



The Economic Importance and Wood Flows from Vermont's Forests, 2007*

North East *State* Foresters Association



Forests dominate Vermont's landscape, covering over 78% of the state. Our forested ecosystem provides the basis for biological diversity, natural communities, scenic landscapes and recreational opportunities. As a natural resource, forests provide an important economic base for employment, tourism and recreation, and support a diverse forest products industry.

We live in a society that has become increasingly detached from the natural environment. Fortunately, Vermonter's appreciation for the forest and wood products remains strong. Add to this the growing interest in the ecosystem services provided by our forests, and we can begin to see the important role Vermont's forest play in our economy today and into the future. From firewood to fine furniture, carbon sequestration to clean water, our forests have value. I hope this report adds to your understanding of the wonderful resources of Vermont's forests, as it describes the economic contributions of forests to the state.

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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 – New York, Vermont, New Hampshire and Maine. A regional report, and the individual state reports, are also available online at www.nefainfo.org. The reports include an overview of the land base in each state and a summary of federal and state data from 2005 or newer that provide a picture of the forest-based manufacturing and forest-related recreation and tourism sectors of the economy.

The reports do not include indirect or induced multipliers, so all data provided represent direct contributions to the economy. The reports update a similar series produced by NEFA in 1995, 2001 and 2004. Different data sources and methods to calculate values were used for the 1995 and 2001 reports, so values from the current reports can only legitimately be compared to the 2004 reports. The economic benefits associated with forest values such as clean water, soil stabilization and regional green space, among others, are not included in this report, so the final values are very conservative.

* Published August, 2007 using 2005 or better data.



Highlights

- The annual contribution of forest-based manufacturing and forest-related recreation and tourism to the Vermont economy is over **\$1.5 billion**.
- Forest-based manufacturing contributes **\$1.0 billion in value of shipments** to the economy in 2005 or **9.3%** of Vermont's total manufacturing sales.
- The forest-based manufacturing industry provides employment for **6,379** people and generates a payroll of over **\$207.4 million**.
- Forest-based recreation and tourism provides employment for over **6,300** people and generates payrolls of **\$93.0 million**.
- Revenues from forest-related recreation and tourism activities totaled **\$485 million** in 2005.
- Vermont landowners received estimated stumpage revenue in 2005 of **\$31.5 million**.
- The sale of Christmas trees, wreaths and maple syrup contributed approximately **\$22 million** in 2005.
- Wood provides the energy for approximately **6% of electrical and heating use** in Vermont.
- Each 1,000 acres of forest land in Vermont supports 1.4 forest-based manufacturing, forestry and logging jobs and 1.4 forest-related tourism and recreation jobs.

Table 1. ANNUAL REVENUES FROM VERMONT'S FORESTS

	Total values and per acre basis	
	Millions of \$	\$ per acre
Forest-based manufacturing value of shipments	\$998.9	\$224
Forest-related recreation and tourism	485.0	109
Christmas trees/maple products	22.4	2
Totals	\$1,506.3 million	335

The Forest Resource in Vermont

Vermont's land area is 5.92 million acres. Seventy-five percent or 4.46 million acres, is forested. The USDA Forest Service classifies 4.35 million acres as timberland or land that is fertile and accessible enough to produce wood as a crop and is not withdrawn from timber harvesting by statute or regulation (table 2).

The majority of timberland in Vermont is privately-owned (4.0 million acres or 81%) by family forest owners or business concerns. Local, State and Federal government owns just over 18.7% or 919,440 acres of Vermont's forest (see figure 1).

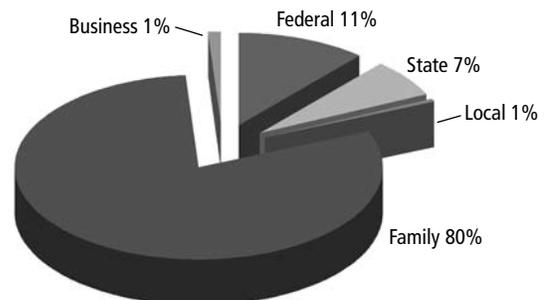
Table 2. TOTAL LAND AREA, FOREST LAND ACRES AND TIMBERLAND ACRES, VERMONT, 2006

