

GEORGIA FORESTRY
COMMISSION



2021 Economic Benefits of the Forest Industry in Georgia

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Executive Summary

Georgia’s forest industry has many components, which interact with all other sectors of the economy in complex ways. The purposes of this analysis are to: (1) quantify the level of economic activity conducted by the components of the forest industry, (2) estimate economic activity supported in all Georgia sectors by the industry’s activities, (3) compare the level of activity in the forest industry with other industries, and (4) quantify the economic activity of forest industry sectors within each of the 12 regional commissions in Georgia.

This report is the latest in a series that began in 2002 and it underwent a significant restructuring in 2003 to reflect the change in industry classification systems from Standard Industrial Classification (SIC) to North American Industry Classification System (NAICS) used by data collection agencies (primarily the Georgia Department of Labor) that provide much of the data used in these analyses. Also, some minor adjustments were made in the 2011 NAICS list to reflect the changes in the new 2012 NAICS code definitions.

The forest industry components, and the level of economic activity represented by them in 2021, are shown in Table E-1. Economic activity is measured by output (similar to sales revenue), employment, and compensation (defined as wages and salaries including benefits). These measures are traditionally used in this type of analysis.

Table E-1 shows that 55,418 workers were employed in all sectors of the forest industry in 2021. These jobs were paid an annual compensation¹ of \$4.4 billion and generated an estimated total revenue of \$24.6 billion.

Table E-1: Georgia Forest Industry Economic Activity (2021)

Sector	Output	Employment	Wages & Salaries
Forest Management and Logging	\$471.9 M	5,384	\$360.3 M
Bioenergy	\$2,431.4 M	1,370	\$263.1 M
Lumber and Wood Preservation	\$2,384.1 M	6,486	\$499.5 M
Veneer, Plywood, Reconstituted, and Engineered Wood	\$1,606.0 M	4,472	\$388.7 M
Prefabricated Wood Buildings and Manufactured Housing	\$533.5 M	2,819	\$126.6 M
Pulp and Paper Products	\$13,751.3 M	19,073	\$1,857.2 M
Woodworking and Paper Industries Machinery	\$110.5 M	405	\$27.8 M
Wooden Furniture, Cabinets, Custom Arch. & Millwork, Windows and Doors	\$2,272.2 M	10,717	\$596.7 M
Containers, Showcases, Partitions, and Shelving	\$1,066.5 M	4,692	\$279.0 M
Total*	\$24,627.3 M	55,418	\$4,398.9 M

*Totals may not add up due to rounding

The industry’s activities bring dollars into the state, which recirculate in a process called the “multiplier effect.” The recirculation touches all major industry sectors as goods and services are bought

¹ Wages and salaries including benefits



and sold to meet increased demands by businesses and households resulting from the new resources brought into the state by the forest industry.

The result of the multiplier effect, given by total impacts (which includes the economic activity in Table E-1²), is also measured by output, employment, and wages and salaries and is shown in Table E-2. Total economic activity supported by the forest industry in Georgia (including the multiplier effect and forestry-related bioenergy firms) was \$41.3 billion in 2021. These activities supported the employment of 143,936 people who earned \$9.6 billion in wages and salaries (including benefits).

Table E-2: Total Benefits by Major Industry (2021)

Sector	Output	Employment	Wages & Salaries
Agriculture, Forestry, Fish & Hunting	\$851.2 M	10,267	\$627.5 M
Mining	\$65.0 M	149	\$13.5 M
Utilities	\$4,044.2 M	2,647	\$492.9 M
Construction	\$165.4 M	729	\$43.2 M
Manufacturing	\$22,798.6 M	51,186	\$3,960.6 M
Wholesale Trade	\$2,418.5 M	7,672	\$677.4 M
Retail Trade	\$757.3 M	8,027	\$274.7 M
Transportation & Warehousing	\$1,548.2 M	10,191	\$584.2 M
Information	\$809.2 M	1,418	\$206.9 M
Finance & Insurance	\$1,340.0 M	4,112	\$322.8 M
Real Estate & Rental	\$1,854.6 M	4,374	\$143.3 M
Professional, Scientific & Tech Services	\$1,054.1 M	6,089	\$516.9 M
Management of Companies	\$527.5 M	2,068	\$309.3 M
Administrative & Waste Services	\$810.2 M	9,625	\$366.3 M
Educational Services	\$104.6 M	1,415	\$63.6 M
Health & Social Services	\$983.6 M	8,150	\$515.3 M
Arts, Entertainment & Recreation	\$113.1 M	1,755	\$37.6 M
Accommodation & Food Services	\$511.9 M	7,220	\$170.4 M
Other Services	\$525.5 M	6,570	\$252.4 M
Government & non-NAICS Industries	\$63.4 M	272	\$24.1 M
TOTAL *	\$41,346.1 M	143,936	\$9,602.9 M

*Totals may not add up due to rounding

Another way to examine the impact of forest industry in Georgia is to compare it with the state's other manufacturing sectors. Table E-3 lists 2021 employment and compensation totals for each major manufacturing sector sorted by employment. These data show that the *forest industry ranked second in direct employment and first in wages and salaries*. Food processing ranked first in employment and third in wages and salaries, and transportation equipment ranked third in employment and second in wages and salaries.

² The economic activity in Table E-1 contains more than just the direct impacts because some of the inter-industry purchasing (indirect impacts) is necessarily contained in the estimates of economic activity.

Table E-3: Comparison to Georgia's Other Manufacturing Sectors (2021)

Industry Sectors	Employment	Wages & Salaries
Food Processing	63,728	\$3,325.9 M
Forestry Industry	55,418	\$4,398.9 M
Transportation Equipment	50,516	\$3,677.0 M
Textiles	44,468	\$2,275.2 M
Fabricated Metal Products	40,240	\$2,393.5 M
Machinery	22,673	\$1,568.6 M
Chemicals	22,453	\$1,817.9 M
Electrical Equipment and Appliances	14,457	\$1,066.2 M
Printing	11,272	\$599.8 M
Computers and Electronic Products	5,010	\$539.5 M
Apparel	2,216	\$106.2 M

Of particular importance to Georgia's state government is how the forest industry affects its annual budget. This is investigated by estimating the revenues associated with the forest industry's total economic activity and subtracting the costs associated with providing state services to Georgia's households and companies associated with that activity. Revenues include individual and corporate income taxes; sales and use taxes; highway taxes; fees; and miscellaneous revenues. Costs include education; public health, safety, and welfare; highways; administration; and miscellaneous. Table E-4 provides the fiscal impact estimates based on total impacts. The forest industry generated an estimated \$774.4 million in revenues for the state budget in 2021. When the costs of providing services to all employees are deducted from these revenues, net annual state revenues were \$237.8 million in year 2021.

Table E-4: Fiscal Impact Analysis (2021)³

Annual State Government Revenues	\$774.4 M
Annual State Government Costs	\$536.6 M
Net Annual Revenues	\$237.8 M

Table E-5 compares the overall results obtained in each impact analysis conducted from 2011 through 2021. Compared to 2020, the industry's 2021 direct output grew by 5.1 percent and employment increased by 2.3 percent. The industry's wages and salaries increased by 5.1 percent.

³ The Georgia Fiscal Impact Model was originally developed in the 1990s by economists at Georgia Tech. Georgia Tech updates the fiscal impact model each year with newly available demographic and state financial data. ***This past year Georgia Tech did a major update and revision to the model.*** In addition to adding the newly available demographic and financial data, Georgia Tech rebuilt the model from the ground up and went back to using log linear estimations to forecast revenues rather than the estimation of levels. Georgia Tech feels strongly that this will bring more accurate results to correct for overestimation of expenditures in the previous model. Due to annual revision of the data and equations, comparisons between results from previous versions of the Georgia Fiscal Impact Model may show very different net fiscal impact results for similar sized projects.

Table E-5: Comparison of Results 2011 to 2021

(Dollars in millions; Employment in persons)

Forest Industry Direct Economic Impact											
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Output*	\$15,082	\$16,072	\$16,564	\$16,843	\$19,203	\$20,794	\$21,348	\$21,488	\$21,996	\$23,442	\$24,627
Employment	46,378	47,123	48,139	48,740	50,385	51,900	53,933	55,089	55,562	54,185	55,418
Wages & Salaries*	\$2,972	\$2,917	\$2,938	\$3,030	\$3,553	\$3,741	\$3,836	\$4,018	\$3,941	\$4,184	\$4,399
Year to Year Percent Change											
Output	4.0%	6.6%	3.1%	1.7%	14.0%	8.3%	2.7%	0.7%	2.4%	6.6%	5.1%
Employment	6.8%	1.6%	2.2%	1.2%	3.4%	3.0%	3.9%	2.1%	0.9%	-2.5%	2.3%
Wages & Salaries	13.3%	-1.9%	0.7%	3.1%	17.3%	5.3%	2.5%	4.7%	-1.9%	6.2%	5.1%
Total Impacts											
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Output*	\$24,975	\$27,469	\$28,014	\$28,674	\$32,154	\$35,237	\$35,923	\$36,262	\$36,486	\$39,060	\$41,346
Employment	118,459	120,260	127,750	129,329	133,256	144,537	147,380	148,414	141,214	140,081	143,936
Wages & Salaries*	\$6,491	\$6,540	\$6,898	\$7,119	\$7,860	\$8,529	\$8,709	\$9,105	\$8,596	\$9,091	\$9,603
Year to Year Percent Change											
Output	5.6%	10.0%	2.0%	2.4%	12.1%	9.6%	1.9%	0.9%	0.6%	7.1%	5.9%
Employment	9.6%	1.5%	6.2%	1.2%	3.0%	8.5%	2.0%	0.7%	-4.9%	-0.8%	2.8%
Wages & Salaries	20.7%	0.8%	5.5%	3.2%	10.4%	8.5%	2.1%	4.5%	-5.6%	5.8%	5.6%
Forest Industry Fiscal Impact											
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
State Revenues	\$487	\$691	\$700	\$721	\$753	\$778	\$970	\$977	\$929	\$706	\$774
State Costs	\$308	\$358	\$360	\$370	\$393	\$433	\$873	\$867	\$822	\$523	\$537
Net Revenues*	\$179	\$333	\$340	\$351	\$360	\$345	\$97	\$109	\$107	\$183	\$238

Source: Enterprise Innovation Institute (EI2) impact assessments and Georgia Department of Labor, Current Employment and Wages

*Output, Wages and Salaries and Revenues are not adjusted for inflation



Table E-6 shows the impact of the forest industry in terms of output, employment, and earnings in each region.

