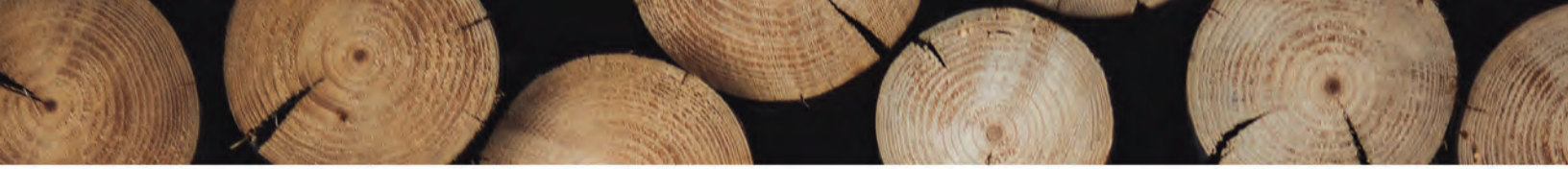

GEORGIA FORESTRY
COMMISSION

2018 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, but 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 2018, 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 55,089 workers were employed in all sectors of the forest industry in 2018. These jobs were paid an annual compensation[1] of more than $4 billion, and generated an estimated total revenue of $21.5 billion.

Table E-1: Georgia Forest Industry Economic Activity (2018)

Sector	Output	Employment	Wages & Salaries
Forest Management and Logging	$503.6 M	5,609	$332.2 M
Bioenergy	$589.8 M	880	$101.9 M
Lumber and Wood Preservation	$1,779.3 M	5,806	$395.6 M
Veneer, Plywood, Reconstituted, and Engineered Wood	$1,769.8 M	4,687	$427.7 M
Prefabricated Wood Buildings and Manufactured Housing	$605.2 M	2,594	$122.5 M
Pulp and Paper Products	$13,109.9 M	19,572	$1,775.7 M
Woodworking and Paper Industries Machinery	$109.7 M	436	$28.3 M
Wooden Furniture, Cabinets, Custom Arch. & Millwork, Windows and Doors	$2,054.4 M	10,585	$551.7 M
Containers, Showcases, Partitions, and Shelving	$966.1 M	4,920	$281.9 M
Total	**$21,487.8 M**	**55,089**	**$4,017.5 M**

[1] Wages and salaries including benefits

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 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-1[2]), 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 $36.3 billion in 2018. These activities supported the employment of 148,414 people who earned $9.1 billion in wages and salaries (including benefits).

Table E-2: Total Benefits by Major Industry (2018)

Sector	Output	Employment	Wages & Salaries
Agriculture, Forestry, Fish & Hunting	$896.9 M	9,906	$553.2 M
Mining	$41.6 M	231	$13.3 M
Utilities	$1,526.4 M	1,859	$232.7 M
Construction	$294.3 M	1,810	$103.0 M
Manufacturing	$21,249.4 M	50,737	$3,731.9 M
Wholesale Trade	$1,860.0 M	7,675	$662.8 M
Retail Trade	$744.8 M	8,553	$273.9 M
Transportation & Warehousing	$1,237.9 M	8,104	$497.4 M
Information	$850.1 M	1,656	$228.4 M
Finance & Insurance	$1,302.5 M	4,821	$351.4 M
Real Estate & Rental	$1,617.9 M	3,914	$108.6 M
Professional, Scientific & Tech Services	$1,097.6 M	8,343	$627.1 M
Management of Companies	$751.2 M	3,040	$377.7 M
Administrative & Waste Services	$686.9 M	10,569	$341.6 M
Educational Services	$113.7 M	1,802	$71.3 M
Health & Social Services	$873.1 M	8,253	$480.5 M
Arts, Entertainment & Recreation	$129.2 M	1,946	$40.1 M
Accommodation & Food Services	$515.6 M	8,515	$180.4 M
Other Services	$443.5 M	6,486	$213.2 M
Government & non-NAICS Industries	$29.7 M	195	$16.5 M
TOTAL	**$36,262.4 M**	**148,414**	**$9,105.1 M**

Another way to examine the forest industry in Georgia is to compare it with the state's other manufacturing sectors. Table E-3 lists 2018 employment and income totals for each major manufacturing sector sorted by employment. These data show that the *forest industry ranked second in total employment and in wages and salaries*. Food processing ranked first in both employment and in wages and salaries, and transportation equipment ranked third in employment and 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 (2018)

Industry Sectors	Employment	Wages & Salaries
Food Processing	68,035	$4,037.6 M
Forest Industry	**55,089**	**$4,017.5 M**
Transportation Equipment	54,687	$3,826.2 M
Textiles	51,203	$2,314.1 M
Fabricated Metal Products	39,377	$2,120.4 M
Machinery	21,898	$1,598.2 M
Chemicals	21,783	$1,338.7 M
Electrical Equipment and Appliances	13,890	$1,017.5 M
Printing	13,055	$625.5 M
Computers and Electronic Products	5,996	$625.3 M
Apparel	2,446	$96.2 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 $977.6 million in revenues for the state budget in 2018. When the costs of providing services to all employees are deducted from these revenues, net annual state revenues were $109.8 million in year 2018.

Table E-4: Fiscal Impact Analysis (2018)[3]	
Annual State Government Revenues	**$977.6 M**
Annual State Government Costs	**$867.8 M**
Net Annual Revenues	**$109.8 M**

Table E-5 compares the overall results obtained in each impact analysis conducted from 2008 through 2018. Compared to 2017, the industry's 2018 direct output grew by 0.7 percent, employment grew by 2.1 percent, and wages and salaries increased by 4.7 percent. The industry's increased activity resulted in high net revenues for the state government.

[3] The Georgia Fiscal Impact Model was originally developed in the 1990s by economists at Georgia Tech. Over the years, the econometric equations in the model have undergone revisions based on the State of Georgia's revenue and expenditure data. One such revision was recently completed. Every equation in the model was re-specified and statistically validated. One result of the new model equations is that expenditures in the model tend to be higher than previous model estimates. Many of the reduced form equations in the model are now driven by either the absolute level of the population, or the growth rate of the population. State expenditures are driven by growth in the state's population. As Georgia attracts jobs, it also attracts people and that drives state expenditures. As a result, 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 2008 to 2018

(Dollars in millions; Employment in persons)

Forest Industry Direct Economic Impact

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Output*	$18,270	$16,906	$14,495	$15,082	$16,072	$16,564	$16,843	$19,203	$20,794	$21,348	$21,488
Employment	57,812	48,519	43,425	46,378	47,123	48,139	48,740	50,385	51,900	53,933	55,089
Wages & Salaries*	$3,131	$2,770	$2,624	$2,972	$2,917	$2,938	$3,030	$3,553	$3,741	$3,836	$4,018
Year to Year Percent Change											
Output		-7.5%	-14.3%	4.0%	6.6%	3.1%	1.7%	14.0%	8.3%	2.7%	0.7%
Employment		-16.1%	-10.5%	6.8%	1.6%	2.2%	1.2%	3.4%	3.0%	3.9%	2.1%
Wages & Salaries		-11.5%	-5.3%	13.3%	-1.9%	0.7%	3.1%	17.3%	5.3%	2.5%	4.7%

