Forest Products Industries' Economic Contributions: Delaware

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Prepared by

Public Sector Consultants
Lansing, Michigan
www.publicsectorconsultants.com

Prepared for

Delaware Department of Agriculture
Delaware Forest Service
Dover, Delaware
agriculture.delaware.gov/forest-service

Michigan Department of Natural Resources
Forest Resources Division
Lansing, Michigan
www.michigan.gov/dnr

Foreword

Forests are an important natural resource in Delaware. They play a key role in maintaining the quality of life for all Delawareans. Healthy, vigorous trees absorb large quantities of carbon dioxide and release oxygen into the environment—in the process filtering out pollutants and greatly improving air quality. Forests protect watersheds and groundwater aquifers thereby preserving the quality of the water we drink and the water that is essential to the health and vitality of natural ecosystems. Forests produce wood and other products we use every day in our places of work and in our homes. Many wildlife species depend on forested habitats for their very survival. Forests also provide every resident with recreational opportunities along with pleasing aesthetic beauty that has been shown to create a general sense of personal well-being (Suttie 2019).

With all these wonderful, natural benefits, it should be no surprise that the mission of the Delaware Forest Service is "to conserve, protect, and enhance Delaware's forests through education, management, and professional assistance." Protecting and conserving Delaware's remaining forest lands is of utmost importance. The *2020 Delaware Statewide Forest Strategy* outlines a number of steps that our foresters, support staff, and cooperating partners will take over the next ten years to improve forest health and functionality, help develop new forest markets, encourage all forest landowners to practice sustainable forest management, and expand public awareness and appreciation of the forests in Delaware. Our goals are measurable and attainable as we seek to conserve this natural and renewable resource for generations to come.

The forest products industry plays a critical role in keeping Delaware's remaining forest lands as productive, working forests. Sustainable forest management and a thriving forest industry go hand-in-hand. Without proper sustainable forest management, there is great potential for environmental degradation and loss of critical ecosystem functions. Without an active forest industry, there is increased potential for conversion of forest land to nonforest uses. But when both are in place, forest health and vigor improve and significant contributions are made to Delaware's economy. This economic study, along with the updated *2020 Delaware Forest Resource Assessment,* clearly indicate an opportunity for diversification and expansion of the forest products industry in Delaware. Collaborative efforts should be made to encourage and aid industry growth to reap the enormous ecological and economic benefits resulting from sustainable forest management.

Michael A. Valenti, Ph.D.
State Forester
Delaware Department of Agriculture
Delaware Forest Service

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Executive Summary

This report assesses broad forest conditions and economic contributions of forest products industries in Delaware. It is one of 20 coordinated and comparable state reports in the northeastern and midwestern United States that provides an improved assessment of forests and the economies they support. Forest data come from the U.S. Forest Service's Forest Inventory and Analysis website, and economic data come from the 2017 Impact Analysis for Planning (IMPLAN), a commercially available economic input-output (IO) model.

Delaware boasts 359,000 acres of forest land covering 29 percent of its land base, with most of this forest land able to produce commercial timber. The majority of Delaware's forest land, 78.5 percent, is privately owned, while state and local governments own about 19 percent and the federal government owns about 2 percent.

Forest Industries

This report presents seven forest products industries, six of which are present in Delaware, that are based on 32 economic sectors in IMPLAN, 22 of which are present in Delaware:

- Forestry
- Logging
- Primary solid wood products
- Secondary solid wood products
- Wood furniture
- Pulp, paper, and paperboard mills
- Secondary paperboard and other paper products

In 2017, Delaware's forest products industries provided direct employment to almost 2,000 people, leading to $811.2 million in output. That same year, labor income was $172.3 million and value-added was $277.3 million. In total contributions, these industries supported over 4,000 jobs, $291.8 million in labor income, $485.4 million in value-added, and $1.1 billion in output.

Among the top sectors (excluding forest products sectors) impacted by forest products industries were wholesale trade, restaurants, real estate, management of companies and enterprises, hospitals, and others. This group of sectors reflects spending by forest products companies, their suppliers, and individuals.

Leading Forest Products Industry Groups

Six of seven forest products industry groups are present in Delaware—pulp, paper, and paperboard mills being the exception. Among the other six industry groups, the leading industries' rank in terms of direct jobs, value-added, and direct output varied by chosen measure:

- Secondary paperboard and other paper products had the highest number of direct jobs (988), the highest value-added ($176.8 million), and the highest direct output ($587.7 million).
- Wood furniture products had the second highest number of direct jobs (436), the third highest value-added ($24.1 million), and the second highest direct output ($72.1 million).
- Secondary solid wood products had the third highest employment (355), the fourth highest value-added ($21.3 million), and third highest output ($68.5 million).
- Logging had the smallest number of direct jobs (29), the second highest value-added ($48.6 million), and the fourth highest direct output ($51.1million).

Leading Individual Forest Products Sectors

Among the 22 forest products sectors present in Delaware, the top four, by measure in order from highest to fourth highest of direct contributions, were:

- Employment—Sanitary paper product manufacturing, paper bag and coated and treated paper manufacturing, wood kitchen cabinet and countertop manufacturing, and institutional wood furniture manufacturing were the top four sectors for direct employment and had a total 1,177 direct jobs or 60.1 percent of total direct jobs.
- Labor income—Commercial logging, sanitary paper product manufacturing, paper bag and coated and treated paper manufacturing, and paperboard container manufacturing were the top four sectors for direct labor income, totaling $122.3 million or 71.0 percent of total direct labor income.
- Value-added—Sanitary paper product manufacturing, commercial logging, paper bag and coated and treated paper manufacturing, and paperboard container manufacturing were the top four sectors for direct value-added, totaling $223.9 million or 80.7 percent of total direct value-added.
- Output—Sanitary paper product manufacturing, paper bag and coated and treated paper manufacturing, paperboard container manufacturing, and commercial logging were the top four sectors in output, totaling $631.0 million or 77.8 percent of direct output.

Delaware's Forest Products Industries Compared to Other Delaware Industries

The forest products industries provide more direct labor income, value-added, and output than commercial fishing, hunting, and trapping and mining and oil and gas production, but less than agricultural production industries (plant crop and animal). Overall, forest products industries accounted

for 11.1 percent of the nonfood manufacturing jobs in Delaware. Nearly 7.0 percent of Delaware's almost 28,000 direct manufacturing jobs in 2017 were in the forest products industries (i.e., 1 in 14 manufacturing jobs).

Delaware's Forest Products Industries Compared to Those of Maryland, New Jersey, and Pennsylvania

Forest products industries in Delaware and the neighboring states of Maryland, New Jersey, and Pennsylvania employed over 98,000 workers and accounted for $32.6 billion in direct output. Pennsylvania's forest products economy was the largest in the region, followed by that of New Jersey. Delaware's forest products economy was the smallest among these states.

Glossary

The following technical terms are used throughout this report when discussing forestry and economic contributions.

