Forest Products Industries' Economic Contributions: New Jersey

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Prepared by

Public Sector Consultants
Lansing, Michigan
www.publicsectorconsultants.com

Prepared for

New Jersey Department of Environmental Protection, Forest Service
Trenton, New Jersey
https://www.nj.gov/dep

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

Foreword

In order to effectively manage forest resources in the nation's most densely populated state, it is important to recognize the valuable economic and social considerations that these resources represent to New Jersey's diverse citizenship. This report serves as a milestone in understanding the economic engine that makes forest management possible for a broad array of objectives. Although New Jersey is not generally considered a major timber-producing state, forest products sectors represent over $17 billion of economic contributions annually. The labor provided by these industries not only serves to provide living for tens of thousands of New Jersey families, but also gives our state's residents unique insight into our place in the shared responsibilities for the management of forest resources, both in the state and around the globe. From this report, it is also apparent that the forest products industry in our state indirectly impacts a wide range of other industries around the region and the world.

The following report is an assessment of broad forest conditions and economic contributions of forest products to New Jersey, along with comparisons to neighboring states and a region comprised of 20 states, including New Jersey, located in the Northeast and Midwest U.S. For this project, the NJ Forest Service partnered with other midwest and northeast states in the region as well as the U.S. Department of Agriculture Forest Service to compile data for this report and the 20-state regional report. The project was administered by the Michigan Department of Natural Resources, with the primary goal of gaining consistent insight into the current economic contributions of the forest products industry in the state of New Jersey and the Northeast and Midwest region. Forest data used in this analysis came from the U.S. Forest Service, an agency of the United States Department of Agriculture, and economic data are based on 2017 Impact Analysis for Planning (IMPLAN) data, a commercially available economic input-output model. It is with great pride and excitement that I present you with the first *Forest Products Industries' Economic Contributions: New Jersey*.

Sincerely,

Todd Wyckoff
Bureau Chief
New Jersey Forest Service
Department of Environmental Protection

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Executive Summary

This report assesses broad forest conditions and economic contributions of forest products industries in New Jersey. 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.

New Jersey boasts 2.0 million acres of forest land that cover 42.4 percent of its land base, with most of this forest land able to produce commercial timber. The majority is privately owned (47.5 percent). About 46 percent is owned by state and local government, and about 6 percent is in federal ownership.

Forest Industries

This report presents seven forest products industries, which are based on 32 economic sectors in IMPLAN, 27 of which are present in New Jersey:

- 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, New Jersey's forest products industries provided direct employment to almost 19,000 people, leading to $6.7 billion in output. That same year, labor income was $1.6 billion and value-added was $1.9 billion. In total contributions, these industries supported almost 42,000 jobs, $3.2 billion in labor income, $4.5 billion in value-added, and $10.9 billion in output.

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

Leading Forest Products Industry Groups

Among the seven 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 (9,756), value-added ($1.3 billion), and direct output ($5.0 billion).
- Wood furniture had the second highest number of direct jobs (5,106) value-added ($364.6 million), and output ($878.2 million).
- Secondary solid wood products had the third highest employment (2,664), value-added ($151.0 million), and output ($494.8 million).
- Pulp, paper, and paperboard mills had the sixth highest number of direct jobs (281) and the fourth highest value-added ($43.8 million) and direct output ($210.2 million).

Leading Individual Forest Products Sectors

Among the 28 forest products sectors present in New Jersey, the top four, by measure in order from highest to fourth highest of direct contributions, were:

- Employment—Paperboard container manufacturing, wood kitchen cabinet and countertop manufacturing, paper bag and coated and treated paper manufacturing, and sanitary paper product manufacturing were the top four sectors and had a combined total of over 11,497 direct jobs, or 61 percent of direct employment.
- Labor income—Sanitary paper product manufacturing, paperboard container manufacturing, paper bag and coated and treated paper manufacturing, and wood kitchen cabinet and countertop manufacturing had the highest labor income, totaling $1.1 billion or 69 percent of direct labor income.
- Value-added—Sanitary paper product manufacturing, paperboard container manufacturing, paper bag and coated and treated paper manufacturing, and wood kitchen cabinet and countertop manufacturing had the highest value-added, totaling $1.4 billion, or 71 percent of direct value-added.
- Output—Paperboard container manufacturing, sanitary paper product manufacturing, paper bag and coated and treated paper manufacturing, and wood kitchen cabinet and countertop manufacturing were the top four sectors in output, totaling $5.0 billion, or 75 percent of direct output.

