



The **Economic Importance**  
of New Hampshire's Forest-Based Economy  
**2011**



A photograph of a deer standing in a pond, with a forest in the background. The image is faded and serves as a background for the text.

## A NOTE FROM THE STATE FORESTER

With nearly 84% of the state covered by trees, forests are one of the major elements that define New Hampshire. They are vitally important to our social, economic, and environmental well-being. These forests help maintain New Hampshire's rural character, present an abundance of recreational opportunities, supply forest and timber products, provide energy, clean the air we breathe and the water we drink, and furnish habitat for many varieties of both plants and animals. These important attributes are also a significant economic driver for our state, resulting in a substantial contribution to our state's overall economy. This publication reveals the specific ways our forests contribute to the economy. It should be noted that these benefits are only available as long as we sustain our forests as forests. One important way of achieving that goal is by actively supporting and encouraging responsible management of our working forests and woodlands for multiple uses and benefits. The wise use and conservation of our forest resources while supporting a vibrant forest-based industry will provide the greatest long-term benefits and economic returns to the citizens of our state for generations to come.

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## EXECUTIVE SUMMARY

The North East *State* Foresters Association has published a report similar to this in 1995, 2001, 2004 and 2007 for New Hampshire and the states of Maine, New York and Vermont. The intent is to describe the direct economic value of the forests of these states—showing that, indeed, in addition to the valuable scenic and other amenity values the forests of New Hampshire provide, they are also an economic engine that is integral to the economy of the state. No economic multipliers were used in determining the value of forest-based manufacturing, forest-related recreation and tourism and Christmas tree/maple syrup economies. Only direct sales and employment have been identified.

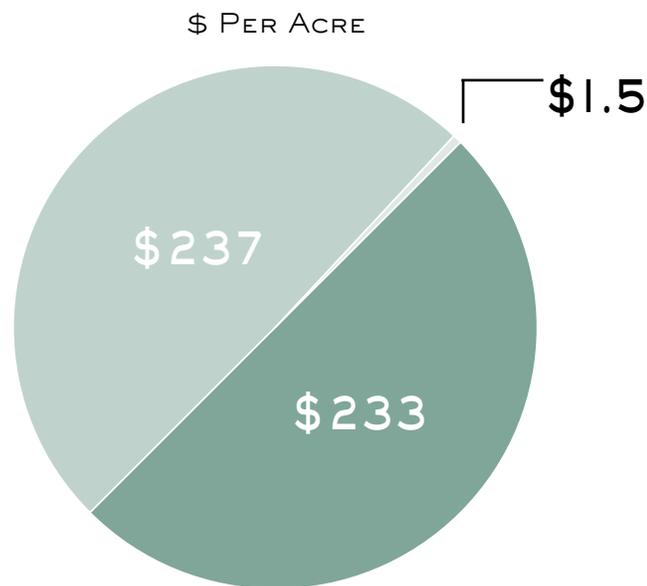
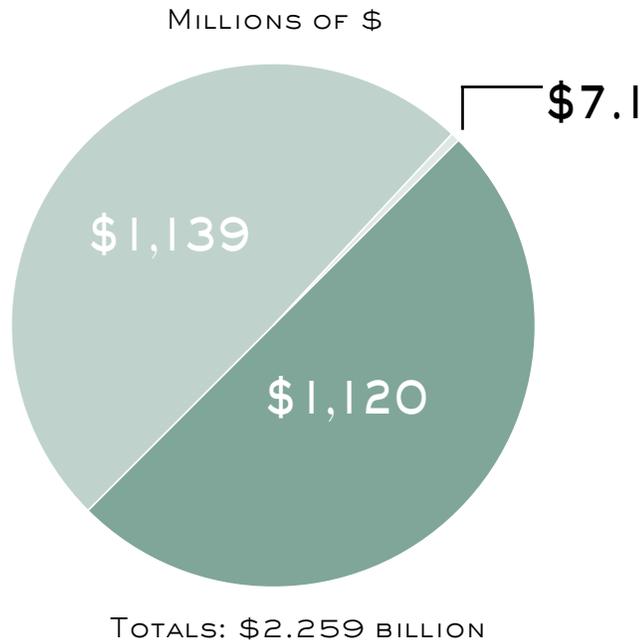
**The economic value of these forest-based components of the economy of New Hampshire, at \$2.259 billion annually, is nearly 4% of the Gross State Product,** which is the measure of all economic activity in New Hampshire in a year. Clearly, forests play an important role in the economic and non-economic life of the state.

### KEY FINDINGS IN THIS REPORT INCLUDE:

- ❖ New Hampshire is nearly **84% forested**—this is about as much forestland as the state had in 1725. **Families own over 68%** of the state's forests while **government owns 24%**, and the rest is owned by business.
- ❖ In 2009, **1.17 million cords of wood** (2.8 million tons) were harvested in New Hampshire while **2.74 million cords** (6.58 million tons) grew in the state's forests. This sustainable use of our forests has resulted in a forest that has trees that are larger than in the past and getting larger, over time. As one would expect given the recent recession, harvest levels are down from 2005—except for harvests of wood used for energy, which are up 25%.
- ❖ The annual contribution of forest-based manufacturing to the state's economy is nearly \$1.15 billion with **8,160 jobs** and payroll of \$384 million a year while forest-based recreation and tourism is worth \$1.12 billion with **11,401 jobs** and payroll of \$224 million. Combined, the forest's direct impact on the economy of the state is \$2.26 billion annually.
- ❖ Forest landowners received over **\$30 million from the sale of their timber** in 2009. This resulted in timber taxes of over **\$3 million paid to communities**.
- ❖ Wood for energy is an increasing use of wood in New Hampshire.
- ❖ The sale of **Christmas trees, wreaths and maple syrup was valued at over \$7 million** in 2009.
- ❖ Every 1,000 acres of forest supports **1.7 forest-based manufacturing jobs** and **2.4 forest-based recreation and tourism jobs**.
- ❖ On a statewide level, forests are managed sustainably. Just over **40 percent of the annual growth of our forests is harvested**, resulting in a forest that is getting larger and older, on average.

# REVENUES FROM NEW HAMPSHIRE FORESTS

FIGURE 1. ANNUAL REVENUES FROM NEW HAMPSHIRE'S FORESTS



- FOREST-BASED MANUFACTURING VALUE OF SHIPMENTS
- FOREST-RELATED RECREATION AND TOURISM
- CHRISTMAS TREES/MAPLE PRODUCTS

THE ECONOMIC VALUE OF THESE FOREST-BASED COMPONENTS OF THE ECONOMY OF NEW HAMPSHIRE, AT \$2.259 BILLION ANNUALLY, IS NEARLY 4 PERCENT OF THE GROSS STATE PRODUCT, WHICH IS THE MEASURE OF ALL ECONOMIC ACTIVITY IN NEW HAMPSHIRE IN A YEAR.

OVER 76% OF THE FORESTS IN NEW HAMPSHIRE ARE OWNED PRIVATELY.

## THE FOREST RESOURCE OF NEW HAMPSHIRE

New Hampshire's land area is 5.74 million acres. Of this, over 4.8 million acres, or nearly 84%, is forested. Timberland is a classification that the USDA Forest Service gives to forestland that is capable of producing repeated forest crops because the land is fertile enough and accessible to be able to harvest the trees. New Hampshire has 4.63 million acres of timberland, or about 81% of the state.