Total land area	Forest land	Timberland
5,919,702	4,462,835	4,352,855

Source: USDA Forest Service, Forest Inventory & Analysis, 2005

Figure 1. TIMBERLAND OWNERSHIP, VERMONT, 2006

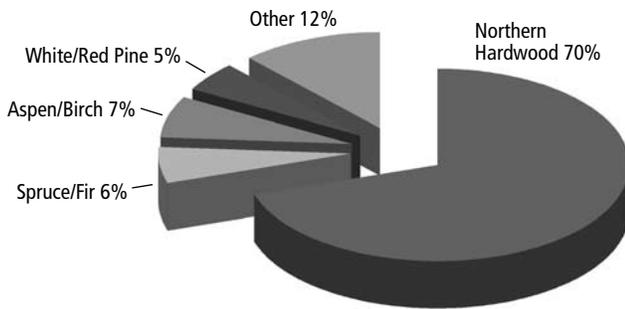
Source: USDA Forest Service, Forest Inventory & Analysis, 2005



Forest types are areas of forest where certain tree species grow in association with one another due to similar growing requirements. The northern hardwood forest type is the most common in Vermont (figure 2) and covers 2.3 million acres (70%), followed by the white/red pine, spruce/fir and aspen/birch types.

Figure 2. FOREST TYPES, VERMONT, 2005

Source: USDA Forest Service, *Forest Inventory & Analysis, 2005*



VERMONT'S FOREST INDUSTRY

Vermont's forest products industry contains a wide variety of manufacturers, from hardwood and softwood sawmills, two biomass energy plants, veneer mills and numerous secondary wood manufacturing producers. As every year passes, however, challenges mount for this industry. Those in the industry who continue to do well are not fearful of trying new methods, investing in the latest in equipment and seeking out the best employees. Challenges being experienced by all sectors result from global competition, high energy costs, high insurance costs, recruitment and retention of workers, among other factors.

Despite this, the forest products industry continues to produce at high levels compared with historic production highs in the 20th century. Investment in the latest technology in existing forest products manufacturing sectors as well as developing new markets, and exploring new products such as biofuels, are key avenues to a successful future for this industry.

Forest-based Manufacturing

Vermont's forest-based manufacturing system consists of:

- timber harvesting and associated trucking,
- primary manufacturing and
- secondary manufacturing.

Those large and small operations in the timber harvesting sector cut the trees down and market the logs, which are processed at sawmills in Vermont or exported for further processing. 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. While several paper mills still exist in Vermont, no pulp mills are present and two in the north country of neighboring state New Hampshire closed in 2005 and 2006. As a result, pulpwood harvested is shipped to mills primarily in New York, although some shipments also occur to Quebec, Canada and Maine.

Another primary manufacturer is the wood energy industry which takes whole tree wood chips or residues such as chips and sawdust from sawmills and burns the wood material in a boiler to produce steam and then electricity. Sometimes these manufacturers sell or use the steam for other manufacturing processes such as dry kilns or greenhouses or other steam users. Vermont has two large-scale wood energy plants in Ryegate and Burlington and nearly fifty very small scale users such as schools. In the region, Vermont has more small scale users of biomass for energy (chiefly heat), than any other state.

This report includes several economic indicators and metrics on forest-based manufacturing that are provided by the federal government. Employment and payroll data are taken from the US Department of Commerce, Bureau of Economic Analysis, Regional Economic Accounts, 2005. Value-added contributions and the value of shipments are provided by the US Bureau of Census, Annual Survey of Manufacturers, 2006 (2005 data).

PRIMARY MANUFACTURING

The conversion of trees (roundwood) or parts of trees into lumber, veneer, pulp and paper or energy starts with the primary manufacturing sectors. In Vermont, the sawmill and wood energy industries are the largest users of wood. The wood energy sector has seen a renewed resurgence as fossil fuel prices have skyrocketed. The state's two large-scale wood energy plants built in the 1980s may see competitor plants built in the next decade. Wood-fired energy production is, once again, economically feasible and popular given its renewable source. Sawmills, the other larger user of wood at the primary manufacturing level, saw nearly twice as much hardwood (maple, birch, ash, etc.) as they do softwood (white pine, spruce and fir and hemlock). This is to be expected given that Vermont's forests are dominated by hardwood species. Over thirty large, commercial-scale sawmills are found in the Green Mountain state.

