Teacher's Guide
Autumn 2010

Northern Woodlands Goes to School Autumn 2010

Welcome to the Autumn 2010 edition of *Northern Woodlands* magazine. The articles in this issue will prompt plenty of discussion and explorations, both in the classroom and in the field. You and your students will find articles on subjects ranging from taxidermy to mushroom hunting, from the debate over burning biomass for fuel to the natural history of American woodcocks.

This teacher's guide serves as a companion to *Northern Woodlands* magazine. In it are several indoor and outdoor activities that expand upon ideas presented in some of the magazine's articles. For each activity, we recommend 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 would love to know your thoughts about our teacher's guide. If you have comments or suggestions, just call or email Emily Rowe at (802) 439-6292 (email: emily@northernwoodlands.org).

We plan to conduct an evaluation of the Northern Woodlands Goes to School Program this fall, and we want to get your feedback on what's working well and what could work better. All participants will be invited to take part in the survey, the results of which will guide the program's future. Please take the time to participate in the survey when you receive the invitation!

Noteworthy News

The National Wildlife Federation's Ecoschools program, www.nwf.org/Global-Warming/School-Solutions/Eco-Schools-USA.aspx, offers a way for your students and school community at large to lessen your school's ecological footprint. Through the program, students establish an eco-action team and perform an environmental audit of the school, looking at energy and water use, transportation, consumption and waste, physical activity, school grounds, and more). They then develop an eco-action plan, working to involve the student body and surrounding community. Students implement and monitor improvements and evaluate their progress. A great way to start the new school year!

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1. The Joys of Woodworking

Rake and Splay: How I Learned to Make a Windsor Chair, by Stephen Long (pg. 42)

Your students may know intellectually that all manmade goods are made somewhere by someone, rather than materializing in box stores, but they may not have had the chance to see and experience that for themselves. Inquire locally or use the web resources listed below to find woodworkers near you. Visit one or more of them at their workshops to see how they carry out their

ME	Career Preparation A Visual and Performing Arts A
NH	Visual Arts I
NY	ART 1 Visual Arts CDOS 1 HPHE 3 Home Economics
VT	5.28 Artistic Proficiency 5.29 Visual Arts

craft. If possible, visit one who utilizes hand tools and arrange for your students to work on a simple woodworking project using a drawknife and other such hand tools.

Website: *Fine Woodworking* magazine's website, www.finewoodworking.com, offers a state-by-state woodworking clubs directory (you'll find a link to "clubs" under the "Community" tab). For some reason, Vermont is not in the listing, so visit the Vermont Wood Manufacturers Association website, www.vermontwood.com, for information about Vermont woodworkers, including a link to the *Vermont Forest Heritage Trail,* an on-line guide to woodworkers around the state.

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2. Biomass and the Northern Forest
The Burning Question: Is Biomass Right for the Northeast? By Chuck Wooster (pg.24)

Wooster's article will introduce students to one of the hottest debates currently under way in the Northern Forest. The article raises the central issues in the biomass debate—to what extent does burning biomass raise atmospheric carbon levels and contribute to climate change? How much biomass can the Northern Forest yield while maintaining optimal health? What are the benefits and liabilities of our increasing utilization of this local, renewable source of energy?

Have your students explore the issue by role-playing a community forum on utilizing biomass for fuel and energy. First, students will need to identify the stakeholders in this issue—loggers, truckers, schools burning biomass for heat, forest ecologists, and many more. Encourage students to include non-human stakeholders—trees, soil, atmosphere, etc. Each student should choose a role and research the impacts of biomass burning on the stakeholder they chose. Encourage them to move beyond black-and-white side-choosing and look at both the positive and negative impacts that exist for each stakeholder. Allow each student two to three minutes to present their case, then open the forum to discussion, with students maintaining their role-playing identities.

The article draws from several primary sources of information that your students can use in researching, available on-line at the websites listed below.

