



# Habitats

University of New Hampshire Cooperative Extension • Forestry, Wildlife and Water Resources Programs Newsletter

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Summer 2002

## Water Conservation in a Wet State: Why Saving Water Makes Sense

by Frank Mitchell, Extension Specialist, Land & Water Conservation

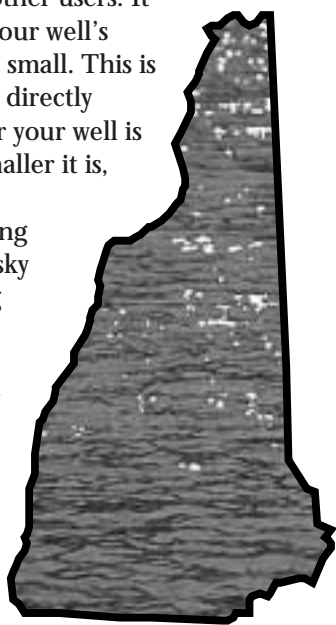
New Hampshire is known as a state with lots of water—streams, rivers, lakes, ponds, wetlands, estuaries and the ocean. Why, then, should we think about water conservation? The recent drought has shown that our water supplies, though usually adequate, can vary dramatically with changes in precipitation patterns. According to the New Hampshire Department of Environmental Services' Drought Management Team, rainfall from September through December of last year was only 50 to 70 percent of normal everywhere except for the north country, where the rainfall was near normal. This affected stream flows, which in the southern part of the state were as low as only one- to two-thirds of normal levels. Groundwater levels were below normal as well, with some wells at record low levels.

This situation got many people thinking more about how to conserve water, both to avoid running severe shortages later as well as to reap other benefits. Using less water than necessary saves more than just the water itself. Consider, for example:

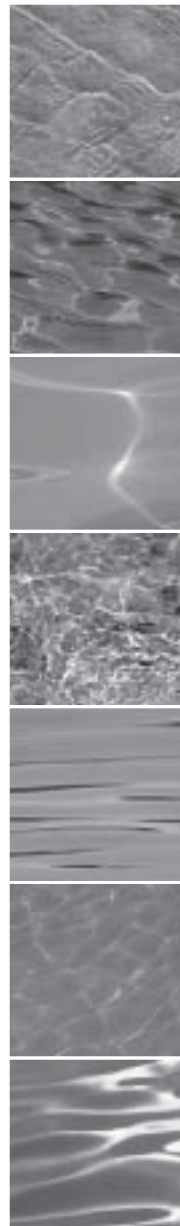
**Saving water saves energy.** Water is heavy—about 8 pounds per gallon, and it takes considerable energy to move it. If you have a private well, saving water reduces the amount of time your pump is running and cuts your electric bill. Even if you're on a public water supply, conserving water reduces electric use by the utility and reduces the costs of

production. These energy savings have indirect benefits as well. Less electric use means less air pollution from fossil fuel generating plants, less waste from nuclear plants and less need for hydro-electric facilities. Interestingly, all these generating sources can impact water resources, so saving electricity also means preventing water pollution.

**Water conservation maintains groundwater and stream flows at normal levels,** keeping supplies available for other users. It also keeps the size of your well's "zone of contribution" small. This is the area of land that is directly above the groundwater your well is drawing down. The smaller it is, the less you have to be concerned about pulling in pollutants from a risky land use nearby. Using less water also allows more treatment time for waste water in your septic system, or, in an urban setting, reduces wastewater treatment volumes and costs. If you water your lawn or garden, water



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## Water Conservation in a Wet State

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conservation can reduce the chance of leaching nitrates (from fertilizer) or chemicals into groundwater. Of course, during droughts, water conservation is insurance against your well going dry altogether!

"We are still suffering from hydrological drought, in that some of the deep aquifers have not fully recovered from the lack of rainfall over the past 12-18 months. However, most of the surface water supplies are good to go, and there is no longer any agricultural drought, which refers to soil moisture."

-Barry Keim, New Hampshire State Climatologist, UNH Climate Change Research Center, July 2, 2002

***Saving water can reduce pollution from runoff*** that can result from excess water used to irrigate gardens and landscapes. Applying water beyond what plant roots can take up can cause fertilizer components such as nitrate to wash into ground or surface waters, creating health and environmental risks.

***Using less water can prevent septic system failure.*** Hydraulic overload is a common cause of the failure of septic system absorption fields (leach fields). Reducing water use and making sure toilets, sinks and appliances aren't leaking are preventive measures. Water conserving fixtures and appliances also help

to maintain septic systems on working order.

In areas near the coast, ***water conservation reduces the risk of salt water intrusion into groundwater wells.***

In places where salt and fresh water meet, the salt water commonly penetrates inland some distance beneath the land surface. Salt water intrusion occurs when excessive removal of freshwater causes the saltwater to rise, displacing the freshwater that was there, entering a well and rendering it useless.

There are many opportunities to conserve water around the home, and most are easy to accomplish. They tend to be of two types: *changes in equipment and appliances and changes in our behavior.* Here are some examples:

### In the home:

- Low flow faucets and shower heads reduce water use directly.

