

The History of Connecticut's Forestlands³

FORESTS PROVIDE WOOD AND OTHER FOREST PRODUCTS, WATERSHED PROTECTION, WILDLIFE HABITAT, DIVERSITY, A SETTING FOR RECREATION, AND MUCH MORE. They play a major role in both the history and culture of Connecticut. The state is one of the most densely populated in the nation, yet its forests remain as much a part of the landscape as its cities and towns. As the function of the forests become more understood, their importance to the well being of Connecticut's inhabitants will increase.

Early settlers found nearly all of Connecticut covered by forests – in open, park-like conditions. For more than a thousand years before European settlement, the Native Americans of the region burned the forest in spring and fall to eliminate tangled underbrush. The forests that resulted provided a more suitable habitat for the game species on which they subsisted. Native populations were small, and had little impact on the forest ecosystems in which they lived. Once Europeans arrived, however, the landscape changed dramatically.

Clearing land for agriculture began slowly, as colonists built small subsistence farms. But, by the early 1800's, the establishment of farms spread rapidly as Connecticut's farmers began to supply food and wool to a rapidly growing nation. Extensive forestlands were cleared, towns were built, and wood was harvested for homes and barns, furniture and fuel. Thousands of small farms formed the basis for a strong, agriculturally based economy.

By 1820, only 25 percent of Connecticut remained forested. Substantial environmental changes to the forest followed, as black bear, elk, mountain lion, white-tailed deer, quail, grouse, and timber wolves disappeared from much of state. Both the loss of habitat and extensive harvesting of certain wildlife species – such as beaver and wild turkey – contributed to alter Connecticut's previously extensive woodlands.

Once thought to be unlimited, forests disappeared, and the state faced declining wildlife populations and timber shortages. Soil erosion from farms increased, and silt muddied the water in creeks that once ran clear. Because of the rapid



³The majority of this section was taken verbatim, with permission from Donald Smith, State Forester for CT DEP, from the publication "The Forests of Connecticut." Other contributions were taken verbatim from "Connecticut's Changing Forests" by Jeffrey S. Ward and J.P. Barsky, "Connecticut's Forests", by J.P. Barsky, and individual work done by David Irvin.



runoff of storm water, springs that previously flowed all year began to dry during the summer.

In spite of these negative environmental impacts, farming continued to flourish. In the end, it would largely be economic rather than environmental reasons that would alter the landscape once again. In 1830, the Erie Canal opened and Connecticut's agricultural zenith passed. Within two decades, the small stony farms of Connecticut were unable to compete with the larger, more mechanized farms of western New York and the Ohio River Valley.

Much of the farmland became exhausted and unsuitable for continuous agricultural crops, and was soon abandoned. Farmers left marginal hillside farms to take jobs created in the cities by the industrial revolution. Finally, the opening of the West after the Civil War, and the added incentive of free land, hastened the pace of farm abandonment across New England. Before long, land went out of farming and forests began to return to much of Connecticut.

Without human interference, the vegetation of abandoned fields underwent a series of changes. Plants with seeds distributed by wind or birds were the first to germinate. These included many of the more common wildflowers – golden rod, New England aster, Queen Anne's lace, Joe-Pye weed, butterfly weed, and blackberries, for example. Trees more suited to open, grassy patches followed, primarily white pine at first. Other species also established themselves on recently abandoned cropland, such as birch and red maple, the latter particularly in bottomlands. Then, as the pines grew and formed a protective canopy, the more climax deciduous types of oak, sugar maple, and hickory became established in the understory.

During the early 1900's, the mature pine stands became the raw materials that began to feed a wood-hungry nation and world. Containers, shipping crates, boxes, pails and barrels were manufactured from the raw wood material supplied by Connecticut's "Second Forest." These were used primarily to ship fish products inland and overseas, an avenue of trade enhanced by the opening of the Panama Canal.

Up until about 1920, the harvesting of pine flourished. After this, much of the pine had been cut and the industry declined. But in the process, the understory of hardwoods had been released, contributing to today's modern deciduous forest.

The late Nineteenth and early Twentieth Centuries also provided many other landscape-altering disturbances that had a major influence on modern forest composition. From the late 1800s to about 1920, entire hillsides were repeatedly clearcut to produce charcoal for the brick, brass, and iron industries. Stands were typically cut every 20-40 years when the trees were still small enough to be handled manually. Charcoal production fell dramatically with the advent of cheap coal and petroleum. Most of the forest in parts of Connecticut today had its origin in the charcoal production era and consists of even-aged stands approximately 100 years of age.

During the early 1900s, immense fires covering thousands of acres regularly roared over the countryside. Some of these fires were accidental, caused by sparks from railroads and industry. Others were deliberately set to clear underbrush in the forest and provide better pasture for livestock. Records from the early 1900s indicate 15,000 to over 100,000 acres (in 1915) of forest fires could occur



annually in Connecticut. This destruction of resources spurred the legislature to create the position of State Forest Fire Warden in 1905 to coordinate control of fighting forest fires. Through the efforts of state and local fire fighters, the annual amount of forest damaged by wildfires was dramatically cut.

Major impacts during this period were not limited to cutting and burning. Prior to importation of the chestnut blight fungus, upwards of 25% of our forest was comprised of American chestnut trees. This extensive component of the forest vanished within just a few years. Disturbances to the forest floor and canopy from a combination of charcoal cuts, fires, and chestnut blight are largely responsible for the dominance of oak species in Connecticut forests during the rest of the Twentieth Century.

Insects and disease have also affected other species in the past century. Dutch elm disease has largely removed American and slippery elm from Connecticut streets and woods. Butternut has mostly disappeared as a result of a canker disease, red pine by insect attack, and now eastern hemlock is threatened by two exotic insect species. In the latter half of the Twentieth Century, gypsy moth outbreaks defoliated large areas of the state.

