



Teacher's Guide

Winter 2005

Welcome to the Winter 2005 edition of *Northern Woodlands* magazine. As the weather turns cold, the hot topics in this latest edition are sure to warm you and your students. How does firewood measure up as an economical and ecological heating source? Can we accommodate wolves in the Northern Forest, and what can we learn from other cultures about living with wolves? Do trees really help sequester carbon and reduce atmospheric carbon levels? We hope you enjoy discovering the answers to these questions and learning more about winter life in our great Northern Forest.

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.

In an effort to cut costs of NWGTS and mitigate the need to ask schools for support, all future teacher's guides will be available in electronic format ONLY and will only include minimal formatting. We welcome your feedback on the new system. ****Please send your email address to anne@northernwoodlands.org so that you will continue to receive your quarterly teacher's guides.****

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: Columbia Forest Products, Inc., 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 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 http://www.northernwoodlands.org/goes_to_school.php, where you can also download each quarter's teacher's guide.

Noteworthy News:

Remember, this is the **last paper version** of the teacher's guide you will receive. We will distribute future guides as minimally formatted PDF files only, so **if you wish to continue receiving this teacher's guide, please send your email address to Anne Margolis, anne@northernwoodlands.org, as soon as possible.**

Northern Woodlands has just published its first-ever wall calendar. Order your 2006 calendar today and enjoy a full year of Virginia Barlow's natural history observations, as seen in each issue of *Northern Woodlands*, and take advantage of the opportunity to record your own. This calendar retails for \$12, but our price to teachers is just \$6 each. Buy one for your classroom wall or a whole bunch for your class's fundraising efforts. **Call (802) 439-6292 today to reserve yours – the supply is limited!**

1. Heating with Wood

Whittling Down the Heating Fuel, by Chuck Wooster (p. 14)

As fuel prices rise, demand on the Northern Forest to provide a cheaper fuel source will steadily increase. Public institutions, including schools, are contemplating switching to wood fuel to meet all or part of their heating needs. Have your student perform a cost-benefit analysis for heating your school with wood. When considering the issue, they should ask not only economic questions (How much does the school currently spend on heating fuel? How many BTUs does that fuel produce? How much wood fuel would match that output? How much would a wood-fired furnace cost? What about the economics of wood procurement and storage? And so on), but also social and ecological questions. (Who would benefit or be hurt by the change? How many trees are needed to produce that amount of wood? How much wood does an acre of forest in your area produce per year? How many acres of woods would it take to sustainably yield the school's firewood? What are the costs/benefits to the forest?)

Have students draft a report and create a multi-media presentation to the school board, using charts, graphs, and photos. Encourage them to write an article for the local paper to share their findings.

Website: Middlebury College commissioned a study to assess the economic and ecological ramifications of shifting to wood fuel for heating campus buildings. Read the report at www.familyforests.org/research/documents/MCBiomassReport.pdf.

Wood-burning technology information from the U.S. Forest Service: www.fpl.fs.fed.us/documnts/techline/wood_biomass_for_energy.pdf.

Mount Wachusett Community College in Massachusetts converted from electric to wood heat. For details, see www.mwcc.mass.edu/programs/FWP/biomass.html.

PLT	Energy Sleuths (gr. 6-8) A Forest of Many Uses (gr. 5-8)
Maine	Economics A English Language Arts A, D, E, G, H Science and Technology B, J, L
NH	English Language Arts 1, 2, 3, 5, 6, 7 Science 2c, 3a, 4c Social Studies 5, 9
VT	1.8 Reports 1.15 Speaking 1.17 Notation and Representation 1.19 Research 1.20 Communication of data 3.9 Sustainability 3.10 Teamwork 6.3 Analyzing Knowledge 6.15 Knowledge of Economic Systems 7.13 Organisms, Evolution, and Interdependence 7.16 Natural Resources

2. The Future of Private Forests

Family Forest Owners Hold the Cards, by Anne Margolis (p. 16)

Have students read both the *Northern Woodlands* article above and the Forest Service report, *Forests on the Edge: Housing Development on America's Private Forests*. Help students examine the problem of private forestland development within your community or region. Have students research your town's forest ownership and determine the percentage in public, industrial private, and non-industrial private hands. What is the town's population today, 100 years ago, 200 years ago? What are the projections for 100 years from now?