Total Impacts

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Output*	$28,723	$27,200	$23,643	$24,975	$27,469	$28,014	$28,674	$32,154	$35,237	$35,923	$36,262
Employment	128,388	118,423	108,112	118,459	120,260	127,750	129,329	133,256	144,537	147,380	148,414
Wages & Salaries*	$6,514	$5,561	$5,377	$6,491	$6,540	$6,898	$7,119	$7,860	$8,529	$8,709	$9,105
Year to Year Percent Change											
Output		-5.3%	-13.1%	5.6%	10.0%	2.0%	2.4%	12.1%	9.6%	1.9%	0.9%
Employment		-7.8%	-8.7%	9.6%	1.5%	6.2%	1.2%	3.0%	8.5%	2.0%	0.7%
Wages & Salaries		-14.6%	-3.3%	20.7%	0.8%	5.5%	3.2%	10.4%	8.5%	2.1%	4.5%

Forest Industry Fiscal Impact

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
State Revenues	$539	$472	$448	$487	$691	$700	$721	$753	$778	$970	$977
State Costs	$333	$314	$282	$308	$358	$360	$370	$393	$433	$873	$867
Net Revenues*	$206	$158	$166	$179	$333	$340	$351	$360	$345	$97	$109

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*

Impact by Region

Quantifying the economic benefits of the forest industry at the local level is difficult given the limitations in employment and wages and salaries data (non-disclosed data). In previous reports, the approach was to group counties with no disclosed data and report aggregate employment, and compensation. In 2011, a new section was added to the report quantifying the impact of the forest industry in 12 jurisdictions consistent with the state's regional commissions. Figure E-1 shows the map of the 12 regions and counties located within each region.

Figure E-1: Map of Regional Commissions

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

Table E-6: Forest Industry's Regional Impact (2018)			
Regions	**Output**	**Employment**	**Wages & Salaries**
Atlanta Regional Commission	$5,724.4 M	12,704	$1,070.3 M
Central Savannah River Area	$1,538.5 M	3,670	$287.7 M
Coastal	$2,318.7 M	4,770	$433.5 M
Georgia Mountains	$796.8 M	2,691	$149.0 M
Heart of Georgia Altamaha	$1,796.6 M	4,760	$335.9 M
Middle Georgia	$1,324.0 M	3,493	$247.5 M
Northeast Georgia	$1,218.6 M	3,186	$227.8 M
Northwest Georgia	$1,462.2 M	3,949	$273.4 M
River Valley	$742.8 M	1,973	$138.9 M
Southern Georgia	$1,741.7 M	5,633	$325.6 M
Southwest Georgia	$1,610.1 M	4,604	$301.0 M
Three Rivers	$1,213.2 M	3,654	$226.8 M
Total	**$21,487.8 M**	**55,089**	**$4,017.5 M**

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
Wooden Furniture, Cabinets, Custom Arch. & Millwork, Windows and Doors	Wood Kitchen Cabinet and Countertop Manufacturing	337110
	Upholstered Household Furniture Manufacturing	337121
	Non-upholstered Wood Household Furniture Manufacturing	337122
	Institutional Furniture Manufacturing	337127
	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 16 firms in Georgia. The total employment for this sector in 2018 was 880.

The level of economic activity in each forest industry component is measured by output, employment, and wages and salaries. Measures for 2018 appear in Table 2-2, which aggregates the numerous categories from Table 2-1 to nine larger groups[4]. This table shows that total employment in all of the forest industry sectors was 55,089 and these jobs earned annual compensation (total wages and salaries including benefits) of $4 billion from estimated total revenue of $21.5 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 19,572 workers, followed by *wooden furniture, cabinets, custom arch. & millwork, windows and doors* with 10,585 employees and *lumber and wood preservation* with 5,806 employees.

Compensation, like employment, is dominated by *pulp and paper* at $1.8 billion (nearly half the total), followed distantly by *wooden furniture, cabinets, custom archwork & millwork* at $551.7 million and *veneer, plywood, reconstituted and engineered wood* at $427.7 million. The largest outputs are produced by *pulp and paper* ($13.1 billion), followed by *wooden furniture,*

[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*.

cabinets, custom archwork & millwork, windows and doors ($2 billion) and *lumber and wood preservation* ($1.8 billion).

Table 2-2: Georgia Forest Industry Economic Activity (2018)

Sector	Output	Employment	Wages & Salaries
Forest Management and Logging	$503.6 M	5,609	$332.2 M
Bioenergy	$589.8 M	880	$101.9 M
Lumber and Wood Preservation	$1,779.3 M	5,806	$395.6 M
Veneer, Plywood, Reconstituted, and Engineered Wood	$1,769.8 M	4,687	$427.7 M
Prefabricated Wood Buildings and Manufactured Housing	$605.2 M	2,594	$122.5 M
Pulp and Paper Products	$13,109.9 M	19,572	$1,775.7 M
Woodworking and Paper Industries Machinery	$109.7 M	436	$28.3 M
Wooden Furniture, Cabinets, Custom Arch. & Millwork, Windows and Doors	$2,054.4 M	10,585	$551.7 M
Containers, Showcases, Partitions, and Shelving	$966.1 M	4,920	$281.9 M
Total	**$21,487.8 M**	**55,089**	**$4,017.5 M**

Table 2-3 provides a comparison of the forest industry activity from 2009 through 2018. Three measures are included in the comparison: output, employment, and compensation. Output (an estimate of the firms' revenues) continued to grow from 2017 to 2018, however at a much slower pace, increasing by 0.7 percent. *Prefabricated wood buildings and manufactured housing* sector showed the highest growth increasing by 40 percent. *Bioenergy* reported the highest level of a decline - 32.1 percent.

Employment also showed growth in 2018 with the state's forest industry reporting an increase of 1,156 jobs, or 2.1 percent from 2017. The majority of the jobs were in the *pulp and paper products* sector. *Prefabricated wood buildings and manufactured housing* and *veneer, plywood, reconstituted, and engineered wood* sectors saw the highest percentage growth at 21.3 percent and 13.5 percent, respectively.

Wages and salaries increased in all but two sectors. The *bioenergy* sector reported a decrease of 31 percent and pulp *and paper* showed a much smaller decrease of 5.1 percent.

