

Winter 2008 Northern Woodlands Goes to School

Welcome to the Winter 2008 edition of *Northern Woodlands* magazine. In it, you and your students will find articles and photo essays that illuminate the joys of exploring the winter woods. Your students will also learn about a host of other subjects—from how snowshoe hares survive northeastern winters to the projected impacts of global climate change on the 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.

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, 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 Dave Mance III at (802) 439-6292 (email: dave@northernwoodlands.org).

Noteworthy News

If you're not familiar with it already, be sure to get to know the Sustainable Schools Project, based out of Shelburne Farms, in Shelburne, Vermont. The program is designed to help schools use sustainability as an integrating context for curriculum, community partnerships, and campus practices. SSP promotes education for sustainability to improve our communities economically, environmentally, and socially for current and future generations.

You can subscribe to their free quarterly *Community Works Journal*, and download their free, 124-page *Vermont Guide to Education for Sustainability*. SSP offers several workshops and sustainability institutes each year. Visit their website, <u>www.sustainableschoolsproject.org</u>, for more information.

1. Biomimicry

Bigfoot, by Bill Amos (pg. 17)

In Amos' article, students learn about the snowshoe hare's many remarkable adaptations for survival. Human-made snowshoes imitate one of the hare's best known adaptations, distributing a person's weight over the snow in the same way the snowshoe hare's wide, furry hind feet do. The article offers an excellent leadin to the study of biomimicry, a scientific discipline that focuses on developing sustainable technologies inspired by nature. As renowned scientist Fritjof Capra notes, "We can design sustainable societies by modeling them after nature's ecosystems," which have field-tested sustainable adaptations for hundreds of thousands of years. The Biomimicry Institute website (see information below) provides many case studies of biomimicry in action, including energy-efficient buildings in Africa inspired by passive cooling in termite mounds and non-toxic fabric finishes inspired by waterrepellant lotus plants.

Introduce your students to biomimicry through the Biomimicry Institute's curriculum materials for middle and high school students. These include downloadable "creature dossiers" describing particular plant and animal adaptations and the technological innovations they've inspired. You'll find a pre-study questionnaire for your students, a PowerPoint presentation that

- WILD Project WILD offers several activities for middle school students that focus on animal adaptations, including Adaptation Artistry and Which Niche?
- ME English Language Arts A, D, H Science and Technology B, J
- NH English Language Arts 1, 5 Science 3a Social Studies 9
- NY CDOS 3 Thinking Skills MST 1 Scientific Inquiry MST 4 The Living Environment MST 5 Engineering Design SS 5
- VT 1.9 Research 2.2 Problem Solving 2.13 Product/Service 3.9 Sustainability 6.2 Uses of Evidence and Data 7.13 Organisms, Evolution, and Interdependence

introduces the concepts of biomimicry, and related classroom activities, including one in which students design a biomimetic shelter.

Books: Biomimicry: Innovation Inspired by Nature. Janine Benyus. 1997. Demonstrates how nature's solutions to survival needs have been the creative jumping-off points for technological innovations for sustainable living.

> *The Hidden Powers of Animals.* Carl P.N. Shuker. 2001. A fascinating look at the astonishing behavior and super-human abilities of animals, from kings of the jungle to household pets. This book reveals incredible truths about animals and their remarkable sensitivities, skills, and strengths.

> *The Way Nature Works.* Ed. Jill Bailey. 1992. Drawing on a series of questions that children might ask, a team of scientists proposes answers in this manual for adult readers. They address large issues such as atmospheric phenomena, ecosystem relationships, and animal communication with brief essays, each well illustrated with charts, diagrams, and photographs.

Websites: The Biomimicry Institute: www.biomimicryinstitute.org/

2. Climate Change in the Northern Forest

Climate Change, Tree by Tree, by David Dobbs (pg. 26)

How will the Northern Forest change, as a result of global climate change, during the next century? After reading Dobbs' article, have students, as a class, list as many of the projected impacts as they can, from a significant decrease in spruce-fir habitat to an increase in the range of invasive exotic insects like hemlock woolly adelgid. Working in teams of two, students can pick one of these impacts and report on its potential ripple effects—ecological, economic, and social. Have each team prepare and deliver an oral presentation to their classmates, utilizing visual aids to illustrate their presentations.

