Northern Woodlands

Teacher's Guide

Spring 2007

Northern Woodlands Goes To School

Welcome to the Spring 2007 edition of *Northern Woodlands* magazine. Step out with your students into the greening world of spring. This edition of *Northern Woodlands* is filled with articles that will inspire field studies to survey salamanders and birds, examine tree flowers, and improve pollinator habitat. In these articles, and in the extension activities below, students can learn about living a sustainable lifestyle and discover the art and science of fly-fishing.

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: Alexander Host Foundation, Fountain Forestry, Inc., Frank and Brinna Sands Foundation, French Foundation, International Paper, Maine TREE Foundation, Merchants Bank, New England Forestry Foundation, Northeastern Lumber Manufacturers Assoc., Twinflower Farm, and Wells River Savings Bank.

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). Visit our Northern Woodlands Goes to School website at www.northernwoodlands.org/goes_to_school.php, where you can also download each quarter's teacher's guide.

Noteworthy News:
4th Promise of Place Conference
March 15-17, 2007
Thursday-Saturday, Lake Morey Inn, Fairlee, Vermont

Join colleagues from New England and beyond to celebrate the power of place-based education. Non-formal and formal educators, program managers, school administrators, historical society members, land managers, and community members from the New England region are invited to three days of workshops and networking. Over 40 diverse workshops designed to build skills and knowledge, including:

- Language of Place: ELL Students Exploring Place
- Place-based Education in the Frameworks
- Stories in Stone: Geology of the Upper Valley
- Based on a Book: Community Reading as Place-based Education.

Enjoy evening entertainment with singer-songwriter Erica Wheeler and African band Jeh Kulu. The keynote speaker will be Richard Louv, author of *Last Child in the Woods* (www.cnaturenet.org). For a complete brochure, go to www.promiseofplace.org. The registration deadline is February 26 (but be sure to inquire if you're interested and the deadline's passed, as there may be room for late

registrants). If you have any questions, contact Julia Penca at jpenca@shelburnefarms.org or (802) 985-8686 x41.

Contribute to Invasive Exotics Research. The National Institute of Invasive Species Science (www.niiss.org), a consortium of partners from Colorado State University, the USGS, and NASA, along with many other public land management agencies, non-profit organizations, educational institutions, and conservation organizations, are seeking teachers who collect information on non-native, invasive species with the help of their students. Their research team has designed an online data management system so that classes can contribute this type of information to a nationally growing database that will be used to help monitor and control these species nationwide. If you are interested in providing information on your monitoring effort through a short survey or are interested in participating in this program, please contact Alycia Crall at mawaters@nrel.colostate.edu or 970-227-3310.

1. Birds, Bees, Bats, and Butterflies

Where Have All the Pollinators Gone? By Carrie Chandler (pg. 55)

PLT	Good Buddies
Wild	Dynamic Duos
ME	English Language Arts A, D, E, H Science and Technology B, M Visual and Performing Arts A Physical Education A
NH	English Language Arts 1, 2, 5, 6 Science 3a
NY	CDOS 3 Managing Information MST 1 Scientific Inquiry MST 4 The Living Environment MST 7 Strategies ART 1 Visual Arts HPHE 1 Physical Education
VT	1.18 Reports 1.19 Research 3.5 Physically Active Lifestyle Choices 5.28 Artistic Proficiency 5.29 Visual Arts 6.2 Uses of Evidence and Data 6.3 Analyzing Knowledge 7.13 Organisms, Evolution, and Interdependence

Which animal species are the pollinators of this region, and what is their status? Have your students select and research one of the many species of bees, birds, bats, beetles, butterflies, or moths that pollinate the flowers in your region. Students can write and illustrate a report on their species. Create a pollination mobile for the classroom. Each student can design a branch of the mobile, with a paper, paper maché, clay, or carved wooden model of their pollinator species hanging on one end and a model of an appropriate flower species that it might pollinate hanging from the other end.

If pollinator species are declining, what are the potential ecological, economic, and social impacts? Have students design and plant a "pollinator garden" at your school with herbaceous plants and shrubs that appeal to a range of pollinator species.

