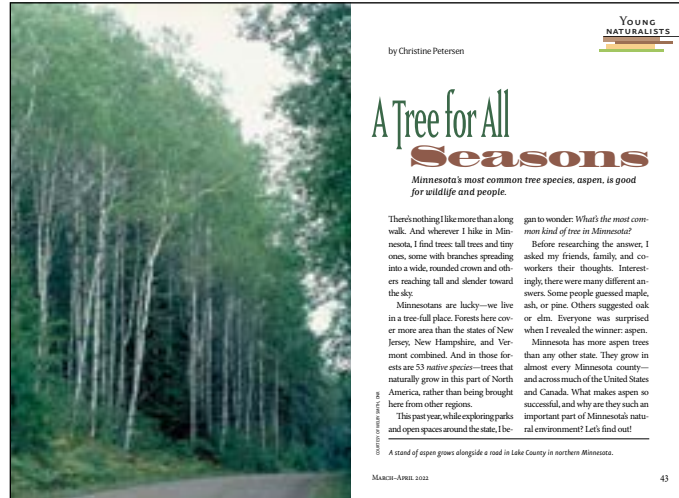
Readers’ contributions keep *Minnesota Conservation Volunteer* alive. The magazine is entirely financially supported by its readers.

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

Thank you for bringing Young Naturalists into your classroom!

“A TREE FOR ALL SEASONS”

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



SUMMARY. If you live in Minnesota, you likely don't live far from an aspen! This Young Naturalists feature story explores the life and times of this ubiquitous tree—where it's found, its unique traits, and its place in the ecosystem. It also describes how people have used the tree in the past and how we use it today.

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. 15–30 minutes, not including time for extension activities.

ESTIMATED INSTRUCTION TIME. 30–60 minutes, not including extension activities.

MINNESOTA ACADEMIC STANDARDS APPLICATIONS. “A Tree for All Seasons” 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)

SCIENCE AND ENGINEERING PRACTICES

1. Asking questions and defining problems
2. Developing and using models.

- 3.Planning and carrying out investigations.
- 6. Constructing explanations (for science) and designing solutions (for engineering)
- 8. Obtaining, evaluating, and communicating information

CROSSCUTTING CONCEPTS

- 2. Cause and effect
- 6. Structure and function
- 7. Stability and change

DISCIPLINARY CORE IDEAS

Life Sciences 1: From molecules to organisms: Structures and processes; 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.

MATH (GRADES 3-8)

Data Analysis (Benchmarks 3.4.1.1, 4.4.1.1, 5.4.1.2, 6.3.3.1)
(Benchmarks 3.4.1.1, 4.4.1.1, 5.4.1.2, 6.3.3.1)

SOCIAL STUDIES

Geography (Standard 3.3.1.1, 4.3.1.1, 5.3.1.1; Benchmarks 4.3.4.9.1, 6.3.4.10.1)

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, 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, 4.2.8.8, 5.2.7.7, 6.5.7.7, 6.5.8.8, 7.5.8.8, 8.5.8.8)

WRITING BENCHMARKS (GRADES 3-8)

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 (Grades 3-8)

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)

LANGUAGE BENCHMARKS GRADES 3-8)

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

READING BENCHMARKS Literacy in Science and Tecchnical Subjects (Grades 6-8)

Key Ideas and Details (Benchmarks 6.13.1.1, 6.13.2.2)

Integration of Knowledge and Ideas (6.13.8.8)

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

Research to Build and Present Knowledge (Benchmark 6.14.7.7)

Arts (Grades 3-8)

Artistic Process: Create or Make (Benchmark 0.2.1.5.1, 0.3.1.5.1, 4.2.1.5.1, 6.2.1.2.1)

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. Ask your students what they know about fur. Give them a chance to share their ideas about animals that have fur and words that describe fur. Then divide them into small groups to do a [KWL activity](#). Within the groups, have students describe what they know (K) about fur and what they wonder (W) about fur. 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.