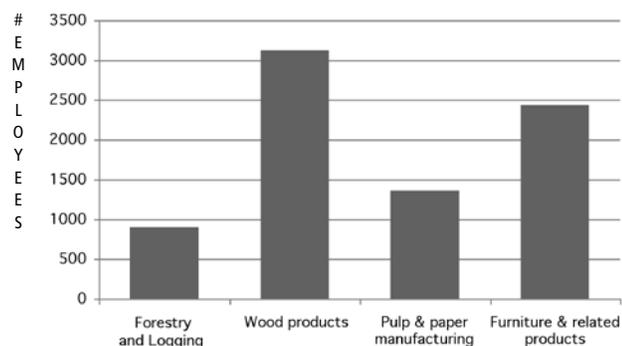
Employment and Production

The forestry and logging sector employed approximately 800 individuals in Vermont in 2005 (figure 3). Employment in wood products was just over 3,100 while paper was approximately 1,400. Furniture and related products employed 2,500.

Figure 4 shows payroll, value added and value of product shipments for Vermont's forest products industry. All figures are from 2005 data. Payroll for forestry and logging was \$32,009,000. Payroll in the wood products sector (includes sawmills, wood energy and secondary solid wood manufacturing) was \$76,559,000 and \$75,919,000 for furniture and related products.

Figure 3. EMPLOYMENT IN FOREST-BASED MANUFACTURING, VERMONT, 2005

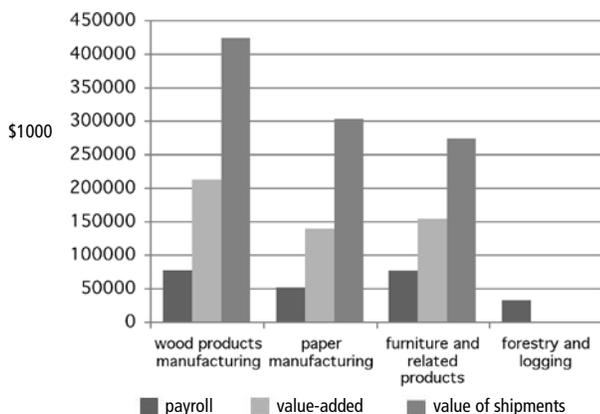
Source: US Dept. of Commerce, Bureau of Economic Analysis, 2005 & US Dept. of Labor, 2005



Further review of Figure 4 occurs in sections that follow.

Figure 4. PAYROLL, VALUE-ADDED AND VALUE OF SHIPMENTS FOR FOREST-BASED MANUFACTURING INDUSTRIES, VERMONT, 2005

Sources: US Dept of Commerce, Bureau of Economic Analysis, 2006



Foresters

Foresters are key participants in the forest products sector. Industrial forestlands, biomass fueled electric generating plants, conserved forestlands and use value appraisal enrolled properties all rely on foresters either on account of statute or because of standard practice. Somewhere between a third and forty percent of the private forestland is associated with professional forest management. However, employment and economic data are not reported in ways that document forester numbers or the economic value of their work. The number of private sector foresters is estimated between 100 and 120. No income information is available.

Logging Sector

The logging industry in Vermont is an important source of employment. Approximately 700 loggers and truckers are employed in Vermont, usually within small logging companies. Loggers produce all the products from the forest for which markets exist in the northeast including: wood

chips for energy, pulpwood (though no pulp mills operate in the state), sawlogs for the many sawmills and veneer for the two veneer mills in Vermont. Logging contractors range from the small single-person companies using chainsaws and a skidder or horses, to large operations that use the latest in cut-to-length logging machinery that cuts, de-limbs and cuts to length trees in the woods. These operations usually use forwarders to get the wood to the landing. A forwarder is a large truck-like machine that has a large bed on which logs and other cut material are placed for driving to the landing where the wood is loaded onto log trucks or tractor trailers to get them to market.

Production of Lumber and Related Solid Wood Products

In 2005, sawmills in Vermont processed 115 million board feet of hardwood sawlogs and 69 million board feet of softwood sawlogs into lumber (figure 5). The total value added for wood products manufacturing which also includes wood preservation, millwork, wood container and pallet manufacturing, and prefabricated wood buildings was \$211.6 million and the value of shipments was \$423.6 million (figure 4).

