



### **Autumn 2009 Northern Woodlands Goes to School**

Welcome to the Autumn 2009 edition of *Northern Woodlands* magazine. In this issue, you and your students will find articles that will inspire a range of in-class and in-the-field investigations. Learn where to find native plant materials for making natural dyes. Read about the ecological ripple effects of beaver activity. Contemplate the economics and ecology of leaving big trees in the forest. And much more!

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 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 Maine TREE foundation, Alexander Host Foundation, and Ghostwriters Communications for their support of this project. As a result of their generosity, over 5,000 students throughout the Northeast are able to participate in Northern Woodlands Goes to School this year.

We would love to know your thoughts about our teacher's guide. If you have comments or suggestions, just call or email Dave Mance III at (802) 439-6292 (email: [dave@northernwoodlands.org](mailto:dave@northernwoodlands.org)).

### **Noteworthy News**

The big news is that **Northern Woodlands Goes to School** has gone digital. So instead of receiving a paper copy of the magazine for each of your students, you'll only receive one paper copy of the magazine. You will, however, have access to a PDF of the entire Autumn issue simply by joining our NWGTS google group at: <http://groups.google.com/group/nwgts?hl=en>. Feel free to download the entire PDF, or any article therein, and distribute it freely. Please let us know if you have any questions about this new format.

Be sure to check out the Northern Woodlands website, [www.northernwoodlands.org](http://www.northernwoodlands.org). It's full of great resources, including a resources page that provides links to dozens of regional forest-related organizations. You'll also find the brand new, bi-weekly electronic newsletter, to which you can subscribe if you're not signed up already. The newsletter is a quick read that will give you a variety of news and information, including a fun puzzler, called *What in the Woods is That?*

## 1. Nature Photography

*What in the Woods is That?* (pg. 19)

In the biweekly *Northern Woodlands* electronic newsletter, you'll find an ongoing contest called ***What in the Woods is That?*** Each newsletter will post a photo of an unusual natural object. If you correctly guess what it is and send your guess to *Northern Woodlands*, you'll be eligible to win a copy of *The Outside Story*, a paperback collection of articles from *Northern Woodlands'* newspaper column by the same name. A prize winner will be drawn at random from all the correct entries.

You can encourage your students to participate in this contest in two ways. As a class, you can view the photo, brainstorm what it might be, and send your answer to *Northern Woodlands*. You can also use the contest as a means to introduce your students to nature photography. This activity will help your students take time to study the natural world closely and observe patterns, colors, and form in nature. Invite a local photographer to give a brief introduction to photo composition, then set your students to the task of creating a digital portfolio of interesting nature shots.

Have each student choose one favorite photograph from their portfolios. Print the photos and mount them on black card stock (a low-cost way to display them nicely), then create a nature photography exhibit for a public space in your school. Each student should sign and title their photograph on the black mat, just as they would a fine art piece (use white pen or pencil). Ask each student to type up a paragraph in which they describe their photo—the subject, the process of photographing it, any discoveries they made along the way, and so on. Mount each paragraph alongside its photograph.

**Website:** You'll find a link to the new *Northern Woodlands* biweekly electronic newsletter on the *Northern Woodlands* website: [www.northernwoodlands.org](http://www.northernwoodlands.org).

The Vocational Information Center offers a webpage of links to dozens of photography lesson plans: [www.khake.com/page87.html](http://www.khake.com/page87.html).

<b>WILD</b>	Museum Search for Wildlife
<b>ME</b>	English Language Arts A, E Visual and Performing Arts A
<b>NH</b>	English Language Arts 1, 2 Visual Arts 1
<b>NY</b>	ART 1 Visual Arts ELA 2 Speaking & Writing
<b>VT</b>	1.12 Personal Essays 5.28 Artistic Proficiency 5.29 Visual Arts

## 2. Investigating Beavers

*A Logger with Four Feet and a Tail*, by Bernd Heinrich (pg. 38)

Beavers are what scientists refer to as a keystone species—a species that has a disproportionate effect on its environment relative to its abundance. Through their tree-cutting and dam-building activities, beavers have helped shape the North American landscape.

