Northern Woodlands

Spring, 2005

Looking for an article? A complete index of the past six years' worth of *Northern Woodlands* is available at http://www.northernwoodlands.org/nw_index.html; we would be happy to make a photocopy of an article you need and mail it to you.

Project Learning Tree Coordinators

Maine: Pat Maloney 207-626-7990, meplt@gwi.net

New Hampshire: Esther Cowles 603-226-0160, info@nhplt.com

New York: Dick Rommel 845-256-3078, rhommel@gw.dec.state.ny.us

Vermont: Virginia Anderson 802-241-3651, ginger.anderson@anr.state.vt.us

NORTHERN WOODLANDS MAGAZINE

802-439-6292

www.northernwoodlands.org

Editorial Mission

To shape the future of the forests of the Northeast through information and education about their value, use, and conservation.

To inspire landowners' sense of stewardship by increasing their awareness of natural history and the principles of conservation and forestry that are directly related to their land.

To encourage loggers, foresters and purchasers of raw materials to continually improve the standards by which they utilize the forest's resources.

To increase the public's awareness and appreciation of the social, economic and environmental benefits of a working forest.

To raise the level of discussion about environmental and natural resource issues.

To educate a new generation of forest stewards.

Please allow your students to keep their copy of each edition of the magazine, and encourage them to share what they have learned with their families.

Teacher's Guide

Northern Woodlands Goes to School

Welcome to the Spring 2005 edition of *Northern Woodlands* magazine. After a long winter, spring is bursting upon the Northern Forest—flowers blossoming, ferns unfurling, animals emerging from winter dens, others returning from southern migrations. This issue of *Northern Woodlands* will take you and your students on a mental excursion into the springtime forest—we hope it plants seeds for you to venture into your community's forests to observe spring's unfolding firsthand.

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: the Alexander Host Foundation, Britton Lumber Company, Cersosimo Lumber Company, Inc., Columbia Forest Products, Fountain Forestry, Inc., Frank and Brinna Sands Foundation, Freeman Foundation, French Foundation, International Paper, Longacre Landscaping, Inc., Maine TREE Foundation, Merchant's Bank, Mill River Lumber, New England Forestry Foundation, Northeastern Lumber Manufacturers Assoc., Pompanoosuc Mills, 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 or would like additional copies of this guide, 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/goestoschool.html.

Noteworthy News:

Regional Forestry Events Online. The Northern Woodlands website offers an events page, www.northernwoodlands.org/events.html, chock-full of regional forestry and environmental events. Read more about it on page 16 of this *Northern Woodlands* issue.

Biodiversity Monitoring Tool. The University of New Hampshire Extension's new handbook, *The Landowner's Guide to Inventorying and Monitoring Wildlife in New Hampshire*, is useful for wildlife study anywhere in the Northeast. You can read it online at www.ceinfo.unh.edu/Forestry/Pubs/wilguide.pdf or order a $10 hardcopy. Find out how to order it on page 16.

Habitat Improvement Funds Available. The federally funded Wildlife Habitat Incentives Program (WHIP) offers cost-share funds for such habitat improvement projects as brush-hogging, streambank restoration, and wetlands rehabilitation. Take advantage of the program to improve wildlife habitat on your school grounds. Learn more about WHIP on page 14.

Wetlands Teacher Training. Environmental Concern Inc., www.wetland.org, promotes understanding and stewardship of wetlands. They are looking for partners to help offer wetland education opportunities to educators. One-, two-, and three-day trainings are available in both of their extensive hands-on curriculum guides: **WOW! The Wonders of Wetlands** and **POW! The Planning of Wetlands.** Local partners help secure a date and a location as well as recruit participants, for which they receive a free space in the workshop. Visit their website to learn how you can take part.

The Framework identifies fields of knowledge considered necessary in the public school curricula of Maine, New Hampshire, and Vermont.

Project WILD is a national conservation education program designed to prepare students to make decisions affecting people, wildlife, and their shared home, Earth. Project WILD is administered by your state's fish and wildlife department.

