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Economic Benefits of the Forestry Industry in Georgia 2011 *Final Report*



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Executive Summary

Georgia's forestry 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 forestry industry, (2) estimate economic activity supported in all Georgia sectors by the industry's activities, (3) compare the level of activity in the forestry industry with other industries, and (4) quantify the economic activity of forestry 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 to this year's NAICS list to reflect the changes in the new 2012 NAICS code definitions.

The forestry industry components, and the level of economic activity represented by them in 2011, 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 the forestry industry in 2011 employed 46,378 workers in all industry sectors combined, paid an annual compensation (as defined by wages and salaries) of nearly \$3 billion, and generated an estimated total revenue of almost \$15.1 billion.

Table E-1: Georgia Forestry Industry Economic Activity 2011

Sector	Output	Employment	Wages & Salaries
Forestry Management, Logging, and Misc. Forest Products	\$805,089,714	5,036	\$262,117,174
Lumber and Wood Preservation	\$1,264,332,491	5,538	\$290,041,861
Veneer, Plywood, Reconstituted, and Engineered Wood	\$590,424,760	2,916	\$161,866,300
Prefabricated Wood Buildings and Manufactured Housing	\$179,780,138	1,365	\$48,584,003
Pulp and Paper Products	\$10,425,880,387	19,012	\$1,636,111,184
Woodworking and Paper Industries Machinery	\$117,481,362	536	\$33,792,433
Wooden Furniture, Cabinets, Custom Arch. & Millwork	\$627,211,858	4,724	\$204,751,931
Windows and Doors	\$494,132,203	3,156	\$147,657,909
Containers, Showcases, Partitions, and Shelving	\$578,048,726	4,095	\$187,676,055
Total	\$15,082,381,638	46,378	\$2,972,598,850

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 forestry industry.

The result of the multiplier effect, given by total impacts (which includes the economic activity in Table E-1¹), is also measured by output, employment, and wages and salaries and is shown in Table E-2. Total economic activity supported by the forestry industry in Georgia (including the multiplier effect and forestry-related bioenergy firms) exceeded \$24.9 billion in 2011. These activities supported the employment of 118,459 people whose compensation was nearly \$6.5 billion.

Table E-2: Total Benefits by Major Industry (2011)

Sector	Output	Employment	Wages & Salaries
Agriculture, Forestry, Fish & Hunting	\$1,073,962,614	8,360	\$405,290,083
Mining	\$15,744,617	85	\$6,723,068
Utilities	\$634,659,959	996	\$107,153,389
Construction	\$198,300,892	1,649	\$72,571,782
Manufacturing	\$15,009,557,843	42,677	\$2,849,159,990
Wholesale Trade	\$847,162,691	4,948	\$397,368,784
Retail Trade	\$497,046,918	7,980	\$235,129,857
Transportation & Warehousing	\$733,658,348	5,358	\$297,174,214
Information	\$491,025,976	1,307	\$111,041,805
Finance & Insurance	\$990,912,492	4,648	\$307,895,398
Real Estate & Rental	\$1,201,879,091	3,715	\$82,762,101
Professional, Scientific & Tech Services	\$670,231,863	4,900	\$359,090,787
Management of companies	\$365,686,708	1,903	\$194,913,672
Administrative & Waste Services	\$410,771,699	6,735	\$198,928,604
Educational Services	\$106,604,202	1,442	\$61,711,525
Health & Social Services	\$725,565,196	7,393	\$395,061,984
Arts, Entertainment & Recreation	\$76,663,667	1,479	\$30,632,996
Accommodation & Food Services	\$321,199,877	5,673	\$110,896,425
Other Services	\$394,047,819	6,153	\$195,226,975
Government & non-NAICS Industries	\$210,099,466	1,057	\$71,779,630
TOTAL	\$24,974,781,938	118,459	\$6,490,513,069

Another way to examine the forestry industry in Georgia is to compare it with the state's other manufacturing sectors. Table E-3 lists 2011 income and employment totals for each major industry sector sorted by employment. These data show that forestry ranked third in total employment, a drop from previous years when it ranked second. However, the industry ranked second in terms of wages and salaries. Food processing ranked first in employment, but third in wages and salaries, and textiles (mostly carpet) was second in employment, but fourth in wages and salaries.