WILD	Philosophical Differences
PLT	What's a Forest to You? (*Focus on Forests* High School Module)
ME	Science and Technology B English Language Arts A, D, H Economics A
NH	English Language Arts 1, 3, 5 Science 3a, 4c Social Studies 5, 9
NY	CDOS 3 Managing Information ELA 3 Listening & Speaking MST 1 Scientific Inquiry MST 4 The Living Environment MST 7 Strategies SS 3 SS 4
VT	1.19 Research 3.9 Sustainability 6.2 Uses of Evidence and Data 6.14 Forces of Unity & Disunity 6.15 Knowledge of Economic Systems 6.18 Nature of Conflict 7.13 Organisms, Evolution and Interdependence 7.16 Natural Resources

Websites: *Biomass Sustainability and Carbon Policy Study,* by the Manomet Center for Conservation Studies. www.manomet.org. You'll find a link to this study on their home page, as well as a link to a follow-up statement that responds to some of issues raised in the press after the study was released.

Forest Biomass Retention and Harvesting Guidelines for the Northeast, by the Forest Guild Biomass Working Group. www.forestguild.org (you'll find a link to the study on their home page).

Heating the Northeast with Renewable Biomass: A Vision for 2025, by the Biomass Thermal Energy Council. www.heatne.com/sessions/Niebling_Vision.pdf.

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3. Foxes

Is it Gray Fox or Red? by Susan C. Morse (pg. 53)

With Morse's great tracking tips in hand, your students can head into the woods and do some tracking of their own. Ask your county forester or local Audubon chapter for the name of a local tracker who might accompany you and your students into the woods to look for animal signs. Before you go, have students look up past *Northern Woodlands* "Tracking Tips" articles ("Tracking Tips" is a regular column in the magazine). Have each student look up a different "Tracking Tips" article, read it carefully, and summarize the main points of the article on a file card that they can bring into the woods. That way, when you walk in the woods, each student can be the authority on a different aspect of tracking.

WILD	Tracks!
ME	English Language Arts A Science and Technology B, J
NH	English Language Arts 1 Science 1a, 2a, 3a
NY	ELA 1 Listening & Reading MST 1 Scientific Inquiry MST 4 The Living Environment
VT	1.19 Research 7.2 Investigation 7.13 Organisms, Evolution and Interdependence

Website: www.northernwoodlands.com. Click on the "Magazine" tab to link to back issues of Northern Woodlands magazine.

Books: *Tracking and the Art of Seeing,* by Paul Rezendes. Harper Collins: New York. 1999.

Mammal Tracks and Scat: Life-size Tracking Guide, by Lynn Levine and Martha Mitchell. Heartwood Press: 2008.

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4. Eating Locally

Know Your Fungus, by Charles W. Johnson (pg. 16)

What do your students know about the Localvore movement (also called "Locavore")? As author Bill McKibben puts it, "Every time you eat non-local food, it's like ordering take-out from 4,000 miles away." Eating locally decreases transportation energy use, keeps money within the local economy, increases regional self-sufficiency, and builds community. While most local foods come from farms, orchards, cheese makers, and so on, wild edibles represent local eating at its purest. Have each student research a different locally available wild edible and create oral report.

Challenge your students to be Localvores for a week (or longer!), eating as many locally grown and produced foods as they can. Have them record all the foods they eat during the week and note where they come from. They can then write a brief report on their findings, including percentage of foods purchased locally, transportation distances for non-local foods, and their conclusions after participating in the week-long challenge.

PLT	A Few of my Favorite Things Resource-Go-Round
ME	English Language Arts A, D, E, G, H Science and Technology B Economics A
NH	English Language Arts 1, 2, 3, 5, 6 Science 3a Social Studies 5, 9
NY	CDOS 3 Managing Information MST 1 Scientific Inquiry MST 4 The Living Environment MST 7 Strategies SS 4
VT	1.8 Reports 1.15 Speaking 1.19 Research 3.9 Sustainability 4.6 Understanding Place 6.2 Uses of Evidence and Data 6.3 Analyzing Knowledge

Websites: www.locavorenetwork.com. This site offers an overview of eating locally, plus a state-by-state listing that provides some useful links to local-eating information in your state.

www.vermontlocalvore.org. You'll find plenty of useful information about eating locally at this website, produced by the Mad River Valley Localvore Project.