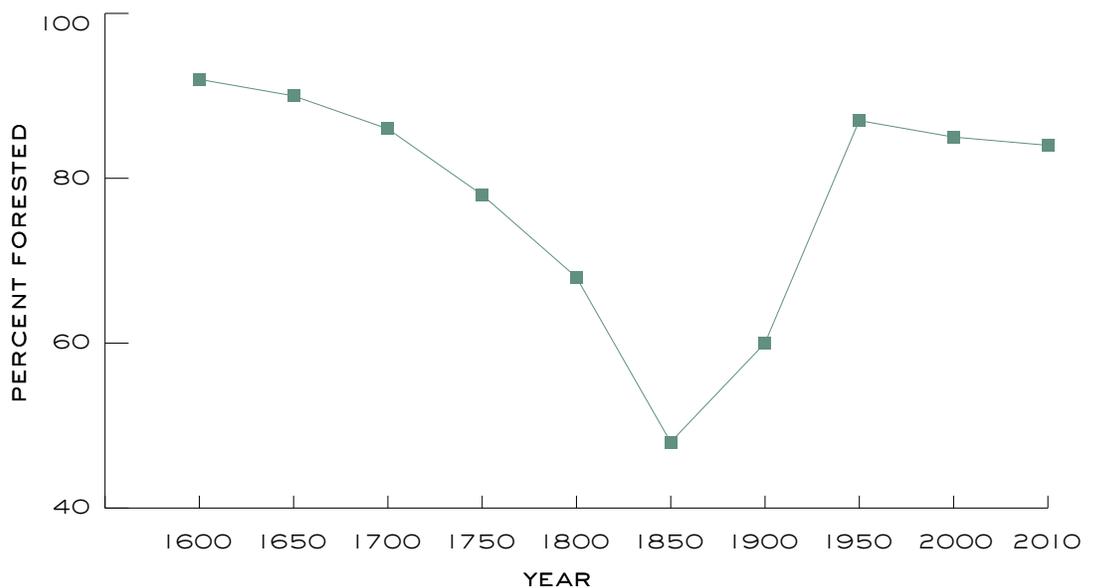
**TABLE 1.** LAND AREA, FORESTLAND AND TIMBERLAND IN NEW HAMPSHIRE, 2009

TOTAL LAND AREA	FOREST LAND	TIMBERLAND
5,740,000 ACRES	4,803,378 ACRES	4,630,000 ACRES

SOURCE: USDA Forest Service, *Forest Inventory & Analysis, 2009*

Historical data (see Figure 2 below) shows the area of forest today in New Hampshire, at 84%, is about what it was in 1725. The low was below 50% forested in 1860. Following this, a rush to western farmlands resulted in literally millions of acres of farmland naturally reverting back to forestland—with virtually **no** artificial planting of trees involved since the forests of the northeast regenerate naturally.

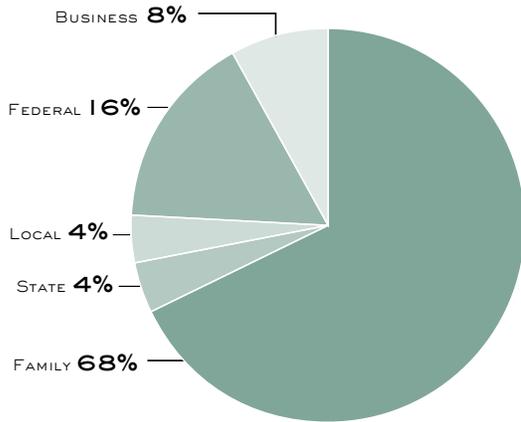
**FIGURE 2.** NEW HAMPSHIRE FOREST AREA



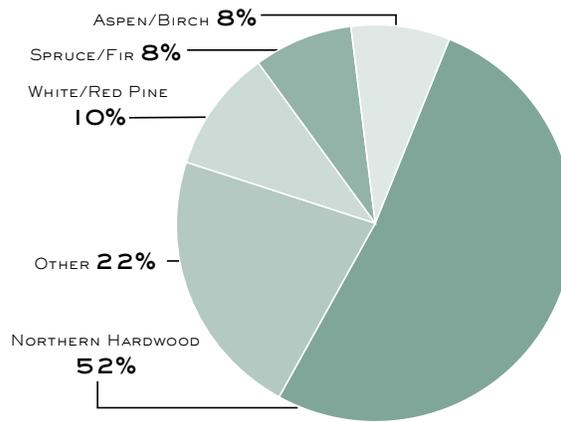
SOURCE: Harvard Forest 2010 & USDA Forest Service, *Forest Inventory & Analysis*

Over 76% of the forests in New Hampshire are owned privately (see Figure 3). The vast majority, 68% or 3.2 million acres, is owned by individuals and families. Business owns over 400,000 acres of forestland. Federal, local and state government own over 24% of New Hampshire's forests or 1.2 million acres.

**FIGURE 3. FOREST OWNERSHIP, NEW HAMPSHIRE, 2009 (ACRES)**



**FIGURE 4. FOREST TYPES, NEW HAMPSHIRE, 2009 (ACRES)**



SOURCE: USDA Forest Service, Forest Inventory & Analysis, 2009

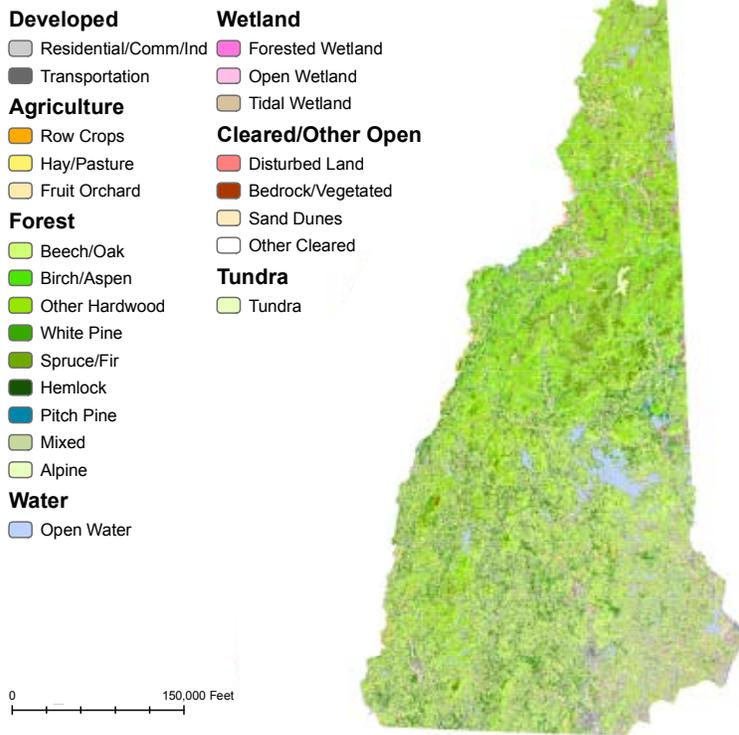
Forest types are areas of forest that have similar tree species growing. These areas tend to have similar growing conditions such as soils, elevation, aspect (compass direction that they face) and, in some cases, latitude. The northern hardwood type, which generally contains a variety of species, is dominated by sugar maple, red maple, yellow birch and American beech. Over 52% of the forested land area in New Hampshire, or 2.5 million acres, is covered by this type (Figure 4). It should be noted that although a forest type is dominated by the core species such as those listed above for northern hardwood, other tree species may also grow in those forests, though generally at reduced densities.