Many communities develop build-out models that project development over the coming decades, given the town's current zoning regulations. Look at your town's zoning regulations and build-out projections, if available. Historical maps and photos (including aerial photos) can help illustrate changes in community population and forested acreage. This research will enable students to begin to form a picture of the past, present, and future of their community's human population and forested landscape. What level of development do your students consider acceptable, ecologically and socially?

PLT	Planning the Ideal Community (gr. 6-8)
WILD	Planning for People and Wildlife (gr. 5-8) To Zone or Not to Zone (gr. 5-8)
ME	English Language Arts A, B, D, H Civics and Government A History B Science and Technology B
NH	English Language Arts 1, 5 Social Studies 4, 17 Science 3a, 4c
VT	1.19 Research 4.2 Democratic Processes 4.6 Understanding Place 6.2 Uses of Evidence and Data 6.3 Analyzing Knowledge 6.4 Historical Connections 6.8 Movements and Settlements 7.13 Organisms, Evolution, and Interdependence 7.16 Natural Resources

This is a perfect opportunity to hold a classroom forum on community values. What are the qualities that make your community healthy and vibrant – a good place to live? If the forested landscape is among those qualities (for aesthetic reasons, wildlife habitat, jobs, maintaining a working forest), what strategies can we employ to conserve the forested landscape? What ways have communities devised to prevent wholesale development of private forests? What are the pros and cons of these approaches?

Website: The Center for Whole Communities' publication, *Measures of Health*, provides an innovative framework with which to examine community resource conservation. www.wholecommunities.org/measures5.html.

The Smart Communities Network offers a page chock-full of links on land-use planning strategies. www.sustainable.doe.gov/landuse/open.shtml.

Book: *Conserving Vermont's Natural Heritage: A Guide to Community-Based Planning for the Conservation of Vermont's Fish, Wildlife, and Biological Diversity*. 2004. Vermont Agency of Natural Resources. An excellent manual easily applicable throughout the Northern Forest. Contact VTANR to receive a copy (fwinformation@anr.state.vt.us) or read it online at www.anr.state.vt.us/fw/fwhome/library.cfm?libbase=Reports_and_Documents

3. Living with Wolves

Wolves as Neighbors, by Alan Sparks (p. 22)

Sparks' s article provides a great role model for students – showing young Romanian students putting learning into action, first researching community-held stories about wolves, then speaking publicly to share their findings on the emotion-filled subject.

The article contains many gems of information with which students can compare their lifestyle and attitudes with those of another culture. Have students make economic and ecological comparisons – for example, annual incomes (U.S. median household income is more than 20 times that of Romania's) and percentage of the population living below poverty level. Romania is about the size of Maine and New York combined. It occupies roughly the same latitude as Maine. Note the differences in settlement patterns, as described in Sparks's article, and how these impact human/wildlife interactions. How do large predator populations compare? What about people's attitudes about those large predators? Though lifestyles differ greatly, attitudes towards wolves are similar. Both the lead article and the sidebar about U.S. wolves cite similar concerns (hunting competition, livestock and pet predation, human safety).

PLT	<i>High School Module – Focus on Risk.</i> Weighing the Options: A look at tradeoffs (Part B: Cost/Benefit Analysis of Protecting Endangered Species) (gr. 9-12)
WILD	Wildlife Issues: Community Attitude Survey (gr. 9-12) Here Today, Gone Tomorrow (gr. 5-8) Who Fits Here? (gr. 5-8)
ME	English Language Arts A, B, D, E, G, H History B Science and Technology B
NH	English Language Arts 1, 2, 5 Social Studies 17 Science 3a
VT	1.11 Persuasive Writing 1.19 Research 4.6 Understanding Place 6.4 Historical Connections 7.13 Organisms, Evolution, and Interdependence

Have students investigate the history and current status of wolves in your state. When was the last recorded sighting? What was their ecological role, and who or what fills that role now? What changes would occur if wolves returned to your state, either by natural migration or reintroduction? The article mentions the impact of federal rulings on wolf status (threatened, endangered, or delisted), offering an opportunity to explore the impacts of the Endangered Species Act on wildlife populations. Using their research to support their arguments, students can write an opinion piece on the recent federal move to down-list wolves in the Northeast from "endangered" to "threatened."