Have your students explore the ecological ripple effects of beavers in the Northern Forest. What animals live in the many habitats that beaver activities create (ponds, wetlands, fallen logs, forest openings, standing dead trees killed by the rising water, and so on)? In what ways does beaver “logging” differ ecologically from human logging? Take your students on a field trip to a local site where beavers are active. Have students investigate and record—in words, sketches, and photographs—the ways in which beavers have changed their environment. As follow-up, students can create a display that illustrates the ecology of beaver habitat, including reference to the habitats created and the species that live in those habitats.

<b>WILD</b>	Habitat Lap Sit Who Fits Here? Which Niche?
<b>PLT</b>	Cast of Thousands ( <i>Forest Ecology</i> High School Module)
<b>ME</b>	English Language Arts A, D, E, H Science and Technology B, J
<b>NH</b>	English Language Arts 1, 2, 3, 5, 6 Science 1a, 2a, 3a
<b>NY</b>	CDOS 3 Managing Information ELA 3 Listening & Speaking MST 1 Scientific Inquiry MST 4 The Living Environment MST 7 Strategies
<b>VT</b>	1.5 Writing Dimensions 1.15 Speaking 1.8 Reports 1.19 Research 6.2 Uses of Evidence and Data 6.3 Analyzing Knowledge 7.1 Scientific Method 7.2 Investigation 7.13 Organisms, Evolution, and Interdependence

In his article, Heinrich raises another interesting subject when he ponders the driving force behind beavers' activities. He wonders whether they are, in fact, thinking and reasoning or just acting from instinct. This opens the door to the whole subject of animal intelligence, which would be a compelling topic for classroom research and debate.

**Website:** Montclair State University offers a very good on-line beaver curriculum for middle school students: [csam.montclair.edu/njsoc/sessions/beaverecology.pdf](http://csam.montclair.edu/njsoc/sessions/beaverecology.pdf).

Animal Intelligence blogsite: [www.animalintelligence.org/](http://www.animalintelligence.org/) .

**Book:** *The Beaver: Natural History of a Wetlands Engineer*, by Dietland Muller-Schwarze and Lixing Sun, 2003. Highly acclaimed by both teachers and scientists, this book is available on-line through Google books (just "google" the book's name and the books.google.com link will appear among the first search-result listings.) Not all pages of the book are available on-line, but the site offers a good sampling of the book's contents.

### 3. Economics of Forest Management

*It Pays to Keep Good Trees Growing*, by Michael C. Greason (pg. 42)

High grading is an all-to-common logging practice where the biggest and best trees in the forest are removed. While this brings some money to the landowner in the short-term, Greason shows how leaving big trees in the forest can be better for the forest, and also better for the landowner's pocketbook. Ask your county forester to take you and your students on a walk in the forest. Have him or her show students how to measure tree diameter, height, and site index (a measure of a site's potential for growing trees), and discuss the economic and ecological decisions a forester needs to make when deciding how best to manage a forest. Have students create a display illustrating the many values of trees that influence a forester's management decisions (providing wildlife food, habitat, seed stock, lumber, firewood, species diversity, stabilizing soil, and so on). The PLT activity, 400-acre Wood, gives students the chance to try their hand at making the kinds of decisions a forester makes when preparing a forest plan.

**Book:** *Working with your Woodland*, by Mollie Beattie, Charles Thompson, and Lynn Levine. 1983.

### 4. Woodland Dyes

*Local Color*, by Allaire Diamond (pg. 24)

Consult your local fiber guild (which you can locate by doing an internet search for "fiber guild" in your state) to see if you can find a fiber artist who works with natural dyes. Ask him or her to take you and your students into the woods to identify and collect plant materials for dying. Ask the fiber artist to bring along samples of arts and crafts made with natural dyes.