New Jersey's Forest Products Industries Compared to Other New Jersey Industries

The forest products industries provide more direct value-added and output than commercial fishing, hunting, and trapping; mining and oil and gas production; and agricultural production industries (plant crop and animal). Overall, forest products industries accounted for 8.6 percent of the nonfood manufacturing jobs in New Jersey. Agricultural production provided the most employment. Over 7 percent of New Jersey's 256,829 direct manufacturing jobs in 2017 were in the forest products industries (i.e., 1 in 14 manufacturing jobs).

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

Forest products industries in New Jersey and the surrounding states of Pennsylvania, New York, Maryland, Delaware, and Connecticut employed 148,766 workers and accounted for $48.5 billion in direct output. Pennsylvania's forest products economy was the largest in the region, followed by that of New York, New Jersey, Maryland, Connecticut, and Delaware.

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 New Jersey'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 New Jersey'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 New Jersey, Forest Products Industries, Economic Contributions of New Jersey'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 New Jersey

New Jersey's forests (Exhibit 1) provide many benefits to the public, such as recreational areas, natural water filtration/purification, removal of carbon dioxide, habitat for wildlife, and a source of renewable energy and economic development. In an urban state such as New Jersey, it is imperative to properly maintain forested areas. The first statewide assessment of forested areas in New Jersey was in 1899 by C. C. Vermeule and reported in the *Annual Report of the State Geologist for the Year 1899: Report of Forests.* That report stated approximately 46 percent of the state was forested. Since the 1960s, the amount of forest land has remained relatively consistent, with approximately 42 percent of the state consisting of forest land in 2017 (Exhibit 2).

Exhibit 1. New Jersey's Forest Land by County, 2017

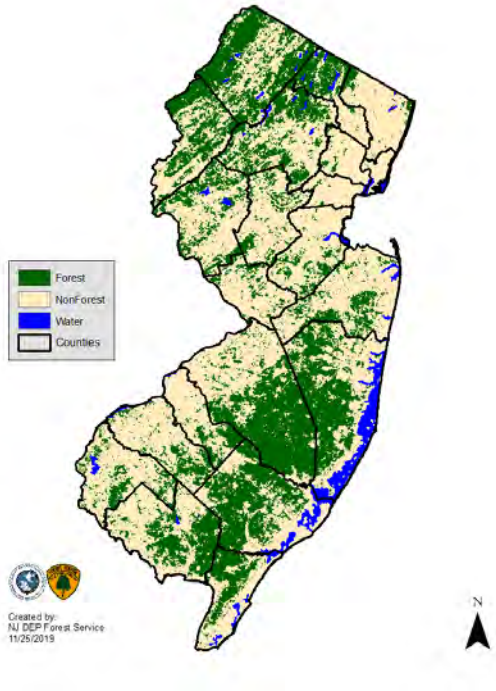


Exhibit 2. New Jersey Land Area by Land Use Type, 2017 (U.S. Forest Service)

Land Use Type	Acres	Percentage
Forest land	1,994,191	42.4%
Nonforest land	2,709,606	57.6%
Total	**4,703,797**	**100.0%**

The ownership of forest land in the state is almost split in half, with private lands making up approximately 47.5 percent. State and local government own approximately 46.2 percent, with state government owning most of these lands (Exhibit 3). The state actively manages a portion of these lands under parcel-wide forest stewardship plans and the Forest Action Plan, an overarching strategic plan for the entire state of New Jersey. As a small state with high population density, there is overwhelming support for public land ownership in New Jersey; despite concerns over taxes, residents have voted in favor of issuing bonds related to the purchase of public forests on several occasions. Of the privately-owned forest land, nearly 20–30 percent is actively managed under either a woodland management plan, forest stewardship plan, or dual plans. Management of privately held forested lands supports most of the forest products industry in New Jersey when comparing to harvest removals across several ownership categories. This is noteworthy when considering public support for acquiring more publicly held forests.