Book: *Of Wolves and Men*, by Barry Lopez. Touchstone Press: 1978. Drawing on literature, history, science, and mythology as well as considerable personal experience with captive and free-ranging wolves, Lopez explores the wolf's world, the relationship between people and wolves, and the need for its preservation. National Book Award finalist.

Website: Forest Service information on status of federal protection for gray wolves in the U.S., including the Northern Forest. www.fws.gov/midwest/wolf/edps/eastern-dps.htm.

Press release from Defenders of Wildlife in response to changes in federal protection for gray wolves in the Northern Forest. www.defenders.org/releases/pr2003/pr0402b03.html.

August, 2005 *Washington Post* article about recent Vermont federal court ruling that challenges the federal decision to reduce Endangered Species Act protection to the gray wolf in the Northeast. www.washingtonpost.com/wp-dyn/content/article/2005/08/19/AR2005081901524.html.

4. Common Wonders

The Curious Blue Jay, by Andrew Thompson (p. 42)

We humans have a propensity to value rarity and disparage or ignore that which is most common. Thompson's eloquent essay on blue jays shares the wonders of one of our most common avian residents, deepening the reader's appreciation for the animal. Good nature writing does this – Thoreau's essay *Wild Apples* is a classic example of illuminating and elevating the ordinary. Have your students choose a common (and perhaps misunderstood or unappreciated) wildlife resident in your community and write an essay that illuminates – through scientific information, poetry, illustrations, historical references, and first-hand observations – the animal's noteworthy story.

WILD	Wild Words (gr. 5-8)
ME E, H	English Language Arts A, B, D, Science and Technology J
NH	English Language Arts 1, 2, 5 Science 1a, 2a, 3a
VT	1.12 Personal Essays 1.19 Research 7.2 Investigation 7.13 Organisms, Evolution, and Interdependence

Book: *The Natural History Essays*, by Henry David Thoreau. Peregrine Smith, Inc. 1980.

5. Greenhouse Gas Emissions

Sink or Source? by Anne Margolis (p. 46)

This article sheds light on new research about carbon sequestration, offering an opening into the larger subject of greenhouse gas (GHG) emissions and global warming. Help your students to not only understand this complex issue but also to learn how to reduce GHG emissions at your school. The New Jersey Sustainable Schools Network has created a hands-on guide, *Doing Our Share: Greenhouse Gas Reductions Manual for Schools*, which will guide you and your students through such activities as quantifying your school's GHG emissions and identifying ways to reduce GHG emissions created by heating, transportation, lighting, and waste production.

Website: *Doing Our Share: Greenhouse Gas Reductions Manual for Schools*, produced by the New Jersey Sustainable Schools Network.
www.globallearningnj.org/GHGmanual.doc.

ME	Science and Technology B, J, M Civics and Government A English Language Arts A, D, H Economics A Social Studies – Geography
NH	Social Studies 4, 5, 9, 13, 14 English Language Arts 2, 6, 7 Science 3a, 3b, 6a
VT	1.19 Research 2.2 Problem Solving 2.14 Planning/Organization 3.9 Sustainability 3.13 Roles and Responsibilities 6.2 Uses of Evidence and Data 6.3 Analyzing Knowledge 6.15 Knowledge of Economic Systems 6.19 Meaning of Citizenship 7.13 Organisms, Evolution, and Interdependence

The Community Learning Network offers a web page full of links to Global Warming curriculum materials, including NASA and the National Forum on Climate Change. www.cln.org/themes/global_warming.html.

6. Experience the Early Lumber Era

Place in Mind, by Pavel Cenkl (p. 76)

Cenkl offers a wonderful way to bring history alive – bring your students into the woods with the lumbering tools of a century ago and let them feel, by the sweat of their brow and the ache of their arms, the work of being a logger in the early 1900s. Interdisciplinary connections abound. Students learn their region's history and the ecological ramifications of that history. Today's forests look quite different from those that grew in the Northeast two or three hundred years ago. How and why? What tree species dominated the ancient forests that grew here at the time of European settlement? Which species were cut first and why? After the forests were heavily cut, or in many places, cleared entirely, what species grew back first? What species dominate now? Why? Ask your local historical society for regional logging history documents and photographs, and create an interpretive display to place in a school common space.