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 red-winged blackbirds. 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. An [aspen grove in Fishlake National Forest, Utah](#), could be the world's largest living organism. How big is it? Why do some people think it's in trouble? Invite students to learn more about this remarkable stand of trees that is actually a single plant.

2. Cloning (aspen's ability to reproduce by sending up sprouts from their roots) is also why Utah's aspen grove Pando is not only one of the world's largest living organisms, but among the oldest as well. Students can explore more of Earth's oldest living things, or work with a partner to learn more about one of the 15 organisms and its location, using Atlas Obscura, then share what they learned about their organism with the class. Older students could be encouraged to think about what these oldest living organisms have in common. This also is an opportunity for students to think about the accuracy of the internet as a source of information. For example, The Arbor Day Foundation suggests Minnesota is home to one of the oldest living organisms on earth, an aspen clone that is thought to be about 8,000 years old. Other websites suggest Utah's Pando clone is the oldest, with some reporting the clone to be more 80,000 years old. The USDA Forest Service suggests the age is closer to 10,000 years. Have students try to get to the bottom of this, while learning about how these clones are aged and also the importance of citing your sources! You might also ask students to collect and organize their data using a spreadsheet, building their understanding of and skills for using spreadsheet tables to display and communicate data.

3. The challenge question below encourages students to think about the adaptive value of trembling leaves. Give students an opportunity to watch an aspen's leaves move in the breeze—in person outdoors if possible, or view a video if not. Invite them to speculate as to how the movement benefits aspen trees. Is it just to give humans a pleasant sound to hear during spring and summer? Then use their speculation as a basis for a lesson on the scientific method. Break into groups of three and have each group form a hypothesis about the trembling and develop an experiment to test it. When you return to your larger group, have each group present what they came up with, and invite other students to suggest ways they might strengthen their proposed experiment (add appropriate controls, control confounding variables, etc.). Alternatively, the trembling of the aspen leaf is an everyday “phenomenon” that students can observe, and from which they can generate their own questions about how and why the leaves tremble, discover connections, and design models to make sense of what they observe. Older students could also be challenged to think about how this adaptation could be used to design solutions in the built/human world. For more information on phenomenon-based science inquiry, see

[Using Phenomena in NGSS-Designed Lessons and Units.](#)

4. People have been using aspen to make paper for centuries. Learn about the process of making paper made from trees. If time allows, use an online resource such as this activity guide from [Project Learning Tree](#) to make your own paper.

5. The story tells us that aspen are often the first trees to grow in a cleared area. As they mature, other trees such as maples and pines start to take over. Do a deep dive into the concept of forest succession. What traits help a pioneer species thrive? What traits characterize trees that take over later? What does this say about the value of biodiversity? The U.S. Forest Service has a [time-lapse video of an aspen grove](#) re-sprouting after a forest fire that may prompt other questions for students to deepen their learning about aspen ecology.

6. Ojibwe traditionally used aspen roots and bark as a source of medicine. Use primary and secondary research to learn more about this practice. What ailments are treated? How are the roots and bark prepared and administered? If time allows, introduce the broader concept of ethnobotany and the use of plants to enhance physical well-being.

7. This story mentions how aspen support many kinds of wildlife through the season and in different stages of their growth. Invite students to represent this main idea (along with key details that support the main idea) visually through a drawing, painting, or media arts. Or “commission” them as artists for Minnesota Conservation Volunteer and invite them to re-design the opening spread for this Young Naturalists story!