Project Learning Tree (PLT) is a program of the American Forest Foundation and the Council for Environmental Education. PLT provides a series of educational activities focused around forests and forest issues. Contact your state forester's office for more information on PLT activities.

Websites are increasingly critical as a research tool. The Teacher's Guide includes web addresses that we hope will help to increase your students' learning opportunities.

Suggested books and readings are also included in the Teacher's Guide to help teachers and students get the most benefit from each edition of the magazine. These references focus on enhancing the concepts featured in the activities.

Where applicable, the Teacher's Guide offers helpful information or resources to supplement activities.

Suggested Activities

1. Stone Wall Investigations

Uncovering the Secrets of New England's Stone Walls with Robert Thorson, by Todd McLeish (page 34)

Exploring Stone Walls: A Field Guide to Stone Walls, by Robert M. Thorson (book review, page 62)

Composing an estimated 250,000 miles crisscrossing New England, stone walls make excellent and readily available subject matter for field study. Take Thorson's *Exploring Stone Walls* field guide with you to interpret with your students the history of stone walls in your community. Have students research the land-use history and geology of your chosen study area before your field investigation and see if the stone walls support your findings.

Nothing Succeeds Like Succession

Stone Wall Secrets, by Robert and Kristine Thorson. Written for elementary and middle school students, Thorson's book reveals history, anthropology, and geography as a grandfather and grandson repair stone walls on their farm. Use it with the *Annotated Teacher's Guide to Stone Wall Secrets* (see description above).

Stone by Stone: The Magnificent History of New England's Stone Walls, by Robert Thorson. Winner of the 2003 Connecticut Book Award for nonfiction, which Thorson describes as being written from the soil's point of view.

Reading the Forested Landscape, by Tom Wessels. Though the entire book is marvelous, the chapter, "Of Junipers and Weird Apples," is particularly useful in learning the cultural history of stone walls.

www.stonewall.uconn.edu. This site, created by Robert Thorson, offers introductory information on stone wall history, purpose, and function. It includes the 71-page *Annotated Teacher's Guide to Stone Wall Secrets* by Robert and Kristine Thorson. Thorson will be presenting his teaching supplements at the Connecticut Science Educator's Professional Development Day on March 12, 2005. See the website for details.

www.fairbanksmuseum.org. The Fairbanks Museum's middle school curriculum, *The Great Northern Forest: From Science to Stewardship*, includes a useful teaching packet called, "Stonewalls, Stumps, and Foundations."

ME English Language Arts A, D, H
Science & Technology J

NH English Language Arts 1, 5
Science 2a

VT 1.9 Research
1.21 Selection
6.2 Uses of Evidence & Data
6.3 Analyzing Knowledge
7.2 Investigation

2. Lepidoptera Lifecycles

Gaudy Giants of the Night, by Gayle Goddard-Taylor (page 22)

Study the incredible lepidopteran lifecycle from egg to larva, pupa, and adult by raising butterflies or moths in your classroom.

Research, plan, and plant a butterfly and moth garden. Have students research appropriate food and cover species, including night-blooming flower species for the moths.

Goddard-Taylor's article provides a perfect launching point for a discussion of the

WILDLIFE CONNECTION

The Floppy-Eared Fox, by Dave Kynor (page 38)
Porcupine, *Erethizon dorsatum*, by Virginia Barlow (60)
Raccoon Ramblings, by Susan Morse (page 21)

This issue of *Northern Woodlands* includes articles about three mammals common to the Northeast. Have students choose a mammal of the Northern Forest to study in depth, including investigation of the animal's eating habits, social habits, family life, physiology, ecological niche, and interactions with humans. What signs does it leave in the forest that indicate its presence? What is the current status of its population in your region? Encourage students to conduct at least one interview—with a local or state wildlife biologist, local sportsmen, or long-time residents—to give depth to their research. Encourage them to create a multi-media display presentation about the ecology of their animal, including drawings, photographs, and props (like plaster casts of tracks or pelts).