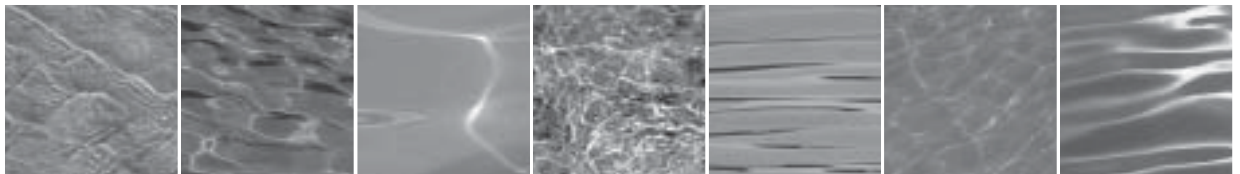
- Low flow toilet(s) can make a big difference. Almost half the water used in a typical home ends up down the toilet! You can also reduce the volume of an existing tank by placing plastic bottles filled with water in it.
- Insulating hot water pipes saves water and energy (less is needed if it doesn't lose heat on its way to the tap).
- Water-saving appliances are readily available and do the job with less water.
- Leaky faucets and appliances can lose significant amounts of water over time and are usually easy to repair.

### In the garden:

- Drought-tolerant species for landscaping save water and time, Contact your local UNH Cooperative Extension office for recommended plants.
- Watering in calm, cool weather when possible, and before mid-day when evaporation loss is greatest will provide more water to plants and less to evaporation.
- Watering is best done thoroughly but infrequently.
- Drip irrigation tubing is very efficient and recommended in areas that are watered regularly.
- Mulches of all types are a classic way to conserve water in addition to their other benefits.
- Roof runoff can be directed to garden areas or collected in barrels or other containers for later irrigation use.
- Weeds kept in check will reduce water loss - they use water, too.

Water conservation is a winner. When you save water, you save money, keep groundwater and surface water supplies in balance, prevent air and water pollution, reduce your risk of contamination and cut costs. Take a fresh look at your home water supply. How many ways to save water can you identify?

*Previously submitted for the Granite State Consumer, March 8, 2002*





## The Lake Chocorua Project: Working Together to Clean the Water

by Jeffrey A. Schloss, UNH Cooperative Extension Water Resources Specialist

The still pristine quality of Chocorua Lake and its view of Mount Chocorua are widely known as an icon of New Hampshire. The area attracts many tourists, especially in the fall season when the lake reflects the chiseled mount surrounded by the multicolored leaves of autumn. Compared with most NH lakes, there are relatively few houses in the watershed. Those that are near the lake have conservation easements and covenants, which require extensive set-backs for housing and septic systems and limit shoreland clearing. The lake provides local residents and visitors an area for swimming, fishing and low impact boating.

### The Lake Chocorua Watershed

The watershed for Chocorua Lake is 13.2 square miles and is well protected except in a few vulnerable areas. The south side of Mount Chocorua is managed by the US Forest Service as a scenic view area. As a result, well over half of the watershed is uncut forest, the highest quality watershed. About 95% of this land is protected by conservation easements which have preserved wood buffers all around the lake, except for Route 16 itself.

North of the lake are conservation lands owned by The Nature Conservancy and the Chocorua Lake Conservation Foundation (CLCF). Several large wetland complexes protect the lake by providing natural filtration and assimilation. Although the lake is protective forest cover in most of its watershed, there are areas in the upper watershed prime for development. Chocorua Lake is very shallow, with an average depth of 12 feet. As a result, sunlight reaches through most of the water column. Thus, even low concentrations of nutrients are readily available to algae and other plant life that occur throughout the lake.

Visual surveys of the entire shoreline disclosed that Route 16 is one of the main sources of erosion into the lake. Problems include runoff, erosion and sediment that lead to increased levels of nutrients entering the lake. Although Route 16 is not the only cause of declining water quality in Chocorua Lake, the harm was rapidly increasing as many of the public's uses of the lake like swimming, canoeing and fishing are affected. Sediment "islands" were developing from which dense beds of aquatic plants appeared. These beds

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UNIVERSITY of NEW HAMPSHIRE  
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### Forestry and Wildlife Program

The UNH Cooperative Extension Forestry and Wildlife Program has cared for New Hampshire's forests since 1925. Our mission is to educate New Hampshire's citizens about rural and urban environments enhancing their ability to make informed natural resources decisions.

### Water Resources Program

E-mail: [water.resources@unh.edu](mailto:water.resources@unh.edu)

UNH Cooperative Extension's Water Resources Program promotes the protection, conservation and wise use of New Hampshire's natural resources through education and outreach.

### Community Conservation Assistance Program (CCAP)

CCAP provides communities and conservation groups with assistance for locally initiated conservation projects, with a focus on dovetailing natural resources inventory work with land conservation planning.

The above programs can be contacted at:

UNH Cooperative Extension  
214 Nesmith Hall, 131 Main Street  
Durham, NH 03824  
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Editor: Darrel Covell

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## The Lake Chocorua Project

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impaired the swimming areas. The surveys also noted that the majority of tributary and runoff sites were buffered by extensive wetland systems located adjacent to much of the lake shoreline. However, there were no wetland areas to intercept the Route 16 runoff.

