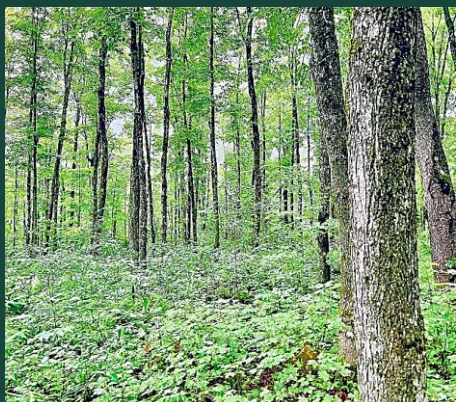




Forest Products Industries' Economic Contributions: Massachusetts, 2023

Prepared For:

Massachusetts Department of Conservation and Recreation
On behalf of,
Northeast-Midwest State Foresters Alliance
Washington DC, USA

Prepared by:

Basanta **Lamsal**, PhD
Jagdish **Poudel**, PhD
Raju **Pokharel**, PhD

Department of Forestry
Michigan State University
East Lansing, Michigan, USA



Department of Forestry
MICHIGAN STATE UNIVERSITY



April 2026

Authors

Basanta Lamsal, PhD: Dr. Basanta Lamsal is a Postdoctoral Fellow in the Department of Forestry at Michigan State University. Dr. Lamsal specializes in the application of input–output economics to the forest sector, forest resource economics, and the auction theory applied to timber markets.

Jagdish Poudel, PhD: Dr. Jagdish Poudel is Forest Economist for the Michigan Department of Natural Resources and an Adjunct Assistant Professor in the Department of Forestry at Michigan State University. Dr. Poudel specializes in traditional forest economics research such as analyzing stumpage demand and supply, timber prices, and forest product utilization, markets, and business. His interests extend to economic analyses of new wood innovations, such as mass timber and woody biomass energy, as well as ecosystem services markets, including habitat conservation and wetland mitigation banking, outdoor recreation and tourism, urban and community forestry, international forestry, and forest carbon markets.

Raju Pokharel, PhD: Dr. Raju Pokharel is an Assistant Professor of Forest Resource Economics in the Department of Forestry at Michigan State University. Dr. Pokharel specializes in evaluating and developing market opportunities for forest products including timber, bioenergy, mass timber, biochar, and others, estimating forest product feedstock supply and market competitions, and assessing the economic trade-off of timber products under different management strategies.

For more information:

Forest Economics and Resource Management Lab (MSU FERM)

URL: <https://www.canr.msu.edu/FERM/>

Room 208, Natural Resources Building, 480 Wilson Rd,

Department of Forestry, Michigan State University

East Lansing, Michigan 68842

Project funded by:

This project was supported by the cooperative agreement 24-CA-11132544-047 between the Northeast-Midwest State Foresters Alliance, Inc. and the USDA, Forest Service State, Private & Tribal Forestry “Project Title: Build and Support State Forestry Utilization and Marketing Capacity Through Targeted Investments in State Forestry Utilization and Marketing Programs”, United States Forest Service
Washington D.C., USA

Suggested citation :

Lamsal, B., Poudel, J., Pokharel, R. 2026. Forest Products Industries' Economic Contributions in Massachusetts. *Technical Report*, Department of Forestry, Michigan State University, East Lansing, Michigan, USA.

Photo Credit: Raju Pokharel

This page is intentionally left blank.

Contents

Authors.....	2
Contents	5
Tables	7
Figures	8
Executive Summary	9
Glossary	11
Forestry Terms	11
Economic Contribution Terms	12
Introduction	14
Forest Resources of Massachusetts state	15
Economic contribution of the Forest Product Industries, 2023.....	21
Economic Performance Trends of Forest Product Industry (2017-2023)	23
Direct and Total Contributions by Forest Product Industry Groups	25
Forestry.....	28
Logging	30
Primary Solid Wood Products.....	32
Secondary Solid Wood Products	34
Wood Furniture	36
Pulp, Paper, and Paperboard Mills	38
Secondary Paperboard and Other Paper Products	40
Top Forest Product Sectors	43
Top Non-Forest Industries supported by the Forest Sector in 2023	45
Importance of the Forest Products Industries in Context.....	48
Natural Resources and Agricultural Industries	48
Manufacturing Industries	50
Summary	52
References.....	53
Appendix A: Forest Products Industries Groupings and IMPLAN Sectors	55

Appendix B. Detailed Economic Contribution Results of 2023	58
B1: Direct Economic Contribution by IMPLAN Sector, 2023.....	58
B2: Direct Economic Contribution by IMPLAN Sector, 2017 (2017 USD))	63
B3: Direct Economic Contribution by IMPLAN Sector, 2017 (2023 USD)	67

Tables

Table 1: Characteristics of Growing Stock in Massachusetts, 2023. [†]	20
Table 2: Statewide Economic Contribution of Forest Products Industries, 2023. [†]	25
Table 3: Direct Economic Contributions in Massachusetts state, Industry Groups, 2023. [†]	26
Table 4: Total Economic Contributions in Massachusetts state, Industry Groups, 2023. [†]	27
Table 5: Direct, Indirect, and Induced Economic Contributions of the Forestry Industry in Massachusetts, 2023. [†]	28
Table 6: Direct, Indirect, and Induced Economic Contributions of the Logging Industry in Massachusetts, 2023. [†]	31
Table 7: Direct, Indirect, and Induced Economic Contributions of the Primary Solid Wood Products Industry in Massachusetts, 2023. [†]	33
Table 8: Direct, Indirect, and Induced Economic Contributions of the Secondary Solid Wood Products Industry in Massachusetts, 2023. [†]	35
Table 9: Direct, Indirect, and Induced Economic Contributions of the Wood Furniture Industry in Massachusetts, 2023. [†]	37
Table 10: Direct, Indirect, and Induced Economic Contributions of the Pulp, Paper, and Paperboard Mills Industry in Massachusetts, 2023. [†]	39
Table 11: Direct, Indirect, and Induced Economic Contributions of the Secondary Paperboard and Other Paper Products Industry in Massachusetts, 2023. [†]	41
Table 12: Top five industries in terms of direct Economic Contributions in Massachusetts state, 2023. [†]	44
Table 13: Top Ten Industries Impacted by Massachusetts state's Forest Products Industries in terms of number of jobs in 2023.	45
Table 14: Top Ten Industries impacted by Massachusetts State's Forest Products Industries in terms of output production in 2023. [†]	47
Table 15: Natural Resources and Agricultural Production Industries in Massachusetts state, 2023. [†]	49
Table 16: Manufacturing Industries in Massachusetts state, 2023. [†]	51

Figures

Figure 1: Massachusetts Forest Land area in acres by Land use type, 2023 (US Forest Service).	16
Figure 2: Massachusetts Forest Land area in acres by Ownership group, 2023 (US Forest Service).....	17
Figure 3: Massachusetts Forest Land area in acres by Forest type group, 2023 (US Forest Service).....	18
Figure 4: Direct output and employment, 2017–2023, Massachusetts state forest products industries.....	24
Figure 5: Direct Value-Added and Labor Income, 2017–2023, Massachusetts state, forest products industries.	25
Figure 6: Trend in direct employment and output for the Forestry industry in Massachusetts, 2017–2023.	30
Figure 7: Trend in direct employment and output for the Logging industry in Massachusetts, 2017–2023.	32
Figure 8: Trend in direct employment and output for the Primary Solid Wood Products industry in Massachusetts, 2017–2023.....	34
Figure 9: Trend in direct employment and output for the Secondary Solid Wood Products industry in Massachusetts, 2017–2023.	36
Figure 10: Trend in direct employment and output for the Wood Furniture industry in Massachusetts, 2017–2023.	38
Figure 11: Trend in direct employment and output for the Pulp, Paper, and Paperboard Mills industry in Massachusetts, 2017–2023.	40
Figure 12: Trend in direct employment and output for the Secondary Paperboard and Other Paper Products industry in Massachusetts, 2017–2023.....	42

Executive Summary

Based on 2023 FIA estimates, Massachusetts contains approximately 2.98 million acres of forest land, representing about 60.0 percent of the state's total land area of 4.97 million acres. Of this forest base, approximately 2.85 million acres (95.6 percent) are classified as timberland, defined as forest land capable of producing commercial volumes of wood. Reserved forestland accounts for 119,081 acres (4.0 percent), while other forestland comprises 10,774 acres (0.4 percent). Non-forest land totals 1.99 million acres, or 40.0 percent of the state's total land area. Building on this land-use context, this report summarizes the economic contribution of Massachusetts' forest products industries using IMPLAN 2023 data and examines changes in industry performance over the pre- and post-COVID period, with emphasis on trends observed over the past seven years (2017-2023).

Forest Product Industries

This report analyzes the economic contribution of Massachusetts's forest products sector, comprised of 28 individual economic sectors (out of a potential 32 identified industries) aggregated into seven industry groups: Forestry, Logging, Primary solid wood products, Secondary solid wood products, Wood furniture, Pulp, paper, and paperboard mills, and Secondary paperboard and other paper products. In 2023, these industries directly supported 14,594 jobs and generated \$5.85 billion in output, \$1.80 billion in Value-Added, and \$1.59 billion in Labor Income. When indirect supply-chain linkages and induced household-spending effects are included, the sector's total economic footprint reached 30,544 jobs, \$9.64 billion in output, \$4.16 billion in Value-Added, and \$3.02 billion in Labor Income. The sector exerts a notable employment multiplier effect on the broader economy; for every 100 direct jobs in the forest industry, roughly 109 additional jobs are supported elsewhere in the state.

Leading Forest Products Industry Groups (direct contribution)

Among the seven aggregated groups, Secondary Paperboard and Other Paper Products was the largest direct employer in 2023 (5,225 jobs), followed by Wood Furniture (3,201 jobs) and Secondary Solid Wood Products (3,069 jobs). In terms of output, Secondary Paperboard and Other Paper Products produced the highest direct output at \$2.82 billion, serving as the sector's converting and packaging engine. Pulp, Paper, and Paperboard Mills generated \$1.22 billion, highlighting the state's continued strength in capital-intensive paper manufacturing. Forestry, while the smallest contributor in dollar terms (\$31.8 million), provided the essential management and biological services supporting the broader value chain.

Leading Individual Forest Products Sectors (direct contribution)

At the disaggregated level (28 sectors), Paperboard container manufacturing remained the top individual employer with 2,376 jobs. Financial dominance was also concentrated in this sector, which ranked first in Labor Income (\$316.5 million), Value-Added (\$375.4 million), and Output (\$1.44 billion). Paper bag and coated and treated paper manufacturing was a consistent top-tier performer, ranking second in Employment (2,013 jobs), though Paper mills outpaced it in output (\$1.06 billion) and labor productivity. Paper mills emerged as a major driver, ranking third in employment (1,252 jobs), Labor Income (227.7 million), and value -added (303.1 million). These rankings show a downstream-focused economy: specialized paper converting and packaging dominating over primary wood processing.

Massachusetts's Forest Products Industries Compared to Other Massachusetts Industries

The Forest Products sector remains a vital component of Massachusetts's natural resource economy. In 2023, it ranked first in employment and second in output when compared to Agriculture, Mining, and Commercial Fishing & Hunting. The forest sector's direct output (\$5.85 billion) trailed Mining (\$11.21 billion) but significantly outperformed Agriculture (\$683.0 million) and Commercial Fishing (\$443.1 million). In terms of employment, the 14,594 jobs supported by the forest industry accounted for around 34.5 percent of the state's total natural resources workforce, slightly edging out Agriculture (14,185 jobs) and significantly surpassing Mining (7,304 jobs) and Commercial Fishing (6,240 jobs). Furthermore, within the statewide manufacturing landscape, Forest Products Manufacturing sectors ranked as the seventh largest manufacturer by output (\$5.71 billion) and the seventh largest employer (13,118 jobs), positioning it as a substantial mid-tier industrial sector.

Seven-years Trends in Massachusetts's Forest Products Industries Economic Contribution

From 2017 to 2023, the sector demonstrated structural consolidation alongside rising value efficiency. Direct employment decreased by 9.3 percent, while direct output declined by 12.8 percent in real terms. Notably, real Value-Added actually increased by 2.2 percent despite the contraction in output and workforce. This trend shows a divergence in the state's forest economy, where efficiency gains to generate more wealth per unit of production, stabilizing the sector's economic contribution even as its physical footprint has shrunk.

Glossary

Forestry Terms

Average annual harvest removals: The estimated volume of trees that were live at the time of the previous inventory and were either cut and removed by direct human activity related to harvesting or died as a result of silvicultural or land-clearing activity by the time of the current inventory.

Average annual mortality: The volume of trees that were live at the time of the previous inventory and are dead in the current inventory.

Average annual net growth: The change in merchantable bole volume of growing-stock trees (at least five inches diameter at breast height [DBH]) after deducting mortality volume, in cubic feet, on forest land.

Forest land: Land that is at least 10 percent stocked by trees of any size, including land that formerly had such tree cover and that will be naturally or artificially regenerated. Forest land includes transition zones, such as areas between heavily forested and non-forested lands that are at least 10 percent stocked with trees and forest areas adjacent to urban and built-up lands, including pinyon-juniper and chaparral areas in the western U.S., and afforested areas. The minimum area for classification of forest land is one acre and 120 feet wide, measured stem-to-stem from the outermost edge. Unimproved roads and trails, streams, and clearings in forest areas are classified as forest land if less than 120 feet wide.

Growing stock: Live trees of commercial species that meet minimum merchantability standards (at least five inches DBH). In general, these trees have at least one solid eight-foot section, are reasonably free of form defect on the merchantable bole, and at least 34 percent or more of the volume is merchantable. Excludes rough or rotten cull trees.

Timberland: A subset of forest land that produces or can produce crops of industrial wood and is not withdrawn from timber utilization by statute or administrative regulation. (Note: Areas qualifying as timberland can produce at least 20 cubic feet per acre per year of industrial wood in natural stands. Currently inaccessible and inoperable areas are included.)

Economic Contribution Terms

Direct effects/contributions: The direct contribution represents the economic activities (output, employment, Labor Income, and Value-Added) that occur within an industry or sector as a result of its existing production to satisfy current (exogenous) final demand. In contribution analysis, the direct effect corresponds to the sector's own production activities that maintain the structure of the regional economy. For example, the direct contribution of the forest products industry reflects its ongoing production and employment required to meet current local and export demand for forest-based goods.

Employment: The number of full- and part-time jobs associated with an industry.

Indirect effects/contributions: The indirect contribution captures the inter-industry linkages created when the industry purchases goods and services from other local industries. These transactions stimulate additional production, employment, and income along the supply chain. For instance, demand for wood products generates additional output in sectors such as transportation, wholesale trade, and equipment manufacturing that supply inputs to the forest industry. The magnitude of indirect contribution reflects the degree of interdependence and strength of local supply-chain relationships.

Induce effects/contributions: The induced contribution measures the additional economic activity generated by household spending of Labor Income earned through direct and indirect effects. When workers employed in the forest products and related supply-chain sectors spend their income on goods and services, such as housing, healthcare, or retail, it further stimulates regional economic activity. This household feedback effect represents the cyclical flow of income and expenditures within the economy.

Labor Income: The dollar total of employee compensation and proprietor income; the latter is associated with self-employed individuals.

Output: The dollar measure of production within an area; it is also viewed as sales.

Social Accounting Matrix (SAM) multipliers: These multipliers are derived by dividing the sum of direct, indirect, and induced effects by the direct effects. The social accounts include payments made between households, households and government, and more. These are available for output, employment, Labor Income, and Value-Added and are used to assess the effects of changes in industry activity (i.e., "ripple effects").

Total effects/contributions: The sum of direct, indirect, and induced effects.

Value-Added (also known as gross state product, or GSP): The sum of Labor Income, other property income (e.g., rents and profits), and indirect business taxes (e.g., excise and sales

taxes). It is the difference between an industry's total output and the cost of its intermediate inputs. The sum of Value-Added for all economic sectors within the region equals the total GSP.