Historical records suggest that severe hurricanes strike Connecticut every 100-150 years. It was estimated that the 1938 hurricane destroyed over 100,000 public shade trees, every mature white pine stand east of the Connecticut River, and almost one-fifth of the timber in the state. Nearly 55,000 acres of forest were flattened and salt damage was observed 45 miles inland. Other weather events that have caused widespread forest destruction include ice storms, microbursts, and tornadoes such as the one that destroyed Cathedral

Pines in 1988.

Amidst a period of destructive influences on the forest, the turn of the Twentieth Century also marked the beginning of the conservation era in Connecticut. The very early Twentieth Century saw the creation of a state forestry agency, the first state forests, and the first real movements to protect and conserve natural resources. Enjoyment of the forest for active and passive recreation became a part of the state and national culture. In the 1930s, President Roosevelt created the Civilian Conservation Corps (CCC), which recruited thousands of young men to plant trees, suppress forest fires, and build a forest infrastructure legacy through our forests that includes many of the same state forest roads used in Connecticut today.

Despite the apparent dramatic changes the Connecticut landscape has undergone since European settlement, including repeated harvesting, large-scale land clearing, wildfire, hurricane, and introduced pests, the forest has shown its resiliency. Human attitudes toward the forest have also not been static. The history of Connecticut forests and the forests present today are a product of constant change and disturbance, both large and small, and ever-changing uses and interests in the forest. The forest of the Twenty-First Century will continue to change, as oak forests gradually diminish in favor of a conversion to maple, birch, and beech. Also changing will be Connecticut's population and attitudes about forests, which at 60% of the state's landscape, is diminishing in favor of suburban sprawl. This century will see all new impacts and pressures on the forest, as increasing populations place greater demands on a decreasing natural resource base growing on the only variable that is truly static: The land area.



Trends in Connecticut's Forests: *A Half-Century of Change*⁴

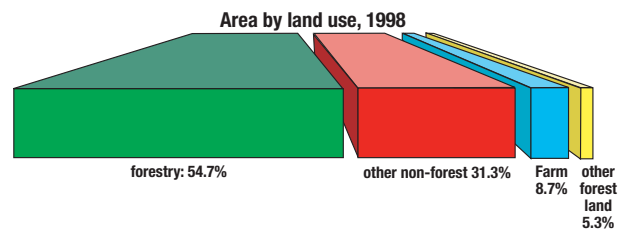
CONNECTICUT'S FORESTS

Forests provide wood and other products, watershed protection, wildlife habitat, biodiversity, a setting for recreation, and much more. Highlighted here are significant trends in Connecticut's forests over the last half-century. Data are summarized from forest inventories conducted by the USDA Forest Service, which periodically inventories the Nation's forest resources. In cooperation with the Connecticut Department of Environmental Protection Division of Forestry, the Forest Service completed the fourth statewide inventory of Connecticut's forests, in 1998.

THE EXTENT OF CONNECTICUT'S REGROWN FOREST

Forests are the predominant type of natural vegetation in Connecticut, covering 1.9 million acres or 60 percent of the State. Connecticut was not always this heavily forested. Early settlers here cleared nearly three-fourths of the original forest for agriculture. Acreage farmed peaked around the middle of the 19th century, and then began a long decline that still continues. Forests have reclaimed much of the abandoned farmland through natural regeneration. The upward trend in forest area peaked during the 1950s. Since 1972, the amount of new forest land coming from abandoned farms has roughly equaled losses of forest land to

development, with the total amount of forest land remaining stable. It is unlikely this trend will continue because there are no longer large amounts of marginal farm land to revert to forest, and development pressures are increasing on both farm and forest land.



In view of its long history and advanced state of economic development, the amount of forest in Connecticut is remarkable. Litchfield County is the most heavily forested (75 percent) and Fairfield County the least (37 percent).

Forest land is categorized by the USDA Forest Service as either timberland or noncommercial forest land. Categorizing forest land is helpful in understanding resource availability and planning forest management. Timberland is capable of growing timber crops and is potentially available for harvesting. Ninety-seven percent of Connecticut's forest land (1.7 million acres) is classified as timberland. Noncommercial forest land includes reserved forest lands, unproductive forests, and urban forests. Harvesting for timber products on these lands is administratively restricted or economically

⁴This section of the plan was taken verbatim, with permission from Donald Smith, State Forester for Connecticut, from the publication "Trends in Connecticut's Forest: A Half-Century of Change"

impractical. Examples include parks, wildlife preserves, and mountaintops and wet lands with poor growing conditions. Noncommercial forest land has increased steadily from 17,000 acres in 1953 to 163,200 acres in 1998. Nearly all of this increase is due to the reclassification of timberland into the noncommercial category. Most noncommercial forest land is in public ownership.

Trends in Forest-Land Area

Inventory Date	Thousands of Acres at Each Inventory			
	1953	1972	1985	1998
Timberland	1,973.0	1,805.6	1,784.5	1,696.1
Noncommercial Forest Land	17.0	55.2	65.7	163.2
Total Forest Land	1,999.0	1,860.8	1,850.3	1,859.3
Percent Forested	63.5%	59.7%	59.7%	60.0
Estimated Total Land Area	3,135.0	3,116.8	3,101.0	3,101.0

Estimates of the total land area have changed because of new measurement techniques and refinements in the classification of small bodies of water.

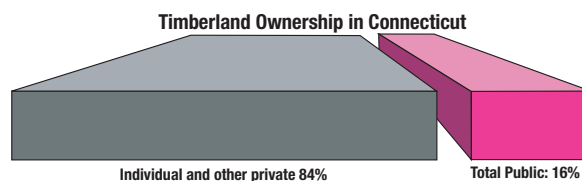
PEOPLE AND FORESTS

The size of the population and how people live on the land are significant forces in shaping the forest. The population grew by 51 percent to 3.3 million people between 1953 and 1998, making Connecticut the fourth most densely populated state. Yet it ranks 13th in percentage of forest cover. Few places on earth have as many people living among so much forest.