### Citizens Detect Problem with Lake Water Quality

As part of the University of New Hampshire Cooperative Extension's (UNHCE) Lakes Lay Monitoring Program (LLMP), citizen volunteers have monitored the water quality of Chocorua Lake for twenty years. Sampling has shown a continued decrease in lake water quality in terms of algae levels, aquatic weed growth and reduced water transparency. In addition, sampling near the lakeshore indicated the highest concentrations of total phosphorous were occurring along the lake's eastern shore that borders the highway. But to be complete and to provide additional watershed information to allow the CLCF to develop a land protection strategy, a water and nutrient budget diagnostic study was initiated.

"It is this type of model project that we at the EPA want to support and continue to see occur."

-Warren Howard,  
EPA New England (Region 1)

The collection of data required for the lake diagnostic was already on-going through the Lake Chocorua Association (LCA) volunteers and LLMP staff, supported by local funding provided by the LCA and CLCF. This was initiated before the watershed was designated through the state's critical watershed process. Costs were kept to a minimum by using volunteers to collect the majority of the weekly and storm event water samples and to monitor the staff gauges for water flow. The gauge-level-to-discharge relationships were calculated from flow measurements conducted on-site by university staff and students on a less regular basis. The UNH Center for Freshwater Biology (CFB) and UNHCE with assistance from the USDA Natural Resources Conservation Service (NRCS) did the analysis of these data at no charge as part of in-kind services that fell within these organizations' missions and plans of work.

### Water Quality Analysis Implicates Highway

The results of the lake watershed diagnostic study confirmed that the Route 16 runoff contributed the greatest amount of nutrients into the lake. However, it disclosed that the northern watershed area contributed the majority of the nutrients, and it documented the importance of the wetlands in those subwatersheds acting to both reduce the nutrient loading as well as shunting the nutrients

until the end of the growing season. All of the pollutants were not necessarily from the highway, as there was evidence of sediment deposition occurring from up-watershed, but the culverts were acting to channel everything directly into the lake. This information provided the NH Department of Transportation (DOT) with the justification they needed to assist in the mitigation of the highway sites. It also directed the CLCF to concentrate their land protection efforts on the northern watershed lands, especially the large wetland complexes.

### Partnership Approach Key to Solution

The NH Conservation Partnership is an approach that addresses issues from the statewide critical watershed assessments. In the case of the Chocorua Lake Watershed Project, the collaborators included the North Country Resource Conservation and Development Agency (NC RCD), Carroll County Conservation District (CCD), Lakes Region Planning Commission, New Hampshire Department of Environmental Services (DES), NH Department of Transportation, USDA Natural Resources Conservation Service, University of New Hampshire Cooperative Extension and UNH Center for Freshwater Biology. This multi-disciplinary group was formed to respond to the concerns and needs expressed by the Town of Tamworth, the Lake Chocorua Association, and the Chocorua Lake Conservation Foundation.

The NC RCD acted to coordinate and facilitate the working group. The use of Americorp personnel allowed for cost-effective support for these processes and succeeded in keeping the project on-track. Initial meetings were undertaken to better define and prioritize concerns, collect existing data, determine additional data needs and assign tasks to cooperators. As these tasks were completed, the group reviewed progress and discussed mitigation approaches. After reviewing available funds and in-kind services, a mitigation plan was decided upon from which design, permitting and construction tasks were assigned. To date, the majority of the work has been completed.

### Improvements to Chocorua Lake

To address the issues on a cost-effective basis, stakeholders pooled their resources for the improvement of Chocorua Lake water quality. Particularly helpful was the in-kind design services provided by the NRCS, CCD and DOT and assistance with permitting applications by the NRCS, CCD and DES. The DOT and the town provided in-kind construction costs, and the CLCF provided additional financial assistance to allow for the construction to start before all funds were received. The federal funding that was matched with the in-kind

and local monies was facilitated through DES.

The best management practices (BMPs) installed to solve the runoff, erosion and sediment problems are:

- Stone-lined waterways *to stabilize channels and gullies*
- Diversion ditches *to divert runoff away from the beach area and lake*
- New culverts and culvert extensions *to outlet runoff safely to stable areas*
- Plunge pools/sediment basins *to settle soil particles containing nitrogen and phosphorous in runoff*

The CLCF has also provided support for pre- and post-BMP installation monitoring to document the success of the installations. This effort is currently ongoing. It includes more detailed monitoring of flow, total phosphorous, total nitrogen, nitrate nitrogen and turbidity. It has been designed not only to evaluate the reduction in loadings coming into the lake but also to monitor the effectiveness of the BMPs themselves in pollutant removal efficiencies. This information should prove transferable to other similar situations throughout the state. In addition, the DES has secured additional federal funding to continue watershed improvement efforts. Plans are currently underway for the DES and UNHCE to work with the town of Tamworth and other watershed towns to support informal public educational programs aimed at non-point source pollution reduction.

#### Expected Project Benefits

The BMP installation's improved water quality should result in:

- Significant reduction in the amount of pollutants discharged into Lake Chocorua.