Table 2-3: Forest Industry Activity 2009 - 2018 Comparison

Output (Millions of Dollars)

Sector	2009	2010	2011	2012*	2013*	2014	2015	2016	2017	2018
Forest Management and Logging	$1,454	$902	$805	$662	$580	$582	$605	$499	$521	$504
Bioenergy	-	-	-	-	$782	$688	$439	$981	$869	$590
Lumber and Wood Preservation	$1,359	$1,176	$1,264	$1,332	$1,272	$1,307	$1,674	$1,690	$1,629	$1,779
Veneer, Plywood, Reconstituted, and Engineered Wood	$664	$667	$590	$583	$1,010	$1,071	$1,362	$1,436	$1,499	$1,770
Prefabricated Wood Buildings and Manufactured Housing	$252	$189	$180	$174	$174	$206	$312	$380	$432	$605
Pulp and Paper Products	$11,018	$9,663	$10,426	$11,297	$10,752	$10,936	$12,461	$13,170	$13,214	$13,110
Woodworking and Paper Industries Machinery	$86	$113	$117	$90	$111	$118	$126	$104	$101	$109
Wooden Furniture, Cabinets, Custom Arch. & Millwork	$996	$872	$627	$1,224	$1,249	$1,301	$1,494	$1,710	$2,182	$2,054
Windows and Doors	$497	$390	$494							
Containers, Showcases, Partitions, and Shelving	$579	$524	$578	$710	$624	$634	$732	$824	$901	$966
Total**	**$16,906**	**$14,495**	**$15,082**	**$16,072**	**$16,564**	**$16,843**	**$19,205**	**$20,794**	**$21,348**	**$21,487**

Employment

Sector	2009	2010	2011	2012*	2013*	2014	2015	2016	2017	2018
Forest Management and Logging	5,119	5,050	5,036	5,500	5,714	5,720	5,820	5,920	5,738	5,609
Bioenergy	-	-	-	-	300	673	693	916	894	880
Lumber and Wood Preservation	5,469	4,902	5,538	5,279	5,177	5,242	5,527	5,520	5,662	5,806
Veneer, Plywood, Reconstituted, and Engineered Wood	3,137	3,025	2,916	2,898	3,651	3,848	3,947	4,108	4,131	4,687
Prefabricated Wood Buildings and Manufactured Housing	1,949	1,409	1,365	1,285	1,252	1,376	1,618	1,836	2,138	2,594
Pulp and Paper Products	18,936	16,939	19,012	19,659	18,754	18,538	18,919	18,983	19,252	19,572
Woodworking and Paper Industries Machinery	300	473	536	479	506	522	526	422	405	436
Wooden Furniture, Cabinets, Custom Arch. & Millwork	6,827	5,905	4,724	7,985	8,434	8,676	9,008	9,646	11,242	10,585
Windows and Doors	2,973	2,252	3,156							
Containers, Showcases, Partitions, and Shelving	3,809	3,470	4,095	4,017	4,135	4,145	4,326	4,549	4,471	4,920
Total**	**48,519**	**43,425**	**46,378**	**47,102**	**47,941**	**48,740**	**50,385**	**51,900**	**53,933**	**55,089**

Wages and Salaries (Millions of Dollars)										
Sector	**2009**	**2010**	**2011**	**2012***	**2013***	**2014**	**2015**	**2016**	**2017**	**2018**
Forest Management and Logging	$238	$239	$262	$305	$251	$255	$345	$294	$312	$332
Bioenergy	-	-	-	-	$39	$45	$49	$80	$147	$102
Lumber and Wood Preservation	$250	$238	$290	$255	$259	$267	$342	$318	$348	$396
Veneer, Plywood, Reconstituted, and Engineered Wood	$158	$163	$162	$150	$238	$253	$253	$242	$250	$428
Prefabricated Wood Buildings and Manufactured Housing	$66	$44	$49	$44	$51	$56	$67	$71	$92	$123
Pulp and Paper Products	$1,494	$1,412	$1,636	$1,620	$1,544	$1,575	$1,796	$2,023	$1,872	$1,776
Woodworking and Paper Industries Machinery	$17	$28	$34	$26	$36	$38	$35	$28	$28	$28
Wooden Furniture, Cabinets, Custom Arch. & Millwork	$271	$249	$205	$331	$344	$362	$449	$466	$547	$552
Windows and Doors	$126	$100	$148							
Containers, Showcases, Partitions, and Shelving	$150	$151	$188	$186	$176	$179	$218	$219	$240	$282
Total**	**$2,770**	**$2,624**	**$2,973**	**$2,917**	**$2,938**	**$3,030**	**$3,553**	**$3,741**	**$3,836**	**$4,019**