Table E-6: Forest Industry's Regional Impact (2021)

Regions	Output	Employment	Wages & Salaries
Atlanta Regional Commission	\$6,644.6 M	12,579	\$1,186.8 M
Central Savannah River Area	\$1,510.2 M	3,342	\$269.8 M
Coastal	\$2,439.9 M	4,296	\$435.8 M
Georgia Mountains	\$910.2 M	2,710	\$162.6 M
Heart of Georgia Altamaha	\$2,101.0 M	4,978	\$375.3 M
Middle Georgia	\$1,639.2 M	3,719	\$292.8 M
Northeast Georgia	\$1,441.5 M	3,452	\$257.5 M
Northwest Georgia	\$1,789.3 M	4,299	\$319.6 M
River Valley	\$830.4 M	1,949	\$148.3 M
Southern Georgia	\$2,160.9 M	6,148	\$386.0 M
Southwest Georgia	\$1,905.6 M	4,717	\$340.4 M
Three Rivers	\$1,254.4 M	3,228	\$224.0 M
Total*	\$24,627.3 M	55,418	\$4,398.9 M

**Totals may not add up due to rounding*

SECTION 1

Introduction

Georgia's forest industry contains many components and supports a significant proportion of the state's economic activity. This analysis quantifies that activity in terms of economic output, employment, and employee compensation. Economic output is defined as business revenues, and employee compensation is defined as wages and salaries including benefits paid by employers. Additional factors considered include how the manufacturing components in the forest industry compare to other manufacturing sectors, and how the forest industry affects state government costs and revenues.

The first step in this process was to define the limits of what constitutes the "forest industry." This was not a simple task because the borders of one industry overlap those of other industries. How this was done and its results appear in Section 2, which also contains estimates of how much economic activity is occurring in each component of the forest industry.

After the industry was defined and activities quantified, the total economic activity supported by the forest industry was estimated. Total activity is generally referred to as the "multiplier effect." This effect occurs whenever dollars are brought into the state's economy and recirculated before leaking out. Section 3 explains the methodology used to estimate total economic activity and provides perspective on how important these activities are in the overall Georgia economy.

Section 4 quantifies the economic impact of urban and community forestry, a sector that was added beginning with the 2016 report. Section 5 shows the forest industry's output, employment, and compensation in the state's 12 regional commissions.

This report is the latest of a series of reports that began with an analysis of the 2002 impacts, continuing annually to the present analysis. The 2002 analysis is not comparable to the subsequent analyses, however, because of a significant change in the industry classification systems implemented in the 2003 data set. The 2002 analysis was based on the Standard Industry Classification system (SIC), and the later data sets used the North American Industrial Classification System (NAICS). Industry classification changes introduced by the NAICS 2012 code required minor adjustments in the NAICS code selection in the 2011 analysis. The new classification was also used in this year's analysis.

The 2014 report includes revisions of 2012 and 2013 historical data, which were made as a result of a more objective and efficient methodology of retrieving data from the ES202 database provided by the Georgia Department of Labor.



SECTION 2

Definition of the Forest Industry in Georgia

The forest industry in Georgia has many diverse components. A general definition would include all service and manufacturing activity related to the growth, harvesting, and use of forest materials that would not exist in Georgia without the presence of extensive forests or forest industries. For example, the papermaking industry would be a part of the forest industry definition, but retail sales of that paper would not. States without commercial forests still sell paper within their borders.

The forest industry definition used in this analysis includes these broad sectors: forest management, logging, wood products (such as dimension lumber), paper products, manufactured housing, furniture, other miscellaneous wood products, and woodworking and papermaking machinery. The 2012 North American Industrial Classification System (NAICS) was used to define the components of the forest industry. The NAICS codes and descriptions comprising the detailed definition appear in Table 2-1.

Table 2-1: Forest Industry Definition Components: NAICS

Grouping	Industry Description	NAICS CODE
Forest Management and Logging	Timber Tract Operations	113110
	Forest Nursery and Gathering Forest Products	113210
	Logging	113310
	Support Activities for Forestry	115310
Bioenergy	Bioenergy Derived from Forest Products	221112
		221117
		321113
		321999
Lumber and Wood Preservation	Sawmills	321113
	Wood Preservation	321114
Veneer, Plywood, Reconstituted and Engineered Wood	Hardwood Veneer and Plywood Manufacturing	321211
	Softwood Veneer and Plywood Manufacturing	321212
	Engineered Wood Member Manufacturing	321213
	Truss Manufacturing	321214
	Reconstituted Wood Product Manufacturing	321219
Prefabricated Wood Buildings and Manufactured Housing	Manufactured Home, Mobile Home, Manufacturing	321991
	Prefabricated Wood Building Manufacturing	321992
Pulp and Paper Products	Pulp Mills	322110
	Paper, Except Newsprint, Mills	322121
	Newsprint Mills	322122
	Paperboard Mills	322130
	Corrugated and Solid Fiber Box Manufacturing	322211
	Folding Paperboard Box Manufacturing	322212
	Other Paperboard Container Manufacturing	322219
	Paper Bag and Coated and Treated Paper Manufacturing	322220

	Stationery Product Manufacturing	322230
	Sanitary Paper Product Manufacturing	322291
	All Other Converted Paper Product Manufacturing	322299
Woodworking and Paper Industries Machinery	Sawmill, Woodworking, and Paper Machinery Manufacturing	333243
	Wood Kitchen Cabinet and Countertop Manufacturing	337110
	Upholstered Household Furniture Manufacturing	337121
	Non-upholstered Wood Household Furniture Manufacturing	337122
	Institutional Furniture Manufacturing	337127
Wooden Furniture, Cabinets, Custom Arch. & Millwork, Windows and Doors	Wood Office Furniture Manufacturing	337211
	Custom Architectural Woodwork and Millwork	337212
	Wood Window and Door Manufacturing	321911
	Cut Stock, Re-sawing Lumber, and Planing	321912
	Other Millwork, Including Flooring	321918
	Burial Casket Manufacturing	339995
	All Other Miscellaneous Wood Product Manufacturing	321999
Containers, Showcases, Partitions and Shelving	Wood Container and Pallet Manufacturing	321920
	Showcases, Partitions, Shelving, and Lockers	337215

Source: North American Industrial Classification System; Georgia Tech's Enterprise Innovation Institute

As in previous years, this analysis includes all firms producing products related to bioenergy that are derived from forest products. This relatively new industry sector is represented by 19 firms in Georgia. The total employment for this sector in 2021 was 1,370.

The level of economic activity in each forest industry component is measured by output, employment, and wages and salaries. Measures for 2021 appear in Table 2-2, which aggregates the numerous categories from Table 2-1 to nine larger groups⁴. This table shows that total employment in all forest industry sectors was 55,418 and these jobs earned annual compensation (total wages and salaries including benefits) of \$4.4 billion from estimated total business revenues of \$24.6 billion.

Within the industry, Georgia companies have representatives in each of the sectors and subsectors down to the NAICS six-digit level. Based on this aggregation scheme, the highest employment is seen in *Pulp and Paper* with 19,073 workers, followed by *Wooden Furniture, Cabinets, Custom Arch. & Millwork, Windows and Doors* with 10,717 employees and *Lumber and Wood Preservation* with 6,486 employees.

Compensation, like employment, is dominated by *Pulp and Paper* at \$1.9 billion (42 percent of the total), followed distantly by *Wooden Furniture, Cabinets, Custom Archwork & Millwork* at \$596.7 million and *Lumber and Wood Preservation* at \$499.5 million. The largest

⁴ There were two changes to the breakdown of categories that were introduced in the 2012 report: *Bioenergy* is shown as a separate sector and *Windows and Doors* sector is combined with *Wooden Furniture, Cabinets, Custom Archwork & Millwork, Windows and Doors*.

outputs are produced by *Pulp and Paper* (\$13.7 billion), followed by *Bioenergy* (\$2.4 billion) and *Lumber and Wood Preservation* (\$2.4 billion).

