



## Teacher's Guide

Spring 2006

### Northern Woodlands Goes To School

Welcome to the Spring 2006 edition of *Northern Woodlands* magazine. Days are lengthening and warming—it's time to explore the greening forests. In this issue of *Northern Woodlands*, you and your students will discover articles that provide plenty of incentives to explore the woods. What does a healthy forest community look like, and how do foresters go about managing for forest products *and* forest health? Can our local forests supply more of our local energy needs? What good are wetlands, and how do biologists go about restoring and managing them?

This teacher's guide serves as a companion to *Northern Woodlands* magazine. In it are several in-class and outdoor activities that expand upon ideas presented in some of the magazine's articles. For each activity, we offer recommendations of related publications, contacts, and websites, as well as Project WILD and Project Learning Tree activities that build upon each activity theme. We also indicate the state curriculum standards each activity fulfills.

We'd like to extend special thanks to the sponsors of this project. As a result of their support, over 5,000 students throughout the Northeast are able to participate in Northern Woodlands Goes to School this year. The sponsors are: Fountain Forestry, Inc., Frank and Brinna Sands Foundation, Freeman Foundation, French Foundation, International Paper, Maine TREE Foundation, Margo and Joe Longacre, Merchants Bank, New England Forestry Foundation, Northeastern Lumber Manufacturers Assoc., Sugar River Savings Bank, Tele Atlas North America, Inc., Twinflower Farm, Wells River Savings Bank, and the Windham Foundation.

We would love to know your thoughts about our teacher's guide. If you have comments or suggestions, or if you need more (or fewer) copies of the magazine for your students, just call or email Anne Margolis at (802) 439-6292 (email: [anne@northernwoodlands.org](mailto:anne@northernwoodlands.org)). Visit our *Northern Woodlands Goes to School* website at [http://www.northernwoodlands.org/goes\\_to\\_school.php](http://www.northernwoodlands.org/goes_to_school.php), where you can also download each quarter's teacher's guide.

#### Noteworthy News:

**New York State Learning Standards.** From now on, our list of related state education standards for each activity will include New York State standards. You can find a complete listing of these standards on-line at <http://www.emsc.nysed.gov/nysatl/standards.html>.

**2006 Envirothon coming soon!** The Envirothon is an environmental competition in which high school students test their knowledge of natural resources and current environmental issues. Teams of 3-5 students compete, answering questions and solving hands-on problems at five stations: Wildlife, Water/Aquatics, Forestry, Soils, and a Current Natural Resource Issue. This year's current issue is Water Stewardship in a Changing Climate. Winners of state and provincial competitions advance to the National Envirothon. For information on this year's Envirothon and for contacts for your state's competition, visit [www.envirothon.org](http://www.envirothon.org).

## 1. Balancing Act

*The Greatest Good*, by Chuck Wooster (p. 17)

The White Mountain National Forest recently finalized its 10-year Forest Plan. The Green Mountain National Forest has nearly completed its plan update. Even if there are no National Forests in your state, there are other publicly held forests—state or municipal. Balancing the concerns of constituents figures into all public land management, and learning about that public process gives your students a window into the democratic process. Watch *The Greatest Good*, the 2-hour documentary produced to celebrate the 100<sup>th</sup> anniversary of the United States Forest Service. You'll find an informative trailer for the movie at the web link below. Teachers can borrow a copy of the DVD from the Forest Service free-loan video library or purchase a copy (see details below). The Forest Service is developing an online curriculum to accompany the movie, which will be available at the *Greatest Good* webpage soon. Have your students create a conservation timeline to help them visualize the chronology of ecological, political, and social issues and reforms over the past 150 years, and try one of the three excellent PLT high school study modules below to investigate public land management.

**Website :** [www.fs.fed.us/greatestgood/](http://www.fs.fed.us/greatestgood/). View the movie trailer or order the movie. Check here for curriculum materials due for release this spring, which will build on ideas raised in the movie.

[www.fs.fed.us/video/library](http://www.fs.fed.us/video/library) or call (818) 683-8366 to borrow a copy of the DVD.

PLT	Squirrels vs. Scopes ( <i>Focus on Forests</i> , high school module) Balancing America's Forests ( <i>Focus on Forests</i> , high school module) Who Owns America's Forests? ( <i>Focus on Forests</i> , high school module)
ME	Science and Technology B, M Economics A History B
NH	Science 3a, 4c Social Studies 5, 9, 12, 13, 14, 17
NY	MST 4 The Living Environment SS 1, 3, 4
VT	3.9 Sustainability 4.6 Understanding Place 6.4 Historical Connections 6.15 Knowledge of Economic Systems 7.13 Organisms, Evolution, and Interdependence 7.16 Natural Resources

## 2. Managing for the Whole Forest Community

*Red Oak, Black Cherry, and Great Blue Herons*, by Bob Henke (p. 28)

Henke's article describes an approach to forest management that considers the needs of both human and wild members of the forest community. Such management requires knowledge of the habits and needs of forest inhabitants. Had the forester simply left a 50-foot buffer around the heron rookery, without anticipating the need for keeping mature trees in the surrounding forest to supply seeds for new trees to someday replace blowdowns of nesting trees, the rookery might have declined over the years.