A MORE GENERAL WAY OF LOOKING AT NEW HAMPSHIRE'S FORESTS IS THROUGH A LAND COVER MAP. THIS SHOWS THAT THE STATE IS DOMINATED BY DECIDUOUS TREES —THOSE THAT LOSE THEIR LEAVES EACH FALL.



ARE  
NEW HAMPSHIRE'S  
TREES BIGGER  
AND OLDER THAN  
THEY WERE WHEN  
WE WERE BORN?  
SURPRISINGLY, YES.

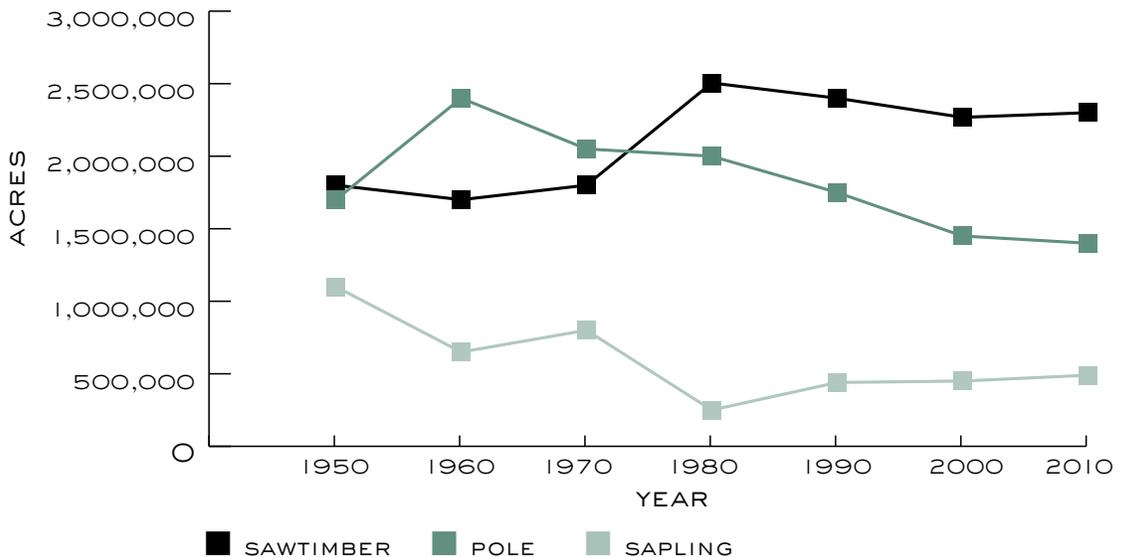
**FIGURE 5. NEW HAMPSHIRE LAND COVER ASSESSMENT**



SOURCE: Complex Systems Research Center, University of New Hampshire, 2002

Are New Hampshire's trees bigger and older than they were when we were born? Surprisingly, yes. As a result of timber harvesting levels that are way below growth (see Table 2 on page 13), our forests are larger and older than they were 50 years ago (see Figure 6 below).

**FIGURE 6. ACREAGE OF TREES IN NEW HAMPSHIRE FORESTS BY SIZE**



SOURCE: USDA Forest Service, Forest Inventory and Analysis

DEFINITIONS: sawtimber – over 9" in diameter at 4.5 feet for softwood and 11" for hardwood

pole – over 5" in diameter

sapling – under 5" in diameter

## NEW HAMPSHIRE'S FOREST-BASED ECONOMY

New Hampshire's abundant forests have provided the raw material to a vibrant forest products industry since the days settlers first arrived. Early in our country's history, logs were used to build dwellings. These were followed by more conventional New England homes and buildings built from boards and other sawed wood products sawed by up-and-down and water-powered sawmills. This was followed by more modern electric or diesel powered mills in the 20th century. Pulp and paper mills later dominated the use of wood in New Hampshire beginning in the late 19th century, and though no pulp mills remain in the state since the shutdown of the mill in Berlin in 2006, pulpwood is still harvested and travels to mills in Maine, New York and eastern Canada.

Since the 1980s, stand alone use of woody biomass for large-scale production of electricity and thermal energy (primarily heat), has become a significant part of the forest products industry.

Overall, the three main sectors of the wood using industries in New Hampshire—solid wood; pulp (all pulpwood exported); and wood energy—result in timber harvest levels that are 70% of all time highs in the 1980s and 1990s.

Additionally, the forest-based recreation and tourism sectors are significant—and growing. These sectors include camping, hiking, hunting, skiing (downhill and cross-country), snowmobiling, ATV riding, fall foliage viewing and wildlife viewing. These sectors have nearly the economic activity that the forest-based manufacturing sectors have, and they employ more than in manufacturing, though the average pay is significantly less in recreation and tourism as compared to forest-based manufacturing.

### FOREST-BASED MANUFACTURING

Use of wood for various products is very robust and complex in New Hampshire. A forest landowner who sells timber will see his or her trees go to every conceivable economic use once they leave the woodlot. Forest-based manufacturing in New Hampshire includes:

- ❖ Timber harvesting and related trucking;
- ❖ Primary manufacturing (sawmills and wood energy plants for electricity and thermal);
- ❖ Secondary manufacturing (e.g. furniture, paper, etc.).

Large and small operations in the timber harvesting sector cut the trees down using chainsaws or, more commonly, mechanized felling equipment and bring the wood to a log landing with skidders or forwarders. The trees are cut into veneer logs, sawlogs, pulpwood, firewood, or processed into wood chips or other products for loading onto trucks and delivery throughout the region directly to primary manufacturing mills or energy plants or to wood concentration yards.

Highest value logs may be shipped to veneer mills that take thin layers from the log in sheets (or peel them like an apple peeler) to produce veneers that go into many uses. If the product is pulpwood, pulp mills will be the processor and use the wood to manufacture pulp used in paper manufacturing. Although New Hampshire does not have a primary pulp processing facility, mills in Maine, Canada and New York provide markets for this important product.

Another primary manufacturer is the wood energy industry which takes whole tree wood chips or residues (biomass) such as chips and sawdust from sawmills and burns the wood material in a boiler to produce steam which, in-turn, produces electricity or, in somewhat smaller applications, at schools and hospitals and other commercial facilities within the state,

THE FOREST-BASED RECREATION AND TOURISM SECTORS ARE SIGNIFICANT—AND GROWING. THESE SECTORS INCLUDE CAMPING, HIKING, HUNTING, SKIING (DOWNHILL AND CROSS-COUNTRY), SNOWMOBILING, ATV RIDING, FALL FOLIAGE VIEWING AND WILDLIFE VIEWING.