<b>PLT</b>	What's a Forest to You? ( <i>Focus on Forests</i> High School Module) 400-acre Wood
<b>ME</b>	Economics A English Language Arts E, H Science and Technology B, J
<b>NH</b>	English Language Arts 2, 6 Science 1a, 2a, 2c, 3a, 4c Social Studies 5, 9
<b>NY</b>	MST 1 Scientific Inquiry MST 4 The Living Environment MST 6 Models MST 7 Strategies SS 3, 4
<b>VT</b>	1.8 Reports 1.20 Communication of data 3.9 Sustainability 6.2 Uses of Evidence and Data 6.15 Knowledge of Economic Systems 7.2 Investigation 7.13 Organisms, Evolution, and Interdependence 7.16 Natural Resources

<b>PLT</b>	Resource-Go-Round
<b>ME</b>	Visual and Performing Arts A Science & Technology 3a
<b>NH</b>	Visual Arts 1 Science 3a, 4c
<b>NY</b>	ART 1 Visual Arts MST 1 MST 4 The Living Environment
<b>VT</b>	5.29 Visual Arts 7.13 Organisms, Evolution, and Interdependence 7.16 Natural Resources

Using one of the references Allaire Diamond mentions in her article, make two or three different dyes and use them to dye wool or basket materials. This project can be as extensive as you have time and inclination for—students can go so far as to weave baskets or create artwork with their dyed materials.

**Website:** *Art in the Forest: A Guide for Landowners*, by Allaire Diamond. Written in partnership with the Vermont Land Trust, this 27-page guide is a great resource for identifying plants for making natural dyes. [www.vlt.org/art-from-the-forest](http://www.vlt.org/art-from-the-forest).

## 5. Natural Ends

*At Work Making Coffins with Richard Winter*, by Amanda Kuhnert (pg. 36)

Before students read Kuhnert’s article, have them study the soil cycle—the process by which living organisms die, decompose, become part of the soil, and support the growth of new life. Then, as part of that study, have them read Kuhnert’s article—the story of a carpenter who builds simple, locally sourced coffins. While your students may not at first see the connection between the soil cycle and human burial, the modern American way of burying our dead has tremendous ecological and social consequences and is intimately connected with soil.

In Kuhnert’s article, Winter notes that his clients “are drawn to the idea of being buried in a simple wooden box” and that the idea of returning to the earth is important to them. That suggests that modern burial practices somehow hinder the process of returning to the earth. Have students research the modern Western approach to burial and compare that, in a report, with burial practices from other parts of the world.

**Website:** The Centre for Natural Burial, based in England, has extensive information on conventional and natural burial practices. [www.naturalburial.coop/](http://www.naturalburial.coop/)

<b>PLT</b>	Nature’s Recyclers Tree Lifecycle
<b>ME</b>	English Language Arts A, B, D, E, H History B Science and Technology B
<b>NH</b>	English Language Arts 1, 2, 5, 6 Science 3a Social Studies 17
<b>NY</b>	CDOS 3 Managing Information MST 4 The Living Environment MST 7 Strategies SS 1, 3
<b>VT</b>	1.8 Reports 1.19 Research 4.6 Understanding Place 6.2 Uses of Evidence and Data 6.4 Historical Connections 7.13 Organisms, Evolution, and Interdependence

## 6. Exporting Invasives

*The Northeast’s Ecological Outbox* by Kenrick Vezina (pg. 17)  
Vezina’s article is a great companion to *Wasps versus Borers* (pg. 19). There’s a tendency to think of invasive exotic species as a problem created by “them,” the rest of the world. This article turns that idea on its head, showing how some of our beloved native species are pesky and maligned invaders in other countries.

This article offers an excellent opening through which students can get a different perspective on a major ecological issue. Have teams of students select one of the American plant or animal species listed in Vezina’s article that has become an invasive overseas, or one from the list of 100 worst invasive species on the “Delivering Alien Invasive Species Inventories for Europe” database (see DAISIE website listing below) and research its impact in its new home. What natural checks and balance are missing from its new environment that allow it to spread unabated?