**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 2009 through 2018.

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

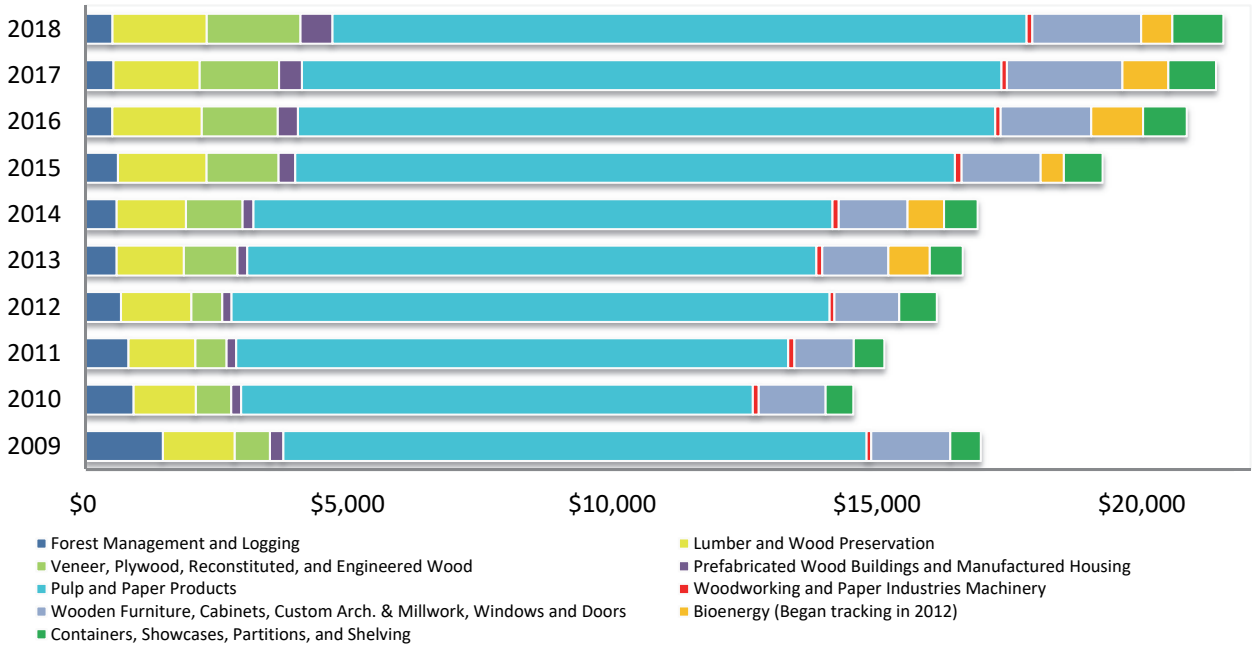


Figure 2-2: Forest Industry Economic Activity: Employment by Sector

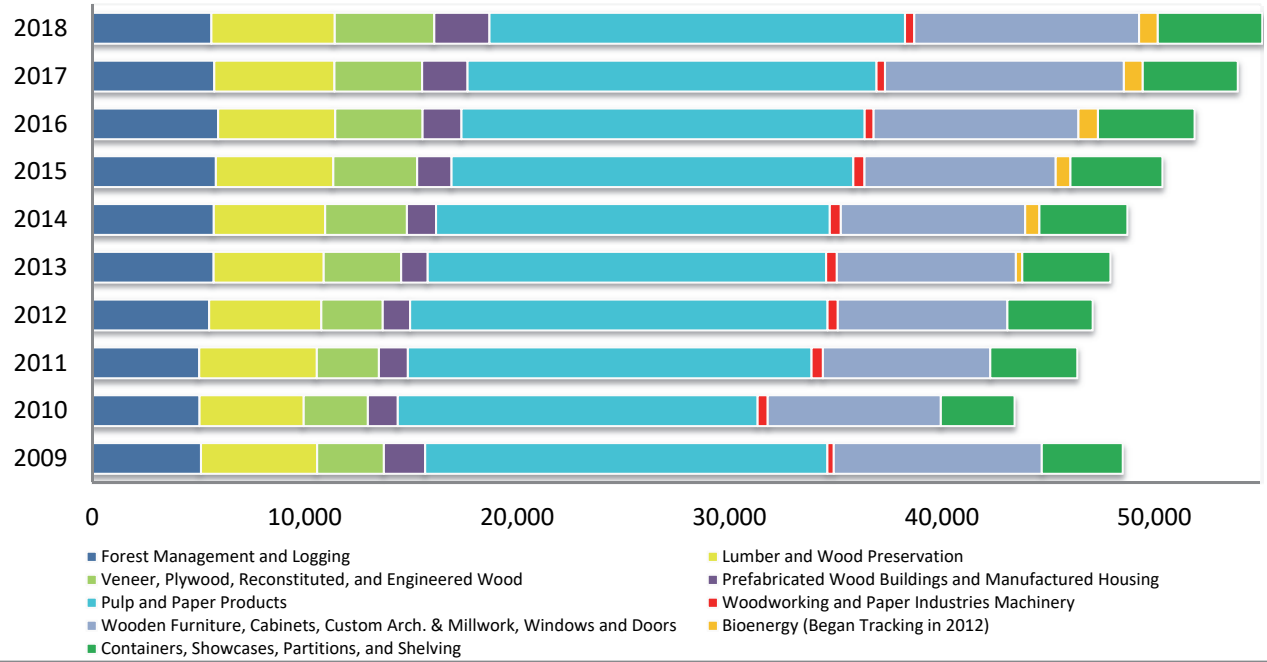
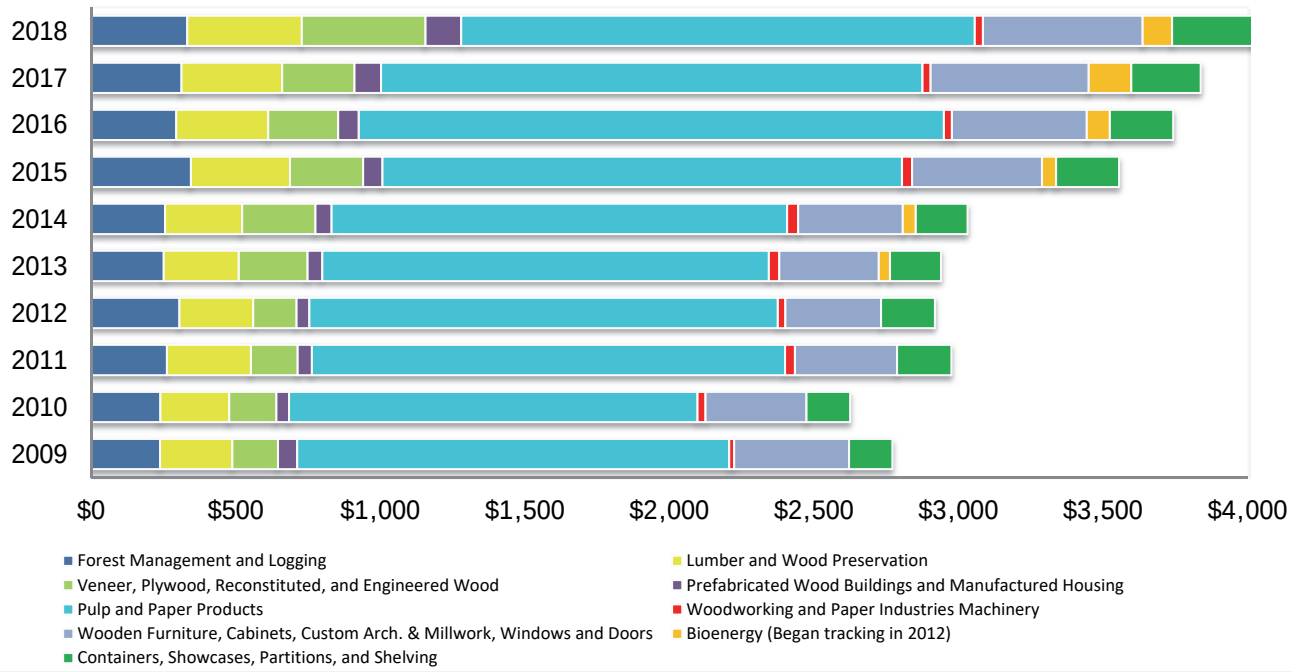


Figure 2-3: Forest Industry Economic Activity: Wages & Salaries by Sector
(Dollars in Millions)



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.[5]

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 2018. It has the drawback, however, of not including single proprietorships (because they have no employees), and it also does not

[5] 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 2018 – 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 forestry-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 2018 representing 39 percent of the total industry in employment and 63 percent of the entire industry output. The entire forest industry (totals in Table 3-1) exported (to a non-Georgia destination) output valued at $19.8 billion in 2018. These activities supported 48,444 jobs with nearly $3.6 billion in wages and salaries.

Table 3-1: Direct Impacts by Forest Industry Sector (2018)

Sector	Output	Employment	Wages and Salaries
Forest Management and Logging	$214.6 M	2,422	$148.0 M
Bioenergy	$586.4 M	875	$101.3 M
Lumber and Wood Preservation	$1,306.8 M	4,264	$290.6 M
Veneer, Plywood, Reconstituted, and Engineered Wood	$1,579.8 M	4,265	$393.2 M
Prefabricated Wood Buildings and Manufactured Housing	$594.2 M	2,549	$120.4 M
Pulp and Paper Products	$12,485.9 M	18,674	$1,692.5 M
Woodworking and Paper Industries Machinery	$102.1 M	406	$26.4 M
Wooden Furniture, Cabinets, Custom Arch. & Millwork, Windows and Doors	$1,999.0 M	10,332	$537.4 M
Containers, Showcases, Partitions, and Shelving	$919.1 M	4,657	$266.6 M
Total	**$19,788.1 M**	**48,444**	**$3,576.4 M**

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 $21.3 billion in output, 50,737 employees, and $3.7 billion in wages and salaries in 2018. A distant second in output and wages and salaries was *wholesale trade* with $1.9 billion and $662.8 million, respectively; while *administrative and waste services* was second in employment with 10,569 employees. The total economic activity supported by Georgia's forest industry totaled $36.3 billion. This activity supported the employment of 148,414 people who earned $9.1 billion in 2018.