Website : Visit the Brooklyn Botanical Garden website, www.www.bbg.org/gar2/topics/essays/2000wi_schoolyards.html, where you'll find a great publication on creating wildlife habitat at your school, "Habitat Gardening—How Schoolyards are Being Transformed into Wildlife Sanctuaries." The site offers many useful links, including ones to the National Wildlife Federation Backyard Habitat program and to Project WILD's WILD School Sites curriculum.

The National Audubon Society also encourages planting backyard habitat through their "Audubon at Home" project, www.audubon.org/bird/at_home/index.html.

Books: *Attracting Birds, Butterflies, and Other Backyard Wildlife.* National Wildlife Federation. Order online at www.nwf.org.

2. Tracking Chronic Wasting Disease

Disease Found in Deer Saliva and Muscles, by Anne Margolis (pg. 54)

Chronic Wasting Disease (CWD), a disease once confined to the West, has now been found in west-central New York. Have students research the disease and chart its expansion from Colorado, where it was first discovered. What are the ecological implications of this disease? How might it impact your state, economically and ecologically, if it were to spread to your region? What are wildlife managers doing to contain the disease?

Website: The New York State Department of Environmental Conservation has a good webpage on CWD in that state, and offers links to useful websites on the disease.

The Chronic Wasting Disease Alliance's website is loaded with useful information, including a map of CWD distribution in the U.S.: www.cwd-info.org

WILD	Deer Crossing Can Do!
ME	English Language Arts A, D, H Science and Technology B Geography A
NH	English Language Arts 1, 5 Science 3a Social Studies 10, 15
NY	CDOS 3 Managing Information CDOS 3 Thinking Skills MST 1 Scientific Inquiry MST 4 The Living Environment MST 7 Strategies
VT	1.18 Information Technology 1.19 Research 6.2 Uses of Evidence and Data 6.3 Analyzing Knowledge 6.7 Geographical Knowledge 7.13 Organisms, Evolution, and Interdependence

3. Cultivating Self-Sufficiency

A Man and a Team, by Jeffrey Lent (pg. 28)
New Hampshire Homestead, by Malin Clyde (pg. 32)

In his essay, Jeffrey Lent recalls a self-sufficient way of life uncommon today; David and C.C. White, described in Malin Clyde's article, are working to create such a way of life. The two articles offer tremendous opportunities for more extensive classroom learning.

A. Clyde's essay speaks of a level of self-sufficiency most of us can only imagine. Ask students to ponder their family's degree of self-sufficiency. What does their family produce to meet their needs for food, heat, clothing, energy, and entertainment? Ask them to come up with at least five things they can do to increase their self-sufficiency (grow a garden, tap a maple tree and make syrup, sew a quilt from fabric scraps, learn to play music, plant apple trees, and so on).

B. Lent's essay raises a critical issue: how do we measure efficiency? Our technological society is largely founded on the premise that machines increase efficiency and so are preferable to non-mechanized means of production. Ask students to consider Lent's description of his father's preference for horses over tractors. Which is more efficient and why? What metrics do students use to make their case? Encourage them to look at full cost accounting and factor in the usually externalized or subsidized costs associated with tractors (pollution, shipment of fossil fuels from around the world, and so on).

C. Give students a hypothetical 100-acre parcel of land, and have them design their own self-sufficient homestead. What would be its key elements? What needs must you meet and how would you meet them? Have them map their homestead and annotate each feature.

D. Have your students chart where their basic resources come from for one day (food, water, energy—transportation, heat, electricity). Then challenge them to prepare a "localvore" meal, with only foods raised within a 100-mile radius of their community.

WILD:	Sustainability: Then, Now, Later
PLT:	In the Good Old Days Renewable or Not?
ME	Science and Technology B Economics A English Language Arts B History B
NH	English Language Arts 7 Science 3a, 4c Social Studies 5, 9, 11, 17
NY	MST 1 Scientific Inquiry MST 4 The Living Environment SS 1, 3, 4
VT	2.4 Improving Effectiveness 3.9 Sustainability 4.6 Understanding Place 6.4 Historical Connections 6.19 Identity and Interdependence 7.13 Organisms, Evolution, and Interdependence 7.16 Natural Resources
VT	7.1 Scientific Method 7.2 Investigation 7.13 Organisms, Evolution, and Interdependence

E. How can you cultivate self-sufficiency in your school? Grow garden at school to supplement the school lunch program, erect a greenhouse to extend the growing season, encourage families to plant a section of their garden for the school. Have students brainstorm possibilities and choose one to act upon.

