

TEACHERS GUIDE

TO “COOL CRITTERS”

Multidisciplinary classroom activities based on the Young Naturalists nonfiction story in *Minnesota Conservation Volunteer*, July–August 2017, 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 Naturalist 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. It is the only state conservation magazine to claim the distinction of being financially supported by contributions from 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!

“COOL CRITTERS”

Multidisciplinary classroom activities based on the Young Naturalists nonfiction story in *Minnesota Conservation Volunteer*, July–August 2017, www.mndnr.gov/mcvmagazine.



SUMMARY. How do animals beat the heat? “Cool Critters” introduces Young Naturalists to the variety of adaptations that help Minnesota wildlife thrive through hot summer days.

SUGGESTED READING LEVELS. Third through middle school grades

MATERIALS. KWL organizer, thermometers, cotton balls, graph paper, paper, poster board, colored pencils, crayons, pens, markers, materials for making your own thermometer (see “Extension Activities” below) and other print and online resources your media specialist may provide

PREPARATION TIME. One to two hours, not including time for extension activities

ESTIMATED INSTRUCTION TIME. One or two 50-minute class periods (not including extensions)

MINNESOTA ACADEMIC STANDARDS APPLICATIONS. “Cool Critters” may be applied to the following Minnesota Department of Education standards:

LANGUAGE ARTS READING BENCHMARKS INFORMATIONAL TEXT 3–8

Key Ideas and Details, Craft and Structure, Integration of Knowledge and Ideas, Range of Reading and Level of Text Complexity

WRITING BENCHMARKS 3–8 Text Types and Purposes, Writing Process, Research to Build and Present Knowledge, Range of Writing

READING BENCHMARKS: LITERACY IN SCIENCE AND TECHNICAL SUBJECTS 6–8

Key Ideas and Details, Craft and Structure, Integration of Knowledge and Ideas, Range of Reading and Level of Text Complexity

WRITING BENCHMARKS: LITERACY IN HISTORY/SOCIAL STUDIES, SCIENCE, AND TECHNICAL SUBJECTS 6–8

Text Types and Purposes, Writing Process: Production and Distribution of Writing, Research to Build and Present Knowledge, Range of Writing

MATHEMATICS 3, 4, 6, AND 7

Geometry and Measurement

3.1.2.4

SCIENCE 3, 4, 5, 6, AND 7

The Nature of Science and Engineering

3.1.1.2.3; 3.1.1.2.4; 6.1.3.4.1

Physical Science

4.2.1.1.1; 4.2.3.1.1; 6.2.1.2.3; 6.2.3.2.3

Life Science

3.4.1.1.1; 3.4.1.1.2; 5.4.1.1.1; 7.4.3.2.4

ARTS K–12

1. Artistic Foundations: Visual Arts; Music
2. Artistic Process: Create or Make: Visual Arts
3. Artistic Process: Perform or Present: Visual Arts; Music
4. Artistic Process: Respond or Critique: Visual Arts; Music

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

PREVIEW. (1) Personalize the subject by inviting students to talk about how they cool off on a hot summer's day. Invite them to share stories of times they have seen other animals trying to stay cool. To find out what your students already know (K) about keeping cool, divide the class into small groups to brainstorm their ideas. 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. Ask what students would like to learn, or what questions they have, about the topic (W). Record their questions on poster board for reference. As you read and discuss the article you will begin to compile the (L) lists, or what they learn while reading the article and related materials and participating in extension activities. KWL gives you the opportunity to introduce interdisciplinary connections you will make during extension activities. If you use the article in science or art class, you may wish to focus your prereading activity on academic standards that apply for that class. (3) Download a [brainstorming web](#).

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.

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 or phrase with smaller letters framing the word or phrase 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 how animals stay cool. 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 make posters showcasing the six ways of keeping cool described in this article. Use photos from magazines to illustrate the various strategies. (4) Have students choose three strategies for keeping cool and compare and contrast them.

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. Demonstrate the cooling effect of evaporation. Place two thermometers on a surface in the sun. Record the temperatures. Ask students to predict what will happen if you cover the base of one of them with a cotton ball soaked in water. Do the experiment and record the temperature of the two thermometers over time until the cotton ball is dry. Graph your results. What do they tell you?
2. The hottest air temperature recorded in Minnesota was 115 degrees. Do some digging to find out what other weather records have been set in Minnesota, where and when.
3. Just as living things have adaptations that help them stay cool in warm weather, many have adaptations to stay warm in cold weather. Invite students to share their observations about such adaptations, then do some research to learn more.

