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Ohio's Forest Economy

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Highlights

- The state of Ohio has approximately 8.05 million acres under forest cover, which is 30.7% of Ohio's land area.
- Nearly three-quarters of Ohio's forestland, 5.8 million acres, is held by 336,000 nonindustrial private landowners.
- The forest volume in Ohio is 96.3% hardwoods and 3.7% conifers.
- Ohio's timber volumes have increased significantly over the past 20 years. Growing stock volume has increased 37.4% and sawtimber volumes have increased 67.6%.
- The ratio of net growth (total growth minus mortality) to removals for growing stock was 2.13:1.00.
- Ohio's sawtimber grew 1.86 billion board feet of wood while 750 million board feet of sawtimber were harvested in 2010. Net growth to removals ratio was 2.49:1.00.
- Inflation-adjusted stumpage prices for many of Ohio's commercial hardwood species have been increasing since 1960. Delivered sawlog prices have largely trended upward for only the higher quality logs. Decreasing trends for some species have been reported over the past twenty years.
- Ohio's forest products industry contributed an estimated \$22.05 billion to Ohio's economy in 2010. Total employment was 118,000 full-time and part-time jobs, with wages and benefits amounting to \$5.69 billion.
- Forestry and logging's industrial outputs contributed an estimated \$434 million in outputs to Ohio's economy. These sectors employed 4,200 people and paid \$106 million in wages and benefits.
- Processors of solid wood products contributed an estimated \$3.72 billion in outputs to Ohio's economy.

These sectors employed 27,700 people and paid \$1.12 billion in wages and benefits.

- Pulp and paper producers' industrial outputs contributed an estimated \$15.15 billion to Ohio's economy. These sectors employed 65,300 people and paid \$3.50 billion in wages and benefits.
- Wood furniture manufacturers' industrial outputs contributed an estimated \$3.14 billion to Ohio's economy. These sectors employed 23,900 people and paid \$1.05 billion in wages and benefits.
- Western Ohio's forest products industry generated the largest impacts in terms of employment and dollars. The industry's contributions as a percent of the regional economy were larger in southeast Ohio. Northeast Ohio was second in both actual and relative contributions.
- Total forest products exports in 2010 amounted to \$8.20 billion. Domestic shipments (within the United States to states outside Ohio) totaled \$7.24 billion while \$964 million of products were shipped internationally.

Why Should Our Woodlands Be Managed?

An abundance of forested acres are present in Ohio. These woodlands provide community support by producing economic activity in 26 forest industrial sectors. Properly managing your woodland improves forest health, aesthetics, and wildlife habitat. It also provides soil stabilization, clean water, self-satisfaction, and a potential source of income.

Managing timber requires less long-term inputs compared to many other land uses. You are able to obtain cost share funds to establish your woodland, tax credits while managing your forest property, and preferable tax treatment at harvest. Moreover, standing timber is a

stable form of wealth, often comparable in performance to mutual fund investments.

Some of the many contributions Ohio's forests and its forest products industry provide to the state's economy are discussed in this fact sheet. Key figures and statistics are also provided. Figures 1–7 were constructed using data from the 2010 forest survey database provided by the United States Forest Service's Forest Inventory and Analysis. Figure 8 was obtained from the Ohio Timber Price Report. Tables 1–8 and Figures 9–11 were developed from data analyzed using IMPLAN®.

Forestland

The state of Ohio has approximately 8.05 million acres of forestland, land that is at least 10% stocked with trees and is not being used for non-forestry purposes. This is two times the number of forested acres in 1900. Forest acreages have been increasing since the 1942 forest survey. The rate of increase has slowed over the past twenty years.

Forest acreage increases from the northwest to the southeast. Most of this land area is located east and south of the glacial line in the western foothills of the Appalachian Mountains (Figure 1). Eight of the top nine forested counties are located in southeastern Ohio. Some of this forestland includes the Wayne National Forest along with several state forests.

Forestland Ownership

Most of Ohio's forestland is privately owned, 6.97 million acres or 86.4% of the total forest area (Figure 2). Much of the privately owned forestland, 5.8 million acres, is controlled by 336,000 family forest owners. Over half, 57.7%, own less than 10 acres while 35.5% own between 10 and 50 acres. The U.S. government owns 290,000 acres and the state of Ohio owns 510,000 acres. A limited number of family-owned forested acres are being actively managed.