Website:

www.climatehotmap.org/curriculum/climate_change_g uide.pdf. This guide, created by The Union of Concerned Scientists, contains curriculum materials for four different climate change studies. The fourth, *Climate Change and Ecosystems*, explores how climate change could impact flora and fauna and the interrelationships among species.

www.northeastclimateimpacts.org/. This website is chock-full of links to scientific research papers on the impacts of climate change, including a link to the extensive, engaging report, *Confronting Climate Change in the U.S. Northeast: Science, Impacts, and Solutions.* The result of collaboration among the Union of Concerned Scientists and more than 50 independent experts, this report contains a section on how climate change might impact the Northern Forest.

www.usgcrp.gov/usgcrp/nacc/forests/default.htm. The federal US Global Change Research Program offers many web-based articles on the specifics of climate change and forests.

www.anr.state.vt.us/site/html/VSCC/ClimateChangeC urriculumMaterialsLinks.pdf. This website of the Vermont Agency of Natural Resources offers many links to excellent on-line curriculum materials on climate change. The Global Climate A Vision for the Future (*Places We Live* High School Module) Far-Reaching Decisions (*Places We Live* High School Module)

PLT

ME

VT

- Economics A English Language Arts A, D, E, G, H Science and Technology B, J
- NH English Language Arts 1, 2, 3, 5, 6 Science 2c, 3a Social Studies 5, 9

NY CDOS 3 Managing Information ELA 2 Speaking and Writing MST 1 Scientific Inquiry MST 4 The Living Environment MST 6 Models MST 7 Strategies SS 4

> 1.8 Reports
> 1.15 Speaking
> 1.17 Notation and Representation
> 1.19 Research
> 1.20 Communication of Data
> 3.9 Sustainability
> 4.6 Understanding Place
> 6.3 Analyzing Knowledge
> 7.13 Organisms, Evolution, and Interdependence

3. Attitudes towards Forests

The Deep, Dark Woods, by Mary Hays (pg. 32) Hays' article explores human attitudes towards forests and the origins of those attitudes. The article offers much kindling for classroom discussion and essay writing. How have human attitudes about the forested landscape of the Northeast shaped our interactions with that landscape over time? Before settlement, how did native people think about and interact with the forest? What about early settlers? When and how did these attitudes begin to shift? How might we define the prevailing attitude today? Who were some of the key figures along the way who catalyzed these shifts in public attitude?

As a class, create a timeline that marks both physical changes in the northern forest (cycles of clearing and reforestation) as well as attitudinal changes (major public policy shifts, like creation of the Forest Service and passage of the Multiple Use-Sustained Yield Act and the Wilderness Act, and publication of landmark books, like *A Sand County Almanac*, that shifted public attitudes about forest management).

Have students select a particular aspect of this evolving relationship with the Northern Forest to research and discuss in depth in an individual written report. They could focus on one of the overarching questions listed above, or on one of the key people or policy changes from the timeline. Or they can focus on the forest use history in your

- PLT In the Good Old Days A Look at Lifestyles Did You Notice? Mapping Your Community Through Time (Places We Live High School Module) Community Character (Places We Live High School Module) ME English Language Arts A, B, D, E, H History B Science and Technology B, J NH English Language Arts 1, 2, 5, 6 Science 2c, 3a Social Studies 17 NY CDOS Managing Information MST 1 Scientific Inquiry MST 4 The Living Environment MST 6 Models **SS** 1 **SS** 3 VT 1.8 Reports 1.17 Notation and Representation 1.19 Research 3.9 Sustainability
 - 4.6 Understanding Place6.4 Historical Connections6.8 Movements and Settlements
 - 7.13 Organisms, Evolution, and
 - Interdependence

community. What were and are the prevailing attitudes toward the forests in your community? What were the management practices that stemmed from those attitudes?

Books: From Coastal Wilderness to Fruited Plain: A History of Environmental Change in Temperate North America from 1500 to the Present, by Gordon G. Whitney. 1996.

Wilderness and the American Mind, by Roderick Nash. 4th edition: 2001.

A Forest Journey: the Role of Wood in the Development of Civilization, by John Perlin. 1991.

Website: www.harvardforest.fas.harvard.edu/museum/landscape.html. The Harvard Research Forest Landscape History dioramas may be useful in creating the timeline of forest attitudes and management.

www.josephbruchac.com. Joseph Bruchac is a Native American author of dozens of books of Native American stories and of teaching curricula for sharing the natural world with children, like *Keepers of the Earth* and *Native Plant Stories*.