Forestry Terms

Average annual harvest removals: The average annual merchantable volume of growing-stock 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 average annual merchantable volume of growing-stock trees that were live at the time of the previous inventory and are dead in the current inventory.

Average annual net growth: The average annual change in merchantable volume of growing-stock trees, after deducting mortality volume, between inventories.

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 nonforested lands that have at least 10 percent canopy cover with live tally trees, or recently had at least 10 percent canopy cover by live tally trees based on the presence of stumps, snags or other evidence, 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 and only includes trees at least 5 inches in diameter at breast height. 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 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 economic activities (e.g., output, employment, labor income, and value-added) associated with an industry or sector in the study area. These can describe the current economic sectors or changes to those sectors.

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

Indirect effects/contributions: The impact of local industries purchasing goods and services from other industries, leading to others' outputs, employment, and labor income. This report uses "indirect effects" to refer to the combination of indirect and induced effects.

Induced effects/contributions: The impact of labor income (employee compensation and proprietor income) via goods and services purchased due to the direct and indirect spending by industries. For this report, induced effects are included with indirect effects and referred to as indirect effects.

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 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 Delaware's economy. They provide jobs, raw materials, and finished goods that generate additional economic activity throughout the state, region, and nation. This report compares the contributions of Delaware's forest products industries with those of adjacent states. It is one of 20 reports in the Northeast and Midwestern area of the United States that broadly assesses forests and their economic contributions. The interactions of these 20 states are covered in a regional report. In total, these documents provide a consistent reporting format, compiled using identical methods, across the northeastern and midwestern United States. Previous state-level reports in this area were not comparable because they used different methods and data.

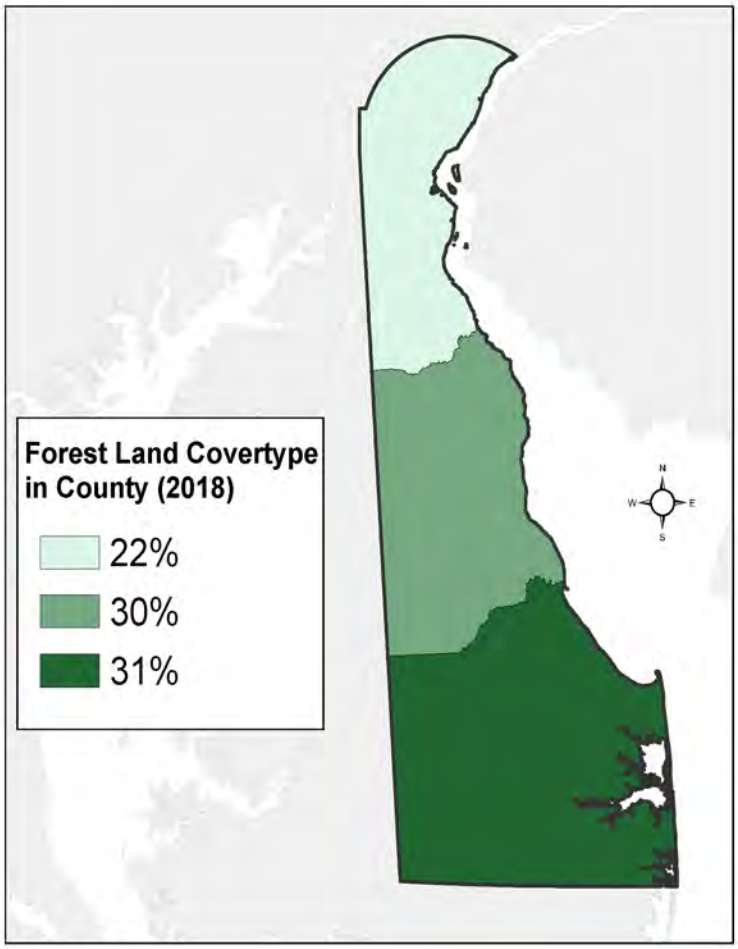
To help quantify these relationships and consistently document the industries' contributions, the Forest Markets & Utilization Committee of the Northeast—Midwest State Foresters Alliance secured federal grant funds to conduct an analysis of 20 midwestern- and northeastern-area states as well as Nebraska. As part of this work, the same project team that completed the individual state reports—comprising members of the Michigan Department of Natural Resources, Public Sector Consultants, Michigan State University forestry economics professor emeritus Larry Leefers, and state forestry experts—published a 20-state report summarizing the economic contributions of forest products industries at a regional level. The U.S. Forest Service funded this work through a 2017 Landscape Scale Restoration grant.

Much of the data used in this report were derived from the U.S. Forest Service Forest Inventory and Analysis database and from IMPLAN, a widely used economic modeling system. These data and related information are presented in four major sections: Forest Resources of Delaware, Forest Products Industries, Economic Contributions of Delaware's Forest Products Industries, and Summary. Due to rounding, some figures in the following tables may not sum to the exact total indicated. The appendices present the economic methods and detailed economic sector data used for this report.

Forest Resources of Delaware

Delaware forest land coverage generally increases as you travel from north to south, which reflects the density of the human population across the state (Exhibit 1). New Castle County contains 22 percent of the state's land area but is home to 58 percent of the population. There is slightly more forest land in all of Delaware now than there was in the early 1900s.

Exhibit 1. Delaware's Forest Land by County, 2018



Source: U.S. Forest Service Forest Inventory and Analysis Program.

Nearly 29 percent, or 358,858 acres, of the state is forested (Exhibit 2). Timberland, totaling 345,728 acres, is the largest component of this forest land. Reserved forest land accounts for the other 13,130 acres.

Exhibit 2. Delaware Land Area by Land Use Type, 2018 (U.S. Forest Service)

Land Use Type	Acres	Percentage
Forest land	358,858	28.7%
Nonforest land	891,702	71.3%
Total	**1,250,560**	**100.0%**

Most forest land in Delaware is privately owned (78.5 percent), and state, county, and local government are the major public owners (Exhibit 3). Landowners can pursue diverse goals. Private forest landowners

have wide latitude in how they treat their lands—some have a hands-off approach, while others pursue active forest management. There are several state and federal programs designed to encourage the active management of private forest lands. State-owned forest lands are actively managed in some areas, while resource protection is emphasized in others. Active timber management on state forest lands, in particular, contributes significantly to Delaware's forest products industries.

Trees are common throughout the state. They occur in our forests; parks; along our streams, lakes, ponds, and roadways; and in our yards. There are approximately 241.2 million trees in Delaware—250 trees for each person in the state.

Exhibit 3. Forest Land by Ownership Group (2018)

Ownership Group	Acres	Percentage
Federal land	8,274	2.3%
State and local governments	68,869	19.2%
Private	281,715	78.5%
Total	**358,858**	**100.0%**

Delaware's major forest types include oak/hickory, loblolly/shortleaf pine, oak/gum/cypress, oak/pine, elm/ash/cottonwood, and maple/beech/birch (Exhibit 4). Tree species with the greatest standing volume include red and silver maple, white and red oaks, sweetgum, loblolly pine, and yellow poplar. The most important commercial tree species in Delaware include loblolly pine, yellow poplar, and white oak. Delaware's diverse timber species support a variety of forest products industries including pulp and paper manufacturing, structural lumber, cants, hardwood grade–lumber, animal bedding, and crane mats.