Composition

Hardwood tree species dominate Ohio's landscape. Hardwoods make up 96.3% of Ohio's forest volume while conifers account for the remaining 3.7%. There are many types of forests found in the state, with oak/hickory being the most common (Figure 3). Ohio's forests are growing over 4.1 billion trees (Figure 4), which include approximately 100 species of hardwoods and 25 species of softwoods. The most abundant in number across diameter classes are the hard maples (sugar and black) and soft maples (red and silver), followed by ash, the red oaks and white oaks, yellow-poplar, and hickory. Maples are becoming more predominant in the lower diameter classes.

Figure 1. Ohio's forested acres.

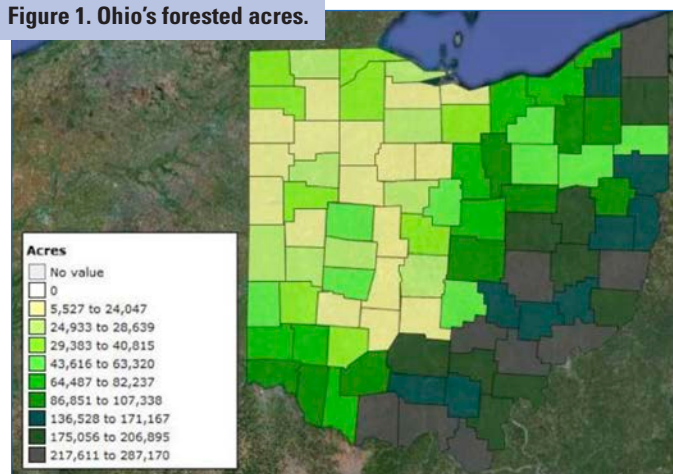


Figure 2. Ownership of Ohio's forestland.

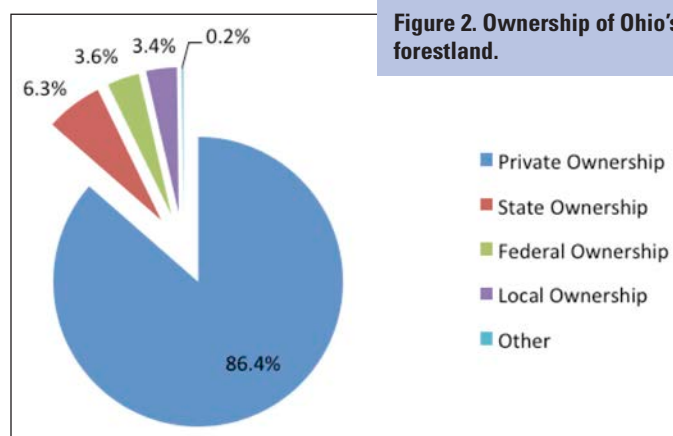


Figure 3. Distribution of Ohio's forest types.

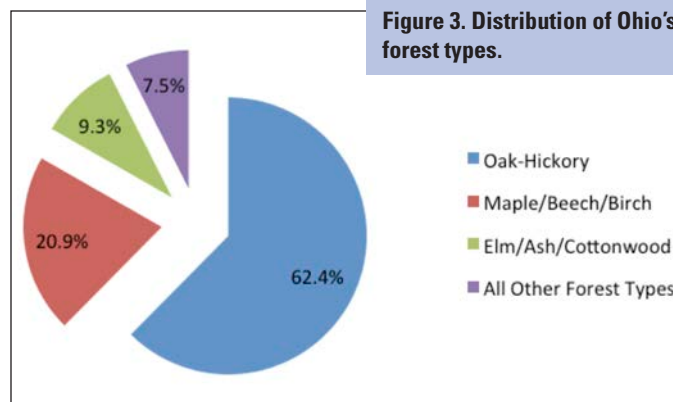
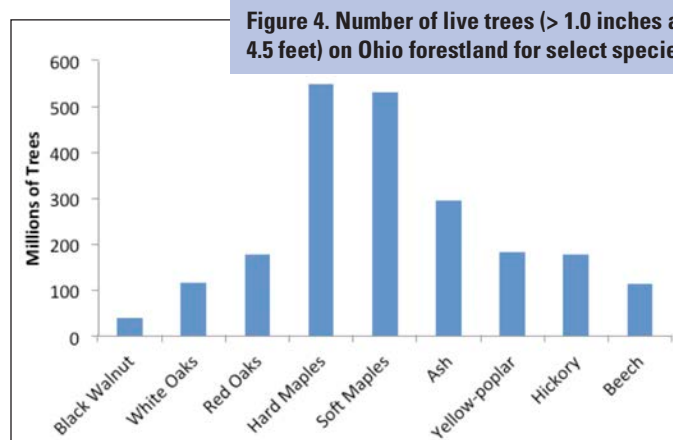