Introduction

Forest products industries are an integral component of Massachusetts's economy. They provide jobs, raw materials, and finished goods that generate additional economic activity throughout the state, region, and nation. Forests in Massachusetts have always supported local and state economies and generated employment and income (Leefers 2014, 2015; Poudel, 2022). These forests form the foundation for a wide array of industries, supporting logging, sawmills, pulp and paper, wood products manufacturing, and furniture production. Collectively, the Forest Products Industry (FPI) contributes directly to the economic development of the region, while also supporting rural livelihoods, providing raw materials for construction and packaging, and generating substantial downstream linkages to other industries (Poudel and Dahal 2025; Lamsal et al. 2025a). The scale and diversity of activities across the FPI underscore its role as a major part of the broader manufacturing economy, contributing to Value-Added and sustaining consumer demand (Lamsal et al. 2025b).

A state report on FPI contributions on Massachusetts was previously published by Leefers et al. (2020) using 2017 IMPLAN data. The present update extends that effort using 2023 data, allowing for a comparison across time. This analysis measures how the performance of forest sector industries in Massachusetts has shifted between 2017 and 2023 in terms of employment, output, Labor Income, and the Gross State Product (GSP), also known as Value-Added¹. Tracking these changes is essential, as it provides a clear picture of both long-term trends and the more recent disruptions caused by the COVID-19 pandemic. The pandemic had economy-wide effects on supply chains, consumer demand, and labor markets (Poudel and Dahal 2025; Lamsal et al. 2025b), and this report therefore captures the pre- and post-COVID conditions of the FPI within the region.

This trend analysis can be used in multiple ways by related stakeholders. For policymakers, it offers a benchmark for monitoring the health of one of the region's key resource-based industries and helps inform workforce development, investment, and rural economic policies. For industry stakeholders, it provides insight into productivity, competitiveness, and sectoral resilience, supporting strategic planning. For researchers and forest managers, it offers a consistent regional framework that connects forest resources with industrial performance and economic outcomes.

¹ The 2017 results in this report are based on data from the IMPLAN Pro desktop version, whereas the 2018–2023 results are based on the IMPLAN web platform. Because there are minor differences between the Pro and web versions, the 2017 estimates shown here may not exactly match 2017 results reproduced from the web version. To maintain consistency with the original 2017 report and ensure a valid basis for comparison and trend analysis, we use the original 2017 IMPLAN Pro data, and IMPLAN web data for all years from 2018 through 2023.

The inventory data used in this report were sourced from the U.S. Forest Service Forest Inventory and Analysis (FIA) database and the economic data were obtained from Impact Analysis for Planning (IMPLAN). These data and related information are presented in four major sections: (i) Forest Resources of Massachusetts, (ii) Economic Contributions of the Massachusetts FPIs, (iii) Comparing FPIs with other industries and neighbor states, and (iv) Summary. We acknowledge that, due to rounding, some values in the tables and figures may not sum to the exact total indicated.

Forest Resources of Massachusetts state

According to 2023 estimates from the USDA Forest Inventory and Analysis (FIA), Massachusetts's total land area is 4.97 million acres. Of this total, 2.98 million acres (60.0 percent) meet the FIA definition of forest land, while the remaining 1.99 million acres (40.0 percent) are classified as non-forest land. FIA defines forest land as land at least 10 percent stocked by trees of any size, including areas that formerly supported such tree cover and that will be naturally or artificially regenerated. Within Massachusetts's forest land base, timberland accounts for 2.85 million acres, or 95.6 percent (Figure 1), representing unreserved forest capable of producing at least 20 cubic feet of wood per acre per year. Reserved forestland comprises 119,081 acres (4.0 percent) and is withdrawn from timber utilization by legal or administrative designation. Other forestland totals 10,774 acres (0.4 percent) and consists of unreserved forests of low productivity. In practical terms, the vast majority of Massachusetts's forest land is both unreserved and biophysically suitable for commercial timber management, with a relatively small share either reserved or too low in productivity to contribute materially to timber supply.

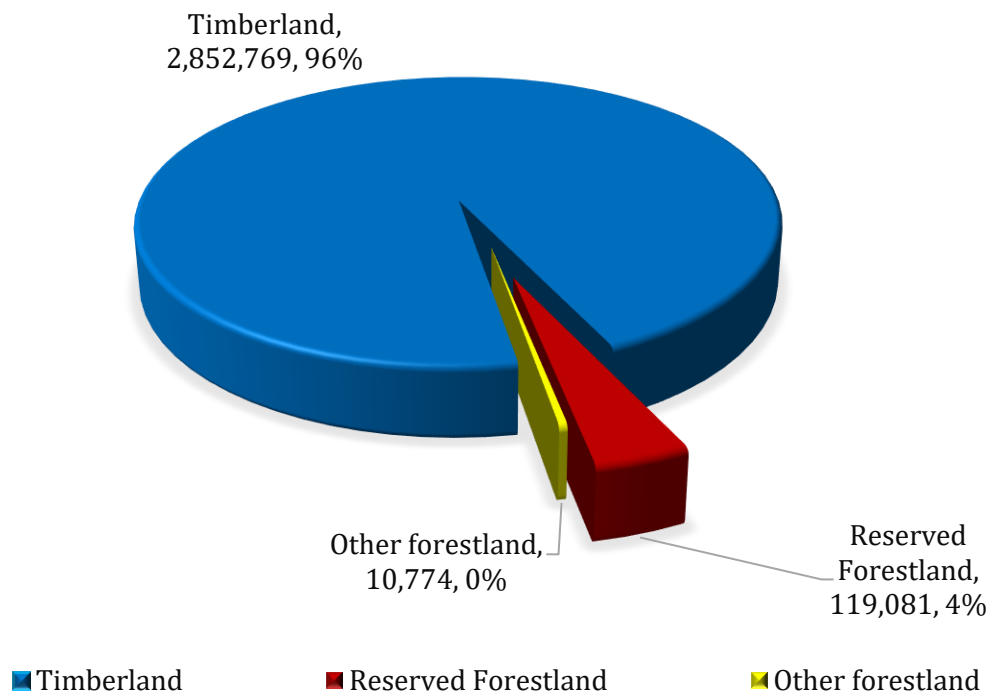


Figure 1: Massachusetts Forest Land area in acres by Land use type, 2023 (US Forest Service).

Ownership of Massachusetts's 2.98 million acres of forest land is distributed among federal, state and local, and private entities, with private landowners holding the largest share (Figure 2). Private ownership accounts for 1.91 million acres, representing 64.1 percent of the state's forest land base. State and local governments manage 990,693 acres (33.2 percent), indicating a substantial public ownership presence at the subnational level. Federal ownership is limited, totaling 79,445 acres (2.7 percent). Overall, Massachusetts's forest land base reflects a mixed ownership structure, with private ownership predominating alongside a comparatively large state and local public land component.

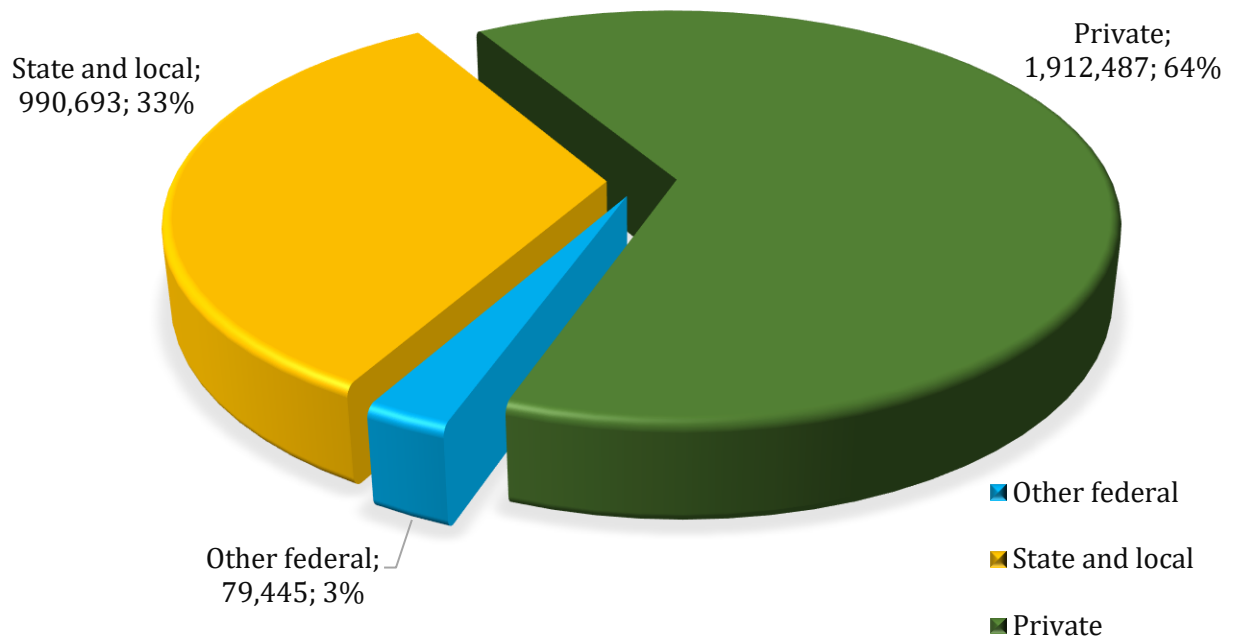


Figure 2: Massachusetts Forest Land area in acres by Ownership group, 2023 (US Forest Service).

Massachusetts's 2.98 million acres of forest land support a diverse mix of hardwood and softwood forest types (Figure 3). The oak/hickory forest-type group is the largest, occupying 1.02 million acres, or 34.1 percent of the state's forest land base. Maple/beech/birch forests represent the second-largest group at 724,186 acres (24.3 percent), followed by the white/red/jack pine group, which totals 439,054 acres (14.7 percent) and reflects a substantial softwood component. Mixed oak/pine forest types account for 328,263 acres (11.0 percent), indicating a notable presence of mixed hardwood–softwood stands. Elm/ash/cottonwood forests comprise 170,733 acres (5.7 percent), while the remaining 303,677 acres (10 percent) are distributed across other forest-type groups. Taken together, hardwood-associated forest types account for a majority of Massachusetts's forest land area, while softwood and mixed forest types represent a significant and spatially important component of the state's forest composition.

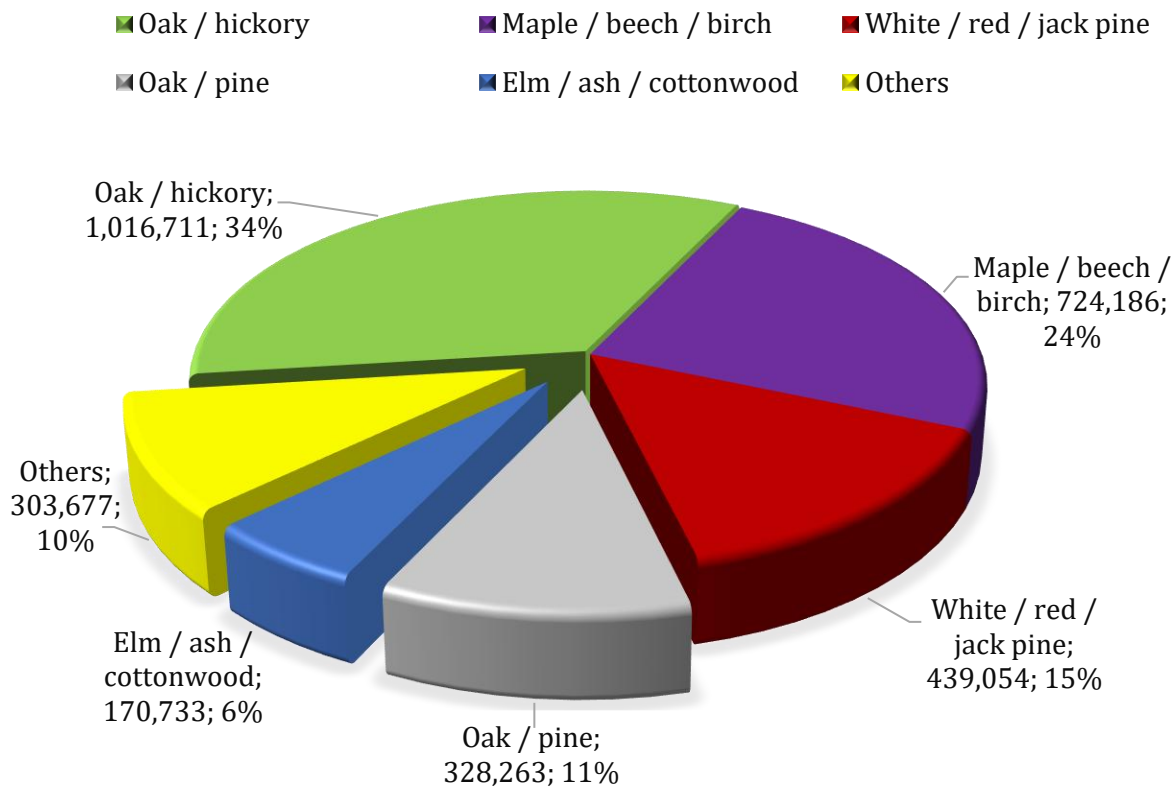


Figure 3: Massachusetts Forest Land area in acres by Forest type group, 2023 (US Forest Service).

Massachusetts's timber resources include a substantial mix of hardwood and softwood growing stock, supporting forest-based activities such as commercial logging, sawtimber, firewood, specialty wood products, millwork, and other secondary wood uses. The estimated volume of standing timber suitable for forest products, defined here as the marketable volume of growing stock, is approximately 9.18 billion cubic feet, or about 115 million standard cords (Table 1). Of this total, hardwoods account for 5.40 billion cubic feet, or 58.9 percent, while softwoods account for 3.78 billion cubic feet, or 41.1 percent. By ownership class, about 65.8 percent of growing-stock volume is on private lands, 32.0 percent is on state and local lands, and 2.2 percent is on other federal holdings. No growing-stock volume is reported on National Forest lands in the table.

Average annual net growth totals 119.4 million cubic feet per year, while average annual harvest removals total 24.5 million cubic feet and average annual mortality totals 68.6 million cubic feet per year. Net growth exceeds harvest removals by a ratio of about 4.9 to 1, indicating that removals remain well below net biological growth statewide. Because net growth is already net of mortality, the implied annual net change in growing-stock volume is net growth minus

harvest removals, or approximately 94.9 million cubic feet per year. This positive balance indicates continued expansion of growing stock volume at the statewide level. Average annual harvest removals equal roughly 0.3 percent of standing volume, or about 0.3 million standard cords, while mortality represents about 0.7 percent of standing volume. Hardwoods account for 51.3 percent of net growth, 32.8 percent of harvest removals, and 66.7 percent of mortality. Harvest removals are concentrated on private lands, which account for about 87.6 percent of total removals, followed by state and local ownerships at about 12.4 percent. Overall, these statewide indicators suggest that Massachusetts's growing stock inventory remains in a condition of positive net growth.

Table 1: Characteristics of Growing Stock in Massachusetts, 2023. [†]

Description	Species group	National Forest	Other federal	State and local	Private	Not available	Total
Net volume	Hardwood	0	78,268	1,723,609	3,602,284	0	5,404,160
	Softwood	0	122,679	1,218,450	2,436,158	0	3,777,287
	Total	0	200,947	2,942,058	6,038,442	0	9,181,448
Average annual net growth	Hardwood	0	984	13,646	46,387	247	61,264
	Softwood	0	1,680	17,872	38,116	510	58,179
	Total	0	2,664	31,518	84,503	757	119,443
Average annual harvest removals	Hardwood	0	0	1,366	6,690	0	8,056
	Softwood	0	0	1,679	14,797	0	16,475
	Total	0	0	3,045	21,487	0	24,531
Average annual mortality	Hardwood	0	371	18,083	27,298	0	45,752
	Softwood	0	704	8,421	13,764	0	22,888
	Total	0	1,074	26,504	41,062	0	68,640

[†] All amounts are in thousands of cubic feet.