WEB RESOURCES

MINNESOTA DNR

GENERAL TEACHER AND STUDENT RESOURCES

[Minnesota DNR Teachers' Resources](#)

[DNR Kids Page](#)

[Quaking Aspen \(Populus tremuloides\)](#)

[Big-toothed aspen \(Populus grandidentata\)](#)

RELATED MCV ARTICLES

[Aspen on the Fast Track](#)

[Minnesota Profile: Quaking Aspen \(Populus tremuloides\)](#)

[The Cinderella Tree](#)

VIDEOS

[Fishlake National Forest Pando Clone](#)

Earth's most massive living thing is struggling to survive
The world's largest organism

STUDY QUESTIONS ANSWER KEY

1. Minnesota has more aspen trees than:
 - a. New Jersey, New Hampshire, and Vermont, combined
 - b. **any other state**
 - c. All of the other 52 native tree species put together
 - d. Canada

2. True or false: There are more aspen trees than oak trees in Minnesota. **True**

3. Which of Minnesota's two aspen species have the following traits?
Label them "Q" for quaking aspen, "B" for bigtooth aspen, or "BQ" for both.

4. Smooth bark that becomes rough as the tree grows old **BQ**
Triangle-shaped leaves **B**
Oval-shaped leaves **Q**
Wide teeth on the leaf edges **B**
Dark scars on branches where branches used to be **BQ**

5. In which of these places would an aspen be most likely to grow?
 - a. in the middle of a pine forest
 - b. in the middle of a woodland
 - c. in the middle of a cornfield
 - d. **at the edge of a forest**

6. What is a pioneer species? **An organism that is among the first to inhabit an area.**

7. Name two ways fires benefits aspen. **Answers may include 1) it clears out dense growth on the forest floor; 2) the ashes it creates add nutrients to the soil; 3) by killing trees, it allows sunlight into the forest.**

8. Which is correct?
 - a. pollen + seed = egg
 - b. **egg + pollen = seed**
 - c. egg + seed = pollen

9. A single aspen tree can produce more than _____ seeds.
100
1,000

100,000
1,000,000
1,000,000,000

10. Which parts of an aspen does the article say that grouse eat? Circle all that apply.

- a. **twigs**
- b. leaves
- c. **buds**
- d. **catkins**
- e. stem

11. What does the writer mean when she calls elk a “lost species”? Mark an “X” next to all that apply.

- They hide, so it is hard to find them.
- They are uncommon because the places they lived were cleared for farming.
- They have a hard time finding their way around in a thick aspen forest.
- They are uncommon because too many were hunted.

12. What makes it possible for aspen to photosynthesize in winter? **The chlorophyll inside their bark.**

Challenge Question: Why might it be beneficial to an aspen to wobble its leaves in the breeze? **Accept any answer that reveals thoughtful consideration of what trees need to survive. Scientists have speculated that the movement helps expose different parts of the leaf to sunlight, reducing the likelihood that one part will get too much sun or overheat; that it increases exposure to the carbon dioxide needed for photosynthesis, or that it helps protect the leaves from insect damage. Perhaps your students will come up with an even better answer!**

MINNESOTA COMPREHENSIVE ASSESSMENTS ANSWER KEY.

1. The title of this story is “A Tree for All Seasons.” Based on what you learned, why is this a good name for the aspen? **Answers may vary but should reflect the fact that aspen has interesting traits in spring, summer, fall, and winter.**

2. Name three ways in which quaking aspen and big-toothed aspen are similar, and three ways in which they are different. **Answers may vary, but similarities may include they are both aspen, they are both trees, they both have whitish bark, etc. Differences may include the shape of the leaf edges.**

3. How can you tell the difference between aspen bark and birch bark? **Birch bark peels off in thin strips, showing a salmon-colored layer underneath.**

4. What does the author mean when she writes, “change creates opportunities”? **Disturbances like fire and floods create conditions like sunlight and nutrient-rich soil that aspen need to grow.**

5. Which of these is not a use for aspen described in the article?

Material for boxes, furniture, and houses

Paper

Fuel pellets

Fences for elk

Medicine

Food for pine martens, bobcats, and hawks

Food for deer, moose, and rodents

VOCABULARY LIST

Catkin – soft, dangling tree flower

Hooved – having hooves

Lodge – an indoor place to gather or live

Predator – an animal that eats other animals

Rodent – a kind of mammal that gnaws its food and has teeth that continually grow

Thicket – a space filled with trees or shrubs

Tribal – of or related to tribes

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