Table 2-2: Georgia Forest Industry Economic Activity (2021)

Sector	Output	Employment	Wages & Salaries
Forest Management and Logging	\$471.9 M	5,384	\$360.3 M
Bioenergy	\$2,431.4 M	1,370	\$263.1 M
Lumber and Wood Preservation	\$2,384.1 M	6,486	\$499.5 M
Veneer, Plywood, Reconstituted, and Engineered Wood	\$1,606.0 M	4,472	\$388.7 M
Prefabricated Wood Buildings and Manufactured Housing	\$533.5 M	2,819	\$126.6 M
Pulp and Paper Products	\$13,751.3 M	19,073	\$1,857.2 M
Woodworking and Paper Industries Machinery	\$110.5 M	405	\$27.8 M
Wooden Furniture, Cabinets, Custom Arch. & Millwork, Windows and Doors	\$2,272.2 M	10,717	\$596.7 M
Containers, Showcases, Partitions, and Shelving	\$1,066.5 M	4,692	\$279.0 M
Total*	\$24,627.3 M	55,418	\$4,398.9 M

*Totals may not add up due to rounding

Table 2-3 provides a comparison of the forest industry activity from 2012 through 2021. Three measures are included in the comparison: output, employment, and compensation. Of the three metrics, wages and salaries and output (an estimate of the firms' revenues), grew at the same rate - 5.1 percent - in 2021. The *Bioenergy* sector showed the highest increase in output compared to 2020 - 70 percent⁵. The *Lumber and Wood Preservation* sector reported the largest drop in revenues - 10.7 percent. Forest industry's employment increased by 2.3 percent, or 1,233 jobs, a reversal of the previous year's decrease at a similar rate.

⁵ The Georgia State Total model reflects a large increase in output per worker. The largest changes were attributed to increases in Proprietor Income per Proprietor and Other Property Income per Total Employment. The increases in proprietor income are largely being reported and internalized directly from the Bureau of Economic Analysis's REA data, which were fully disclosed for Georgia and not estimated by IMPLAN for the sector that contains IMPLAN sector 45. The increase in Other Property Income is attributed to changes in IMPLAN's processes for calculating Value Added. Prior to 2019, IMPLAN used data lagged one year from the BEA showing state-level industry-specific Gross Operating Surplus, Gross Taxes on Production and imports, and subsidies. As such, IMPLAN used other sources to project the BEA data. However, the BEA now releases this data much more timely so in 2019 IMPLAN retired the process of using lagged data and projections for these calculations.

Table 2-3: Forest Industry Activity 2012 - 2021 Comparison

Output (Millions of Dollars)

Sector	2012*	2013*	2014	2015	2016	2017	2018	2019	2020	2021
Forest Management and Logging	\$662	\$580	\$582	\$605	\$499	\$521	\$504	\$442	\$474	\$472
Bioenergy	-	\$782	\$688	\$439	\$981	\$869	\$590	\$307	\$1,432	\$2,431
Lumber and Wood Preservation	\$1,332	\$1,272	\$1,307	\$1,674	\$1,690	\$1,629	\$1,779	\$2,513	\$2,669	\$2,384
Veneer, Plywood, Reconstituted, and Engineered Wood	\$583	\$1,010	\$1,071	\$1,362	\$1,436	\$1,499	\$1,770	\$1,339	\$1,512	\$1,606
Prefabricated Wood Buildings and Manufactured Housing	\$174	\$174	\$206	\$312	\$380	\$432	\$605	\$601	\$461	\$533
Pulp and Paper Products	\$11,297	\$10,752	\$10,936	\$12,461	\$13,170	\$13,214	\$13,110	\$13,650	\$13,637	\$13,751
Woodworking and Paper Industries Machinery	\$90	\$111	\$118	\$126	\$104	\$101	\$109	\$112	\$114	\$110
Wooden Furniture, Cabinets, Custom Arch. & Millwork	\$1,224	\$1,249	\$1,301	\$1,494	\$1,710	\$2,182	\$2,054	\$2,079	\$2,096	\$2,272
Windows and Doors										
Containers, Showcases, Partitions, and Shelving	\$710	\$624	\$634	\$732	\$824	\$901	\$966	\$952	\$1,047	\$1,067
Total**	\$16,072	\$16,564	\$16,843	\$19,205	\$20,794	\$21,348	\$21,487	\$21,996	\$23,442	\$24,627

Employment

Sector	2012*	2013*	2014	2015	2016	2017	2018	2019	2020	2021
Forest Management and Logging	5,500	5,714	5,720	5,820	5,920	5,738	5,609	5,507	5,459	5,384
Bioenergy	-	300	673	693	916	894	880	755	845	1370
Lumber and Wood Preservation	5,279	5,177	5,242	5,527	5,520	5,662	5,806	6,943	6,707	6,486
Veneer, Plywood, Reconstituted, and Engineered Wood	2,898	3,651	3,848	3,947	4,108	4,131	4,687	4,100	4,216	4,472
Prefabricated Wood Buildings and Manufactured Housing	1,285	1,252	1,376	1,618	1,836	2,138	2,594	2,680	2,444	2,819
Pulp and Paper Products	19,659	18,754	18,538	18,919	18,983	19,252	19,572	19,698	19,310	19,073
Woodworking and Paper Industries Machinery	479	506	522	526	422	405	436	438	417	405
Wooden Furniture, Cabinets, Custom Arch. & Millwork	7,985	8,434	8,676	9,008	9,646	11,242	10,585	10,637	10,108	10,717
Windows and Doors										
Containers, Showcases, Partitions, and Shelving	4,017	4,135	4,145	4,326	4,549	4,471	4,920	4,804	4,679	4,692
Total**	47,102	47,941	48,740	50,385	51,900	53,933	55,089	55,562	54,185	55,418



Wages and Salaries (Millions of Dollars)

Sector	2012*	2013*	2014	2015	2016	2017	2018	2019	2020	2021
Forest Management and Logging	\$305	\$251	\$255	\$345	\$294	\$312	\$332	\$284	\$356	\$360
Bioenergy	-	\$39	\$45	\$49	\$80	\$147	\$102	\$62	\$158	\$263
Lumber and Wood Preservation	\$255	\$259	\$267	\$342	\$318	\$348	\$396	\$500	\$517	\$500
Veneer, Plywood, Reconstituted, and Engineered Wood	\$150	\$238	\$253	\$253	\$242	\$250	\$428	\$294	\$357	\$389
Prefabricated Wood Buildings and Manufactured Housing	\$44	\$51	\$56	\$67	\$71	\$92	\$123	\$121	\$108	\$127
Pulp and Paper Products	\$1,620	\$1,544	\$1,575	\$1,796	\$2,023	\$1,872	\$1,776	\$1,813	\$1,841	\$1,857
Woodworking and Paper Industries Machinery	\$26	\$36	\$38	\$35	\$28	\$28	\$28	\$29	\$28	\$28
Wooden Furniture, Cabinets, Custom Arch. & Millwork	\$331	\$344	\$362	\$449	\$466	\$547	\$552	\$560	\$547	\$597
Windows and Doors										
Containers, Showcases, Partitions, and Shelving	\$186	\$176	\$179	\$218	\$219	\$240	\$282	\$279	\$271	\$279
Total**	\$2,917	\$2,938	\$3,030	\$3,553	\$3,741	\$3,836	\$4,019	\$3,941	\$4,183	\$4,400

**Revised data*

***Totals may not add up due to rounding*

****Output and Wages and Salaries are not adjusted for inflation*



Figures 2-1 through 2-3 show output, employment, and compensation changes for each forest industry sector from 2012 through 2021.

Figure 2-1: Forest Industry Economic Activity: Output by Sector
(Dollars in Millions)

