

project WWEB

Winter
2010

Connecting Projects WILD, WET and Learning Tree in New Hampshire

Discover the Wonders of Vernal Pools

Vernal pools are a type of temporary wetland that exists in many regions of the world. They have different components, arise at different times of the year and are host to a wide variety of organisms. Although they are often small in size and may hold water for just a few weeks during the year, vernal pools are incredibly important to the survival of many species.

How many species can possibly use vernal pools in such a short amount of time? As you will find in this issue, vernal pools are important habitat for amphibians, reptiles, crustaceans and macroinvertebrates, not to mention larger predators. These unique areas

require protection, and because of their inconspicuous nature, they are often overlooked by the untrained eye.

Vernal pools can be a wonderful tool for teaching about many different topics. The water cycle, food webs, life cycles, habitats, biodiversity, ecosystems, interconnections, deforestation, impacts of development and mapping are just a few of the areas that could be explored using vernal pools as an outdoor classroom. Students can use a variety of tools and resources during their studies and will likely ask many questions along the way.



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The Habitat Value of Vernal Pools

by Malin Clyde, UNH Cooperative Extension

Have you ever heard the deafening sound of spring peepers in the woods and wondered where it was coming from? Perhaps you saw what looked like a large puddle in the woods and noticed frogs there in the spring. This may have been a habitat that is commonly referred to as a “vernal pool.”

Vernal pools exist in a variety of landscapes – in forests, fields, shrub swamps, marshes, or in gravel pits, to name just a few. These small waterbodies can vary in size from less than one-tenth of an acre to over two acres. They are generally characterized by a seasonal cycle of flooding and drying and can be completely dry at certain times of the year. Some vernal pools flood in the spring with water from melting snow, rain, or high groundwater and then dry (or dry down to a shallower depth) by summer’s end. Other pools follow a similar pattern, but fill with rain in autumn, hold water all winter and spring, and then dry out by late summer. The annual drying cycle of vernal pools makes them different from other wetlands and



© NHFG PHOTO BY VICTOR YOUNG

Adult spotted salamanders often exceed 8 inches in length.

“Hope and the future for me are not in lawns and cultivated fields, not in towns and cities, but in the impervious and quaking swamps.”

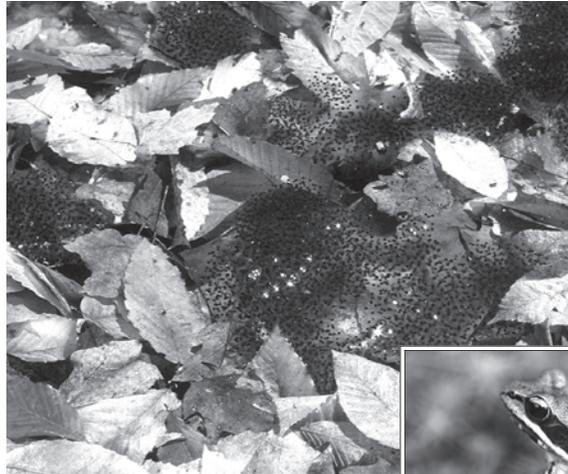
- Henry David Thoreau in *Walking*



plays a key role in determining which wildlife species uses which pools as habitat.

Vernal pools are unique wetland habitats that provide critical breeding habitat for several amphibian species of conservation concern in New Hampshire, as documented in the state's Wildlife Action Plan. The marbled salamander is a state endangered species that requires vernal pools for breeding. Marbled salamanders lay eggs in dry basins during the fall and guard their eggs until the pools fill with water.

Fish are often top predators in wetlands, but they can't survive in pools that dry out or that have low dissolved oxygen levels. As a result, vernal pools are suitable for amphibians whose tadpoles and larvae are especially vulnerable to fish predation. These species include wood frog, spotted salamander, blue-spotted salamander and Jefferson's salamander. In the spring, these amphibians migrate from nearby woodlands to vernal pools, where they breed and deposit eggs. Once hatched, tadpoles and larvae spend most of their time foraging. This allows them to develop quickly, in an effort to migrate from the pools as juveniles before the pool dries out. After leaving a vernal pool, amphibians also provide an important prey base to a variety of mammals and birds in the uplands, and they contribute to nutrient export and



Female wood frogs may lay as many as 3,000 eggs, packed in fist-sized balls.