Exhibit 4. Forest Land Area by Forest Type Group (2018)

Forest Type Group	Acres	Percentage
Oak/hickory	184,181	51.3%
Loblolly/shortleaf pine	66,450	18.6%
Oak/gum/cypress	56,221	15.7%
Oak/pine	26,332	7.3%
Elm/ash/cottonwood	10,217	2.8%
Maple/beech/birch	9,649	2.7%
Other	5,808	1.6%
Total	**358,858**	**100.0%**

The estimated volume of standing timber suitable for forest products was about 963.9 million cubic feet, or about 12.2 million standard cords[1] (Exhibit 5). Average annual net growth exceeded annual harvest removals by a ratio of about 1.9 to 1. That is, for every cubic foot of harvesting that took place, 1.9 cubic feet of timber grew (after accounting for mortality). Average annual harvest removals in 2018 of growing stock were about 8.7 million cubic feet, or about 110,000 cords—roughly 0.9 percent of standing volume.

Exhibit 5. Characteristics of Growing Stock in Delaware, 2018 (million cubic feet)

Measure	Total	National Forest	Other Federal	State and Local Government	Private
Net volume	963.9	-	2.3	235.9	725.7
Average annual net growth	16.4	-	0.1	3.1	13.2
Average annual harvest removals	8.7	-	-	0.3	8.4
Average annual mortality	8.7	-	-	2.2	6.5

Note: Net volume is merchantable volume, in cubic feet, of growing-stock trees for timber species (trees where diameter is measured at breast height) from a 1-foot stump to a minimum 4-inch top diameter, or to where the central stem breaks into limbs all of which are less than 4.0 inches in diameter. Volume loss due to rotten, missing, and form cull has been deducted. Growing stock is defined as live trees of commercial species that meet minimum merchantability standards and only includes trees at least 5 inches in diameter at breast height. Net growth is the average annual change (gross growth minus mortality) in merchantable volume, in cubic feet, of growing-stock trees on forestland. Harvest removals are the average annual merchantable volume, in cubic feet, of growing-stock trees at the time of removal from forest land. Annual mortality is the average annual merchantable volume, in cubic feet, of growing-stock trees at the time of mortality on forest land.

Forest Products Industries

Contribution analysis focuses on industries' role in an economy. The first step is often defining the region (e.g., a state). One of the next steps is to define exactly which economic sectors comprise the focus industries. To analyze the contributions of the forest industries, representatives from the U.S. Forest Service's northeastern and midwestern states and Nebraska selected 32 sectors by consensus for inclusion in the analysis. A description of the methods and data is presented in Appendix A. To concisely describe and communicate the economic contribution of the forest products industries, these 32 sectors were aggregated into seven broad groups (Appendix B):

- Forestry
- Logging

[1] A standard cord is a unit of measurement for pulpwood or sawlogs, generally equivalent to a stack of wood measuring four feet wide by four feet tall by eight feet long. A stacked cord of wood typically contains about 79 cubic feet of solid wood, excluding air space.

- Primary solid wood products
- Secondary solid wood products
- Wood furniture
- Pulp, paper, and paperboard mills
- Secondary paperboard and other paper products

In total, these sectors cover forest-specific manufacturing activities, including the conversion of trees into primary products and the manufacture of products used by other sectors and households. Primary industries (e.g., sawmills, reconstituted wood products [such as oriented strand board], and power plants) use wood directly from the forest, including roundwood, chips, or similar forms. Secondary industries (e.g., trusses and furniture) use one or more primary forest products (e.g., lumber and paperboard) in their manufacturing processes. Value is added as the timber is processed through primary and secondary manufacturers. Several sectors included wood and nonwood products (e.g., institutional furniture manufacturing). Therefore, output and other measures were reduced to better reflect the wood-only component by using published government data or surveys (Gibson, Leefers, and Poudel 2020).

This report used IMPLAN to estimate economic contributions of the forest products industries. IMPLAN is a widely used input-output model that comprises economic data and software. IO models characterize financial linkages among and between sectors, households, and institutions, and can be constructed for different geographic areas. Within these models, various sectors have production functions that show the value of inputs used in production of outputs or commodities. Delaware's economy was represented by 368 sectors in 2017, the most recent year available for IMPLAN data at the time of the analysis. These sectors are based on the North American Industrial Classification System (NAICS).

Economic Contributions of Delaware's Forest Products Industries

This section of the report includes four major subsections: Economic Contributions Defined, Economic Contribution Results, Importance of the Forest Products Industries in Context, and Supplemental Economic Contribution Information.

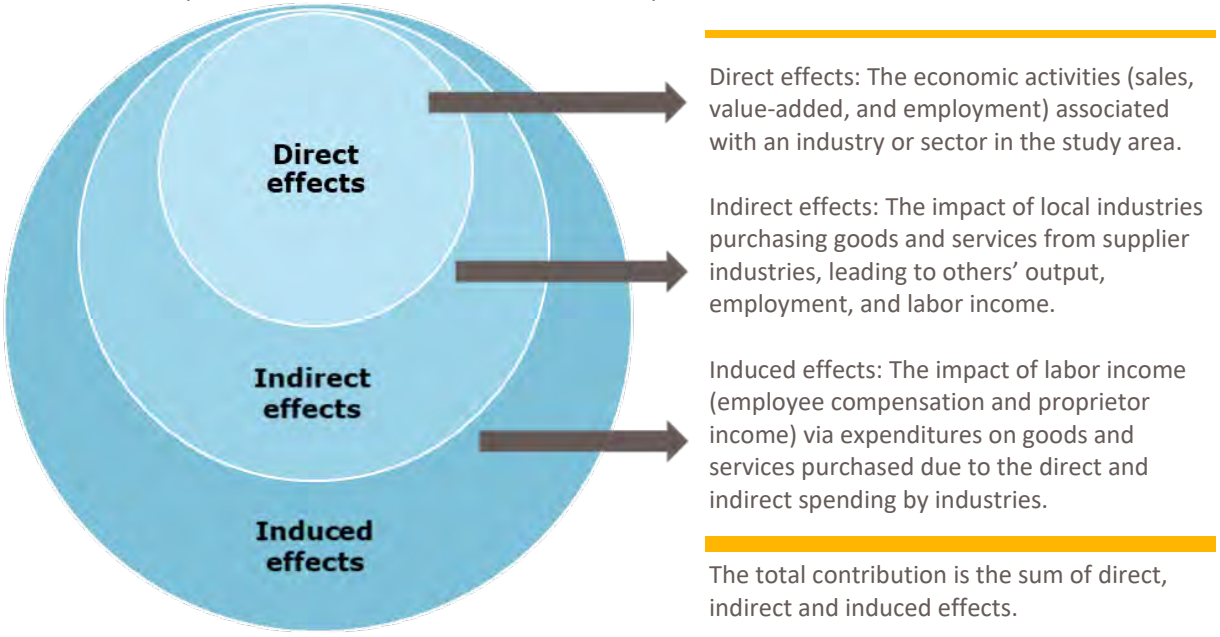
Economic Contributions Defined

Input-Output Analysis and IMPLAN

Forest products industries influence the economy in three ways: direct effects (when industries sell commodities in response to demand), indirect effects (as suppliers to directly impacted sectors), and induced effects (household spending by employees in directly and indirectly impacted sectors) (Exhibit

6). The total economic contribution is the value of production required to meet all the needs stemming from the initial activity—in this case, forest product–related purchases.