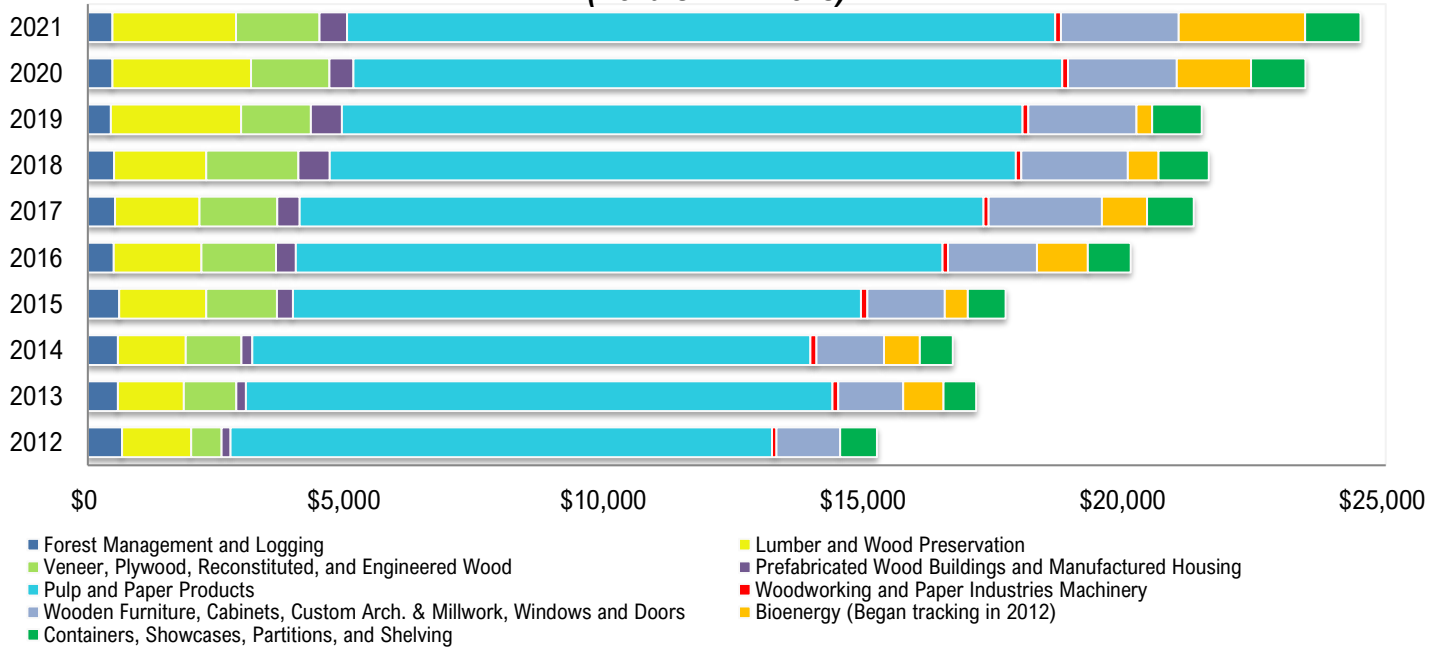


Figure 2-2: Forest Industry Economic Activity: Employment by Sector

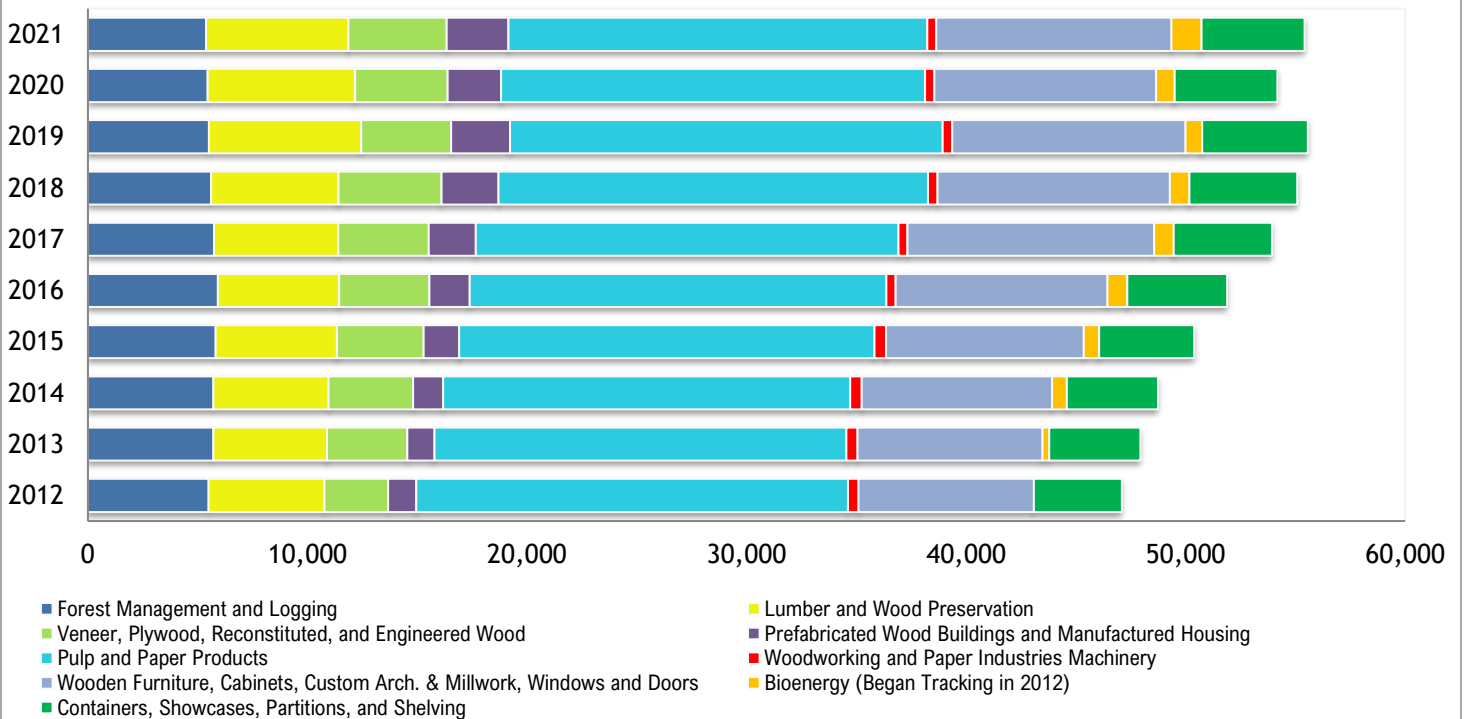
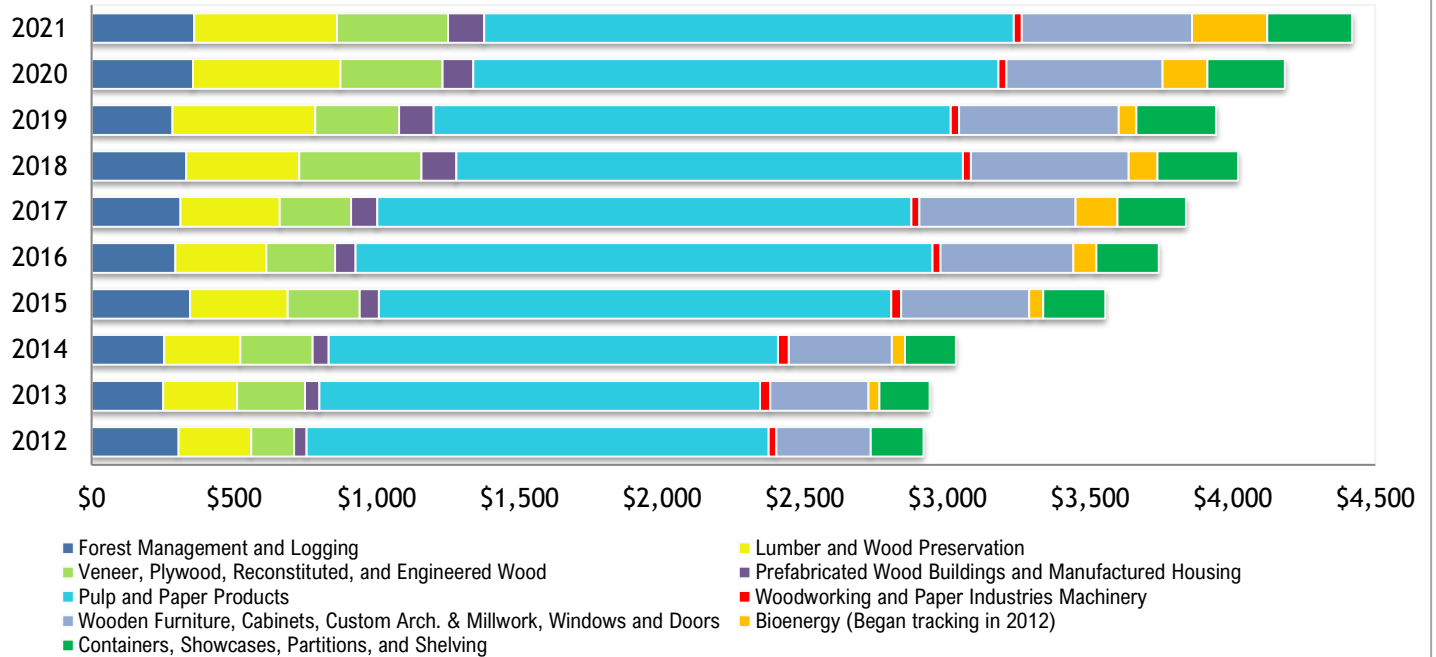


Figure 2-3: Forest Industry Economic Activity: Wages & Salaries by Sector
(Dollars in Millions)



SECTION 3

Economic Benefits

Economic impact analyses have used basically the same methods for more than 40 years. The tools, although greatly improved in quality and ease of use, are also similar to those in long-time use.

The conceptual basis for estimating economic benefits of an industry is that resources brought into Georgia's economy by the industry raise the level of economic activity. This additional economic activity, commonly called the multiplier effect, supports increased employment, income, and business revenues. These increases are estimated from an input-output (I/O) model.

The purpose of an I/O model is to estimate the flows of resources among various economic sectors by using the "recipes" followed by producers. These recipes provide the type and amount of goods and services purchased during production, which are produced by other firms. For example, a pulp mill purchases wood from a logger. The logger, in turn, purchases equipment and fuel from firms, that, in turn, purchase their raw materials from still other firms. Combined with estimates of what percentages of these items are supplied by Georgia firms, the recipes can be used to estimate how much of each item is purchased from Georgia firms and how much is purchased from outside Georgia.

