

TEACHERS GUIDE

TO “SUPER SQUIRRELS!”

Multidisciplinary classroom activities based on the Young Naturalists nonfiction story in *Minnesota Conservation Volunteer*, March-April 2019, 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!

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SUMMARY. Many, if not most, Minnesotans are familiar with gray squirrels or red squirrels. This story introduces young naturalists to two lesser known species, the northern flying squirrel and the southern flying squirrel. Through photos, text, and drawings, readers will learn about these creatures’ identifying characteristics, lifestyles, anatomy, and more.

SUGGESTED READING LEVELS. Third through middle-school grades

MATERIALS. KWL organizer; optional resources include paper to make paper airplanes, information on Lincoln-Douglas debating, 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. “Super Squirrels!” activities described below may be used to support some or all of the following Minnesota Department of Education standards:

SCIENCE (GRADES 3-8)

Nature of Science and Engineering (Benchmarks 3.1.1.2.3, 3.1.3.2.1, 3.1.3.2.2, 3.1.3.4.1, 4.1.2.2.3, 5.1.1.2.2, 5.1.3.4.1, 6.1.2.1.4, 6.1.2.2.1, 7.1.1.2.4, 8.1.1.1.1, 8.1.1.2.1)

Physical Science (Benchmarks 4.2.1.1.1, 5.2.2.1.2)

Earth Science (Benchmark 5.3.4.1.3)

Life Science (Benchmarks 3.4.1.1.1, 5.4.1.1.1, 5.4.4.1.1, 7.4.4.1.2,)

SOCIAL STUDIES (GRADES 5-8)

Citizenship and Government (Benchmarks 5.1.1.1.2, 6.1.1.1.1, 7.1.1.1.1, 8.1.1.1.1)

MATH (GRADES 2-4)

Geometry and Measurement (2.3.2.1, 2.3.2.2, 3.3.3.4)

Data Analysis (3.4.1.1, 4.4.1.1)

ENGLISH LANGUAGE ARTS (GRADES 3-8)

Reading Benchmarks: Informational Text (Grades 3-8)

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, 5.2.9.9, 6.5.7.7)

Writing Benchmarks (Grades 3-8)

Text Types and Purposes (Benchmarks 3.6.1.1, 4.6.1.1, 5.6.1.1)

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)

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 (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 Technical 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: Perform or Present (Benchmarks 0.3.1.2.1)

Artistic Process: Create or Make (Benchmarks 0.2.1.5.1, 4.2.1.5.1, 6.2.1.2.1, 6.2.1.5.1)

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

Volunteer.

PREVIEW. Do a [KWL activity](#). Divide students into small groups. Within the groups, have students describe what they already know (K) about flying squirrels and what they wonder (W) about flying squirrels. 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.

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 flying squirrels. 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 about flying squirrels with others. (4) Have students write and perform a play that demonstrates their knowledge of at least 10 facts about flying squirrels.

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. When flying squirrels use their patagia to soar through the air, they are demonstrating the principles of flight. Learn about the four forces of flight (this [NASA lesson](#) might be a good place to start), then apply your new knowledge to designing, testing, and refining paper airplanes.

2. Flying squirrels are most active at night. Explore together: What other animals—including insects and birds—are “night owls”? How do these animals benefit from limiting its activity to after dark? What adaptations help them survive in the dark?

3. A Wisconsin biologist recently found a flying squirrel that [glows pink in ultraviolet light](#). How might a trait like that help a flying squirrel survive? Invite students to share their thoughts. Then, as a group, investigate the phenomenon of ultraviolet coloration and ultraviolet vision in other animals and plants. Students might also be encouraged to find other sources that describe this discovery, paying attention to details about who first made this observation and how the discovery was made, toward recognizing that science involves people of different ages, cultures, and backgrounds.

4. The article notes that a flying squirrel can maneuver to escape a house cat. Explore the impact of house cats on wildlife. Younger students could be encouraged to make a list of the pros and cons of allowing house cats to roam outdoors. For older students, organize a [Lincoln-Douglas debate](#) around the topic of outlawing free-roaming cats. Have students draw on their lists or the information from the debate to write an opinion piece on this topic, supporting a point of view with reasons and information. Or students could use the information to orally present their own personal opinion, using appropriate facts and details to support their point of view.