ALTHOUGH  
NEW HAMPSHIRE  
DOES NOT HAVE  
A PRIMARY PULP  
PROCESSING  
FACILITY, MARKETS  
IN MAINE, CANADA  
AND NEW YORK  
PROVIDE MARKETS  
FOR THIS IMPORTANT  
PRODUCT.

produces heat from chips or wood pellets. In yet another application, heat or steam from biomass boilers are used for manufacturing processes such as dry kilns, greenhouses, or paper making. Any manufacturing process that needs large amounts of heated water or steam can get this energy product from boilers that use woody biomass as their feedstock. Wood cut into firewood for wood stoves, furnaces and boilers is still a significant user of wood in the state, especially as the price of oil increases.

The state also has nearly 50 substantial sized sawmills and specialty wood products mills. The wood energy sector has seen a renewed resurgence as fossil fuel prices increased before the recent recession and are increasing again. The state's six wood-fired electricity-generation plants built in the 1980s were joined by the large 50 megawatt Northern Wood Power plant at PSNH's Schiller Station in Portsmouth in 2006. This plant uses over 550,000 green tons of wood chips annually.

While use of wood for energy production is the area of the forest products industry that continues to grow, it is important to note that the raw material for this sector, chiefly whole-tree wood chips produced in the forest as part of normal timber harvesting activities, is a low value product. Loggers cannot build a successful business around just harvesting trees for wood chips. With today's prices, energy biomass, largely in the form of wood chips, is a residual or supplemental part of a timber harvesting operation that must contain sawlogs and pulpwood (higher value products) for the logging and trucking sector to survive. Forest landowners would not be willing to sell only trees to be chipped for wood energy, given the low price this product brings on the stump. However, woody biomass energy products are an important part of any timber harvesting operation.

To get a sense of the economic value of the forest products manufacturing sectors, we have used several economic indicators and metrics provided by the federal government. Employment and payroll data are taken from the U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Accounts and the U.S. Census of Manufacturers, 2009 and 2010. Value-added contributions and the value of shipments are provided by the U.S. Bureau of Census, Annual Survey of Manufacturers, 2010 (2009 data).

### PRIMARY FOREST PRODUCTS MANUFACTURING AND WOOD FLOWS

In 2009, 43.5 million board feet<sup>1</sup> of hardwood sawlogs and 120.5 million board feet of softwood sawlogs were harvested from the forests of New Hampshire. Total sawlog harvest in 2009 was down about 100 million board feet from 2005 harvest. In 2009, 531,000 green tons of hardwood pulpwood and 271,000 green tons<sup>2</sup> of softwood pulpwood were harvested in the state. This is down about 22% from 2005 levels. Over 1.12 million green tons of whole tree chips were harvested in 2009—a 25% increase from 2005 levels. The estimated value of these harvested volumes to landowners in stumpage<sup>3</sup> equals over \$30 million. Figure 7 on page 9 shows the flows of wood from the major categories of wood harvested—all calibrated in tons for easy comparison. The map that is part of Figure 7 shows the flows graphically.

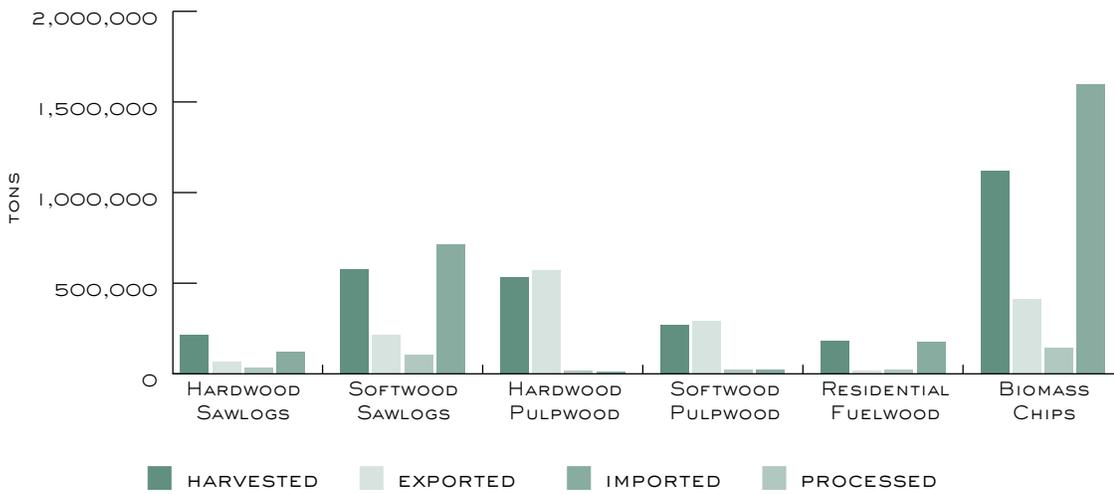
The economic value of these sectors can be seen in Figure 8 on page 10 and is explained in the next section.

<sup>1</sup> Board foot equals a solid piece of wood 1 inch thick by 12 inches wide by 12 inches long.

<sup>2</sup> Green ton – weight in tons (1 ton = 2000 pounds) of pulpwood or wood chips harvested from live trees—contains substantial amounts of water weight hence “green.”

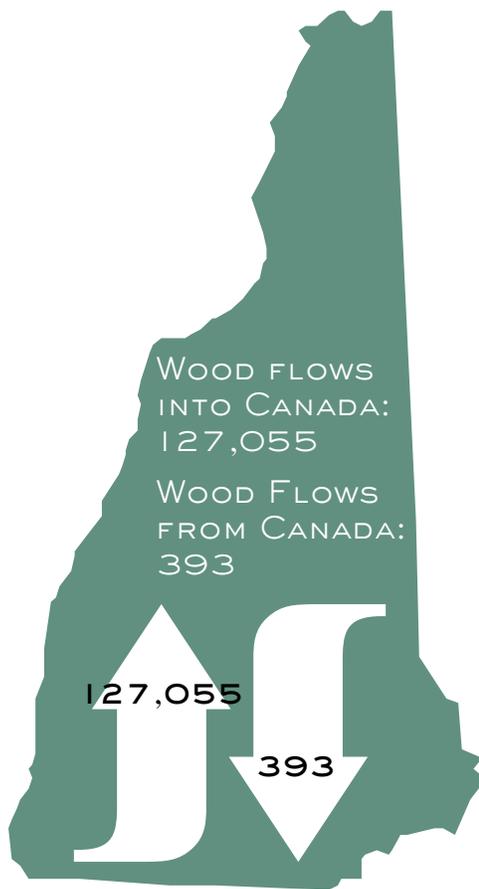
<sup>3</sup> Stumpage – value landowners receive for their trees when they are sold in a timber sale.

**FIGURE 7. WOOD FLOWS IN NEW HAMPSHIRE**



SOURCES: Report of Cut data, NH DRA, 2009, NH Wood Processor Reports, 2009, Harvest and wood processor reports, Maine and Vermont and Statistics Canada

WITH TODAY'S PRICES, ENERGY BIOMASS, LARGELY IN THE FORM OF WOOD CHIPS, IS A RESIDUAL OR SUPPLEMENTAL PART OF A TIMBER HARVESTING OPERATION THAT MUST CONTAIN SAWLOGS AND PULPWOOD (HIGHER VALUE PRODUCTS) FOR THE LOGGING AND TRUCKING SECTOR TO SURVIVE.