¹ 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 of Georgia Industries: 2011

Industry Sectors	Employment	Wages & Salaries
Food Processing	52,497	\$1,806,012,334
Textiles	46,911	\$1,772,642,285
Forestry Industry	46,378	\$2,231,474,553
Transportation Equipment	35,793	\$2,353,487,988
Fabricated Metal Products	21,141	\$905,576,138
Chemicals	17,548	\$1,179,864,629
Machinery	15,486	\$798,561,876
Printing	14,162	\$653,028,915
Computers and Electronic Products	9,613	\$957,866,229
Electrical Equipment and Appliances	8,663	\$566,010,698
Apparel	3,288	\$94,225,181

Of particular importance to Georgia's state government is how the forestry industry affects its annual budget. This is investigated by estimating the revenues associated with the forestry 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 forestry industry generated an estimated \$487 million in revenues for the state budget in 2011. When the costs of providing services to all employees are deducted from these revenues, net annual state revenues were \$179 million for 2011.

Table E-4: Fiscal Impact Analysis 2011

Annual State Government Revenues	\$487,167,473
Annual State Government Costs	\$307,847,671
Net Annual Revenues	\$179,319,802

Table E-5 compares the overall results obtained in each impact analysis conducted from 2003 through 2011. As the table shows, the forestry industry's output, employment, and wages and salaries have stabilized, showing annual growth of 4, 7, and 13 percent, respectively, compared to 2010. The industry's increased activity resulted in higher net revenues for the state government.

Table E-5: Comparison of Results 2003 to 2011

(Dollars in millions; Employment in persons)

Forestry Industry Direct Economic Impact									
	2003	2004	2005	2006	2007	2008	2009	2010	2011
Output	\$12,679	\$14,163	\$16,150	\$17,760	\$18,459	\$18,270	\$16,906	\$14,495	\$15,082
Employment	65,706	67,633	67,694	67,733	64,192	57,812	48,519	43,425	46,378
Wages & Salaries	\$3,007	\$3,299	\$3,422	\$3,513	\$3,394	\$3,131	\$2,770	\$2,624	\$2,972
Year to Year Percent Change									
Output		11.7%	14.0%	10.0%	3.9%	-1.0%	-7.5%	-14.3%	4.0%
Employment		2.9%	0.1%	0.1%	-5.2%	-9.9%	-16.1%	-10.5%	6.8%
Wages & Salaries		9.7%	3.7%	2.7%	-3.4%	-7.7%	-11.5%	-5.3%	13.3%
Total Impacts									
	2003	2004	2005	2006	2007	2008	2009	2010	2011
Output	\$20,199	\$22,729	\$25,972	\$27,738	\$28,547	\$28,723	\$27,200	\$23,643	24,975
Employment	136,022	144,944	154,147	149,347	141,155	128,388	118,423	108,112	118,459
Wages & Salaries	\$5,600	\$6,276	\$6,827	\$6,773	\$6,696	\$6,514	\$5,561	\$5,377	\$6,491
Year to Year Percent Change									
Output		12.53%	14.27%	6.80%	2.92%	0.62%	-5.30%	-13.08%	5.63%
Employment		6.56%	6.35%	-3.11%	-5.49%	-9.04%	-7.76%	-8.71%	9.57%
Wages & Salaries		12.07%	8.78%	-0.79%	-1.14%	-2.72%	-14.63%	-3.31%	20.72%
Forestry Industry Fiscal Impact									
	2003	2004	2005	2006	2007	2008	2009	2010	2011
State Revenues	\$514	\$546	\$591	\$580	\$566	\$539	\$472	\$448	\$487
State Costs	\$368	\$392	\$414	\$400	\$373	\$333	\$314	\$282	\$308
Net Revenues	\$147	\$155	\$176	\$180	\$193	\$206	\$158	\$166	\$179

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



Impact by Region

Quantifying the economic benefits of the forestry 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 this year's report, we quantify the impact of the forestry 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 forestry industry in terms of output, employment, and compensation in each region.

Table E-6: Forestry Industry's Regional Impact

Regions	Output	Employment	Wages & Salaries
Three Rivers	\$882,157,403	2,713	\$173,865,119
Southwest Georgia	\$1,093,360,945	3,362	\$215,491,397
Southern Georgia	\$1,277,016,199	3,927	\$251,688,160
River Valley	\$737,681,937	2,268	\$145,390,332
Northwest Georgia	\$1,425,470,863	4,383	\$280,947,210
Northeast Georgia	\$732,478,371	2,252	\$144,364,757
Middle Georgia	\$940,620,992	2,892	\$185,387,756
Heart of the Georgia Altamaha	\$1,461,283,637	4,493	\$288,005,579
Georgia Mountains	\$696,971,689	2,143	\$137,366,716
Coastal	\$1,396,392,114	4,294	\$275,216,056
Central Savannah River Area	\$1,234,163,306	3,795	\$243,242,249
Atlanta Regional Commission	\$3,204,784,181	9,855	\$631,633,518
Total	\$15,082,381,638	46,378	\$2,972,598,850

SECTION 1

Introduction

Georgia's forestry 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 forestry industry compare to other manufacturing sectors, and how the forestry industry affects state government costs and revenues.