Exhibit 3. Forest Land by Ownership Group (2017)

Ownership Group	Acres	Percentage
Other federal	126,827	6.4%
State and local governments	920,952	46.2%
Private	946,412	47.5%
Total	**1,994,191**	**100.0%**

New Jersey's major forest types include oak/hickory, loblolly/shortleaf pine, oak/pine, oak/gum/cypress, and maple/beech/birch (Exhibit 4). Tree Species vary significantly from northern New Jersey to southern New Jersey. Most northern New Jersey forests are composed of northern hardwoods (white pine, eastern hemlock, mixed oaks) and other hardwoods, such as maple, beech, and birch. Southern New Jersey is primarily composed of southern yellow pines such as pitch and shortleaf, as well as various species of oak. Across all New Jersey forests, red maple and pitch pine are the most common species of trees in both number of trees and volume. Atlantic white cedar is one of the most valuable tree species in southern New Jersey for its habitat value as a wetland obligate as well as its timber qualities.

Exhibit 4. Forest Land Area by Forest Type Group (2017)

Forest Type Group	Acres	Percentage
Oak/hickory	828,259	41.5%
Loblolly/shortleaf pine	473,839	23.8%
Oak/pine	195,229	9.8%
Oak/gum/cypress	177,313	8.9%
Maple/beech/birch	142,083	7.1%
Elm/ash/cottonwood	99,281	5.0%
Other	28,381	1.4%
Other eastern softwoods	18,052	0.9%
Other hardwoods	15,701	0.8%
White/red/jack pine	9,436	0.5%
Aspen/birch	6,616	0.3%
Total	**1,994,191**	**100.0%**

The estimated volume of standing timber suitable for forest products was about 3.9 billion cubic feet, or nearly 49.9 million standard cords[1] (Exhibit 5). The top five species by volume include pitch pine, red

[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.

maple, yellow poplar, white oak, and sweet gum. Average annual net growth exceeded annual harvest removals by approximately 10.9 to 1. This means the forests of New Jersey grow significantly more than what is harvested; for every cubic foot of wood harvested 10.9 cubic feet of wood grows every year. Only 0.13 percent of the total standing volume within the state was harvested, indicating that New Jersey's timber resource is largely underutilized. Approximately 40.4 million cubic feet of wood, or 511,980 cords, are lost to mortality of trees annually. A majority of this volume comes from the following species groups: other yellow pines, other red oaks, soft maple, ash, and select white oaks.

Exhibit 5. Characteristics of Growing Stock in New Jersey, 2017 (in thousand cubic feet)

Measure	Total	National Forest	Other Federal	State and Local Government	Private
Net volume	3,940,405	0	237,623	1,712,409	1,990,373
Net growth	56,738	0	2,466	21,960	32,312
Harvest removals	5,213	0	31	449	4,734
Average annual mortality	40,446	0	1,665	18,659	20,122

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
- 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 (IO) model that comprises economic data and software. IO models characterize financial linkages among and between sectors, households, and institutions. Within these models, various sectors have production functions that show the value of inputs used in production of outputs or commodities. New Jersey's economy was represented by 497 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 New Jersey's Forest Products Industries