Table 3-2: Total Benefits by Major Industry (2018)

Sector	Output	Employment	Wages & Salaries
Agriculture, Forestry, Fish & Hunting	$896.9 M	9,906	$553.2 M
Mining	$41.6 M	231	$13.3 M
Utilities	$1,526.4 M	1,859	$232.7 M
Construction	$294.3 M	1,810	$103.0 M
Manufacturing	$21,249.4 M	50,737	$3,731.9 M
Wholesale Trade	$1,860.0 M	7,675	$662.8 M
Retail Trade	$744.8 M	8,553	$273.9 M
Transportation & Warehousing	$1,237.9 M	8,104	$497.4 M
Information	$850.1 M	1,656	$228.4 M
Finance & Insurance	$1,302.5 M	4,821	$351.4 M
Real Estate & Rental	$1,617.9 M	3,914	$108.6 M
Professional, Scientific & Tech Services	$1,097.6 M	8,343	$627.1 M
Management of Companies	$751.2 M	3,040	$377.7 M
Administrative & Waste Services	$686.9 M	10,569	$341.6 M
Educational Services	$113.7 M	1,802	$71.3 M
Health & Social Services	$873.1 M	8,253	$480.5 M
Arts, Entertainment & Recreation	$129.2 M	1,946	$40.1 M
Accommodation & Food Services	$515.6 M	8,515	$180.4 M
Other Services	$443.5 M	6,486	$213.2 M
Government & non-NAICS Industries	$29.7 M	195	$16.5 M
TOTAL	**$36,262.4 M**	**148,414**	**$9,105.1 M**

Table 3-3 extracts information from several previous tables to compare the overall results obtained in each impact analysis conducted from 2008 through 2018.

In the 2008-2009 period, forest industry output declined by 8 percent, and employment and wages and salaries from total impacts fell by 16 and 12 percent, respectively. The decline was not a surprise given that the U.S economy was in recession. The two sectors that declined the most (in percentage terms) were *prefabricated buildings* and *veneer, plywood, and reconstituted wood products*. Productivity increases were apparent in forest industry sectors (pulp and paper products, for example) as well as sectors stimulated by the multiplier effect, which would serve to allow output increases with employment declines.

From 2009 to 2010, the decline in industry activity accelerated with output declining by about 14 percent. Employment and compensation, however, declined by smaller percentages, compared to the previous year, with declines of almost 11 percent and 5 percent, respectively. Total impacts did not decline as much in percentage terms in all parameters, probably because compensation declined the least, and induced impacts almost always depend on income. In the

fiscal impact analysis, both revenues and costs declined, but because the cost decline was slightly larger than the revenue decline, net revenues actually increased slightly.

The forest industry's activity picked up pace in 2011, showing growth after three years of continuous decline. 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 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. As the graphs show, all direct and total impact metrics realized growth compared to 2017 rates, with wages and salaries showing the highest increase in direct and total impacts.

Table 3-3: Comparison of Results 2008 to 2018

(Dollars in millions; Employment in persons)

Forest Industry Direct Economic Impact											
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Output*	$18,270	$16,906	$14,495	$15,082	$16,072	$16,564	$16,843	$19,203	$20,794	$21,348	$21,488
Employment	57,812	48,519	43,425	46,378	47,123	48,139	48,740	50,385	51,900	53,933	55,089
Wages & Salaries*	$3,131	$2,770	$2,624	$2,972	$2,917	$2,938	$3,030	$3,553	$3,741	$3,836	$4,018
Year to Year Percent Change											
Output		-7.5%	-14.3%	4.0%	6.6%	3.1%	1.7%	14.0%	8.3%	2.7%	0.7%
Employment		-16.1%	-10.5%	6.8%	1.6%	2.2%	1.2%	3.4%	3.0%	3.9%	2.1%
Wages & Salaries		-11.5%	-5.3%	13.3%	-1.9%	0.7%	3.1%	17.3%	5.3%	2.5%	4.7%
Total Impacts											
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Output*	$28,723	$27,200	$23,643	$24,975	$27,469	$28,014	$28,674	$32,154	$35,237	$35,923	$36,262
Employment	128,388	118,423	108,112	118,459	120,260	127,750	129,329	133,256	144,537	147,380	148,414
Wages & Salaries*	$6,514	$5,561	$5,377	$6,491	$6,540	$6,898	$7,119	$7,860	$8,529	$8,709	$9,105
Year to Year Percent Change											
Output		-5.3%	-13.1%	5.6%	10.0%	2.0%	2.4%	12.1%	9.6%	1.9%	0.9%
Employment		-7.8%	-8.7%	9.6%	1.5%	6.2%	1.2%	3.0%	8.5%	2.0%	0.7%
Wages & Salaries		-14.6%	-3.3%	20.7%	0.8%	5.5%	3.2%	10.4%	8.5%	2.1%	4.5%
Forest Industry Fiscal Impact											
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
State Revenues	$539	$472	$448	$487	$691	$700	$721	$753	$778	$970	$977
State Costs	$333	$314	$282	$308	$358	$360	$370	$393	$433	$873	$867
Net Revenues*	$206	$158	$166	$179	$333	$340	$351	$360	$345	$97	$109