Purchases from sources outside the Georgia economy are known as "leakage," and have an impact on the multiplier effect; the higher the leakage, the lower the multiplier effect.

The impact is calculated with IMPLAN I/O model. IMPLAN is a nationally recognized economic model that uses Georgia data to tailor its estimates to the state economy.⁶

The analytical process includes three steps following the definition of the industry sectors, as described in the previous section. The first step is to quantify employment, income, and output associated with each of the defined sectors. Several data sources were used to accomplish this.

The best source for employment and wages was the employment security data collected and maintained by the Georgia Department of Labor. Commonly called ES202 data or, more recently CEW (covered employment and wages) data, it has the advantage of being current thus allowing an estimate of the economic benefits occurring in 2021. It has the drawback, however, of not including single proprietorships (because they have no employees), and it also does not

⁶ One area of uncertainty that persists, however, is the level of benefits provided to workers in each of the forest industry sectors. The available wage and salary information does not include benefits, but the I/O model bases its analysis on wages and salaries that include benefits. An average of 28.9 percent was assumed for this analysis, based on the latest available U.S. Bureau of Labor Statistics compensation cost data for all civilian employment.

include employees not covered by unemployment insurance, such as some governmental employees.

The second task was to divide the forest industry output into two categories; (1) output sold to another Georgia firm and (2) output sold outside the state. Another way to look at this is to recall that the multiplier effect starts from dollars brought into the Georgia economy. Output not sold to another Georgia firm is, by definition, bringing in resources from outside the Georgia economy, and it is these “exports” that fuel the multiplier effect. Forest industry output used as an input to another Georgia forest-industry firm is already accounted for in the multiplier effect; counting it again would result in double-counting and would imply a higher-than-observed level of production from the input-supplying industry. For example, if the multiplier effect was calculated for the paper industry, it will include some of the activities of Georgia logging operations. If the entire output from logging was then added to the multiplier effect for paper, it would double-count the logging output that went to the paper industry. The I/O model is used iteratively for these estimations, with the resulting estimates called “direct impacts.” Direct impacts are measures of the output from, in this case, forest sectors that are exported to entities outside Georgia (these are considered exports even if they only go to Alabama).

The third step was to use the I/O model to estimate total impacts, which were divided into three components. The first is the *direct* impacts - the value of resources brought into the state; the second is *indirect* impacts - impacts generated from recirculation of resources resulting from forest industry purchases from other industries); and the third is *induced* impacts, which result from activities in the household sector. Adding direct, indirect, and induced impacts yields total impacts.

Three measures of economic impacts are provided. The first, output, is a measure of how much each industry or sector produced in 2021 – roughly equivalent to a measure of sales revenue. The second measure is compensation, including all household income and employee benefits. The third measure is employment, or number of jobs, in each forestry-related industry.

Findings

Table 3-1 provides estimates of direct impacts for each of the forest industry sectors contained in the industry’s definition. These differ from the level of economic activity shown in Tables 2-2 because Table 3-1 eliminates production consumed by another sector. This eliminates the double counting of production in the multiplier effect of the consuming-industry sector. For example, Table 3-1 does not contain much output from the forest management and logging industry segment because most of it appears to be consumed by the various Georgia wood-using industries such as paper and lumber. Logging operations are included primarily as part of the multiplier effect by these consuming industries, not as a direct impact separate from them.

Another way to interpret Table 3-1 is to consider the direct impacts to be estimates of the exports of forest-related industries. This exporting (to anyone outside Georgia) brings resources into the state to support the increase in economic activity estimated by the multiplier effect.

Pulp and paper products, which includes all pulping and paper-making activities, continued to be the largest industry segment in 2021 representing 37 percent of the total industry in employment and 57 percent of the entire industry output. The entire forest industry (totals in Table 3-1) exported (to a non-Georgia destination) output valued at \$22.5 billion in 2021. These activities supported 48,553 jobs with \$3.9 billion in wages and salaries.

Table 3-1: Direct Impacts by Forest Industry Sector (2021)

Sector	Output	Employment	Wages and Salaries
Forest Management and Logging	\$210.7 M	2,585	\$163.3 M
Bioenergy	\$2,413.0 M	1,359	\$261.0 M
Lumber and Wood Preservation	\$1,687.8 M	4,568	\$352.7 M
Veneer, Plywood, Reconstituted, and Engineered Wood	\$1,432.9 M	4,017	\$344.6 M
Prefabricated Wood Buildings and Manufactured Housing	\$521.3 M	2,753	\$123.7 M
Pulp and Paper Products	\$12,940.7 M	18,019	\$1,749.6 M
Woodworking and Paper Industries Machinery	\$108.3 M	397	\$27.2 M
Wooden Furniture, Cabinets, Custom Arch. & Millwork, Windows and Doors	\$2,202.6 M	10,433	\$580.4 M
Containers, Showcases, Partitions, and Shelving	\$1,010.6 M	4,422	\$263.0 M
Total*	\$22,527.8 M	48,553	\$3,865.4 M

**Totals may not add up due to rounding*

In addition to direct employment, Georgia’s forest industry generates economic activity and supports jobs in other sectors of the state’s economy. The total impact is estimated by applying the IMPLAN input-output (I/O) model to the direct impacts (provided in Table 3-1.)

Table 3-2 summarizes the impacts by aggregated industry codes (used in the I/O model), which are roughly equivalent to two-digit NAICS codes. As shown, all industries in Georgia are impacted by the activity of the forest industry. *Manufacturing* continued to see the biggest benefits, with \$22.8 billion in output, 51,186 employees, and \$4 billion in wages and salaries in 2021. A distant second and third in output were *Utilities* and *Wholesale Trade* with \$4 billion and \$2.4 billion, respectively; while *Wholesale Trade* and *Agriculture, Forestry, Fish and Hunting* were second and third in wages and salaries with \$677.4 million and \$627.5 million respectively. *Agriculture, Forestry, Fish and Hunting* was second in employment with 10,267 employees, followed by *Transportation & Warehousing* with 10,191 employees.

The overall economic activity supported by Georgia’s forest industry totaled \$41.4 billion. This activity supported the employment of 143,936 people who earned \$9.6 billion in 2021.

Table 3-2: Total Benefits by Major Industry (2021)

Sector	Output	Employment	Wages & Salaries
Agriculture, Forestry, Fish & Hunting	\$851.2 M	10,267	\$627.5 M
Mining	\$65.0 M	149	\$13.5 M
Utilities	\$4,044.2 M	2,647	\$492.9 M
Construction	\$165.4 M	729	\$43.2 M
Manufacturing	\$22,798.6 M	51,186	\$3,960.6 M
Wholesale Trade	\$2,418.5 M	7,672	\$677.4 M
Retail Trade	\$757.3 M	8,027	\$274.7 M
Transportation & Warehousing	\$1,548.2 M	10,191	\$584.2 M
Information	\$809.2 M	1,418	\$206.9 M
Finance & Insurance	\$1,340.0 M	4,112	\$322.8 M
Real Estate & Rental	\$1,854.6 M	4,374	\$143.3 M
Professional, Scientific & Tech Services	\$1,054.1 M	6,089	\$516.9 M
Management of Companies	\$527.5 M	2,068	\$309.3 M
Administrative & Waste Services	\$810.2 M	9,625	\$366.3 M
Educational Services	\$104.6 M	1,415	\$63.6 M
Health & Social Services	\$983.6 M	8,150	\$515.3 M
Arts, Entertainment & Recreation	\$113.1 M	1,755	\$37.6 M
Accommodation & Food Services	\$511.9 M	7,220	\$170.4 M
Other Services	\$525.5 M	6,570	\$252.4 M
Government & non-NAICS Industries	\$63.4 M	272	\$24.1 M
TOTAL *	\$41,346.1 M	143,936	\$9,602.9 M

**Totals may not add up due to rounding*

Table 3-3 extracts information from several previous tables to compare the overall results obtained in each impact analysis conducted from 2011 through 2021.

The forest industry's activity picked up pace in 2011, showing growth after three years of decline due to the recession. Both direct and total impacts showed improvement. However, total impacts showed higher growth in percentage terms than direct impacts. In the 2010 to 2011 period output increased by nearly 6 percent, employment increased by nearly 10 percent, and wages and salaries increased by an impressive 21 percent.

As Table 3-3 shows, the trend of positive growth continued in the 2011 – 2017 period among all metrics, with the exception of wages and salaries that showed a slight decline of 2 percent from 2011 to 2012. Direct and total output impacts showed the highest growth at 14 and 12 percent, respectively, during the 2014 – 2015 period. Compensation also showed substantial growth during this time period increasing by 17 percent for direct impact and 10 percent for total impacts. Employment from direct impacts showed the highest level of growth during the 2016 – 2017 period with 4 percent. Employment from total impacts grew by 9 percent from 2015 to 2016.

While the industry continued to grow in year 2018, the rate of growth in direct and total output of 1 percent, which is equivalent to sales, was smaller than in previous years. The slower rate of growth may indicate a lower level of activity within sectors of the forest industry. Wages and salaries from direct and total impacts increased at higher rates, nearly 5 percent respectively. Employment grew 2 percent from direct impact and 1 percent from total impact.