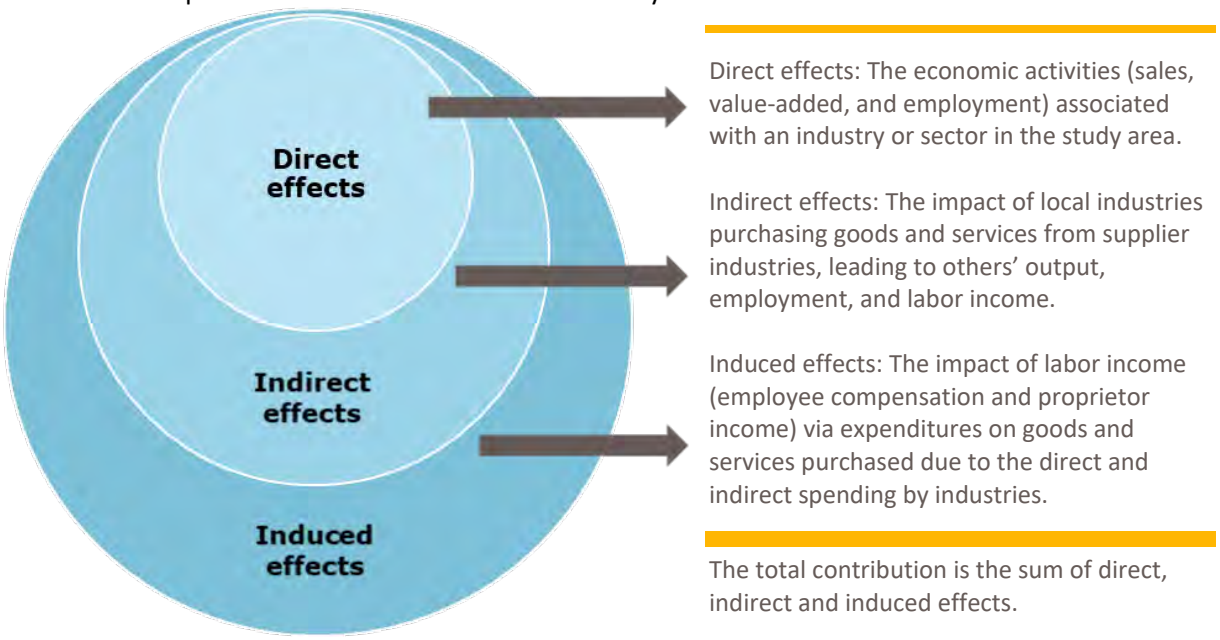
This section of the report includes four major subsections: Economic Contributions Defined, Economic Contribution Results, Importance of the Forest Products Industries in Context, and Supplemental Economic Contribution Information.

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 New Jersey (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 New Jersey, New York, and Pennsylvania reveals that the direct employment for 2017 was 139; 4,014; and 4,740 jobs, respectively. Summing the individual state's total employment contributions (direct, indirect, and induced) yields 14,198 jobs. However, if the states are combined as one region, the total employment contribution increases to 14,445 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 rely on the sustainable use of natural resources, and New Jersey'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. New Jersey forest products industries' total economic contribution in terms of output was $10.9 billion, based on direct output of $6.7 billion (Exhibit 7). There were 18,702 direct jobs associated with this level of economic activity, supporting a total of 41,942 jobs. Direct labor income, which includes employee compensation and proprietor income, was $1.6 billion, or $82,913 per job. Total labor income, which includes income paid directly to industry employees and proprietors, their suppliers, and other industries they support, totaled $3.2 billion.

Exhibit 7. Economic Contribution of Forest Products Industries in New Jersey, 2017 Dollars

Effect	Employment	Labor Income (Thousands of Dollars)	Value-added* (Thousands of Dollars)	Output (Thousands of Dollars)
Direct	18,702	$1,550,628	$1,908,904	$6,720,879
Total	41,942	$3,186,935	$4,477,820	$10,894,609

* Value-added in IMPLAN is equivalent to GSP.