Note: **Growing stock** is all live trees of commercial species that meet minimum merchantability standards. **Net volume** is net volume in cubic feet of growing stock for timber species, for trees greater than or equal to five inches in diameter, from a one-foot stump to a minimum four-inch top diameter, or to where the central stem breaks into limbs, all of which are less than four inches in diameter. **Net growth** is the average annual net growth of growing stock, in cubic feet, on forest land. **Annual mortality** is the average annual cubic foot mortality of live growing-stock trees (at least four inches DBH), in cubic feet, on forest land. **Harvest removals** are the average annual harvest removals, in cubic feet, of growing stock trees on forest land.

Economic contribution of the Forest Product Industries, 2023

The FPIs in this study are defined as 32 IMPLAN industries (only 28 industries present in Massachusetts) that were aggregated into seven analytic groups for consistent reporting across the state. This report follows the same industry grouping framework used in the 2017 report, which was originally developed through consultation with state forestry agencies and other stakeholders and represent a working consensus on what constitutes the regional FPI (Leefers et al. 2020). The complete list of industries and groupings are presented in [Appendix A](#).

The FPI encompasses a wide range of activities that begin with forest management and timber harvesting and extend through the conversion of raw materials into high-value finished goods. These activities include timber tract operations, nurseries, logging, sawmills, wood preservation, pulp and paper manufacturing, furniture production, and related downstream sectors (Poudel and Dahal 2025). The FPI is a cornerstone of the Massachusetts economy, not only providing direct employment in logging, milling, and manufacturing but also supporting a much larger network of indirect and induced jobs in transportation, warehousing, wholesale trade, and retail (Leefers et al. 2020). Its health has far-reaching consequences for rural communities, where it is often one of the few sources of year-round employment, and for regional supply chains that depend on steady flows of wood, fiber, and paper products (Lamsal et al. 2025a).

Measuring these contributions requires more than simply counting jobs, mills, or other establishments. Contribution analysis is essentially a descriptive, ex-post accounting framework that traces how industries interact within a regional economy and support the economy (Lamsal et al. 2025b, Watson et al. 2015). It not only measures the direct transactions tied to a sector, but also the indirect effects in supplier industries and the induced effects from household spending that ripple outward. Economic contribution analysis depends on standardized frameworks that can translate government statistics into regional input–output models. The Bureau of Economic Analysis (BEA) provides the foundation through its Benchmark Input-Output Accounts, which map the flow of goods and services across industries and establish the structure of GDP by industry (BEA 2023). The Bureau of Labor Statistics (BLS) complements this with the Quarterly Census of Employment and Wages (QCEW) and occupational data, which provide details on employment and payroll. Further, the U.S. Census Bureau adds extra detail with the Economic Census and County Business Patterns, which track establishments, receipts, and industry-level production. IMPLAN harmonizes these data sources into a consistent input-output modeling framework for estimating regional economic contributions (IMPLAN 2023). IMPLAN is widely used in forest-sector economic research to estimate employment, output, Labor Income, and Value-Added effects associated with forest-products industries. Several

forest-sector studies have also paired IMPLAN with FIA data to link forest resource conditions with regional economic outcomes, including timber-product output in Ohio (Coronado et al. 2014), domestic hardwood substitution for imported trailer decking in New York (Pokharel et al. 2023), and potential mass timber processing facility development in Michigan (Khanal et al. 2024). IMPLAN also provides a bridge table that is important for defining the forest-products sectors included in this report. The bridge table is useful in both directions: it aggregates NAICS industries into IMPLAN sectors for modeling and identifies the NAICS components represented within each IMPLAN sector. Although this does not by itself constitute a formal sector disaggregation within IMPLAN, it provides the basis for constructing partial-sector estimates when external data are available.

This distinction is particularly important for forest sector analysis because several IMPLAN sectors contain both forestry and non-forestry components (Poudel and Dahal 2025). In this study, the IMPLAN bridge table was used to identify the relevant NAICS-defined activities embedded within broader IMPLAN sectors, and external data were then used to approximate the forest-related share of selected mixed sectors. For example, IMPLAN Sector 10 (All Other Crop Farming) includes a wide variety of agricultural activities such as alfalfa, peanut, and hemp farming, also in addition to maple syrup production. Using USDA maple syrup production data, only the maple syrup portion of Sector 10 was included in the FPI. Similarly, IMPLAN Sector 19 (Support Activities for Agriculture and Forestry) encompasses a broad spectrum of NAICS industries, including soil preparation, crop harvesting, farm labor contracting, and specialized support services for forestry. To avoid overstating the sector, only Support Activities for Forestry were retained in the FPI totals, using BLS employment and establishment data. Thus, the partial-sector estimates reported here reflect analyst-defined allocations based on the IMPLAN bridge table and supplementary data, rather than an automatic sector split performed within IMPLAN. In the 2017 report, several additional sectors were treated as partial sectors, IMPLAN 40 (Electric Power Generation, Biomass), IMPLAN 352 (Institutional Furniture Manufacturing), and IMPLAN 356 (Showcase, Partition, Shelving, and Locker Manufacturing), but in 2023, following stakeholder consensus and due to limited data to isolate wood-based components, these are treated as full sectors; consequently, the 2023 economic contribution estimates for these specific sectors appear higher and are not directly comparable to the 2017 figures. Any comparison between years should therefore be interpreted with caution.

Further, the 2023 analysis implemented the mixed endogenous-exogenous closure using the Output- and Employment -based multipliers formulation approach (Miller and Blair 2022; Lamsal et al. 2025a), whereas the 2017 report used the equivalent matrix-inversion approach. Since these approaches are alternative computational expressions of the same input-output framework and, under the same closure assumptions, these formulations are theoretically equivalent and yield the same multipliers and results.

Note on Data Consistency (2017 vs. 2018–2023): Readers should interpret the sharp variance between 2017 and 2018 data with caution. The 2017 figures presented in this report are retained from previous studies that used the desktop-based IMPLAN Pro software. Data for 2018 through 2023 were generated using the modernized IMPLAN Cloud (Web) platform, which utilizes updated accounting frameworks and regional purchase coefficients. Although both sets of estimates are based on the same underlying input–output/SAM framework, they are not fully comparable in construction. IMPLAN revised its industry classification structure over time, moving from the 536-industry scheme used for 2013–2017 data years to the 546-industry scheme used for 2018–2022, and later to the 528-industry scheme beginning in 2023. IMPLAN also documents differences in trade-flow and regional purchase coefficient estimation between legacy Pro-era workflows and the current cloud environment. In addition, this report applies updated aggregation and sector-inclusion rules for selected forest-related industries. Accordingly, differences between 2017 and later years may reflect methodological discontinuity in addition to underlying economic change. Comparisons spanning 2017 to 2018 should therefore be interpreted with caution.

Economic Performance Trends of Forest Product Industry (2017-2023)

Figures 4 and 5 illustrate the economic trajectory and structural changes of Massachusetts's Forest Sector over the seven-year study period (2017-2023). As detailed in Figure 4, the state's forest industry has experienced a period of contraction followed by stabilization. Direct employment decreased from 16,083 jobs in 2017 to a low of 14,342 in 2020; however, the sector has since stabilized, maintaining 14,790 jobs in 2023. Real Industry Output displays a more dynamic trend, highlighting the sector's responsiveness to market adjustments. After output bottomed out at \$5.64 billion in 2022, the industry posted a recovery in 2023, rising to \$5.86 billion. This recent uptick in output, achieved with a relatively flat workforce, suggests that while the total industrial footprint has shrunk since 2017, the remaining active sectors are operating with increased productivity per employee.

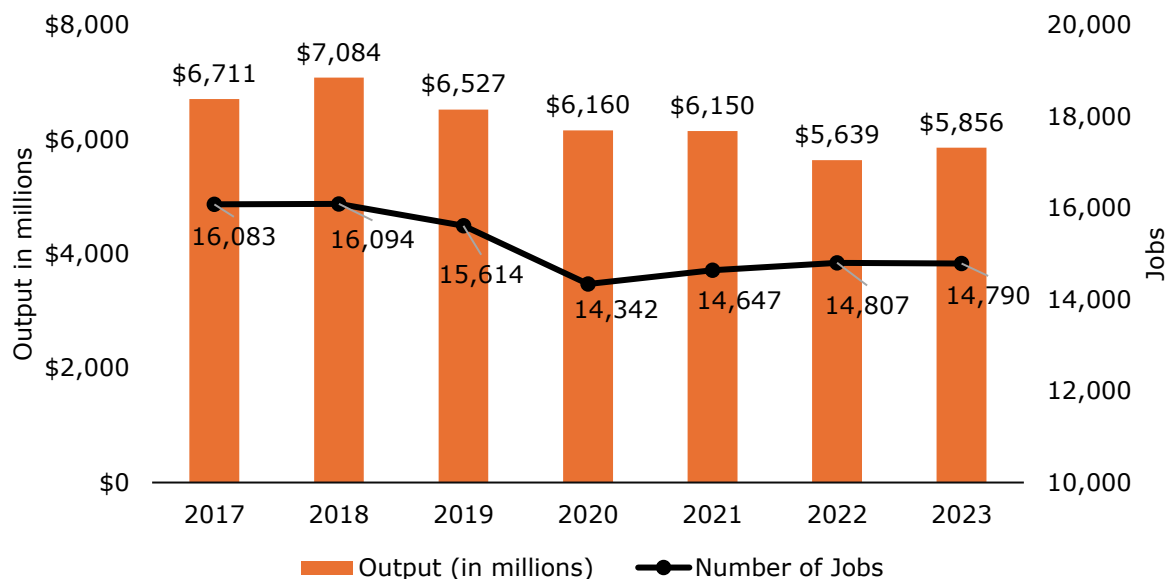


Figure 4: Direct output and employment, 2017–2023, Massachusetts state forest products industries.

Figure 5 highlights a critical divergence regarding the sector’s efficiency in generating wealth for the state economy. While gross Output fell by 12.8% over the seven-year period, Real Value-Added, the sector’s net contribution to GSP, showed an upward trend. Value-Added increased from \$1.76 billion in 2017 to \$1.80 billion in 2023. The industry is effectively capturing more economic value per unit of production, likely driven by a shift toward higher-margin secondary wood products or efficiencies in processing intermediate inputs. Conversely, Labor Income has faced downward pressure, declining from \$1.89 billion in 2017 to \$1.59 billion in 2023, suggesting that the gains in Value-Added efficiency have not translated linearly into aggregate income growth for the period.

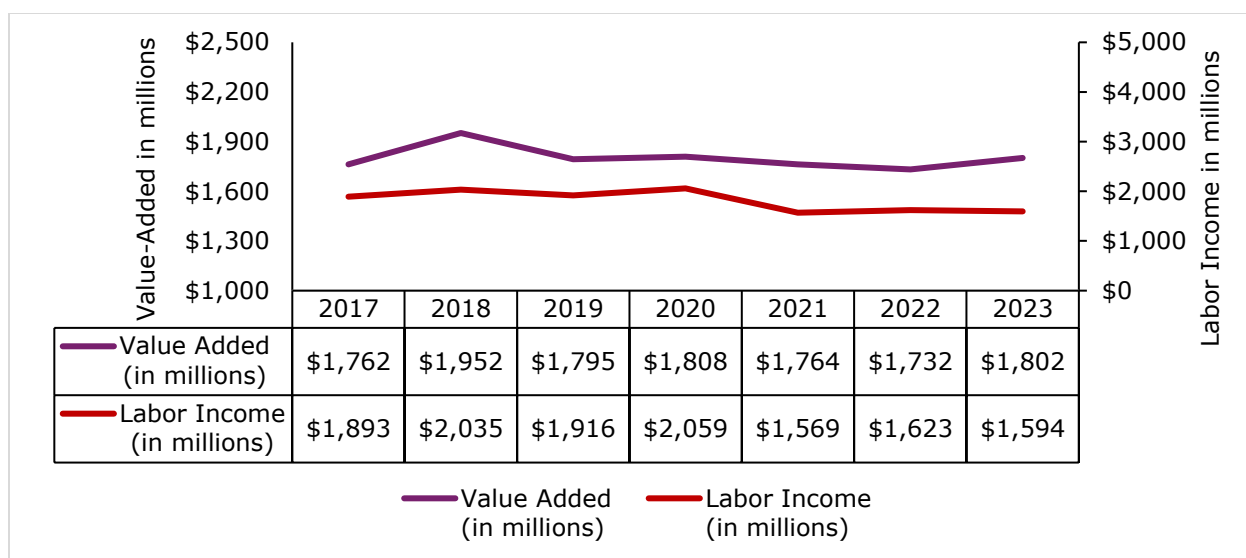


Figure 5: Direct Value-Added and Labor Income, 2017–2023, Massachusetts state, forest products industries.

Direct and Total Contributions by Forest Product Industry Groups

In 2023, Massachusetts’s forest products industries directly provided 14,594 jobs, generated \$5.85 billion in output, and contributed \$1.80 billion in Value-Added to the state economy (Table 2). The sector’s aggregate influence on the broader regional economy remains substantial. When accounting for indirect supply-chain transactions and induced household spending, the total economic contribution of the forest sector reached 30,544 jobs and \$9.64 billion in total output.

Table 2: Statewide Economic Contribution of Forest Products Industries, 2023. [†]

	Employment	Labor Income	Value-Added	Output
Direct in 2023	14,594	\$1,593,185	\$1,800,085	\$5,852,618
Compared to 2017	-9.3%	-15.8%	2.2%	-12.8%
Total in 2023	30,544	\$3,024,678	\$4,161,809	\$9,638,116
Compared to 2017	-19.2%	-20.3%	-10.6%	-16.6%
Multipliers in 2023	2.09	1.90	2.31	1.65

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2023 dollars value.

The calculated multipliers further demonstrate the sector’s deep integration into Massachusetts’s economy. The employment multiplier of 2.09 indicates that for every 100 direct jobs in the forest industry, an additional 109 jobs are supported in other sectors. Even more

striking is the Value-Added multiplier of 2.31, which suggests that every dollar of wealth created directly by forest industries generates an additional \$1.31 elsewhere in the state. Together, these sizable multipliers reflect strong local supply-chain linkages and underscore the forest sector's role as a high-leverage economic anchor, supporting substantial activity in transportation, manufacturing, and service sectors relative to its direct size.

Tables 3 and 4 detail the direct economic contributions of the seven industry groups and their subsequent expansion into total contributions through multiplier effects. In 2023, Massachusetts's forest sector structure is heavily weighted toward downstream manufacturing rather than raw extraction. Massachusetts's employment is concentrated in Value-Added production, specifically in paper converting and packaging. The Secondary Paperboard and Other Paper Products sector is the clear labor leader, directly providing 5,225 jobs. This figure is more than triple the combined workforce of the Forestry and Logging sectors (1,473 jobs), implying a mature industrial ecosystem where the primary economic activity involves processing intermediate materials into high-value finished goods rather than harvesting raw timber.

Table 3: Direct Economic Contributions in Massachusetts state, Industry Groups, 2023. [†]

Industries	Employment	Labor Income	Value-Added	Output
1.Forestry	800	\$26,474	\$27,896	\$31,771
2.Logging	673	\$40,993	\$105,308	\$108,064
3.Primary Solid Wood Products	202	\$16,185	\$9,324	\$102,091
4.Secondary Solid Wood Products	3,069	\$320,232	\$277,875	\$890,240
5.Wood Furniture	3,201	\$254,371	\$230,698	\$679,955
6.Pulp, Paper, and Paperboard mills	1,424	\$263,962	\$350,035	\$1,223,373
7.Secondary Paperboard and other Paper Products	5,225	\$670,967	\$798,950	\$2,817,125

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2023 dollars value.