PHOTO © ALAN BRIERE

cycling in the larger landscape.

A variety of other species use vernal pools as well. Fairy shrimp are small crustaceans that require vernal pools for breeding. Invertebrates that form an important part of the local food web can also be found in vernal pools. For example, insects are eaten by developing salamander larvae. Spotted and Blanding's turtles, great blue herons, raccoons and predatory insects travel to vernal pools to feed on amphibian eggs, tadpoles, insects and crustaceans in the pools.

Most vernal pools are active by late April and, with planning, make perfect outdoor classrooms. Take your class to a local vernal pool during the spring and bring a

field book (e.g., *Guide to the Animals of Vernal Pools*). Students can search for amphibian egg masses on the edge of the pool and possibly observe adult amphibians. Aquarium fish nets can be used to capture tadpoles and invertebrates from late April through June.

Keep in mind that most amphibian larvae and tadpoles are aquatic and require water to survive. Small, covered plastic containers with holes in the top come in handy to separate and temporarily hold small organisms for viewing. In addition, egg masses should be examined

with care and not dislodged from sticks. It's best not to apply insect repellent to hands prior to sampling, because these chemicals can harm the organisms found in vernal pools.

Other than these few precautions, vernal pools can be explored with very little formal equipment and can be the subject of long-term studies for older students.



Adapted by Tracy Tarr from: *Vernal Pools Habitat Stewardship Series*, New Hampshire Wildlife Action Plan, UNH Cooperative Extension, with permission of Malin Clyde.

Activities Related to Articles in this Issue

Project WET Suggests:

In *Life in the Fast Lane*, students use a scavenger hunt and investigations of temporary wetlands in their neighborhoods to learn about the benefits of and challenges to organisms living in temporary wetlands.

Do You Dig Wetland Soil? (WOW! The Wonders of Wetlands) has students make and use a wetland soils color chart, then dig a hole in a wetland area to study the physical characteristics of the soil. (K-12 with options)

In *Water Under Foot* (WOW! The Wonders of Wetlands), students make a groundwater model and demonstrate groundwater's relationship to the land and to wetlands.

Project Learning Tree Suggests:

Many PLT activities lend themselves to exploring vernal pools and other forest habitats where vernal pool critters may be found during other parts of the year. Here are a few to try:

Habitat Pen Pals gives students a chance to learn about the diversity of habitats around the world and to write letters from the perspective of organisms living in these habitats.

In *The Fallen Log*, students become familiar with things living in or on rotting logs and gain an understanding of how decomposition takes place.

Green Space (in the *Places We Live*, secondary module) allows middle and high school students to investigate green infrastructure and native plant communi-

ties at the neighborhood, community and regional scales. Students explore issues surrounding growing human populations and protecting green space.

Project WILD suggests:

In *Puddle Wonders* (WILD Aquatic), students observe and measure water that accumulates in puddles, predict where puddles will form and describe organisms that live in or near these wet spaces.

Students explore the concept of "ecotones" by visiting places where habitats overlap in *The Edge of Home* (WILD Aquatic).

In *Rainfall and the Forest*, students work with state highway and vegetative maps to determine relationships among rainfall, vegetation and animal habitats.

Spotlight on...

Ashuelot Valley Environmental Observatory

Citizen science at its finest in southwestern New Hampshire

Ashuelot Valley Environmental Observatory (AVEO) is a nonprofit organization on the campus of Keene State College that links citizens with professional scientists for the purpose of gathering ecological data aimed at protecting and restoring the environment of southwestern New Hampshire.

Trained citizen volunteers help scientists evaluate the environmental health of the valley by participating in a number of projects. They monitor bird productivity and survivorship, inventory the Pisgah State Park forest community, test water quality in the Ashuelot River, monitor mammal populations and provide protection for migrating amphibians each spring.

Join the Salamander Brigade

A major focus of AVEO volunteer activity is on vernal pools and the migrating amphibians that rely on them for breeding habitat. In fact, the most popular volunteer project is the Salamander Brigade. Early every spring, on those first warm rainy nights, more than one hundred volunteers gather at ten different road crossings in Cheshire County to literally “lend a hand” to migrating amphibians, vulnerable to passing vehicles.

These heroic volunteers count migrating amphibians and safely usher them across



A spring peeper (quarter shows small size) is difficult for motorists to see when crossing a road.