The first step in this process was to define the limits of what constitutes the "forestry 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 forestry industry.

After the industry was defined and activities quantified, the total economic activity supported by the forestry 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 industry's output, employment, and compensation in the state's 12 regional commissions.

This report is the latest of a series of reports begun with an analysis of the 2002 impacts and 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 NAICS 2012 code required minor adjustments in the NAICS code selection for this year's analysis.

SECTION 2

Definition of the Forestry Industry in Georgia

The forestry 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 forestry industry definition, but retail sales of that paper would not. States without commercial forests still sell paper within their borders.

Therefore, the forestry industry definition used in this analysis includes these broad sectors: forestry, 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 forestry industry. The NAICS codes and descriptions comprising the detailed definition appear in Table 2-1.

Table 2-1: Forestry Industry Definition Components: NAICS

NAICS CODE	Industry Description
113110	Timber Tract Operations
113210	Forest Nursery and Gathering Forest Products
113310	Logging
321113	Sawmills
321114	Wood Preservation
321211	Hardwood Veneer and Plywood Manufacturing
321212	Softwood Veneer and Plywood Manufacturing
321213	Engineered Wood Member Manufacturing
321214	Truss Manufacturing
321219	Reconstituted Wood Product Manufacturing
321911	Wood Window and Door Manufacturing
321912	Cut Stock, Re-sawing Lumber, and Planning
321918	Other Millwork, Including Flooring
321920	Wood Container and Pallet Manufacturing
321991	Manufactured Home, Mobile Home, Manufacturing
321992	Prefabricated Wood Building Manufacturing
321999	All Other Miscellaneous Wood Product mfg.
322110	Pulp Mills
322121	Paper, Except Newsprint, Mills

322122	Newsprint Mills
322130	Paperboard Mills
322211	Corrugated and Solid Fiber Box Manufacturing
322212	Folding Paperboard Box Manufacturing
322219	Other Paperboard Container Manufacturing
322220	Paper Bag and Coated and Treated paper Manufacturing
322230	Stationery Product Manufacturing
322291	Sanitary Paper Product Manufacturing
322299	All Other Converted Paper Product Manufacturing
333243	Sawmill, Woodworking, and Paper Machinery Manufacturing
337110	Wood Kitchen Cabinet and Countertop Manufacturing
337121	Upholstered Household Furniture Manufacturing
337122	Non-upholstered Wood Household Furniture Manufacturing
337127	Institutional Furniture Manufacturing
337211	Wood office Furniture Manufacturing
337212	Custom Architectural Woodwork and Millwork
337215	Showcases, Partitions, Shelving, and Lockers
339995	Burial Casket Manufacturing

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 six firms in Georgia. Of these firms, two were confirmed to be in existing forestry-related sectors, i.e., fuel pellets from forestry wastes, which were included in miscellaneous wood products. The remaining firms are in disparate industry sectors, so their impact was included under Miscellaneous Wood Products sector. The total employment for this sector in 2011 was 156 persons, with 35 persons employed in sectors not previously included.

The level of economic activity in each forestry industry component is measured by output, employment, and wages and salaries. Measures for 2011 appear in Table 2-2, which aggregates the numerous categories from Table 2-1 to a more manageable number. This table shows that total employment in all of the forestry industry sectors was 46,378 and these jobs earned annual compensation (total wages and salaries including benefits) of nearly \$3 billion from estimated total revenue of \$15 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 19,012 workers, followed by lumber and wood preservation with 5,538 employees.

Compensation, like employment, is dominated by pulp and paper at more than \$1.6 billion (more than half the total), followed distantly by lumber and wood preservation at \$290 million and forestry management and logging at \$262 million. The largest outputs are produced by pulp and paper (\$10.4 billion), followed by



Lumber and wood preservation (almost \$1.3 billion) and forestry management and logging (\$805 million.)