Each direct job in the forest products industries supported 1.24 additional jobs, and every $1 million in direct labor income supported an additional $1.06 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, New Jersey's population was estimated at 9.0 million people, with total employment of 5.4 million. The gross state product was $592.9 billion from 497 economic sectors (of the possible 536 in the US). The GSP's largest component was labor income, which was $383.0 billion.

Direct value-added for forest products industries was $1.9 billion, 0.3 percent of New Jersey's total GSP. The percentage over doubles to 0.8 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). In New Jersey, 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, labor income, value-added, and output. Logging was the smallest group for all metrics.

One group—secondary paperboard and other paper products—accounted for over half of the employment, labor income, value-added, and output of forest products industries.

Exhibit 8. Direct Economic Contributions in New Jersey, Industry Groups, 2017

Industry Group	Employment	Labor Income (Thousands of Dollars)	Value-added (Thousands of Dollars)	Output (Thousands of Dollars)
Forestry	459	$39,939	$40,452	$49,654
Logging	139	$14,701	$15,023	$18,084
Primary solid wood products	297	$15,561	$20,611	$114,241
Secondary solid wood products	2,664	$131,576	$151,019	$494,848
Wood furniture	5,106	$344,118	$364,558	$878,242
Pulp, paper, and paperboard mills	281	$32,211	$43,785	$210,213
Secondary paperboard and other paper products	9,756	$972,521	$1,273,457	$4,955,597
Total	**18,702**	**$1,550,628**	**$1,908,904**	**$6,720,879**

Exhibit 9. Total Economic Contributions in New Jersey, Industry Groups, 2017

Industry Group*	Employment	Labor Income (Thousands of Dollars)	Value-added (Thousands of Dollars)	Output (Thousands of Dollars)
Forestry	651	$50,980	$60,135	$81,893
Logging	194	$16,471	$19,600	$26,412
Primary solid wood products	700	$46,207	$68,493	$186,339
Secondary solid wood products	4,783	$280,963	$383,345	$871,187
Wood furniture	9,014	$603,839	$771,722	$1,544,854
Pulp, paper, and paperboard mills	1,012	$86,540	$129,367	$341,834
Secondary paperboard and other paper products	25,588	$2,101,936	$3,045,156	$7,842,090
Total	**41,942**	**$3,186,935**	**$4,477,820**	**$10,894,609**

*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 seven industry groups, forestry was the fourth largest in terms of direct contributions in 2017. Direct contributions were $49.7 million in output, 459 jobs, $39.9 million in labor income, and $40.5 million 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, one-third (37 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. The direct contributions of logging were $18.1 million in output, 139 jobs, $14.7 million in labor income, and $15.0 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 New Jersey, 20 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 New Jersey. 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 $114.2 million in output, 297 jobs, $15.6 million in labor income, and $20.6 million in value-added. Total contributions for primary solid wood products, including direct, indirect and induced effects, were $186.3 million in output, 700 jobs, $46.2 million in labor income, and $ 68.5 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 New Jersey. 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 $494.8 million in output, 2,664 jobs, $131.6 million in labor income, and $151.0 million in value-added. Total contributions were $871.2 million in output, 4,783 jobs, $281.0 million in labor income, and $383.3 million in value-added.

Wood Furniture

Wood furniture was the second largest group in terms of direct employment in New Jersey. 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 $878.2 million in output, 5,106 jobs, $344.1 million in labor income, and $364.6 million in value-added. Total contributions of wood furniture were $1.5 billion in output, 9,014 jobs, $603.8 million in labor income, and $771.7 million in value-added.

Pulp, Paper, and Paperboard Mills

The pulp, paper, and paperboard mills industry group was the sixth largest in terms of direct employment in New Jersey. The group includes pulp mills, paper mills, and paperboard mills that make paper or pulp from raw wood and from purchased pulp. The pulp, paper, and paperboard mills group's direct contributions were $ 210.2 million in output, 281 jobs, $32.2 million in labor income, and $43.8 million in value-added. Total contributions were $341.8 million in output, 1,012 jobs, $86.5 million in labor income, and $129.4 million in value-added.