WOOD FLOWS INTO NEW HAMPSHIRE: 283,303



WOOD FLOWS OUT OF NH: 632,590

ALL UNITS ARE IN GREEN TONS

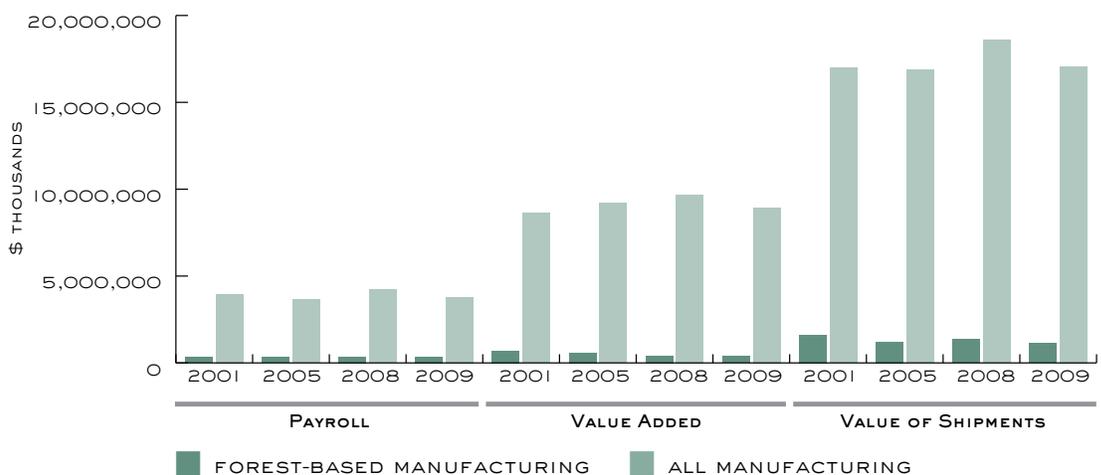
**IN 2009, FOREST-BASED MANUFACTURING PROVIDED 9% OF THE MANUFACTURING PAYROLL (9% IN 2005) AND EMPLOYED 12% OF MANUFACTURING EMPLOYEES (13% IN 2005).**

**FIGURE 8. ANNUAL PAYROLL, VALUE-ADDED AND VALUE OF SHIPMENTS—NEW HAMPSHIRE FOREST-BASED MANUFACTURING INDUSTRIES**



SOURCE: U.S. Department of Commerce, Bureau of Economic Analysis, U.S. Census, Survey of Manufacturers, NH Dept. of Environmental Services, NH Public Utilities Commission, ISO New England, 2008, 2009 & 2010

**FIGURE 9: FOREST-BASED MANUFACTURING AND ALL MANUFACTURING INDUSTRIES, NEW HAMPSHIRE 2001-2009**



SOURCE: U.S. Department of Commerce, Bureau of Economic Analysis, 2001-2009 & Annual Survey of Manufactures, U.S. Department of Commerce 2001-2009

Figure 9 provides a comparison of the forest-based manufacturing sector with the total manufacturing sector in New Hampshire over the period from 2001 to 2009. In 2009, forest-based manufacturing provided 9% of the manufacturing payroll (9% in 2005) and employed 12% of manufacturing employees (13% in 2005). Also in 2009, this sector provided 4% of value added receipts in manufacturing (6% in 2005) and 7% of value of shipments receipts (7% in 2005).

### FORESTRY AND LOGGING

There are approximately 1,300 individuals employed in the forestry and logging sector in New Hampshire<sup>4</sup> (see Figure 10 on page 11). Foresters provide services such as timber evaluation and appraisal, the development of management plans, management of the full suite of forest resources for the landowner and the preparation, marketing and supervision of timber sales. Foresters who provide services to landowners for compensation must be licensed by the state. There are over 300 licensed foresters in New Hampshire.

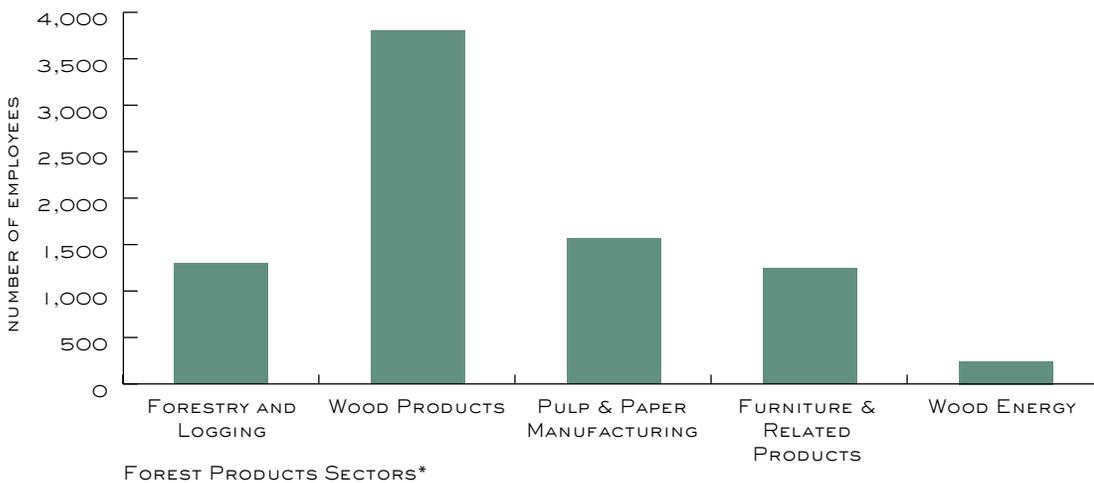
<sup>4</sup> U.S. Dept. of Labor and U.S. Census, Annual Survey of Manufactures, 2009

The logging industry is an important source of employment in the New Hampshire forest products industry. Over 800 loggers are employed as sole proprietors or as part of larger full-service timber harvesting companies. The majority of these participate in the voluntary certification program—Professional Loggers Program—that promotes safety and environmental awareness through the NH Timber Harvesting Council. Loggers provide a full suite of services to forest landowners, often through foresters who manage the land for the landowner. Loggers have large investments that can easily total several million dollars. This investment is in logging machinery such as feller bunchers, skidders, forwarders, log trucks, chippers and other equipment.

**Annual payroll for forestry and logging is \$59.1 million.**

OVER 800 LOGGERS ARE EMPLOYED AS SOLE PROPRIETORS OR AS PART OF LARGER FULL-SERVICE TIMBER HARVESTING COMPANIES.

**FIGURE 10: EMPLOYMENT IN FOREST PRODUCTS MANUFACTURING**



SOURCES: U.S. Dept. of Labor, U.S. Dept. of Commerce, Bureau of Economic Analysis and Innovative Natural Resource Solutions LLC, 2009 and 2010

\*NOTE: Most of the employment in the wood energy sector is in the forestry/logging sector.

### PRODUCTION OF LUMBER AND RELATED SOLID WOOD PRODUCTS

Employment in the manufacturing of solid wood products once the tree leaves the forest, totals over 3,800. These individuals run complicated computerized sawing equipment, sorters, fork lifts, trucks and other machinery. They also work at such tasks as sorting and grading of both logs and lumber.