Visit a local forest with your students (school, municipal, or other public forest). Explore it with your county forester or a consulting forester, identifying the natural communities present and generating a list of wildlife species likely to be found in each habitat. Have each student choose an animal and research its habitat needs. What management strategies would help retain or enhance the habitat characteristics that species relies on?

Have students write a report on their species, including a list of forest management practices that will best suit their species. Then compile their lists to begin generating management recommendations for the forest they visited. Which practices are at odds with one another? How can students manage the forest so as to balance the needs of all the wildlife species? Can they maintain the health of the forest community while harvesting products for human use? How? Is there an existing management plan for the forest? Does it do an adequate job of conserving habitat for the animals your students studied?

**Website:** [www.familyforests.org/ecoforestry](http://www.familyforests.org/ecoforestry). The Vermont Family Forests website provides information about managing healthy forests. Their publication, *Landowner's Guide to Vermont Family Forests Certification* (found on the webpage above), offers a sample natural communities map and management plan.

PLT	400-Acre Wood (gr. 7-8) Adopt-a-Forest ( <i>Forest Ecology</i> High School Module) Cast of Thousands ( <i>Forest Ecology</i> High School Module)
WILD	Web of Life (gr. 5-8)
ME	Science and Technology B, M, J English Language Arts A, D, E, H
NH	English Language Arts 1, 2, 5, 6, 7 Science 1a, 2a, 3a Social Studies 12
NY	MST 1 Scientific Inquiry MST 4 The Living Environment MST 7 Strategies CDOS 3 Managing Information
VT	1.5 Writing Dimensions 1.8 Reports 1.19 Research 3.9 Sustainability 3.10 Teamwork 6.2 Uses of Evidence and Data 6.3 Analyzing Knowledge 7.2 Investigation 7.13 Organisms, Evolution, and Interdependence

**Book:** *New England Wildlife: Habitat, Natural History, and Distribution*, by Richard M. DeGraaf and Mariko Yamasaki. University Press of New England: 2001.

*Landowner's Guide to Wildlife Habitat: Forest Management for the New England Region*, by Richard M. DeGraaf, et al. University of Vermont Press/University Press of New England: 2005.

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### 3. How Wetlands Work

*At Work Restoring Wetlands with Biologist Dave Odell*, by Eben McLane (p. 34)

In his article, McLane states that 50 percent of the Northeast's wetlands have disappeared. Why does that matter? What functions do wetlands serve? What plant and animal species inhabit wetlands? Plan a spring visit to a wetland in your region, and visit a managed wetland if you can—one that has been restored and is actively managed to encourage wetland species. Invite a volunteer from your local Audubon chapter to accompany you to help identify the many bird species you are likely to see. Where in the wetlands do you find each species?

You'll likely see many amphibians as well. Collect and submit data to regional amphibian studies, like Vermont's Reptile and Amphibian Atlas (see information below). Contact your state fish and wildlife agency for information about citizen surveys in your region.

WILD	Ecosystem Facelift (gr. 7-8)
ME	Science and Technology B, M, J
NH	Science 1a, 2a, 2b, 3a, 3b, 6d Social Studies 12
NY	MST 1 Scientific Inquiry MST 3 MST 4 The Living Environment MST 6 Patterns of Change
VT	7.1 Scientific Method 7.2 Investigation 7.13 Organisms, Evolution, and Interdependence

**Website** Contact your state wildlife department for information about wetlands to visit in your area. They may also be able to provide a wetland ecologist to accompany you.

Vermont Department of Fish and Wildlife, [www.anr.state.vt.us/fw/fwhome/](http://www.anr.state.vt.us/fw/fwhome/).  
New York Department of Environmental Conservation, [www.dec.state.ny.us/](http://www.dec.state.ny.us/).  
Maine Department of Inland Fisheries and Wildlife, [www.state.me.us/ifw/](http://www.state.me.us/ifw/).  
New Hampshire Fish and Game Department, [www.wildlife.state.nh.us/](http://www.wildlife.state.nh.us/).