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5. Win-win Stewardship

Stewardship Story, by Liza Ketchum (pg. 17)

The livestock exclusion work that Ketchum describes in this essay is one good way to protect fragile riparian areas and decrease non-point source pollution. Ketchum's efforts resulted in a win-win outcome in which cattle continued to graze and access water, while the health of the riparian corridor dramatically

improved. The article offers a lead-in to the subject of non-point source pollution, a significant issue not only here in the Northeast, but throughout the world.

Have your students consult local maps to identify the waterways in the watershed in which your school community lies (your regional Natural Resources Conservation Service can help provide maps if needed). Then have them each create a visually appealing, concise brochure for landowners that describes the problem of non-point source pollution and identifies ways to reduce that pollution, helpful resources for carrying out the work, sources of funding (like WHIP) to offset costs, and so on. Encourage them to create photos and diagrams to illustrate their brochures. Have the class vote on the most effective brochure, then present that brochure to your community's zoning board and conservation commission and encourage them to distribute it to landowners, particularly those with land abutting waterways in your community.

WILD	Ethi-Thinking Planning for People and Wildlife Improving Wildlife Habitat in the Community
ME	English Language Arts A, D, H Geography A Science and Technology J
NH	English Language Arts 1, 5 Social Studies 9, 10, 15
NY	CDOS 3 Thinking Skills ELA 1 Listening & Reading MST 1 Scientific Inquiry MST 7 Strategies SS5
VT	1.19 Research 2.2 Problem Solving 6.2 Uses of Evidence and Data 6.7 Geographical Knowledge

Websites:

www.epa.gov/nps This EPA website provides extensive information on non-point source pollution and ways to reduce it.

www.protectingwater.com This website offers suggestions of ways that homeowners can reduce their contributions to non-point source pollution.

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6. A Question of Invasives

Got Fern?: Controlling Native Invasive Plants, by Irwin Post (pg. 48)

Post's article adds a new twist to the discussion of invasive plants. This discussion usually focuses on exotic species that have gained a foothold in the Northern Forest, displacing native plant species. Post, however, describes three *native* plants that can dominate forest stands in the Northeast, inhibiting the growth of other species. It's important for students to understand the immense difference in ecological impact between the species Post describes and exotic invasive plants.

PLT	Home Sweet Home (in *Forest Ecology, High School Module*
ME	English Language Arts A, D, E, G, H Science and Technology B, L, M
NH	English Language Arts 1, 3, 5, 6 Science 3a, 3b, 4c
NY	MST 2 MST 4 The Living Environment MST 7 Strategies SS 3
VT	1.8 Reports 1.15 Speaking 1.19 Research 4.6 Understanding Place 6.4 Historical Connections 7.13 Organisms, Evolution, and Interdependence 7.16 Natural Resources

As a key deciduous tree species in the Northern Forest, the beech merits in-depth study.

How does present-day beech distribution and abundance compare with pre-settlement forests? Studies such as the Harvard Forest report listed below show that pre-settlement forests in the Northeast contained a far higher percentage of beeches than present-day forests. Why might this have been the case? How might this higher abundance of beeches have affected wildlife in pre-settlement forests? If beeches dominated northeastern forests in their undisturbed pre-settlement state, is it appropriate to call them "invasive" in present-day forests? As Post points out in his article, "The real problem with native invasive plants is that they conflict with our human desires." Should we manipulate the forest to meet our desires, or manipulate our desires to meet the ecological realities of the forest? How has beech wood been used historically in woodworking, and why is it out of favor now? The *Fine Woodworking* article listed below may be helpful in addressing this question.

Have students choose a question related to Post's article to ponder, research, and explore in a brief paper. Each student can summarize their findings and share them with the rest of the class.

Websites: http://harvardforest.fas.harvard.edu. Click on the "Publications" tab and search for the following document about pre-settlement forest composition: *The Forests of Presettlement New England, USA: Spatial and Compositional Patterns Based on Town Proprietor Surveys.*

www.finewoodworking.com/Materials/MaterialsPDF.aspx?id=2574. This link brings up a *Fine Woodworking* magazine article, "Beech: A Tough Nut Worth Cracking," by Jon Arno, about the woodworking assets and liabilities of beech.