The trend of direct output and employment growth continued in 2019. Output grew by 2.4 percent while employment increased by nearly 1 percent. Direct wages and salaries decreased by nearly 2 percent. A decrease in earnings was reported by other sectors included in this study's comparative analysis.

The COVID-19 pandemic of 2020 impacted employment and activity of every sector of the economy. Forestry's direct and total employment decreased by 2.5 and 0.8 percent respectively. Direct output and earnings increased by 6.6 and 6.2 percent respectively, a reflection of the spike in demand for lumber and other forest industry related products.

The industry recovered in 2021 showing growth in all three metrics. Direct output and wages and salaries increased by 5.1 percent respectively. Direct employment increased by 2.3 percent.

The annual percent-change information in Table 3-3 is also presented graphically in figures 3-1 and 3-2. Figure 3-1 presents a graph of output, employment and compensation of direct activity, while Figure 3-2 presents these metrics for the total economic impact. It should be noted that these data are in nominal dollars and have not been adjusted for inflation.

Table 3-3: Comparison of Results 2011 to 2021

(Dollars in millions; Employment in persons)

Forest Industry Direct Economic Impact											
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Output*	\$15,082	\$16,072	\$16,564	\$16,843	\$19,203	\$20,794	\$21,348	\$21,488	\$21,996	\$23,442	\$24,627
Employment	46,378	47,123	48,139	48,740	50,385	51,900	53,933	55,089	55,562	54,185	55,418
Wages & Salaries*	\$2,972	\$2,917	\$2,938	\$3,030	\$3,553	\$3,741	\$3,836	\$4,018	\$3,941	\$4,184	\$4,399
Year to Year Percent Change											
Output	4.0%	6.6%	3.1%	1.7%	14.0%	8.3%	2.7%	0.7%	2.4%	6.6%	5.1%
Employment	6.8%	1.6%	2.2%	1.2%	3.4%	3.0%	3.9%	2.1%	0.9%	-2.5%	2.3%
Wages & Salaries	13.3%	-1.9%	0.7%	3.1%	17.3%	5.3%	2.5%	4.7%	-1.9%	6.2%	5.1%
Total Impacts											
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Output*	\$24,975	\$27,469	\$28,014	\$28,674	\$32,154	\$35,237	\$35,923	\$36,262	\$36,486	\$39,060	\$41,346
Employment	118,459	120,260	127,750	129,329	133,256	144,537	147,380	148,414	141,214	140,081	143,936
Wages & Salaries*	\$6,491	\$6,540	\$6,898	\$7,119	\$7,860	\$8,529	\$8,709	\$9,105	\$8,596	\$9,091	\$9,603
Year to Year Percent Change											
Output	5.6%	10.0%	2.0%	2.4%	12.1%	9.6%	1.9%	0.9%	0.6%	7.1%	5.9%
Employment	9.6%	1.5%	6.2%	1.2%	3.0%	8.5%	2.0%	0.7%	-4.9%	-0.8%	2.8%
Wages & Salaries	20.7%	0.8%	5.5%	3.2%	10.4%	8.5%	2.1%	4.5%	-5.6%	5.8%	5.6%
Forest Industry Fiscal Impact											
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
State Revenues	\$487	\$691	\$700	\$721	\$753	\$778	\$970	\$977	\$929	\$706	\$774
State Costs	\$308	\$358	\$360	\$370	\$393	\$433	\$873	\$867	\$822	\$523	\$537
Net Revenues*	\$179	\$333	\$340	\$351	\$360	\$345	\$97	\$109	\$107	\$183	\$238

Source: Enterprise Innovation Institute (EI2) impact assessments and Georgia Department of Labor, Current Employment and Wages

*Output, Wages and Salaries and Revenues are not adjusted for inflation



Figure 3-1: Annual Percent Change in Direct Economic Activity

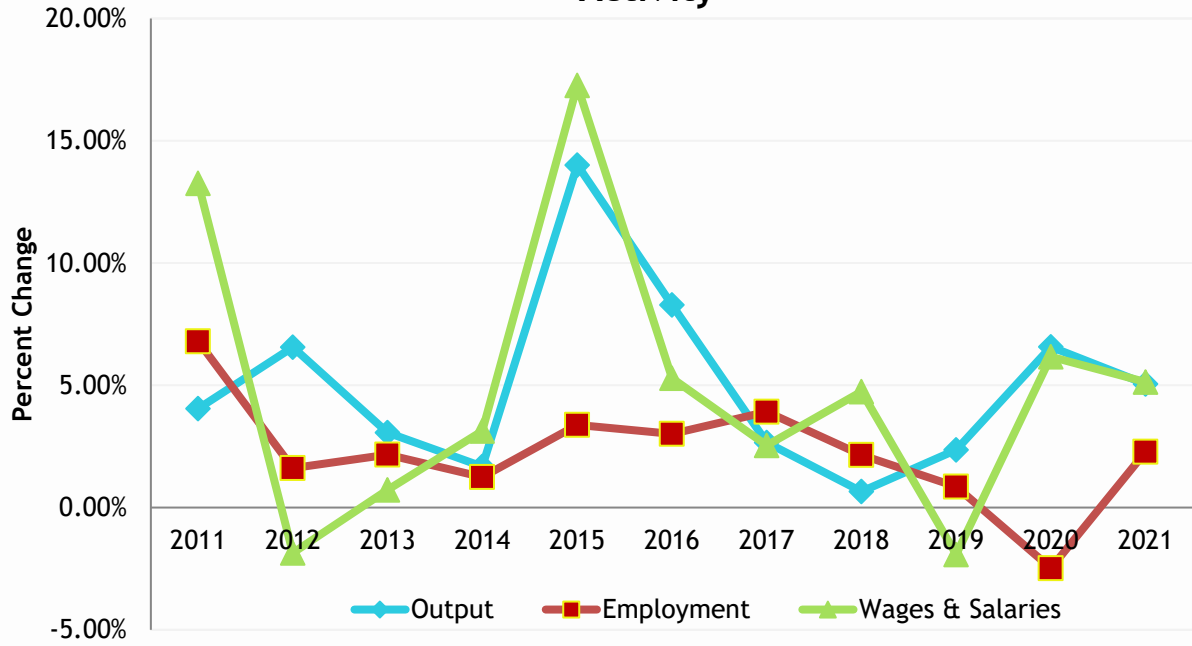
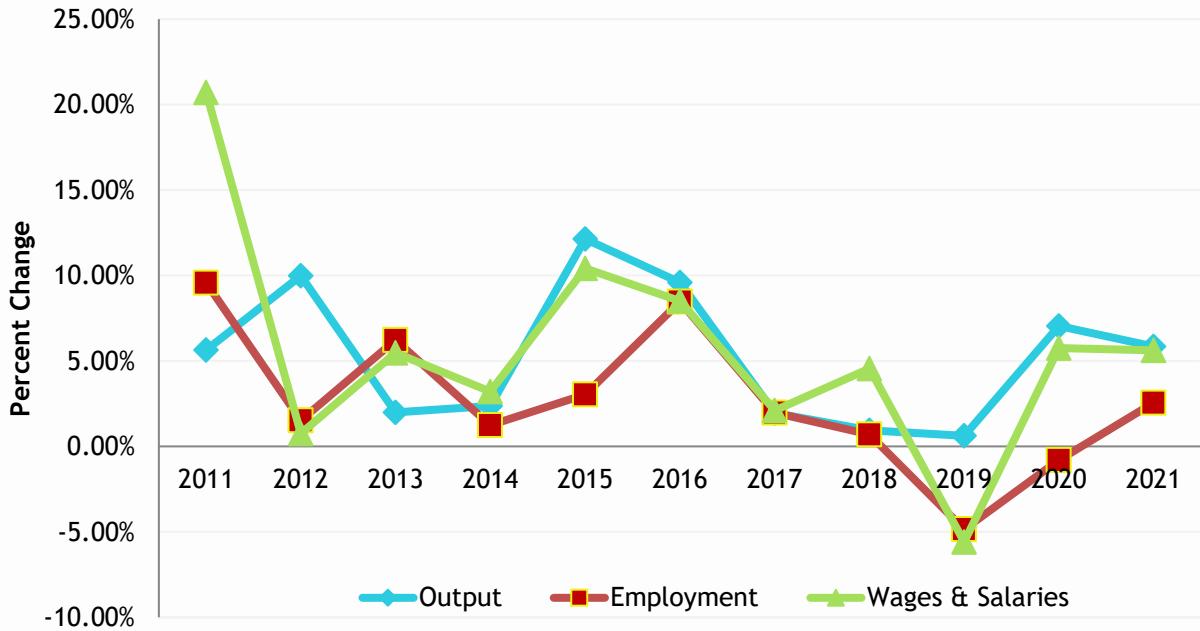


Figure 3-2: Annual Percent Change in Total Economic Activity



Comparison of the Forest Industry with Other Manufacturing Sectors

It is difficult to appreciate the significance of the impacts generated by the forest industry without some basis of comparison. Table 3-4 compares the forest industry with other manufacturing industries, showing the forest industry ranks second in employment and first in wages and salaries for 2021.