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

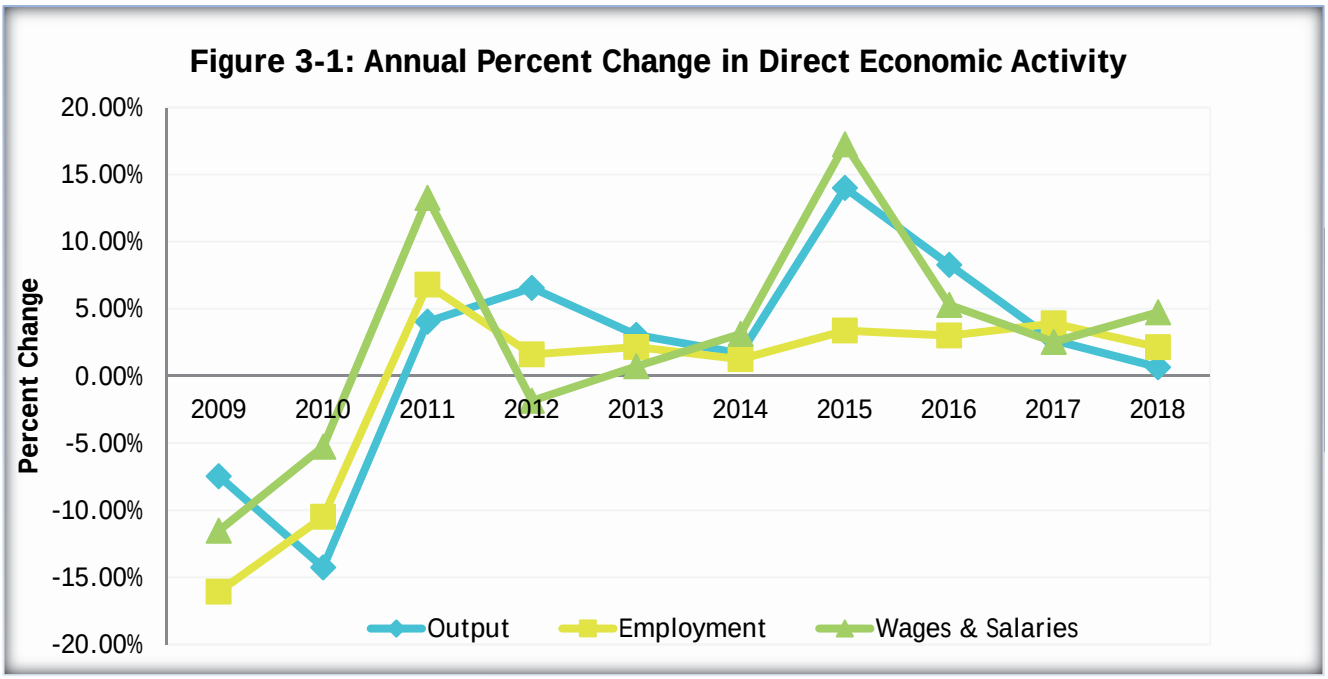


Figure 3-1: Annual Percent Change in Direct Economic Activity
Percent Change
20.00%
15.00%
10.00%
5.00%
0.00%
-5.00%
-10.00%
-15.00%
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2018
Output
Employment
Wages & Salaries

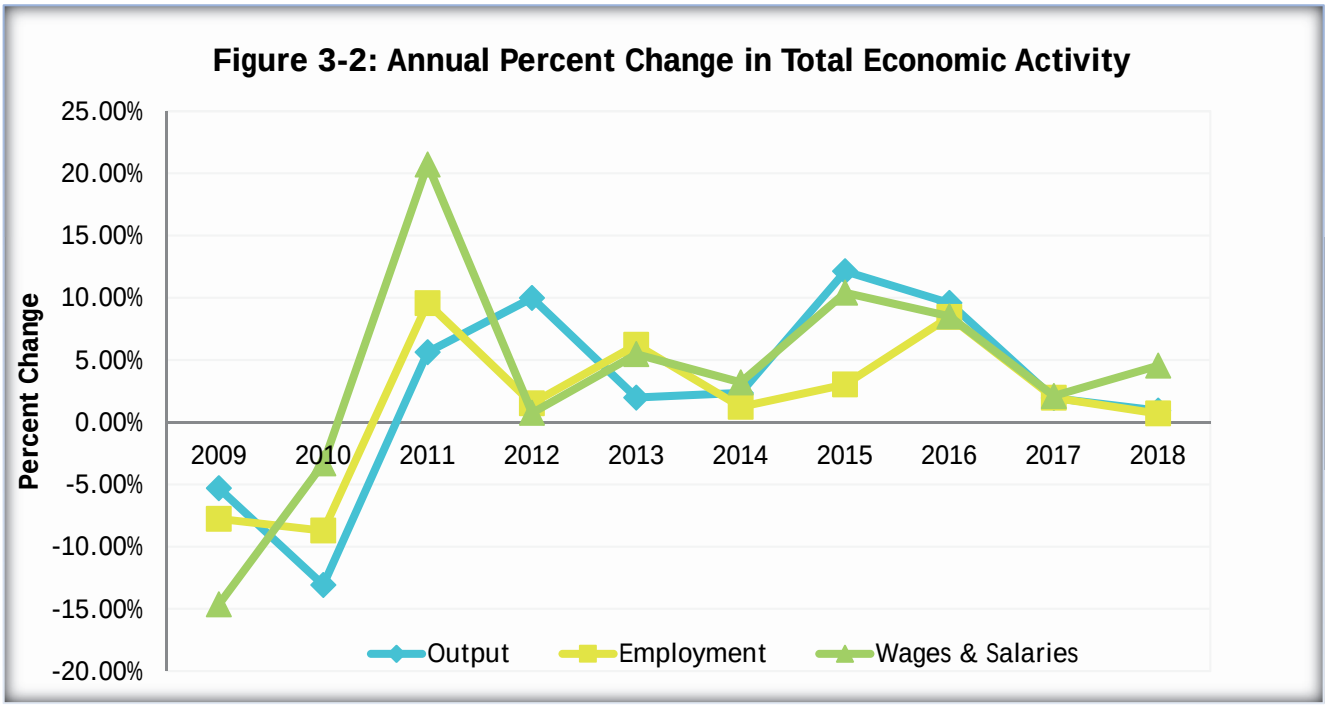
Figure 3-2: Annual Percent Change in Total Economic Activity
Percent Change
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
-5.00%
-10.00%
-15.00%
-20.00%
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
Output
Employment
Wages & Salaries

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. This comparison is provided in Table 3-4, which shows that the forest industry is the second largest industry sector in Georgia, behind food processing, in employment and in wages and salaries.

Table 3-4: Comparison to Georgia's Other Manufacturing Sectors (2018)

Industry Sectors	Employment	Wages & Salaries
Food Processing	68,035	$4,037.6 M
Forest Industry	**55,089**	**$4,017.5 M**
Transportation Equipment	54,687	$3,826.2 M
Textiles	51,203	$2,314.1 M
Fabricated Metal Products	39,377	$2,120.4 M
Machinery	21,898	$1,598.2 M
Chemicals	21,783	$1,338.7 M
Electrical Equipment and Appliances	13,890	$1,017.5 M
Printing	13,055	$625.5 M
Computers and Electronic Products	5,996	$625.3 M
Apparel	2,446	$96.2 M

SECTION 4

Economic Impact of Urban and Community Forestry

Urban and community forestry[6] 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,[7] it was determined that urban and community forestry employed 33,113 people in year 2018 who earned $1.2 billion in wages and salaries and generated $2.2 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 2018 created and supported 46,400 jobs with wages and salaries of $1.8 billion and generated $4.2 billion of economic activity.

Table 4-1: Economic Impact of Urban and Community Forestry: 2018

	Direct	Indirect and Induced	Total
Employment	33,113	13,287	**46,400**
Wages & Salaries	$1,151.8 M	$645.7 M	**$1,797.5 M**
Output	$2,226.8 M	$1,946.9 M	**$4,173.7 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.

[6] 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).