Website Vermont Localvore Project: www.vermontlocalvore.org/.
Northeast Organic Farming Association website offers plenty of information about food self-sufficiency, including localvore information: www.nofavt.org/localvore.php

Northeast Organic Farming Association's *Farm2School Primer*:
www.nofavt.org/pdfs/Farm2SchoolPrimer.pdf

Books: For older students, Wendell Berry's many books provide thoughtful commentary on America's agricultural crisis and the cultural crisis that accompanies our loss of self-sufficiency and connection with the land. Some key books include:
Home Economics, "A Defense of the Family Farm." North Point Press: San Francisco. 1987.
The Unsettling of America: Culture and Agriculture. Avon: New York. 1978.
What are People For? "The Work of Local Culture." North Point Press: San Francisco. 1990.
The Gift of Good Land. "The Economics of Subsistence" and "Family Work." North Point Press: San Francisco. 1981.

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4. Stalking Tree Flowers

Trees and Dendrons, by Robert Kimber (pg. 57)

Robert Kimber's essay celebrates trees, from the etymology of their collective name to the springtime miracles of their sprouting leaves and flowers. If you are fortunate enough to have a woodland around your school, take your students on a woods walk once a week to chart the unfolding of tree flowers. Though many are understated by comparison with showy herbaceous wildflowers, all are exquisite, especially under close examination. Be sure to bring hand lenses. Why might some plants have showier or more fragrant flowers than others? How are various tree flowers pollinated? Have students keep a journal of their discoveries, including annotated field sketches of the flowers they discover.

PLT:	Germinating Giants
ME	Visual and Performing Arts A Science and Technology B, J
NH	Science 1a, 2a, 3a
NY	ART 1 Visual Arts MST 1 Scientific Inquiry MST4 The Living Environment
VT	5.28 Artistic Proficiency 7.2 Investigation 7.13 Organisms, Evolution, and Interdependence

Books: *The National Audubon Society Field Guide to Trees*, by Elbert L. Little, is an excellent field guide for students, offering photographs of tree flowers.

Nature Journaling: Learning to Observe and Connect with the World Around You, by Claire Walker Leslie. Storey Publishing, 1998.

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5. Speaking for the Land

Aldo Leopold's Odyssey, by Julianne Lutz Newton. Reviewed by Karen Rauter (pg. 62)

Rauter's review provides the perfect lead-in to a study of Aldo Leopold, one of the great conservationists of the twentieth century. His best-known publication, *A Sand County Almanac*, still informs conservation work today. From its foreword to its final essay, the book offers timely insights into our relationship with the natural world, in accessible language. In the first section of the book, each chapter focuses on a particular month. As spring unfolds outside your classroom, have your students read the springtime chapters, which will spark their own awareness of the natural world around them. (Note that, in the *April* chapter, there's a beautiful description of the woodcock's aerial display—see *Calendar Connection* article below.)

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

In the *March* chapter, Leopold writes, "One swallow does not make a summer, but one skein of geese, cleaving the murk of a March thaw, is the spring." Leopold justifies this statement beautifully in the essay that follows. Have students study

this essay, and then write about their own quintessential spring experience (maple sugaring, getting stuck during mud season, seeing the first robin, etc.) Encourage students to keep a field journal (see activity 4 for more on journaling) to record their thoughts and observations.

Website The American Library Association offers an excellent four-page PDF on Leopold and *A Sand County Almanac*, including discussion questions:
www.ala.org/ala/ppo/currentprograms/storylines/sandcounty.pdf

Career Connection
At Work Teaching Beginners with Fishing Guide Hank Rope, by Stephanie Specchio (pg. 42)

Students can gain tremendous knowledge about stream ecology, aquatic invertebrates, and conservation through fly-fishing, in addition to learning fine motor skills and a useful skill that builds self-sufficiency. Invite a representative from your local angling club to introduce your students to the art and science of fly-fishing. A fisheries biologist from your state's wildlife department can teach students about the current state of fish and fisheries in your region. If possible, have students try their hands at fishing at a local river. In the classroom, students can learn to tie flies, a craft which requires an understanding of the ecology of fish and the invertebrates they eat—when and where they hatch, what their habits are, and how an artificial fly mimics those habits.