In 2009, sawmills in New Hampshire processed 24.6 million board feet of hardwood sawlogs and 149 million board feet of softwood sawlogs into lumber (Figure 7). The total annual value added for wood products manufacturing which also includes kiln drying and planing, millwork, wood container and pallet manufacturing, and prefabricated wood buildings is \$120 million and the value of shipments was \$614 million (Figure 8).

**Annual payroll in the solid wood products sector is \$115 million.**

### PULP AND PAPER MANUFACTURING

While the two wood pulp mills in New Hampshire closed in 2005 and 2006, there are still paper manufacturing plants operating that use purchased pulp from outside New Hampshire as raw material. Paper manufacturing in New Hampshire still employs over 1,500. These high paying jobs result in the production of both high-grade papers (writing, printing) and lower grade papers (paper towels).

THE WOOD  
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QUICKLY.

Employees in this sector run the complicated paper machines and the multitude of related machinery (folding, cutting, etc.) located in the paper manufacturing firms. This sector does not account for the hundreds or more employed in the printing companies throughout the state, of which there are many large and small employers.

**The total annual value added for paper manufacturing is \$113 million and the value of shipments is approximately \$360 million (see Figure 8 on page 10).**

### WOOD ENERGY

The wood energy sector in New Hampshire is significant and is growing and diversifying quickly. The sector includes traditional firewood processing, more sophisticated thermal uses of biomass such as wood chips and pellets, primarily for heating, as well as large-scale wood chip use for electricity generation.

Wood fiber and bark burned for energy are referred to as biomass and come from several sources: tree tops and low quality stems of harvested trees (whole tree chips) from forestry harvests, whole tree chips from land clearing or development, and sawmill residue. **Revenues from the sale of biomass chips to the plants in 2010 totaled over \$50 million.**

Please see page 14 for a more thorough review of the growing wood energy sector.

## SECONDARY FOREST PRODUCTS MANUFACTURING

Secondary manufacturing generally refers to the cutting and assembly of lumber into parts or finished products. Paper making could be considered secondary manufacturing as well but we have covered that above instead because it starts with raw material—pulpwood. A diversity of trees growing in New Hampshire contributes to a vibrant secondary industry, composed of several hundred dispersed companies that provide jobs and economic stability to mostly rural communities. Cabinets, moulding, clapboards, furniture, canoe and kayak paddles and many other products are manufactured by this sector.

### FURNITURE AND RELATED PRODUCTS

Furniture and related products is a category of manufacturing that includes wood kitchen cabinet and countertop manufacturing, non-upholstered wood household furniture manufacturing, and custom architectural woodwork and millwork manufacturing. In 2009, 1,245 individuals were employed in New Hampshire in this sector (Figure 10), with an annual payroll of \$56 million. The total annual value added for furniture and related products was \$72 million and the value of shipments was \$165 million (Figure 8).

### CHRISTMAS TREES AND MAPLE SYRUP

Though small, the Christmas tree and maple syrup industry are an important local economic component of the forest products industry in New Hampshire and are well-recognized. In 2009, the wholesale and retail sale of maple syrup and related products totaled \$4.8 million while Christmas trees were \$ 2.4 million.

## SUSTAINABILITY

Concerns about the sustainability of harvesting trees for products have become more acute in recent years, especially as discussion around increased biomass use for energy has reached the legislature and the halls of Congress. The notion of sustainability of use of forest resources centers on the basic definition: use of forest resources today should not impair possible use by future generations—in this case, use of trees to make products and create energy.

The vast majority of timber cut in New Hampshire comes from private forests. Private landowners make the decision about when or whether to harvest. Research from the USDA Forest Service National Woodland Owners Survey shows that timber harvesting is not the primary reason family forest owners own land. Providing wildlife habitat, nature viewing and other non-timber activities generally rank higher as reasons for owning land. Therefore, landowners are not so sensitive to what the market is demanding unless the price changes dramatically. Therefore, biomass which is the lowest value product at the stump (priced between .75 cents and \$2 per ton) is not likely to make landowners react to an uptick in market price.

Loss of forestland to other uses, such as development, is the biggest threat to New Hampshire's forests. Land use change is defined as when trees are harvested and put to various uses but the land changes from forest to non-forest use. Once converted to other uses, land is no longer in forest and cannot provide forest products for society. In recent years in New Hampshire, though slowed by the recent recession, approximately 5,000 acres of forest and farmland have been converted to developed uses each year. There are a multitude of public and private efforts that have been underway for decades to slow this conversion and keep lands in forests and farms. These include land trusts in the private sector and several state programs such as the Land and Community Heritage Investment Program (LCHIP) and federal programs such as the Forest Legacy Program.

Secondly, the rate of harvest of trees relative to the growth of the state's forests is important to the sustainability question as well. Recent data (see Table 2) shows that, in New Hampshire, annual harvests of timber for various products is just over 40 percent of the amount of wood that grows each year in the state's forests. In a nutshell, this means that each year the trees in New Hampshire's forests are growing larger and older. From a statewide perspective, the timber harvests are sustainable. This may not be the case if looking at a single tree species or a small geographic area of the State. And New Hampshire's sustainability record occurs through minimal state government regulation and much private commitment to stewardship.

**TABLE 2.** FOREST GROWTH VS. HARVESTING

STATE	NEW HAMPSHIRE
STANDING VOLUME GROWING STOCK (GREEN TONS)	304,025,663
NET GROWTH GROWING STOCK (GREEN TONS/ANNUAL)	4,947,048
NET GROWTH TOPS & BRANCHES (GREEN TONS/ANNUAL)	1,632,526
TOTAL NET GROWTH (GREEN TONS/ANNUAL)	6,579,574
HARVEST (GREEN TONS/ANNUAL)	2,800,000

SOURCE: USDA Forest Service, *Forest Inventory and Analysis*.

THE NOTION OF SUSTAINABILITY OF USE OF FOREST RESOURCES CENTERS ON THE BASIC DEFINITION: USE OF FOREST RESOURCES TODAY SHOULD NOT IMPAIR POSSIBLE USE BY FUTURE GENERATIONS—IN THIS CASE, USE OF TREES TO MAKE PRODUCTS AND CREATE ENERGY.

AT THE RESIDENTIAL LEVEL, WOOD IS ONE OF MANY FUELS USED FOR HEATING. WOOD HEAT CAN COME FROM EITHER CORDWOOD OR WOOD PELLETS; POPULARITY OF WOOD AS A PRIMARY HEATING SOURCE MAY INCREASE AS NEW TECHNOLOGIES ARE AVAILABLE TO CONSUMERS AND AS OIL PRICES RISE.

## WOOD ENERGY IS A BIG PART OF NEW HAMPSHIRE'S ENERGY ECONOMY

While the last decade has seen wood energy gain increased attention at the national level, New Hampshire has a long history of using wood for thermal and electric energy generation. Many New Hampshire homes use wood as a primary or supplemental form of heating; and community-scale biomass applications, such as heating schools with wood boilers, is growing statewide. New Hampshire has seven operating utility-scale biomass plants, generating renewable electricity.

### THE RESOURCE

Biomass fuel—primarily for biomass electric applications but also for some thermal—is the largest single component of New Hampshire's timber harvest. In 2009, over 1.1 million green tons of biomass chips were harvested from New Hampshire forests; this represents 38% of all volume harvested. This is an increase from 2005, when roughly 860,000 green tons of biomass fuel was harvested<sup>ii</sup> (Figure 7).