More than 1,000 communities world-wide use the natural filtration functions of wetlands to help purify community water. The city of Arcata, California, developed a wetland specifically to filter pollutants from the community's wastewater system. For a description of Arcata's wetlands system and an overview of how wetlands filter pollutants, visit the National Academy of Science page, [www.acnatsci.org/education/kye/te/wetland.html](http://www.acnatsci.org/education/kye/te/wetland.html).

The Vermont Reptile and Amphibian Atlas offers a great opportunity for students to contribute information to an ongoing scientific survey. Learn how at [www.community.middlebury.edu/~herpatlas/herp\\_index.htm](http://www.community.middlebury.edu/~herpatlas/herp_index.htm).

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### Biomass Focus:

#### Utilizing Wood for Electricity, Heat, Automobile Fuel, and More

*A Forest Full of Energy: Wood Grows as a Major Fuel in the Northeast*, by Eric Kingsley (p. 22)

*Wood Chips Keep Schools Warm*, by Hamilton E. Davis (p. 38)

*Putting Wood in Your Gas Tank: Wood Fiber Could Be Important Source of Ethanol*, by Gail Dutton (p. 54)

Wood energy is big news in the Northern Forest and around the country. Escalating oil prices, combined with the desire to reduce dependence on fuel imports and increase self-sufficiency, are stirring great interest in using wood to produce electricity, heat, ethanol (gasoline component and substitute), solvents, and even plastics. The three articles above describe exciting possibilities for creating sustainable sources for those products. Though each article focuses on a different wood product, common themes and issues emerge in each: How does increased wood utilization for these products affect local and regional economies? How does this utilization impact forest health? How does increased wood burning affect global climate change? Below, you'll find suggested activities for investigating these three questions. All three articles provide important background information for each topic.

#### 4. Wood Energy and Global Climate Change

In *Wood Chips Keep Schools Warm*, Hamilton Davis notes that one of the benefits of heating with wood is that, “it slows global warming because it backs out the use of fossil fuels, whose consumption only adds carbon to the atmosphere.” Why does burning firewood contribute less to climate change than burning fossil fuels? In theory, if wood is burned at the same (or lesser) rate as the forest produces it, then no net carbon is released into the atmosphere.

But all wood fuel is not created equal in terms of net carbon release—some methods for procuring, processing, and delivering wood utilize far more fossil fuels, and thus release more carbon, than others. Chainsaws, delivery trucks, wood splitters, wood chippers all use fossil fuels. Have students model and diagram different wood procurement/processing/delivery scenarios (for example, a landowner cuts, hand splits, and hauls wood from the forest to her home by pickup; a logger uses a skidder to haul trees from the forest. On the landing, a chipper chips low-value logs, and a delivery truck hauls the chips to a wood-burning school 30 miles away. Many scenarios are possible. Compare their contributions to atmospheric carbon.

ME	Economics A Science and Technology B, J, L, M
NH	Science 1a, 2c, 3a, 6c Social Studies 5, 9, 12, 13, 14
NY	MST 1 Scientific Inquiry MST 4 The Living Environment MST 6 Models SS 4
VT	1.17 Notation and Representation 1.22 Simulation and Modeling 3.9 Sustainability 6.15 Knowledge of Economic Systems 7.13 Organisms, Evolution, and Interdependence

**Website:** The Canadian Natural Resources Department website is loaded with information on wood burning and the environment, [www.canren.gc.ca/prod\\_serv/index.asp?Cald=103&PgId=586](http://www.canren.gc.ca/prod_serv/index.asp?Cald=103&PgId=586).

The Union of Concerned Scientists offers curriculum activities to teach students about global climate change, [www.climatehotmap.org/curriculum/](http://www.climatehotmap.org/curriculum/).

University of Alaska Fairbanks provides several links to climate change curriculum materials, [www.uaf.edu/olcg/globalchange/#climate](http://www.uaf.edu/olcg/globalchange/#climate).

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#### 5. Wood Energy and Forest Health

Wood is looking better and better as a local energy source. Advocates note that, unlike fossil fuels, wood is renewable and sustainable. Yet renewability and sustainability have their limits. What are the limits of the Northern Forest’s ability to produce wood products? How do we ensure the health of the forest community while meeting an increasing need for wood products?

This is an excellent opportunity to discuss forest production capacity. On what factors does that capacity depend? How much of that annually produced biomass should remain in the forest, and how much can we remove while maintaining forest health?

Visit a local forest with your county forester or consulting forester. Use forestry tools to determine basal area and site index. Calculate the allowable cut for this stand. How much wood fuel could an acre of this forest produce each year? Look for signs of forest health—stable and productive soils, native biological diversity, low incidence of invasive exotics, high water quality.