PLT	In the Good Old Days (gr. 6-8)
WILD	Sustainability: Then, Now, Later (gr. 9-12)
ME	Physical Education A English Language Arts B History B Science and Technology B, J
NH	Science 2c, 3a Social Studies 11, 17
VT	1.20 Communication of Data 3.5 Physically Active Lifestyle Choices 4.6 Understanding Place 6.4 Historical Connections 6.19 Identity and Interdependence 7.13 Organisms, Evolution, and Interdependence

Website: The Davistown Museum (of Liberty, Maine) website provides excerpts about the history of lumbering in Maine from Richard G. Wood's 1935 text, *A history of lumbering in Maine, 1820-1861*.

The Patten Lumberman's Museum offers an online pictorial and written history of Maine's logging history. www.lumbermensmuseum.org/logger.cfm.

The Northern Forest Heritage Park in Berlin, New Hampshire, is a nonprofit organization that preserves, interprets, and promotes the story of the working forest and the multi-cultural heritage of the region. www.northernforesterheritage.org/#about.

Wildlife Connection

Form Follows Function, by Susan Morse (p. 13)

Candid Cameras Focus on Wildlife, by Donald Wharton (p. 50)

Winter is an excellent time to teach students about local wildlife populations, since snow and mud hold imprints of animal tracks. Take your students tracking in a nearby woodland to determine which animals are active in winter and what they're doing. A scouting camera can be an excellent tool in these studies, capturing images of the elusive animals on the land. Check with local sportsmen's groups to inquire about borrowing a scouting camera. Set it up in a site unlikely to be disturbed by humans, and create a photo album of your wildlife neighbors.

WILD	Tracks! (gr. 5-8)
ME	Physical Education A Science and Technology B, J
NH	Science 1a, 2a, 3a
VT	3.5 Physically Active Lifestyle Choices 7.2 Investigation 7.13 Organisms, Evolution, and Interdependence

Website: New England Sportsman Network: www.nesportsman.com/.

Career Connection

At Work Logging with Ed and Robert Berry, by Jami Badershall (p. 36)

Place in Mind, by Pavel Cenkl (p. 76)

Introduce your students to the career of logging. Cenkl's article offers a historical perspective, while Badershall's gives a present-day account of the logging trade. Loggers provide your students with resources they use every day of their lives. Invite a logger to join your class in the woods to share with your students the details of a logger's life – how they work in the woods (laying out logging roads, cutting and skidding trees, scaling logs) and why.

PLT	Who Works in this Forest? (gr. 5-6)
ME	Career Preparation A Economics A
NH	Social Studies 5, 9 Science 4c
VT	3.9 Sustainability 3.15 Career Choices 4.6 Understanding Place 6.15 Knowledge of Economic Systems 7.16 Natural Resources

Website: The Forest Service offers state-by-state forest information, including Certified Master Logger contact information. www.na.fs.fed.us/pubs/misc/flg/index.cfm

Calendar Connection

First Hunt, by Stephen Long (p. 59)

One of the images in this story that's sure to get a knowing nod from parents and teachers is the child's inability to be silent for more than 10 seconds. Attentive silence takes practice and is a key skill for hunting and for wildlife observation in general. It's also very challenging to cultivate in the classroom setting. Offer your students opportunities to practice attentive silence. Bring them into a wild setting – your school grounds may well offer such a space – where they can spread out and sit alone, journal in hand, and record their observations of the land for 10 minutes (longer with older students) using words and/or sketches. Have students return to their chosen spot once a month throughout the year to record the seasonal changes they observe, lengthening the observation time by a few minutes each visit.

WILD	Drawing on Nature (gr. 5-8)
ME	Science and Technology J Visual and Performing Arts A English Language Arts E
NH	English Language Arts 2 Science 1a, 2a, 3a
VT	1.12 Personal Essays 5.29 Visual Arts 7.2 Investigation

Book: *A Life in Hand: Creating the Illuminated Journal*, by Hannah Hinchman. Gibbs Smith: 1991.

Keeping a Nature Journal: Discover a Whole New Way of Seeing the World Around You, by Clare Walker Leslie and Charles E. Roth. Storey Publishing: 2000.