<b>PLT</b>	Home Sweet Home ( <i>Forest Ecology</i> High School Module) Saga of the Gypsy Moth ( <i>Forest Ecology</i> High School Module)
<b>ME</b>	English Language Arts A, B, D, E, H Science and Technology B
<b>NH</b>	English Language Arts 1, 2, 5, 6 Science 3a
<b>NY</b>	CDOS 3 Managing Information MST 4 The Living Environment MST 7 Strategies
<b>VT</b>	1.8 Reports 1.19 Research 6.2 Uses of Evidence and Data 7.13 Organisms, Evolution, and Interdependence

**Website:** The DAISIE website provides access to the database of invasive exotic species in Europe:  
[www.europe-aliens.org/](http://www.europe-aliens.org/).

The US Department of Agriculture hosts a web page with extensive information about invasive exotic species in Europe.  
[www.invasivespeciesinfo.gov/international/europe.shtml](http://www.invasivespeciesinfo.gov/international/europe.shtml).

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### Calendar Connection

*Birds in Focus*, by Bryan Pfeiffer (pg. 45)

Autumn is a great time to get outside and look at birds with your students. As Pfeiffer's article explains, identifying songbirds can be tricky this time of year, both because of plumage changes and because the males are singing a lot less than in springtime or not at all. But it's migration time—a time when you and your students can see gatherings of raptors, waterfowl, and neotropical migratory songbirds moving through your region. Invite a local Audubon member to take you on a birding outing to local migration hotspots (each student should bring a pair of binoculars and notebook). Students should make a list of the birds they see on the outing. After the fieldtrip, have each student choose one of the species they saw, research it, and create an interpretive display that shows the bird's life cycle, including spring and fall plumage changes, migration habits, and so on.

**Website:** Cornell University's All About Birds website is an excellent, free resource that provides good introductory information about hundreds of bird species. [www.allaboutbirds.org](http://www.allaboutbirds.org).

**Movie:** *Winged Migration*. 2003 Sony Picture Classics.

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<b>WILD</b>	Bird Song Survey
<b>ME</b>	English Language Arts A, D, E, H Science and Technology B, J Visual and Performing Arts A
<b>NH</b>	English Language Arts 1, 2, 5, 6 Science 1a, 2a, 3a Visual Arts 1
<b>NY</b>	ART 1 Visual Arts CDOS 3 Managing Information MST 1 Scientific Inquiry MST 4 The Living Environment MST 7 Strategies
<b>VT</b>	1.8 Reports 1.19 Research 5.29 Visual Arts 6.2 Uses of Evidence and Data 7.2 Investigation 7.13 Organisms, Evolution, and Interdependence

### Career Connection

*The Power of Trees*, by Todd McLeish (pg. 53)

This brief article illustrates the cross-disciplinary nature of environmental work. It describes how MIT researchers are exploring the voltage naturally produced by living trees. Their collaboration with Voltree Power to harness this voltage to produce sensors for predicting and detecting forest fires requires input from the fields of electrical, electronic, and mechanical design, ergonomics, wireless communication, custom computer software design, biophysics, and nanomaterial science. And this article sheds light on just one small branch of green energy research and technology.

Have your students work in teams to research a cutting-edge green energy innovation and create a short presentation for the rest of the class. Their presentation should include visual aids that clearly and simply explain how the technology works, its applications, advantages and disadvantages, and so on. The National Renewable Energy Laboratory website is a good place to begin their investigations.

<b>PLT</b>	Who Works in this Forest?
<b>ME</b>	Career Preparation A English Language Arts E, G, H Science and Technology L
<b>NH</b>	English Language Arts 3, 6 Science 4c
<b>NY</b>	CDOS 1 MST 7 Strategies SS 3
<b>VT</b>	1.15 Speaking 3.9 Sustainability 3.15 Career Choices 7.16 Natural Resources

**Website:** Voltree is the small, green company that's creating technology to utilize the metabolic energy of trees. Their website includes a page (click the navigation tab entitled "News") with links to the many news articles that have been written about their new technology. [www.voltreepower.com](http://www.voltreepower.com).