A young volunteer helps rescue a spotted salamander.

roads during one or more “big nights.” On just two nights in 2008, volunteers safely crossed nearly 4,000 amphibians at nine sites throughout the county and the Ashuelot watershed. In total, more than 1,100 spring peepers, 1,000 wood frogs and nearly 1,300 spotted salamanders, as well as other species of salamanders and frogs, were

potentially spared from the crush of tires.

Teachers interested in having their students participate in vernal pool documentation and the annual Salamander Brigade in Cheshire County should contact David Moon, Executive Director of AVEO, for more information and training opportunities at 603-358-2069 or moon@aveo.org.



Vernal Pools:

A Protected Wetland Resource in New Hampshire

**By Sandy Crystall
DES Wetlands Bureau**

Freshwater wetlands and surface waters (including vernal pools) have been protected under state law since 1969. Government officials and wetland scientists use three indicators to identify wetlands: water at or near the surface for approximately two weeks during the growing season; “hydric” soils that have characteristics indicating they are saturated at times; and plants adapted to growing in saturated soil conditions.

Identifying Vernal Pools

Vernal pools are a special kind of wetland with unique characteristics that make them easy to miss, especially when they dry up in the summer. New Hampshire laws and Department of Environmental Services (DES) rules are in place to help protect

vernal pools from the impacts of various activities that fragment the landscape, such as land development and road construction. In 2008, New Hampshire adopted specific definitions for what constitutes a vernal pool and established vernal pool identification requirements for certain projects seeking a wetland permit.

The simplified definition of a vernal pool is “a surface water or wetland, which provides breeding habitat for amphibians and invertebrates that have adapted to the unique seasonal environments and has no viable fish population.”

Vernal pools are waterbodies that:

- Cycle annually from flooded to dry conditions, although the hydroperiod, size, and shape of the pool might vary from year to year.

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- Form in a shallow depression or basin.
- Have no permanently flowing outlet.
- Hold water for at least two continuous months following spring ice-out.
- Lack a viable fish population.
- Support one or more primary vernal pool indicators, or three or more secondary vernal pool indicators.

Primary vernal pool indicators are the presence or physical evidence of breeding by wood frog, spotted salamander, Jefferson-blue spotted salamander complex, marbled salamander (which breed in the fall), or fairy shrimp.

Secondary vernal pool indicators include, but are not limited to, caddis fly larvae and cases, clam shrimp and their shells, fingernail clams and their shells, aquatic beetle larvae, dragonfly larvae and exuviae, spire-shaped snails and their shells, flat-spire snails and their shells, damselfly larvae and exuviae and true fly larvae and pupae.

Protected by Law

Any project classified as minor or major impact under the wetland rules must identify all wetlands, surface waters and the locations of any vernal pools on the property.

Applicants are required to follow DES vernal pool regulations and assess the project's impact on plants, fish and wildlife, including: rare and special concern species, state and federally listed threatened and endangered species, species at the extremities of their ranges, migratory fish and wildlife

and exemplary natural communities identified by the state's Natural Heritage Bureau.

In addition, the U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish & Wildlife Service and the National Marine Fisheries Service review impacts to wetland resources under the federal Clean Water Act. For certain projects, the Army Corps of Engineers regulates impacts to vernal pool habitat and may require preservation of a majority of the area surrounding a vernal pool.

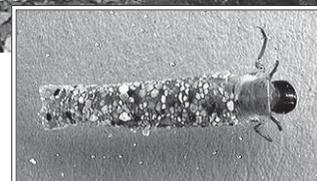
How You Can Help

Even with all these rules in place, vernal pools remain at risk. To help protect vernal pools in your community:

- Minimize disturbance on your land, especially near wetlands. Encourage and follow zoning ordinances that define wetland setbacks or buffers where certain activities are restricted to protect



Even before the ice is off, vernal pools are teeming with life. Caddisfly larvae (right) are often found in vernal pools.



water quality and other functions of the wetland. These buffers can help keep the forest canopy intact around the pool.

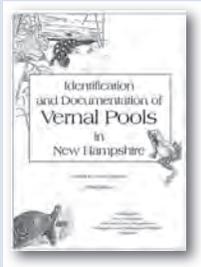
- Keep some natural debris on your lot to provide habitat for vernal pool species.
- Help identify and monitor New Hampshire's vernal pool critters; get involved with Fish and Game's Reptile and Amphibian Reporting Program (RAARP).
- Work with a wetland scientist to identify the vernal pools in your town.