- Stabilization and protection of a highly popular tourist destination.
- Maintained opportunities for recreational activities at Chocorua Lake.
- Increased enjoyment of Lake Chocorua by area residents and visitors.

The project also stands as a successful model of how to rapidly address critical watershed problems using a cost-effective collaborative approach between agencies, service providers and local stakeholders.

#### Results to Date

First- and second-year post-BMP monitoring has confirmed the efficacy of the BMPs installed. We have seen an 82%-93% decrease in phosphorus loadings and similar results in runoff concentrations after storm events.

#### Keys to Success

The major driving force for the project was the local grassroots organizations with their well documented concerns and tireless efforts. Facilitation of the multi-agency task force was assigned to a single entity, the North Country Recreation Conservation and Development Agency, which was able to keep all stakeholders "in the know." Utilizing the expertise of all partners on a well-defined and iterative schedule of tasks to be completed and reviewed kept the project moving along. The ability to utilize volunteers, Americorps personnel and student labor, as well as justifying additional agency efforts under existing plans of work, kept the effort cost-effective. By pooling local resources and the in-kind services, matching requirements for federal assistance was met.

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## Geospatial Technologies Applications Training and Resources Center

*by Nancy Lambert, Extension Specialist, Natural Resources*

New Hampshire organizations, communities and citizens need access to geospatial technologies to expand their capacity to address issues and concerns facing the state. UNH Cooperative Extension and Complex Systems Research Center are developing a geospatial technology applications training and resource center to address this need. This center will expand Extension's current geospatial technology education programs. The NH Charitable Foundation and the NH Space Grant Consortium have awarded funding to support the strategic planning process and to hire an additional full time Extension Specialist to develop and implement training programs.

Geospatial technologies include Geographic Information Systems (GIS), Global Positioning Systems (GPS) and remote sensing. These technologies provide valuable information and analytical tools, increasingly critical for decision making, planning and management. A GIS is a computer-based tool for mapping, managing, analyzing and displaying data that has a spatial or geographic dimension. It serves as the foundation of geospatial technologies, allowing you to integrate and map information from various

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# Water Conservation Notes

## Local Water Protection Grants

Since 1997, DES has made small grants to water suppliers, municipalities, and other local organizations for the purpose of protecting drinking water sources and other important water resources. In 1998, the source water protection grant program joined with the grant program of DES's Nonpoint Source Program to offer local water protection grants.

Grant money can be used for all phases of watershed management and drinking water protection including organization building, watershed planning, delineation, assessment, and implementation. Local watershed management can protect rivers and streams, lakes and ponds, wetlands, groundwater, drinking water supplies, or any combination of these.

Past projects in the drinking water protection category have included delineation of wellhead protection areas and critical watershed segments, inventorying potential contamination sources, formation of watershed protection alliances, development of local ordinances, performing land surveys as a precursor to land acquisitions, water quality monitoring, shoreline surveys, and controlling access to sources.

2002 Source Water Protection Grant applications will be due November 30, 2002. If you would like to be put on the mailing list to receive an application contact Johnna McKenna at (603) 271-7017 or [jmckenna@des.state.nh.us](mailto:jmckenna@des.state.nh.us) or visit <http://www.des.state.nh.us/dwspp/grants.htm>

## Source Water Grants Gaining Popularity

Applications for the 2002 Source Water Protection Grant program doubled to over 30, and 18 projects, totaling \$254,061, were approved. Unlike in the past where all eligible projects were funded, projects had to be ranked according to specific criteria this year. The ranking criteria will be available in the 2003 application so that applicants know what elements obtain the highest ranking.

Eight of the 18 approved projects address source security, vulnerability assessment, and emergency response planning. Of those eight, five grants totaling \$53,945 will pay for security measures at wellheads and pump houses. Two additional systems will receive funds to conduct vulnerability assessments and develop emergency response plans. Finally, Pennichuck Water Works will stencil and map storm drains in its watershed. Maps will be distributed to emergency response teams to help them prevent contamination during emergencies.

Non-security projects for this year include protecting a surface water supply source by investigating various protection opportunities, performing a watershed analysis and developing a model protection ordinance. The Lakes Region Planning Commission will address the need for collaborative drinking water resource planning and protection for Belmont, Tilton and Northfield. Manchester Water Works and LifeWise Community Projects will receive funds to promote source water protection education to schoolchildren.

The next round of grants will be this fall with applications sent in September and due in mid-November. Questions regarding the program or requests to be added to the mailing list should be directed to Johnna McKenna at 271-7017 or [jmckenna@des.state.nh.us](mailto:jmckenna@des.state.nh.us). Last year's application can be found on the web at [www.des.state.nh.us/dwspp](http://www.des.state.nh.us/dwspp) along with a list of previously funded grants.

## DES Teams Up With USGS on Groundwater Availability Project

NH Department of Environmental Services (DES) and the United States Geological Survey (USGS) are conducting a statewide Groundwater Availability Assessment Project. The project is designed to answer questions about how much water is available in a subbasin based upon both the physical properties of the environment of a hydrologic system (subbasin and aquifer) and the current water usage patterns. Through the project, the two partners will develop a tool to estimate groundwater contributions to base flow and seasonal flow durations and frequencies in streams throughout New Hampshire.