4. Do some historical research to learn about the day Minnesota's hottest temperature record was set. What did the news reports of the time have to say? How did people and other living things stay cool? Have students imagine they were alive then, and write a first-person story about the day.
5. Rabbit ears and deer ears get rid of heat with a lot of surface area. What human inventions do the same thing? Do a web search for "radiators" and see what you learn.
6. Learn about favorite temperatures for different kinds of fish. What does this tell you about how to fish for your favorite fish at a specific time of year?
7. Compare and contrast what happens to an animal's body during estivation and hibernation. How are the two states similar? How do they differ?
8. Research how air conditioners work and make a presentation to the class. Which of the strategies for cooling are involved?
9. Learn about how various tools for measuring temperature work, then build your own thermometer.

WEB RESOURCES

GENERAL TEACHER AND STUDENT RESOURCES

[Minnesota DNR Teachers' Resources](#)

[DNR Kids Page](#)

YOUNG NATURALISTS FEATURES

[Damsels and Dragons](#)

[Minnesota Is Hopping With Hares and Rabbits](#)

VIDEOS

[Double-crested Cormorant Gular Fluttering \(video\)](#)

OTHER RESOURCES

[How Birds Keep Their Cool](#)

[From Panting to Pooping, 8 Weird Ways Animals Keep Cool](#)

[Minnesota Climate Extremes](#)

[Ideal Water Temperatures for Freshwater Fish](#)

STUDY QUESTIONS ANSWER KEY

1. How does a nesting gull beat the heat on a sunny day? **It turns during the course of the day so its body gets the least amount of sunlight.**
2. How does panting help an animal stay cool? **As air moves past moist surfaces in the mouth, water molecules evaporate, taking heat with them.**
3. Name three kinds of Minnesota birds that pant. **Answers may vary; those listed in the article are tree swallows, crows, and goldfinches.**
4. Describe three ways you stay cool on a hot summer's day. **Answers may vary; they may include going to air conditioned places, using a fan, swimming, sweating, playing with water, staying in the shade, drinking or eating something cold.**

5. Name four kinds of birds that use gular fluttering to stay cool. **Answers may vary; ones mentioned in the article are great blue herons, pelicans, quail, and nighthawks.**
6. If a bird performed 420 gular flutters per minute, how many would that be per second? **7**
7. The process of cooling off by touching something cool is called:
- A. evaporation
 - B. radiation
 - C. conduction**
 - D. estivation
8. True or false: Cormorants, pelicans, and other birds use blood vessels in their ears to radiate heat from their bodies. **False. Birds spread their wings to radiate heat from their bodies.**
9. Are fish cold-blooded or warm-blooded? **Cold-blooded**
10. Name four kinds of animals that estivate: **Answers may vary; those listed in the article are toads, worms, snails, butterflies.**
11. What is the main difference between hibernation and estivation? **Hibernation helps animals survive cold, and estivation helps animals survive heat.**
12. Name five kinds of animals that take baths to stay cool: **Answers may vary; those listed in the article are moose, white-tailed deer, merlins, house sparrows, humans, and songbirds.**
13. Two cooling strategies that take advantage of evaporation are **panting** and **bathing**. **(Other correct answers include sweating and gular fluttering.)**
- CHALLENGE: Based on what you learned in this story, why does a fan help you feel cooler? **It moves air past the surface of your body, increasing evaporation.**

MINNESOTA COMPREHENSIVE ASSESSMENTS ANSWER KEY.

1. Which of these animals does NOT sweat?
- A. Humans
 - B. Horses
 - C. Gorillas
 - D. Deer**
2. A herring gull sits in a special way minimizes the amount of sunlight that hits it. What is the antonym of minimize? **Maximize**
3. The obelisk posture is:
- A. A small cavity in a rock a snake uses to shade itself in hot weather
 - B. A pose a dragonfly takes to help minimize exposure to the sun**
 - C. The way a squirrel spreads itself out on a tree branch
 - D. A fox's posture when it is panting.
4. What is conduction? **The process by which heat moves directly from a warm object to a cool one.**
5. If a lake or stream gets too warm, a cold-water fish species may no longer be able to live in it. What might happen to it instead? **It could die out or, if the body of water is connected to other water bodies, it could move to another lake or stream.**

VOCABULARY LIST

evaporation the process by which a liquid turns into a gas

loaf relax

laced covered with a lacelike pattern

minimize get or make the least of

obelisk a tall, thin pillar

parasite a living thing that benefits from another living thing in a way that harms the host

posture the way an animal holds its body

sundial an object that uses a shadow cast by the sun to tell time

visor a flat object that provides shade

vole a small, mouselike mammal