Winter 2010 WEB Resources

- www.wildnh.com/wildlife/Nongame/RAARP/Vernal_pool_manual.pdf

Identification and Documentation of Vernal Pools in New Hampshire, 2nd edition. Mike Marchand. 2004.



- www.vernalpool.org
Vernal Pool Association

- www.wildnh.com/Wildlife/Nongame/reptiles_amphibians.htm
Reptiles and amphibians identification and reporting - Nongame and Endangered Wildlife Program

- *A Field Guide to the Animals of Vernal Pools* by Leo P. Kenney and Matthew R. Burne. (To order: www.mass.gov/dfwele/dfw/nhosp/publications/nhosp_pubs.htm)

- http://des.nh.gov/organization/divisions/water/wetlands/vernal_pools.htm
DES Wetlands Bureau – Vernal Pool page

- www.pwrc.usgs.gov/frogquiz/index.cfm
USGS Frog Call Quiz

- www.umaine.edu/vernalpools/Videos.html
Video showing identification of egg masses, from Maine.

- www.wildnh.com/Wildlife/wildlife_plan.htm. The New Hampshire Wildlife Action Plan identifies vernal pools as critical habitat for various species of conservation concern.

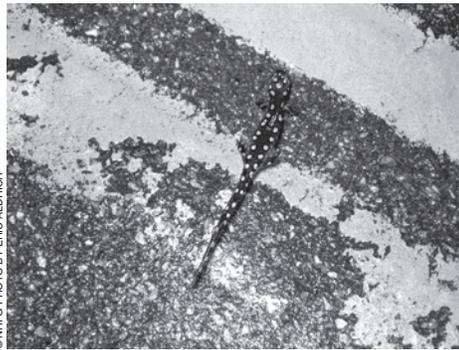
- www.epa.gov/bioindicators/html/vernal_pools.html. *US EPA-Biological Indicators of Watershed Health - Vernal Pools and other Seasonal Pools*

- *The Importance of Hydroperiod in Wetland Assessment*, University of New Hampshire Cooperative Extension. Tarr, M. D. and K. J. Babbitt. 2008.

Safe Passage for Vernal Pool Creatures

By Jed Merrow, Biologist/Project Manager, McFarland Johnson

How do vernal pool amphibians get across the road? All too often, unfortunately, the answer is inconspicuously and slowly, which certainly means they are no match for car tires. Vernal pool amphibians are small and, to make matters worse, typically only migrate on rainy nights when visibility is especially poor. Most drivers don't see them, and the result is often road kill.



Spotted salamanders cross the road to reach breeding areas.

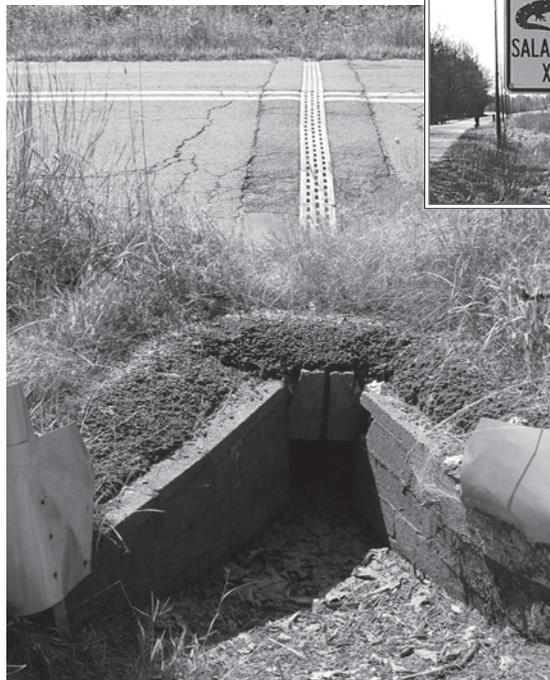
Crossing Challenges

Solving this problem is not as simple as installing a culvert under a road. Vernal pool amphibians require wet ground and seem to avoid tunnels that are too long, narrow, dark or dry. What's more, they don't follow particular trails in their migrations, but are scattered across the landscape, with each amphibian making a beeline for its preferred breeding pool. So a tunnel that will successfully get amphibians across the road has to be wet, but not a stream, neither too dark nor narrow, and must have "diversion walls" that funnel the creatures to the culvert opening.