Most of Connecticut's forest land is owned by an estimated 102,000 private individuals and enterprises, which hold 84 percent of the state's timberland. State, federal, and other

public owners hold the remaining 16 percent. The numbers of acres owned strongly influence landowners' motives and management activities. Owners of large tracts of forest are more likely to manage their forests for timber products. Private and public water utilities, own some of the largest forested tracts. Although many in number, owners with small holdings account for a small portion of the timberland. Three-fourths of the private forest landowners have fewer than 10 acres and they collectively own about 9 percent of the timberland. These small tracts are primarily home sites.

The number of owners with fewer than 50 acres of timberland has increased by 68 percent since 1975. Wildlife biologists have found that breaking up large tracts of unbroken forest into many smaller forests by roads, home building and other land development has been detrimental to many species of birds and other wildlife.



Private Timberland By Size Class of Owner, 1993		
Acres Owned	Numbers of Owners	Total Acres in Class
1-9	77,200	126,700
10-49	18,400	404,600
50-99	3,200	202,300
100-499	3,000	379,300
500-999	200	126,700
1000+	<50	176,800
all size class	102,000	1,416,400

MORE LARGE SIZE STANDS

Timberland is classified by the size of trees growing on it for both timber resource and wildlife habitat purposes. Sawtimber stands, which have the majority of their stocking in large trees suitable for sawlogs, have increased in acreage. These stands have more of the attributes that are beneficial to wildlife: an understory with herbaceous plants and shrubs that provide wildlife food and cover habitat; bole cavities for nesting; bark flaps for feeding sites; and large dead trees, both standing and on the forest floor.

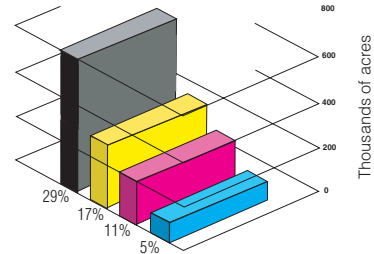
Poletimber-size stands declined in acreage. Trees in these stands are not yet mature enough to produce large amounts of nuts and seeds, and often form dense overstories that inhibit the growth of understory vegetation.

The area categorized as sapling/seedling and nonstocked stands has decreased from 29 percent of timberland in 1953 to 5 percent in 1998. Typically, early-successional pioneer tree species, along with many shrub and herbaceous plants that need full sun to grow, are found here. These stands provide unique nesting and feeding habitats for wildlife.

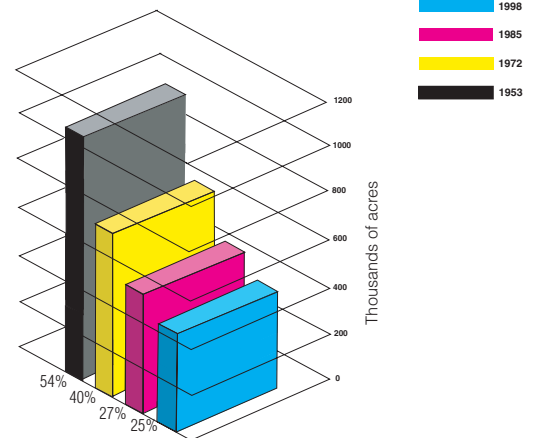
The shift to the more mature sawtimber-size class shows that forest habitats are changing. This is good news not only for the lumber industry but also for many wildlife species. However, the decline in wildlife species that need early-successional stands, such as blue birds and chestnut-sided warblers, is of concern to many wildlife biologists. Forests containing all stand-size classes provide diverse habitats for wildlife, and an even flow of forest products, and might be more resistant to insect and disease outbreaks.

Timberland Area by Stand-Sized Class and Percent of Total By Inventory Year:

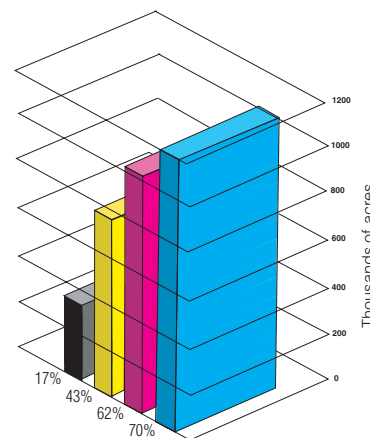
Sapling-Seedling Nonstock Percentages



Poletimber Percentages



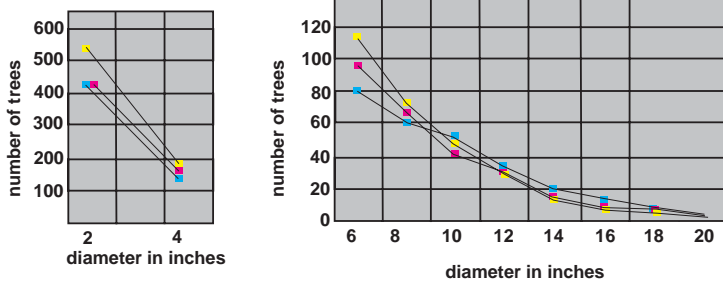
Sawtimber Percentages



TREES HAVE INCREASED IN SIZE AND NUMBER

How well forests are populated with trees is determined by measures of tree size and number. Foresters measure tree diameters at 4½ feet above the ground and refer to this as diameter at breast height (d.b.h.). Since 1972, the average d.b.h. of trees 5 inches in diameter or greater has increased from 8.7 to 9.8 inches. During this period, the average

Numbers of Trees by Diameter Class



number of trees per acre, 5 inches d.b.h. or greater, has increased from 157 to 161.