Exhibit 6. Concept of Total Economic Contribution Analysis



IO modeling using IMPLAN software and data is a conventional approach for documenting forest products industries' economic contributions. This analysis used the matrix inversion approach with external IMPLAN model adjustment as a primary method for estimating economic contributions of forest products industries in Delaware (Gibson, Leefers, and Poudel 2020). Major economic indicators generated by IMPLAN include employment (full- and part-time jobs), labor income, total output, and value-added.

Interaction Between State and Regional Analyses

IMPLAN models are based on interactions across the economy. One important aspect of these interactions is whether commodities are sourced locally or imported. In smaller areas (e.g., counties), fewer commodities are sourced locally. As a result, leakages occur when purchases are made—that is, fewer dollars stay in the local economy.

Larger economies have fewer leakages and more commodities are sourced locally. For example, an examination of the logging industries (IMPLAN sector 16) in Delaware and Maryland, reveals that the direct employment for 2017 was 29 and 648 jobs, respectively. Summing the individual state's total employment contributions (direct, indirect, and induced) yields 1,240 jobs. However, if the states are combined as one region, the total employment contribution increases to 1,251 jobs. This increase reflects less leakage and more local purchases.

The larger role is due to trade, but IMPLAN does not explicitly show trade with specific states, only overall imports and exports. The regional analysis highlights the larger role of forest products industries in the region's economy. Consequently, the state-level analyses underestimate the actual contributions from a regional perspective.

Economic Contribution Results

This section presents direct and total contributions for all forest products industries, direct and total contributions by forest product industry groups (e.g., logging, furniture, etc.), the top forest products sectors, and the top nonforest products sectors affected by the forest products industries. Finally, this section compares forest industries in nearby states, other natural resources industries, and manufacturing industries within the state.

Forests and forest products industries are central for the transition to a greener and more sustainable economy. A green goods and services economy relies on the sustainable use of natural resources, and Delaware's forest products industries are tightly bound to forests and the goods and ecosystem services that they provide (e.g., wildlife habitat, watershed protection, carbon sequestration, etc.).

Direct and Total Contributions by Forest Products Industries

Contribution analysis provides a means to assess the role various industries play in a state's economy. Delaware forest products industries' total economic contribution in terms of output was $1.1 billion, based on direct output of $ 811.2 million (Exhibit 7). Nearly 2,000 direct jobs were associated with this level of economic activity, supporting a total of 4,003 jobs. Direct labor income, which includes employee compensation and proprietor income, was $172.3 million, or $88,033 per job. Total labor income, which includes income paid directly to industry employees and proprietors, their suppliers, and other industries they support, totaled $291.8 million.

Exhibit 7. Region-wide Economic Contribution of Forest Products Industries, 2017 Dollars

Effect	Employment	Labor Income (Thousands of Dollars)	Value-added* (Thousands of Dollars)	Output (Thousands of Dollars)
Direct	1,957	$172,281	$277,321	$811,193
Total	**4,003**	**$291,789**	**$485,356**	**$1,147,886**

* Value-added in IMPLAN is equivalent to GSP.

Each direct job in the forest products industries supported 1.0 additional jobs, and every $1 million in direct labor income supported an additional $0.7 million in indirect and induced labor income.

Most state economies are large relative to any particular industry or group of industries. The forest products industries are no exception. In 2017, Delaware's population was estimated at 961,939 people,

with total employment of 579,516. The gross state product was $71.0 billion from 368 economic sectors (of the possible 536 in the US). The GSP's largest component was labor income, which was $36.6 billion.

Direct value-added for forest products industries was $277.3 million; 0.4 percent of Delaware's total GSP. The percentage almost doubles to 0.7 percent when considering total value-added effects. These percentages hold for other economic measures (e.g., jobs) as well.

Direct and Total Contributions by Forest Product Industry Groups

As previously noted, the 32 IMPLAN forest products sectors were combined into seven industry groups (Appendix B), with only six of these being present in Delaware. Of the six groups, secondary paperboard and other paper products was the largest of these groups in terms of direct employment, labor income, value-added, and output. Wood furniture was the second largest group in terms of direct employment, and output and third largest for both labor income and value-added. Logging was the smallest group in terms of direct employment, and forestry, which includes timber tract operations and forestry support activities, was the smallest group for labor income, value-added, and output.

Secondary paperboard and other paper products accounted for nearly three-quarters of the output of forest products industries and just over half of the industries' employment.

Exhibit 8. Direct Economic Contributions in Delaware, Industry Groups, 2017

Industry Group	Employment	Labor Income (Thousands of Dollars)	Value-added (Thousands of Dollars)	Output (Thousands of Dollars)
Forestry	88	$3,121	$644	$982
Logging	29	$46,732	$48,599	$51,148
Primary solid wood products	60	$4,115	$5,908	$30,741
Secondary solid wood products	355	$18,861	$21,309	$68,525
Wood furniture	436	$22,640	$24,050	$72,076
Pulp, paper, and paperboard mills	-	-	-	-
Secondary paperboard and other paper products	988	$76,812	$176,810	$587,721
Total	**1,957**	**$172,281**	**$277,321**	**$811,193**

Exhibit 9. Total Economic Contributions in Delaware, Industry Groups, 2017

Industry Group*	Employment	Labor Income (Thousands of Dollars)	Value-added (Thousands of Dollars)	Output (Thousands of Dollars)
Forestry	92	$3,563	$1,748	$2,692
Logging	287	$58,061	$69,978	$86,046
Primary solid wood products	144	$9,664	$15,211	$46,393
Secondary solid wood products	598	$33,412	$45,595	$107,503
Wood furniture	696	$37,284	$49,046	$112,250
Pulp, paper, and paperboard mills	-	-	-	-
Secondary paperboard and other paper products	2,186	$149,805	$303,779	$793,002
Total	**4,003**	**$291,789**	**$485,356**	**$1,147,886**

*Forestry and logging are reported in this table, but most of their contributions are as indirect inputs or intermediate inputs used for production in the other five industry groups.

For the following sector-specific discussions, refer to Exhibit 8 for direct contribution details and Exhibit 9 for total contribution details. See Appendix C for detailed economic measures for industry groups and their component sectors.