In *Wood Chips Keep Schools Warm*, Davis notes that Vermont’s 25 wood-heated schools use 16,000-18,000 tons of wood chips annually. So, on average, how many acres of healthy forest are needed to supply wood chips for one school?

ME	Science and Technology B, J
NH	Science 1a,2a, 2b, 3a, 4c, 6d
NY	MST 1 Scientific Inquiry MST 4 The Living Environment SS 3 CDOS 3 Thinking Skills
VT	6.2 Uses of Evidence and Data 7.2 Investigation 7.13 Organisms, Evolution, and Interdependence 7.16 Natural Resources

**Website** The Nature Conservancy hosts an extensive website on managing healthy private forests, [www.privateforest.org/](http://www.privateforest.org/).

[www.biomasscenter.org/](http://www.biomasscenter.org/) Biomass Energy Research Center website provides lots of information about benefits and issues surrounding wood burning (climate change, forest sustainability, air quality, economics) and about the technology for both heating and electricity production, funding issues, and more.

## 6. Wood Energy and Community Building

Utilizing local sources of wood to meet energy needs has the potential to not only build the local economy but also to build a sense of community and place. What are the ripple effects to your community (both positive and negative) of shifting from fossil fuels to wood fuels for heating in your community? Who are the stakeholders? These include foresters, loggers, fuel wood producers (splitter or chipper), truckers, landowners, and the general public. If you can, visit a wood chip-burning facility, whether an electricity-generating plant or school heating system, with your students. Have students track, through an annotated diagram, a wood chip from the forest through to airborne particulates released from a wood-fired heating system. Who and what is impacted along the production path, and how?

Utilizing local energy sources is one excellent step towards reducing our dependence on fossil fuels. Energy conservation is another. What ways can we reduce the amount of electricity, heat, and automobile fuel we use? How much fossil fuel could these conservation methods save per year?

PLT	Energy Sleuths (gr. 5-8)
WILD	Flip the Switch for Wildlife (gr. 5-8) Sustainability: Then, Now, Later (gr. 912)
ME	Economics A Science and Technology B, J, L, M
NH	Science 1a, 2c, 3a, 6c Social Studies 5, 9, 12, 13, 14
NY	MST 1 Scientific Inquiry MST 4 The Living Environment MST 6 Models SS 4
VT	1.17 Notation and Representation 1.22 Simulation and Modeling 3.9 Sustainability 6.15 Knowledge of Economic Systems 7.13 Organisms, Evolution, and Interdependence

**Website:** The Vermont Department of Forests, Parks, and Recreation devotes several webpages to wood energy and to converting school heating systems to wood-fired systems. [www.vtfpr.org/energy/energy.cfm](http://www.vtfpr.org/energy/energy.cfm).

[www.nrel.gov/biomass/](http://www.nrel.gov/biomass/) Learn about federally funded research into alternatives to fossil fuels at the National Renewable Energy Laboratory biomass research webpage.

[www.biomasscenter.org/](http://www.biomasscenter.org/) Biomass Energy Research Center. This Vermont-based organization offers lots of information about the benefits and issues of wood burning and about the technology for both heating and electricity production, funding issues, and more.

### Wildlife Connection

**Are Coyotes Decimating Deer?** By Michael Caduto (p. 14)

Before students read Caduto's article, have them write a brief essay on what they know (or think they know) about coyotes. Ask them, too, to describe how they feel about them—does the coyote conjure positive or negative images in their minds? Why? Then have them read the article, and use it as a launching point for learning more about coyotes in your state. What is their current and historic population? What is their ecological role? Invite a biologist from your state wildlife division to discuss coyotes and state management practices with your students. What are your state's rules about coyote hunting? Have your students create an educational display about coyotes for your town library, using photos, illustrations, charts, and maps to tell the story.

**Website:** The New York State Department of Environmental Conservation offers a webpage on the coyote, with a link to a more in-depth article on coyotes by Dr. Robert Chambers.

[www.dec.state.ny.us/website/dfwmr/wildlife/coyinnny.htm#links](http://www.dec.state.ny.us/website/dfwmr/wildlife/coyinnny.htm#links).

