

TEACHERS GUIDE

TO “CRITTER CROSSINGS”

Multidisciplinary classroom activities based on the Young Naturalists nonfiction story in *Minnesota Conservation Volunteer*, March-April 2021, 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!

“CRITTER CROSSINGS”

Multidisciplinary classroom activities based on the Young Naturalists nonfiction story in *Minnesota Conservation Volunteer*, July-August 2022, mndnr.gov/mcvmagazine.



SUMMARY. Roads can harm wildlife by exposing them to risk of collisions with vehicles and disrupting their ability to reach habitat. This article explores one strategy for alleviating the problem—building tunnels and bridges that allow them to cross.

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. “Critter Crossings” 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 AND FOCUSES ON THE THREE DIMENSIONS FROM THE FRAMEWORK FOR K-12 SCIENCE EDUCATION (NRC, 2012) SCIENCE AND ENGINEERING PRACTICES

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

- 3. Planning and carrying out investigations
- 7. Engaging in argument from evidence.
- 8. Obtaining, evaluating, and communicating information.

CROSSCUTTING CONCEPTS

- 2. Cause and effect
- 6. Scale, proportion, and quantity

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 1: Engineering design; 2: Links among Engineering, Technology, Science, and Society

SOCIAL STUDIES

Citizenship and Government (Benchmarks 3.1.1.1.1, 3.1.4.6.1, 4.1.1.1.1, 5.1.1.1.2, 6.1.1.1.1, 6.1.1.1.3, 6.1.4.6.1, 6.1.4.6.7, 7.1.1.1.1, 8.1.1.1.1)

Geography (Benchmark 4.3.4.9.1)

ARTS

Artistic Process: Create or Make (Benchmarks 0.2.1.2.1., 0.3.1.5.1, 4.2.1.5.1, 6.2.1.5.1)

ENGLISH LANGUAGE ARTS

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, 6.5.2.2, 7.5.1.1, 7.5.2.2, 8.5.1.1, 8.5.2.2)

Craft and Structure (Benchmarks 3.2.4.4, 4.2.4.4, 4.2.5.5, 5.2.4.4, 5.2.5.5, 6.5.4.4, 6.5.6.6, 7.5.4.4, 7.5.6.6, 8.5.4.4, 8.5.6.6)

Integration of Knowledge and Ideas (Benchmarks 3.2.7.7, 4.2.7.7, 4.2.8.8, 5.2.7.7, 5.2.8.8., 5.2.9.9, 6.5.7.7, 6.5.8.8, 7.5.8.8, 8.5.8.8)

WRITING BENCHMARKS

Text Types and Purposes (Benchmarks 3.6.1.1, 4.6.1.1, 5.6.1.1, 6.7.1.1, 7.7.1.1, 8.7.1.1)

Research to Build and Present Knowledge (Benchmarks 3.6.7.7, 4.6.7.7, 4.6.9.9, 5.6.7.7, 5.6.9.9, 6.7.7.7, 6.7.8.8, 6.7.9.9, 7.7.7.7, 7.7.8.8, 7.7.9.9, 8.7.7.7, 8.7.8.8, 8.7.9.9)

SPEAKING, VIEWING, LISTENING AND MEDIA LITERACY

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 (Benchmarks 3.8.4.4, 4.8.4.4., 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, 7, 8.11.4.4, 8.11.6.6)

READING BENCHMARKS: LITERACY IN SCIENCE AND TECHNICAL SUBJECTS

Key Ideas and Details (Benchmarks 6.13.1.1, 6.13.2.2)

Craft and Structure (Benchmark 6.13.6.6)

Integration of Knowledge and Ideas (Benchmark 6.13.8.8)

WRITING BENCHMARKS: LITERACY IN SCIENCE AND TECHNICAL SUBJECTS

Research to Build and Present Knowledge (Benchmark 6.14.7.7)

For current, complete Minnesota Academic Standards, see the [Department of Education website](#). Teachers who find other connections to standards may contact *Minnesota Conservation Volunteer*.