Changes in the numbers of trees were not distributed evenly across diameter classes. Since 1972, most of the increase in the number of trees occurred in diameter classes above 8 inches. Numbers of trees in the 2-, 4-, 6-, and 8-inch classes have decreased.

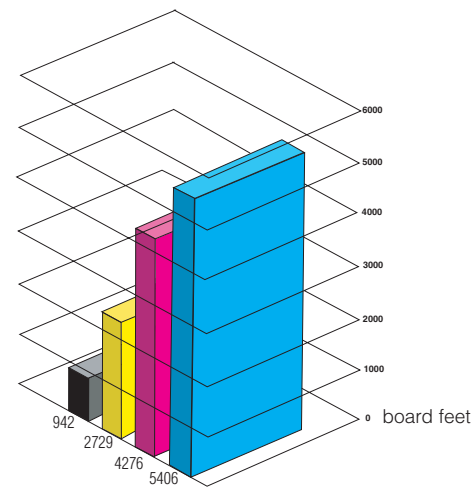
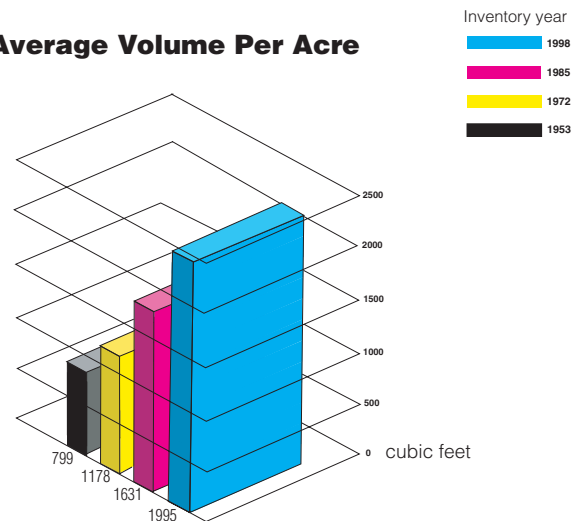
THE VOLUME OF TREES HAS INCREASED

This increase in size and number of trees has resulted in an increase in the average volume of trees per acre of timberland. Volume per acre increased from 799 cubic feet in 1953 to 1,995 cubic feet in 1998.

AVERAGE VOLUME PER ACRE

Despite a decrease in timberland area since 1985, the total cubic volume of trees increased by 16 percent. The portion of these trees that is large enough to produce sawlogs has increased by 20 percent to now total 9.2 billion board feet.

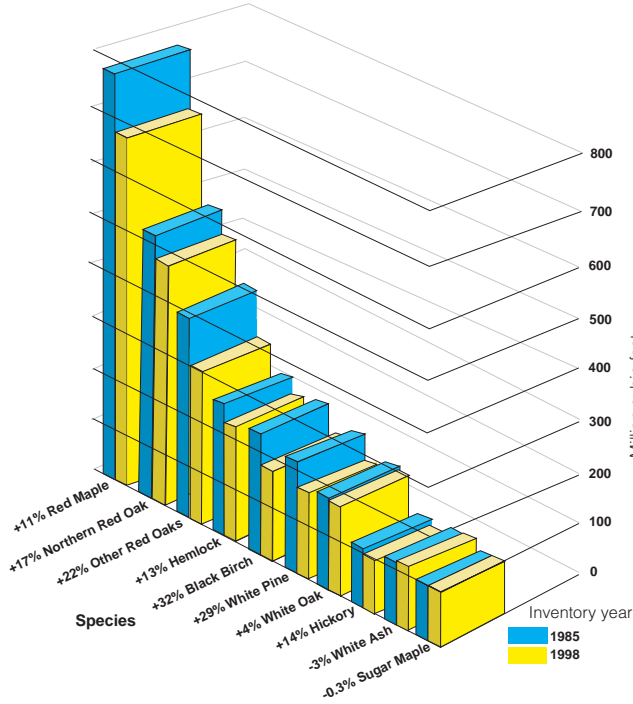
Average Volume Per Acre



RED MAPLE LEADS IN VOLUME

Connecticut's forests contain a diverse mix of species. The 1998 inventory identified 64 tree species, though many of these are uncommon. The 10 most common species (listed in the chart below) account for 88 percent of the cubic-foot volume. When ranked by volume, red maple is the leading species followed by northern red oak, which was the leading species in the 1953 and 1972 inventories. Ongoing high-grading of oak stands during harvesting on private land, high oak mortality following gypsy moth caterpillar outbreaks, and lack of oak regeneration are significant factors in this change.

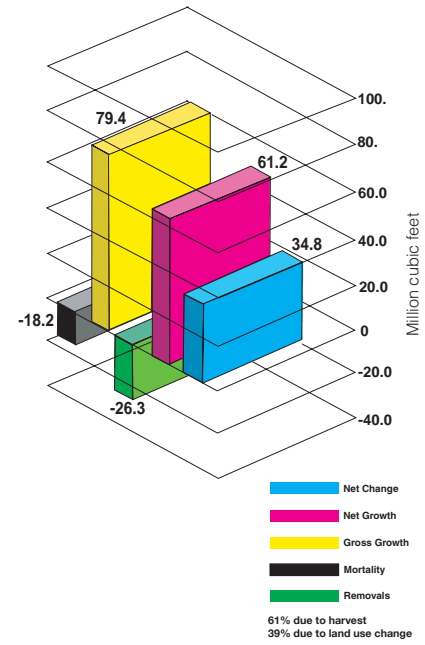
Change in Volume of Top 10 Species



THE VOLUME OF GROWTH IS TWICE REMOVALS

Forests have increased in volume during the last 50-years, and also have produced timber products. The 1998 forest inventory revealed that on an annual basis since 1985, the net growth of trees averaged 55.7 million cubic feet and removals averaged 25.5 million cubic feet. The net growth of wood, which includes losses due to natural mortality, was about 2.3 times as much as was being cut or otherwise removed. Sixty-one percent of removals are attributed to harvesting, and 38 percent to the reclassification of timberland to noncommercial forest land or conversion to a nonforest use. Oak species accounted for nearly half of the volume harvested. The surplus growth over removals yields an annual net increase of 34.8 million cubic feet -- an annual increase of 1 percent. The growth of trees has exceeded harvesting since the first inventory in 1953 and today's well-stocked stands are the result of these steady gains accumulating in the forest.