The National Renewable Energy Laboratory: [www.nrel.gov](http://www.nrel.gov).

### Wildlife Connection

*Wasps versus Borers*, by Laurie DiCesare (pg. 19)

The emerald ash borer is approaching the Northern Forest, and could have devastating consequences for the forest community. DiCesare's article not only offers an opportunity to focus on the broad issue of invasive exotics, it also introduces the idea that students can take part in real and important scientific investigations. The timing will not likely be right for your students to get involved in the square-headed wasp biosurveillance program that is being used to track emerald ash borers, since the wasps are active only until mid-September. But the article introduces the idea of citizen monitoring, and you and your students can research citizen monitoring initiatives in your area in which the students can take part. Citizen monitoring programs allow your students to go beyond *practicing* the scientific method to *participating* in it in ways that truly can make a difference, contributing meaningfully to ongoing scientific research. Some common citizen monitoring programs include monitoring of water quality (contact your state's water quality division), reptiles and amphibians (Vermont Reptile and Amphibian Atlas), and monarch butterflies (Monarch Larva Monitoring Project).

**Website:** The Vermont Reptile and Amphibian Atlas project offers data collection forms, instructions, and information for collecting and contributing data. [www.community.middlebury.edu/~herpatlas](http://www.community.middlebury.edu/~herpatlas).

The Monarch Larva Monitoring Project involves citizens in collecting data that will help to explain the distribution and abundance patterns of monarch butterflies in North America. Their website explains how to get involved. [www.mlmp.org](http://www.mlmp.org).

<b>PLT</b>	Home Sweet Home ( <i>Forest Ecology</i> High School Module) Saga of the Gypsy Moth ( <i>Forest Ecology</i> High School Module)
<b>ME</b>	English Language Arts A, B, D, E, H Science and Technology B
<b>NH</b>	English Language Arts 1, 2, 5, 6 Science 3a
<b>NY</b>	CDOS 3 Managing Information MST 4 The Living Environment MST 7 Strategies
<b>VT</b>	1.8 Reports 1.19 Research 6.2 Uses of Evidence and Data 7.13 Organisms, Evolution, and Interdependence

## HANDOUTS

## Writing From the Land

*Unfortunate Location*, by Louis Jenkins (pg. 65)

Read Louis Jenkins' short poem at least twice. Notice the tension between his appreciation of the pines' beauty and long-standing presence and his frustration at some of the pines' other qualities that negatively impact his day-to-day life.

Choose a plant or animal that you encounter in your life—perhaps a woodchuck or deer or squirrel that shows up periodically in your yard, or a tree or flower that grows nearby—and write about the qualities that attract you and those that frustrate or repel you. Use vivid sensory details (smells, tastes, textures, sounds, and visual descriptions) to bring your writing to life.

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



## Word Search

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

1. As its name suggests, this bird eats mostly conifer seeds (two words). **PINE SISKIN**
2. This fish-eating bird will remain in the Northeast until ponds and streams freeze. **KINGFISHER**
3. This raptor (bird of prey) eats mourning doves and other birds (two words). **COOPER'S HAWK**
4. This bird species gathers in flocks in winter and eats crabapples and other fruits that remain on the trees (two words). **CEDAR WAXWING**
5. Like its cousin, the red-throated loon, this waterfowl species heads south later than many other water birds (two words). **COMMON LOON**
6. Although crows migrate south for the winter, this closely related bird does not. **RAVEN**
7. Though many songbirds stop singing as soon as their young leave the nest, this migratory songbird sings right up until the time it flies south (three words). **EASTERN WOOD-PEWEE**
8. Species of bird that stores acorns in the ground for the winter (two words). **BLUE JAY**
9. When visiting backyard feeders, this migratory songbird prefers to eat seeds and cracked corn on the ground or in a ground-level feeder (two words). **FOX SPARROW**
10. This songbird spends the winter in Central or northern South America (two words). **WOOD THRUSH**