WILD	Blue Ribbon Niche (Aquatic WILD Curriculum Guide) Fishy Who's Who (Aquatic WILD Curriculum Guide) Fashion a Fish (Aquatic WILD Curriculum Guide)
ME	Science and Technology B Physical Education A
NH	Science 3a
NY	MST 4 The Living Environment HPHE 1 Physical Education
VT	3.5 Physically Active Lifestyle Choices 7.13 Organisms, Evolution, and Interdependence

Books: *A River Runs Through It*, by Norman McLean. 25th anniversary edition. University of Chicago Press: 2001.
A novel beautifully interwoven with fly-fishing, for older students.

Calendar Connection
Singing While They Sugar, by Geoff Marchant (pg. 22)

The woodcocks are back! Take your students birding with a representative from your local Audubon Society. If possible, take them out once every two weeks during the spring, and chart the new arrivals as they return from wintering grounds. Have your students select a local bird species to learn about in depth. Where do they travel to in winter? What are their mating habits? Their songs? Make an artistic rendering—wood carving, sculpture, painting—with a small description by each piece of artwork that reveals what the student found to be the most fascinating aspects of the bird. Display the artwork in your local library or other art space.

WILD	Birdsong Survey
ME	Science and Technology B, J English Language Arts A, D,E, H
NH	Science 1a, 2a, 2b, 3a, 6d English Language Arts 1, 2, 5, 6
NY	MST 1 Scientific Inquiry MST 4 The Living Environment MST 7 Strategies CDOS 3 Managing Information
VT	1.8 Reports 1.19 Research 7.1 Scientific Method 7.2 Investigation 7.13 Organisms, Evolution, and Interdependence

Website: You'll find a listing of state and local Audubon chapters on the National Audubon Society website, www.audubon.org.

Wildlife Connection
Salamanders in Our Woods
Spotting Salamanders, by Gerry Lemmo (pg. 38)

Take your students into the woods to search for salamanders. Choose a site likely to have the greatest variety (ask your students to ponder what habitat features should be present (vernal pools, streams, big logs, etc). Classes in Vermont can contribute their findings to the Vermont Reptile and Amphibian Atlas Project, coordinated by herpetologist Jim Andrews at Middlebury College. On their website, you can download data sheets for recording your findings, as well as handouts with tips on finding, handling, identifying, and photographing amphibians (they appreciate receiving photographs as well as written documentation).

What landscape features offer habitat for salamanders? What management strategies should forest managers use to ensure protection of salamander habitat (buffers around streams and vernal pools, well-sited access roads maintained to prevent erosion that would degrade salamander habitat, downed woody material left in the forest). Each state in the U.S. recently completed a State Wildlife Action Plan, designed to maintain or increase populations of "species of greatest conservation need." These plans are available online. Have students review the recommendations in their state's plan for conserving amphibian species. What can they do to improve salamander habitat on their school grounds?

WILD	Riparian Retreat (Aquatic WILD Curriculum Guide)
PLT	The Fallen Log 400-acre Woods
ME	Science and Technology B, J English Language Arts A, D, H
NH	Science 1a, 2a, 3a English Language Arts 1, 5, 7
NY	MST 1 Scientific Inquiry MST 4 The Living Environment CDOS Managing Information
VT	1.19 Research 2.4 Improving Effectiveness 7.1 Scientific Method 7.2 Investigation 7.13 Organisms, Evolution, and Interdependence

Website: **Vermont Reptile and Amphibian Atlas Project**:
http://community.middlebury.edu/~herpatlas/herp_index.htm

Vermont Family Forests: Certified Ecoforestry section, www.familyforests.org/ecoforestry/, you'll find their Forest Management Checklist, with 36 management practices for maintaining forest community health.