Successful amphibian culverts were installed in Amherst, Mass., several years ago by University of Massachusetts researchers. The culverts, designed by reptile and amphibian expert Scott Jackson of UMass, feature a slotted top built into the roadway the length of the culvert. Rain and runoff can directly enter the culvert, keeping it moist and allowing air flow and some visibility. Most vernal pool amphibians have successfully passed through these structures.

Amphibian culverts have been installed elsewhere in New England, but typically lack the open top that allows the required moisture to enter the culvert. A lack of follow-up monitoring makes it uncertain whether the tunnels are used by amphibians.

In Windham and Salem, N.H., a new highway was recently constructed through forestland containing many vernal pools. A variety of culvert designs were considered, but none met both the amphibians' needs and the Department of Transportation's design and maintenance requirements. In this instance, a dry culvert was installed on an experimental basis, and was found not to be used by amphibians – though it has been used by a wide variety of mammalian wildlife like raccoon and fox. New pools were constructed on one side of the



Amphibian crossing sign and successful amphibian culvert in Amherst, Mass.



This tunnel in Windham, N.H., was created specifically for wood frogs and spotted salamanders.

road, and special drainage measures were designed to protect the integrity of the existing vernal pools. Road runoff was directed away from vernal pools, and natural hillside runoff was directed under the new road to vernal pools to preserve their hydrology.

Elsewhere, scientists are conducting experiments to determine what factors affect amphibian movements through tunnels and culverts. In New York state, for example,

researchers set up experimental structures to determine how the size of the opening, substrate type, length, and light influenced several reptile and amphibian species' (but not vernal pool amphibians') preferences for the structures. They concluded that tunnels that were at least 1.6 feet in diameter with soil or gravel substrates and at least two foot high diversion walls would accommodate many reptile and amphibian species.

Roads Take a "Toll"

The heavy toll that roads take on reptile and amphibian populations is becoming more and more apparent. Fortunately, regulators, designers and researchers are paying attention and trying to find solutions that work. More crossing structures need to be installed, with follow-up monitoring, to determine what works for New England's vernal pool species.



PHOTO © MARK PICARD

Tips for Creating an Amphibian and Reptile Friendly Backyard (or School Yard)

Enjoy wildlife where you find it.

Keeping wildlife as pets prevents them from reproducing, which is important for survival of wildlife populations in your area. It is against the law to collect some species of amphibians and reptiles.

Don't turn it loose.

Don't release plants and animals from your home to the outdoors, including aquarium plants and animals. These living things can introduce diseases or become problems as they compete with and prey upon native wildlife and plants.

Plant native species.

Plants adapted to live in your local area need less maintenance than those originally from other areas. Native plants are often hardier and require less water, fertilizer and pesticide use.

Enhance habitat.

Includedifferent habitat types in your yard to give wildlife more spaces to use. Plant a variety of native shrubs and trees. Let leaves stay where they fall on part of your property. Logs, rocks and brush piles all can provide important shelter.



Minimize pesticide use.

Amphibians are particularly vulnerable to pesticides. Their skin allows not only water and oxygen to be absorbed directly into their body, but chemicals, too.



Adapted from the Partners in Amphibian and Reptile Conservation brochure, "Your Backyard Guide: Helping Amphibians and Reptiles"

ANNOUNCEMENTS

N.H. Environmental Educators Annual Conference, March 10, 2010

This year's N.H. Environmental Educators' annual conference, "Locally Grown Learning: Education Using Your Community Resources," will be held at the Squam Lakes Natural Science Center in Holderness from 12:00 noon to 8:00 p.m. Join us for a day of workshops to learn about taking advantage of local learning experiences and using community resources to help teach about the outdoors. Contact Alicia Carlson at alicia.carlson@des.nh.gov or Judy Tumosa at judy.l.tumosa@wildlife.nh.gov for details.

Spring WET Workshops

On Sunday, May 9, 2010, join us for a "WOW! The Wonders of Wetlands" workshop in Fremont for an introduction to wetland ecology. On Saturday, May 22, 2010, N.H. Project WET and Environmental Concern at the Manchester Water Works present a "POW! The Planning of Wetlands" workshop to learn about creating, restoring, or enhancing a wetland on school grounds. Contact Alicia Carlson at wet@des.nh.gov.