Writing Exercise: Writing from the Land

Winter Hunt, by Charles Fergus (p. 38)

Read the essay above, in which Charles Fergus leads the reader on a journey through the North Woods. Like the author's springer spaniel, Caillie, the essay follows a meandering path – taking little diversions, like the discussion of pileated woodpeckers, along the way – all the while leading us through the vivid sights, sounds, smells, and textures of that mid-winter adventure. Tell the story of an outdoor adventure of your own – whether a hunting or fishing experience, a hike, cross-country ski trek, or canoe trip. If you can't remember a vivid experience, then go on an adventure – climb a local peak, explore the woods near your house – and write about it in a way that allows your reader, through vivid sensory details, to envision your adventure. Remember, a good story relies on detail and timing – you don't need to describe every step of the journey. Choose the moments and images that will bring your story to life.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Crossword Puzzle

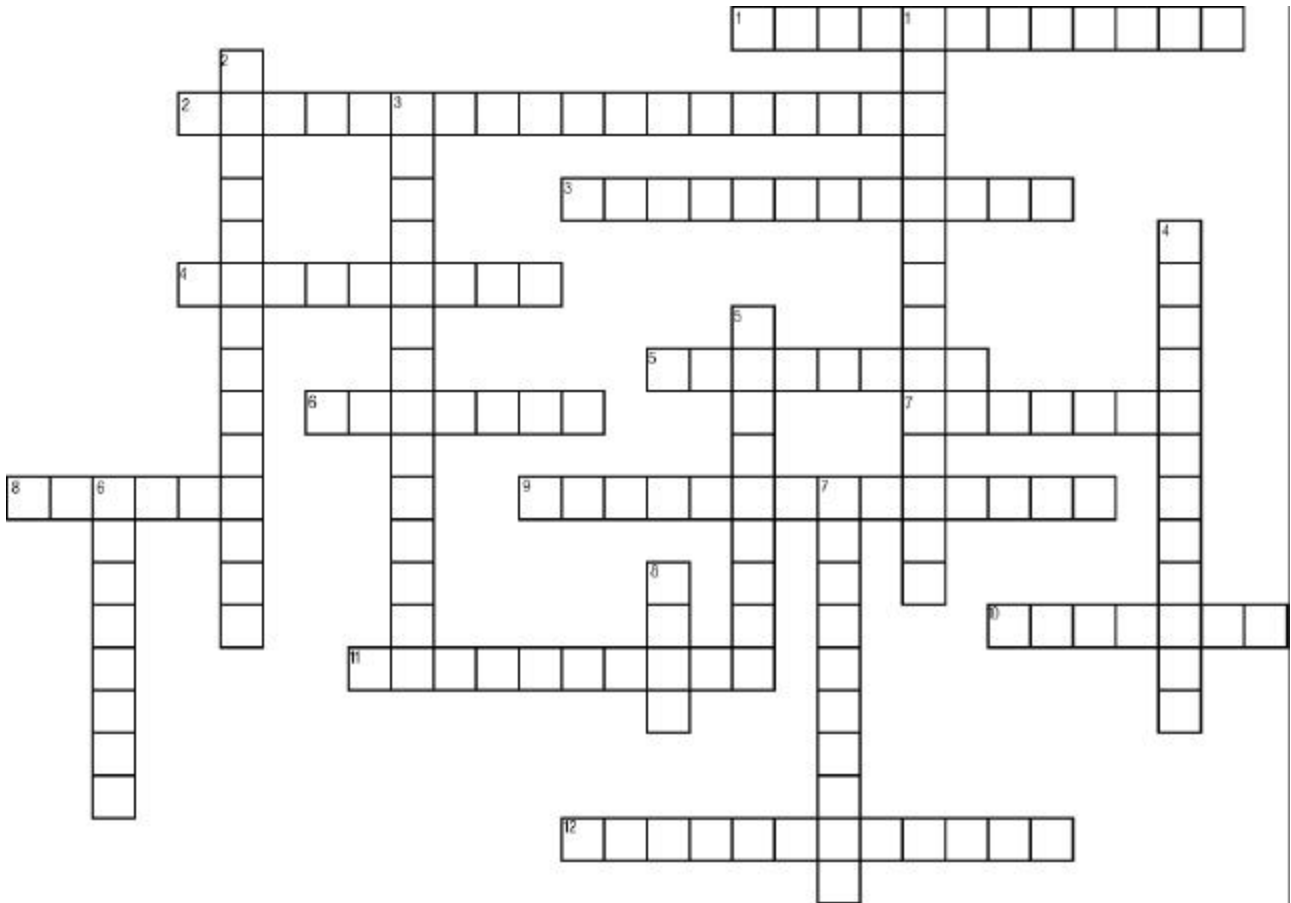
Winter Calendar (p. 4)