5. Compare and contrast. Have students choose another Minnesota squirrel species and compare anatomy and life history with one of the flying squirrel species, recording these comparisons on a chart.

6. Wildlife biologists at the Minnesota Department of Natural Resources remind us that if we see a sick or orphaned animal, we should leave it alone or call a local wildlife rehabilitation center for further guidance. They use the phrase, “If you care, leave it there!” Invite students to speculate as to why leaving an animal that appears sick or injured alone could be a way to care for it. Then compare their thinking with the [reasons the DNR provides](#). Students can look for clues in the story as to why a baby flying squirrel might end up on the ground even though it isn’t orphaned. Have students participate in collaborative discussions, building on others’ ideas and expressing their own. Students can make posters using the “If you care, leave it there!” slogan to help others learn what to do if they see sick or injured wildlife.

7. Flying squirrels can move between trees that are dozens of feet apart, with the known record of 290 feet. Have students measure distances of 12 feet, 24 feet, and 36 feet, and

compare those distances with how far they can leap. Students could also measure tracks of gray squirrels in the snow to see how far these squirrels can jump. Have students think about how they could measure a distance of 290 feet. What tools or methods can be used to measure distances of that length? Have students measure the length of their school building and compare it with this flying squirrel “flight” record. Students could also be asked to brainstorm other animals and/or objects in nature that can travel distances of 290 feet or more through the air.

8. During the winter, flying squirrels use holes in trees for their homes. Family members live in the same nest to help keep the nest warm by sharing body heat. Students, either in small groups or as a class, could investigate the temperature of possible outdoor “nests” they would use if they were a squirrel in winter. They could select places they would nest and make predictions about which “nests” would be warmest, and check their predictions by measuring and comparing the actual temperatures. Help students experiment with how the temperature changes if they crowd together in one of the possible nesting sites, as compared to if only one student was in the “nest.” These predictions and observations could be recorded on a chart to further skills relating to the practice of science.

9. For many years people have been trying to replicate the flying squirrel’s gliding abilities. Skydivers have developed a special suit that mimics the flying squirrel. The suit works to slow their descent and allows them to maneuver through the air. Using the sketch of the flying squirrel’s body and adaptations as well as information from the story, have students design and draw a suit people could wear that would mimic the adaptations of the flying squirrel that allows it to glide and land. Students could be encouraged to select coloring for their suit based on either the northern flying squirrel or the southern flying squirrels.

10. Have students think of another kind of mammal that flies or glides. Have students look up information on how that mammal flies or glides, and then compare and contrast that mammal with flying squirrels. Which traits are similar? Which are different? How do the differences in the body parts they use to fly/glide relate to the way flying/gliding helps them survive? (For example, bats actively use their wings to fly long distances in pursuit of food and other needs, while flying squirrels passively use their skin flaps to create lift over relatively short distances.)

WEB RESOURCES

GENERAL TEACHER AND STUDENT RESOURCES

[Minnesota DNR Teachers’ Resources](#)

[DNR Kids Page](#)

RELATED MCV ARTICLES

[Shadow Tails \(Young Naturalists\)](#)

[Flying Squirrel](#)

GENERAL FLYING SQUIRREL INFORMATION

[Flying Squirrel \(Minnesota Department of Natural Resources\)](#)

[Flying Squirrels \(National Wildlife Federation\)](#)

VIDEOS

[The Cutest Flying Rodent | Super Squirrel](#)

[Flying Squirrel | World's Weirdest](#)

[DCL Web Cam - Flying Squirrel](#)

STUDY QUESTIONS ANSWER KEY

1. How does being nocturnal benefit a flying squirrel? **It reduces competition with other tree squirrels.**

2. Which of the following are traits of a northern flying squirrel? Which are traits of a southern flying squirrel? Which are traits of both? Mark each: N = northern, S = southern, B = both