Book: *Wetland, Woodland, Wildland,* by Elizabeth H Thompson and Eric R. Sorenson. University Press of New England, 2000. This excellent, readable book has a section describing the history of Vermont's forests (including discussion of beech) on page 88.

Wildlife Connection

Birds in Focus, by Bryan Pfeiffer (pg. 11)

Set up a hummingbird feeder outside your classroom window to attract ruby-throated hummingbirds heading south for the winter. Have your students plan a hummingbird native landscaping project that they can install in the spring. The Operation Ruby Throat website, www.rubythroat.org, is a great resource for general ecological information and landscaping tips, as well as extensive suggestions for research studies for high school students. There are enough suggestions, in fact, that each of your students can select a different one and design a research project to address a hypothesis of their choosing (though they would not actually carry out the research, this process gives practice in the process of creating a rigorous scientific research project, including hypothesis, background research on related studies, and methodology.)

WILD	Bird Song Survey
ME	Science and Technology B, J
NH	English Language Arts 7 Science 3a
NY	CDOS Thinking Skills MST 4 The Living Environment
VT	2.2 Problem Solving 2.13 Product/Service 2.14 Planning/Organization 7.13 Organisms, Evolution and Interdependence

Website: www.rubythroat.org. This "Operation Ruby Throat" website offers plenty of good information on ruby-throated hummingbirds, including research ideas for high school students.

Career Connection

At Work with Taxidermist Leon Verville, by Dave Mance III (pg. 32)

Autumn is hunting season, and there's no better time to expose your students to the field of taxidermy. Invite a regional taxidermist (see taxidermy website below for state-by-state listing of taxidermists) to come to your classroom to share his or her craft with your students. Several websites offer brief histories of taxidermy. Have students research these websites prior to the classroom visit and record five interesting facts about taxidermy history to share with their classmates.

Website: www.taxidermy.net. Click on "Taxidermists" tab for a state-by-state listing of taxidermists.

PLT	Who Works in this Forest?
ME	English Language Arts A, D, H Science and Technology B
NH	Science 3a English Language Arts 1, 5
NY	CDOS 3 Managing Information MST 1 Scientific Inquiry MST 4 The Living Environment MST 7 Strategies
VT	1.19 Research 7.13 Organisms, Evolution and Interdependence

Calendar Connection
Woods for the Woodcock, by Charles Fergus (pg. 34)
November, according to Fergus, is a good month to see American woodcocks in Northern Forest communities. Make the woodcock the "Bird of the Month" in a classroom display that includes photos, audio and/or video clips (which can be displayed on a computer), engaging interpretive writing, and so on. Create a new display each month, highlighting a species that students can see in their community during that month.

Website: All About Birds (www.allaboutbirds.org)

Book: *Sibley Guide to Bird Life and Behavior,* by David Allen Sibley. Knopf: 2001.

ME	English Language Arts A, D, H Science and Technology B Visual and Performing Arts A
NH	English Language Arts 1, 5 Science 3a Visual Arts 1
NY	ART 1 Visual Arts CDOS 3 Managing Information MST 1 Scientific Inquiry MST 4 The Living Environment
VT	1.19 Research 4.6 Understanding Place 5.29 Visual Arts 6.2 Uses of Evidence and Data 7.13 Organisms, Evolution, and Interdependence

HANDOUTS

Writing From the Land
Place in Mind, by Mary Hays (pg. 72)

Hays describes herself as a Field and Forest Person. What about you? Are you a Lake Person, a Mountain Person, or something else? Use vivid sensory images to describe a landscape, and a particular place within that landscape, where you feel most at home. If possible, recall a specific event (like Hays' description of walking through the forest with her grandchildren) to bring that place and your experience in it to life.

Word Search

Using the *Autumn Calendar* (pg. 4) to help you answer the following clues, find ten animals of the Northern Forest in the word search puzzle below.