Across

1. This bird searches for insects in tree bark by hopping up the tree trunk in a spiraling pattern (2 words).
2. When a male and female of this bird species mate, they remain together year-round (2 words).
3. This animal's fur changes from brown to white in winter (2 words).
4. This bog plant produces edible fruits.
5. Pine grosbeaks eat the seeds of this hardwood tree (2 words).
6. Early December meteor shower.
7. White-breasted nuthatches store and eat the seeds of this conifer.
8. When a harsh winter weakens and kills deer, this feline sometimes eats their carcasses.
9. Members of this mammal species shelter together in groups of 10 or more on winter nights (2 words).
10. Each flowerhead of this wetland plant produces about 125,000 seeds.
11. In late winter, this abundant rodent is an important food for hawks and owls (2 words).
12. Favored food of golden-crowned kinglets.

Down

1. After catching a mouse, this bird species will sometimes impale it on the spike of a hawthorn tree before eating it.
2. Longest night of the year (2 words).
3. This bird species has steadily expanded its range north over the last 30 years, now inhabiting central Maine (2 words).
4. One of the earliest signs of spring, this plant blooms in mid-February in southern New England (2 words).
5. The dried fruit of this vine provides late-winter food for many wildlife species (2 words).
6. This amphibian often overwinters as a tadpole.
7. January meteor shower.
8. This substance insulates against frigid winter air.