DES and USGS will jointly develop hydrologic data sets, hydrologic statistical relationships, geographical information system (GIS) land feature data coverages, and water use data sets for the entire state of New Hampshire. This information can then be used by agencies, municipalities, planners, and interest groups in a GIS-based relational database to construct water availability and use analysis reports for any basin within the state.

Work on the Groundwater Availability Assessment Project is ongoing, and is scheduled to be completed by December 2002. A comprehensive scope of work for this project may be obtained by contacting Brandon Kernan at 271-0660 or [bkernan@des.state.nh.us](mailto:bkernan@des.state.nh.us)

## Water and Wildlife

*by Darrel Covell, UNH Cooperative Extension Wildlife Specialist*

Water is an essential item for all animals. It is one of the four components of wildlife habitat: food, water, space and shelter. When water ceases to exist in an animal's habitat for a long period of time (e.g., a drought occurs), one of three things happens - movement out of the habitat in search of water, extreme lack of movement to conserve water, or death.

Many highly mobile animals, such as deer, fox, geese and other birds and mammals, are able to travel to nearby sources of water to sustain themselves. Others, such as spotted salamanders, gray treefrogs, Blanding's turtles and other reptiles and amphibians, may burrow under a moist log or seek refuge in the edges of a large wetland. While lack of water in New Hampshire is not usually a problem, the combination of lower water levels and drier conditions can occasionally make life difficult for some animals.

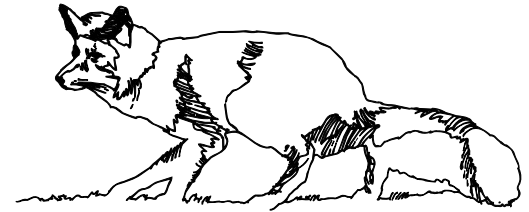
Vernal pools, temporary water bodies that dry out periodically, are one of the first places we see impacts from drought conditions. While amphibians are well adapted to the ephemeral nature of vernal pools, severe drought conditions can cause these pools to dry up prematurely - that is before frog and salamander eggs and tadpoles have developed into their

terrestrial forms. Additionally, dry conditions make for poor insect abundance - a major food for frogs and salamanders.

When drought conditions occur in spring and summer, amphibian reproduction can be drastically reduced.

On the other hand, many frogs and salamanders, which we tend to associate with wet areas, actually spend a great deal of time in the uplands away from water. For example, our state salamander, the red-spotted or eastern newt, has a "red eft" stage, which is terrestrial (land-based) for many years. While moist woodlands may be a preferred habitat of the red eft, individuals can be found in rather dry upland sites. Absent good water conditions for extended periods, red efts can still survive in and under moist logs and in mossy, shaded areas that retain moisture better.

While long periods of hot, dry conditions can cause problems for some wildlife, New Hampshire's wild animals are well adapted to the idiosyncracies of New England weather. Individual animals may suffer, but populations of wildlife species have experienced extreme climate variations before—and they're still here!



# Trees and Drought

by Karen P. Bennett, *Extension Specialist, Forest Resources*

## Introduction

Water is the single most important substance for tree life- as much as ninety percent of the variation in tree growth is because of water supply. However, drought effects more than tree growth, it's "felt" throughout a tree. Lack of water leads to decreased rates of diameter and height growth; poor resistance to other stresses; disruption of food production and distribution; and changes the timing and rate of physiological processes, like flower and fruit production.

In relation to trees, "drought" is a prolonged period with low precipitation, during which the soil water is reduced to such an extent that transpiration (the process by which tree leaves emit moisture and oxygen) exceeds the water supply available to the leaf. Trees suffer.

Water movement in trees is primarily physical- pressure gradients are created by the temperature and air movement on the leaf surface, pulling water from the soil. Trees act as conduits through which water passes- instead of water evaporating at the soil surface, it evaporates from the leaf. There are a few points of biological control that override this physical water movement. The soil/root interactions, vascular system, and leaves all provide resistance to water movement. The stomate, a small opening in the leaf lower surface, is a biological control valve actively controlled by the tree to conserve water.

## How Trees Cope With Drought— What You Don't See

Before you see the effects of lack of water, trees cope with drought generally by following these priorities:

1. sensing root zone stresses
2. osmotically adjusting to stress
3. changing stomatal conductance (opening and closing)
4. increased absorbing root production
5. using stored food
6. root suberization (development of waterproof layer around damaged areas)
7. initiating foliage, branch and/or root abscission (dropping off)