Conduct a mammal inventory on your school grounds using the methodology and data collection sheets included in *The Landowner's Guide to Inventorying and Monitoring Wildlife in New Hampshire* (see website information below).

Tracking and the Art of Seeing, by Paul Rezendes. 1999: HarperCollins.

The University of New Hampshire Extension's website contains the useful handbook, *The Landowner's Guide to Inventorying and Monitoring Wildlife in New Hampshire*. Read it on-line at www.ceinfo.unh.edu/Forestry/Pubs/wilguide.pdf.

ME Science & Technology B, J
Visual & Performing Arts A

NH Science 1a, 2a, 2b, 3a, 6d

VT 1.19 Research
5.29 Visual Arts
6.2 Uses of Evidence & Data
7.1 Scientific Method
7.13 Organisms, Evolution, & Interdependence

Suggested Activities

unintended ecological consequences of introducing exotic species for biological pest control. Her article notes the introduction of *Compsilura* (tachinid fly) to parasitize gypsy moths, a move that has negatively impacted several native moth species. Students can research other cases of biological pest control run amok, or you can use the article as a means to introduce the notion of native biological diversity and the ecological threat posed by accidental or intentional introduction of exotic species.

Home Sweet Home (in *Forest Ecology, High School Module*)

Saga of the Gypsy Moth (in *Forest Ecology, High School Module*)

Planting Animals
World Travelers
Improving Wildlife Habitat in the Community
Appendix: Guidelines for Responsible Use of Animals in the Classroom

The Eisenhower National Clearinghouse, funded by the U.S. Department of Education, offers information and curriculum sources for raising monarch butterflies in the classroom. www.enc.org/features/calendar/unit/0,1819,93,00.shtm.

The Classroom Animals and Pets website, created and maintained by an elementary school teacher, contains lots of practical advice for raising butterflies in the classroom. www.teacherwebshelf.com/classroompets/insectsandco-butterflies.htm.

Science & Technology B, J

ME

Science 2a, 2b, 3a

NH

1.19 Research
2.14 Planning/Organization
4.6 Understanding Place
6.2 Uses of Evidence & Data
7.2 Investigation
7.13 Organisms, Evolution, & Interdependence

VT

3. Appreciating Black Flies

In Praise of Black Flies, by Bill Amos (page 15)

Taking students on spring field trips in the Northern Forest can be a daunting prospect once black fly season begins, with swatting and complaints superceding whatever subject you're investigating. So what could be better than to make black flies themselves the object of your explorations? Conduct a stream macroinvertebrate study with your students, noting black fly larvae location and density, as well as the location of other macroinvertebrates.

Where do black flies fit into the ecological web of the Northern Forest? What are their predators? Studied carefully, any animal or plant, no matter how vilified, evokes wonder and praise for its remarkable adaptations for survival.

A Guide to Common Freshwater Invertebrates, by J. Reese Voshell. Excellent guide to macroinvertebrates for middle and high school students. McDonald & Woodward Publishing Company (www.mwpub-co.com).

http://www.mainenature.org/blackfly/blackflyinfo.html. Q & A format with lots of information about black flies, including useful web links.

Science & Technology B, J

ME

Science 1a, 2a, 2b, 3a, 6d

NH

4.6 Understanding Place
7.2 Investigation
7.13 Organisms, Evolution, & Interdependence

VT

4. Tamaracks and Bog Ecology

From the Bog to the Sea: Maine Logger Harvests Stumps for Ships' Knees, by Andy Kekacs (page 52)

This article delves into two fascinating subjects: bog ecology and earning a living by working directly with the land. What is a bog and how does it form and maintain itself? How does it differ from other wetlands? How do tamaracks and other bog residents survive the wetness and acidity of the bog environment? If there is a bog relatively nearby, take this opportunity to go explore it. Take pH measurements, identify bog residents, sample the soil—bogs are fabulous study areas.