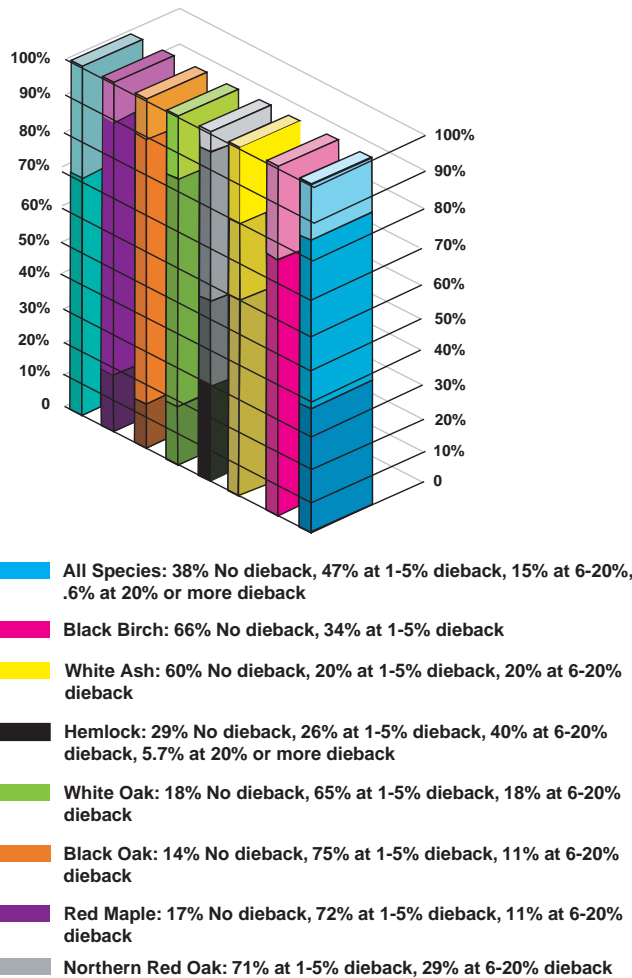
Components of Change in Live Volume on Timberland



FOREST HEALTH

The USDA Forest Service Forest Health Monitoring (FHM) Program looks at a wide set of indicators that reflect forest conditions. One of these measures is crown dieback, or the percentage of branch tips that are dead. Dieback can be a sign that the tree is being attacked by an insect or disease or has other health problems. Few trees in Connecticut measured by FHM scientists had significant amounts of crown dieback. Eighty-five percent of the trees measured had little (1 to 5 percent) or no dieback; only 1 percent of the trees had dieback greater than 20 percent. Hemlock trees accounted for the heaviest dieback, most likely attributable to damage by the hemlock wooly adelgid. Differences in dieback among species may indicate differences in tree vigor, though some variations should be expected due to differences in growth characteristics. Over time, observations of dieback and other attributes will allow researchers to identify trends and better evaluate forest conditions.

Dieback of Trees Measured in 1996-99 Important Species and All Species Combined



CONCERNS AND OBSERVATIONS

From the mid-1800s to the early 1950s, the widescale return of Connecticut's forests was remarkable. For the past 50 years, new forest land has been offset by losses to land development, with the total amount of forest land stable. Forests are maturing, as shown by increases in tree size and number and volume per acre. Most trees are in good condition according to

forest health monitoring surveys. The challenge for the future is how to sustain the delivery of goods and services people expect from Connecticut's forest resource while addressing problems associated with increasing land development; introduced pests, diseases, and invasive exotic plants; and lack of regeneration of desirable tree species due to heavy browsing by deer.



Wildlife and Forest Health⁵

THE CONNECTICUT STATEWIDE FOREST RESOURCE PLAN IS ALSO IMPORTANT FOR WILDLIFE MANAGEMENT AND CONSERVATION EFFORTS. As Connecticut has become more forested, populations of species such as the wild turkey and black bear have increased significantly and are continuing to expand. Moose, an animal often associated with large forest blocks, has also begun reappearing in Connecticut's forests. Some woodland raptors such as the Cooper's hawk have steadily increased in the changing landscape. Unfortunately the same is not true for wildlife species that prefer early successional habitat.

Thicket and shrubland specialists like the yellow-breasted chat are disappearing rapidly and have become state endangered and threatened species. The loss of agricultural lands through development and changing land-use practices has caused a dramatic decline in upland sandpipers and other grassland birds.

Habitat conservation and management are key components for maintaining wildlife diversity in Connecticut. There remains much we do not know about the specific needs, requirements and threats for many wildlife species. Until baseline data can be collected on these species, addressing the habitat needs of a suite of species is the best way conservation can be accomplished. This requires a forest resource plan that is broad-based, addressing a variety of habitat types, and the ecological, cultural and social factors that shape management efforts.

A parallel Comprehensive Wildlife Conservation Strategy is being developed to help guide wildlife conservation efforts. The Connecticut Statewide Forest Resource Plan is an integral part of this effort. The dovetailing of these two efforts will provide an ideal way for Connecticut to begin to address long-term, landscape-level conservation of wildlife and their habitats.

