“Tree Guardians”
Multidisciplinary Classroom Activities

Teachers guide for the Young Naturalists article “Tree Guardians” by Mary Hoff. Published in the Sept.–Oct. 2008 Minnesota Conservation Volunteer, or visit www.mndnr.gov/young_naturalists/tree_guardians.

Young Naturalists teachers guides are provided free of charge to classroom teachers, parents, and students. This guide contains a brief summary of the article, suggested independent reading levels, word count, materials list, estimates of preparation and instructional time, academic standards applications, preview strategies and study questions overview, adaptations for special needs students, assessment options, extension activities, Web resources (including related Conservation Volunteer articles), copy-ready study questions with answer key, and a copy-ready vocabulary sheet and vocabulary study cards. There is also a practice quiz (with answer key) in Minnesota Comprehensive Assessments format. Materials may be reproduced and/or modified to suit user needs. Users are encouraged to provide feedback through an online survey at www.mndnr.gov/education/teachers/activities/ynstudyguides/survey.html. Please note, if you are downloading Conservation Volunteer articles from the Web site, that only the Young Naturalists article is available in PDF.

Summary
“Tree Guardians” describes the work life of several foresters as they fight fire, supervise the planting of seedlings, and work with a logger to ensure proper harvest of mature trees. In the final section of the article, readers learn how foresters also work in the private sector to assist landowners manage forests wisely.

Suggested reading levels:

- third through middle grades

Total words: 2,214

Materials: Paper, poster board, pencils, pens, markers, and print resources from your media center

Preparation time:
One to two hours, not including time for extension activities
“Tree Guardians” may be applied to the following Minnesota Department of Education standards:

**Language Arts**

I. Reading and Literature
   A. Word Recognition, Analysis and Fluency
   B. Vocabulary Expansion
   C. Comprehension

II. Writing
   A. Types of Writing
   B. Elements of Composition
   C. Spelling
   D. Research
   E. Handwriting and Word Processing

III. Speaking, Listening and Viewing
   A. Speaking and Listening
   B. Media Literacy

**Science**

Grades 3 and 4

IV. Life Science
   B. Diversity of Organisms
   C. Interdependence of Life

Grades 5 and 8

IV. Life Science
   F. Flow of Matter and Energy

**Social Studies**

Grades 4–8

II. Minnesota History
   C. Early settlement and statehood 1810–1860: The student will know and understand the factors that led to rapid settlement of Minnesota in the 19th century and the changes the new Minnesotans brought with them.
   E. Industrial Era 1865–1914: The student will know and understand Minnesota's major industries and economic, social, political and technological changes that accompanied industrialization.

**Arts**

All grades

D. Visual Arts

Complete Academic Standards are available at www.education.state.mn.us. Teachers who find other connections to academic standards are encouraged to contact Minnesota Conservation Volunteer.

Before you read, ask students to survey the article. Examine the photos. Use the KWL strategy (Ogle, 1986) to find out what your students already know (K) about foresters, what (W) they would like to learn, and eventually, what they learned (L) while reading the article and related materials, and through participating in extension activities. You might begin by asking small groups to brainstorm their ideas about what foresters do. Then combine the groups' data to make a class list. Display your K and W ideas on poster board or paper (see Vocabulary preview). Add to your L list as you read and discuss the article. See www.teach-nology.com/web_tools/graphic_org/kwl for a KWL generator that will produce individual organizers for your students. Individual organizers may be useful as students read the article for answers to W questions. KWL also gives you the opportunity to introduce interdisciplinary connections you will make during extension activities. For example, if you plan to use the article during social studies, science, or art, you may ask students to review their KWL for concepts that are specific to those disciplines.
See the copy-ready vocabulary list included in this guide. You may wish to modify the list based on your knowledge of your students’ needs. Pretesting vocabulary individually, in small groups, or with your entire class can be an effective vocabulary preview strategy. You may then post-test at the conclusion of this activity (see Assessment section below).

Connections to vocabulary in the article may also be made during KWL. If students are not familiar with some of the terms, include them in the W list. Other terms may be added to the W list as they read the article. Eventually they can be moved to the L list. You may write vocabulary from the article in green ink, while other ideas are written in black. Notes: Some of the words in the vocabulary list definitions may require further explanation. Also, preview the study questions for unfamiliar terms.

You may wish to use the study cards found at the end of this guide. Cut along the horizontal line; fold in the middle and tape or staple. Study cards (see Strategic Tutoring, Hock, Deshler, and Schumaker 2000) can be applied to any subject area. On one side of the card, in large letters, write a key word or phrase that students are expected to know. In smaller letters frame the word or phrase in a question or statement. On the other side of the card, in large letters, write the answer to the question. Finally, in smaller letters, frame the answer in a question or statement. Blanks are provided to allow you or your students to add new words or phrases.