Vermont Wildlife Action Plan: www.vtfishandwildlife.com/swg_cwcs_report.cfm

New Hampshire Wildlife Action Plan:
www.wildlife.state.nh.us/Wildlife/wildlife_plan.htm

New York Wildlife Action Plan:
www.dec.state.ny.us/website/dfwmr/swg/cwcs2005.html

Maine Wildlife Action Plan:
www.state.me.us/ifw/wildlife/compwildlifestrategy/index.htm

Writing Exercise: Writing from the Land

A Place in Mind, by Thomas Cooper (pg. 76)
Do you have a favorite tree, one near your house or somewhere else in your town? What makes that tree stand out among others for you? Do you have strong memories connected with that tree? Using vivid sensory imagery (words that evoke sights, sounds, smells, tastes, and textures), describe your tree and tell its story. If no particular tree comes to your mind, choose a tree outside your window as the subject of your writing.

Crossword Puzzle

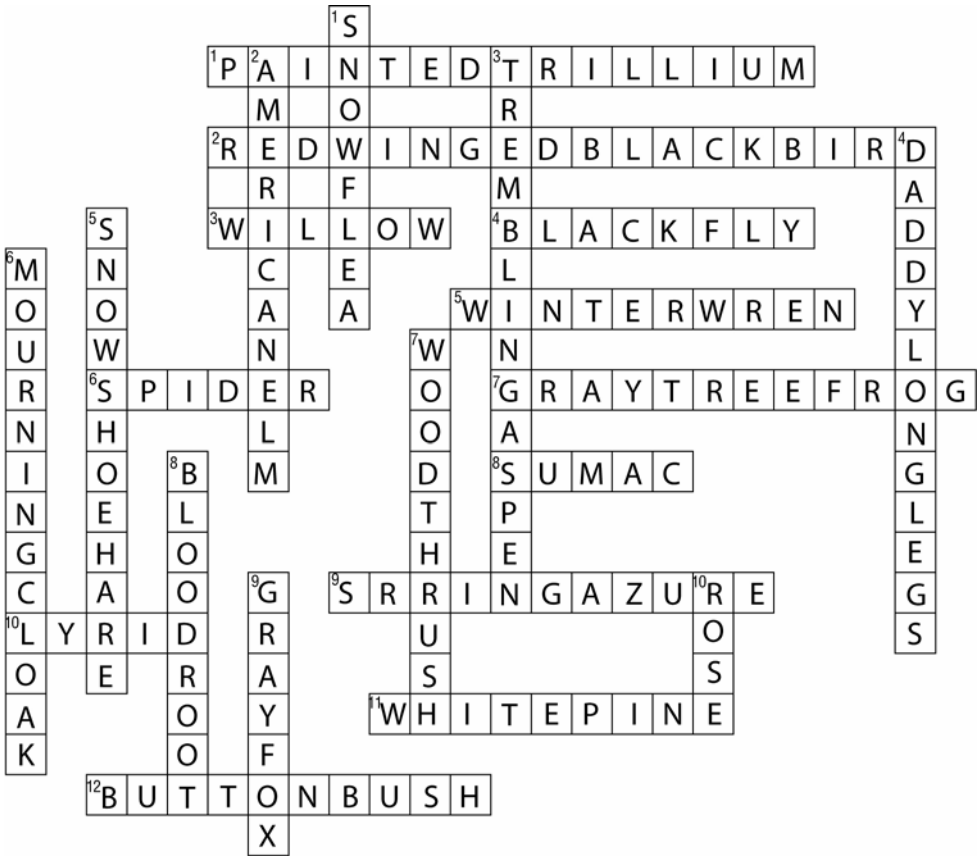
Northern Woodlands Spring Calendar (p. 4)

Across

1. This May wildflower blooms in conifer woodlands (two words). PAINTED TRILLIUM
2. This water-loving bird is one of the earliest migrants to return to the Northern Forest (three words). RED-WINGED BLACKBIRD
3. The pollen of this woody plant provides the first spring food for many bee species. WILLOW
4. This biting insect has been around for 180 million years. BLACKFLY
5. This songbird sings one of the longest and most complicated bird songs known (two words). WINTER WREN
6. Some species of this invertebrate eat birch pollen grains. SPIDER
7. This amphibian sings from late afternoon until after midnight in springtime (three words). GRAY TREE FROG
8. Robins will eat the berries of this plant if snow covers the ground. SUMAC
9. The wings of this butterfly species are a silvery violet-blue (two words). SPRING AZURE
10. April meteor shower. LYRID
11. Road salt can kill the leaves of this conifer (two words). WHITE PINE
12. The fruits of this wetland shrub serve as important springtime food for waterfowl returning to the Northeast from their southern wintering grounds. BUTTONBUSH