Forestry

The forestry group includes timber tract operations, establishments primarily engaged in the operation of timber tracts for the purpose of selling standing timber, and support activities for forestry such as estimating timber; forest firefighting; forest pest control; treating burned forests from the air for reforestation or on an emergency basis; and consulting on wood attributes and reforestation related to timber production, wood technology, forestry economics and marketing, and forest protection.

Out of six industry groups in Delaware, forestry was the third smallest in terms of direct employment in 2017. Direct contributions were $1.0 million in output, 88 jobs, $3.1 million in labor income, and $0.6 million in value-added. In most cases, value-added is greater than labor income, one of the value-added components. Often, this situation does not hold for agricultural sectors due to farm subsidies, which show up as “negative taxes.” Sector 19, support activities for agriculture and forestry, reflects this for Delaware in 2017, leading to the smaller value-added. Total contributions are based, in part, on backward linkages to suppliers. Total contributions for forestry can be lower than direct contributions (i.e., initial IMPLAN levels) because many of the contributions are inputs into other industries. For example, 11 percent of forestry jobs are counted as contributions in other industries, mostly logging and primary solid wood products (e.g., sawmills). Hence, the total contributions displayed in Exhibit 9

underrepresent the industry's broader contributions—reporting total contributions for forestry is somewhat misleading because much of the forestry total contribution effects are hidden in the total contributions of other industries. The same holds true for logging below.

Logging

The logging industry group contains establishments primarily engaged in one or more of the following: cutting timber, cutting and transporting timber, and producing wood chips in the field. Logging was the smallest in terms of direct employment, excluding pulp, paper, and paperboard mills. The direct contributions of logging were $51.1 million in output, 29 jobs, $46.7 million in labor income, and $48.6 million in value-added. Most logging activity is an input into production in other industries, especially for manufacturing primary solid wood products (e.g., lumber), paper, and paperboard. In Delaware, 2 percent of logging jobs are included in the total contributions of other industries. As with forestry, logging's total contributions are underrepresented due to their inclusion in other industries.

Primary Solid Wood Products

The primary solid wood products industry group was the fifth largest group in terms of direct employment in Delaware. Primary solid wood products sectors include wood-based electric power generation, sawmills, wood preservation, veneer and plywood manufacturing, and reconstituted and wood product manufacturing industries. The direct contributions of the group were $ 30.7 million in output, 60 jobs, $4.1 million in labor income, and $5.9 million in value-added. Total contributions for primary solid wood products, including direct, indirect and induced effects, were $46.4 million in output, 144 jobs, $9.7 million in labor income, and $15.2 million in value-added. Many primary solid wood products (e.g., lumber and panels) are inputs in other industries, which counted in other industries' total contributions.

Secondary Solid Wood Products

Secondary solid wood products was the third largest group in terms of direct employment in Delaware. This group contains engineered wood member and truss manufacturing; wood windows and doors manufacturing; cut stock, resawing lumber, and planing; other millwork, including flooring, wood container, and pallet manufacturing; manufactured home (mobile home) manufacturing; prefabricated wood building manufacturing; and all other miscellaneous wood product manufacturing. Direct contributions of secondary solid wood products were $68.5 million in output, 355 jobs, $18.9 million in labor income, and $21.3 million in value-added. Total contributions were $107.5 million in output, 598 jobs, $ 33.4 million in labor income, and $45.6 million in value-added.

Wood Furniture

Wood furniture was the second largest group in terms of direct employment in Delaware. Wood furniture includes wood kitchen cabinet and countertop manufacturing; upholstered household furniture manufacturing; nonupholstered wood household furniture manufacturing; institutional wood

furniture manufacturing; wood office furniture manufacturing; custom architectural woodwork and millwork manufacturing; and showcase, partition, shelving, and locker manufacturing. Direct contributions of wood furniture were $72.1 million in output, 436 jobs, $22.6 million in labor income, and $24.1 million in value-added. Total contributions of wood furniture were $112.3 million in output, 696 jobs, $37.3 million in labor income, and $ 49.0 million in value-added.

Pulp, Paper, and Paperboard Mills

The pulp, paper, and paperboard mills industry group was not present in Delaware in 2017.

Secondary Paperboard and Other Paper Products

The secondary paperboard and other paper products group was the largest in terms of direct employment in Delaware. The group comprises paper and paperboard manufacturing, paper bag and coated and treated paper manufacturing, stationery product manufacturing, sanitary paper product manufacturing, and all other converted paper product manufacturing. Facilities in this group manufacture products from purchased pulp, paper, paperboard, or recycled materials. The direct contributions in 2017 were $587.7 million in output, 988 jobs, $76.8 million in labor income, and $176.8 million in value-added. Total contributions were $793.0 million in output, 2,186 jobs, $149.8 million in labor income, and $303.8 million value-added.

Top Forest Product Sectors

Among the 32 industry sectors that comprise the seven industry groups listed above, the leading sectors varied by the contribution measure examined. In terms of direct jobs, the four largest forest products sectors were sanitary paper product manufacturing (431 jobs), paper bag and coated and treated paper manufacturing (388 jobs), wood kitchen cabinet and countertop manufacturing (203 jobs), and institutional wood furniture manufacturing (155 jobs). These sectors reflect the diversity of manufacturing in the state.

The sanitary and paper product manufacturing sector is comprised of establishments primarily engaged in converting purchased sanitary paper stock or wadding into sanitary paper products, such as facial tissues, handkerchiefs, table napkins, toilet paper, towels, disposable diapers, sanitary napkins, and tampons.

The paper bag and coated and treated paper manufacturing sector is comprised of establishments primarily engaged in one or more of the following: (1) cutting and coating paper and paperboard; (2) cutting and laminating paper, paperboard, and other flexible materials (except plastics film to plastics film); (3) manufacturing bags, multiwall bags, sacks of paper, metal foil, coated paper, laminates, or coated combinations of paper and foil with plastics film; (4) manufacturing laminated aluminum and other converted metal foils from purchased foils; and (5) surface coating paper or paperboard.

The wood kitchen cabinet and countertop manufacturing sector is comprised of establishments primarily engaged in manufacturing wood or plastics laminated on wood kitchen cabinets, bathroom vanities, and countertops (except freestanding). The cabinets and counters may be made on a stock or custom basis.

The institutional wood furniture manufacturing sector is comprised of establishments primarily engaged in manufacturing institutional-type furniture (e.g., library, school, theater, and church furniture). Included in this industry are establishments primarily engaged in manufacturing general purpose hospital, laboratory, and dental furniture (e.g., tables, stools, and benches). The furniture may be made on a stock or custom basis and may be assembled or unassembled (i.e., knockdown). Bureau of Labor Statistics does not break this industry into wood and nonwood components.

In terms of labor income, commercial logging, sanitary paper product manufacturing, paper bag and coated and treated paper manufacturing, and paperboard container manufacturing were the highest, totaling $122.3 million. They also had the highest value-added and output—totaling $223.9 million and $631.0 million respectively—although the order of the four sectors varied by metric.