Study questions parallel the story (the answer to the first question appears first in the article, followed by the second, and so on). Preview the entire guide with your class before you read the article. You may wish to read the story aloud and complete the study questions in class, in small groups, or as an independent activity. The questions may be assigned as homework, depending on the reading ability of your students. Inclusion teachers may provide more direct support to special needs students (see Adaptations section). The study questions may be also used as a quiz. Note: Items 4, 5, 8, 12, and 14 and the Challenge require varying degrees of analytical thinking.

Read aloud to special needs students. Abbreviate the study questions or highlight priority items to be completed first, for example, items 1, 2, 3, 6, 7, and 11. If time allows, remaining items may be attempted. Peer helpers, paraprofessionals, or adult volunteers may lend a hand with the study questions. With close teacher supervision, cooperative groups can also offer effective support to special needs students, especially for extension activities.

You may use all or part of the study guide, combined with vocabulary, as a quiz. Other assessment ideas include: (1) Students may write an essay describing how foresters help manage Minnesota forests. (2) Students may write multiple-choice, short answer or true-false questions to test their classmates’ understanding of the story. Student-generated questions may be then used as an alternative to study questions. (3) Students may write a letter to a classmate or the teacher with advice on how to prepare for a career in forestry. (4) Poster presentations may describe one or more of the roles foresters play.

1. Investigate one or more environmental issues associated with Minnesota forests. See Web sites below.
2. Invite a DNR forester to your classroom. Possible topics may include tree identification, forest harvesting and management, disease and pest control, and fire prevention/fighting.
3. Visit one of Minnesota’s state parks (http://www.mndnr.gov/state_parks/list.html). Park naturalists are eager to work with teachers on activities and presentations that connect
Extension activities

4. Encourage students to explore more deeply the history of logging in Minnesota. The legend of Paul Bunyan is a good introduction to this topic.

5. To help students understand the relationship of Native Americans with trees and how it differs from Europeans, read the Ojibwe legend “Winaboju and the Birch Tree” (http://www.nativetech.org/brchbark/winabojo.htm). See Web sites below that further explore this topic.

6. Students may explore the relationship of trees with climate change. How do logging of vast areas of land and growing new forests affect levels of carbon dioxide in the atmosphere?

7. Ask students to read about the great Hinckley fire of 1894 (http://www.mnhs.org/library/tips/history_topics/21hinckley.html). Wildfires are still a concern. Can students make a connection between climate change and fires?

8. Is your school part of the Minnesota School Forest Program? The School Forest Program is the Minnesota DNR’s outdoor classroom program. Students can learn about a variety of natural resources topics, such as forestry, in a real-world, hands-on context. DNR assistance is available to establish and maintain your school forest site. Find more information at www.mndnr.gov/schoolforest.

Web resources

Minnesota DNR Division of Forestry
http://www.mndnr.gov/forestry/index.html
http://www.mndnr.gov/faq/mnfacts/forests.html

Minnesota School Forest Program
www.mndnr.gov/schoolforest

Forest Fires
http://www.mndnr.gov/forestry/fire/index.html
http://query.nytimes.com/gst/abstract.html?res=950CE0DD1730E033A2575AC1A9619C94659ED7CF
http://www.mnhs.org/library/tips/history_topics/21hinckley.html

University of Minnesota Forestry
http://www.forestry.umn.edu/

Forestry Careers
http://www.forestrycareers.org
http://www.safnet.org/aboutforestry/forestryvideo.cfm

Urban Forestry
http://www.forestry.umn.edu/extension/urban_com/index.html
http://www.treepeople.org/vfp.dll?OakTree--getPage--&PNPK=206

Forests and Climate Change
http://www.americanforests.org/resources/climatechange/
http://www.fs.fed.us/ne/delaware/atlas/
Many related Minnesota Conservation Volunteer articles are available online at www.mndnr.gov/volunteer/articles/index.html, including:

**March–April 1999**
“Tremendously Marvelous Trees”
http://www.mndnr.gov/young_naturalists/trees/index.html

**September–October 2001**
“What Should a Forest Be?”
http://www.mndnr.gov/volunteer/sepoct01/fieldnotes.html

**March–April 2003**
“Partners in Forest Conservation”
http://www.mndnr.gov/volunteer/marapr03/fnpartners.html

**November–December 2004**
“The Real Story of the Chippewa National Forest”
http://www.mndnr.gov/volunteer/novdec04/chippewanf.html