Pulp and Paper Manufacturing

Since 2004 there has been a major change in the pulp mill sector of manufacturing in the Northern Forest region – especially as it relates to pulp markets for timber harvested in Vermont. A small pulp mill in Groveton, NH and a larger pulp mill in Berlin, NH both closed (2005 and 2006). These mills used approximately 1.2 million tons of pulpwood when both were in operation, a sizable portion of which came from Vermont trees. Vermont loggers and landowners also utilize the two pulp mills in New York at Ticonderoga and Glens Falls.

Wood Energy

Wood provides approximately 6% of electrical and heating needs in Vermont. Wood fiber and bark burned for energy are referred to as biomass and come from two sources: tree tops and low quality stems of harvested trees (whole tree chips) which come from forestry harvests and land clearing or development and sawmill residue. The two biomass plants in Vermont located in Ryegate and Burlington utilize approximately 900,000 tons of wood chips per year. Nearly 200,000 tons of that wood came from Vermont forests. The biomass market provides an important outlet for low-grade wood, a material neither suitable nor economical to process for lumber or paper. Revenues from sales of biomass chips in 2005 in Vermont totaled \$5 million (assuming \$25.00/ton). Though no recent data has been collected on the amount of residential firewood harvested and processed, the Vermont Department of Forests, Parks & Recreation estimates that

approximately 275,000 cords were harvested and sold in 2005. This product netted landowners approximately \$1.4 million in stumpage.

SECONDARY MANUFACTURING

Secondary manufacturing refers to the drying, planing, cutting and assembly of lumber into parts or finished products. A diversity of trees growing in Vermont contributes to a growing secondary industry, composed of over five-hundred dispersed companies that provide jobs and economic stability to mostly rural communities. Cabinets, moulding, clapboards, furniture, canoe and kayak paddles and many other small wood products are manufactured by this sector.

Furniture and Related Products

Furniture and related products, 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 2005, 2,433 individuals were employed in this sector (figure 3), with a payroll of \$75.9 million. The total value added for furniture & related products was \$153.3 million and the value of shipments was \$273.0 million (figure 4).

ASSOCIATED FOREST PRODUCTS

Sales of maple products in 2005 totaled \$11.4 million. Estimated sales of Christmas trees and wreaths totaled \$11 million.

THE POSITION OF FOREST-BASED MANUFACTURING IN THE VERMONT ECONOMY

Tables 3 & 4 provide a comparison of the forest-based manufacturing sector with the total manufacturing sector in Vermont. Forest-based manufacturing provides 12% of the manufacturing payroll and employs 16% of manufacturing employees. This sector provides 9% of value added receipts in manufacturing and 9% of value of shipments receipts. These percentages have not changed appreciably since the 1997 or 2001 Economic Census, which was the source of data for NEFA's previous report. Since forest-based

manufacturing continues to provide equivalent percentages of employees, payroll, value added and value of shipments for Vermont, the sector is still positioned highly in the manufacturing economy.

Table 3. GROSS STATE PRODUCT, FOREST-BASED MANUFACTURING, VERMONT, 2005

	millions of \$
Wood products manufacturing	\$211.6
Furniture and related product manufacturing	\$153.3
Paper manufacturing	\$138.8
	Total \$503.7
GSP, Manufacturing, Vermont	\$5,418.8
GSP, Total for Vermont	\$23,065.0

Table 4 provides a comparison of the forest-based manufacturing sector (excluding logging) with the total manufacturing sector in Vermont. Forest-based manufacturing provides 12% of the manufacturing payroll and employs 16% of manufacturing employees. This sector provides 6% of value added receipts in manufacturing and 7% of value of shipments receipts.

TIMBER HARVESTING & WOOD FLOWS

In 2005, 118.6 million board feet¹ of hardwood sawlogs and 92.8 million board feet of softwood sawlogs were harvested from the forests of Vermont. In that same year, 48,468 cords of hardwood pulpwood and 72,358 cords of softwood pulpwood were harvested in the State. Over 189,607 green tons of whole tree chips were harvested in 2005 as well. The estimated value of these harvested volumes to landowners in stumpage² equals \$33 million. Figure 5 shows the flows of wood from the major categories of wood harvested – all calibrated in cords for easy comparison. The map that is part of Figure 5 shows the flows graphically.