Is it possible to harvest ecologically in a wetland? What special management concerns arise when working in and around a bog? What are other economic values of bogs and wetlands?

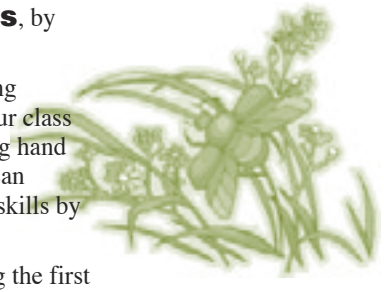
Watch on Wetlands

www.newmansknees.com. This website has great photographs and descriptions of Newman Gee's tamarack ships' knees.

Bogs of the Northeast, by Charles Johnson. 1985: University Press of New England.

CALENDAR CONNECTION

A Head Start for Spring Wildflowers, by Kathryn Lund Johnson (page 46)



Wildflowers make excellent field study subjects—being stationary and relatively easy to identify—so bring your class into the woods to observe their annual unfolding. Bring hand lenses and field guides to aid identification. Students can learn wildflower physiology and develop observation skills by drawing/painting the wildflowers they encounter.

Keep an illustrated class journal of wildflowers, noting the first sightings of each species and the duration of their blooming.

Drawing on Nature

Newcomb's Wildflower Guide, by Lawrence Newcomb. 1989: Little, Brown. This field guide is a favorite of naturalists because of its excellent key that leads you step by step to correct identification.

Plant Observer's Guidebook, by Charles E. Roth. Offers tips on recording observations, taking photographs, creating field maps and study transects, and more.

ME

Science & Technology J
Visual & Performing Arts A

NH

Science 1a, 2a

VT

5.29 Visual Arts
7.2 Investigation

Suggested Activities

Ecology of the Northern Lowland Bogs and Conifer Forests by James Arthur Larsen. 1982: Academic Press.

The Book of Swamp and Bog: Trees, Shrubs, and Wildflowers of the Eastern Freshwater Wetlands, by John Eastman and Amelia Hansen. 1995: Stackpole Books.

ME Economics A
Science & Technology B

NH Science 3a
Social Studies 5, 9

VT 3.9 Sustainability
7.13 Organisms, Evolution, & Interdependence
1.20 Communication of Data
2.14 Planning/ Organization
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

5. Stewardship vs. Friendship

A Contract Between Friends,
by David Brynn (page 9)

As this article points out, the words we use to define our relationship with the natural world matter. Have your students read the "A Contract Between Friends" and discuss its relevance as a group. Why does it matter whether we consider ourselves an "owner," a "steward," or a "friend" when relating to/managing a forest? What differences in behavior do each of those titles connote?

Have students consider our cultural relationship with the natural world. Which of the above labels best fits our current relationship with the natural world? How would it be different if we opted instead to assume the role of "friend"? Do any human cultures, past or present, model a more non-hierarchical, friendship model of relationship with the natural world? Ask students to describe the relationship they think is most fitting for us to have with the natural world and explain why in an essay.

Words to Live By

Enviro-Ethics
Ethi-Reasoning
Sustainability: Then, Now, Later

Home Economics, by Wendell Berry. 1987: North Point Press. "Getting Along With Nature," "Preserving Wildness," and several of the other essays in this collection delve into questions of right relationship with nature.

A Sand County Almanac, by Aldo Leopold. 1949: Oxford University Press. The section called "The Land Ethic" is a classic discussion of ethical relationship with the natural world.

ME English Language Arts A, E, G

NH English Language Arts 1, 2
Social Studies 11

VT 1.7 Responses to Literature
1.11 Persuasive Writing
1.12 Personal Essays
3.3 Respect
4.6 Understanding Place
6.19 Identity & Interdependence

CAREER CONNECTION

An Investment in Forestry

by Brooks Mills (page 28)

Forestry is both an art and a science, embracing the disciplines of ecology, botany, silviculture, mathematics, and economics, and requiring a working knowledge of the wood products industry. Invite a forester to take your students into the woods for a hands-on introduction to the career of forestry. Have the forester show students how he or she goes about managing a forest—developing a forest map and management plan, assessing forest health, determining management prescriptions. How does the forester decide which trees to cut and which to leave to best safeguard forest health and meet landowners' management objectives?