Top Nonforest Industries Impacted

Contribution analysis using IMPLAN relies on backward linkages from forest products industries sectors among themselves and to other sectors in Delaware. Including the 22 forest products industries, 76 sectors were impacted in 2017 (counting sectors with ten or more jobs supported). The top ten sectors (excluding forest products sectors) included wholesale, restaurants, real estate, management of companies and enterprises, hospitals, and others (Exhibit 10). This set of sectors reflects indirect and induced spending by forest products companies, their suppliers, and individuals.

These data were at an aggregate level, so 50 jobs in truck transportation included log trucks, delivery trucks, and office jobs for some trucking companies, among others. Five of these sectors were among the top ten sectors for employment in the state of Delaware (real estate was number one, followed by hospitals and full-service restaurants—each had over 20,000 jobs).

Exhibit 10. Direct Jobs Impacted by the Forest Products Industries Among Delaware's Top Ten Non-Forest Products Industries in 2017

Sector	Description	Jobs
395	Wholesale trade	162
501	Full-service restaurants	96
440	Real estate	89
461	Management of companies and enterprises	82
502	Limited-service restaurants	81
482	Hospitals	76
468	Services to buildings	68
411	Truck transportation	50
464	Employment services	47
400	Retail - Food and beverage stores	41
Total	**-**	**793**

Neighboring States

Delaware and the surrounding states of Maryland, New Jersey, and Pennsylvania are important for forest products. Forest products industries employ almost 98,000 workers across these states and account for $32.6 billion in direct output (Exhibits 11 and 12). Pennsylvania had the largest forest products economy with 68,541 direct jobs and output in excess of $22.4 billion. Delaware had the smallest forest products industry among these states. The three largest industry groups, each with over 21,000 employees, were secondary paperboard and other paper products, secondary solid wood products, and wood furniture.

Exhibit 11. Forest Products Industries Direct Employment in Delaware, Maryland, New Jersey, and Pennsylvania, 2017

Industry	Delaware	Maryland	New Jersey	Pennsylvania
Forestry	88	140	459	1,865
Logging	29	648	139	4,740
Primary solid wood products	60	643	297	6,812
Secondary solid wood products	355	2,167	2,664	18,638
Wood furniture	436	2,506	5,106	13,720
Pulp, paper, and paperboard mills	-	800	281	3,186
Secondary paperboard and other paper products	988	1,909	9,756	19,581
Sum of Direct Contributions	**1,957**	**8,813**	**18,702**	**68,541**

Exhibit 12. Forest Products Industries Direct Output in Delaware, Maryland, New Jersey, and Pennsylvania, 2017

Industry	Delaware (Thousands of Dollars)	Maryland (Thousands of Dollars)	New Jersey (Thousands of Dollars)	Pennsylvania (Thousands of Dollars)
Forestry	$982	$8,425	$49,654	$126,178
Logging	$51,148	$53,294	$18,084	$697,606
Primary solid wood products	$30,741	$224,358	$114,241	$2,151,337
Secondary solid wood products	$68,525	$497,136	$494,848	$3,613,125
Wood furniture	$72,076	$441,018	$878,242	$2,282,116
Pulp, paper, and paperboard mills	-	$584,636	$210,213	$2,722,271
Secondary paperboard and other paper products	$587,721	$825,013	$4,955,597	$10,827,005
Sum of Direct Contributions	**$811,193**	**$2,633,880**	**$6,720,879**	**$22,419,639**

Importance of the Forest Products Industries in Context

To help contextualize the relative importance of the forest products industries, it is useful to compare the contribution of Delaware's forest products industries with others. Natural resources and agricultural industries significantly contribute to the diversity of economic activities reflected in Delaware's $71.0 billion GSP. The forest products industries provide more direct labor income, value-added, and output than the commercial fishing, hunting, and trapping and mining and oil and gas production industries (Exhibit 13). Agricultural production provided the largest amount of employment (full- and part-time), by far, of these industries.

Exhibit 12. Natural Resources and Agricultural Production Industries in Delaware, 2017

Industry	Employment	Labor Income (Thousands of Dollars)	Value-added (Thousands of Dollars)	Output (Thousands of Dollars)
Forest products	1,957	$172,281	$277,321	$811,193
Commercial fishing, hunting, and trapping	416	$14,847	$51,033	$51,711
Mining and oil and gas production	546	$74,272	$75,048	$121,278
Agricultural production (plant crop and animal)	4,785	$454,412	$549,093	$1,493,036
Total	**7,703**	**$715,812**	**$952,495**	**$2,477,218**

Labor income per job is highest in mining, and oil and gas production ($136,029) and lowest in commercial fishing, hunting, and trapping ($35,690). For forest products, the average per job is $88,033; agricultural production has the second highest average income at $94,966.

Most of the forest products industries are manufacturers, however, the forestry, logging, and biomass power groups are not. There were 27,464 manufacturing jobs in Delaware in 2017 with 1,840 in the forest products industries—6.7 percent of the total. Of 16 industries, forest products manufacturing was fourth in terms of employment, behind food, computer and electronic product, and chemical manufacturing. It was fifth in terms of labor income and output and sixth in terms of value-added (Exhibit 14).

Exhibit 13. Manufacturing Industries in Delaware, 2017

Manufacturing Industries	Employment	Labor Income (Thousands of Dollars)	Value-added (Thousands of Dollars)	Output (Thousands of Dollars)
Food	10,402	$531,306	$650,570	$3,298,833
Computer and electronic product	2,682	$343,680	$543,913	$1,177,858
Chemical	2,254	$311,953	$965,794	$2,520,006
Forest products	1,840	$122,428	$228,077	$759,063
Fabricated metal	1,692	$108,601	$145,144	$386,296
Miscellaneous	1,515	$83,807	$168,721	$454,919
Plastics and rubber products	1,436	$114,132	$224,042	$608,543
Textiles and apparel	810	$70,858	$71,478	$224,979
Machinery	761	$53,994	$79,581	$257,510
Electrical equipment	735	$72,286	$98,495	$270,853
Petroleum and coal	726	$151,019	$592,982	$3,603,242
Transportation equipment	661	$60,439	$78,956	$373,489
Nonmetallic mineral product	652	$47,799	$58,558	$201,893
Printing	625	$31,399	$27,164	$82,707
Beverage and tobacco product	472	$28,849	$252,715	$548,603
Primary metal	202	$16,260	$30,167	$146,049
Total	**27,464**	**$2,148,810**	**$4,216,358**	**$14,914,843**

Supplemental Economic Contribution Information

The report by Gibson, Leefers, and Poudel provides a detailed discussion of which sectors were included and excluded from this analysis (2020). Most economic data used in this report were derived from IMPLAN, with one notable exception.