There are clear differences in capital intensity and labor efficiency across the manufacturing sub-sectors. For example, while Wood Furniture requires a substantial labor force (3,201 jobs) to generate approximately \$680 million in output, the Pulp, Paper, and Paperboard Mills sector generates nearly double that output (\$1.22 billion) with a workforce of only 1,424. This indicates that the paper manufacturing sub-sector is highly automated and capital-intensive,

generating significantly higher output per jobs (around \$859 thousand) compared to sectors like furniture manufacturing (\$212 thousand per jobs).

When supply-chain and induced effects are integrated (Table 4), Secondary Paperboard and Other Paper Products remains the primary economic engine of the state's forest sector, supporting 12,821 total jobs and \$4.69 billion in total economic output. However, a notable leverage effect is found in the Pulp, Paper, and Paperboard Mills sector. Despite its smaller direct workforce, this sector possesses a robust employment multiplier of approximately 3.4 (4,893 total jobs supported by 1,424 direct jobs). This reflects deep backward linkages; because paper mills require consistent volumes of fiber, energy, and maintenance services, their operation sustains a disproportionately large network of utility providers, transportation services, and raw material suppliers throughout the regional economy.

Table 4: Total Economic Contributions in Massachusetts state, Industry Groups, 2023. [†]

Industries	Employment	Labor Income	Value- Added	Output
1.Forestry	907	\$34,889	\$42,355	\$53,702
2.Logging	859	\$54,499	\$128,050	\$142,231
3.Primary Solid Wood Products	581	\$49,633	\$66,770	\$191,639
4.Secondary Solid Wood Products	5,919	\$566,395	\$685,291	\$1,546,149
5.Wood Furniture	5,456	\$454,099	\$558,005	\$1,206,536
6.Pulp, Paper, and Paperboard mills	4,893	\$593,556	\$884,582	\$2,098,342
7.Secondary Paperboard and other Paper Products	12,821	\$1,359,251	\$1,966,447	\$4,692,529

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2023 dollars.

Note: In Table 4, readers may observe that the sum of the economic contributions for the individual industries exceeds the reported total contribution for the Forest Sector as a whole as presented in Table 2. This difference is intentional and results from the "mixed-model" approach used to ensure accuracy.

In Input-Output (I-O) analysis, simply adding the total contributions of individual sectors results in double-counting. This occurs because the output of one forest industry often serves as an input for another. For example, logs harvested by the Logging sector are inputs for the Furniture sector. If modeled individually and summed, the model counts both the direct value of the logs and the associated supply-chain ripples (indirect effects) twice: once as a production requirement for the Furniture, and again as a direct output of the Logging sector. To provide the

most accurate estimate, the aggregated total is calculated by treating the forest industries as a single economic unit. This method mathematically nets out all inter-industry transactions within the sector, ensuring that the final results reflect only the new economic value generated for the state economy.

Forestry

Economic Contribution of Forestry

Table 5 presents the economic contribution of the Forestry sector. For Massachusetts, this industry group aggregates two specific IMPLAN sectors: (1) timber tract operations, which involves the management of forest lands for the sale of standing timber; and (2) support activities for forestry. It is important to note that the "All other crop farming" sector, or the Maple Syrup Production, is either not present or the data is undisclosed for Massachusetts.

Table 5: Direct, Indirect, and Induced Economic Contributions of the Forestry Industry in Massachusetts, 2023. [†]

	Employment	Labor Income	Value-Added	Output
Direct	800	\$26,474	\$27,896	\$31,771
Indirect	3	\$315	\$571	\$969
Induced	104	\$8,100	\$13,889	\$20,962
Total	907	\$34,889	\$42,355	\$53,702

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2023 dollars.

In 2023, the Forestry sector directly supported 800 jobs and generated nearly \$31.8 million in direct output. While this sector provides the biological raw material for the rest of the forest economy, its financial structure differs sharply from the downstream manufacturing sectors. The data reveals an exceptionally labor-intensive industry where the majority of gross output is allocated to the workforce rather than to intermediate supplies. Specifically, nearly 83% of the sector's direct output flows directly to Labor Income (\$26.5 million out of \$31.8 million).

This heavy reliance on labor rather than physical inputs dictates the sector's unique multiplier effects. The employment multiplier is approximately 1.13, meaning that for every 100 jobs in Forestry, about 13 additional jobs are supported elsewhere in the state. Decomposing this multiplier reveals that the sector's economic ripples are driven almost exclusively by workforce spending (induced effects) rather than business supply chains (indirect effects).

- **Indirect Effect:** The sector generated negligible indirect impacts, supporting only 3 jobs and less than \$1 million in output. This reflects the land-intensive nature of timber growing; unlike a manufacturing industry that constantly purchases chemicals, energy,

and parts, forestry operations have minimal business-to-business purchasing requirements.

- **Induced Effect:** In contrast, the induced effect supported 104 jobs and approximately \$21.0 million in output. Because such a high percentage of the sector's output is retained as Labor Income, the primary economic contribution beyond the forest itself arises when foresters and land managers spend their earnings within their local communities.

When these effects are combined, the Forestry industry contributed a total of 907 jobs, \$53.7 million in output, and \$42.4 million in Value-Added to the Massachusetts economy in 2023. The total output multiplier of 1.69 implies that every \$100 of output generated by forest management activities generates an additional \$69 of economic activity throughout the state.

Trend Analysis: Forestry (2017–2023)

As illustrated in Figure 6, the Forestry industry in Massachusetts displays a distinct divergence between workforce stability and economic output. While employment levels have remained relatively resilient, the sector experienced a severe structural contraction in financial output early in the study period from which it has not recovered. In 2017, the sector operated at a peak efficiency, generating \$73.9 million in output with 1,030 jobs. However, by 2018, output plummeted to \$45.7 million, a decline of nearly 38% in a single year, while the workforce remained stable. Following this correction, output continued a gradual descent, bottoming out at \$33.1 million in 2022 before a slight recovery to \$35.6 million in 2023.

In contrast, employment has demonstrated resilience. After dipping to a pandemic-era low of 919 jobs in 2020, the workforce rebounded to 996 in 2023, effectively returning to within 3.3% of its 2017 baseline. This divergence has resulted in a severe decline in labor productivity. In 2017, the average output per job was approximately \$71,780. By 2023, this figure dropped to around \$35,696 per job.

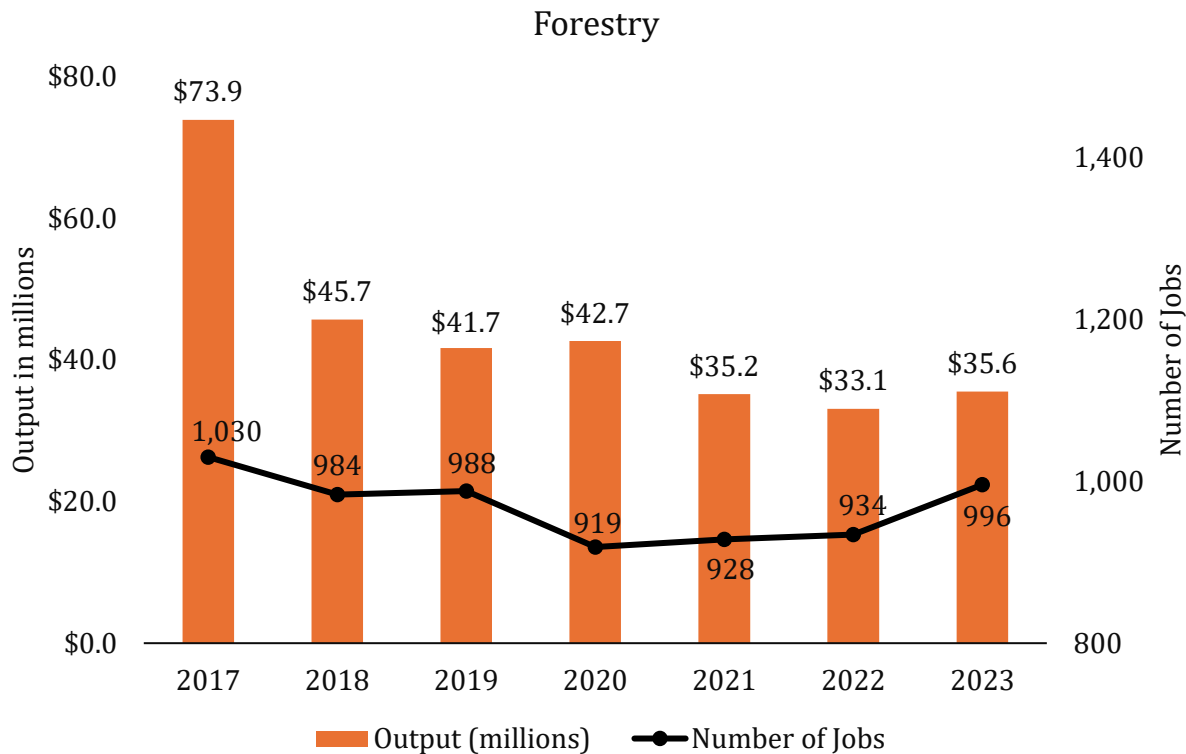


Figure 6: Trend in direct employment and output for the Forestry industry in Massachusetts, 2017–2023.

Logging

Economic Contribution of Logging

Table 6 outlines the economic contributions of the Logging sector, which comprises establishments primarily engaged in cutting timber, transporting logs, and producing wood chips in the field. In 2023, this sector served as a specialized source of employment in Massachusetts, directly supporting 673 jobs. The industry generated \$108.1 million in direct output and contributed \$105.3 million in Value-Added to the state's economy.

The multiplier analysis characterizes Logging as a sector with an exceptionally lean supply chain structure. A distinctive economic feature here is the overwhelming dominance of household spending (induced effects) over business-to-business transactions (indirect effects). Induced effects generated \$32.7 million in output, compared with \$1.4 million from indirect supply-chain activity. This suggests that logging's secondary impacts in Massachusetts are driven mainly by household spending from workers' earnings, rather than by a large in-state supplier network. While loggers do purchase inputs such as fuel and equipment maintenance, the model indicates these purchases account for a relatively small share of the overall ripple effect.

When these direct, indirect, and induced impacts are aggregated, the Logging industry contributed a total of 859 jobs, \$142.2 million in output, and \$128.1 million in Value-Added to the Massachusetts economy. The Output Multiplier is 1.32, which indicate that for every dollar of timber harvested, an additional \$0.32 of economic activity is stimulated elsewhere in the state.

Table 6: Direct, Indirect, and Induced Economic Contributions of the Logging Industry in Massachusetts, 2023. [†]

	Employment	Labor Income	Value-Added	Output
Direct	673	\$40,993	\$105,308	\$108,064
Indirect	24	\$862	\$1,059	\$1,443
Induced	162	\$12,644	\$21,683	\$32,725
Total	859	\$54,499	\$128,050	\$142,231

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2023 dollars.

Trend Analysis: Logging (2017–2023)

As presented in Figure 7, the Logging industry in Massachusetts has followed a trajectory defined by steady workforce contraction contrasted with extreme volatility in financial output. Over the seven-year period, direct employment followed a consistent linear decline, dropping from a peak of 835 jobs in 2017 to a study-period low of 673 in 2023. This represents a 19.4% reduction in the workforce, signaling a long-term consolidation of the labor pool. Output, however, dropped sharply from \$158.3 million in 2017 to \$65.1 million in 2022 (a decrease of about 58.9 percent) before increasing to \$108.1 million in 2023 (an increase of about 66.1 percent from 2022), despite the workforce continuing to shrink. This divergence in the final year highlights a significant spike in operational efficiency or market value. In 2022, the average output per worker sat at \$91,829. By 2023, this figure increased to \$160,494 per job. This pattern suggests that the 2023 rebound was driven more by higher value per unit of activity than by an expansion in the workforce.

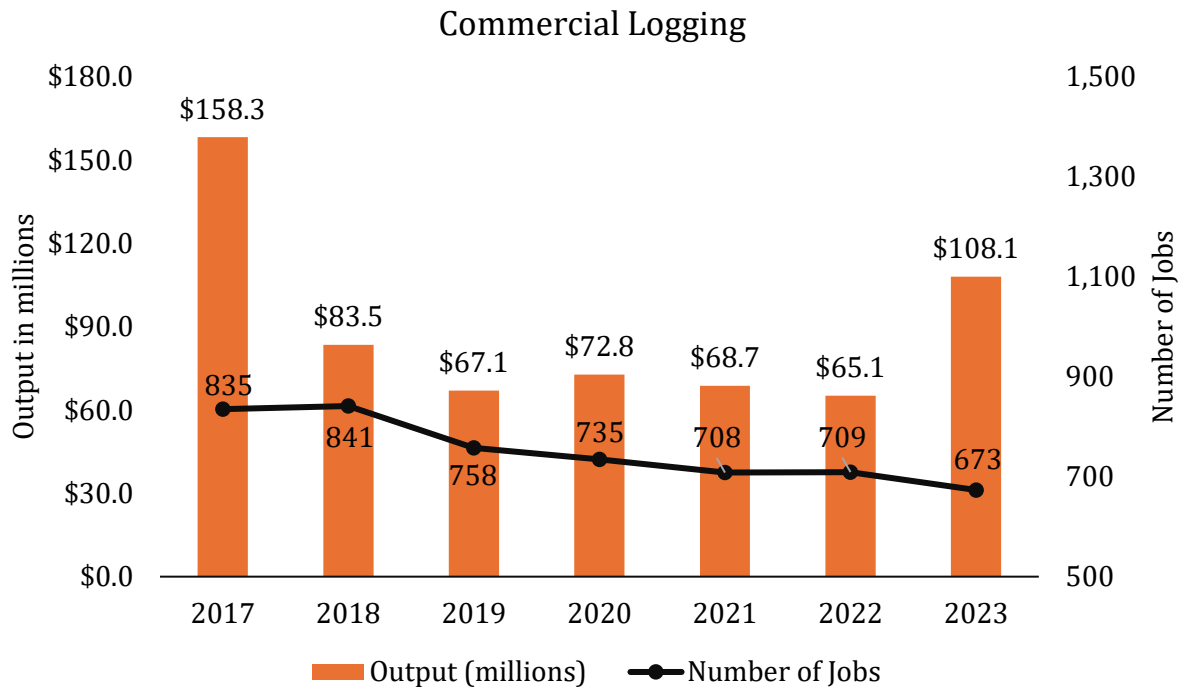


Figure 7: Trend in direct employment and output for the Logging industry in Massachusetts, 2017–2023.

Primary Solid Wood Products

Economic Contribution of Primary Solid Wood Products

Table 7 presents the economic contributions of the Primary Solid Wood Products industry. In Massachusetts, this sector encompasses manufacturing activities such as Electric power generation – Biomass, sawmills, wood preservation, reconstituted wood product manufacturing, and wood-based electric power generation (biomass). It is important to note that Veneer and Plywood manufacturing (Sector 126) is not present or disclosed within the Massachusetts dataset for 2023; therefore, the figures below reflect the remaining active sub-sectors.

In 2023, this manufacturing sector directly provided 202 jobs and generated \$102.1 million in direct output. A distinct structural characteristic of this sector in Massachusetts is its high "input intensity" relative to value creation. The Direct Value-Added (\$9.3 million) is relatively modest compared to the gross output, suggesting that a significant portion of the sector's output is immediately passed through to purchase intermediate goods, logs, energy, and chemicals, rather than being retained as capital or Labor Income within the mills themselves.

The multiplier results show particularly strong backward linkages into the state economy. Indirect effects supported 232 jobs, exceeding the sector's direct employment, yielding an

employment multiplier of 2.88. Put differently, every 100 direct jobs in primary solid wood products manufacturing are associated with about 188 additional jobs elsewhere in the state through supplier activity and household-spending effects. In output terms, total output was \$191.6 million relative to \$102.1 million direct output (an output multiplier of 1.88). Total Value-Added reached \$66.8 million, with indirect and induced Value-Added of \$57.4 million (Value-Added multiplier of 7.16) accounting for a substantial portion of the total. Overall, these results indicate that while the mills themselves are a relatively small direct employer, they play an important role in supporting a larger network of upstream and service-providing industries across Massachusetts.