Have students work in teams, using basic forestry tools (10-factor prisms, tree scale sticks) to determine basal area, tree diameter and height, and timber volume. If your community owns a municipal forest, find out if it has a management plan. If it doesn't, make that forest the site for your forestry field work, and consider using the simulation model created at Oregon State University (see website below) to guide students in developing a management plan for the forest.

Tough Choices (High School Module: *Focus on Forests*)
Balancing America's Forests (High School Module: *Focus on Forests*)
400-acre Wood
A Forest of Many Uses
Forest for the Trees

Tree Identification Book, by George W. Symonds and Stephen V. Chelminski. Harper Resource: 1972.

Wetland, Woodland, Wildland: A Guide to the Natural Communities of Vermont, by Elizabeth H. Thompson and Eric R. Sorenson. University Press of New England, 2000.

Working With Your Woodland, by Mollie Beattie, Charles Thompson, and Lynn Levine. University Press of New England, 1983. Excellent resource for information about resource management written for the general public.

Read about an exciting forestry simulation for middle school students (but very appropriate for older students) developed by Oregon State University. www.cof.orst.edu/service/alumni/focus_fall92/learning.htm.

ME Science and Technology B, J
Geography A

NH Science 1a, 2a, 2b, 3a, 6d
Social Studies 10, 15

VT 3.9 Sustainability
6.7 Geographical Knowledge
7.2 Investigation
7.13 Organisms, Evolution, and Interdependence

Northern Woodlands

Word Search: Bird Search

Spring Calendar (page 4)

1. In late March, listen for the *Conk-er-eee* call of this returning migratory bird, particularly near wetlands (3 words).
2. By early March, members of this bird species are incubating eggs in tree cavities (2 words).
3. According to lore, the altitude at which this bird flies predicts fair or foul weather.
4. This bird commonly nests in the high branches of white pines.
5. This bird uses its wings to make a low-pitched drumming sound to attract a mate.
6. This bird may use the same nest year after year, refurbishing and then laying a clutch of speckled, aqua-colored eggs in it.
7. This migratory bird returns to northeastern lakes and rivers as soon as the ice melts (2 words).
8. Bird species that preys on ruffed grouse (3 words).
9. Animal that pollinates the flowers of wild columbine.
10. Crabapples provide late-winter food for this bird species (2 words).

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

Northern Woodlands

Word Search: Bird Search

Spring Calendar (page 4)

1. In late March, listen for the *Conk-er-eee* call of this returning migratory bird, particularly near wetlands (3 words). RED-WINGED BLACKBIRD
2. By early March, members of this bird species are incubating eggs in tree cavities (2 words). BARRED OWL
3. According to lore, the altitude at which this bird flies predicts fair or foul weather. SWALLOW
4. This bird commonly nests in the high branches of white pines. CROW
5. This bird uses its wings to make a low-pitched drumming sound to attract a mate. GROUSE
6. This bird may use the same nest year after year, refurbishing and then laying a clutch of speckled, aqua-colored eggs in it. RAVEN
7. This migratory bird returns to northeastern lakes and rivers as soon as the ice melts (2 words). HOODED MERGANSER
8. Bird species that preys on ruffed grouse (3 words). GREAT HORNED OWL
9. Animal that pollinates the flowers of wild columbine. HUMMINGBIRD
10. Crabapples provide late-winter food for this bird species (2 words). CEDAR WAXWING

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

Northern Woodlands

Writing Exercise: Appreciating Home

Mountains and Mileage, by William Shutkin (page 57)

Read Shutkin's essay, then consider your home place; do you live rurally, or in a village, town, or city? How do you interact with the natural world in your home place? What do you appreciate about where you live? What opportunities does it afford you? What are the drawbacks of living where you live? Use vivid images to illustrate your points and bring your home place to life.