**November–December 2005**
“Fire Planes Pay Off”
http://www.mndnr.gov/volunteer/novdec05/fire_planes.html

**May–June 2005**
“The Strike Tree”
http://www.mndnr.gov/volunteer/mayjun05/spstriketree.html

**January–February 2006**
“Breaking Up the Forest”
http://www.mndnr.gov/volunteer/janfeb06/breaking_up.html

**March–April 2006**
“Green as Money” http://www.mndnr.gov/volunteer/marapr06/green_money.html

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**Web resources continued**

Arbor Day Foundation
http://www.arborday.org/
http://www.arborday.org/trees/whattree/

Native Americans and Trees
http://www.nativetech.org/brchbark/brchbark.htm
http://www.umaine.edu/hudsonmuseum/tree.htm
http://www.kstrom.net/isk/food/maple.html

GPS
http://www.gps.gov/

Teacher resources
http://www.mndnr.gov/education/teachers/index.html

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Related articles
Related articles

May–June 2006
“Look Down in the Woods” (article with teachers guide)
http://www.mndnr.gov/young_naturalists/forest_floor/index.html

May–June 2006
“Stamped and Certified”
http://www.mndnr.gov/volunteer/mayjun06/forestry_certification.html

November–December 2007
“Walks in the Old Woods”
http://www.mndnr.gov/volunteer/novdec07/old_woods.html

March–April 2008
“In the Woods with…..Dave Epperly”
http://www.mndnr.gov/volunteer/marapr08/in_the_woods.html

References


Study Questions

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Name___________________________________________Period_______Date_________________

1. Explain how Jana Albers uses red-pine seedlings to detect disease. ___________________________________
   ______________________________________________________________________________________
   ______________________________________________________________________________________

2. What conditions describe a “forest-fire kind of day?” _______________________________________
   ______________________________________________________________________________________

3. How does Jeremy Fauskee use a helicopter in fighting fires? __________________________________
   ______________________________________________________________________________________
   ______________________________________________________________________________________

4. Compare/contrast a CL 215 airplane to a Hughes 500. _______________________________________
   ______________________________________________________________________________________
   ______________________________________________________________________________________

5. When would the CL 215 be more useful? _________________________________________________
   ______________________________________________________________________________________

6. Fires that are started on purpose are called ________________________________________________

7. How does fire keep forests healthy? _______________________________________________________
   ______________________________________________________________________________________
   ______________________________________________________________________________________

8. What do you think Jeremy means when he says he likes “the diversity” of his job? ______________
   ______________________________________________________________________________________
   ______________________________________________________________________________________

MINNESOTA CONSERVATION VOLUNTEER
9. Why is Patty Thielen supervising the planting of jack pine? ______________________________________________________

10. Explain how a planting bar is used. ________________________________________________________________

11. Describe what each of these logging machines do:
   (a) feller buncher ________________________________________________________________________________
   (b) skidder _____________________________________________________________________________________
   (c) delimber _____________________________________________________________________________________
   (d) slasher _______________________________________________________________________________________

12. Pick two or three of the jobs foresters do and explain why you might be interested in those jobs.
    _______________________________________________________________________________________________
    _______________________________________________________________________________________________
    _______________________________________________________________________________________________

13. Why does Patty Thielen like her job? ________________________________________________________________
    _______________________________________________________________________________________________
    _______________________________________________________________________________________________

14. Why do you think foresters have to go to college? __________________________________________________________
    _______________________________________________________________________________________________

15. What is a clinometer, and how is it useful to foresters? _____________________________________________________
    _______________________________________________________________________________________________

Challenge: How does Brad Gatzlaff’s job differ from those of Jana Albers, Jeremy Fauskee, and Patty Thielen?
    _______________________________________________________________________________________________
    _______________________________________________________________________________________________
    _______________________________________________________________________________________________
1. Explain how Jana Albers uses red-pine seedlings to detect disease. If the fungus is present in the adult trees, Jana will be able to see it in the seedlings.

2. What conditions describe a “forest-fire kind of day?” High winds and dry air make for a forest-fire kind of day.

3. How does Jeremy Fauskee use a helicopter in fighting fires? Jeremy helps in three ways: (1) He tells firefighters on the ground what the fire is doing; (2) He brings more firefighters to the fire; (3) He pours water on the fire.

4. Compare/contrast a CL 215 airplane to a Hughes 500. Answers may vary, but should include: both are aircraft; both fight fires; the CL 215 is a fixed-wing plane while the Hughes 500 is a helicopter; the plane is much bigger and faster, and can deliver more water per trip.