Table 7: Direct, Indirect, and Induced Economic Contributions of the Primary Solid Wood Products Industry in Massachusetts, 2023.[†]

	Employment	Labor Income	Value-Added	Output
Direct	202	\$16,185	\$9,324	\$102,091
Indirect	232	\$21,953	\$37,732	\$59,795
Induced	147	\$11,495	\$19,715	\$29,753
Total	581	\$49,633	\$66,770	\$191,639

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2023 dollars.

Trend Analysis: Primary Solid Wood Products (2017–2023)

Figure 8 shows that Massachusetts' Primary Solid Wood Products industry experienced substantial year-to-year variability from 2017 to 2023, with a mid-period expansion followed by a sharp contraction. Employment declined from 300 jobs in 2017 to 202 jobs in 2023, a decrease of 32.7 percent. Output fell from \$130.5 million in 2017 to \$102.1 million in 2023, a decrease of 21.8 percent. After easing in 2018 and 2019, output rose sharply in 2020 to \$157.8 million (the study-period high) and remained elevated in 2021 at \$137.3 million, when employment reached 301 jobs. The sector then contracted markedly in 2022, with employment dropping to 211 jobs and output declining to \$98.0 million, followed by a modest rebound in output to \$102.1 million in 2023 while employment declined further to 202 jobs. Over the full period, output per job increased from about \$435 thousand per job in 2017 to about \$505 thousand per job in 2023 (an increase of about 16.2 percent), indicating higher average output

per worker despite a smaller workforce.

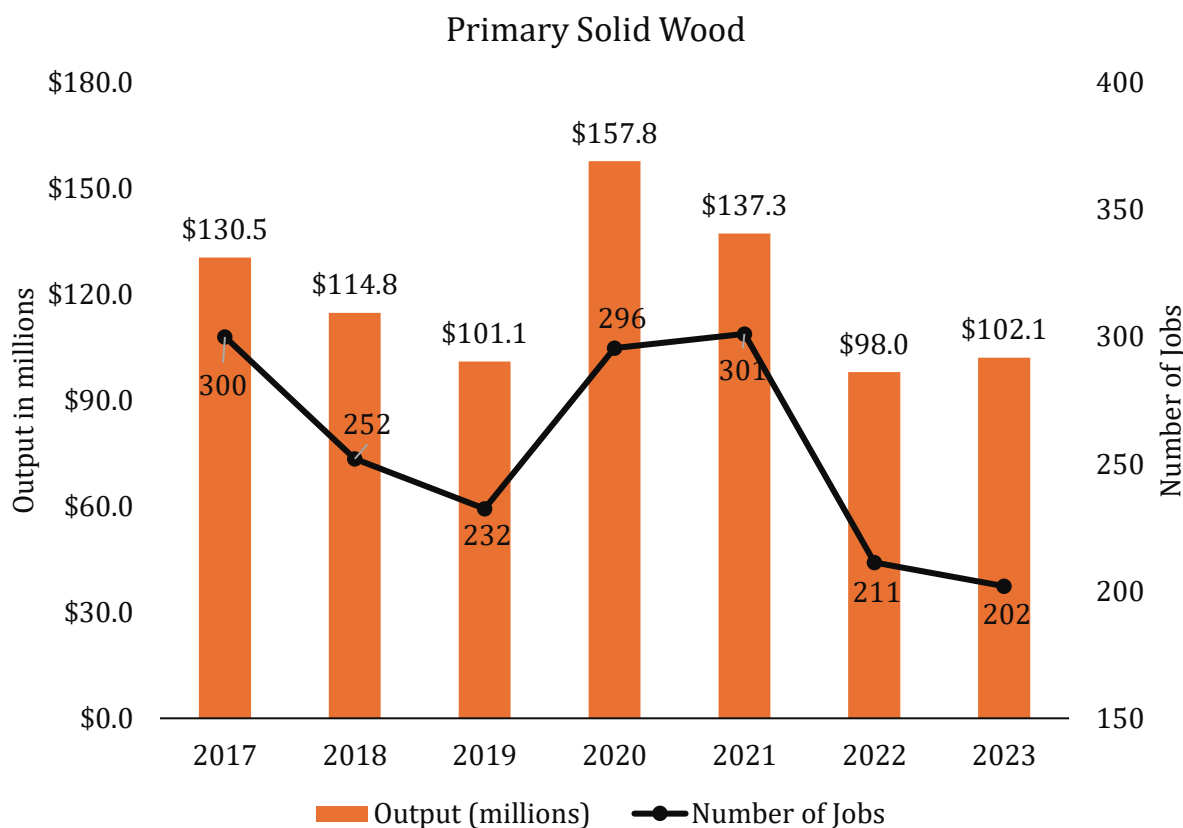


Figure 8: Trend in direct employment and output for the Primary Solid Wood Products industry in Massachusetts, 2017–2023.

Secondary Solid Wood Products

Economic Contribution of Secondary Solid Wood Products

Table 8 details the economic contribution of the Secondary Solid Wood Products industry. This diverse Value-Added sector encompasses industries such as engineered wood member and truss manufacturing, wood windows and doors manufacturing, millwork and flooring, wood container and pallet manufacturing, and prefabricated wood building manufacturing. In 2023, this sector stood as a significant manufacturing employer within the Massachusetts forest economy, directly providing 3,069 jobs and generating roughly \$890.2 million in direct output.

The sector exhibits a balanced employment multiplier of approximately 1.93, indicating that for every 100 jobs created in secondary manufacturing, around 93 additional jobs are supported elsewhere in the Massachusetts economy. While healthy, this multiplier is notably lower than that of the Primary Solid Wood sector (2.88). This distinction reflects upstream supply chain dynamics: whereas Primary manufacturers rely on labor-intensive forestry and logging operations for raw inputs, Secondary manufacturers primarily purchase processed lumber from

capital-intensive sawmills or import intermediate wood components. Consequently, the Indirect Employment effect (1,172 jobs) is significantly smaller than the direct workforce, contrasting sharply with the Primary sector where the indirect workforce exceeded the direct workforce.

When fully aggregated, the sector supports a total of 5,919 jobs and contributes over \$1.55 billion in total economic output. Financially, the sector acts as an effective value multiplier, contributing a total of \$685.3 million in Value-Added. This group exhibits a high degree of value retention, consistent with its focus on converting rough lumber into finished construction components and specialized wood products. Correspondingly, the ratio of direct Value-Added to output in this sector is approximately 31.2%, substantially exceeding the 9.1% observed in the Primary sector.

Table 8: Direct, Indirect, and Induced Economic Contributions of the Secondary Solid Wood Products Industry in Massachusetts, 2023. [†]

	Employment	Labor Income	Value-Added	Output
Direct	3,069	\$320,232	\$277,875	\$890,240
Indirect	1,172	\$114,864	\$182,218	\$316,084
Induced	1,679	\$131,300	\$225,199	\$339,824
Total	5,919	\$566,395	\$685,291	\$1,546,149

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2023 dollars.

Trend Analysis: Secondary Solid Wood Products (2017–2023)

Figure 9 shows that Massachusetts' Secondary Solid Wood Products industry expanded over the 2017–2023 period, with growth in employment, output, and output per worker. Direct employment increased from 2,790 jobs in 2017 to 3,069 jobs in 2023, an increase of 10.0 percent. Output increased from \$668.1 million in 2017 to \$890.2 million in 2023, an increase of 33.2 percent. After rising through 2019, output moderated during 2020–2022 but remained generally above the 2017 level, and then increased sharply in 2023 from \$770.7 million to \$890.2 million (an increase of 15.5 percent). Productivity, measured as output per job, increased from about \$239 thousand per worker in 2017 to about \$290 thousand per worker in

2023, an increase of about 21.1 percent.

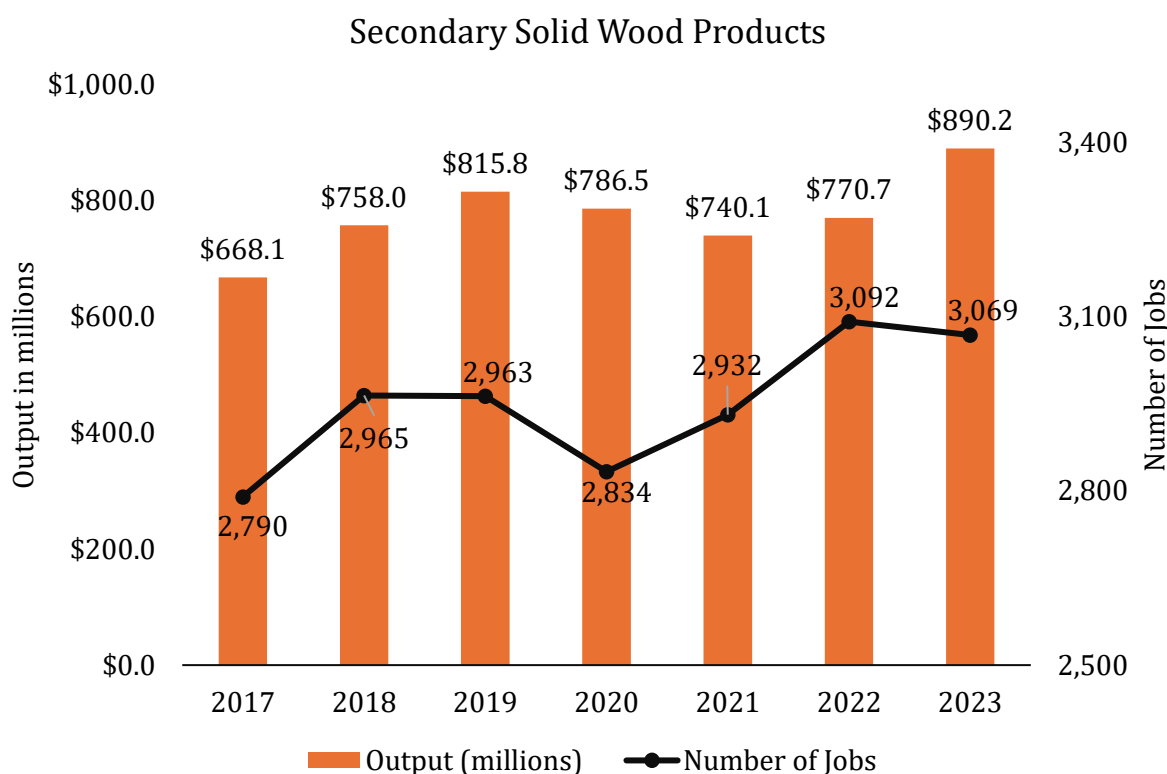


Figure 9: Trend in direct employment and output for the Secondary Solid Wood Products industry in Massachusetts, 2017–2023.

Wood Furniture

Economic Contribution of Wood Furniture

Table 9 presents the economic contributions of the Wood Furniture industry. This group encompasses a wide range of Value-Added manufacturers, including those producing wood kitchen cabinets and countertops, upholstered and non-upholstered household furniture, institutional wood furniture, wood office furniture, and custom architectural woodwork. In 2023, this sector directly provided 3,201 jobs and generated about \$680.0 million in direct output, along with \$254.4 million in Labor Income and \$230.7 million in Value-Added. Labor Income represents about 37.4 percent of direct output, indicating that payroll is a substantial component of direct production costs in this sector.

Including multiplier effects, the industry supported a total of 5,456 jobs and generated \$1.21 billion in total output, \$454.1 million in total Labor Income, and \$558.0 million in total Value-Added. The employment multiplier is 1.70, meaning that every 100 direct wood-furniture jobs support about 70 additional jobs elsewhere in the Massachusetts economy. The composition of secondary effects shows that induced impacts are slightly larger than indirect impacts for

employment (1,334 induced jobs versus 921 indirect jobs), which suggests that household spending from employee earnings is an important pathway for broader job support, alongside purchases from suppliers.

Table 9: Direct, Indirect, and Induced Economic Contributions of the Wood Furniture Industry in Massachusetts, 2023.[†]

	Employment	Labor Income	Value-Added	Output
Direct	3,201	\$254,371	\$230,698	\$679,955
Indirect	921	\$95,379	\$148,223	\$256,313
Induced	1,334	\$104,349	\$179,085	\$270,269
Total	5,456	\$454,099	\$558,005	\$1,206,536

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2023 dollars.

Trend Analysis: Wood Furniture Industry (2017–2023)

As illustrated in Figure 10, the Wood Furniture industry in Massachusetts has demonstrated exceptional workforce resilience, achieving a near-complete return to baseline following the pandemic-induced volatility. The sector's employment trajectory follows a clear "V-shaped" recovery; after contracting to a low of 2,849 workers in 2020, employment rebounded steadily to reach 3,201 jobs in 2023.

Financial output, however, has not fully recaptured its pre-pandemic momentum. While the sector experienced a significant boom in 2018, peaking at \$789.2 million, recent performance suggests a stabilization rather than continued growth. Output for 2023 settled at \$680.0 million, effectively returning to parity with the 2017 level (\$685.0 million) but remaining well below the 2018 high-water mark. Given the output, and employment trend, the productivity (output per job) was relatively stable over the period. It increased during the 2018 peak (about \$238 thousand per job), but by 2023 productivity was about \$212 thousand per job, similar to 2017 (about \$214 thousand per job).

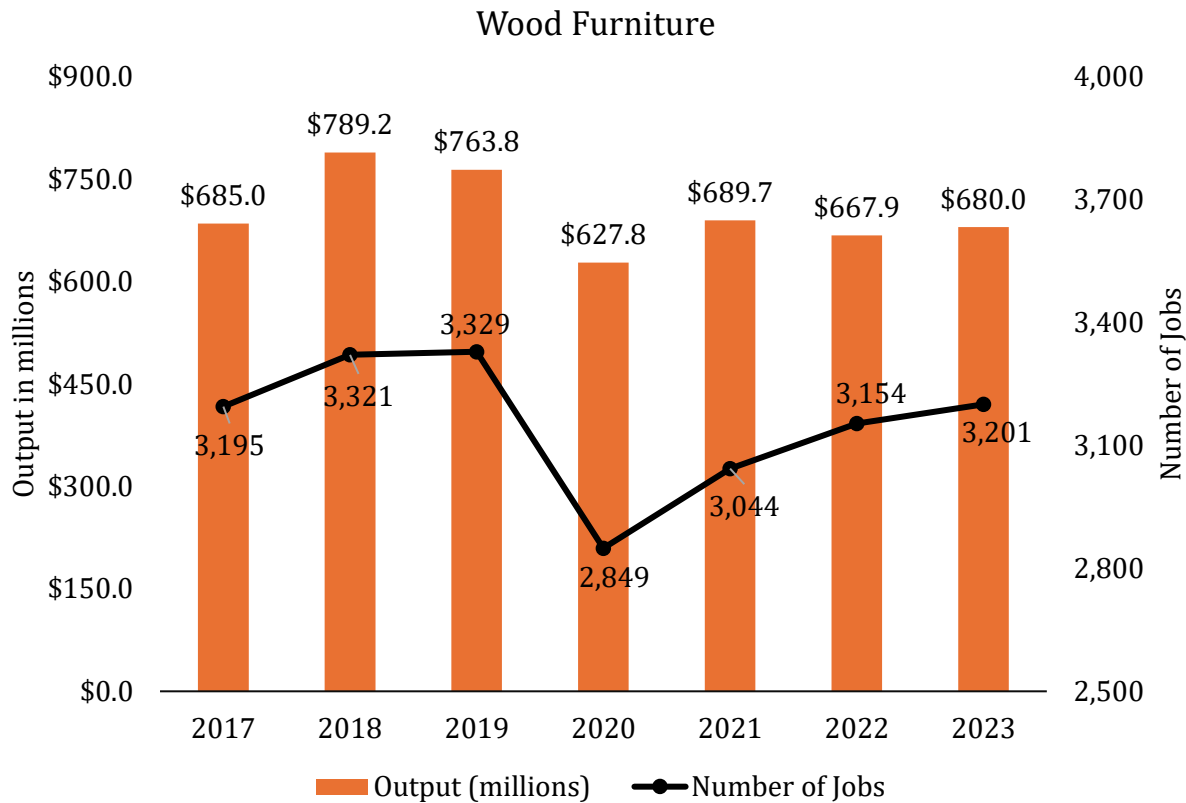


Figure 10: Trend in direct employment and output for the Wood Furniture industry in Massachusetts, 2017–2023.