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Crossword Puzzle

Winter Calendar (page 4)

ACROSS

1. The scientific name for the bacteria that give soil its familiar, earthy smell.

2. Look for this amphibian on warm, rainy spring nights, migrating to vernal pools to mate (2 words).

3. Common, non-native insect that lays its eggs on the backs of earthworms so that the hatched larvae can feed on the earthworm's body (2 words).

4. Fruit common to northeastern bogs (2 words).

5. Quaking aspen and red maple are pollinated by this natural force.

6. Mammal that feeds on grouse eggs.

7. In farming lore, storm on this day portends bountiful crops (3 words).

8. In mid-March, this odiferous mammal emerges from hibernation.

9. This rodent practices the art of maple sugaring by nipping maple twigs in early spring and licking the sap that collects and concentrates there (2 words).

DOWN

1. Pine grosbeaks eat the red berries of this plant in late winter and early spring.

2. The tiny seeds of this hardwood tree grow in cones and are scattered in spring by the wind (2 words).

3. This butterfly overwinters as an adult (rather than as an egg or larva), so you may see it on warm days in early spring (2 words).

4. Also called liverwort, this spring flower was once believed to cure liver ailments.

5. This beautiful yellow flower is also called Bluebead, after its shiny, blue fruits.

6. On warm, late-winter days, look for this tiny insect on the snow (2 words).

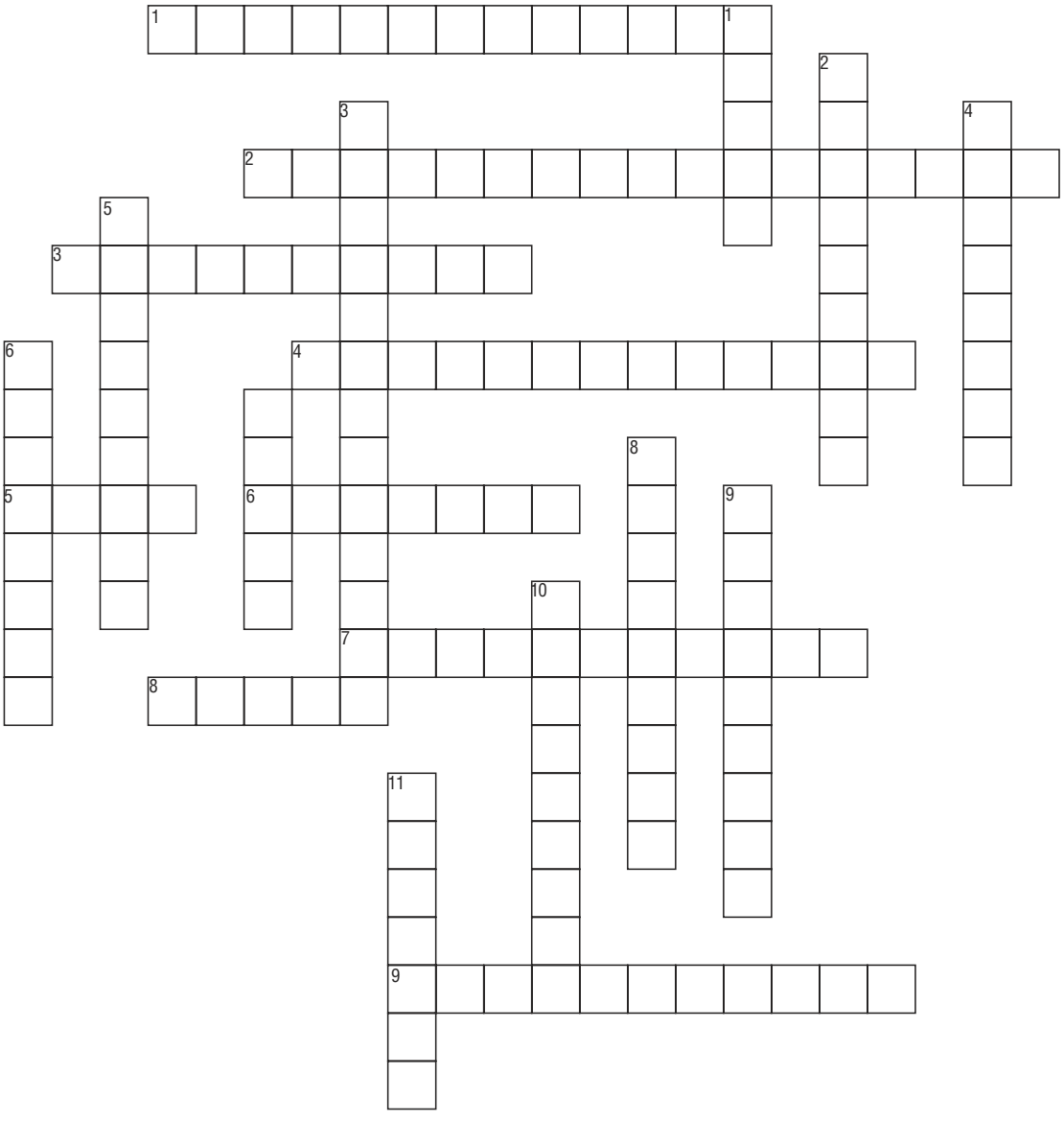
7. This fish species begins to spawn when water temperatures reach 50°F.