Table 2-2: Georgia Forestry Industry Economic Activity 2011

Sector	Output	Employment	Wages & Salaries
Forestry Management, Logging, and Misc. Forest Products	\$805,089,714	5,036	\$262,117,174
Lumber and Wood Preservation	\$1,264,332,491	5,538	\$290,041,861
Veneer, Plywood, Reconstituted, and Engineered Wood	\$590,424,760	2,916	\$161,866,300
Prefabricated Wood Buildings and Manufactured Housing	\$179,780,138	1,365	\$48,584,003
Pulp and Paper Products	\$10,425,880,387	19,012	\$1,636,111,184
Woodworking and Paper Industries Machinery	\$117,481,362	536	\$33,792,433
Wooden Furniture, Cabinets, Custom Arch. & Millwork	\$627,211,858	4,724	\$204,751,931
Windows and Doors	\$494,132,203	3,156	\$147,657,909
Containers, Showcases, Partitions, and Shelving	\$578,048,726	4,095	\$187,676,055
Total	\$15,082,381,638	46,378	\$2,972,598,850

Table 2-3 provides a comparison of the forestry industry activity for 2004 through 2011. Three measures are included in the comparison: output, employment, and compensation. Output (an estimate of the firms' revenues) increased over the 2010-2011 period, reversing a declining trend that started over the 2007-2008 period. However, the increase in activity was not consistent among all sectors. Only five forestry sectors reported growth: lumber and wood preservation, pulp and paper products, Woodworking and paper industries machinery, windows and doors, and containers, showcases, partitions, and shelving.

Employment, like output, showed signs of improving in 2011 with the state's forestry industry reporting an increase of 2,953 jobs from 2010. The majority of the new jobs were in the pulp and paper products sector. Lumber and wood preservation, woodworking and paper industries machinery; windows and doors; and containers, showcases, partitions, and shelving sectors also showed employment growth.

Wages and salaries showed the biggest improvement, with almost all sectors showing an increase (except veneer, plywood, reconstituted, and engineered wood and wooden furniture, cabinets, custom Architectural and millwork that showed small declines.)

Table 2-3: Forestry Industry Activity 2004 - 2011 Comparison

Output (Millions of Dollars)								
Sector	2004	2005	2006	2007	2008	2009	2010	2011
Forestry Management, Logging, and Misc. Forest Products	\$1,384	\$1,447	\$1,846	\$1,807	\$1,698	\$1,454	\$902	\$805
Lumber and Wood Preservation	\$1,482	\$1,811	\$2,057	\$2,100	\$1,732	\$1,359	\$1,176	\$1,264
Veneer, Plywood, Reconstituted, and Engineered Wood	\$1,062	\$1,290	\$1,260	\$1,322	\$961	\$664	\$667	\$590
Prefabricated Wood Buildings and Manufactured Housing	\$388	\$561	\$596	\$523	\$427	\$252	\$189	\$180
Pulp and Paper Products	\$7,888	\$8,808	\$9,590	\$10,131	\$10,856	\$11,018	\$9,663	\$10,426
Woodworking and Paper Industries Machinery	\$47	\$53	\$52	\$61	\$67	\$86	\$113	\$117
Wooden Furniture, Cabinets, Custom Arch. & Millwork	\$1,115	\$1,241	\$1,366	\$1,374	\$1,153	\$996	\$872	\$627
Windows and Doors	\$344	\$406	\$446	\$517	\$721	\$497	\$390	\$494
Containers, Showcases, Partitions, and Shelving	\$454	\$533	\$548	\$624	\$654	\$579	\$524	\$578
Total	\$14,163	\$16,150	\$17,760	\$18,459	\$18,270	\$16,906	\$14,495	\$15,082
Employment								
Sector	2004	2005	2006	2007	2008	2009	2010	2011
Forestry Management, Logging, and Misc. Forest Products	6,005	6,133	6,152	5,914	5,529	5,119	5,050	5,036
Lumber and Wood Preservation	8,505	8,839	8,957	8,773	6,477	5,469	4,902	5,538
Veneer, Plywood, Reconstituted, and Engineered Wood	6,588	7,110	6,963	6,004	4,448	3,137	3,025	2,916
Prefabricated Wood Buildings and Manufactured Housing	3,494	4,531	4,500	3,581	2,983	1,949	1,409	1,365
Pulp and Paper Products	25,032	23,150	22,861	21,651	20,816	18,936	16,939	19,012
Woodworking and Paper Industries Machinery	292	319	314	304	295	300	473	536
Wooden Furniture, Cabinets, Custom Arch. & Millwork	10,164	10,378	10,770	10,189	8,235	6,827	5,905	4,724
Windows and Doors	2,522	2,446	2,598	3,043	3,967	2,973	2,252	3,156
Containers, Showcases, Partitions, and Shelving	5,031	4,788	4,618	4,733	4,506	3,809	3,470	4,095
Total	67,633	67,694	67,733	64,192	57,812	48,519	43,425	46,378
Wages and Salaries (Millions of Dollars)								
Sector	2004	2005	2006	2007	2008	2009	2010	2011
Forestry Management, Logging, and Misc. Forest Products	\$234	\$254	\$267	\$273	\$255	\$238	\$239	\$262
Lumber and Wood Preservation	\$353	\$385	\$400	\$391	\$282	\$250	\$238	\$290
Veneer, Plywood, Reconstituted, and Engineered Wood	\$312	\$341	\$353	\$291	\$211	\$158	\$163	\$162
Prefabricated Wood Buildings and Manufactured Housing	\$122	\$164	\$165	\$119	\$99	\$66	\$44	\$49
Pulp and Paper Products	\$1,616	\$1,595	\$1,630	\$1,602	\$1,565	\$1,494	\$1,412	\$1,636
Woodworking and Paper Industries Machinery	\$18	\$20	\$18	\$19	\$18	\$17	\$28	\$34
Wooden Furniture, Cabinets, Custom Arch. & Millwork	\$359	\$389	\$404	\$393	\$330	\$271	\$249	\$205
Windows and Doors	\$104	\$104	\$100	\$115	\$173	\$126	\$100	\$148
Containers, Showcases, Partitions, and Shelving	\$181	\$169	\$175	\$191	\$172	\$150	\$151	\$188
Total	\$3,299	\$3,422	\$3,513	\$3,394	\$3,131	\$2,770	\$2,624	\$2,973