Pulp, Paper, and Paperboard Mills

Economic Contribution of Pulp, Paper, and Paperboard Mills

Table 10 summarizes the 2023 economic contributions of the Pulp, Paper, and Paperboard Mills industry in Massachusetts (all monetary values are in thousands of U.S. dollars, adjusted to 2023 dollars). In this dataset, the activity reflected in this industry group is driven primarily by paper and paperboard mills; pulp mills (Sector 136) are not present or are not disclosed for Massachusetts in 2023. Even with that limitation, the sector shows a high-output profile relative to its direct workforce. In 2023, the industry directly supported 1,424 jobs and generated \$1.22 billion in direct output, along with \$264.0 million in Labor Income and \$350.0 million in Value-Added (about \$859 thousand in output per direct job).

The multiplier results indicate substantial linkages to the broader state economy. Indirect effects supported 1,701 jobs, exceeding direct employment, which is consistent with a production process that relies heavily on purchased inputs and services (e.g., energy, transportation and logistics, process inputs, and specialized maintenance and technical services). Induced effects supported an additional 1,768 jobs, reflecting household spending associated with employee

compensation, and proprietor income. Taken together, the sector supported 4,893 total jobs and generated \$2.10 billion in total output. The implied employment multiplier is about 3.44, meaning every 100 direct mill jobs support about 244 additional jobs elsewhere in the Massachusetts economy; this is the largest employment multiplier among the seven forest-sector groups reported.

Table 10: Direct, Indirect, and Induced Economic Contributions of the Pulp, Paper, and Paperboard Mills Industry in Massachusetts, 2023. [†]

	Employment	Labor Income	Value-Added	Output
Direct	1,424	\$263,962	\$350,035	\$1,223,373
Indirect	1,701	\$191,296	\$297,329	\$517,039
Induced	1,768	\$138,298	\$237,218	\$357,929
Total	4,893	\$593,556	\$884,582	\$2,098,342

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2023 dollars.

Trend Analysis: Pulp, Paper, and Paperboard Mills (2017–2023)

Figure 11 shows that Massachusetts’ paper, and paperboard mills sector contracted in employment over the 2017–2023 period, while output fluctuated and showed a modest rebound in the most recent year. Direct employment declined from 1,845 jobs in 2017 to 1,357 jobs in 2020, then partially recovered to 1,424 jobs in 2023. Overall, the 2023 workforce was about 23 percent smaller than in 2017. Output peaked in 2018 at \$1,773.3 million before trending downward to \$1,154.0 million in 2022, followed by an increase to \$1,223.4 million in 2023.

Productivity (output per job) remained high throughout the period. It increased to about \$971 thousand per job in 2018, and in 2023 it was about \$859 thousand per job, slightly higher than the 2017 level of about \$848 thousand per job. This pattern suggests that while the sector employs fewer workers than in 2017, output per worker has been relatively stable in recent years, consistent with a capital-intensive industry where output is not closely proportional to employment.

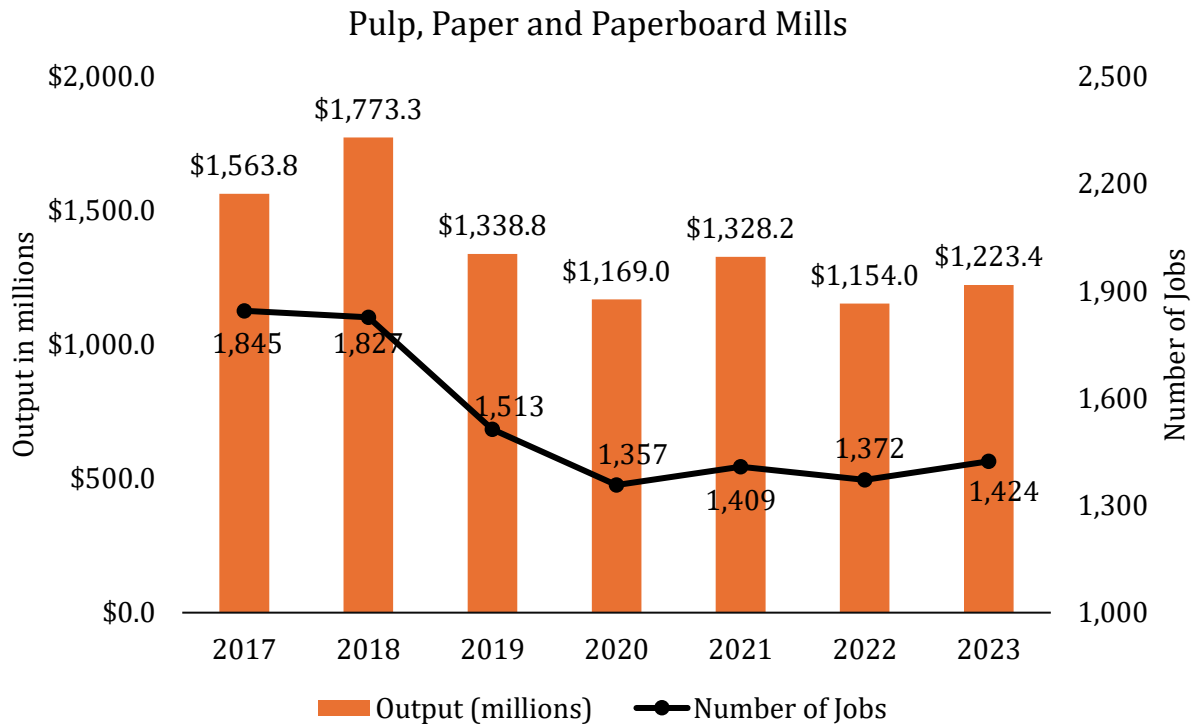


Figure 11: Trend in direct employment and output for the Pulp, Paper, and Paperboard Mills industry in Massachusetts, 2017–2023.

Secondary Paperboard and Other Paper Products

Economic Contribution of Secondary Paperboard and Other Paper Products

Table 11 outlines the economic contribution of the Secondary Paperboard and Other Paper Products industry. This group is composed of "converters" that manufacture finished goods from purchased paper, paperboard, or recycled materials. Specific industries in this category include paperboard container manufacturing, paper bag production, stationery, and coated paper products. It is important to note that Sanitary Paper Product Manufacturing (Sector 142) is not disclosed or present in the Massachusetts dataset; therefore, the figures below exclude that specific sub-sector and reflect the remaining converting industries. In 2023, this sector stood as the clear leader in employment within the Massachusetts forest economy, directly providing 5,225 jobs and generating over \$2.82 billion in direct output, along with \$671.0 million in Labor Income and \$799.0 million in Value-Added.

Including multiplier effects, the sector supported 12,821 total jobs and generated \$4.69 billion in total output, \$1.36 billion in total Labor Income, and \$1.97 billion in total Value-Added. The implied employment multiplier is 2.45, meaning that every 100 direct jobs support about 145 additional jobs elsewhere in the state economy. Induced employment (4,029 jobs) is somewhat larger than indirect employment (3,567 jobs), indicating that household spending associated

with employee compensation is a major pathway for secondary job support, alongside supplier-chain activity.

Table 11: Direct, Indirect, and Induced Economic Contributions of the Secondary Paperboard and Other Paper Products Industry in Massachusetts, 2023.[†]

	Employment	Labor Income	Value-Added	Output
Direct	5,225	\$670,967	\$798,950	\$2,817,125
Indirect	3,567	\$373,198	\$592,739	\$1,059,929
Induced	4,029	\$315,086	\$574,758	\$815,475
Total	12,821	\$1,359,251	\$1,966,447	\$4,692,529

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2023 dollars.

Trend Analysis: Secondary Paperboard and Other Paper Products (2017–2023)

Figure 12 shows that Massachusetts' secondary paperboard and other paper products industry declined gradually in both employment and output from 2017 to 2023. Direct employment decreased from 6,087 jobs in 2017 to 5,225 jobs in 2023, a decline of about 14.2 percent. Output was highest in 2018 at \$3,519.5 million and then trended downward, reaching \$2,817.1 million in 2023. Relative to 2017 output of \$3,431.7 million, 2023 output was lower by about 17.9 percent.

Productivity, measured as output per job, fluctuated during the period and declined in the later years. Output per job increased from about \$564 thousand per job in 2017 to a high of about \$617 thousand per job in 2020, but then fell to about \$534 thousand per job in 2022 and was about \$539 thousand per job in 2023. Because output declined somewhat faster than employment over the full period, output per job in 2023 was slightly below the 2017 level, implying lower average output generated per worker compared with the beginning of the study period.

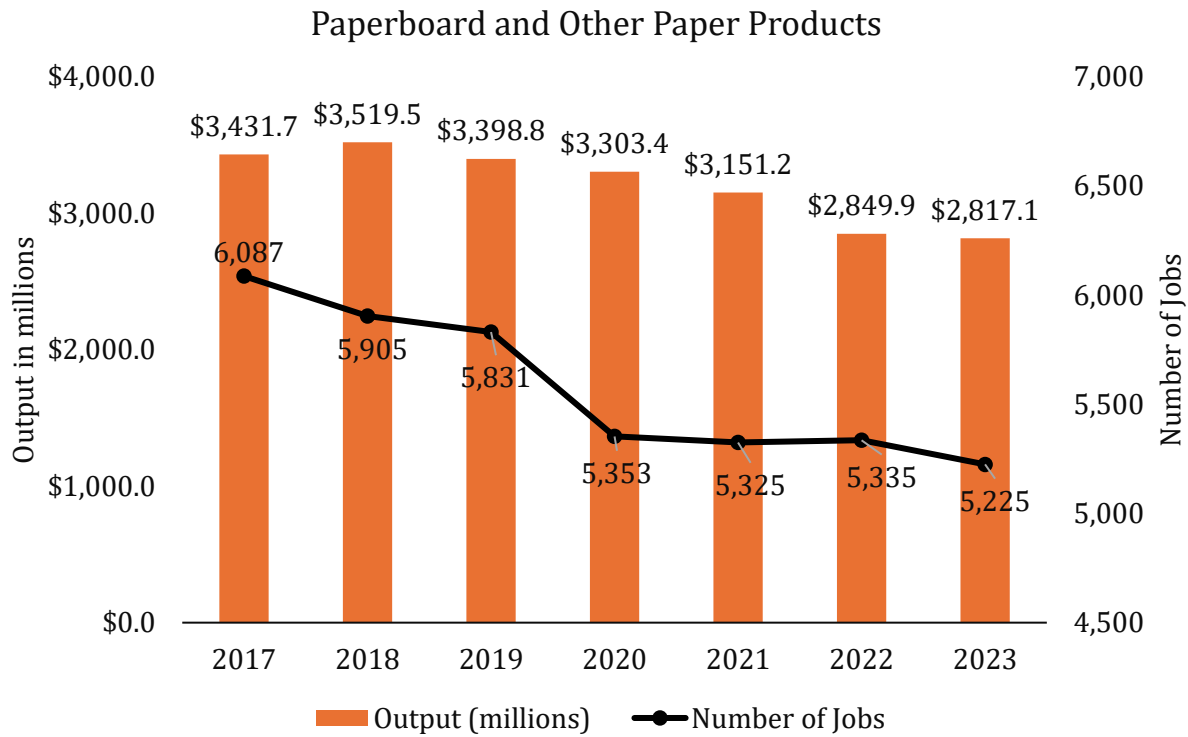


Figure 12: Trend in direct employment and output for the Secondary Paperboard and Other Paper Products industry in Massachusetts, 2017–2023.

Top Forest Product Sectors

Massachusetts's forest-products sector is represented by 28 specific IMPLAN industries, as four of the standard 32 identified forest industries are not present or undisclosed in the state's 2023 industry mix. The economic profile of Massachusetts's forest sector is distinctively defined by advanced packaging manufacturing and paper processing sectors. Paperboard container manufacturing stands as the undisputed economic anchor of the state's forest economy. It ranks first across all four major economic indicators, providing 2,376 jobs and generating \$1.44 billion in direct output.

In terms of employment, the sector is heavily consolidated around paper converting and coating. The top two employers, Paperboard container manufacturing and Paper bag and coated and treated paper manufacturing, combined employ nearly 4,400 individuals, far outpacing the solid wood sectors. In the solid wood category, Custom architectural woodwork and millwork is the primary employer, ranking fourth with 1,124 jobs. Wood container and pallet manufacturing follows at rank five with 1,039 jobs. This distribution shows that labor demand in the solid wood sub-sector is driven by secondary manufacturing and finish carpentry rather than sawmilling or primary processing.

A divergence between labor intensity and capital intensity is visible among the top performers. Paper mills, while ranking third in employment (1,252 jobs), climbs to second place in Output (\$1.06 billion) and third in Value-Added (\$303.1 million, which shows that the paper manufacturing sub-sector generates significantly higher economic value per worker compared to the more labor-intensive wood assembly sectors. Additionally, Commercial logging appears in the top four for Value-Added (\$105.3 million), despite not ranking in the top five for Employment or Output. This emphasizes a high Value-Added ratio for logging operations, where the value generated is high relative to the cost of intermediate inputs.

Table 12: Top five industries in terms of direct Economic Contributions in Massachusetts state, 2023. [†]

Rank	Employment	Labor Income	Value-Added	Output
1	Paperboard container manufacturing (2,376)	Paperboard container manufacturing (\$316,491)	Paperboard container manufacturing (\$375,429)	Paperboard container manufacturing (\$1,443,044)
2	Paper bag and coated and treated paper manufacturing (2,013)	Paper bag and coated and treated paper manufacturing (\$258,089)	Paper bag and coated and treated paper manufacturing (\$309,477)	Paper mills (\$1,059,946)
3	Paper mills (1,252)	Paper mills (\$227,680)	Paper mills (\$303,092)	Paper bag and coated and treated paper manufacturing (\$1,001,288)
4	Custom architectural woodwork and millwork (1,124)	Wood container and pallet manufacturing (\$109,546)	Commercial logging (\$105,308)	Wood container and pallet manufacturing (\$279,227)
5	Wood container and pallet manufacturing (1,039)	Custom architectural woodwork and millwork (\$102,088)	Wood container and pallet manufacturing (\$99,529)	Custom architectural woodwork and millwork (\$229,668)

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2023 dollars value.

Top Non-Forest Industries supported by the Forest Sector in 2023

Excluding the forest-products industries themselves, the Massachusetts economy included 458 other IMPLAN sectors in 2023. The forest sector supported at least one job in 188 of these sectors and at least ten jobs in 131 of them. In addition to the 14,594 direct jobs within the industry, the forest sector supported 15,950 indirect and induced jobs across the state's economy. These additional jobs, generated through supply chain purchases and household spending, are heavily concentrated in real estate, logistics, healthcare, and corporate services. Table 13 highlights the top ten non-forest industries most heavily impacted by this economic activity in 2023. Together, these ten sectors account for 4,950 jobs. This represents approximately 31.0 percent of all indirect and induced employment generated by the forest economy.

Table 13: Top Ten Industries Impacted by Massachusetts state's Forest Products Industries in terms of number of jobs in 2023.