Down

1. You can find this tiny insect hopping on the snow in early spring (two words). SNOW FLEA
2. In early April, this tree comes into bloom (two words). AMERICAN ELM
3. The seeds of this hardwood ripen in late May (two words). TREMBLING ASPEN
4. This spider's eggs, laid in late summer, hatch the following May (two words). DADDY LONGLEGS
5. In spring, this mammal dines on clover, grass, ferns, and alder leaves (two words). SNOWSHOE HARE
6. This butterfly species overwinters as an adult and emerges in late April (two words). MOURNING CLOAK
7. This migratory songbird can sing as many as 20 different songs (two words). WOOD THRUSH
8. Though this plant bears a white flower, the sap exuded from its roots is bright red. BLOODROOT
9. This mammal may raise its young in a hollow log or a bank burrow (two words). GRAY FOX
10. The eastern tent caterpillar usually lays its eggs on the twigs of trees in this taxonomic family, which includes black cherry, serviceberry, and crabapple trees. ROSE



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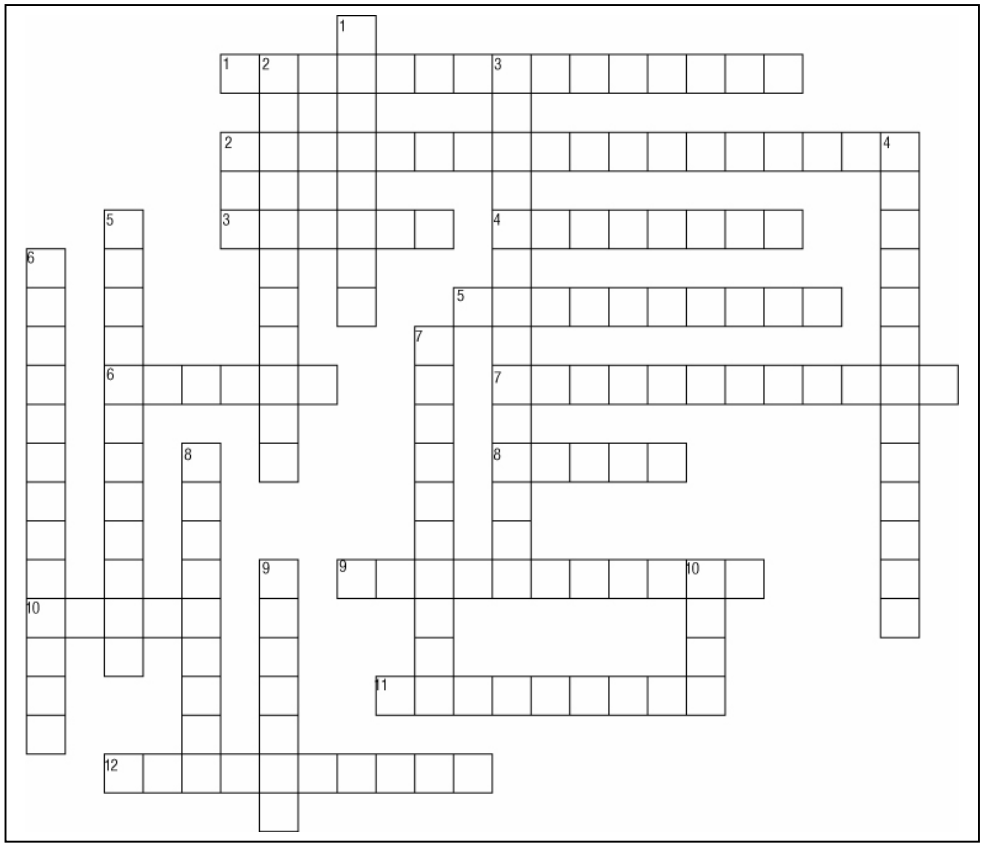