WILD	Checks and Balances (gr. 5-8) Wildlife Issues: Community Attitude Survey (gr. 9-12) Philosophical Differences (gr. 9-12)
ME	English Language Arts A, E, H Visual and Performing Arts A Science and Technology B
NH	English Language Arts 1, 2, 5 Science 3a
NY	ART 1 Visual Arts ELA 2 Speaking & Writing MST 1 Scientific Inquiry MST 4 The Living Environment SS 5 CDOS 3 Managing Information
VT	1.12 Personal Essays 1.19 Research 5.29 Visual Arts 6.2 Uses of Evidence and Data 6.3 Analyzing Knowledge 7.13 Organisms, Evolution and Interdependence

### Career Connection

*Woodworking in General Education*, by Doug Stowe (p. 9)

Doug Stowe, woodworker and educator, notes, “the common view that hands-on education is only for slow learners as a precursor for vocational training is way off the mark.” Moreover, he sees a “link between the failure to engage the hands and the failure to engage the head and heart in the learning experience.” Do a woodworking project with your students, but take it a step further. First, find a forest (either private or municipal) where you can obtain permission to fell a tree for use by your class. Then bring your students to that forest. If the forest has a management plan and managing forester, invite that forester to accompany you. What can the forest provide for your building project? Does it offer softwoods, like pine, cedar, or spruce? You can use softwood lumber to make nesting boxes for wood ducks (see related article, *At Work Restoring Wetlands with Biologist Dave Odell*, by Eben McLane, p. 34), bluebirds, or other bird species.

ME	Science and Technology B, J
NH	Science 3a, 4c
NY	MST 4 The Living Environment MST 5 Engineering Design SS3
VT	2.13 Product/Service 7.13 Organisms, Evolution, and Interdependence 7.16 Natural Resources

How many bird boxes would one softwood tree yield? Have your students, with the help of the managing forester, study their tree of choice and determine its board footage. Obtain community help for felling and milling the tree. Your high school vocational center may help. If not, ask your county forester for suggestions. Have students build the bird boxes and hang them in appropriate sites in your community or sell them as a fundraiser. Students can create a fact sheet about the bird species for which you’ve build the next boxes, including instructions for hanging and maintenance.

### Website:

The USGS Northern Prairie Wildlife Research Center provides instructions for constructing bluebird boxes as well as instructions for hanging and maintenance.  
[www.npwrc.usgs.gov/resource/birds/birdhous/birdhous.htm](http://www.npwrc.usgs.gov/resource/birds/birdhous/birdhous.htm).

Cornell University Laboratory of Ornithology’s Birdhouse Network website offers building instructions for wood ducks, bluebirds, and many other species.  
[www.birds.cornell.edu/birdhouse/bhbasics/nestboxplans.htm](http://www.birds.cornell.edu/birdhouse/bhbasics/nestboxplans.htm).

### Calendar Connection

*Pussy Willow*, *Salix discolor*, by Virginia Barlow (p. 43)

There’s nothing better after a long winter than a splash of spring foliage in the classroom. Cut pussy willow twigs for your classroom and place them in a container of water. Once the fuzzy catkins swell, the leaves aren’t far behind. When the ground warms outside, have students plant the twigs in moist soil in appropriate sites on your school grounds. The pussy willow shrubs will provide habitat for wildlife, as well as a ready source for pussy willow twigs for years to come.

PLT	Improve Your Place (gr. 5-8)
WILD	Improving Wildlife Habitat in Your Community (gr. 5-8)
ME	Science and Technology B
NH	Science 3a
NY	MST 4 The Living Environment
VT	7.13 Organisms, Evolution & Interdependence



# Crossword Puzzle

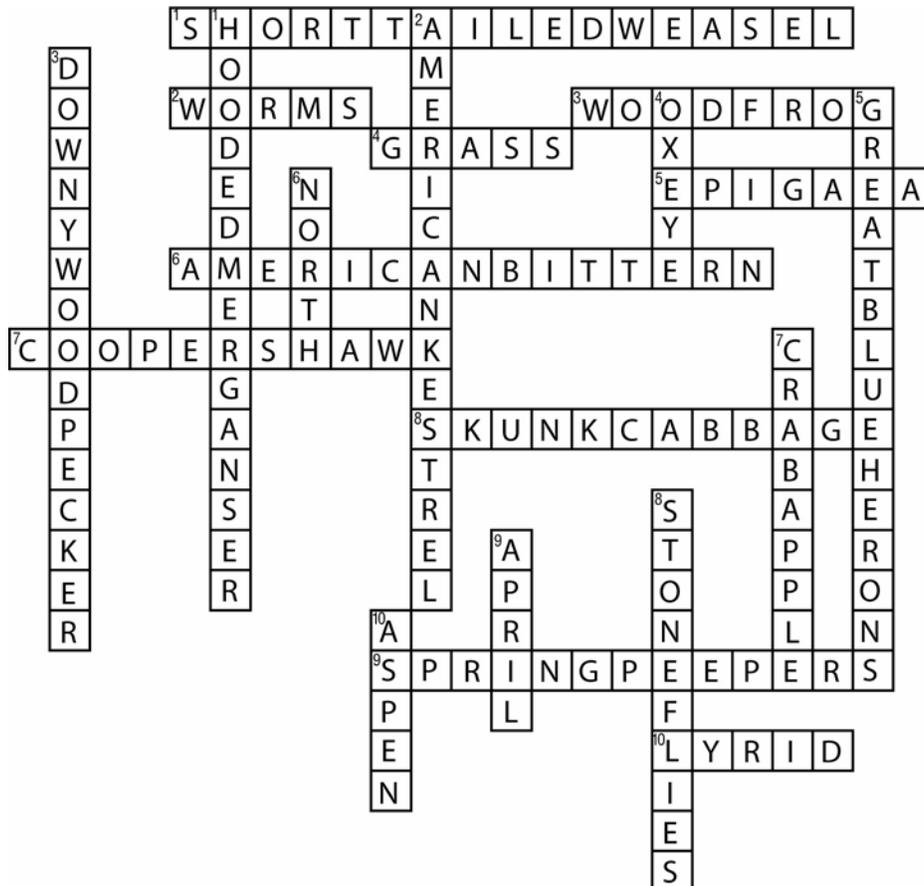
Northern Woodlands Spring Calendar (p. 4)