4. New Life from Dead Wood

An Appreciation of Debris, by Alexander Evans and Robert Perschel (pg. 43)

An Appreciation of Debris focuses on an extremely important and timely issue. To use the analogy of banking, forestry is sustainable when the forester removes only the "interest" from the forest, rather than dipping into "principle"—that is, if the forester removes an amount of biomass less than or equal to the amount the forest community needs to remain healthy. Once we start dipping into principle, the forest's fertility and health erode. Evans and Pershel's article points to the importance of course woody material in conserving forest health. And yet that material is increasingly at risk. Biomass energy is all the rage in northeastern communities these days. Schools and office complexes are converting to large wood gasification units. Homeowners are installing wood pellet furnaces and wood stoves. How can we conserve forest health while supplying this increasing demand for wood energy? What are the limits to biomass supply?

Have students create a survey of the changes in wood use and in attitudes toward wood use for heating in your community. Encourage them to generate questions for various audiences: home owners,

PLT	Nature's Recyclers The Fallen Log
WILD	Sustainability: Then, Now, Later Project WILD provides an appendix, "Interviewing People" that offers useful information on the process of conducting an interview.
ME	English Language Arts D, G Science and Technology B
NH	English Language Arts 3 Science 1a, 3a, 4c
NY	ELA 1 Listening and Reading MST 1 MST 4 The Living Environment SS3
VT	 1.13 Clarification and Restatement 2.1 Types of Questions 3.9 Sustainability 7.13 Organisms, Evolution, and Interdependence 7.16 Natural Resources and Agriculture

firewood (cord wood, pellets, chips) suppliers, foresters. Has demand for wood energy increased in your community? How are local wood suppliers meeting that increased demand? What harvest methods are they using? Are they safeguarding coarse woody debris? Are those suppliers aware of, concerned with, and proactively addressing potential forest health issues related to a decrease in coarse woody material? Have each student conduct at least one survey interview, then discuss the results as a class.

Books: Dirt: The Ecstatic Skin of the Earth, by William Bryant Logan. 1996. Beautifully written essays on soil and nutrient cycling.

Websites: www.biomasscenter.org. The Biomass Energy Resource Center, based in Montpelier, Vermont, offers good information about forest sustainability

5. Coevolution

Milkweed, by Krishna Ramanujan (pg. 56) Coevolution is the natural process in which a change in one species acts as a selective force on another species, and counteradaptation by the second species, in turn, is a selective force on individuals in the first species. In her article, Ramanujan describes one classic case of coevolution—that of monarch butterflies and milkweed. Some of the best known examples of coevolution involve flowering plants and their pollinators/seed dispersers, but countless other examples fill the Northern Forest, like the coevolution of algae and fungus to form lichen. Discuss examples of coevolution as a class, then have students pick one example of coevolution to research in depth. Have students deliver a brief oral report accompanied by an engaging visual display.

Books: The *Botany of Desire: A Plant's-eye View of the World,* by Michael Pollan. A highly readable account of the co-evolution of plants and humans. ME English Language Arts A, D, E, G, H Science and Technology B, J, L
 NH English Language Arts 1, 3, 5, 6 Science 2c, 3a
 NY CDOS Managing Information ELA 2 Speaking and Writing MST 4 The Living Environment MST 6 Models MST 7 Strategies
 VT 1.15 Speaking 1.17 Notation and Representation

1.17 Notation and Representation1.19 Research7.13 Organisms, Evolution, andInterdependence

Websites: <u>www.pollinator.org</u>. Coevolution Institute website focuses on pollinators and flowers. Though their curriculum materials are mostly geared toward younger students, they may provide ideas for instruction at any level.

http://www.accessexcellence.org/AE/AEPC/WWC/1995/coevolution.php. This classroom project, designed for introductory biology students, illustrates coevolution among flowers and pollinators in a fun, hands-on way.

6. Experiencing Winter

A Place in Mind, by John Harrigan (pg. 80) *Winter Camping* photo essay, pictures by Garrett Conover (pg. 38)

Both Harrigan's article and the *Winter Camping* photo essay celebrate the joys of getting out of our all-too-cozy houses and experiencing winter in the rough. "Why do we do this?" Harrigan asks in his essay. "Because we can, maybe, but more for the sheer joy of testing ourselves against the land and the elements." What winter adventures have your students undertaken? Have them write about them in a descriptive essay.