Table 3-4: Comparison to Georgia's Other Manufacturing Sectors (2021)

Industry Sectors	Employment	Wages & Salaries
Food Processing	63,728	\$3,325.9 M
Forestry Industry	55,418	\$4,398.9 M
Transportation Equipment	50,516	\$3,677.0 M
Textiles	44,468	\$2,275.2 M
Fabricated Metal Products	40,240	\$2,393.5 M
Machinery	22,673	\$1,568.6 M
Chemicals	22,453	\$1,817.9 M
Electrical Equipment and Appliances	14,457	\$1,066.2 M
Printing	11,272	\$599.8 M
Computers and Electronic Products	5,010	\$539.5 M
Apparel	2,216	\$106.2 M

SECTION 4

Economic Impact of Urban and Community Forestry

Urban and community forestry⁷ provides significant benefits to communities around the state. This study quantifies the sector's economic impact in the state of Georgia.

For the purposes of this study, urban and community forestry includes these sectors:

NAICS Code	Industry Description
111421	Nursery and Tree Production
541320	Landscape Architectural Services
561730	Landscaping Services
924120	Administration of Conservation programs
925120	Administration of Urban Planning and Community and Rural Development

Using data provided by the Georgia Department of Labor,⁸ it was determined that urban and community forestry employed 33,820 people in year 2021 who earned \$1.6 billion in wages and salaries and generated \$3.2 billion in economic activity. The spending by these companies and their employees generated additional activity in other sectors of the state's economy. Overall, urban and community forestry companies in 2021 created and supported over 52,000 jobs with wages and salaries of \$2.5 billion and generated \$6.3 billion of economic activity.

Table 4-1: Economic Impact of Urban and Community Forestry: 2020

	Direct	Indirect and Induced	Total
Employment	33,820	18,260	52,080
Wages & Salaries	\$1,595.6 M	\$935.2 M	\$2,530.8 M
Output	\$3,246.0 M	\$3,011.5 M	\$6,257.5 M

The impact values of urban and community forestry are separate values from the impact of forest industry and are not included in the charts and tables shown in other sections of this report.

⁷ Urban and Community Forestry can be defined as the planning, establishment, protection, maintenance and management of trees and associated plants, individually through arboricultural practices, in small groups, or under forest conditions (open spaces, greenbelts, roadside screens, parks, woodlands, curb areas, and residential developments) within cities, their suburbs, and towns for their economic, environmental, physiological, sociological and psychological public health benefits (developed from the Cooperative Forestry Assistance Act of 1978, as amended through 2008).

⁸ Source: Georgia Department of Labor, ES202 data

Section 5

Economic Impact by Regional Commission

Regional Economies

Economies are interwoven in a complex web. In general, however, a local economy's economic health depends on the inflow and outflow of resources. Economic base theory calls economic sectors responsible for bringing resources in "basic" or "traded" sectors. The resources that are brought in are then (at least partially) recirculated within the local economy to support the "non-basic" sectors. For example, a sawmill will generally sell its products to builders or lumber supply houses outside the local economy. The revenue it receives from these sales is then used to purchase logs from, perhaps, a local logging firm. It also pays its employees who spend their wages in local restaurants, grocery stores, and the like. As the basic sector grows or declines, so does the non-basic sector.

Forest industry components are very much part of Georgia's basic industry sector, with products sold worldwide. As such, it is one of the key sources of funds flowing into many local Georgia economies. Where the local economy has many sources of such flows, the growth or decline of any specific sector, such as the forest industry, may not have significant effects. However, in those communities where the forest industry is a large proportion of the local basic industry, all economic support activities, such as retail, are likewise generally dependent.

Approach

Employment and income data limitations at the county level make it difficult to quantify the local economic impact of the forest industry. Instead, this report shows the forest industry's impact on Georgia's 12 regional commissions. Table 5-1 shows a list of the regional commissions and their respective counties.

Table 5-1: Regional Commissions

Regions	Counties
Northwest Georgia	Bartow, Catoosa, Chattooga, Dade, Fannin, Floyd, Gilmer, Gordon, Haralson, Murray, Paulding, Pickens, Polk, Walker, Whitfield
Georgia Mountains	Banks, Dawson, Forsyth, Franklin, Habersham, Hall, Hart, Lumpkin, Rabun, Stephens, Towns, Union, White
ATL Regional Commission	Cherokee, Clayton, Cobb, DeKalb, Douglas, Fayette, Fulton, Gwinnett, Henry, Rockdale
Three Rivers	Butts, Carroll, Coweta, Heard, Lamar, Meriwether, Pike, Spalding, Troup, Upson
Northeast Georgia	Barrow, Clarke, Elbert, Greene, Jackson, Jasper, Madison, Morgan, Newton, Oconee, Oglethorpe, Walton
Middle Georgia	Baldwin, Bibb, Crawford, Houston, Jones, Monroe, Peach, Pulaski, Putnam, Twiggs, Wilkinson

This analysis examines the proportion of each region's output, employment, and compensation (as defined by wages and salaries) indicated by the ES202 data that is attributable directly to forest industries. These figures were calculated using 6-digit NAICS level data and should be considered as approximate estimates. Table 5-2 shows that as in the previous years, the Atlanta Regional Commission, Southern Georgia and the Heart of Georgia Altamaha are the top three regions with the largest employment in the forest industry. See Figures A-1 through A-3 in the Appendix for maps showing each region's output, employment, and wages and salaries.

Table 5-2: Forest Industry's Regional Impact (2021)

Regions	Output	Employment	Wages & Salaries
Atlanta Regional Commission	\$6,644.6 M	12,579	\$1,186.8 M
Central Savannah River Area	\$1,510.2 M	3,342	\$269.8 M
Coastal	\$2,439.9 M	4,296	\$435.8 M
Georgia Mountains	\$910.2 M	2,710	\$162.6 M
Heart of Georgia Altamaha	\$2,101.0 M	4,978	\$375.3 M
Middle Georgia	\$1,639.2 M	3,719	\$292.8 M
Northeast Georgia	\$1,441.5 M	3,452	\$257.5 M
Northwest Georgia	\$1,789.3 M	4,299	\$319.6 M
River Valley	\$830.4 M	1,949	\$148.3 M
Southern Georgia	\$2,160.9 M	6,148	\$386.0 M
Southwest Georgia	\$1,905.6 M	4,717	\$340.4 M
Three Rivers	\$1,254.4 M	3,228	\$224.0 M
Total*	\$24,627.3 M	55,418	\$4,398.9 M

**Totals may not add up due to rounding*



References

Bureau of Economic Analysis Input-Output Sectors as contained in “IMPLAN Pro: Data Guide,” IMPLAN Group, Inc., 2022.

Georgia Department of Labor, ES202 Wage and Employment Data: 2021.

North American Industrial Classification System (NAICS):
<http://www.census.gov/epcd/www/naicstab.htm>

U.S. Department of Labor, Bureau of Labor Statistics, “Employer Costs for Employee Compensation”