Figure 4. Number of live trees (> 1.0 inches at 4.5 feet) on Ohio forestland for select species.



Timber Volumes

Not all forestland is capable of timber production. Timberland is forestland capable of producing at least 20 cubic feet of wood per acre annually¹. Approximately 20 tree species comprise the majority of Ohio's timber volume. Growing stock is all live trees of commercial species from seedling to sawtimber. Sawtimber is trees meeting the minimum size requirements for producing lumber. Timber volumes are often reported on a net basis, which is gross volume minus deductions for cull.

Growing stock has increased from 3.9 billion cubic feet in 1952 to 13.9 billion cubic feet in 2010. In 1952 there was an estimated 14.4 billion board feet of sawtimber. By 1991, the inventory had increased to 30.4 billion board feet. Now, it has eclipsed 50.0 billion board feet (Figure 5).

Growth and Removals

An estimated 204 million cubic feet of growing stock, including 807 million board feet of sawtimber, grew in Ohio's forests in 1952. The 1991 survey found 293 million cubic feet of wood was being grown annually in growing stock, counting 960 million board feet of sawtimber. The 2010 survey indicated the net growth of growing stock had increased by 100 million cubic feet while sawtimber net growth had doubled to 1.86 billion board feet of wood per year. Overall, the ratio of net growth to removals for all growing stock was 2.13:1.00, which means Ohio's forests are growing more than two times the volume of timber being removed (Figure 6). The ratio of net growth to removals for all sawtimber is 2.49:1.00, 33% higher than the 1991 ratio of 1.86:1.00 (Figure 7).

Timber Prices

There are ten commercial hardwood species recorded in the Ohio Timber Price Report, which dates to 1960 and is currently conducted twice annually by OSU Extension. Data are gathered for three regions (Figure 8) on the prices paid for standing timber, or stumpage, and delivered sawlogs to wood-using facilities on a per thousand board feet (MBF) basis using the Doyle Log Scale. The regions are based upon both forestland distribution (Figure 1) and prevailing local market conditions.

Participants in the Ohio Timber Price Report survey include foresters, timber buyers, loggers, wood dealers, and mills. Timber prices are generally, but not always, lower in southeastern Ohio compared to the other regions. An abundant supply is available, largely accessible, and of appropriate quality for maintaining mill production. More information regarding current prices and the timber price report can be found at www.ohiowood.osu.edu.

Properly managed timber can be a sound investment for landowners looking for long-term security. The real

Figure 5. Ohio timber volumes. Growing stock is represented on the left Y-axis and sawtimber is represented on the right Y-axis. Note the scales are different.

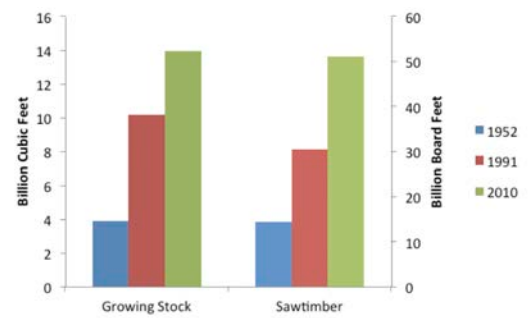


Figure 6. Annual net growth and removals for Ohio growing stock.