Numerous initiatives are underway in the State of Connecticut to address the needs of wildlife, both on a state and regional basis. Some of the programs included are listed below:

U.S. Fish & Wildlife Service Partners for Fish and Wildlife Program- offers technical and financial assistance to private (non-federal) landowners to voluntarily restore wetlands and other fish and wildlife habitats on

⁵First section written by Jenny Dickson, Supervising Wildlife Biologist 2, DEP March 22, 2004.

their land. Money is given directly to the Wildlife Division through a Memorandum of Understanding to complete wetland or early successional habitat restoration projects on private land. A 50% match is required.⁶

U.S. Fish & Wildlife Service Private Stewardship Grant Program-

Provides grants and other assistance on a competitive basis to individuals and groups engaged in local, private, and voluntary conservation efforts that benefit federally listed, proposed, or candidate species, or other at-risk species.⁷ Match requirements are 10%. Land acquisitions, including purchase of conservation easements, are NOT eligible. The DEP Wildlife Division can assist landowners in completing grant applications.

Wildlife Habitat Management Program- A program of the DEP Wildlife Division which provides habitat diversity for maintaining stable, healthy and diverse wildlife populations throughout Connecticut. To meet this goal, various techniques are employed which influence such habitat types as agricultural lands, grasslands, old fields, forests, and wetlands. The DEP Wildlife Division has direct management responsibility for 90 wildlife management areas, totaling 26,393 acres.⁸

Recreation Management Program- A program within the DEP Wildlife Division that administers the pheasant liberation program, administers the sporting dog field trial program, and improves hunter access to private lands through the permit-required hunting program and the cooperative wildlife management area program.⁹

Deer Management Program- A program within the DEP Wildlife Division that inventories deer populations, establishes season lengths and bag limits, determines harvest totals and impacts of harvest on the deer population. In addition, this program quantifies crop damage and vehicle collision data to assess social tolerance for deer populations, administers controlled hunts to manage deer population in areas that are not hunted during traditional seasons, and assesses deer herd health using biological data collected from harvested deer.¹⁰

Wildlife Habitat Incentives Program (WHIP)- The purpose of this

⁶Obtained from <http://partners.fws.gov/> on 1/13/04.

⁷Obtained from http://endangered.fws.gov/grants/private_stewardship/index.html on 3/30/04.

⁸Taken directly from the February 2000 DEP Wildlife Division brochure "Connecticut State Lands Wildlife Habitat Management Program."

⁹Obtained from www.dep.state.ct.us/burnatr/prgactiv.htm on 3/25/04.

¹⁰Obtained from www.canr.uconn.edu/ces/forest/coverts.htm on 1/13/04.



program is to create, restore and maintain upland wildlife habitat, wetland wildlife habitat, aquatic habitat and habitats of threatened and endangered wildlife species. Priorities in Connecticut include riparian buffers, tidal and non-tidal marshes, control of non-native invasive plants and early successional stage habitats, such as grasslands and old fields.¹¹

Landowner Incentives Program (LIP)- A program designed to assist States by providing grants to establish or supplement landowner incentive programs that protect and restore habitats on private lands, to benefit Federally listed, proposed or candidate species or other species determined to be at-risk, and provide technical and financial assistance to private landowners for habitat protection and restoration.¹²

The Coverts Project-A special educational program of the UCONNCS, the RGS, the DEP, and the CFP. Since 1983, The Coverts Project has been reaching out to Connecticut's individual woodland owners and teaching them how sound management practices can make wildlife healthier, more diverse, and more abundant.¹³

¹¹Rothbart, Paul. "USDA Farm Bill Programs Hard at Work in CT", *Connecticut Wildlife*, March/April 2000.

¹²Obtained from <http://federallaid.fws.gov/lip/lip.html> on 3/30/04

¹³Obtained from www.canr.uconn.edu/ces/forest/coverts.htm on 1/13/04.

¹⁴Obtained from Ann Kilpatrick, DEP Wildlife Biologist on March 30, 2004.



Fisheries and Forest Health⁵

CONNECTICUT FORESTS CONTAIN NUMEROUS PONDS, LAKES, RIVERS AND STREAMS THAT SUPPORT A VARIETY OF FISH SPECIES. As Connecticut continues to develop, forestlands serve a vital role in the protection of fish and their habitats as these lands remain as undeveloped open space. The following narrative contains some basic information about the relationships between fish resources and forest health.

Fish Communities and Forests

Along a stream continuum, stream flow, hydrology, physical habitat and water quality are all factors that help determine which fish species are present in a watershed and the abundance and diversity of those species. For example, many small headwater brooks are located in forests. These brooks, small enough in width that a person can jump across, very often support only one species of fish, native brook trout. The survival of this coldwater fish species is dependent upon thick overhead forest canopies that shade the brook and prevent increases in water temperatures. As we move downstream in a watershed, fish species diversity and abundance will increase. A good example is the Salmon River that flows through the Salmon River State Forest. The Salmon River is one of the most diverse and utilized fishery resources in Connecticut containing some 18 species of freshwater, anadromous and catadromous fishes. Anadromous fish spend most of their life cycle in the ocean and enter freshwaters as adults to spawn whereas catadromous fish spend most of their life cycle in freshwater and return to saltwater to spawn as adults. In addition, the Salmon River is a valuable recreational resource being considered a major trout stream in Connecticut and the New England region.

Riparian Corridor Protection

Lands adjacent to streams and rivers, often referred to as the riparian corridor, serve several vital functions in the maintenance of biologically healthy and diverse stream and riparian ecosystems. Vegetated riparian corridors: (1) naturally filter sediments, nutrients, fertilizers, and other non-point source pollutants from overland runoff, (2) maintain stream water temperatures suitable for spawning, egg and fry incubation, and rearing of resident finfish, (3) stabilize streambanks and stream channels thereby

¹⁵Written by Brian Murphy, Senior Fisheries Biologist, DEP March 18, 2004



reducing instream erosion and aquatic habitat degradation, (4) supply large woody debris to streams providing critical instream habitat features for aquatic organisms, (5) provide a substantial food source for aquatic insects, which represent a significant proportion of food for resident finfish, and (6) serve as a reservoir, storing surplus runoff for gradual release into streams during summer and early fall base flow periods.