Has a gray belly – N

Can soar between trees – B

Has a white belly – S

Nests in a hole in a tree – B

Found in Alaska and Canada – N

Has slender bones on its feet that help it spread its patagia – B

Likes coniferous trees – N

Likes deciduous trees – S

Found in Mexico and Central America – S

More likely to live in Minnesota's Arrowhead region – N

More likely to live in eastern Minnesota – S

Found from Mille Lacs Lake to Wild River State Park – B

Builds a nest in tree branches – N

3. True or false? Northern tree squirrels are larger than southern tree squirrels. **True. They grow to be 12 inches long, while southern tree squirrels grow to be 9–10 inches long.**

4. How does a flying squirrel change direction when it's in the air? **By kicking a leg backward or tilting its body.**

5. The longest observed flight of a flying squirrel was almost 300 feet. A football field is 100 yards long. What proportion of a football field was that flight? **$100 \times 3 = 300$ feet. The flight was almost as long as a football field!**

6. What are two places where a flying squirrel might build its nest? **high in the branches of a conifer tree or in a hole in a tree trunk.**

7. The picture of a flying squirrel's skull shows that it has large eyes and large ear openings. How might these traits be useful to an animal that is active mainly at night? **An-**

swers may vary. **Large eyes may allow for good night vision. Large ear openings may allow for good hearing, which would be helpful when vision is limited.**

8. According to the story, why might a northern flying squirrel dig in the snow?

- a. to find mushrooms to eat
- b. to make a snow fort to sleep in
- c. to find baby mice to eat
- d. to make a place to go to the bathroom

9. Name three ways flying squirrels help forests stay healthy. **Answers may vary, but include spreading mushroom spores, helping trees sprout, helping nuts become new trees.**

10. True or false: Flying squirrels hibernate in holes in trees. **False. Flying squirrels don't hibernate.**

11. Name two ways flying squirrels save energy in winter. **By huddling together; by going into torpor.**

12. Match the numbers with the event in a young flying squirrel's life: [Julie note I will mix these up; this is just the answer key]

Number of weeks a baby squirrel is inside its mother before it is born: **5**

Number of babies born at a time: **2-4**

Number of grams a newborn flying squirrel weighs: **6**

Number of months before a baby flying squirrel's eyes open: **1**

Age in days when a baby flying squirrels starts to eat solid food: **40**

Number of months until a baby flying squirrel is as big as its mother: **2**

13. What kind of call does a flying squirrel make?

- a. nothing
- b. a clucking sound
- c. a high-pitched call
- d. a chatter
- e. b and c**

MINNESOTA COMPREHENSIVE ASSESSMENTS ANSWER KEY.

1. How many flying squirrel species are there in the world? More than 40 How many in Minnesota? **2**

2. What is a drey?

- a. a baby flying squirrel
- b. a type of mushroom
- c. a state similar to hibernation
- d. a nest made of twigs and leaves**

3. Name three things flying squirrels eat. **Answers may vary, but should include at least some of these: June bugs, moths, beetles, insect larvae, spiders, shrews, carri-**

on, berries, seeds, bird eggs, baby mice, acorns, nuts, mushrooms, tree buds, fruits, fungi, lichen

4. What is torpor? **An energy-saving condition in which an animal's heartbeat and breathing slow.**

5. How does a flying squirrel use moss? **It stuffs it into the cracks in its nest to insulate it from water and wind.**

6. Why do mother squirrels leave their babies at night? **Answers may vary but should include to find food.**

7. How does a flying squirrel frighten other squirrels away from its nest?

a. by biting them

b. by stamping its feet

c. by growling

d. by throwing things at them

VOCABULARY LIST

cache a place where something is stored or hidden

carrion a dead, rotting animal or animal part

descend move to a lower level

lichen living thing that grows over rocks and other surfaces

naturalists people who study nature

nocturnal animal that is active at night

rudder a device used to steer something

suitable appropriate

territory an area that an animal defends

trapeze a swing used to perform acrobatic tricks