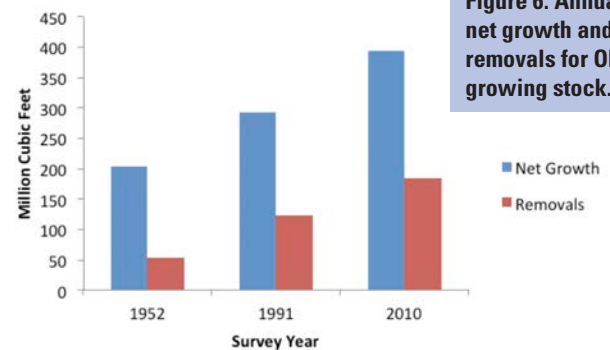


Figure 7. Annual net growth and removals for Ohio sawtimber.

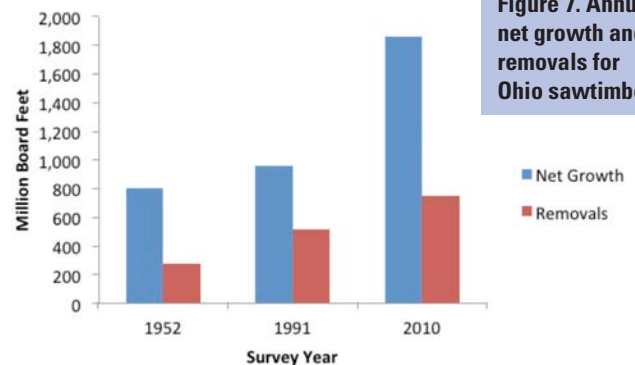
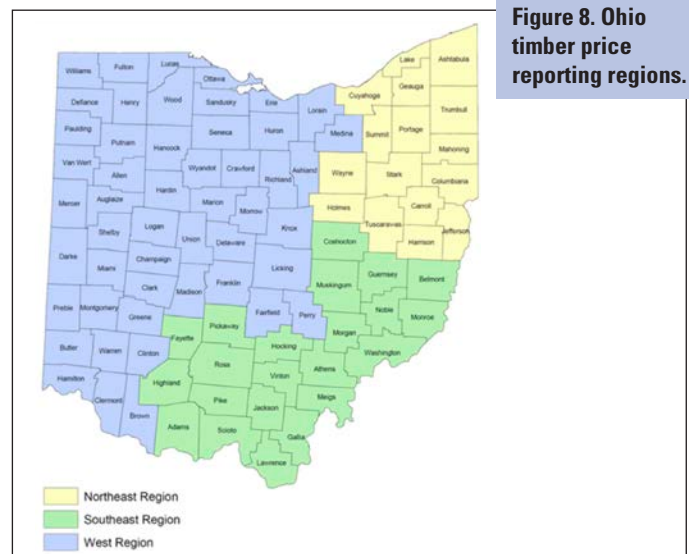


Figure 8. Ohio timber price reporting regions.



prices for stumpage, those adjusted for inflation to base year 1982, have been increasing statewide at an annual percentage rate of between 0.5 and 1.5% for many species since 1960. Regional rates of change have often been higher in southeastern Ohio over the 52 year reporting period. Real prices at the state level for some species have been declining since the mid-1990s.

Real sawlog prices across the state have largely only been increasing for the higher quality logs since 1960. This can be attributed to numerous factors, including rising harvest and delivery costs, among others. Please contact the School of Environment and Natural Resources at The Ohio State University for detailed descriptions of price trends by species.

Ohio's Forest Products Industry

The forest products industry consists of 26 individual sectors in Ohio, which can be aggregated into four groups—resource, solid wood products, pulp and paper, and wood furniture (Table 1). Tertiary sectors, such as support activities for agriculture and forestry, printing and publishing, and others, were not included due to their degree of separation from the direct production and manufacturing of wood and timber-based products.

Additional tree-based products, while important to the economic base of Ohio, were also excluded. Short rotation woody crops and Christmas trees are classified differently by the U.S. Census Bureau, as those products are generally grown over much shorter cycles than timber and use different production processes. Collecting, reducing, and concentrating maple sap for syrup is considered an agricultural food-based industry.

Determining Economic Impact

One way to estimate economic impact is through input-output analysis. Input-output analysis follows commodity flows through each stage of production from producer to consumer. This tracks how the products manufactured

by one business are used as inputs in another company or industrial sector.