8. In April, this insect forages for pollen among maple tree blossoms.

9. Commonly considered a weed, this plant bears edible flowers and leaves.

10. According to lore, a swarm of these in springtime is worth a load of hay.

11. May meteor shower.



Northern Woodlands

Crossword Puzzle

Winter Calendar (page 4)

ACROSS

1. The scientific name for the bacteria that give soil its familiar, earthy smell. ACTINOMYCETES

2. Look for this amphibian on warm, rainy spring nights, migrating to vernal pools to mate (2 words). SPOTTED SALAMANDER

3. Common, non-native insect that lays its eggs on the backs of earthworms so that the hatched larvae can feed on the earthworm's body (2 words). CLUSTER FLY

4. Fruit common to northeastern bogs (2 words). WILD CRANBERRY

5. Quaking aspen and red maple are pollinated by this natural force. WIND

6. Mammal that feeds on grouse eggs. RACCOON

7. In farming lore, storm on this day portends bountiful crops (3 words). ALL FOOLS' DAY

8. In mid-March, this odiferous mammal emerges from hibernation. SKUNK

9. This rodent practices the art of maple sugaring by nipping maple twigs in early spring and licking the sap that collects and concentrates there (2 words). RED SQUIRREL

DOWN

1. Pine grosbeaks eat the red berries of this plant in late winter and early spring. SUMAC

2. The tiny seeds of this hardwood tree grow in cones and are scattered in spring by the wind (2 words). GRAY BIRCH

3. This butterfly overwinters as an adult (rather than as an egg or larva), so you may see it on warm days in early spring (2 words). MOURNING CLOAK

4. Also called liverwort, this spring flower was once believed to cure liver ailments. HEPATICA

5. This beautiful yellow flower is also called Bluebead, after its shiny, blue fruits. CLINTONIA

6. On warm, late-winter days, look for this tiny insect on the snow (2 words). SNOW FLEA

7. This fish species begins to spawn when water temperatures reach 50°F. PERCH

8. In April, this insect forages for pollen among maple tree blossoms. BUMBLEBEE

9. Commonly considered a weed, this plant bears edible flowers and leaves. DANDELION

10. According to lore, a swarm of these in springtime is worth a load of hay. HONEYBEES

11. May meteor shower. AQUARID