Industries	Number of Jobs
Other real estate	723
Hospitals	614
Wholesale - Other durable goods merchant wholesalers	548
Warehousing and storage	525
Full-service restaurants	506
Management of companies and enterprises	445
Couriers and messengers	431
Individual and family services	400
Wholesale - Other nondurable goods merchant wholesalers	383
Employment services	374
Total	4,950

The composition of these top sectors reveals the specific mechanisms through which the forest sector stimulates the wider Massachusetts economy:

- **Real Estate and Healthcare (Induced Effects):** The top two impacted sectors, Other real estate (723 jobs) and Hospitals (614 jobs), illustrate the powerful "induced" effect of the forest workforce's spending. Along with Individual and family services (400 jobs) and Full-service restaurants (506 jobs), these industries are sustained not by supply chain

purchases, but by the wages and salaries, and other income spent by forest-sector employees.

- **Logistics and Distribution:** Strong linkages are found in the movement of physical goods. Wholesale - Other durable goods merchant wholesalers ranks third with 548 jobs, reflecting the network of distributors handling building materials and wood products. When combined with Warehousing and storage (525 jobs) and Couriers and messengers (431 jobs), it shows that the forest sector is a key driver of the state's logistics infrastructure, requiring reliable networks to store and distribute finished paper and wood products to consumer markets.
- **Corporate and Business Support:** Notably, Management of companies and enterprises (445 jobs) and Employment services (374 jobs) appear in the top ten. This suggests that Massachusetts's forest product firms, particularly the larger paper converting and packaging entities, are significant consumers of corporate support services. They rely on external firms for administrative oversight, and organizational management to maintain their complex manufacturing operations.

In terms of economic output, the forest sector's influence concentrated toward asset-based wealth, high-volume commercial trade, and essential infrastructure. As detailed in Table 14, the top ten non-forest industries supported by forest-sector activity generated a combined \$1.34 billion in output in 2023. The Owner-occupied housing sector ranks as the single largest beneficiary with \$207.6 million in output. In economic modeling, this sector represents the imputed rental value of homeownership. This induced prosperity is further evidenced by the strong performance of Other real estate (\$146.2 million), Hospitals (\$138.8 million), and Monetary authorities and depository credit intermediation (\$99.9 million), which reflect the essential financial and service spending of forest-sector employees within their local communities.

Further, commercial trade remains a dominant structural component. When Wholesale - Other durable goods (\$200.5 million) and Wholesale - Other nondurable goods (\$169.3 million) are combined, the wholesale trade sector accounts for nearly \$370 million in economic activity. This underscores the forest industry's reliance on a massive commercial distribution network to move finished paper packaging and building products to market.

The output rankings also highlight the capital and infrastructure footprint of the forest economy. Management of companies and enterprises ranks sixth (\$131.3 million), indicating that the sector supports substantial corporate administrative activity. Furthermore, Electric power transmission and distribution (\$89.3 million) and Truck transportation (\$82.3 million) appear in the top ten, reflecting the operational realities of the industry: it requires immense

energy inputs to power manufacturing facilities and a robust freight network to maintain the flow of goods through the supply chain.

Table 14: Top Ten Industries impacted by Massachusetts State’s Forest Products Industries in terms of output production in 2023. [†]

Industries	Output
Owner-occupied housing	\$207,642
Wholesale - Other durable goods merchant wholesalers	\$200,520
Wholesale - Other nondurable goods merchant wholesalers	\$169,271
Other real estate	\$146,240
Hospitals	\$138,816
Management of companies and enterprises	\$131,297
Monetary authorities and depository credit intermediation	\$99,908
Electric power transmission and distribution	\$89,285
Truck transportation	\$82,302
Wholesale - Drugs and druggists’ sundries	\$75,887
Total	\$1,341,169

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2023 dollars value.

Importance of the Forest Products Industries in Context

Natural Resources and Agricultural Industries

To contextualize the economic importance of the forest economy, Table 15 compares the direct contributions of Massachusetts's four primary natural resource sectors: Forest Products, Agriculture, Mining, and Commercial Fishing & Hunting.

The data indicates a significant structural shift in the state's natural resource hierarchy. Unlike many states where Agriculture is the dominant volume leader, in Massachusetts, the Forest Products industry has emerged as the largest employer among the natural resource sectors. With 14,594 jobs, the forest sector slightly edges out Agriculture (14,185 jobs) and supports more than double the workforce of Mining, and Oil & Gas (7,304 jobs) and Commercial Fishing & Hunting (6,240 jobs). This establishes the forest industry as the primary pillar of the state's rural and resource-based labor market.

A comparison of financial contributions, however, reveals a stark divergence in capital intensity and economic leverage. While Forest Products and Agriculture have nearly identical workforce sizes, their economic outputs differ substantially. The Forest Products industry generated \$5.85 billion in output, which is more than 8.5 times the output generated by Agriculture (\$683 million).

The trend analysis over the study period (from 2017) highlights extreme volatility across the natural resource base, with the Forest Products sector occupying a middle ground of structural consolidation. The Mining, and Oil & Gas sector experienced substantial growth, with Output increasing by approximately 704% and Value-Added rising by 510%. In contrast, the agriculture sector contracted during the study period. Employment declined by 34.7%, and Labor Income decreased by 76.1%. The Forest Products sector exhibited different trends compared to the volatility observed in mining and agriculture. While the sector underwent consolidation, evidenced by a 9.3% decrease in Employment and a 12.8% decline in Output, Real Value-Added increased by 2.2% (\$1.80 billion). This divergence suggests that while the sector's physical scale has reduced, its contribution to GSP has remained stable or improved due to a shift toward higher Value-Added activities.

Table 15: Natural Resources and Agricultural Production Industries in Massachusetts state, 2023. [†]

Industry	Employment	Δ2017 ^{††}	Labor Income	Δ2017 ^{††}	Value-Added	Δ 2017 ^{††}	Output	Δ 2017 ^{††}
1. Forest Products	14,594	-9.3%	\$1,593,185	-15.8%	\$1,800,085	2.2%	\$5,852,618	-12.8%
2. Commercial fishing, hunting & trapping	6,240	0.6%	\$382,154	-40.4%	\$440,433	-29.4%	\$443,104	-31.6%
3. Mining, and oil & gas production	7,304	98.8%	\$3,381,205	310.9%	\$6,240,707	510.1%	\$11,208,952	703.7%
4. Agriculture production (plant crops and animals)	14,185	-34.7%	\$253,980	-76.1%	\$448,599	-58.0%	\$683,008	-54.2%
Total	42,324	-11.3%	\$5,610,524	26.9%	\$8,929,825	99.4%	\$18,187,682	77.5%

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2023 dollars value.

^{††} All percentage differences are calculated in real terms using 2023 constant dollars.

Manufacturing Industries

To assess the relative standing of the forest sector within Massachusetts industrial base, Table 16 compares the aggregated "Forest Products manufacturing" contribution against the state's other major manufacturing groups. Note that in this context, "Forest Products" refers specifically to the manufacturing sub-sectors (Groups 3 through 7), excluding the extraction activities of forestry and logging and other non-manufacturing sectors (IMPLAN codes 10, 15, 16, 19, and 40 see Appendix A). Forest products manufacturing accounts for 90% of total forest-sector employment, 96% of Labor Income, 93% of Value-Added, and 98% of total forest-sector output.

In 2023, the Forest Products Manufacturing sector provided 13,118 jobs, representing approximately 5.5% of the state's total manufacturing workforce (240,124 jobs). Among the 16 manufacturing groups, Forest Products ranked seventh in terms of employment. It contributed fewer jobs than the Chemical sector (15,330 jobs) but exceeded Plastics and Rubber Products (12,021 jobs) and Transportation Equipment (10,233 jobs). In terms of financial output, the sector generated \$5.71 billion, also ranking seventh among the 16 sectors. The state's manufacturing output is heavily concentrated in the Computer and Electronic Product (\$29.42 billion) and Chemical manufacturing (\$25.91 billion) sectors. The Forest Products sector's output of \$5.71 billion places it below Machinery manufacturing (\$8.18 billion) but above Transportation Equipment (\$5.43 billion).

A comparison of labor productivity (gross output per job) indicates distinct differences in capital intensity across the manufacturing base. Sectors such as Chemical manufacturing (\$1.69 million per job) and Petroleum and Coal manufacturing (\$1.47 million per job) exhibit the highest output-to-labor ratios, reflecting significant automation and high-value product mixes. Forest Products manufacturing generated approximately \$435 thousand in output per worker.

This performance occurs within a broader contraction of the Massachusetts manufacturing base. Between 2017 and 2023, total manufacturing employment in the state declined by 5.4%, and total output decreased by 9.9% in real terms. Overall, the Forest Products Manufacturing sector operates as a mid-sized component of this industrial economy, ranking in the top half of all manufacturing categories for both employment and output.

Table 16: Manufacturing Industries in Massachusetts state, 2023. [†]

Manufacturing Industries	Employment	Labor Income	Value-Added	Output
Computer and Electronic Product	44,465	\$7,475,825	\$11,674,001	\$29,422,800
Food	33,066	\$2,296,283	\$2,963,936	\$13,445,726
Fabricated Metal	31,238	\$3,213,921	\$4,687,803	\$10,655,765
Miscellaneous	21,405	\$2,637,119	\$4,418,979	\$8,390,176
Machinery	18,483	\$2,394,916	\$3,427,469	\$8,178,619
Chemical	15,330	\$2,940,857	\$15,444,968	\$25,906,230
Forest Products	13,118	\$1,525,238	\$1,666,041	\$5,710,276
Plastics and Rubber Products	12,021	\$1,079,214	\$1,490,661	\$5,270,207
Transportation Equipment	10,233	\$1,647,584	\$1,833,561	\$5,426,851
Printing	9,229	\$779,673	\$1,193,236	\$2,128,300
Textiles and Apparel	8,105	\$663,131	\$895,786	\$2,169,319
Electrical Equipment	7,083	\$921,667	\$1,578,682	\$3,714,382
Beverage and Tobacco Product	6,882	\$559,319	\$880,686	\$3,246,832
Nonmetallic Mineral Product	5,468	\$500,891	\$946,656	\$2,121,748
Primary Metal	2,950	\$327,221	\$501,095	\$3,198,596
Petroleum and Coal	1,046	\$469,058	\$621,279	\$1,538,384
Total	240,124	\$29,431,917	\$54,224,839	\$130,524,212
Compared to 2017	-5.4%	-9.3%	-3.9%	-9.9%

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2023 dollars value.

Summary

The 2023 economic contribution report demonstrates that the Forest Products sector remains a cornerstone of Massachusetts's industrial base and a vital engine for its diverse manufacturing economy. In 2023, the Forest Products sector directly provided 14,594 jobs and generated \$5.85 billion in direct economic output. The sector's influence extends deeply into the broader regional economy; when accounting for indirect supply chain purchases and induced household spending, the total contribution reached 30,544 jobs and \$9.64 billion in total output. This indicates a robust employment multiplier of 2.09. Essentially, for every 100 direct jobs in the forest sector, an additional 109 jobs are supported elsewhere in the Massachusetts economy, reflecting the deep integration of forest industries with the state's logistics, real estate, and corporate service sectors.

The industry exhibits a distinct structural emphasis on downstream conversion rather than raw extraction. Massachusetts's sector is defined by advanced packaging and paper processing. The Secondary Paperboard and Other Paper Products group stands as the primary employment driver, supporting 5,225 jobs. Furthermore, despite employing fewer workers than the converting sectors, the Pulp, Paper, and Paperboard Mills sector remains a capital-intensive powerhouse. It generated over \$1.22 billion in direct output with only 1,424 jobs, highlighting the high automation and value-generation capacity of the state's mills. When analyzing the specific, unaggregated industries, Paperboard container manufacturing emerges as the most significant subsector, ranking first in employment (2,376 jobs), Labor Income (\$316 million), Value-Added (\$375 million), and total output (\$1.4 billion).

In the broader context of the state economy, the forest sector serves as the primary anchor of the natural resource base. It is the largest employer among the four natural resource sectors, supporting about 35 percent of the state's natural resource workforce, and it ranks second across the other key measures (Labor Income, Value-Added, and output). Within the broader manufacturing sector, forest products stand as a solid mid-tier position, ranking as the seventh-largest manufacturing employer with 13,118 jobs, and seventh in output with \$5.71 billion of output.

The 2017–2023 period indicates a measurable shift in the forest sector's economic structure. While total employment declined by 9.3 percent, real Value-Added increased by 2.2 percent, resulting in higher value-added per worker over the study period. Overall, the sector continues to convert renewable resources into essential products, including packaging, construction components, and consumer goods, while maintaining an important presence in Massachusetts' manufacturing base and supporting employment statewide.

References

- Bureau of Economic Analysis. (2023). Fundamental concepts. In NIPA handbook: Concepts and methods of the U.S. National Income and Product Accounts (Chapter 2).
<https://www.bea.gov/resources/methodologies/nipa-handbook/pdf/chapter-02.pdf>
- Coronado, C. J., McConnell, T. E., & Matthews, S. N. (2014). Economic impacts of timber product outputs in Ohio across timber market regions. *BioResources*, 9(4), 7579–7592.
<https://bioresources.cnr.ncsu.edu/resources/economic-impacts-of-timber-product-outputs-in-ohio-across-timber-market-regions/>
- IMPLAN Group LLC. (2023). IMPLAN® model: Data and software system [Data and software].
<https://implan.com/>
- Khanal, N., Pokharel, R., Poudel, J., Gc, S., Shannon, E., Huff, E., & Finley, A. (2024). Analysis of location, feedstock availability, and economic impacts of potential mass timber processing facilities in Michigan. *Forest Policy and Economics*, 163, 103203.
<https://doi.org/10.1016/j.forpol.2024.103203>
- Lamsal, B., Cavo, M., & Wagner, J. E. (2025b). Decomposing the economic contribution of a sector: A case study of New York State’s forest sector. *Forest Science*, 71, 423–444.
<https://doi.org/10.1007/s44391-025-00023-x>
- Lamsal, B., Poudel, J., & Pokharel, R. (2025a). Regional economic and employment impacts of industrial decline in the forest sector: Evidence from sawmill closures in Michigan. *Forest Policy and Economics*, 178, 103601. <https://doi.org/10.1016/j.forpol.2024.103601>
- Leefers, L., Poudel, J., Neumann, D., & Public Sector Consultants. (2020). Forest products industries’ economic contributions in the Northeast and Midwest. Public Sector Consultants.
- Pokharel, M., Germain, R. H., Wagner, J. E., & Smith, W. B. (2023). Estimating a regional economic conservation benefit of using domestic hardwoods vs. apitong for trailer decking: A case study on US Army use. *Forests*, 14(7), 1428.
<https://doi.org/10.3390/f14071428>
- Poudel, J. (2022). Forest products industries’ economic contributions: Michigan. Forest Resources Division, Michigan Department of Natural Resources.
- Poudel, J., & Dahal, R. (2025). A comprehensive look at the forest products industry’s economic contribution to the United States: Pre- and post-COVID analysis. *Forest Policy and Economics*, 172, 103440. <https://doi.org/10.1016/j.forpol.2025.103440>
- Poudel, K., & Ochuodho, T. O. (2021). Forest sector dependence and economic well-being in Kentucky: An econometric analysis. *Forest Science*, 67(6), 659–669.
<https://doi.org/10.1093/forsci/fxab048>

Watson, P., Cooke, S., Kay, D., & Alward, G. (2015). A method for improving economic contribution studies for regional analysis. *Journal of Regional Analysis & Policy*, 45(1), 1–15.

Appendix A: Forest Products Industries Groupings and IMPLAN Sectors

A1: Forestry Industry Grouping and IMPLAN Sectors

Industry Code	Industry name
10	All other crop farming***
15	Forestry, forest products, and timber tract production
19	Support activities for agriculture and forestry-*

Note: Sectors with an “*” indicate that only a portion of the sector is included in the forest products industries.

Sectors denoted by “****” indicate that the corresponding FPI is not present in Massachusetts.