Four measures are used to evaluate economic impact. *Employment* is the number of full-time and part-time jobs. *Labor income* is the sum of employee compensation (wages and benefits) plus proprietor income. *Value-added* is the sum of labor income, interest, profits, and indirect business taxes, which primarily consist of sales and excise taxes paid by individuals to businesses through normal operations. *Total output* is the total value of production measured as the sum of value-added plus the cost of buying goods and services to produce the product.

Economic impacts of an industrial sector are reported three ways. *Direct impacts* are those generated by the industry of interest through employment, value-added, and industrial output. *Indirect impacts* result from the purchasing of goods and services by the industry being studied to meet its demands. This activity results in employment, value-added, and industrial output for supporting businesses. *Induced impacts* are the changes produced from the purchasing of goods and services by households as a result of changes in employment and/or production levels. Summing these effects provides the *total impacts*.

Taxes include those paid to (1) state, county, and municipal governments and (2) the U.S. federal government. These taxes are generated from labor income, indirect business taxes, households, and corporations associated within the forest products industry. State and local taxes include dividends, social security, indirect business, corporate profits, personal taxes. Federal taxes include social security, indirect business, corporate profits, and personal taxes.

Impact Analysis for Planning (IMPLAN®), an economic impact analysis software package distributed by the Minnesota IMPLAN Group, was used to conduct an input-output analysis of Ohio's forest products industry. IMPLAN® was originally used by the U.S.

Table 1. IMPLAN model forest products industrial sectors.

Industry Group	Individual Sectors
Resource	Forestry, forest products, and timber tract production; Commercial logging
Solid Wood Products	Sawmills and wood preservation; Veneer and plywood manufacturing; Engineered truss member manufacturing; Reconstituted wood product manufacturing; Wood windows, doors, and millwork manufacturing; Wood container and pallet manufacturing; Manufactured home manufacturing; Prefabricated wood building manufacturing; All other miscellaneous wood product manufacturing
Pulp and Paper	Pulp mills; Paper mills; Paperboard mills; Paperboard container manufacturing; Coated and laminated paper, packaging paper, and plastic films manufacturing; All other paper bag and coated and treated paper manufacturing; Stationery product manufacturing; Sanitary paper product manufacturing; All other converted paper product manufacturing
Wood Furniture	Wood kitchen cabinet and countertop manufacturing; Upholstered household furniture manufacturing; Non-upholstered wood household furniture manufacturing; Institutional furniture manufacturing; Office furniture; Custom architectural woodwork and millwork manufacturing

Forest Service for modeling the regional economic impacts of the national forests' management plans. It divides Ohio's economy into 440 industrial sectors. The data used by IMPLAN® for modeling are provided by agencies within the Departments of Commerce, Agriculture, and Interior.

Each industrial group, as well as the industry as a whole, was modeled collectively when determining economic contributions to prevent overestimating any indirect and induced impacts due to inter-sector transactions. Data for the year 2010 were used, and results were reported in 2010 dollars.

Industry Impacts, 2010

The direct impacts of Ohio's forest products industry are presented in Table 2. The industry employed 47,900 people and contributed \$12.7 billion dollars in economic activity to Ohio's economy. New wealth created via value addition amounted to over \$3.82 billion, with value-added broken into its individual components—employee compensation, proprietor income, other property type income, and indirect business taxes. Additionally, \$200 million in state and local taxes and \$527 million in federal taxes were directly generated.

The total effect of Ohio's forest product industry was much greater when the direct, indirect, and induced impacts of the sector on other industries were taken into account (Table 3). Over 118,000 people were employed in 372 sectors and paid \$5.69 billion in labor income as a result of forest products activities. Of the total labor income, \$1.70 billion was indirect and \$1.40 billion was induced by industry and supply chain household purchasing. Industrial output totaled \$22.05 billion, including \$9.02 billion in value-added. Total tax impacts included \$725 million in state and local taxes and \$1.21 billion in federal taxes.

Resource Industries

The U.S. Census Bureau defines resource industries as those engaged in managing, harvesting, and delivering timber which has grown over long production cycles, that is at least 10 years. Industries in this group conduct business at varying stages of the management cycle. Timber production requires land that is available and appropriate for decades-long rotations. Nurseries grow seedlings for site regeneration. Forest management depends upon tree species, the growing conditions of the site, the production goals, and what the local forest products markets will support. Commercial logging includes businesses which harvest timber, harvest and deliver timber, and chip trees in the field for delivery. These businesses use specialized equipment to conduct

Table 2. Direct impacts of Ohio's forest products industry. Figures are rounded with dollars reported in millions.