Then take your students on a winter adventure—it could be as simple as a hike into the woods with a campfire in the snow. At some point

PLT	Earth Manners
ME	English Language Arts E Physical Education A
NH	English Language Arts 2 Physical Education 1
NY	ELA 2 Speaking and Writing HPHE 1 Physical Education
VT	1.2 Personal Essays3.5 Physically Active LifestyleChoices

during the hike, have students silently walk one by one (send them down the trail at half-minute intervals), and encourage them to tune into the sights, smells, sounds, and textures of the winter woods.

Career Connection

At Work in the Maine Woods with Logger Tom Cushman, by Wendy Bowden Farrand (pg. 48)

Farrand's article notes that Tom Cushman is selling the firewood he harvests as certified (NEMLC) firewood, to capitalize on customers' desire to purchase firewood that was harvested sustainably. Help your students learn about wood certification as a marketing tool in your state. Are there certified wood suppliers

in your region? (you can find this out by contacting the Forest Stewardship Council, an independent, third-

party certification organization.) If yes, invite one or more to visit the classroom and share their experience with students. Have students prepare questions before the visit that will help them understand ecological, economic, and ethical aspects of wood certification. After the visit, have students write an opinion piece about wood certification as a means of promoting local, sustainable wood supplies.

Websites: www.familyforests.org. Vermont Family Forests offers extensive information on their website about certification as a marketing tool and means of encouraging sustainable forestry.

> www.vtwoodnet.org. Vermont Woodnet offers a detailed listing of certified Vermont wood products providers.

www.fscus.org. The Forest Stewardship Council can put you in touch with FSC-certified wood products producers in your state.

WILD	Sustainability: Then, Now, Later
ME	Economics A English Language Arts D, E
NH	English Language Arts 2 Science 1a, 4c Social Studies 5, 9
NY	ELA 2 Speaking and Writing MST 1 SS 3 SS 4
VT	1.11 Persuasive Writing2.1 Types of questions3.9 Sustainability4.6 Understanding Place7.16 Natural Resources and Agriculture

Wildlife Connection

Ripple in Still Water, by Anne Margolis (pg. 56)

This brief article is an excellent lead-in to a community service project for your students. Repeated low

doses of pesticides can have enormous ripple effects in aquatic communities. According to the Environmental Protection Agency, 100 million pounds of active ingredients from herbicides, insecticides, and fungicides were applied in homes and gardens in the United States in 2001 (that figure doesn't include the much larger amount of agricultural pesticides used annually). Have your students launch a public awareness campaign about the threats to wildlife posed by household and community pesticide use.

What information would they like to share with the public in their public awareness campaign? Once your students determine their message, they need to determine the most effective methods for getting their message across clearly, concisely, engagingly, and affordably. Would their campaign include radio announcements? Letters to the editor? Informational brochures distributed to each household? Posters? Bumper stickers? What are the most cost-effective means of educating the public? Does your town have a website or e-mail distribution list? Have students work in teams to develop a multi-pronged public education campaign.

Books:	Healthy Homes in a Toxic World: Preventing, Identifying, and Eliminating Hidden Health Hazards in Your Home, by Maury M. Breecher and Shirley Linde.1992. Chapter 7 focuses on household pesticides.
Websites:	Although Margolis' article specifically deals with the impacts of malathion, a popular mosquito insecticide,

there are countless articles on the internet about the threats posed by other household and agricultural pesticides.

PLT	Improve Your Place Take Action! (Focus on Forests High School Module) Far-Reaching Decisions (Places We Live High School Module)
WILD	Can Do!
ME	Civics and Government A English Language Arts A, D, H Science and Technology B, J
NH	Science 3a Social Studies 4 English Language Arts 1, 5, 7
NY	CDOS 3 Managing Information MST 1 Scientific Inquiry MST 4 The Living Environment SS 5
VT	 1.18 Information Technology 1.19 Research 2.4 Improving Effectiveness 2.13 Product/Service 2.14 Planning/Organization 3.13 Roles and Responsibilities 6.2 Uses of Evidence and Data 6.9 Meaning of Citizenship 7.13 Organisms, Evolution, and Interdependence

Calendar Connection

Barry Moser, Snow Clad Landscape, by Adelaide Tyrol (pg. 79)

Barry Moser's exquisitely rendered block prints are perfect subjects for art study in winter, when black and white dominate the landscape's palette. While wood engraving is more challenging and technical than you'll likely want to get into, it's a simple matter for students to create block prints with linoleum blocks or other, even softer, easier-to-use block materials. Before initiating the art project, be sure to have students check out Moser's website to see an extensive gallery of his work (<u>www.moser-pennyroyal.com</u>).