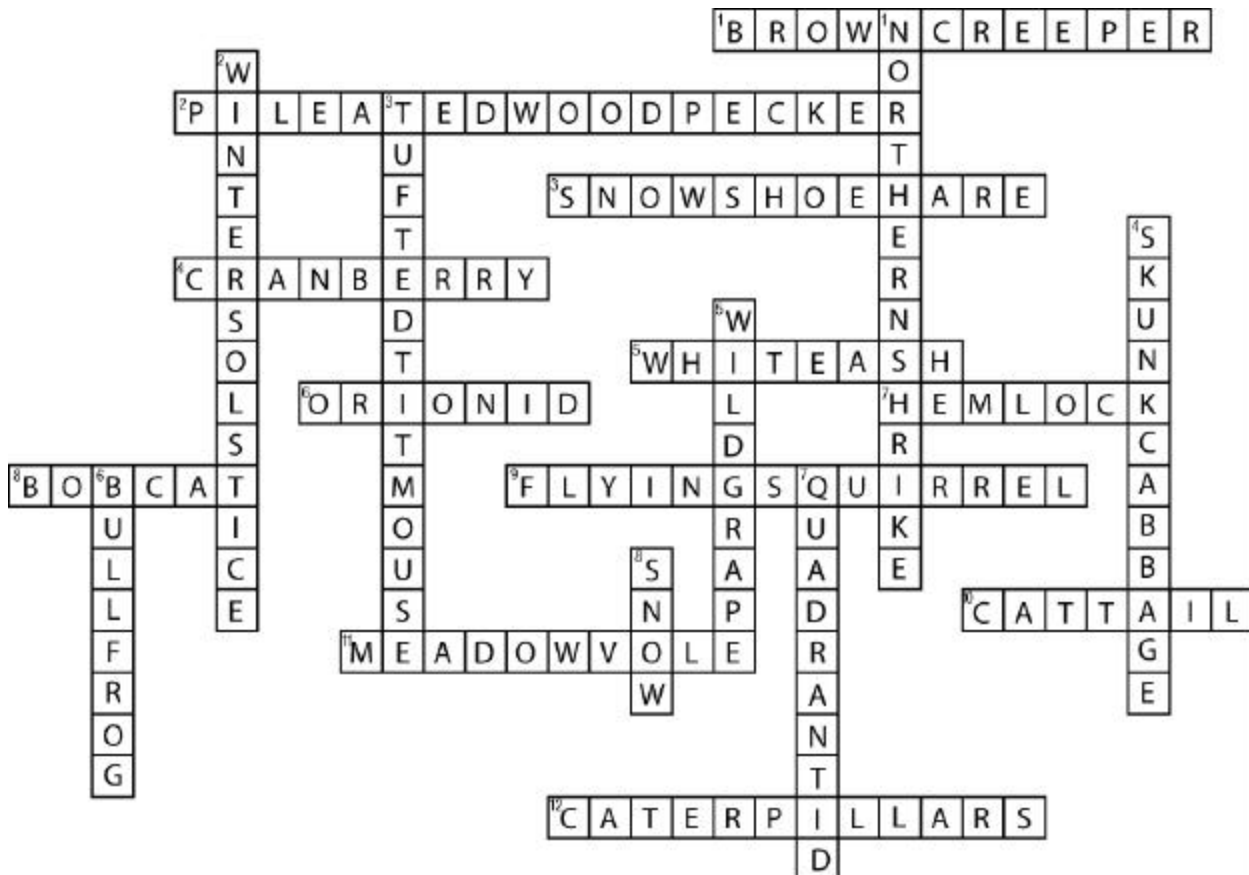
Crossword Puzzle: Answers

Across

1. This bird searches for insects in tree bark by hopping up the tree trunk in a spiraling pattern (2 words). **BROWN CREEPER**
2. When a male and female of this bird species mate, they remain together year-round (2 words). **PILEATED WOODPECKER**
3. This animal's fur changes from brown to white in winter (2 words). **SNOWSHOE HARE**
4. This bog plant produces edible fruits. **CRANBERRY**
5. Pine grosbeaks eat the seeds of this hardwood tree (2 words). **WHITE ASH**
6. Early December meteor shower. **ORIONID**
7. White-breasted nuthatches store and eat the seeds of this conifer. **HEMLOCK**
8. When a harsh winter weakens and kills deer, this feline sometimes eats their carcasses. **BOBCAT**
9. Members of this mammal species shelter together in groups of 10 or more on winter nights (2 words). **FLYING SQUIRREL**
10. Each flowerhead of this wetland plant produces about 125,000 seeds. **CATTAIL**
11. In late winter, this abundant rodent is an important food for hawks and owls (2 words). **MEADOW VOLE**
12. Favored food of golden-crowned kinglets. **CATERPILLARS**

Down

1. After catching a mouse, this bird species will sometimes impale it on the spike of a hawthorn tree before eating it. **NORTHERN SHRIKE**
2. Longest night of the year (2 words). **WINTER SOLSTICE**
3. This bird species has steadily expanded its range north over the last 30 years, now inhabiting central Maine (2 words). **TUFTED TITMOUSE**
4. One of the earliest signs of spring, this plant blooms in mid-February in southern New England (2 words). **SKUNK CABBAGE**
5. The dried fruit of this vine provides late-winter food for many wildlife species (2 words). **WILD GRAPE**
6. This amphibian often overwinters as a tadpole. **BULLFROG**
7. January meteor shower. **QUADRANTID**
8. This substance insulates against frigid winter air. **SNOW**



Scavenger Hunt

Within the pages of the Winter 2005 edition of *Northern Woodlands*, you'll find the answers to the following questions.

1. Number of tons of salt spread on U.S. roads in winter.
2. Name three native tree species that are particularly sensitive to (easily damaged by) road salt.
3. Percentage of United States forests owned privately.
4. Number of acres of private forestland likely to be developed in the next 30 years.
5. Nickname for gray birch, from its ability to inhabit very poor soil.
6. Name three birds that eat gray birch seeds.
7. Current upper-end price of a cord of firewood.
8. Pre-buy price of a gallon of home heating oil this season.
9. Name for ice that forms on the bottom of a stream or river.
10. Snowshoe hares account for up to ____ percent of a Canadian lynx's diet.

Scavenger Hunt: Answers

1. Number of tons of salt spread on U.S. roads in winter. **22.5 MILLION**
2. Name three native tree species that are particularly sensitive to (easily damaged by) road salt. **SUGAR MAPLE, BEECH, WHITE PINE**
3. Percentage of United States forests owned privately. **60**
4. Number of acres of private forestland likely to be developed in the next 30 years. **44.2 MILLION**
5. Nickname for gray birch, from its ability to inhabit very poor soil. **POVERTY BIRCH**
6. Name three birds that eat gray birch seeds. **GOLDFINCH, PINE SISKIN, CHICKADEE**
7. Current upper-end price of a cord of firewood. **\$225**
8. Pre-buy price of a gallon of home heating oil this season. **\$2.50**
9. Name for ice that forms on the bottom of a stream or river. **ANCHOR ICE**
10. Snowshoe hares account for up to ____ percent of a Canadian lynx's diet. **97**