## Drought Effects on Trees—What You Do See

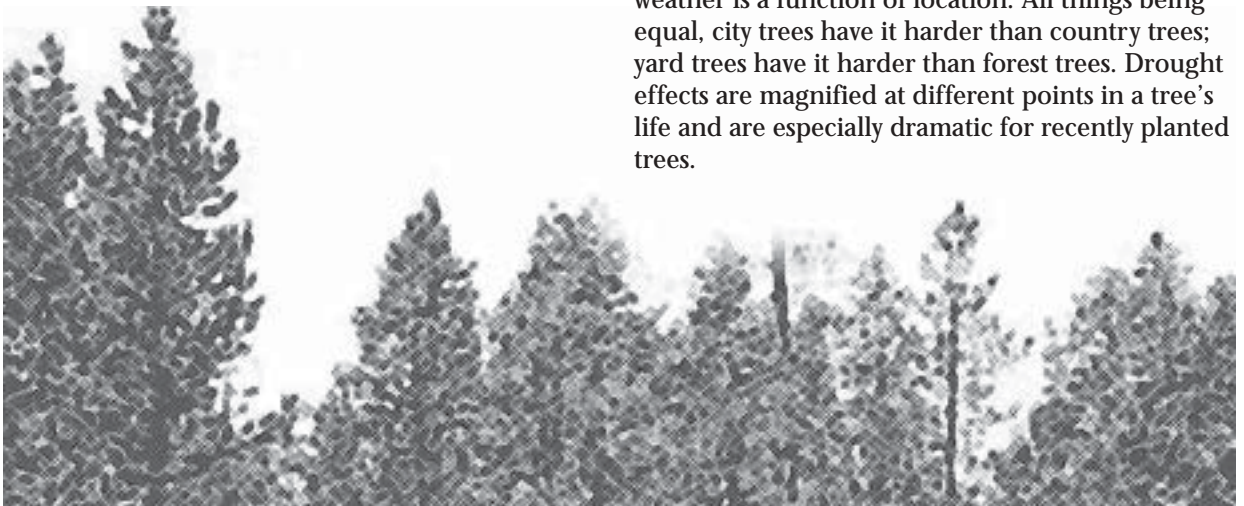
Drought has short and long term effects. Though often easier to spot, the short term effects may not be the real point of concern. Immediate visible effects include leaf wilting, scorch, and some defoliation.

Hardwood trees display different symptoms than do softwoods. Softwood needles usually don't wilt, rather the older needles turn yellow or brown and drop. Hardwood leaves wilt. In addition to wilting, leaves may curl or warp, turn brown along the edges (scorch), turn yellow or brown, and even fall off.

Long term symptoms include branch dieback and death of the plant as the plants ability to absorb water is damaged. Secondary effects include increased susceptibility to insect and disease infestations. Disease incidence likely won't increase from just one year of drought, but after repeated years, root rots, cankers, wood rots, and wilt all are likely to occur. Wood boring insects and bark beetles increase.

## Caring for Trees on the Landscape

Though trees share similar broad biological characteristics, how vulnerable they are to harsh weather is a function of location. All things being equal, city trees have it harder than country trees; yard trees have it harder than forest trees. Drought effects are magnified at different points in a tree's life and are especially dramatic for recently planted trees.



The best way to care for trees experiencing drought is to water them. This creates a dilemma since water conservation is the rule during droughts. Limit tree watering to newly planted trees, within the last three years, or those that have recently experienced significant root damage. If they don't receive an inch of rain a week, provide one slow, good soaking each week.

Other recommendations for trees stressed by drought:

- Mulch with 3" to 4" of organic material to conserve moisture.
- Avoid herbicides around your trees, including "weed and feed" products.
- Don't fertilize since it stimulates growth and trees have a hard time maintaining usual growth during droughts.
- Don't wound your trees by pruning, bumping with lawnmowers or weed whackers. Good advice any time!
- Defer live branch pruning until moisture levels return to normal. (Damage to living bark of a water-stressed tree could be an infection point or attract insects.)

### Selecting Trees for the Landscape

There isn't an ideal drought resistant tree for every landscape. A few factors to consider when selecting trees that use water efficiently:

- Native trees are better adapted to local soil, moisture, climate, and pests than non-native.

- Trees with small leaves (linden, elm, ash) are more easily cooled and have better water use efficiency than trees with larger trees (sycamore, basswood).
- Upland species are usually more resistant than bottomland.
- Early successional species, those that colonize old fields and disturbed sites (pines, birches) use water more effectively than late successional species (sugar maple and beech).
- Trees with upright crowns are more effective in water use than those with flat, wide-spreading crowns.
- Trees with multi-layered crowns have many living branches and leaf layers (oak, ash, hickory) and are more efficient than those with leaf canopies that concentrate leaves in single layers along the outer edge of the crown (beech).
- Drought tolerant plants usually have thick leaf waxes and bark, efficient stomatal control and extensive root systems

*The Minnesota Department of Natural Resources, UMass Extension, University of Tennessee, and Texas A&M all provided background information for this article. For more information, call the Forestry Information Center (1-800-444-8978) and ask for the "drought package". This package contains all sources for this article and goes into greater depth about the biology of trees and drought.*

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## Geospatial Technologies

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sources. GPS is a source of GIS data and can be used to determine the locations of roads, trails, historic structures, or any other features found on the landscape. Remote sensing is the process of measuring and observing phenomena on the earth using remote instruments such as airborne cameras and satellite-based sensors. Results of this processing give us a "bird's eye" view of the earth, which can be integrated into a GIS, and is very useful for land cover and land use assessments.