PLT Releases Environmental Experiences for Early Childhood

PLT's new Early Childhood guide integrates nature-based exploration, art, literature, math, music and movement, and outdoor play into early childhood education programs. The guide contains eleven activities that encourage young children to explore the senses, the seasons

and neighborhood trees. Activities highlight the importance of kinetic learning and engagement by incorporating music and movement. Contact info@nhplt.org for more details or to set up a workshop.

PLT's GreenSchools! Program – Schools Wanted

PLT's GreenSchools! program provides environmental investigation audits for educators, students, parents and interested community members to teach, learn and engage together in creating a more green and healthy learning environment. This FREE program combines environmental education, service learning and leadership opportunities for students to help turn their school into a model GreenSchool. To get started, register at www.pltgreenschools.org.

Discover Wild New Hampshire Day

April 17, 2010 • 10 am – 3 pm
N.H. Fish and Game Dept.
11 Hazen Drive, Concord

PLT's New Online Community for Educators

This new component of National PLT's website creates an online community for educators to learn from each other about how to integrate PLT and EE into their classrooms. This community will serve to engage our PLT educators after they attend a workshop, as well as a way to engage new educators in PLT. To join, go to www.plt.org.

Interactions in the Sciences: Observe, Investigate, Explain - Connecting life, physical and earth science.

Course dates are July 6 – 16, 2010, from 8:30 a.m. – 3:30 p.m. Callback dates: November 10, 2010; and March 16, 2011; (4:00 p.m. – 6:00 p.m.). Presenting partners: Amoskeag Fishways Learning and Visitors Center, Beaver Brook Association, Massachusetts Department of Conservation and Recreation and the Nashua River Watershed Association. Journey upstream to discover the diversity of life in the Merrimack River ecosystem. Receive the Project Learning Tree PreK-8 Activity Guide. These course-wide activities will help you meet physical, life and earth science frameworks in your classroom. Graduate Credit and PDPs awarded. For more information, go to www.mits.org or www.amoskeagfishways.org. Call 603-626-FISH or 617-328-1515.

Susan Cox, NHPLT's Outstanding Educator 2009

Susan Cox, Conservation Education Specialist, USDA Forest Service, is NHPLT's 2009 Outstanding Educator. Susan is a true collaborator and manages to work across boundaries with numerous organizations and interests to promote high-quality environmental education wherever she goes. Susan provides the much-needed content knowledge, skills and inspiration to help teachers understand how to bring "real science" into the classroom. Congratulations, Susan!

ON THE H.O.M.E. FRONT

Schoolyards in Winter

The cold months offer a surprisingly rich array of outdoor learning opportunities.

by Marilyn Wyzga

Outdoor classrooms don't have to shut down and move indoors when the north-east winter rages. Winter is an excellent time for all kinds of outdoor study, a time to make unique discoveries about your school grounds that aren't afforded by other months. To quote a Minnesota teacher, "I figure, you better find out things to do in the winter, because that's half your year."

Observe Wildlife Activity

This is the time to study animal activity, since snow makes tracks so visible. Do a focused census of all the plants and animals that occur on a few square feet of your site. You can rope off or flag an area specifically for track study, and keep human traffic out. Choose a spot such as a pond or a lone tree in a field, and observe and record its use by wildlife. Construct a food web based on your observations. Note which species are native and which were introduced from other parts of the world (exotic) – some of which may be designated as invasive.

Track meadow voles through the runways they build in tall grass beneath the snow. Study and compare the different behaviors of squirrels – red, gray and flying – as well as chipmunks. For more ideas and related classroom activities, check out the "Animal Tracks" activities from Ten-Minute Field Trips, reprinted in the *Homes for Wildlife* Appendices. You can also borrow one of the Track Kits or Fur Kits from the N.H. Fish and Game Department to supplement your study (contact 603-271-3211 or info@wildlife.nh.gov).



Teachers learn Project WILD 'Below Zero' activities to enrich their winter curriculum.

Another opportunity presented by this cold season is feeder study. Put different kinds of bird feed in similar feeders and determine food preferences of your resident bird species. With the leaves off the trees, you can more easily observe other places on the school grounds where birds are getting their food, perhaps from berries or seed heads. Compare your feeder findings to their natural diet. Observe the feeders over a period of time, noting what birds visit each one, some information about the weather and snow cover, which seeds are the preferred foods of which birds, when the birds feed most frequently and so on. Besides learning about avian food preferences, you can learn a lot about their behavior. Challenge your students to learn five new birds from studying them at the feeders. Then observe them in the field, noting habitat, flight patterns and other distinguishing characteristics.