### WOOD HEATING

Wood can be used in a variety of thermal applications at the residential and industrial scale. For example, a number of New Hampshire sawmills use wood to heat kilns used to dry lumber. At the residential level, wood is one of many fuels used for heating. Wood heat can come from either cordwood or wood pellets; popularity of wood as a primary heating source may increase as new technologies are available to consumers and as oil prices rise. Harvest data suggest about 75,000 cords are cut commercially for firewood each year but older use data for New Hampshire and new data from Vermont suggest the usage for cordwood is more likely in the 250,000 cords per year range. More primary research is needed in this area to better understand this important use of wood for energy.

In 2009, an estimated 26,000 New Hampshire homes used wood as the primary heating source<sup>iii</sup>; a large number of homes also use wood as supplemental heat. This number has been increasing steadily from 1970, when an estimated 2,000 New Hampshire homes used wood as a primary heating source.

**FIGURE II: NEW HAMPSHIRE HOMES HEATING WITH WOOD**



SOURCE: U.S. Census Bureau, 2005 – 2009 American Community Survey, New Hampshire—Selected Housing Characteristics: 2005 – 2009

Wood is also becoming an increasingly popular fuel for community-scale heating, such as schools and municipal buildings. For example, in 2010 the Winnisquam School District began using biomass fuel to heat the high school in Tilton, New Hampshire. Using wood for heat is a highly efficient use of biomass fuel, with the majority of the energy in the wood captured and put to use. Biomass thermal applications of this scale generally use 1,000 to 2,000 green tons per year, and are an important opportunity to generate energy from renewable sources.

In addition to cordwood and community-scale heating, New Hampshire’s capitol complex and parts of Concord’s downtown are heated by Concord Steam, which uses wood to provide district heat to a portion of the city. District heating, often used in a campus environment, has opportunities for expansion in the state’s cities and town centers.

New Hampshire also has two pellet manufacturers, located in Jaffrey and Barnstead, which take in raw wood and manufacture a dried, densified pellet used in heating. Wood pellets, which can be used in specifically designed stoves, furnaces or boilers, provide an easy to handle, consistent and renewable way to generate heat.

### BIOMASS ELECTRIC

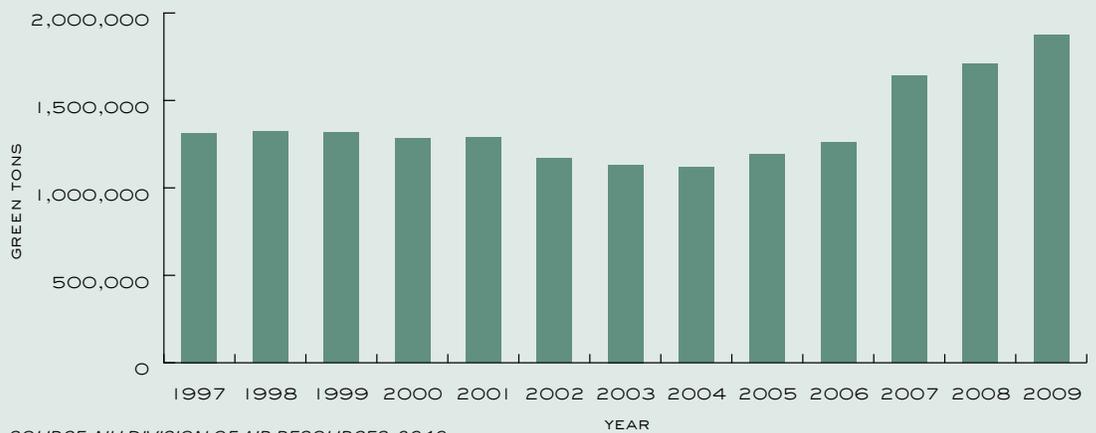
New Hampshire currently has 7 operating wood-fired power plants, that combined provide over 150 MW of generation capacity. Five of these plants have been in near-continuous operation for over 20 years, providing New Hampshire residents with renewable power from the state’s forests. Another facility was recently converted from coal to wood, replacing an imported fuel with biomass that is local and renewable. In addition to existing biomass electric projects, several more facilities are in various stages of development and have the potential to grow this market.

New Hampshire biomass plants used roughly 1.9 million green tons of wood fuel in 2009, up from 1.3 million green tons in 2000<sup>iv</sup>. Much of the wood used at these facilities comes from New Hampshire timber harvesting operations, and some is purchased from suppliers in neighboring states.

NEW HAMPSHIRE CURRENTLY HAS SEVEN OPERATING WOOD-FIRED POWER PLANTS, THAT COMBINED PROVIDE OVER 150 MW OF GENERATION CAPACITY.

IN MANY APPLICATIONS, BIOMASS IS COST COMPETITIVE, AND CAN PROVIDE CONSUMERS WITH AN OPPORTUNITY TO SAVE MONEY, USE A RENEWABLE FUEL, AND SUPPORT THE LOCAL ECONOMY.

**FIGURE 12: USE OF WOOD TO GENERATE ELECTRICITY IN NEW HAMPSHIRE**



SOURCE: NH DIVISION OF AIR RESOURCES, 2010

### BENEFITS OF BIOMASS

Biomass energy when used for generation of electricity, heat, or (someday) liquid fuel has a number of benefits. Biomass is a locally sourced fuel, and—unlike most other energy sources used in New Hampshire—benefits the local economy through jobs in the harvesting, processing and use of wood. There are often emissions reductions associated with biomass, depending upon the application and the fuel being replaced or offset. Biomass fuel is made from low-grade wood—generally not suited for higher value markets—and provides for landowners and land managers options and opportunities when practicing forestry. In many applications, biomass is cost competitive, and can provide consumers with an opportunity to save money, use a renewable fuel, and support the local economy.

**TABLE 3. MAJOR USERS OF WOOD FOR ENERGY IN NEW HAMPSHIRE**

TOWN	TYPE
ALEXANDRIA	ELECTRIC
ASHLAND	ELECTRIC
BETHLEHEM	ELECTRIC
PORTSMOUTH	ELECTRIC
SPRINGFIELD	ELECTRIC
TAMWORTH	ELECTRIC
WHITEFIELD	ELECTRIC
BARNSTEAD	PELLET
JAFFREY	PELLET
CONCORD	DISTRICT HEAT
DIXVILLE NOTCH	DISTRICT HEAT
ANDOVER	COMMUNITY SCALE (HEAT)
GREENFIELD	COMMUNITY SCALE (HEAT)
HANOVER	COMMUNITY SCALE (HEAT)
MARLBOROUGH	COMMUNITY SCALE (HEAT)
PEMBROKE	COMMUNITY SCALE (HEAT)
PENACOOK	COMMUNITY SCALE (HEAT)
SUTTON	COMMUNITY SCALE (HEAT)
TILTON	COMMUNITY SCALE (HEAT)



SOURCES FOR THE WOOD ENERGY SECTION:

<sup>1</sup> New Hampshire Division of Forests and Lands, 2009 Report of Cut Data.

<sup>2</sup> New Hampshire Division of Forests and Lands, 2005 Report of Cut Data.