5. When would the CL 215 be more useful? On larger fires that are farther away from the base.

6. Fires that are started on purpose are called? Prescribed burns

7. How does fire keep forests healthy? Prescribed burns burn up dead plants to release nutrients into the soil, make room for new plants and prepare the soil for seeds to sprout.

8. What do you think Jeremy means when he says he likes “the diversity” of his job? He gets to do many interesting things.

9. Why is Patty Thielen supervising the planting of jack pine? She must make sure the workers do the job properly.

10. Explain how a planting bar is used. The shovel end is pushed into the ground and moved back and forth to make a wedge-shaped hole for the roots of the seedling.

11. Describe what each of these logging machines do:
   (a) feller buncher Cuts the tree down
   (b) skidder Drags the trees out of the woods to a landing area
   (c) delimber Cuts off branches
   (d) slasher Cuts the trunk into 8-foot pieces

12. Pick two or three of the jobs foresters do and explain why you might be interested in those jobs. Answers will vary. See page 40 for list of jobs.

13. Why does Patty Thielen like her job? Like Jeremy, she likes the variety. She also likes to ride four-wheelers and snowmobiles.

14. Why do you think foresters have to go to college? Answers will vary. Foresters must know a lot about plants, soils, fires, and how to work with people.

15. What is a clinometer, and how is it useful to foresters? A clinometer measures the height of trees. It helps foresters estimate how much wood is in a tree.

Challenge: How does Brad Gatzlaff’s job differ from those of Jana Albers, Jeremy Fauskee, and Patty Thielen? Brad works for himself as a private businessperson. The others work for the state government (DNR).
Name _________________________________________ Period _______ Date_________________

1. Why might a landowner want to get rid of buckthorn?
   A. Buckthorn is not a beautiful plant.
   B. Buckthorn is an invasive, nonnative tree that crowds out native plants.
   C. Buckthorn has an unpleasant odor.
   D. Buckthorn has sharp thorns.

2. Why does Patty Thielen need a GPS? ____________________________________________________
   ____________________________________________________________________________________

3. A drip torch is used to ____________________________________________________________
   A. make candles
   B. provide light for firefighters
   C. start prescribed burns
   D. release nutrients

4. Why are aircraft so important in fighting forest fires? ________________________________
   ____________________________________________________________________________________

5. Minnesota has _________________________ trees.
   A. 10 million
   B. 10 trillion
   C. 10 thousand
   D. 10 billion
1. Why might a landowner want to get rid of buckthorn? **B. Buckthorn is an invasive, nonnative tree that crowds out native plants.**

2. Why does Patty Thielen need a GPS? **She uses her GPS to locate trees that are to be harvested.**

3. A drip torch is used to **C. start prescribed burns.**

4. Why are aircraft so important in fighting forest fires? **Answers may vary, but should include that aircraft are fast and safe, and can put water precisely on fires.**

5. Minnesota has **D. 10 billion trees.**
**Vocabulary**

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- **diversity** a variety of something
- **fungus** an organism that lives by absorbing energy and nutrients from plants, animals, or dead organic matter
- **GPS** GPS (global positioning system) a device for finding location using signals from satellites
- **habitat** habitat natural conditions in which a plant or animal lives
- **herbicide** herbicide a chemical that kills plants
- **nutrients** nutrients Substances that provide nourishment, for example, the minerals a plant needs to grow
- **soil science** soil science the study of soil as a natural resource
- **tamarack** tamarack (larch) a tree that loses its needles in winter
## Vocabulary Study Cards

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Cut along the horizontal lines, fold on the dashed vertical line and tape or staple. Blanks are provided to allow you or your students to add new words or phrases.

<table>
<thead>
<tr>
<th>What is <strong>diversity</strong>?</th>
<th>What is a <strong>variety of something</strong> called?</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is <strong>a fungus</strong>?</td>
<td>What is an <strong>organism that lives by absorbing energy and nutrients from plants, animals, or dead organic matter</strong> called?</td>
</tr>
<tr>
<td>What is <strong>a GPS</strong>?</td>
<td>What is a <strong>device for finding location using signals from satellites</strong> called?</td>
</tr>
</tbody>
</table>
A plant or animal’s **habitat** is the

The **natural conditions in which a plant or animal lives** is called its

What is a **herbicide**?

What is a chemical that kills **plants** called?

What are **nutrients**?

Substances that provide nourishment, for example, the minerals a plant needs **to grow** are
What is soil science?

What is a tamarack?

Another name for larch, a tree that loses its needles in winter, is

The study of soil as a natural resource is called
Vocabulary Study Cards
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Cut along the horizontal lines, fold on the dashed vertical line and tape or staple. Blanks are provided to allow you or your students to add new words or phrases.