Category	Employment	Output	Employee Compensation
Value	47,905	\$12,753	\$2,435
Category	Proprietor Income	Other Property Type Income	Indirect Business Taxes
Value	\$153	\$1,122	\$114

Table 3. The total impacts of the forest products industry on Ohio's economy. Figures are rounded with dollars reported in millions.

Impact Type	Employment	Labor Income	Value-Added	Output
Direct Impact	47,905	\$2,589	\$3,826	\$12,753
Indirect Impact	32,148	\$1,702	\$2,679	\$5,132
Induced Impact	37,978	\$1,401	\$2,511	\$4,164
Total Impact	118,031	\$5,693	\$9,017	\$22,050

Table 4. The total impacts of resource industries on Ohio's economy. Figures are rounded with dollars reported in millions.

Impact Type	Employment	Labor Income	Value-Added	Output
Direct Impact	2,703	\$53.9	\$109	\$255
Indirect Impact	820	\$26.1	\$56.1	\$99.3
Induced Impact	725	\$26.5	\$47.7	\$79.0
Total Impact	4,247	\$106	\$212	\$434

harvesting operations. Resource industries initiate the forest-to-market process, and thus are critical to the overall health of Ohio's forest products industry (Table 4).

Solid Wood Products Industries

These industries produce a variety of wood products. Harvested timber is normally taken to sawmills to be processed into lumber as a first step in its utilization. Lumber is often the primary raw material for other secondary manufacturing industries in this group, such as millwork and pallets. Some lumber also travels to a treating facility, where it is pressure-treated with wood preservatives.

The highest quality logs are sliced into thin sheets at a veneer plant. Lower quality logs may be minimally processed into ties and timbers. They can also be broken down into smaller wood pieces and reconstituted to form wood composite panels and beams (Table 5).

Pulp and Paper

Pulp and paper businesses are the largest industrial contributors to Ohio's forest economy. These industries thermally, chemically, and/or mechanically harvest cellulose from wood fibers, form and dry the cellulose into matted sheets, and then convert the sheets into value-added paper products. Many facilities often conduct multiple manufacturing processes to produce a variety of products. The primary subgroup obtains the pulped fibers from logs and forms the paper into sheets or paperboard while the secondary group purchases the sheets with other materials and designs and shapes them into finished products (Table 6).

Wood Furniture

Wood furniture industries are also considered secondary forest products manufacturing. Wood furniture businesses specialize in making pieces primarily from wood, although a number of other materials are required. Wood furniture is manufactured for households, offices, and institutions. Standard designs are often used but may be customized to suit individuals. Wood furniture can be upholstered, non-upholstered, and casegoods, such as cabinets and dressers.

Most furniture manufacturing facilities purchase kiln-dried lumber, although some may purchase green lumber and then dry it onsite. Production processes include working and framing wood members to the desired shapes. Consumer preferences play a large part in design and function as well as species and finish selections (Table 7).

Regional Forest Products Industry Activities

Many of the primary forest products manufacturers are located in southeastern and northeastern Ohio, nearer the forest resource (Figures 1 and 8). The industry, though, makes large contributions throughout the state's economy as secondary industries are often located closer to population centers.

The total impacts in employment and dollars were highest in the west (Table 8). Each economic indicator was at least 28% greater in western Ohio than in the other regions. The west has the largest economy of the three regions, and it includes several metropolitan areas. A greater number of transactions are captured within its regional economy and less leakage occurs out of it. Western Ohio collected \$339 million in total state and local taxes; northeastern Ohio was next at \$242 million followed by southeastern Ohio at \$74.6 million. Western Ohio's total federal tax impact was \$568 million; northeastern Ohio was next at \$427 million followed by southeastern Ohio at \$114 million.

Table 5. The total impacts of solid wood products industries on Ohio's economy. Figures are rounded with dollars reported in millions.

Impact Type	Employment	Labor Income	Value-Added	Output
Direct Impact	13,186	\$513	\$645	\$1,970
Indirect Impact	7,081	\$329	\$481	\$930
Induced Impact	7,454	\$274	\$493	\$817
Total Impact	27,721	\$1,117	\$1,618	\$3,718

Table 6. The total impacts of the pulp and paper industries on Ohio's economy. Figures are rounded with dollars reported in millions.