PREVIEW. Give students a chance to share their thoughts and observations about roads and wildlife. Then divide them into small groups to do a [KWL activity](#). Within the groups, have students describe what they know (K) about ways to keep animals safe from cars and trucks and what they wonder (W) about them. Give each student [a copy of the organizer](#) 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 vocabulary list at the end of this guide. Share the words with your 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 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. The author of this story is a wildlife ecologist. Invite a wildlife ecologist to your classroom live or virtually to share what their job is like. Older students can be asked to learn

more about becoming a wildlife ecologist and what that work entails through conducting internet research. For younger students, a video such as [I want to be a wildlife conservationist](#), could be a launching point for learning more about what wildlife ecologists do and broadening their awareness of a range of wildlife-related careers.

2. If you or your students know of someone with a trail camera, ask permission to watch a recording of animals it has “captured” when no one was watching. View the images together and invite students to share their thoughts on what they learned about the various animals that goes beyond their in-person observations. Or invite students to view this Voyageurs Wolf Project [footage from a trail camera](#) in northern Minnesota. Using clues from the story, this [story of a teen inventor](#), and their own creative thinking, have students brainstorm applications for trail cameras in the context of wildlife road crossings..

3. The story tells us that culverts were designed to carry water, but people noticed wildlife were using them to safely travel under roads. As a result, designers and engineers were able to redesign culverts to work even better for the second purpose. Introduce your students to the [engineering design process](#). Then invite them to think of an everyday object that serves a specific purpose, imagine how that object might do “double duty” to solve a second problem or meet a second need, and describe how they might use the design process to make it even better at doing so. For example, a basketball could also help students learn geography if it were imprinted with a world map.

4. The Minnesota Department of Transportation and the Minnesota Department of Natural Resources are working together to make roads safer for wildlife. Use this as a launch point for learning about Minnesota’s state government. How many branches of government are there? How do agencies such as MnDOT and DNR fit in? How do they benefit the people of Minnesota? How do we pay for them?

5. The Netherlands is another country investing in wildlife corridors. It is home to about 600 wildlife crossings, or “ecoducts,” including what is said to be the longest wildlife corridor in the world. Natuurbrug Zanderij Crailoo is about a half-mile long, and many species have used this crossing since it was built in 2006, including 13 mammal species, six amphibian species, and two reptile species. Even species that are rarer to that area, the cricket and sand earworm, have been documented using the crossing. And the animals share the crossing with people! Every week, more than 3,000 walkers, cyclists and horse riders traverse it. Invite students to learn more about this crossing and encourage them to research and discuss pros and cons regarding having people share wildlife crossings. This could culminate in a written opinion piece, supported by clear reasons and supporting evidence, or in an oral presentation, where relevant facts and details are used to support one’s point of view. Alternatively, students could be challenged to design

an investigation to determine if (or to what extent) human use affects wildlife use of the crossing.

6. Many people in Minnesota may not be aware of what the DNR is doing to help wildlife safely cross roadways. After reading the story, invite students to look up pictures of passage benches online and to learn about general guidance for creating passage benches. (For example, [WSB](#), an engineering consulting firm, has user-friendly information on what passage benches are, what they look like, and mistakes to avoid when building them.) Have students create a model of a passage bench that includes information that can help others learn about the issue of wildlife and safe road crossings. Alternatively, students could create an educational exhibit to display (at the school, local library, community center, etc.) about different solutions for wildlife roadway crossings, such as the overpasses, underpasses, and fencing mentioned in the story, as well as other lesser-known potential solutions, such as [elevated road segments](#), micro-passages, and land corridors.

7. Because wildlife crossings can reduce wildlife death and traffic accidents, the public as well as transportation departments and natural resources agencies are generally supportive of them. Yet sometimes, the public may not be in favor, due to concerns about how they will look or the cost of the crossing. Students could be invited to plan an investigation regarding local roadways and how they would determine whether a wildlife crossing is needed, or to more generally consider the issue of wildlife crossings from multiple perspectives. Older students could be asked to explore how a [potential wildlife crossing in Island Park, Idaho](#), polarized a community, using that as a launching point for researching the advantages and disadvantages of wildlife crossings. Also, perhaps surprisingly, not all environmentalists enthusiastically support wildlife crossings. Invite older students to read [this New York Times article](#), and to reflect on what the environmentalist means when she describes wildlife crossings as a “band-aid” and a road as the “wound.” Students can discuss their views on this, or write an opinion piece, expressing their point of view back by relevant evidence. This can lead to further exploration of the issue of habitat fragmentation and how wildlife deaths from roadway crossings are one part of a larger conservation issue.