Winter is the time to take advantage of bare branches – of both trees and shrubs – to learn identification of flora by buds, twigs and bark. Start an herbarium with twig samples. Develop your own comparison chart or dichotomous key, or learn to use one. (For more ideas, look into *Project Learning Tree* "Looking at Leaves," *Homes for Wildlife* p. 63 (learning to use keys), and *Wild Times* fall 2009 issue (www.wildnh.com).

Inventory for the Season

The site inventory cards in *Homes for Wildlife* are useful tools for the winter months, and encourage students to build

science process skills. Try measuring the temperature in different areas of the schoolyard – near the building, in shaded areas, etc. Measure the amount of sunlight that reaches different places around the school. Continue a study of "Colors and Hues" and "25-Words" through the winter. This season will reveal new color patterns and prompt different vocabulary responses than other times of year. After you've traced the color matching through the seasons, create a seasonal comparison chart, or a continuous prism using colors from all the charts. What do the colors and words tell you about the world outside your windows in January, February and March?

Using *The Curious Naturalist* for inspiration, develop a seasonal activity calendar. Chart the arrival and departure of birds, insects, reptiles and amphibians – any creature that migrates or hibernates. Investigate galls, the wintering home of insects. An excellent activity for gall explorations is in *Hands-On Nature* (also reprinted in the appendices of *Homes for Wildlife*).

One seventh grade teacher, Larry Webster, based his winter curriculum on phenology ("the study of natural phenomena that recur periodically, such as migration or blossoming, and their relation to climate and changes in season"). He noted that his students would "come to see that nature is not 'somewhere else,' but a dynamic presence in their daily lives." From December to March, they study large mammals by sign and track; winter birds at feeders; natural lights and the color of the sky, ice

HOME continued on page 8

and snow; animal coping mechanisms for truly cold weather; pond organisms under the ice; conifers that stay green all winter; planning for winter conditions to stay safe in cold weather; perennial weeds that persist throughout winter and their methods of seed dispersal; identifying deciduous trees by shape and twig; and sap flow. These students explore similar topics in other months of the year, forming a continuous, dynamic picture of the surrounding landscape.

Prune, Plan and Write a Grant!

For maintaining your schoolyard habitats, late winter is a good time to prune shrubs and trees, put up new nesting boxes and clean out existing bird nest boxes. And

when the wind chill dips the temperature too low to venture out, it's also a good time to do some indoor planning. Use the time to develop an enhancement plan, research wildlife needs, write a grant proposal, design a garden area, plot a schoolyard habitats budget, develop new activity ideas for using the school grounds, plan for Earth Day, maintain and add to your schoolyard habitat records book, or create a presentation about your project for community groups. You may also wish to encourage spring's arrival by raising plants from seed, under grow lights in the classroom or on a sunny windowsill, and then host a "welcome spring!" plant sale.

All these areas of study feed into an



COURTESY PHOTO

In late winter, Kelly School 4th graders grow shade plants from seeds for their habitat.

Winter Schoolyard Activity Resources:

- *A Guide to Bird Behavior*, Volumes 1 and 2, Donald and Lillian Stokes, Little Brown and Co., Boston
- *The Bird Feeder Book*, Donald and Lillian Stokes, Little Brown and Co., Boston
- *The Curious Naturalist*, John Mitchell, Prentice-Hall, Inc., NJ, 1980
- *Hands-On Nature: Information and Activities for Exploring the Environment with Children*, Jenepher Lingelbach, Lisa Purcell and Susan Sawyer, VT Institute of Natural Science, 2000
- *Homes for Wildlife, A Planning Guide for Habitat Enhancement on School Grounds*, Marilyn Wyzga, NH Fish and Game, 1994
- *Ten-Minute Field Trips*, by Helen Ross Russell, National Science Teachers Association, 1990

ongoing schoolyard survey. This census information adds value to your inventory, as it reveals what wildlife and plants you have, and how the two may be interacting in the depths of winter. It reveals how best to provide the essential habitat features for the wildlife in your schoolyard. So take advantage of the season and expand your outdoor classroom.



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