Of the above mentioned functions, research on forestlands has shown a definitive positive relationship between trees that naturally fall into streams, called large woody debris and their value in creating and enhancing fish habitats. Accumulations of large woody debris in a stream creates gradual steps, gravel bars and pools. These are important structural elements, which both disperse stream energy and create fish habitat. Therefore, the protection of trees in riparian areas is necessary for future recruitment of wood to streams to help maintain quality fish habitat.

Because of the value of large woody debris and other important functions of riparian ecosystems, the DEP Inland Fisheries Division developed a policy that recommended that riparian corridors be protected with an undisturbed 100 ft. wide vegetated riparian buffer zone. A riparian buffer is one of the most natural mitigation measures to protect the water quality and fisheries resources of watercourses. Copies of the policy are available upon request from the DEP Inland Fisheries Division by calling 860-295-9523 (Eastern District Headquarters), 860-567-8998 (Litchfield Field Office), or 860-424-3474 (Central Office).

Erosion and Sedimentation Concerns

Removing or altering vegetation, which exposes bare ground, can increase the potential for soil erosion. Runoff over bare ground carries more soil to a stream, degrading water quality by increasing sedimentation. Incidents of erosion and sedimentation are more likely to occur as forested lands are converted to other land uses and due to improper timber harvest practices such as skidding beside or within a stream channel. If sediment runoff does occur, the following damage to stream ecosystems could be expected: (1) Sediment reduces the survival of resident fish eggs and hinders the emergence of newly hatched fry. Adequate water flow, free of excess sediment particles is required for fish egg respiration



and successful hatching, (2) Sediment reduces the survival of aquatic macroinvertebrates. Since aquatic insects are important food items in fish diets, reduced insect population levels in turn will adversely affect fish growth and survival. Fish require an excessive output of energy to locate preferred prey when aquatic insect levels decrease, (3) Sediment reduces the amount of usable habitat required for spawning purposes. Excessive fines can clog and even cement gravels and other desirable substrates together. Fish may be forced to disperse to other areas not impacted by siltation, (4) Sediment reduces stream pool depth. Pools are invaluable stream components since they provide necessary cover, shelter, and resting areas for fish. Reductions of usable fish habitat can effectively limit fish population levels, (5) Turbid waters impair gill functions of fish and normal feeding activities of fish. High concentrations of sediment can cause mortality in adult fish by clogging the opercular cavity and gill filaments, (6) Sediment encourages the growth of filamentous algae and nuisance proportions of aquatic macrophytes. Eroded soils contain plant nutrients such as phosphorous and nitrogen. Once introduced into aquatic habitats, these nutrients function as fertilizers resulting in accelerated plant growth and nutrient enrichment of waters, (7) Sediment contributes to the depletion of dissolved oxygen. Microorganisms readily decompose organic matter associated with soil particles thereby effectively reducing oxygen levels.

SUMMARY

Protection of forestlands in Connecticut plays an important role in the protection of water quality and fish habitats. Forestland management must ensure that sound timber harvest management practices are followed to ensure that water quality and habitats of fish are maintained. The use of undisturbed, vegetated riparian buffers along streams in concert with the implementation of best management practices regarding erosion and sediment control will help ensure the ultimate health of fisheries resources on forestlands.



A Resource for Everyone: *Forests and the Connecticut Economy*¹⁶

CONNECTICUT IS ONE OF THE NATION'S MOST HEAVILY FORESTED STATES. This is a surprise to many people, in part because we are also the nation's fifth most densely populated state. Simply put, there are few places on earth where so many people live among so much forest. Despite over 380 years of settlement, the twenty-first century finds Connecticut nearly 60% forested. Today's forests remain a vital resource contributing much to our economy, our environment and the quality of our daily lives.

A World Class Timber Industry

Connecticut's forests produce between 60 and 80 million board feet of timber annually, providing over \$14 million in direct income to forest landowners and raw material for some 350 Connecticut processing and manufacturing firms. These firms convert timber into a wide range of products including framing and finish lumber; custom cabinets and furniture; architectural millwork; flooring; doors; and windows. In doing so, they contribute over \$500 million dollars to our annual economy while employing some 3,600 people. And because trees are a renewable natural resource, this industry can be sustained indefinitely without altering the rural character of our countryside.

Connecticut's forests produce world-class timber products that are exported around the globe, including Canada, Europe, Japan and Malaysia. Worldwide, demand is increasing while supplies are shrinking. As a state where the annual growth of both softwood and hardwood timber exceeds the annual harvest, Connecticut's timber industry has excellent potential for growth in the years ahead.

The Beauty and Bounty of Wildlife

Because forests are our natural vegetative cover, most of our native wildlife species need healthy forests to reproduce and thrive. Connecticut's resident wildlife populations include some 60 species of mammals, 135 species of birds and 82 species of freshwater fish.

Connecticut and its municipalities collect some \$4 million in fees each year from the sale of hunting and fishing licenses, permits and tags. In addition, \$3.8 million worth of meat and fur are harvested from our state's forests each

¹⁶Taken Directly from the 2001 Forestry brochure "A Resource for Everyone: Forests and the Connecticut Economy"

year. Deer hunting alone produces \$5.9 million of directly related annual economic expenditures in our state.

Tens of thousands of residents and visitors to our state also enjoy viewing and photographing wildlife. These photographers, bird watchers and wildlife enthusiasts contribute much to the state's economy, although their exact impact is yet to be fully quantified.