Impact Type	Employment	Labor Income	Value-Added	Output
Direct Impact	19,805	\$1,410	\$2,360	\$8,759
Indirect Impact	22,166	\$1,224	\$1,938	\$3,834
Induced Impact	23,340	\$861	\$1,543	\$2,559
Total Impact	65,312	\$3,496	\$5,842	\$15,153

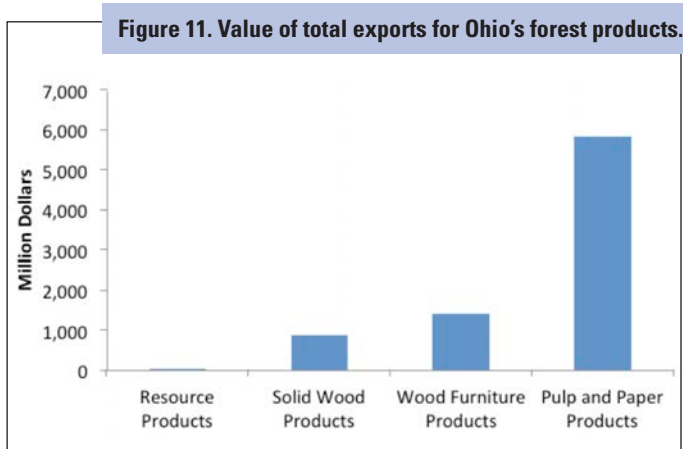
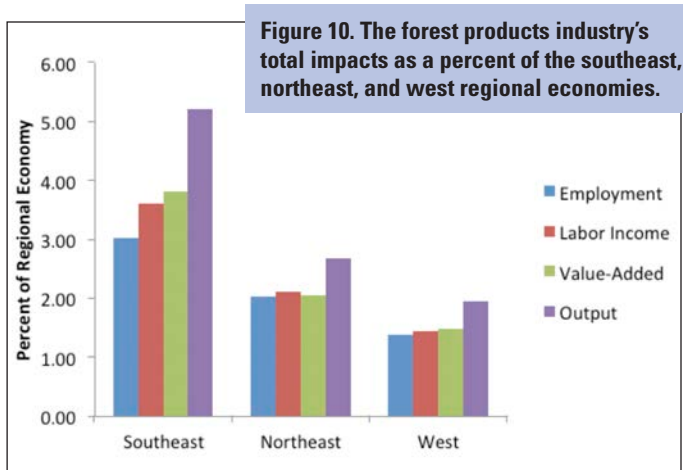
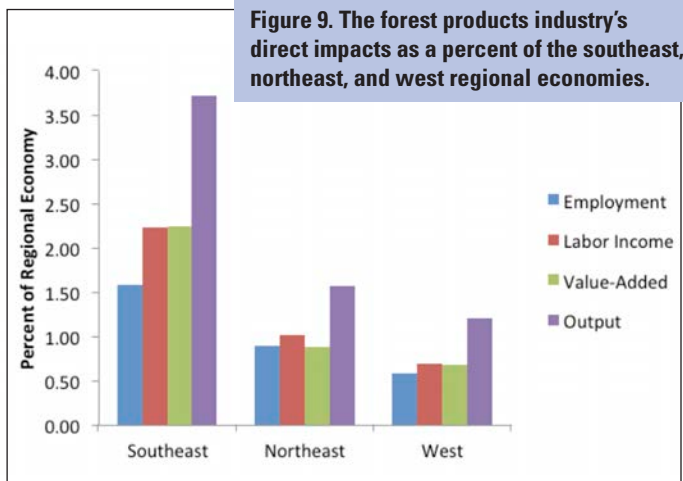
Table 7. The total impacts of the wood furniture industries on Ohio's economy. Figures are rounded with dollars reported in millions.

Impact Type	Employment	Labor Income	Value-Added	Output
Direct Impact	12,211	\$568	\$696	\$1,725
Indirect Impact	4,744	\$224	\$352	\$649
Induced Impact	6,989	\$258	\$462	\$766
Total Impact	23,944	\$1,050	\$1,511	\$3,140

Table 8. Regional total impacts of the forest products industry. Figures are rounded with dollars reported in millions. Regions are based on those defined in the Ohio Timber Price Report.