The wood flows shown on the map are characteristic of forest product movements for the past few decades. The volumes in each direction and of each product do change over time but the thorough integration of the state within the regional economy is a long-term reality.

Table 4. FOREST-BASED MANUFACTURING AND OTHER MANUFACTURING INDUSTRIES, VERMONT, 2005

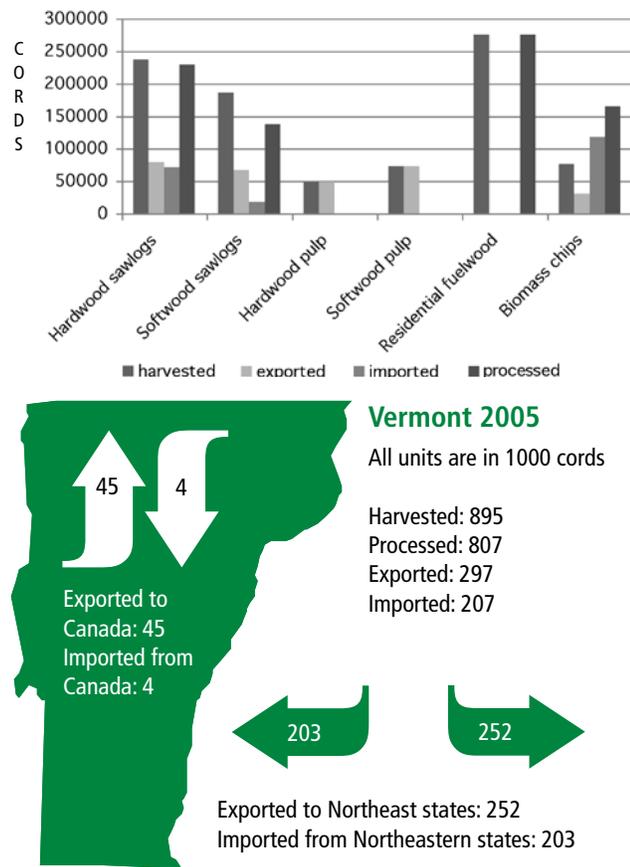
	# employees	% of manufacturing employees	Payroll (\$1000)	% of manufacturing payroll	Value added (\$1000)	% value added all manufacturing	Value of shipments (\$1000)	% of value of shipments all manufacturers
Forest-based manufacturing	6,379	16%	207,470	12%	503,767	9%	998,874	9%
All manufacturing	38,795		1,762,834		5,418,786		10,686,097	

Source: US Department of Commerce, Bureau of Economic Analysis, 2005 & Annual Survey of Manufactures, Nov. 2006 US Department of Commerce (2005 data)

1 Board foot equals a solid piece of wood 1 inch thick by 12 inches wide by 12 inches long. 2 Stumpage – value landowners receive for their trees when they are sold in a timber sale.



Figure 5. WOOD FLOWS IN VERMONT, 2005



Since the early 1980s, concern has grown over the shipment of sawlogs outside the state. The forest products industry and its allies recognize the lost employment and value-adding opportunities associated with the movement of logs out of Vermont to be processed elsewhere. Since the inception of this concern, log movements have reached a point where almost all of the spruce and fir harvested in Vermont leaves the state for processing. Canada developed throughout the 1980s and the early 1990s as the destination for the majority of Vermont spruce and fir logs.

During the 1990s, shipments of hardwood and white pine logs out of the state have grown, though the diversity of destinations has been greater than for spruce and fir. During the same period, shipments of white pine and hardwood logs into Vermont have increased.

The sawmill sector in Vermont has evolved to focus more on hardwoods and white pine. Smaller sawmills have traditionally been more able to compete when sawing hardwoods and/or white pine. Over the past 20 years, spruce and fir markets have pushed the sawmill sector to rely on larger, more automated mills in order to remain competitive.

All pulpwood produced in Vermont is shipped outside the state. Vermont is host to several paper making businesses but none has pulp processing capability.

Forest-Related Recreation and Tourism

In Vermont, as one of the most heavily forested states in the nation, most recreation and tourism activities are linked to the forest, but it is difficult to estimate the specific contribution made by the forest environment towards recreation and tourism expenditures. The recreation activities selected for this report use the same methodology as those used in our similar report in 2004. The activities that take place primarily in a 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 was raised to 100% for fall foliage viewing.