There are many beneficial applications of these technologies. In New Hampshire, GIS has been used extensively to generate natural resources inventories for municipalities and private organizations. Remote sensing data were used to identify wetlands and ice storm damage and is currently being used by the Complex Systems Research Center to classify land cover statewide. GPS receivers have been used statewide to map historical, recreational and natural resources such as graveyards, emergency management facilities, trails and wells. High school students used remote sensing and GIS to map forest damage and to create maps of their communities. Municipalities use GIS to streamline a variety of tasks including identifying abutters, tracking assessments and mapping zoning districts. In addition to these natural resources and municipal applications, geospatial technologies can be used in the fields of safety and justice, health and education and K-12 education. The proposed center will expand training opportunities to include these areas of interest. For more information, contact Nancy Lambert, 862-4343, nancy.lambert@unh.edu.

# Wildlife in the White Mountain National Forest: Habitat Management in Perspective

by Darrel Covell, Extension Specialist, Wildlife

People have very different ideas when it comes to appropriate uses of the White Mountain National Forest (WMNF). This is one reason that the WMNF has traditionally had a theme of multiple use over its 100-year history, attempting to meet the demands of our diverse society. This is also a reason why active management on the WMNF has become geographically more restricted over time, as the call for pristine places in an otherwise human-dominated landscape has resulted in the designation of “wilderness areas” and other such “protected areas.”

Management Status for Lands in the White Mountain National Forest<sup>1</sup>

Management Status	Acres	% WMNF
Timber/Habitat Management Allowed	345,000	46%
Protected Areas <sup>a</sup>	406,000	54%

<sup>a</sup> Includes wilderness areas, research natural areas, alpine areas, etc.

As protected areas have expanded, the acreage of forest that is left alone to grow older in the WMNF has grown. While this has benefitted wildlife dependent on more mature forest, including some that are of management concern, others have suffered. Due to a lack of natural and human disturbances, the amount of younger forests and disturbance-dependent forest communities like aspen and paper birch have declined.

Throughout New Hampshire, the amount of the aspen-birch forest type declined by 46% between 1983 and 1997 (according to the 2 most recent forest inventories conducted jointly by the USDA Forest Service and NH Division of Forests and Lands).

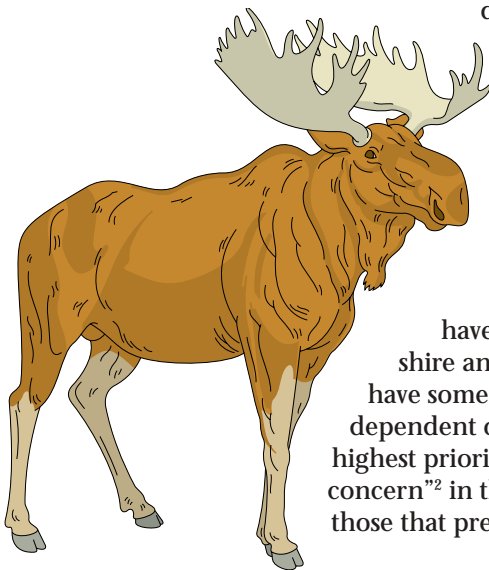
As aspen-birch forests have declined in New Hampshire and on the WMNF, so too have some of the wildlife species dependent on them. Some of the highest priority “birds of management concern”<sup>2</sup> in the northeastern U.S. are those that prefer the aspen-birch forest

type, including chestnut-sided warbler, golden-winged warbler, Nashville warbler, ruffed grouse and American woodcock). In fact, among forest birds, those dependent on regenerating or scrub habitats have the highest percent (48%) of species with significant population declines in the north-east since 1966.<sup>3</sup>

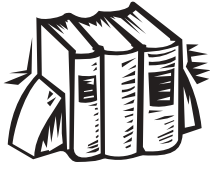
These Types of Forests...	Support These Wildlife Species...
Young Forests and Young Forest Types (For example, seedling-sapling stage forests and aspen-birch forests)	chestnut-sided warbler, Nashville warbler, golden-winged warbler, Philadelphia vireo, yellow-bellied sapsucker, American woodcock, ruffed grouse, snowshoe hare, lynx
Older/Mature Forests	hooded merganser, red-breasted nuthatch, blue-headed vireo, black-throated blue warbler, black-backed woodpecker, pileated woodpecker, wood thrush, scarlet tanager

Some active management is needed to maintain the full spectrum of wildlife diversity on the WMNF. Under the current Forest Plan, this can only occur on the 46% where habitat management is allowed. Since more than 50% of the WMNF is “protected” and going toward an older-aged forest, the opportunity to create and retain younger forests, including the aspen-birch community, is limited to the remaining 345,000 acres. If the wildlife that depend on aspen-birch and young forest habitat are to do well on the WMNF, then early successional forest management techniques, which regenerate young forests, must be employed. Unfortunately for the disturbance-dependent wildlife, techniques such as patch and clearcutting, are being used much less frequently on the WMNF (see graph on page 12).

As the Forest Plan for the White Mountain National Forest is revised in the coming months, it will be important for the public and the revisers to consider active management in the context of the



*continued on page 12*



# From the Resources Library

by Karen Bennett, Extension Specialist, Forest Resources

## UNH Cooperative Extension Forestry Information Center

The following publications are available from the Forestry Information Center. Unless noted, all publications are free. For charge publications, make check payable to UNH Cooperative Extension and remit to Forestry Information Center, Room 211 Nesmith Hall, 131 Main St, Durham, NH 03825. To request copies, call 1-800-444-8978 or email [kathy.barrett@unh.edu](mailto:kathy.barrett@unh.edu).