For most of the partial sectors (Appendix B), ratios of published government data were used to identify a portion of the industry that would be treated as forest products. In cases where only part of an IMPLAN sector was associated with forest products, analysts faced three options. The most conservative option was to include only sectors viewed as 100 percent in forest products, excluding sectors where only part produced forest products. At the other end of the spectrum, analysts could have focused on sectors producing any forest products at all, even if the forest products represented a small part of total output. Between these extremes, analysts could choose a third option—selecting the portion of a sector that produced forest products and include only that portion, mindful to include a means for assessing the magnitude of that portion. That is the approach used in this report.

Wood is used in many other products not covered by the 22 sectors highlighted in this report. For example, boats, blinds, musical instruments, burial caskets, organic chemicals, and pharmaceuticals may use wood directly or as an extract. However, the wood-only component of these product groups is difficult to quantify and was unable to be included in this report. Surveys could be designed and conducted to determine the forest products component of these sectors. In practice, the production functions, employment, output, and other metrics would need to be compiled and inserted into IMPLAN.

Summary

Over the last 20 years, individual states located in the midwestern and northeastern area of the United States have conducted statewide economic contributions studies of the forest products industries. However, these studies differed in approach, data used, and measures reported. Developing a consistent approach required funding that spanned multiple states. The Forest Markets & Utilization Committee of the Northeast—Midwest State Foresters Alliance secured grant funds through the Landscape Scale Restoration Program within the U.S. Forest Service, Eastern Region, State and Private Forestry to support investigation of the economic contributions of the forest products industry in the 20 northeastern and midwestern states and Nebraska. To that end, the Michigan Department of Natural Resources Forest Resources Division (serving as the lead on the grant project) contracted with Public Sector Consultants to facilitate discussions among the project partner states and to reach consensus on an appropriate analysis methodology and report template for both the regional and state reports, in addition to conducting the analysis.

This report serves as a snapshot of economic contributions of the forest products industries in Delaware for 2017, as well as a baseline report for future analyses. State data were used in this report, but given IMPLAN's structure, substate and multistate analyses can be developed. However, future analyses may again require funding from the U.S. Forest Service or other institutions for assessments across multiple states. Methods used in developing this report are consistent across the region. There were 1,957 direct jobs in the forest products industries, and overall, 4,003 jobs were supported. Direct labor income was $172.3 million with total labor income at $291.8 million. Direct value-added was $277.3 million, and the

total contribution for value-added was $485.4 million. Finally, direct output was $811.2 million with a total contribution of $1.1 billion in output. Similar report findings are available from other states in the region and are summarized in a regional report.

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Appendix A: Methods and Data

Input-Output Analysis: IMPLAN

Several key decisions related to methods were developed through a consensus process (Gibson, Leefers, and Poudel 2020). The project team, in consultation with the states, made consensus decisions regarding the modeling method for estimating economic contributions, the forest products sectors to include in analysis (either in total or in part), the IMPLAN year for reporting results, and the use of an analysis spreadsheet for consistent reporting.

The economic contributions of the region and each state's forest products industries relied on 2017 IMPLAN software and data. IMPLAN is a widely used economic IO model that focuses on interdependence among various producing and consuming sectors in the economy. IMPLAN has 536 industry sectors for the 2017 data set and is based on the NAICS. IMPLAN data are compiled and linked by the IMPLAN software (Version 3.1.1001.12); data come from various government agencies, including the U.S. Census Bureau, the U.S. Bureau of Labor Statistics, and the U.S. Bureau of Economic Analysis. Economic measures in IMPLAN include employment, labor income, value-added, output, and others. More detailed information on data sources is available at the IMPLAN website.

Wassily Leontief developed IO modeling in the mid-20th century. Impact analysis examines the effects of changes in demand in a regional economy, while contribution analysis can evaluate the role of several related sectors in a region. IMPLAN provides the software and data to conduct such analyses. Each sector has a production function tracing the backward linkages (i.e., suppliers) to other sectors. Various sectors produce commodities (e.g., the logging sector produces logs). Leakages (e.g., foreign and domestic imports/exports) to and from other regions are also modeled. Social accounting flows among industries, households, government, and capital are included in IMPLAN.

The analysis process begins with creating an IMPLAN model. One or more geographic areas (e.g., counties or states) are selected as the region. Then, models are run through the creation of multipliers. This report uses Social Accounting Matrix (SAM) multipliers. Next, activities are selected to estimate either economic impacts or contributions. For example, analysts can estimate the impacts of expanding or contracting industries. In the case of contribution analysis, it is important to ensure that the level of production does not exceed the actual level of production in the region. Contribution analysis essentially counters the effects of the multipliers.

Contributions can be in terms of value-added, output, employment, and/or labor income. Value-added is commonly used to describe an industry's economic contributions and is a conservative measure of these contributions. Value-added is the difference between an industry's output, and the costs of intermediate inputs. When a sawmill sells a board, the value of the log and other inputs is not counted in value-added because they were counted when produced by loggers and others. Thus, only new additions to value (e.g., labor income) are included. Labor income is the major component of value-

added and includes employee compensation and proprietor income. Value-added, summed across all sectors, is equal to GSP.

Another measure of economic contribution is industry output. For example, if a log is sold to a sawmill that sells boards, both sales are counted as part of the overall region's output, as they are important economic activities. Another measure, employment, includes both full- and part-time jobs. As the number of sectors in an analysis increases, there can be overlap in the number of part-time jobs across sectors.

Methods

IMPLAN estimates economic impacts (i.e., effects of economic changes) and contributions (i.e., effects of existing industries). Two methods for multisector economic contribution analysis are available (Parajuli et al., 2018), both requiring significant data manipulation.

The first method customizes the IMPLAN model by changing selected endogenous tables, whereas the second method adjusts input values based on matrix inversion prior to analysis. In method one, the changes are internal to IMPLAN and difficult to monitor from a quality control perspective.

Method two relies mostly on spreadsheet-based manipulation and is easier to monitor. When the contribution analysis is completed, direct effects from the IMPLAN sectors of interest equal the amounts shown in IMPLAN's "Industry Detail" table, and the total contributions (direct plus indirect plus induced) are estimated. Both methods prevent over reporting of total effects, which can occur if standard economic impact analysis is used when contribution analysis results are desired.

IMPLAN was designed for economic impact analysis. Multipliers ensure that the ripple effect manifests across the economy. A portion of those effects often involve self-purchases within the sector of interest. That is, if the output from the logging sector is $1 million in a local economy, the economic impact of $1 million in sales would be greater than that amount due to self-purchases. The contribution methods are designed to yield the $1 million direct contribution and its associated effects. Put simply, the amount of sales (direct contribution) estimated cannot exceed the amount that actually exists. Methods one and two accomplish this.

The matrix inversion approach relies on developing a detailed social accounting matrix (SAM) output multipliers for each sector in the forest products industries. Hence, a 32x32 matrix is developed with the diagonal yielding a value close to 1.0 for the detailed multipliers relating each row-column sector to itself (e.g., logging to logging, sawmills to sawmills, etc.). The actual matrix can be developed in several ways. For example, the SAM matrix can be exported from IMPLAN and narrowed down to the appropriate row and columns for the forest products industries. Then, it can be used to develop detailed multipliers via matrix inversion. Alternatively, detailed multipliers can be exported and rearranged into a 32x32 matrix. The approach used in this report was to rely on a matrix developed by IMPLAN staff for

the state. Then, the matrix was inverted and multiplied the initial IMPLAN output values for forest industries sectors to yield inputs for IMPLAN analysis.