Appendix

Figure A-1: Regional Forest Industry Employment: 2021

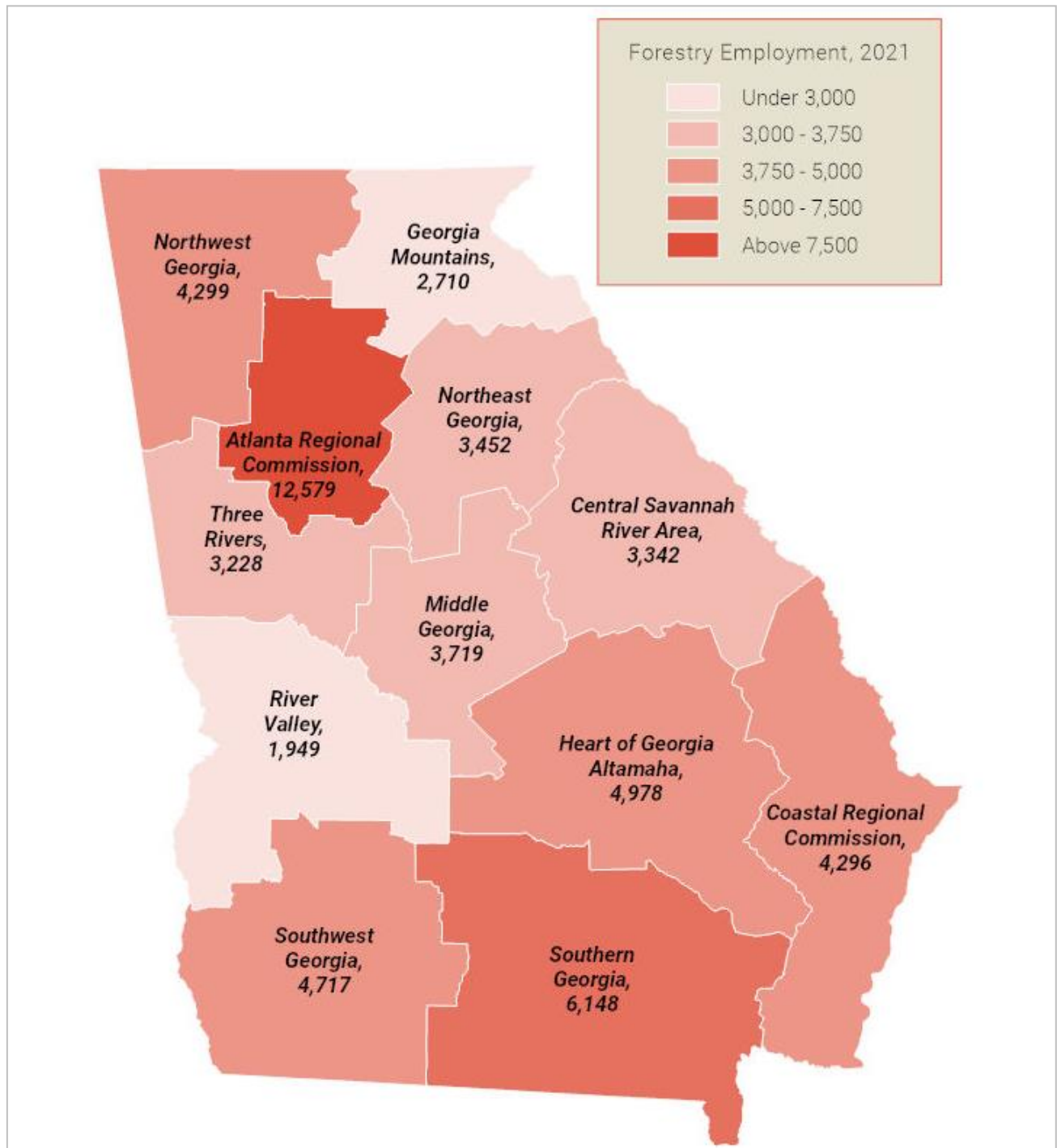


Figure A-2: Regional Forest Industry Wages and Salaries: 2021

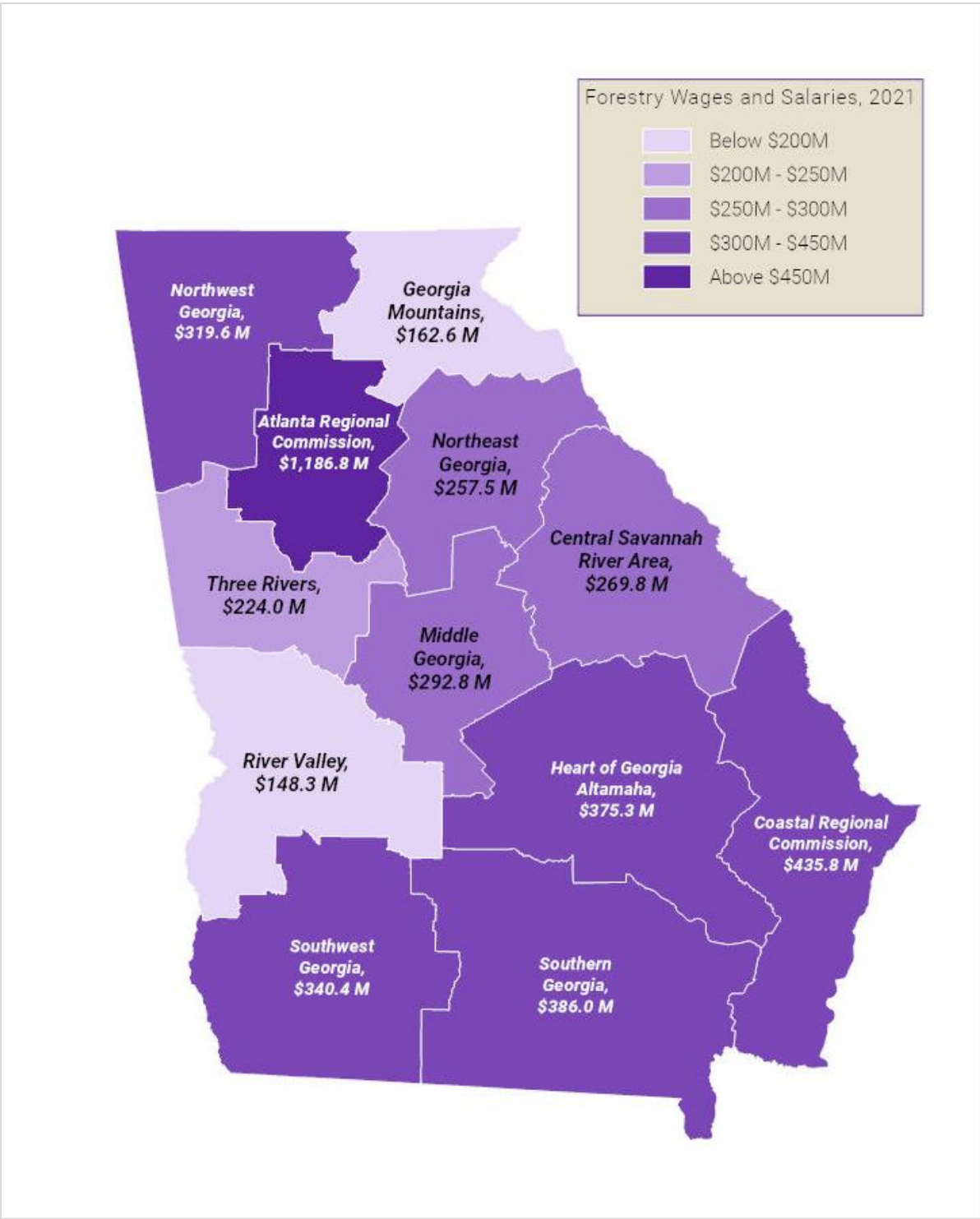
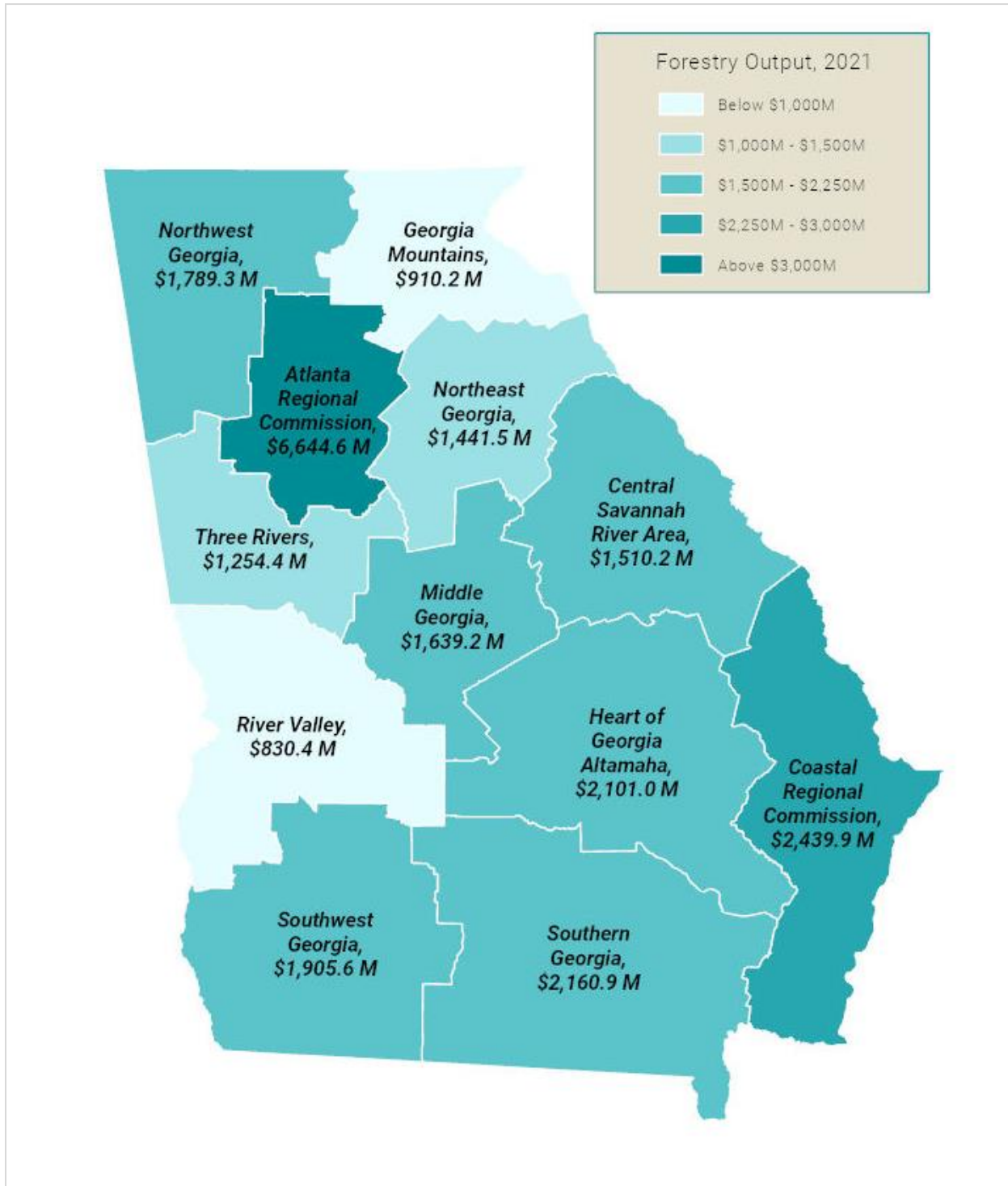


Figure A-3: Regional Forest Industry Output: 2021





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