Secondary Paperboard and Other Paper Products

The secondary paperboard and other paper products group was the largest in terms of direct employment in New Jersey. 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 $5.0 billion in output, 9,756 jobs, $972.5 million in labor income, and $1.3 billion in value-added. Total contributions were $7.8 billion in output, 25,588 jobs, $2.1 billion in labor income, and $3.0 billion 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 are paperboard container manufacturing (3,950 jobs), wood kitchen cabinet and countertop manufacturing (2,759 jobs), paper bag and coated and treated paper manufacturing (2,656 jobs), and sanitary paper product manufacturing (2,132 jobs). These sectors reflect the diversity of manufacturing in the state.

The paperboard container manufacturing sector comprises establishments primarily engaged in converting paperboard into containers without manufacturing paperboard. These establishments use corrugating, cutting, and shaping machinery to form paperboard into containers. Products made by these establishments include boxes, corrugated sheets, pads, pallets, paper dishes, and fiber drums, and reels. In a consumer-driven economy with more and more shipping, this industry is well positioned for growth.

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

The sanitary paper product manufacturing sector comprises 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 sanitary paper product manufacturing, paperboard container manufacturing, paper bag and coated and treated paper manufacturing, and wood kitchen cabinet and countertop manufacturing had the highest labor income, totaling $1.1 billion; value-added, totaling $1.4 billion; and output (or sales), totaling $5.0 billion.

Top Nonforest Industries Impacted

Contribution analysis using IMPLAN relies on backward linkages from forest products industries sectors among themselves and to other sectors in New Jersey. Including the 28 forest products industries present in New Jersey, 158 sectors were impacted in 2017 (counting sectors with ten or more jobs

supported). The top ten sectors (excluding forest products sectors) included wholesale, real estate, restaurants, trucking, 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 813 jobs in truck transportation included log trucks, delivery trucks, and office jobs for some trucking companies, among others. Seven of these sectors were among the top ten sectors in the state of New Jersey (real estate was number one, followed by wholesale trade and hospitals—each had over 150,000 jobs).

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

Sector	Description	Jobs
395	Wholesale trade	2,016
440	Real estate	1,057
461	Management of companies and enterprises	894
411	Truck transportation	813
501	Full-service restaurants	789
502	Limited-service restaurants	663
482	Hospitals	632
464	Employment services	562
468	Services to buildings	536
400	Retail - Food and beverage stores	399
Total	**NA**	**8,363**

Neighboring States

New Jersey and the neighboring states of Pennsylvania, New York, Maryland, Delaware, and Connecticut make up an important region for forest products. Forest products industries employ over 148,000 workers across these states and account for $48.5 billion in direct output (Exhibits 11 and 12). Pennsylvania had the largest forest products industry in terms of direct jobs and output followed by New York, New Jersey, Maryland, Connecticut, and Delaware. The three largest industry groups, each with over 32,000 employees, were secondary paperboard and other paper products, wood furniture, and secondary solid wood products.

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

Industry	New Jersey	Pennsylvania	New York
Forestry	459	1,865	1,658
Logging	139	4,740	4,014
Primary solid wood products	297	6,812	2,861
Secondary solid wood products	2,664	18,638	7,113
Wood furniture	5,106	13,720	11,791
Pulp, paper, and paperboard mills	281	3,186	4,898
Secondary paperboard and other paper products	9,756	19,581	10,689
Sum of Direct Contributions	**18,702**	**68,541**	**43,024**

Industry	Maryland	Delaware	Connecticut
Forestry	140	88	90
Logging	648	29	569
Primary solid wood products	643	60	276
Secondary solid wood products	2,167	355	1,268
Wood furniture	2,506	436	2,535
Pulp, paper, and paperboard mills	800	0	828
Secondary paperboard and other paper products	1,909	988	2,164
Sum of Direct Contributions	**8,813**	**1,957**	**7,730**