## Across

- In March, this animal's pelt begins to turn from white to brown (3 words). SHORT-TAILED WEASEL
- Ninety percent of the woodcock's diet consists of these invertebrates. WORMS
- Amphibian with a duck-like call (2 words). WOOD FROG
- Woodchucks eat this in springtime after emerging from hibernation. GRASS
- Genus name for the lovely springtime wildflower, trailing arbutus, from the Greek word meaning, "upon the ground." EPIGAEA
- Males of this bird species have a call that's been likened to the sound of a pile driver (2 words). AMERICAN BITTERN
- This bird species, once common, declined from DDT poisoning (2 words). COOPER'S HAWK
- This flower is one of the first to bloom in spring. Its leaves can sprout in January in southern New England (2 words). SKUNK CABBAGE
- These frogs migrate to their breeding grounds on rainy nights when temperatures top 41°F (2 words). SPRING PEEPERS
- April meteor shower. LYRID

## Down

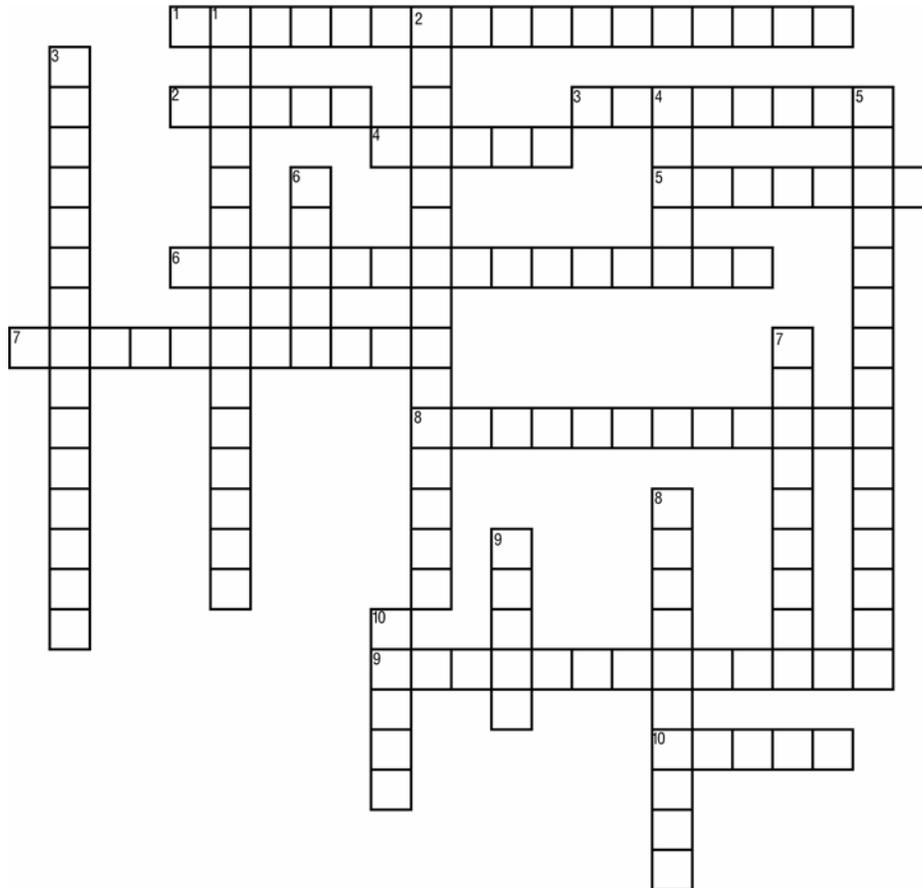
- This waterfowl species dives for minnows in ponds and rivers (2 words). HOODED MERGANSER
- This migratory bird nests in holes excavated by flickers (2 words). AMERICAN KESTREL
- This small, cavity-nesting bird excavates a perfectly round hole (2 words). DOWNY WOODPECKER
- The leaves of this May-blooming daisy add strong flavor to salad. OXEYE
- These wading birds return to wetlands in the north in late March (3 words). GREAT BLUE HERONS
- According to folklore, wind from this direction creates excellent conditions for maple sugaring. NORTH
- Though robins are best known for eating worms, they also dine on this fruit in springtime. CRABAPPLE
- When male phoebes return to the Northeast, they feed on these insects as they fly over streams. STONEFLIES
- Tree swallows usually return to the Northeast from their southern wintering grounds in this month. APRIL
- In springtime, bears sometimes eat the newly emerged leaves of this tree. ASPEN