A2: Logging Industry Grouping and IMPLAN Sector

Industry Code	Industry name
16	Commercial logging

A3: Primary Solid Wood Products Industry Grouping and IMPLAN Sectors

Industry Code	Industry name
40	Electric power generation – Biomass**
124	Sawmills
125	Wood preservation
126	Veneer and plywood manufacturing***
128	Reconstituted wood product manufacturing

Note: Sectors with “***” indicate that it is treated as **full sector** in 2023; however in 2017 it was treated as a **partial (wood component only)** so the numbers are not strictly comparable.

Sectors denoted by “****” indicate that the corresponding FPI is not present in Massachusetts.

A4: Secondary Solid Wood Products Industry Grouping and IMPLAN Sectors.

Industry Code	Industry name
127	Engineered wood member and truss manufacturing
129	Wood windows and door manufacturing
130	Cut stock, resawing lumber, and planning
131	Other millwork, including flooring
132	Wood container and pallet manufacturing
133	Manufactured home (mobile home) manufacturing
134	Prefabricated wood building manufacturing
135	All other miscellaneous wood product manufacturing

A5: Wood Furniture Industry Grouping and IMPLAN Sectors.

Industry Code	Industry name
348	Wood kitchen cabinet and countertop manufacturing
349	Upholstered household furniture manufacturing
350	Non-upholstered wood household furniture manufacturing
352	Institutional furniture manufacturing**
353	Wood office furniture manufacturing
354	Custom architectural woodwork and millwork
356	Showcase, partition, shelving, and locker manufacturing**

Note: Sectors with “**” indicate that it is treated as **full sector** in 2023; however in 2017 it was treated as a **partial (wood component only)** so the numbers are not strictly comparable.

A6: Pulp, Paper, and Paperboard Mills Industry Grouping and IMPLAN Sectors.

Industry Code	Industry name
136	Pulp mills***
137	Paper mills
138	Paperboard mills

Sectors denoted by “***” indicate that the corresponding FPI is not present in Massachusetts.

A7: Secondary Paperboard and Other Paper Products Industry Grouping and IMPLAN Sectors.

Industry Code	Industry name
139	Paperboard container manufacturing
140	Paper bag and coated and treated paper manufacturing
141	Stationery product manufacturing
142	Sanitary paper product manufacturing***
143	All other converted paper product manufacturing

Sectors denoted by “***” indicate that the corresponding FPI is not present in Massachusetts.

Appendix B. Detailed Economic Contribution Results of 2023

B1: Direct Economic Contribution by IMPLAN Sector, 2023

B1.1: Direct Economic Contributions, Forestry Sector Details, 2023. [†]

Industries	Employment	Labor Income	Value-Added	Output
All other crop farming	0	\$0	\$0	\$0
Forestry, forest products, and timber tract production	280	\$11,918	\$12,891	\$15,638
Support activities for agriculture and forestry	520	\$14,557	\$15,005	\$16,133
Total	800	\$26,474	\$27,896	\$31,771

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2023 dollars value.

B1.2: Direct Economic Contributions, Logging Sector Details (2023, in 2023 USD). [†]

Industries	Employment	Labor Income	Value-Added	Output
Commercial logging	673	\$40,993	\$105,308	\$108,064
Total	673	\$40,993	\$105,308	\$108,064

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2023 dollars value.

B1.3: Direct Economic Contributions, Primary Solid Wood Products Sector Details (2023, in 2023 USD).[†]

Industries	Employment	Labor Income	Value- Added	Output
Electric power generation -				
Biomass	3	\$480	\$841	\$2,507
Sawmills	144	\$10,786	\$7,438	\$62,196
Wood preservation	50	\$4,372	\$992	\$33,898
Veneer and plywood manufacturing	0	\$0	\$0	\$0
Reconstituted wood product manufacturing	5	\$547	\$53	\$3,490
Total	202	\$16,185	\$9,324	\$102,091

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2023 dollars value.

B1.4: Direct Economic Contributions, Secondary Solid Wood Products Sector Details (2023, in 2023 USD).[†]

Industries	Employment	Labor Income	Value-Added	Output
Engineered wood member and truss manufacturing	155	\$14,828	\$12,269	\$58,222
Wood windows and door manufacturing	690	\$76,601	\$68,498	\$208,819
Cut stock, resawing lumber, and planing	15	\$1,251	\$699	\$4,652
Other millwork, including flooring	486	\$52,534	\$41,483	\$146,153
Wood container and pallet manufacturing	1,039	\$109,546	\$99,529	\$279,227
Manufactured home (mobile home) manufacturing	4	\$571	\$542	\$1,468
Prefabricated wood building manufacturing	151	\$16,817	\$13,699	\$51,829
All other miscellaneous wood product manufacturing	528	\$48,084	\$41,156	\$139,871
Total	3,069	\$320,232	\$277,875	\$890,240

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2023 dollars value.

B1.5: Direct Economic Contributions, Wood Furniture Sector Details (2023, 2023 USD).[†]

Industries	Employment	Labor Income	Value-Added	Output
Wood kitchen cabinet and countertop manufacturing	1,001	\$73,546	\$85,333	\$201,943
Upholstered household furniture manufacturing	35	\$2,344	\$2,697	\$7,856
Non-upholstered wood household furniture manufacturing	466	\$34,147	\$38,554	\$94,033
Institutional furniture manufacturing	289	\$19,572	\$22,529	\$66,681
Wood office furniture manufacturing	82	\$5,995	\$7,583	\$22,022
Custom architectural woodwork and millwork	1,124	\$102,088	\$53,138	\$229,668
Showcase, partition, shelving, and locker manufacturing	205	\$16,679	\$20,864	\$57,752
Total	3,201	\$254,371	\$230,698	\$679,955

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2023 dollars value.

B1.6: Direct Economic Contributions, Pulp, Paper, and Paperboard Mills Sector Details (2023, in 2023 USD).[†]

Industries	Employment	Labor Income	Value-Added	Output
Pulp mills	0	\$0	\$0	\$0
Paper mills	1,252	\$227,680	\$303,092	\$1,059,946
Paperboard mills	172	\$36,282	\$46,943	\$163,427
Total	1,424	\$263,962	\$350,035	\$1,223,373

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2023 dollars value.

B1.7: Direct Economic Contributions, Secondary Paperboard and Other Paper Products Sector Details (2023, in 2023 USD).[†]

Industries	Employment	Labor Income	Value-Added	Output
Paperboard container manufacturing	2,376	\$316,491	\$375,429	\$1,443,044
Paper bag and coated and treated paper manufacturing	2,013	\$258,089	\$309,477	\$1,001,288
Stationery product manufacturing	370	\$41,420	\$45,585	\$169,014
Sanitary paper product manufacturing	0	\$0	\$0	\$0
All other converted paper product manufacturing	465	\$54,967	\$68,458	\$203,779
Total	5,225	\$670,967	\$798,950	\$2,817,125

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2023 dollars value.

B2: Direct Economic Contribution by IMPLAN Sector, 2017 (2017 USD))

B2.1: Direct Economic Contributions, Forestry Sector Details (2017, in Nominal 2017 USD). [†]

Industries	Employment	Labor Income	Value-Added	Output
All other crop farming	290	\$35,329	\$35,696	\$43,298
Forestry, forest products, and timber tract production	370	\$10,382	\$10,054	\$11,475
Support activities for agriculture and forestry	370	\$1,864	\$1,715	\$4,217
Total	1,030	\$47,575	\$47,465	\$58,990

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2023 dollars value.

B2.2: Direct Economic Contributions, Logging Sector Details (2017, in Nominal 2017 USD). [†]

Industries	Employment	Labor Income	Value-Added	Output
Commercial logging	835	\$98,577	\$107,977	\$126,321
Total	835	\$98,577	\$107,977	\$126,321

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2017 dollars value.

B2.3: Direct Economic Contributions, Primary Solid Wood Products Sector Details (2017, in Nominal 2017 USD).[†]

Industries	Employment	Labor Income	Value- Added	Output
Electric power generation -				
Biomass	0	\$0	\$0	\$0
Sawmills	194	\$7,180	\$7,265	\$49,965
Wood preservation	100	\$5,033	\$3,616	\$51,302
Veneer and plywood manufacturing	0	\$0	\$0	\$0
Reconstituted wood product manufacturing	6	\$250	\$326	\$2,827
Total	300	\$12,464	\$11,206	\$104,095

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2017 dollars value.

B2.4: Direct Economic Contributions, Secondary Solid Wood Products Sector Details (2017, in Nominal 2017 USD).[†]

Industries	Employment	Labor Income	Value-Added	Output
Engineered wood member and truss manufacturing	226	\$12,311	\$13,642	\$49,998
Wood windows and door manufacturing	684	\$47,648	\$46,890	\$154,465
Cut stock, resawing lumber, and planing	18	\$681	\$673	\$3,635
Other millwork, including flooring	515	\$32,560	\$31,782	\$103,726
Wood container and pallet manufacturing	841	\$52,979	\$51,854	\$137,568
Manufactured home (mobile home) manufacturing	28	\$1,854	\$1,683	\$6,401
Prefabricated wood building manufacturing	65	\$3,778	\$3,736	\$11,099
All other miscellaneous wood product manufacturing	413	\$16,640	\$16,128	\$66,184
Total	2,790	\$168,452	\$166,388	\$533,076

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2017 dollars value.

B2.5: Direct Economic Contributions, Wood Furniture Sector Details (2017, in Nominal 2017 USD).[†]

Industries	Employment	Labor Income	Value-Added	Output
Wood kitchen cabinet and countertop manufacturing	1,213	\$78,233	\$83,140	\$192,736
Upholstered household furniture manufacturing	40	\$1,526	\$1,636	\$7,186
Non-upholstered wood household furniture manufacturing	542	\$32,748	\$37,633	\$78,763
Institutional furniture manufacturing	264	\$15,164	\$16,840	\$50,290
Wood office furniture manufacturing	46	\$2,608	\$3,257	\$9,696
Custom architectural woodwork and millwork	846	\$68,876	\$75,707	\$156,138
Showcase, partition, shelving, and locker manufacturing	245	\$16,193	\$18,455	\$51,719
Total	3,195	\$215,348	\$236,669	\$546,528

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2017 dollars value.

B2.6: Direct Economic Contributions, Pulp, Paper, and Paperboard Mills Sector Details (2017, in Nominal 2017 USD).[†]

Industries	Employment	Labor Income	Value-Added	Output
Pulp mills	0	\$0	\$0	\$0
Paper mills	1,478	\$180,407	\$126,080	\$989,990
Paperboard mills	367	\$45,217	\$24,023	\$257,704
Total	1,845	\$225,625	\$150,104	\$1,247,694

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2017 dollars value.

B2.7: Direct Economic Contributions, Secondary Paperboard and Other Paper Products Sector Details (2017, in Nominal 2017 USD). [†]

Industries	Employment	Labor Income	Value-Added	Output
Paperboard container manufacturing	2,716	\$333,120	\$325,429	\$1,308,956
Paper bag and coated and treated paper manufacturing	2,229	\$256,521	\$222,998	\$960,185
Stationery product manufacturing	623	\$70,366	\$60,589	\$229,772
Sanitary paper product manufacturing	36	\$7,814	\$5,202	\$24,205
All other converted paper product manufacturing	483	\$112,219	\$107,097	\$214,964
Total	6,087	\$780,039	\$721,316	\$2,738,083

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2017 dollars value.

B3: Direct Economic Contribution by IMPLAN Sector, 2017 (2023 USD)

B3.1: Direct Economic Contributions, Forestry Sector Details (2017, in 2023 USD). [†]

Industries	Employment	Labor Income	Value- Added	Output
All other crop farming	290	\$43,198	\$43,646	\$54,266
Forestry, forest products, and timber tract production	370	\$12,695	\$12,294	\$14,382
Support activities for agriculture and forestry	370	\$2,279	\$2,097	\$5,285
Total	1,030	\$58,172	\$58,037	\$73,933

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2023 dollars value.

B3.2: Direct Economic Contributions, Logging Sector Details (2017, in 2023 USD). [†]

Industries	Employment	Labor Income	Value-Added	Output
Commercial logging	835	\$120,534	\$132,027	\$158,321
Total	835	\$120,534	\$132,027	\$158,321

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2023 dollars value.

B3.3: Direct Economic Contributions, Primary Solid Wood Products Sector Details (2017, in 2023 USD). [†]

Industries	Employment	Labor Income	Value-Added	Output
Electric power generation -				
Biomass	0	\$0	\$0	\$0
Sawmills	194	\$8,780	\$8,883	\$62,623
Wood preservation	100	\$6,154	\$4,421	\$64,298
Veneer and plywood manufacturing	0	\$0	\$0	\$0
Reconstituted wood product manufacturing	6	\$306	\$398	\$3,543
Total	300	\$15,240	\$13,702	\$130,464

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2023 dollars value.

B3.4: Direct Economic Contributions, Secondary Solid Wood Products Sector Details (2017, in 2023 USD).[†]

Industries	Employment	Labor Income	Value-Added	Output
Engineered wood member and truss manufacturing	226	\$15,053	\$16,680	\$62,664
Wood windows and door manufacturing	684	\$58,261	\$57,333	\$193,594
Cut stock, resawing lumber, and planing	18	\$833	\$823	\$4,556
Other millwork, including flooring	515	\$39,812	\$38,861	\$130,002
Wood container and pallet manufacturing	841	\$64,779	\$63,404	\$172,417
Manufactured home (mobile home) manufacturing	28	\$2,267	\$2,058	\$8,023
Prefabricated wood building manufacturing	65	\$4,620	\$4,568	\$13,910
All other miscellaneous wood product manufacturing	413	\$20,347	\$19,720	\$82,950
Total	2,790	\$205,971	\$203,448	\$668,115

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2023 dollars value.

B3.5: Direct Economic Contributions, Wood Furniture Sector Details (2017, in 2023 USD). [†]

Industries	Employment	Labor Income	Value-Added	Output
Wood kitchen cabinet and countertop manufacturing	1,213	\$95,658	\$101,658	\$241,560
Upholstered household furniture manufacturing	40	\$1,866	\$2,001	\$9,006
Non-upholstered wood household furniture manufacturing	542	\$40,042	\$46,015	\$98,716
Institutional furniture manufacturing	264	\$18,542	\$20,591	\$63,030
Wood office furniture manufacturing	46	\$3,189	\$3,983	\$12,152
Custom architectural woodwork and millwork	846	\$84,217	\$92,569	\$195,691
Showcase, partition, shelving, and locker manufacturing	245	\$19,799	\$22,566	\$64,820
Total	3,195	\$263,313	\$289,382	\$684,974

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2023 dollars value.

B3.6: Direct Economic Contributions, Pulp, Paper, and Paperboard Mills Sector Details (2017, in 2023 USD). [†]

Industries	Employment	Labor Income	Value-Added	Output
Pulp mills	0	\$0	\$0	\$0
Paper mills	1,478	\$220,589	\$154,162	\$1,240,774
Paperboard mills	367	\$55,289	\$29,374	\$322,985
Total	1,845	\$275,878	\$183,536	\$1,563,759

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2023 dollars value.

B3.7: Direct Economic Contributions, Secondary Paperboard and Other Paper Products Sector
Details (2017, in real 2023 Dollars). [†]

Industries	Employment	Labor Income	Value- Added	Output
Paperboard container manufacturing	2,716	\$407,316	\$397,912	\$1,640,541
Paper bag and coated and treated paper manufacturing	2,229	\$313,655	\$272,667	\$1,203,419
Stationery product manufacturing	623	\$86,039	\$74,084	\$287,978
Sanitary paper product manufacturing	36	\$9,554	\$6,361	\$30,337
All other converted paper product manufacturing	483	\$137,213	\$130,951	\$269,419
Total	6,087	\$953,778	\$881,975	\$3,431,694

[†] All monetary values (Labor Income, Value-Added, and Output) are in thousands of U.S. dollars, adjusted to 2023 dollars value.