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T	I	B	G	K	C	N	Y	I	C	U	E	W	I	W	I
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## Crossword Puzzle

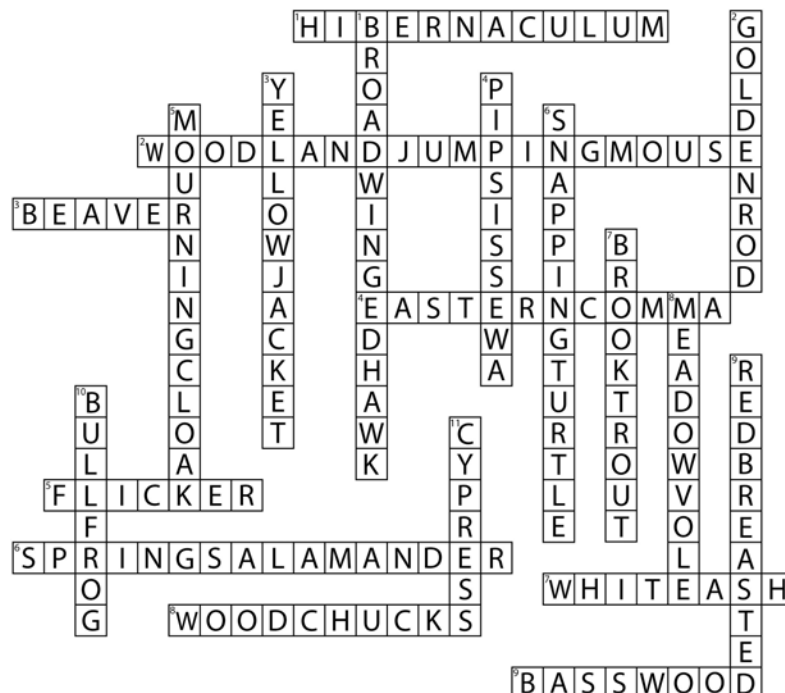
Use the *Autumn Calendar* (pg. 4) to help you answer the following clues:

### ACROSS

1. Name given to the place where timber rattlesnakes hibernate during winter. **HIBERNACULUM**
2. Small mammal that hibernates for half the year (three words). **WOODLAND JUMPING MOUSE**
3. This mammal stores branches near its den to eat during the winter. **BEAVER**
4. This butterfly's name comes from the distinctive white markings on its underwing (two words). **EASTERN COMMA**
5. You may see this woodpecker foraging for ants on a mowed lawn. **FLICKER**
6. Though this species of amphibian mates in autumn, it doesn't lay its eggs until spring (two words). **SPRING SALAMANDER**
7. This tree's leaves turn shades of purple in autumn (two words). **WHITE ASH**
8. These mammals overwinter in deep, grass-lined burrows. **WOODCHUCKS**
9. One of the porcupine's favorite sources of food. **BASSWOOD**

### DOWN

1. This raptor of the Northern Forest reaches its South American wintering grounds by mid-November (three words). **BROAD-WINGED HAWK**
2. Autumn wildflower that provides late-season food for bees. **GOLDENROD**
3. In the fall, all the males and workers of this wasp species die, and the queen goes into hibernation (two words). **YELLOW JACKET**
4. Evergreen plant found in dry woods. **PIPSISSEWA**
5. This butterfly species emerges from its chrysalis in September and overwinters as an adult (two words). **MOURNING CLOAK**
6. After this reptile's eggs hatch, most hatchlings move to water for the winter (two words). **SNAPPING TURTLE**
7. This fish species lays its eggs in clean, fast-moving streams in autumn (two words). **BROOK TROUT**
8. Favored food of northern saw-whet owls (two words). **MEADOW VOLE**
9. Nuthatch species that prefers to live among softwood trees (two words). **RED-BREASTED**
10. Frog species that spends two years as a tadpole. **BULLFROG**
11. Mexican tree that provides winter habitat for monarch butterflies. **CYPRESS**



## Crossword Puzzle

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