1. This resident bird species eats carpenter ants and bark beetles all winter long (two words). PILEATED WOODPECKER
2. This often-solitary mammal searches for a mate in September. PORCUPINE
3. This insect overwinters under the loose bark of dead deciduous trees. LACEWING
4. During autumn migration, you can see large flocks of this bird species on muddy flats or at the edges of slow rivers (two words). LEAST SANDPIPER
5. In September, males of this wildlife species spar with one another to establish dominance (three words). WHITE-TAILED DEER
6. This bird of prey hunts mourning doves and other small birds gathered at backyard bird feeders (three words). SHARP-SHINNED HAWK
7. This reptile hibernates on the bottom of a slow-moving stream (two words). WOOD TURTLE
8. While most migratory birds leave our region in autumn, this species migrates south from Canada *into* our region to spend the winter (two words). SNOW BUNTING
9. In late autumn, this mammal's pelt turns from brown to white in the northern parts of its range (three words). LONG-TAILED WEASEL
10. Fertile females and males of this insect species emerge in October (two words). PAPER WASP

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

Crossword Puzzle

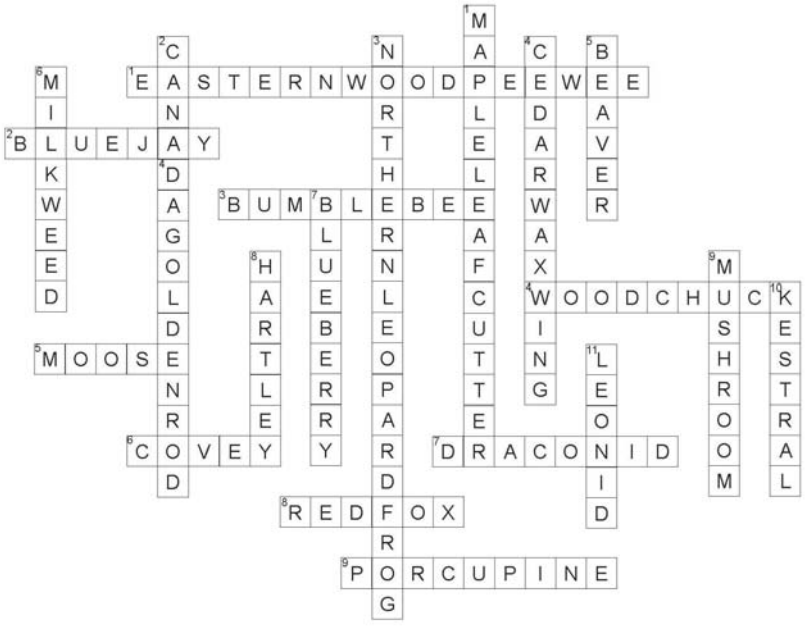
Use the *Autumn Calendar* (pg. 4) to help you answer the following clues:

ACROSS

1. Although many bird species stop singing after the nesting season, you can still hear this bird in September (three words). EASTERN WOOD PEEWEE
2. Insect-filled acorns make a protein-rich autumn food for this bird (two words). BLUE JAY
3. This insect's queen may spend the winter in an abandoned mouse burrow. BUMBLEBEE
4. This mammal spends the winter in a woodland burrow. WOODCHUCK
5. This mammal rolls in mud wallows in autumn. MOOSE
6. Term used to describe a small group of ruffed grouse that overwinter together. COVEY
7. October meteor shower. DRACONID
8. When this mammal's offspring leave the den, they can venture as much as 50 miles from their birthplace (two words). RED FOX
9. This mammal fattens up for the winter by eating fruit, nuts, and grasses. PORCUPINE

DOWN

1. Insect that eats maple leaves (three words). MAPLE LEAF CUTTER
2. This yellow flower blooms in September (two words). CANADA GOLDENROD
3. This amphibian hibernates on pond or stream bottoms (three words) NORTHERN LEOPARD FROG
4. This bird species eats juniper berries in winter (two words). CEDAR WAXWING
5. It can take this animal just two nights to build its shelter. BEAVER
6. The seeds of this plant are attached to fluffy "parachutes" and are spread by the wind. MILKWEED
7. The leaves of this bush turn bright red in autumn. BLUEBERRY
8. This comet will be visible to the naked eye in October and November. HARTLEY
9. If October is wet, _____ hunting is usually good. MUSHROOM
10. The young of this falcon species migrate south before their parents. KESTREL
11. November meteor shower. LEONID



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