WEB RESOURCES

MINNESOTA DNR

[Minnesota DNR Teachers' Resources](#)

NEWS STORIES

[How do animals safely cross a highway? Take a look.](#)

[Highway 5 fencing aimed at protecting turtles](#)

[MnDOT Hwy 14 dedicated deer crossing aimed at reducing collisions with vehicles](#)

[Minnesota town installs turtle tunnel](#)

[Critters Crawl the Washington County Turtle Tunnel](#)

RELATED MINNESOTA CONSERVATION VOLUNTEER ARTICLES

[Turtle Power](#) (Young Naturalists feature)

VIDEOS

[Wildlife crossing stop roadkill. Why aren't there more?](#)

[These wildlife bridges save thousands of animal lives](#)

ENGINEERING RESOURCES FOR OLDER STUDENTS

[Measures to reduce road impacts on amphibians and reptiles in California](#)

STUDY QUESTIONS ANSWER KEY

1. The article names four kinds of animals that die while crossing roads. What are they, and what traits do they have in common that might make them more likely than other animals to meet this fate? **Deer, raccoons, squirrels, turtles. Answers may vary but might include they can't fly, they are eaten by other animals, they range over large areas, they are abundant.**

2. The author works for the Minnesota Department of Transportation. What is his job?

a. Highway engineer

b. Wildlife ecologist

c. Dead animal removal specialist

d. Road ecologist

3. How big are culverts? **Culverts come in many sizes. They can be as small as a pipe or big enough for deer to walk through.**

4. What are three things we can do to make culverts better wildlife "roads" beneath the road? **Make them bigger, make multiple ones at different levels, make them easier to get into.**

5. What is a passage bench?

a. A place for animals to rest as they walk under a road

b. Space for animals to walk on under a bridge

c. A place for wildlife ecologists to sit while watching wildlife pass by

d. A structure animals can use to float under a bridge.

6. Why is riprap a problem for small animals like ducklings and frogs? **They can fall into and get trapped in the spaces between the rocks.**

7. How many passage benches are there in Minnesota? **More than 150.**

8. True or false: The purpose of the fences the article describes is to prevent animals from crossing a road. **False. Some direct animals to a culvert or bridge so they can cross under a road.**

9. True or false: A fence that prevents animals from crossing the road is better than no fence at all. **False. Without a fence, at least some animals can cross the road.**

10. Which of these does the article tell us are helping to make Minnesota's roads safer for wildlife?

- a. Minnesota Department of Transportation
- b. Minnesota Department of Natural Resources
- c. Minnesota Department of Agriculture
- d. U.S Fish and Wildlife Service
- e. Minnesota Zoo
- f. a and b
- g. All of the above**

11. The article names seven kinds animals known to use critter crossings. Put on your reading detective hat and see if you can find all of them. **Raccoons, coyotes, rabbits, deer, bear, great blue herons, turtles.**

Challenge Question: If a turtle fence reduced roadkill 63 percent and researchers found eight dead turtles in May of the year before it was built, how many would they expect see in May of the year after it was built? **They would expect to see three dead turtles.**

MINNESOTA COMPREHENSIVE ASSESSMENTS ANSWER KEY.

1. What was the original purpose of culverts? **To funnel water under a road.**
2. How do researchers learn what kinds of animals use a culvert to cross under a road? **By observing and identifying the footprints they make.**
3. True or false: More animals use passage benches than expected. True. **The author says that he and his coworkers were pleasantly surprised at how many animals used them.**
4. Name three ways people benefit from wildlife tunnels. **This question requires students to make inferences from the information the article presents. Accept any reasonable answers. Possibilities include avoiding injuries and property damage from collisions, avoiding emotional trauma from hitting an animal, not having to clean up roadkill, having a job building wildlife corridors, being able to enjoy living animals.**

5. Special structures make roadways safer for people to cross them, too. Can you name any of these? **Answers may vary but might include pedestrian and bicycle bridges, crosswalks, fences, flashing lights, and “pedestrian crossing” signs.**

VOCABULARY LIST

aggregate – crushed rocks, gravel, and sand

barrier – something that blocks something else

effective – working well

roam – wander

sturdy – strong

tailored – designed or made specifically for

vehicle – an object like a car or truck used to move people or things from one place to another

riprap – large rocks or concrete pieces used to stabilize land

+++