# Crossword Puzzle

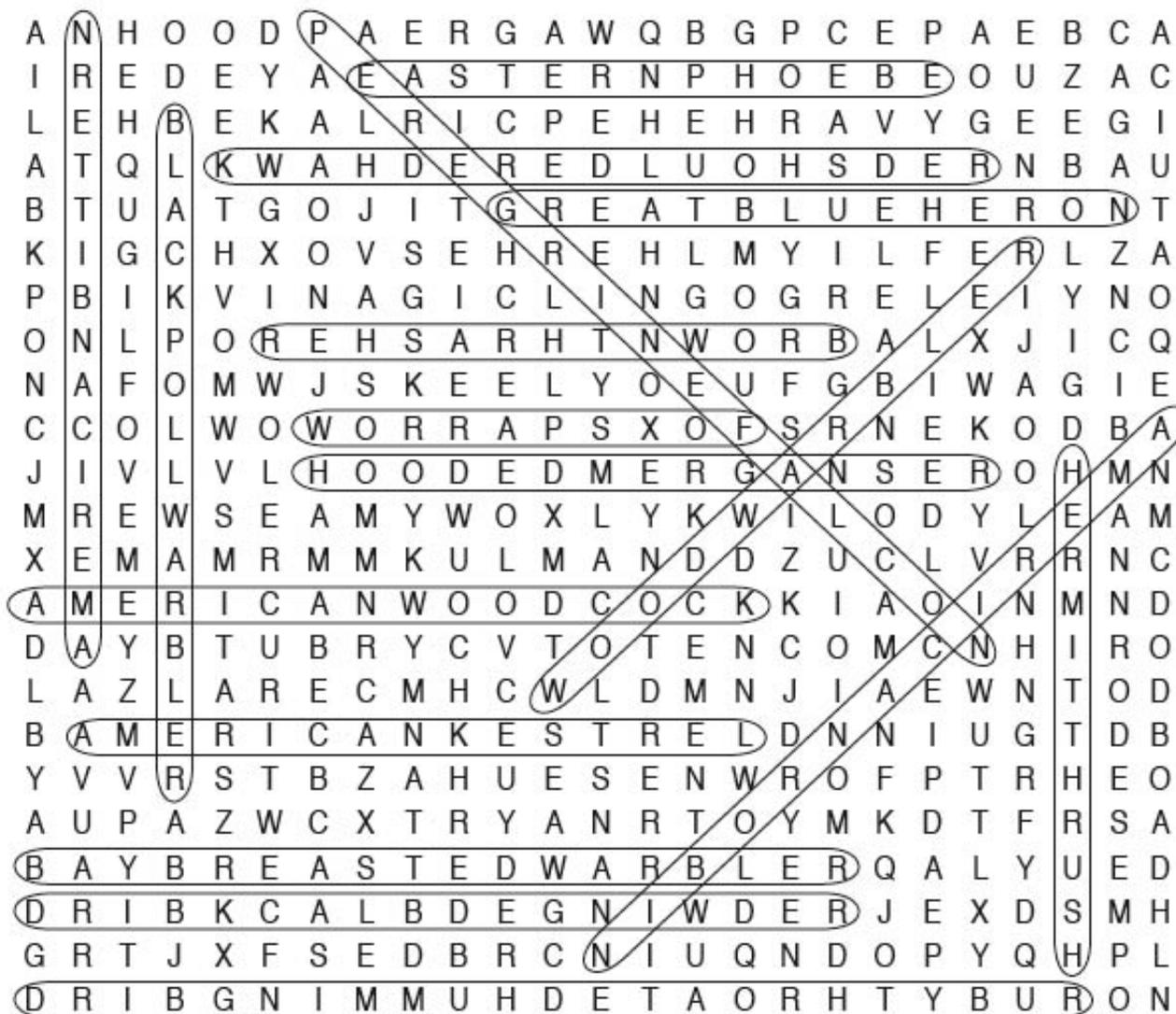
*Northern Woodlands Spring Calendar* (p. 4)