Appendix B: Forest Products Industries Groupings and IMPLAN Sectors

Exhibit B1. Forestry Industry Grouping and IMPLAN Sectors

IMPLAN Sector	Sector Name
10	Maple syrup production*
15	Forestry, forest products, and timber tract production
19	Support activities for forestry*

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

Exhibit B2. Logging Industry Grouping and IMPLAN Sector

IMPLAN Sector	Sector Name
16	Commercial logging

Exhibit B3. Primary Solid Wood Products Industry Grouping and IMPLAN Sectors

IMPLAN Sector	Sector Name
47	Electric power generation—biomass*
134	Sawmills
135	Wood preservation
136	Veneer and plywood manufacturing
138	Reconstituted wood product manufacturing

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

Exhibit B4. Secondary Solid Wood Products Industry Grouping and IMPLAN Sectors

IMPLAN Sector	Sector Name
137	Engineered wood member and truss manufacturing
139	Wood windows and doors manufacturing
140	Cut stock, resawing lumber, and planing
141	Other millwork, including flooring
142	Wood container and pallet manufacturing
143	Manufactured home (mobile home) manufacturing
144	Prefabricated wood building manufacturing
145	All other miscellaneous wood product manufacturing

Exhibit B5. Wood Furniture Industry Grouping and IMPLAN Sectors

IMPLAN Sector	Sector Name
368	Wood kitchen cabinet and countertop manufacturing
369	Upholstered household furniture manufacturing
370	Nonupholstered wood household furniture manufacturing
372	Institutional wood furniture manufacturing*
373	Wood office furniture manufacturing
374	Custom architectural woodwork and millwork manufacturing
376	Showcase, partition, shelving, and locker manufacturing*

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

Exhibit B6. Pulp, Paper, and Paperboard Mills Industry Grouping and IMPLAN Sectors

IMPLAN Sector	Sector Name
146	Pulp mills
147	Paper mills
148	Paperboard mills

Exhibit B7. Secondary Paperboard and Other Paper Products Industry Grouping and IMPLAN Sectors

IMPLAN Sector	Sector Name
149	Paperboard container manufacturing
150	Paper bag and coated and treated paper manufacturing
151	Stationery product manufacturing
152	Sanitary paper product manufacturing
153	All other converted paper product manufacturing

Appendix C: Detailed Economic Contribution Results

Direct Economic Contribution by IMPLAN Sector

Exhibit C1. Direct Economic Contributions, Forestry Detail, 2017

Sector	Employment	Labor Income (Thousands of Dollars)	Value-added (Thousands of Dollars)	Output (Thousands of Dollars)
Forestry, forest products, and timber tract production	-	-	-	-
Support activities for forestry	88	$3,121	$644	$982
Maple syrup production	-	-	-	-
Subtotal	**88**	**$3,121**	**$644**	**$982**

Exhibit C2. Direct Economic Contributions, Logging Detail, 2017

Sector	Employment	Labor Income (Thousands of Dollars)	Value-added (Thousands of Dollars)	Output (Thousands of Dollars)
Commercial logging	29	$46,732	$48,599	$51,148
Subtotal	**29**	**$46,732**	**$48,599**	**$51,148**

Exhibit C3. Direct Economic Contributions, Primary Solid Wood Products Detail, 2017

Sector	Employment	Labor Income (Thousands of Dollars)	Value-added (Thousands of Dollars)	Output (Thousands of Dollars)
Electric power generation—biomass	-	-	-	-
Sawmills	3	$157	$167	$875
Wood preservation	15	$858	$1,329	$8,350
Veneer and plywood manufacturing	3	$182	$203	$868
Reconstituted wood product manufacturing	39	$2,917	$4,209	$20,648
Subtotal	**60**	**$4,115**	**$5,908**	**$30,741**

Exhibit C4. Direct Economic Contributions, Secondary Solid Wood Products Detail, 2017

Sector	Employment	Labor Income (Thousands of Dollars)	Value-added (Thousands of Dollars)	Output (Thousands of Dollars)
Engineered wood member and truss manufacturing	75	$3,883	$4,228	$16,299
Wood windows and doors manufacturing	34	$2,144	$2,461	$7,853
Cut stock, resawing lumber, and planing	30	$1,485	$1,935	$6,719
Other millwork, including flooring	31	$1,652	$1,945	$6,239
Wood container and pallet manufacturing	69	$3,159	$3,508	$10,494
Manufactured home (mobile home) manufacturing	-	-	-	-
Prefabricated wood building manufacturing	66	$3,830	$4,119	$11,669
All other miscellaneous wood product manufacturing	51	$2,707	$3,112	$9,253
Subtotal	**355**	**$18,861**	**$21,309**	**$68,525**

Exhibit 14. Direct Economic Contributions, Wood Furniture Detail, 2017

Sector	Employment	Labor Income (Thousands of Dollars)	Value-added (Thousands of Dollars)	Output (Thousands of Dollars)
Wood kitchen cabinet and countertop manufacturing	203	$8,952	$9,397	$27,752
Upholstered household furniture manufacturing	-	-	-	-
Nonupholstered wood household furniture manufacturing	10	$412	$450	$1,203
Institutional wood furniture manufacturing	155	$9,662	$10,274	$29,912
Wood office furniture manufacturing	4	$98	$110	$639
Custom architectural woodwork and millwork manufacturing	-	-	-	-
Showcase, partition, shelving, and locker manufacturing	64	$3,516	$3,819	$12,571
Subtotal	**436**	**$22,640**	**$24,050**	**$72,076**

Exhibit 15. Direct Economic Contributions, Pulp, Paper, and Paperboard Mills Detail, 2017

Sector	Employment	Labor Income (Thousands of Dollars)	Value-added (Thousands of Dollars)	Output (Thousands of Dollars)
Pulp mills	-	-	-	-
Paper mills	-	-	-	-
Paperboard mills	-	-	-	-
Subtotal	**-**	**-**	**-**	**-**

Exhibit C7. Direct Economic Contributions, Secondary Paperboard and Other Paper Products Detail, 2017

Sector	Employment	Labor Income (Thousands of Dollars)	Value-added (Thousands of Dollars)	Output (Thousands of Dollars)
Paperboard container manufacturing	141	$10,612	$14,924	$66,019
Paper bag and coated and treated paper manufacturing	388	$28,136	$45,816	$174,028
Stationery product manufacturing	-	-	-	-
Sanitary paper product manufacturing	431	$36,864	$114,549	$339,826
All other converted paper product manufacturing	28	$1,200	$1,522	$7,848
Subtotal	**988**	**$76,812**	**$176,810**	**$587,721**

Note: Value-added in IMPLAN is equivalent to gross state product.

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