[7] 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

Central Savannah River Area	Burke, Columbia, Glascock, Hancock, Jefferson, Jenkins, Lincoln, McDuffie, Richmond, Taliaferro, Warren, Washington, Wilkes
River Valley	Chattahoochee, Clay, Crisp, Dooly, Harris, Macon, Marion, Muscogee, Quitman, Randolph, Schley, Stewart, Sumter, Talbot, Taylor, Webster
Heart of Georgia Altamaha	Appling, Bleckley, Candler, Dodge, Emanuel, Evans, Jeff Davis, Johnson, Laurens, Montgomery, Tattnall, Telfair, Toombs, Treutlen, Wayne, Wheeler, Wilcox
Southwest Georgia	Baker, Calhoun, Colquitt, Decatur, Dougherty, Early, Grady, Lee, Miller, Mitchell, Seminole, Terrell, Thomas, Worth
Southern Georgia	Atkinson, Bacon, Ben Hill, Berrien, Brantley, Brooks, Charlton, Clinch, Coffee, Cook, Echols, Irwin, Lanier, Lowndes, Pierce, Tift, Turner, Ware
Coastal	Bryan, Bulloch, Camden, Chatham, Effingham, Glynn, Liberty, Long, McIntosh, Screven

Source: Georgia Department of Community Affairs

Figure 5-1: Map of Regional Commissions

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 (2018)

Regions	Output	Employment	Wages & Salaries
Atlanta Regional Commission	$5,724.4 M	12,704	$1,070.3 M
Central Savannah River Area	$1,538.5 M	3,670	$287.7 M
Coastal	$2,318.7 M	4,770	$433.5 M
Georgia Mountains	$796.8 M	2,691	$149.0 M
Heart of Georgia Altamaha	$1,796.6 M	4,760	$335.9 M
Middle Georgia	$1,324.0 M	3,493	$247.5 M
Northeast Georgia	$1,218.6 M	3,186	$227.8 M
Northwest Georgia	$1,462.2 M	3,949	$273.4 M
River Valley	$742.8 M	1,973	$138.9 M
Southern Georgia	$1,741.7 M	5,633	$325.6 M
Southwest Georgia	$1,610.1 M	4,604	$301.0 M
Three Rivers	$1,213.2 M	3,654	$226.8 M
Total	**$21,487.8 M**	**55,089**	**$4,017.5 M**

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Bureau of Economic Analysis Input-Output Sectors as contained in "IMPLAN Pro: Data Guide," IMPLAN Group, Inc.,2019.

Georgia Department of Labor, ES202 Wage and Employment Data: 2018.