Across	Down
1. In March, this animal's pelt begins to turn from white to brown (3 words).	1. This waterfowl species dives for minnows in ponds and rivers (2 words).
2. Ninety percent of the woodcock's diet consists of these invertebrates.	2. This migratory bird nests in holes excavated by flickers (2 words).
3. Amphibian with a duck-like call (2 words).	3. This small, cavity-nesting bird excavates a perfectly round hole (2 words).
4. Woodchucks eat this in springtime after emerging from hibernation.	4. The leaves of this May-blooming daisy add strong flavor to salad.
5. Genus name for the lovely springtime wildflower, trailing arbutus, from the Greek word meaning, "upon the ground."	5. These wading birds return to wetlands in the north in late March (3 words).
6. Males of this bird species have a call that's been likened to the sound of a pile driver (2 words).	6. According to folklore, wind from this direction creates excellent conditions for maple sugaring.
7. This bird species, once common, declined from DDT poisoning (2 words).	7. Though robins are best known for eating worms, they also dine on this fruit in springtime.
8. This flower is one of the first to bloom in spring. Its leaves can sprout in January in southern New England (2 words).	8. When male phoebes return to the Northeast, they feed on these insects as they fly over streams.
9. These frogs migrate to their breeding grounds on rainy nights when temperatures top 41°F (2 words).	9. Tree swallows usually return to the Northeast from their southern wintering grounds in this month.
10. April meteor shower.	10. In springtime, bears sometimes eat the newly emerged leaves of this tree.



## Word Search

Northern Woodlands Spring Calendar, p. 4



### Migratory birds

Find the following bird species that migrate from southern wintering grounds to breed in the Northern Forest in springtime. Then look for them in nearby forests—they're easiest to spot before the trees leaf out.

Red-shouldered hawk

Peregrine falcon

Great blue heron

American woodcock

Hooded merganser

American kestrel

Eastern phoebe

American robin

Ruby-throated hummingbird

Hermit thrush

Fox sparrow

American bittern

Blackpoll warbler

Bay-breasted warbler

Wood warbler

Red-winged blackbird

Brown thrasher

## Word Search

*Northern Woodlands Spring Calendar, p. 4*

A N H O O D P A E R G A W Q B G P C E P A E B C A  
I R E D E Y A E A S T E R N P H O E B E O U Z A C  
L E H B E K A L R I C P E H E H R A V Y G E E G I  
A T Q L K W A H D E R E D L U O H S D E R N B A U  
B T U A T G O J I T G R E A T B L U E H E R O N T  
K I G C H X O V S E H R E H L M Y I L F E R L Z A  
P B I K V I N A G I C L I N G O G R E L E I Y N O  
O N L P O R E H S A R H T N W O R B A L X J I C Q  
N A F O M W J S K E E L Y O E U F G B I W A G I E  
C C O L W O W O R R A P S X O F S R N E K O D B A  
J I V L V L H O O D E D M E R G A N S E R O H M N  
M R E W S E A M Y W O X L Y K W I L O D Y L E A M  
X E M A M R M M K U L M A N D D Z U C L V R R N C  
A M E R I C A N W O O D C O C K K I A O I N M N D  
D A Y B T U B R Y C V T O T E N C O M C N H I R O  
L A Z L A R E C M H C W L D M N J I A E W N T O D  
B A M E R I C A N K E S T R E L D N N I U G T D B  
Y V V R S T B Z A H U E S E N W R O F P T R H E O  
A U P A Z W C X T R Y A N R T O Y M K D T F R S A  
B A Y B R E A S T E D W A R B L E R Q A L Y U E D  
D R I B K C A L B D E G N I W D E R J E X D S M H  
G R T J X F S E D B R C N I U Q N D O P Y Q H P L  
D R I B G N I M M U H D E T A O R H T Y B U R O N

### Migratory birds

Find the following bird species that migrate from southern wintering grounds to breed in the Northern Forest in springtime. Then look for them in nearby forests—they're easiest to spot before the trees leaf out.

Red-shouldered hawk  
Peregrine falcon  
Great blue heron  
American woodcock  
Hooded merganser  
American kestrel  
Eastern phoebe  
American robin  
Ruby-throated hummingbird

Hermit thrush  
Fox sparrow  
American bittern  
Blackpoll warbler  
Bay-breasted warbler  
Wood warbler  
Red-winged blackbird  
Brown thrasher