Estimates of number of visitor, or participant, days engaged in for each selected recreation activity were drawn from the latest National Survey on Recreation and the Environment (NSRE, 2004) and by updating data from the 2004 NEFA reports. For camping and hiking, the average number of visitor days per visit for the North region in the NSRE was used. These were updated to 2005 by the percent increase in population as determined from U.S. Census projections (US Bureau of the Census). For downhill skiing, cross country skiing, sightseeing (fall foliage viewing) and snowmobiling, the numbers used in the 2000 study (which were 1997 data) were updated using trend increases contained in the NSRE for 2000 and extrapolated to 2005 assuming the trends between 1994 and 2001 would hold through 2005. Statewide Comprehensive Outdoor Recreation Plans (SCORP) for each state were used for the 2001 NEFA reports, but these are no longer available. Expenditure data per participant-day were updated using the Consumer Price Index (US Bureau of Labor Statistics). (The factor for converting 1997 prices to 2005 prices is 1.24.) There were no direct number of visitor-days developed for hunting and wildlife viewing. Instead, direct estimates of expenditures were taken from the National Survey of Fishing, Hunting and Wildlife-Related Activities (US Dept. of Interior, 2004).

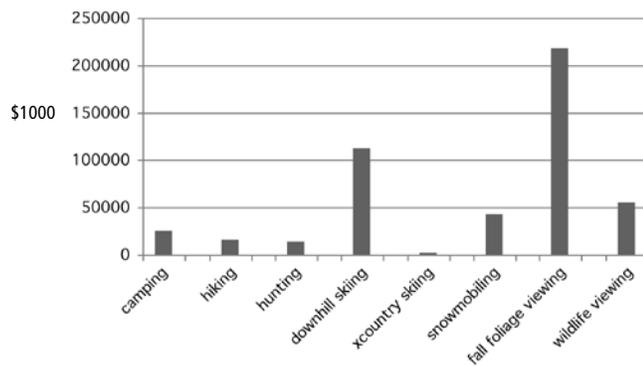
Estimates of impacts on employment and payroll were developed from ratios of employment or payroll to sales based on data for these in the 1997 Economic Census of the U.S. Bureau of the Census following procedures used in the 2000 report. Employment impacts were calculated by first taking estimated 2005 sales and deflating them back to the 1997 datum then applying the calculated ratio of sales to employment. For payroll, the estimate of sales to payroll

was applied directly to the 2005 sales results. The rationale for this is that employment does not increase due to nominal dollar increases but rather will increase due to real (deflated) dollar output increases.

The recreation activities included in this report contribute \$649 million dollars in sales to the Vermont economy. The portion attributed to the forest resource is \$485 million 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 nearly half of the total sales, and downhill skiing is second (figure 6). About 6,300 people are directly employed with payrolls of \$93 million due to forest-related recreation in Vermont.

Figure 6. FOREST-RELATED RECREATION AND TOURISM EXPENDITURES, VERMONT, 2006

Source: NEFA, 2006



Conclusion

The economic importance of Vermont's forest is significant. In a predominantly rural state, the forest provides important jobs and payroll for 13,000 people and an important source of income for forest landowners. The sale of forest products adds \$1 billion to the state's economy. Additionally, the forest attracts millions of visitors to the state for recreation and tourism activities, contributing almost \$500 million. Altogether, the contribution of forest based manufacturing and forest-related recreation and tourism to Vermont's economy is over \$1.5 billion.

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NORTH EAST STATE FORESTERS ASSOCIATION (NEFA) NEFA'S MISSION

Encourage sound decisions about the management and use of rural and urban forest resources in the NEFA region by: developing quality data and information about the forests of the region, identifying significant regional trends, assist the states in broadening awareness of forest health and sustainability issues, providing a regional context for state and local decisions about forest resources and analyzing the environmental, social and economic impacts of forest land use.

This series of reports, as well as other NEFA publications, and additional information about NEFA can be found at www.nefainfo.org. NEFA is the State Foresters of New York, Vermont, New Hampshire and Maine cooperating with the US Forest Service, State and Private Forestry.



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