<sup>3</sup> U.S. Census Bureau, 2005 – 2009 American Community Survey, New Hampshire – Selected Housing Characteristics: 2005 – 2009.

<sup>4</sup> New Hampshire Department of Environmental Services, Air Resources Division, 2010.

THE RECREATION  
ACTIVITIES INCLUDED  
IN THIS REPORT  
CONTRIBUTE \$1.35  
BILLION DOLLARS  
IN SALES TO THE  
NEW HAMPSHIRE  
ECONOMY.

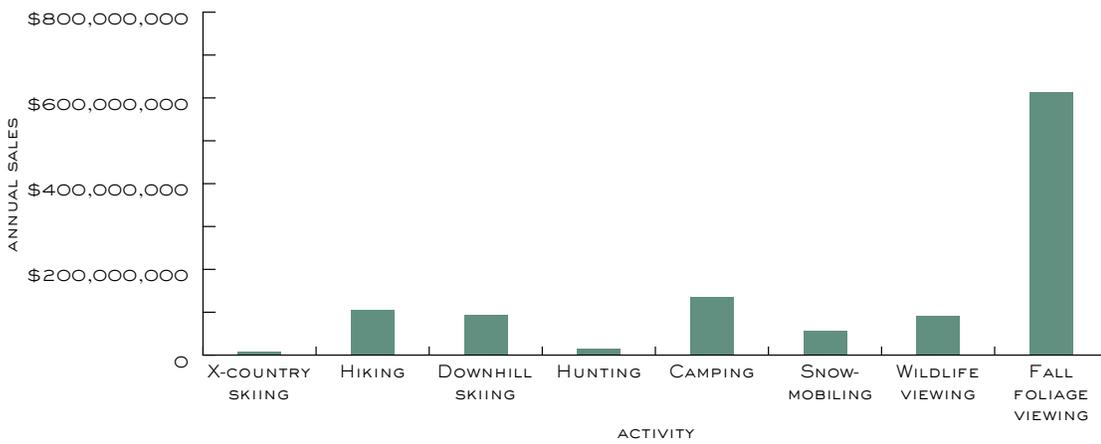
## FOREST-BASED RECREATION

Logically, a large percentage of recreation and tourism activities in New Hampshire are linked to the forest because it so dominates the landscape. In most places where people recreate, forests are at the site or nearby or in clear view of the location. Yet estimating the specific contribution made by the forest environment towards recreation and tourism expenditures is still a challenge. The recreation activities selected for this report use the same methodology as those used in our similar reports in 2004 and 2007. The activities that take place primarily in the forest environment include camping, hiking, hunting, downhill skiing, cross-country skiing, snowmobiling, fall foliage viewing, and wildlife viewing. Attributing 100% of the economic contribution of these activities to forests is an overstatement, but 50% is an understatement. In his analysis for this report, Dr. Hugh Canham assumed three-quarters (75%) of each activity would not take place if there were no forests. That percentage is 100% for fall foliage viewing.

Further description of the methodology used is helpful because the data sources are not as straightforward as those used for forest products. As with the forest products estimates, the most up-to-date data was used for recreation and tourism. Estimates of number of visitor, or participant, days engaged in for each selected recreation activity were drawn from the National Survey on Recreation and the Environment (NSRE) (Cordell et al 2004) and by updating the data in the previous studies by the percent increase in population as determined from U.S. Census projections (U.S. Bureau of the Census). Expenditure data per participant-day are an average of (1) updated amounts from the 2007 study using the change in Consumer Price Index (U.S. Bureau of Labor Statistics) and (2) updated data on outdoor recreation spending (Stynes and White, 2006). For hunting and wildlife viewing no direct number of visitor-days was developed. Instead, direct estimates of expenditures were updated from those in the 2006 National Survey of Fishing, Hunting, and Wildlife-Related Activities (U.S. Department of Interior 2006). Employment impacts were calculated by first taking estimated 2009 sales and deflating them back in time and using a sales to employment ratio. For payroll, the estimate of sales to payroll was applied directly to the 2009 sales results.

**The recreation activities included in this report contribute \$1.35 billion dollars in sales to the New Hampshire economy. The portion attributed to the forest resource is \$1.12 billion dollars.** These are distributed among purchases at food and beverage stores, automobile gasoline service stations, accommodations (lodging places), eating and drinking establishments, and a host of other retail trade or service sectors. Fall foliage viewing is the largest contributor with over 45% of the total sales, and is followed by, in order, wildlife viewing, cross country skiing, snowmobiling and hunting (Figure 13). **About 11,401 people are directly employed in recreation and tourism as a result of the forest with payrolls of \$187 million annually due to forest-related recreation in New Hampshire.** All of these numbers have trended slightly upwards since the 2007 and 2004 reports were issued. In the 2007 report (2005 data), recreation/tourism activities related to forests contributed \$1.07 billion annually while in 2004 (2002 data) it was \$940 million annually.

**FIGURE 13.** ANNUAL SALES IN OUTDOOR RECREATION ACTIVITIES IN NEW HAMPSHIRE ATTRIBUTED TO FORESTS—2009



SOURCE: *Direct Economic Impact from Forest-Related Recreational Activities in New Hampshire for 2009*, Dr. Hugh Canham.



## POSITION OF FOREST-BASED ECONOMY IN NEW HAMPSHIRE

Table 4 provides a comparison of the forest-based manufacturing sector with the total manufacturing sector in New Hampshire (also see Figure 9). An important note in Table 4, in the asterisks to the table, an interesting fact is noted about the economic activity level in the forest products industry during the recession period beginning in 2008. Compared to data from 2005, in 2009 the forest products economy performed better than the manufacturing economy as a whole. All manufacturing was at about 50% of 2005 levels in 2009 while forest products manufacturing was over 64% of 2005 levels.

**TABLE 4.** GROSS STATE PRODUCT, FOREST-BASED MANUFACTURING, NEW HAMPSHIRE, 2009

TYPE	MILLIONS OF \$
WOOD PRODUCTS MANUFACTURING	\$120
FURNITURE AND RELATED PRODUCT MANUFACTURING	\$72
PAPER MANUFACTURING	\$113
FORESTRY AND LOGGING	\$20
WOOD ENERGY	\$50
<b>TOTAL</b>	<b>\$375*</b>
GSP, MANUFACTURING, NEW HAMPSHIRE	\$6,453**
<b>GSP TOTAL</b>	<b>\$59.400</b>

\*This is over 64% of what the value of these forest sectors was in 2005.

\*\*This is just over 50% of what the value of manufacturing was in 2005.

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The North East *State* Foresters Association (NEFA) is the State Foresters of Maine, New Hampshire, Vermont, and New York cooperating with the U.S. Forest Service State & Private Forestry on issues of common interest (see [www.nefainfo.org](http://www.nefainfo.org)).

This booklet is part of a series on the economic importance and value of forest-based manufacturing and forest-related recreation and tourism of the four states in the NEFA region. Past reports can be viewed at [www.nefainfo.org](http://www.nefainfo.org). Economic multipliers were **not** used in this or any past reports and the economic benefits associated with forest values such as clean water, carbon, soil stabilization and regional green space, among others, are also not included in this report. As a result, the final values are very conservative.

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