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

Industry	New Jersey (Thousands of Dollars)	Pennsylvania (Thousands of Dollars)	New York (Thousands of Dollars)
Forestry	$49,654	$126,178	$48,511
Logging	$18,084	$697,606	$265,205
Primary solid wood products	$114,241	$2,151,337	$895,177
Secondary solid wood products	$494,848	$3,613,125	$1,346,545
Wood furniture	$878,242	$2,282,116	$1,956,501
Pulp, paper, and paperboard mills	$210,213	$2,722,271	$3,620,763
Secondary paperboard and other paper products	$4,955,597	$10,827,005	$5,351,321
Sum of Direct Contributions	**$6,720,879**	**$22,419,639**	**$13,484,023**

Industry	Maryland (Thousands of Dollars)	Delaware (Thousands of Dollars)	Connecticut (Thousands of Dollars)
Forestry	$8,425	$982	$2,506
Logging	$53,294	$51,148	$39,521
Primary solid wood products	$224,358	$30,741	$116,580
Secondary solid wood products	$497,136	$68,525	$230,835
Wood furniture	$441,018	$72,076	$450,940
Pulp, paper, and paperboard mills	$584,636	-	$611,003
Secondary paperboard and other paper products	$825,013	$587,721	$964,105
Sum of Direct Contributions	**$2,633,880**	**$811,193**	**$2,415,490**

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 New Jersey's forest products industries with others. Natural resources and agricultural industries significantly contribute to the diversity of economic activities reflected in New Jersey's $592.9 billion GSP. The forest products industries provide more direct value-added and output than the commercial fishing, hunting, and trapping; mining and oil and gas production; and agricultural production industries (Exhibit 13). New Jersey's forest products industries comprised 0.3 percent of the GSP in 2017. Agricultural production provided the largest amount of employment (full- and part-time) of these industries.

Exhibit 13. Natural Resources and Agricultural Production Industries in New Jersey, 2017

Industry	Employment	Labor Income (Thousands of Dollars)	Value-added (Thousands of Dollars)	Output (Thousands of Dollars)
Forest products	18,702	$1,550,628	$1,908,904	$6,720,879
Commercial fishing, hunting, and trapping	1,294	$113,359	$146,396	$186,310
Mining and oil and gas production	4,071	$1,796,453	$1,828,584	$2,115,764
Agricultural production (plant crop and animal)	26,232	$603,605	$941,141	$1,556,294
Total	**50,299**	**$4,064,045**	**$4,825,025**	**$10,579,246**

Labor income per job is highest in mining and oil and gas production ($441,271) and lowest in agricultural production ($23,010). For forest products, the average income per job is $82,913; commercial fishing, hunting, and trapping had the second highest average income at $87,621.

Most of the forest products industries are manufacturers, however, the forestry, logging, and biomass power groups are not. There were over 256,000 manufacturing jobs in New Jersey in 2017, of which 18,104 were in the forest products industries, 7.1 percent of the total. Of 16 industries, forest products manufacturing was sixth in terms of employment, behind food, chemical, computer and electronic product, fabricated metal, and miscellaneous manufacturing. It was seventh in terms of labor income and value-added and sixth in terms of output (Exhibit 14).