*The State of New Hampshire Forests*, a tri-fold, colored brochure, is the executive summary of the interim report of the 1996 New Hampshire Forest Resources Plan. Both the summary and full report can be requested.

*Summary: Existing and Potential Markets for Low Grade Wood in New Hampshire* summarizes three reports on markets for low grade wood. Full copies are available from the NH Division of Forests and Lands, PO Box 1856, Concord NH, or by contacting us.

*2001 Workshop Proceedings: Forest Measurements for Natural Resource Professionals* includes 18 papers by leading researchers and practitioners in sampling and measurement of down coarse woody material; forest inventory; and cruising hardware and software for foresters.

*Conservation Options: A Landowner's Guide* by the Land Trust Alliance covers protecting your land while retaining title (conservation easements, leases, management agreements, mutual cov-

enants); and protecting your land while transferring title (donating land, selling land). **\$5.00.**

*Conservation Options for Private Landowners* brochure by the Land Trust Alliance gives an overview of the most common land protection techniques.

*The Drought Package* includes information about helping trees cope with stress as well as the biology of trees and drought.

## Other Library Resources

*Conserving Family Farms* by Annette Lorraine, Upper Valley Land Trust, is another great addition to your library. Published by the NH Coalition for Sustaining Agriculture and UNH Cooperative Extension, it addresses the needs and concerns of farmers interested in permanently protecting the family farm. This 40-page manual leads the reader through business and personal issues, explains what is involved in making provisions for agricultural uses within easements, and recommends how to put friendly easements together. It is now available at the UNH Cooperative Extension web site at [ftp://ceftp.unh.edu/Consff.pdf](http://ceftp.unh.edu/Consff.pdf).

The *Silvics Manual of North America, volumes 1 (conifers) and 2 (hardwoods)* are available on the web at [http://na.fs.fed.us/spfo/pubs/silvics\\_manual/table\\_of\\_contents.htm](http://na.fs.fed.us/spfo/pubs/silvics_manual/table_of_contents.htm). This edition of the "silvics manual" differs from the original in length, format, and the number of species, including those without commercial timber value. A call to the superintendent of documents revealed that both volumes are out of print and are available only on line at this time.

## Upcoming Events

Check the event calendar on the UNH Cooperative Extension Forestry and Wildlife Program web site at <http://ceinfo.unh.edu/forest.htm>

Sept. 28, Saturday, 10 a.m. - 2 p.m.

**Merrimack County Tree Farm Field Day.** Shaker Village, Canterbury. FREE. Fun and informative demonstrations and tours. Sponsored by Society for the Protection of NH Forests, UNH Cooperative Extension, Tree Farm Program, Canterbury Shaker Village, Project Learning Tree, & NH Timberland Owners Association. Contact Tim Fleury at 603-796-2151 or 225-5505 or email at [tim.fleury@unh.edu](mailto:tim.fleury@unh.edu).

Oct. 15 or 16, Tuesday or Wednesday, 9:30 a.m. - 4:30 p.m.

**Mapping Wildlife Habitat Using NH GIS Data.** Grafton County Extension Office, North Haverhill. FEE: \$95. Hands-on workshop demonstrates how GIS can be used to identify wildlife habitat in NH communities. Participants use ArcView GIS software and NH GIS data to map significant wildlife habitat. Contact Sharon Hughes at 603-862-1029 or email [sharon.hughes@unh.edu](mailto:sharon.hughes@unh.edu).

# Habitats

UNH Cooperative Extension  
214 Nesmith Hall  
131 Main Street  
Durham, New Hampshire 03824-3597

525081

## Wildlife in the White Mountain National Forest

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current state of the Forest, habitat and wildlife trends, and the overall management status of the entire WMNF. Wildlife diversity will be maintained (and perhaps improved) in the next 15 years if management practices are included which best suit the wildlife species of highest management concern. For example, the federally threatened lynx depends on successional habitats (especially young stands of softwoods) with high densities of snowshoe hare - their main prey item. Lynx also tend to den in more mature forests with downed logs or rocky areas. For this species, a balance of both active management and more mature forests on the WMNF may bring back this cat of the north woods. Time will tell.

### Footnotes

- 1 From 1986 White Mountain National Forest Plan (most recent plan).
- 2 As defined by Partners in Flight, see <[www.partnersinflight.org](http://www.partnersinflight.org)>.
- 3 Analysis of U.S. Fish and Wildlife Service Region 5 (northeastern U.S.) from Sauer, J. R., J. E. Hines, and J. Fallon. 2001. The North American Breeding Bird Survey, Results and Analysis 1966 -2000. Version 2001.2, USGS Patuxent Wildlife Research Center, Laurel, MD. (See <[www.mbr-pwrc.usgs.gov/bbs/bbs.html](http://www.mbr-pwrc.usgs.gov/bbs/bbs.html)>).

Acres of Early Successional (Young) Forest Management  
White Mountain National Forest, 1991-2000