Encourage them to observe carefully how Moser uses carved lines to evoke shading and texture in his

prints. Using Moser's "Snow Clad Landscape" as an example, have students create a winter scene, touching on themes of dormancy and renewal. For instructions on basic block printing, see the On-line Art Magazine website information below.

ME	Visual and Performing Arts A
NH	Visual Arts 1, 6
NY	ART 1 Visual Arts
VT	5.28 Artistic Proficiency 5.29 Visual Arts

 Websites:
 http://www.ebsqart.com/artMagazine/za_227.htm.

 On-line Art Magazine offers a clear, easy-to-follow guide to block printing.

<u>http://www.woodengravers.co.uk/index.html</u>. The Society of Wood Engravers, based in the United Kingdom, hosts a wonderful website that includes an extensive gallery of wood engraving examples, plus a how-to guide to wood engraving.

<u>http://www.moma.org/exhibitions/2001/whatisaprint/flash.html</u>. The Museum of Modern Art website will help students understand the print making process and the various kinds of print making techniques, including wood engraving.

HANDOUTS Writing From the Land

Winter Camping photo essay, pictures by Garrett Conover (pg. 38)

Look through the photo essay on winter camping. Choose one of the photos, and imagine yourself in that scene. Using vivid language, describe what is happening around you when the picture was taken. What do you see, feel, taste, hear, and smell? Don't tell the reader what you're experiencing—show them. (For example, rather than "It was really cold," you could say, "Whenever I blinked, my eyelashes froze together.")

Crossword

Across

- 1. In winter, mice and birds eat the seeds of this plant, nicknamed "rattail" (two words). COMMON PLANTAIN
- 2. January meteor shower. QUADRANTID
- The fruits of this wetland plant provide winter fruit for people and wildlife (two words). BOG CRANBERRY
- 4. This mammal breeds in February. SKUNK
- This mammal seeks the protection of southfacing hemlock stands in winter (three words). WHITE-TAILED DEER.
- 6. Bark-eating mammal. BEAVER
- 7. New England's smallest bat species (two words). EASTERN PIPISTREL
- The young of this mammal species are born in winter and weigh about four pound by mid-February (two words). BLACK BEAR
- 9. The small cones of this conifer open in cold, dry weather. HEMLOCK
- 10. Though this mammal hibernates in winter, it becomes active during warm spells. RACCOON
- 11. Some of the more than 30 species of this insect begin hatching in mid-February. STONEFLY

Down

- 1. A light green lichen found in damp, cold lowlands (three words). OLD MAN'S BEARD
- 2. This mammal's fur turns white in winter (two words). SNOWSHOE HARE
- 3. Even when ponds in the Northern Forest are frozen over, this reptile remains active below the ice (two words). PAINTED TURTLE
- 4. Fish-eating mammal that hunts in ice-covered streams. OTTER
- 5. Kind of fungus named for its rich bands of color (two words). TURKEY TAIL
- 6. Evergreen fern (two words). CHRISTMAS FERN
- 7. This mammal often inhabits the abandoned burrow of a muskrat or bank beaver. MINK
- 8. This mammal stores apples in trees to eat in winter (two words). RED SQUIRREL
- 9. This woodland mammal composes twenty percent of a fisher's diet. PORCUPINE



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Word Search Winter Birds of the Northern Forest *Winter Calendar*, (pg. 4)

- 1. This bird-eating bird will prey on blue jays and mourning doves (two words). COOPER'S HAWK
- 2. Bird species that eats larch seeds (two words). RED CROSSBILL
- 3. This bird species eats ragweed seeds. REDPOLL
- 4. In the wild, this bird eats predominantly grass seeds (two words). MOURNING DOVE
- 5. This bird species plucks seeds from birch catkins (two words). PINE SISKIN
- 6. This bird species stores hemlock seeds in bark crevices to eat later (three words). WHITE-BREASTED NUTHATCH
- 7. One of the first bird species to return north in spring (two words). BELTED KINGFISHER
- 8. Members of this bird family begin establishing their territories in January. WOODPECKER
- 9. Though it'll eat sunflower seeds at your feeder, this bird species eats spiders, insects, and even the meat of dead animals in winter (three words). BLACK-CAPPED CHICKADEE
- 10. This bird eats the seeds of spruce and fir trees in winter (two words). PINE GROSBEAK

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