Exhibit 14. Manufacturing Industries in New Jersey, 2017

Manufacturing Industries	Employment	Labor Income (Thousands of Dollars)	Value-added (Thousands of Dollars)	Output (Thousands of Dollars)
Food	43,554	$2,653,046	$4,316,387	$17,474,895
Chemical	40,290	$9,163,420	$18,159,380	$46,048,594
Computer and electronic product	22,136	$2,532,312	$4,152,136	$9,224,127
Fabricated metal	21,876	$1,694,798	$2,078,523	$5,245,235
Miscellaneous	20,522	$2,597,524	$3,775,406	$7,767,509
Forest products	18,104	$1,495,988	$1,853,429	$6,653,141
Printing	16,664	$1,097,164	$1,459,358	$2,899,974
Plastics and rubber products	15,646	$1,315,062	$1,765,583	$5,466,160
Machinery	13,939	$1,785,124	$1,700,675	$4,503,171
Nonmetallic mineral product	10,822	$855,754	$1,288,924	$3,389,899
Textiles and apparel	9,678	$538,334	$618,560	$1,637,874
Electrical equipment	6,862	$681,416	$1,024,449	$2,640,732
Transportation equipment	5,581	$450,755	$614,150	$2,378,351
Primary metal	4,606	$406,485	$524,781	$2,764,680
Beverage and tobacco product	3,562	$235,144	$642,259	$2,246,509
Petroleum and coal	2,987	$573,667	$2,532,411	$10,438,322
Total	**256,829**	**$28,075,992**	**$46,506,410**	**$130,779,172**

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 28 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 New Jersey 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 18,702 direct jobs in the forest products industries, and overall, 41,942 jobs were supported. Direct labor income was $1.6 billion with total labor income at $3.2 billion. Direct value-added was $1.9 billion, and the total contribution for value-added was $4.5 billion. Finally, direct output was $6.7 billion with a total contribution of $10.9 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	333	$35,814	$36,504	$45,223
Support activities for forestry	126	$4,125	$3,949	$4,431
Maple syrup production	-	-	-	-
Subtotal	**459**	**$39,939**	**$40,452**	**$49,654**

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	139	$14,701	$15,023	$18,084
Subtotal	**139**	**$14,701**	**$15,023**	**$18,084**

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	79	$4,661	$5,146	$22,612
Wood preservation	71	$2,279	$3,724	$37,439
Veneer and plywood manufacturing	90	$4,485	$5,521	$24,366
Reconstituted wood product manufacturing	56	$4,136	$6,220	$29,823
Subtotal	**297**	**$15,561**	**$20,611**	**$114,241**

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	210	$11,722	$13,299	$47,089
Wood windows and doors manufacturing	685	$40,451	$47,097	$154,932
Cut stock, resawing lumber, and planing	-	-	-	-
Other millwork, including flooring	458	$21,140	$25,849	$89,940
Wood container and pallet manufacturing	1,043	$47,676	$52,663	$158,989
Manufactured home (mobile home) manufacturing	-	-	-	-
Prefabricated wood building manufacturing	80	$2,369	$2,581	$11,720
All other miscellaneous wood product manufacturing	187	$8,219	$9,530	$32,178
Subtotal	**2,664**	**$131,576**	**$151,019**	**$494,848**

Exhibit 15. 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	2,759	$156,660	$163,789	$413,111
Upholstered household furniture manufacturing	214	$11,476	$12,104	$41,971
Nonupholstered wood household furniture manufacturing	441	$29,599	$31,882	$65,330
Institutional wood furniture manufacturing	220	$14,876	$15,754	$43,628
Wood office furniture manufacturing	149	$11,609	$13,436	$34,134
Custom architectural woodwork and millwork manufacturing	673	$62,966	$66,409	$130,443
Showcase, partition, shelving, and locker manufacturing	650	$56,932	$61,183	$149,625
Subtotal	**5,106**	**$344,118**	**$364,558**	**$878,242**

Exhibit 16. 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	240	$26,899	$37,111	$177,323
Paperboard mills	41	$5,313	$6,675	$32,891
Subtotal	**281**	**$32,211**	**$43,785**	**$210,213**

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	3,950	$313,318	$391,476	$1,821,860
Paper bag and coated and treated paper manufacturing	2,656	$207,825	$248,234	$1,126,902
Stationery product manufacturing	676	$42,538	$50,545	$234,076
Sanitary paper product manufacturing	2,132	$387,720	$560,184	$1,673,373
All other converted paper product manufacturing	342	$21,120	$23,018	$99,386
Subtotal	**9,756**	**$972,521**	**$1,273,457**	**$4,955,597**

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

U.S. Forest Service Nondiscrimination Statement

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