Holiday Trees and Greens

Pick up any Christmas card, and chances are there will be a snow-covered tree on it somewhere. Trees, forests and the holiday season have been fully intertwined since the first Christmas tree was brought in to stand by the hearth. Over 350 Connecticut growers plant, tend and harvest over 6,000 acres of Christmas trees. They sell at least 400,000 trees each winter, earning over \$10 million. In addition, 12.5 tons of mountain laurel greens are sold from our Connecticut State Forests each year, and the manufacture and sale of wreaths, laurel ropes and a variety of other holiday decorations earns growers and others considerable additional holiday income.

The Sweet Sugar Maple

Connecticut residents have enjoyed the sweet, natural flavor of pure maple syrup and candy since colonial times. Who wouldn't enjoy a good old-fashioned sugar-on-snow party on a crisp, sunny March day? The opportunity awaits us all, because Connecticut's maple industry is alive, healthy and growing.

Connecticut today has over 300 maple producers who boil the sweet sap into an average of 12,000 gallons of maple syrup per year, with a retail value of almost \$1/2 million. Best of all, the "supply and demand" picture offers great promise for the future: demand for Connecticut's maple syrup typically exceeds our production, while our forests contain tens of thousands of acres of sugar maple that go untapped every year. Anyone who's visited a sugarhouse at boiling time has fond memories of the experience, and today a growing number of Connecticut sugarhouses are open to the public. Innovative marketing strategies to promote maple products and the opportunity for a close-to-home "sugarhouse experience" can play a key role in the growth of Connecticut tourism.

Recreation and Tourism: Enjoyment for Residents and Dollars for Local Economies

Connecticut's forests form the essential backdrop for our state's \$4.9 billion tourism industry. Surveys repeatedly show that the state's appeal as a tourist destination is largely attributed to its scenic qualities, of which Connecticut's forests are an integral part. Tourism annually supports an estimated 114,500 state jobs (7.7% of the state labor force), which pay over two billion dollars in wages and generate \$1/2 billion in state and local taxes.

Residents and out-of-state visitors enjoy some 8 million recreation days each year in Connecticut's 171,479 acres of state parks and state forests, generating \$2.4 million in day-use fees. Our state's public and private campgrounds attract over 900,000 visitors each year, generating \$16 million in user fees. Campground travelers (about 38% are out-of-state visitors) spend some \$296 million in our state each year.

One key component of the many recreational uses in Connecticut forests is a network of hundreds of miles of hiking trails, used by tens of thousands of visitors each year. Our state's Blue Blazed Hiking Trail System, maintained by Connecticut Forest and Park Association volunteers, has over 700 miles of trails on both public and private forestland. These forests also provide countless opportunities for cross-country skiing, snow-mobiling, mountain biking, picnicking, bird watching, horseback riding and many other activities. The demand for quality outdoor recreation experiences continues to grow, creating increasing income opportunities for private forest owners who offer these activities in their forests on a fee basis.

Protecting Our Water

The people of Connecticut use more than 3 billion gallons of water each year. Over 2 million state residents obtain their water from surface reservoirs, while another one million use wells to pump ground water. Connecticut's forests play a vital role in the cleansing and protection of both these water supplies, providing what amounts to a free service that could cost untold millions to replace or rectify in their absence. In New York, for example, studies showed that spending \$1.5 billion to safeguard forested reservoirs would save \$6 to 8 billion in treatment costs for New York City's water system.

Forests have long been used as buffers around reservoirs, cleansing and regulating the flow of surface runoff and protecting the watershed from contamination. Research has shown that forests are the best possible land use for protecting ground water quality as well. As our population grows, healthy forests that help keep our water clean will become an increasingly important investment in our children's' future.

Keeping Warm With Wood

Some 500,000 cords of firewood are harvested from Connecticut's forests each year, displacing 108 million gallons of fuel oil which would otherwise costs our residents over \$130 million annually (average winter 2000-2001 retail prices). Best of all, firewood is very often a byproduct of environmentally sound timber and wildlife improvement practices. Properly

done, removing fuelwood from a working forest can actually increase the value growth rate of the remaining timber and/or enhance the habitat for wildlife.

Witch Hazel: A Connecticut Yankee Product

Witch hazel, a forest shrub unique to the northeastern United States, reaches its greatest concentrations in southern New England. Over 100 years ago, the Reverend E.E. Dickinson of Essex learned that it could be distilled into an astringent with numerous medicinal qualities, and a uniquely Connecticut industry was born. Today, witch hazel enjoys a global market and is sold as an astringent for home use, an ingredient in specialized over-the-counter drugs, and as a base for many cosmetics. Connecticut produces over two million gallons of processed witch hazel each year, with a wholesale value of over \$9 million, representing virtually 100 percent of the world's supply. Better yet, for the past decade demand for witch hazel has grown 10-12% annually and is projected to continue to increase at that rate in the future.

FORESTS for the Future

When a Connecticut landowner grows and nurtures a seedling into a Christmas tree, or a veneer log, or a tree to be harvested for firewood, new capital is created: new wealth that did not previously exist in our economy.

Economically speaking, it's the same as pumping oil out of the ground, with one BIG difference: forests are a renewable resource. You can always grow another seedling into another veneer log, and another and another.

Connecticut's forests contribute hundreds of millions of dollars annually to our state's economy, protect our environment and keep our state a beautiful and desirable place to live. Better still, they have the potential to contribute much more. But will they? We cannot forget that almost 90% of our forests belong not to the state or federal government, but to tens of thousands of private individuals. As a result, thousands of acres of forestland are lost each year through conversion to residences and other uses. The future of what remains lies squarely in these owners' hands.

Studies show that most owners want to be good forest stewards. Many want to ensure that their land remains forest at least into the next generation. But forest management and estate planning issues are complex, and few owners have the expertise to reach these goals on their own.

If we can provide our forest owners with the education and professional advice they need, Connecticut can lead the nation in demonstrating how lots of people and lots of forests can happily co-exist, and how healthy forests contribute to a healthy economy.

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