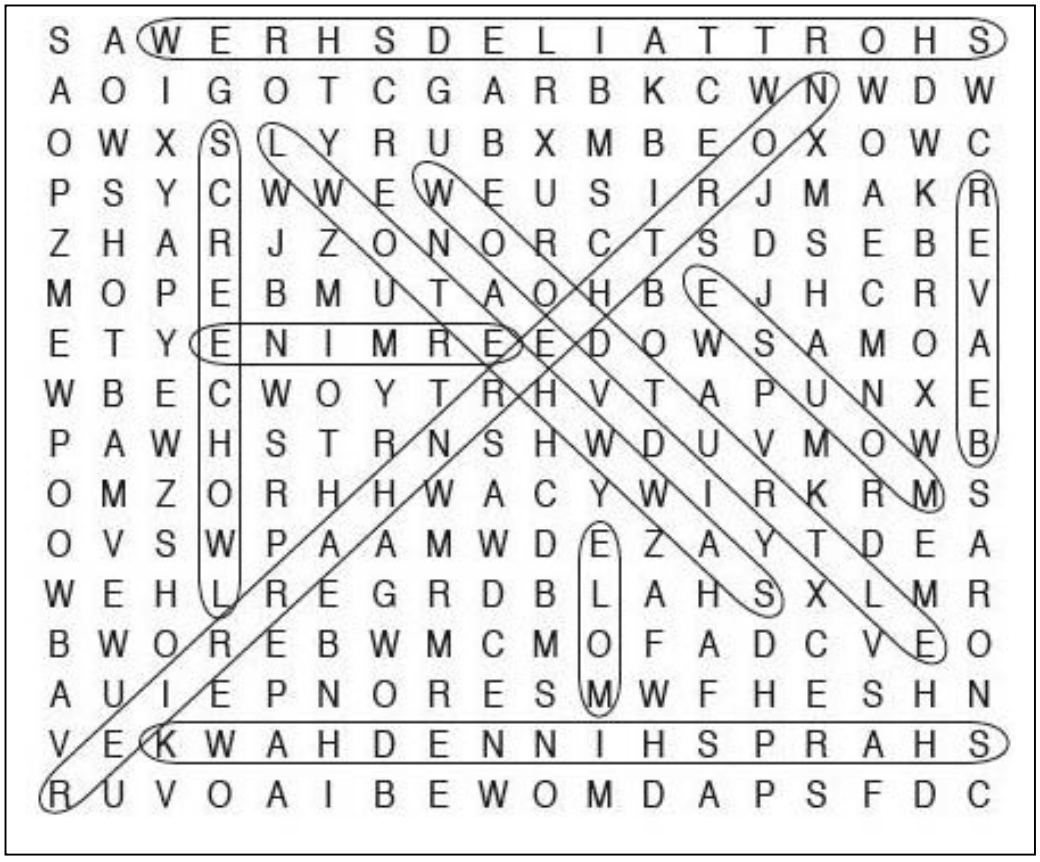
Word Search

Animals of the Northern Forest

Spring Calendar (pg. 4)

Using the clues below, and the *Spring Calendar* in your *Northern Woodlands* magazine, find 10 animals of the Northern Forest in the word search below.

1. This bird's short, steady whistles sound a bit like an alarm signal (three words). SAW-WHET OWL
2. This mammal's fur begins to turn from white to brown in mid-March. ERMINE
3. By late March, this bird is incubating four or five white eggs (two words). SCREECH OWL
4. Males of this bird species return 10 days earlier than females (two words). NORTHERN HARRIER
5. This small, subterranean mammal excavates tunnels. MOLE
6. This bird of prey, which feeds mostly on smaller birds, returns from its wintering grounds in late March (three words). SHARP-SHINNED HAWK
7. Old nest holes of this mammal provide habitat for bumblebee colonies. MOUSE
8. This reptile overwinters on stream bottoms (two words). WOOD TURTLE
9. The bite of this tiny mammal is poisonous (three words). SHORT-TAILED SHREW
10. This mammal leaves its birth home at age two. BEAVER



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