Region	Employment	Labor Income	Value-Added	Output
Southeast	11,982	\$511	\$909	\$2,564
Northeast	42,563	\$2,066	\$3,100	\$7,431
West	54,412	\$2,657	\$4,275	\$10,610

The industry's direct and total contributions to each region's economy, though, were largest in the southeast. The direct functions of labor income, value-added, and output in southeastern Ohio were at least two times larger than their roles in the other regions' economies (Figure 9). The industry's total measures of economic importance



in southeastern Ohio were all at least 1.5 times larger than in the other regions (Figure 10). The magnitude of these differences illustrates the significance of the forest products industry to southeast Ohio's economy.

Exports

Ohio exported \$8.20 billion of forest products in 2010. Of that, \$7.24 billion were exported domestically (to other states within the United States) while \$964 million

in products were shipped to foreign markets. Resource industries shipped \$15.1 million out of state and \$25.1 million out of the United States. Solid wood products processors sold \$779 million to out-of-state markets and \$104 million to foreign markets. Wood furniture manufacturers exported \$1.27 billion domestically and \$148 million internationally. Pulp and paper producers shipped \$5.14 billion out of state and \$685 million to foreign markets.

How Can I Learn to Better Manage My Woodland?

There are many ways to maximize the benefits our woodlands provide. Perhaps most important is to become actively involved in the stewardship of your property. Second, join your local forestry association. Discussing your strategies with fellow landowners and forestry professionals will make you more aware of the potential costs and benefits associated with particular management activities.

A good idea is to use the resources the state provides for optimally managing your woodland. Your local service forester can help you develop a management plan for your property. Your local Soil and Water Conservation District is available to provide soils information.

Preparing for a timber sale is often a once in a lifetime opportunity. Make certain you do your due diligence to ensure a successful experience. Enlist the assistance of a professional forester to help you maximize the potential of both your sale and the residual stand (www.osafdirectory.com). Finally, consider hiring an Ohio Master Logging Company to conduct your harvesting operation (<http://ohioforest.site-ym.com/?page=MLProgram>).

For More Information, Please Consult the Following Sources

School of Environment and Natural Resources

The Ohio State University

2021 Coffey Road

Columbus, OH 43210

Phone: (614) 688-3421

Web: <http://www.ohiowood.osu.edu/>;

<http://woodlandstewards.osu.edu/>

Ohio Division of Forestry

2045 Morse Road, Building H-1

Columbus, OH 43229

Phone: (614) 265-6694, or toll free at 1-877-247-8733

Fax: (614) 447-9231

Web: <http://www.ohiodnr.com/>

[DivisionofForestryHomepage/tabid/4803/Default.aspx](http://www.ohiodnr.com/DivisionofForestryHomepage/tabid/4803/Default.aspx)

Ohio Division of Soil and Water Resources

2045 Morse Road, Building B-3

Columbus, OH 43229

Phone: (614) 265-6610

Fax: (614) 262-2064

Web: <http://www.dnr.state.oh.us/Default.aspx?alias=www.dnr.state.oh.us/soilandwater>**Ohio Forestry Association**

Ohio Master Logging Company Program

Office: 746 Morrison Road, Columbus, OH 43230

Mail: 1100-H Brandywine Boulevard,

Zanesville, OH 43701

Phone: (614) 497-9580

Fax: (614) 497-9581

Web: <http://www.ohioforest.org/>**Ohio Society of American Foresters**Web: www.osafdirectory.com**Call Before You Cut**

Phone: (877) 424-8288

Web: <http://www.callb4ucut.com/>**References**

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Acknowledgments

Dr. Matt Bumgardner, U.S. Forest Service; John Dorka, Ohio Forestry Association; Dr. Robert Romig, Ohio State University; and Eric Roush, Glatfelter, kindly reviewed this fact sheet and offered valuable suggestions.

¹Twelve board feet are theoretically contained in one cubic foot of wood. In actuality, though, approximately five board feet of lumber are obtained from processing one cubic foot of wood due to losses from slabbings, saw kerf, edgings, and processing wastes.

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