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: 2018

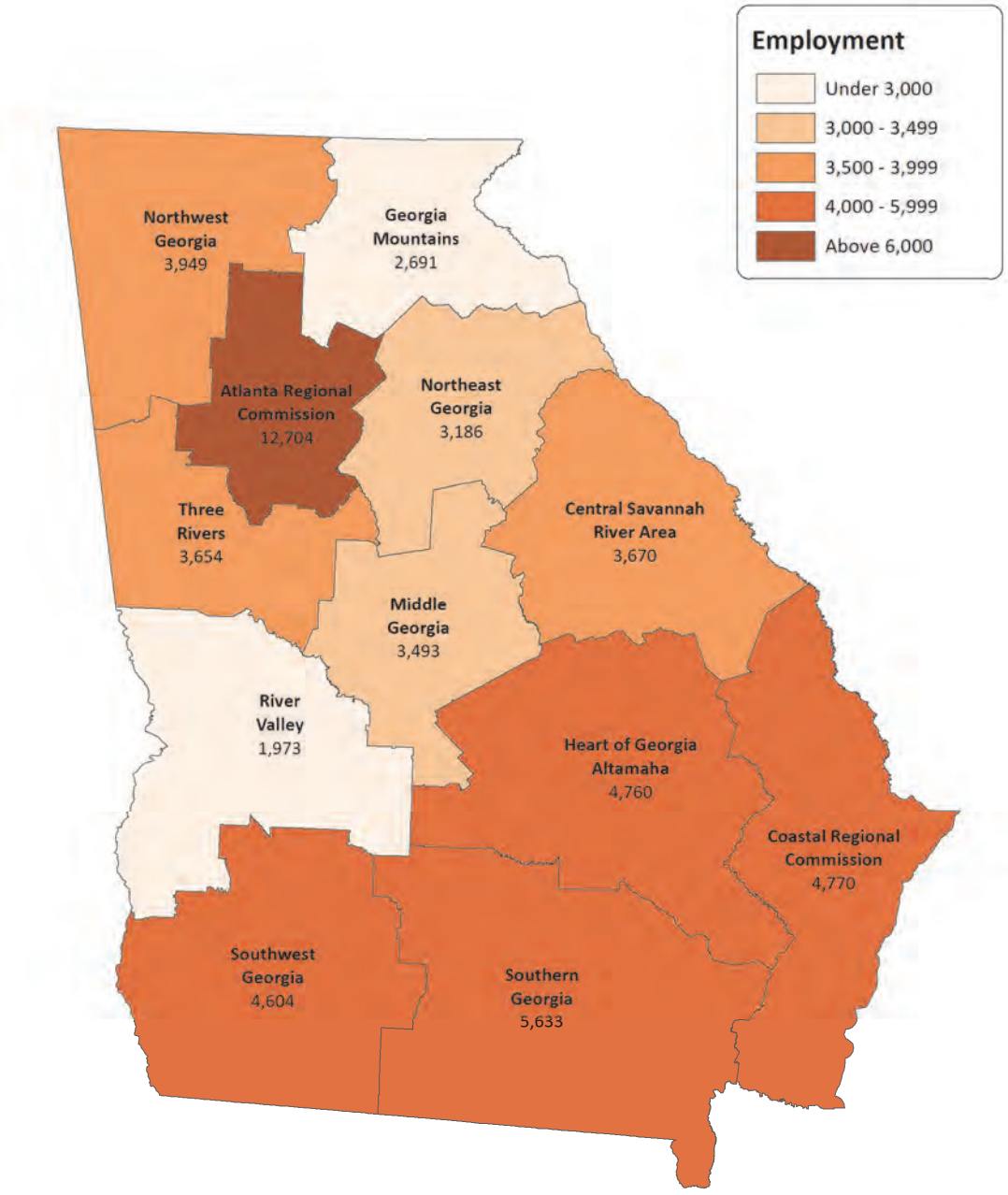


Figure A-2: Regional Forest Industry Wages and Salaries: 2018

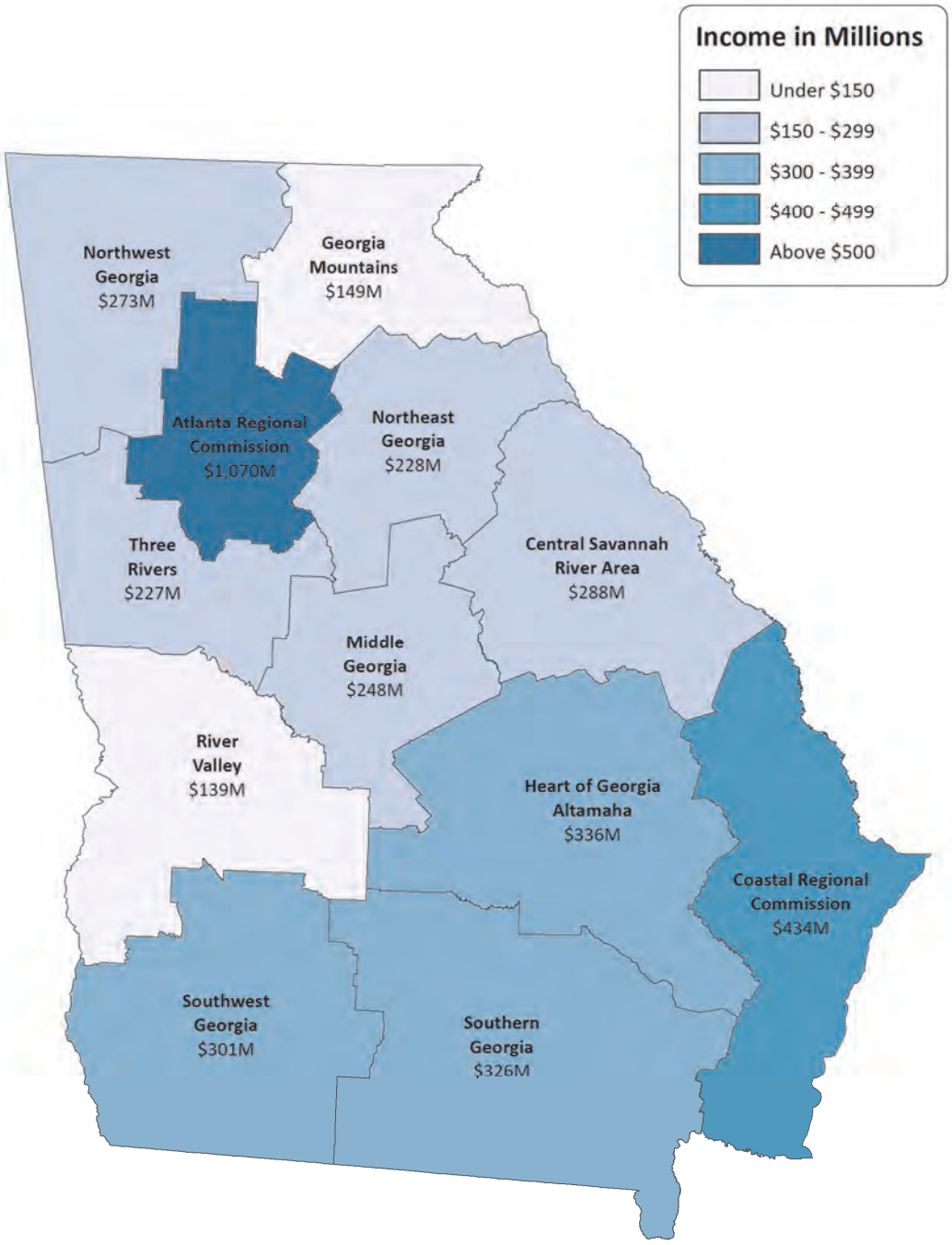
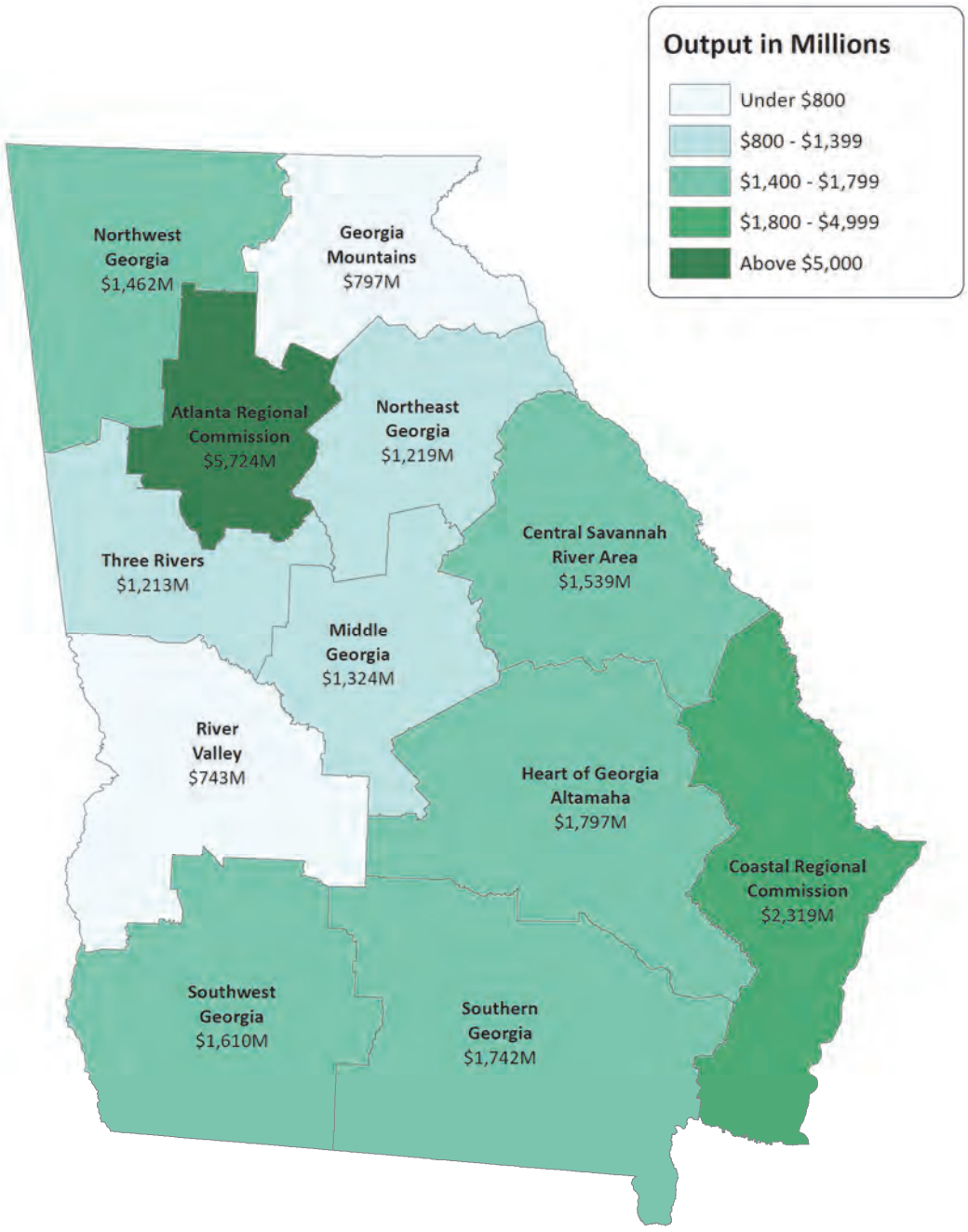


Figure A-3: Regional Forest Industry Output: 2018



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