Figures 2-1 through 2-3 show output, employment, and compensation changes for each forestry industry sector from 2004 through 2011.

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

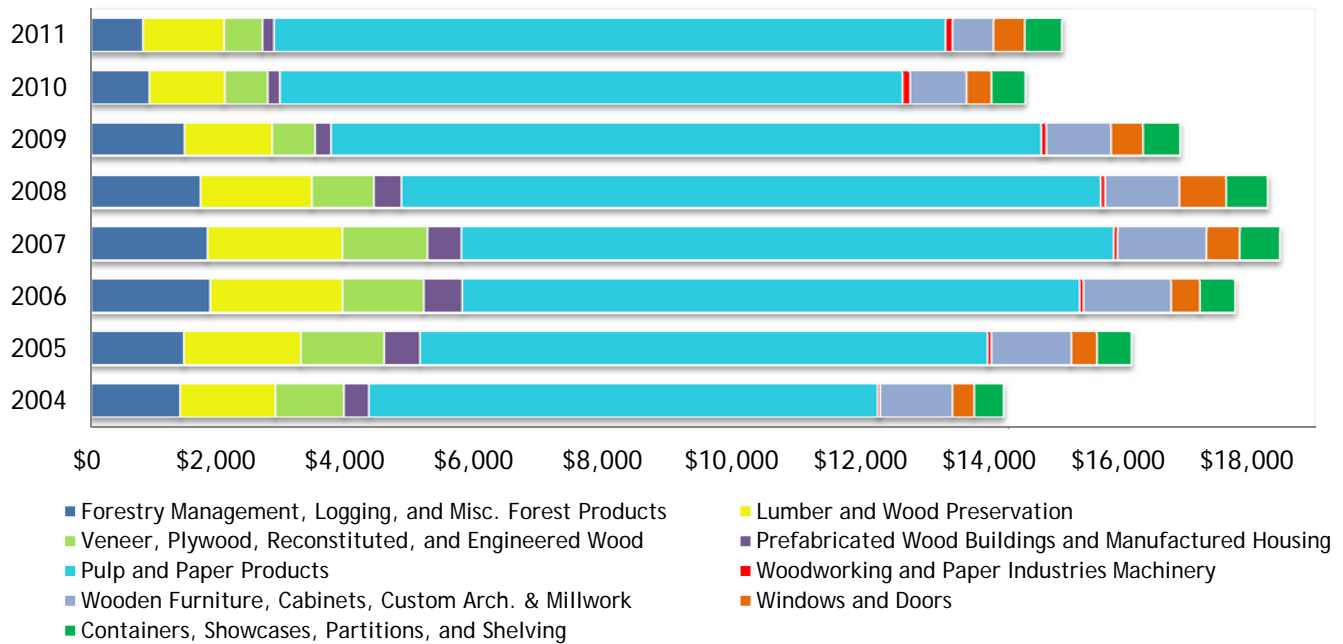


Figure 2-2: Forestry Industry Economic Activity: Employment by Sector

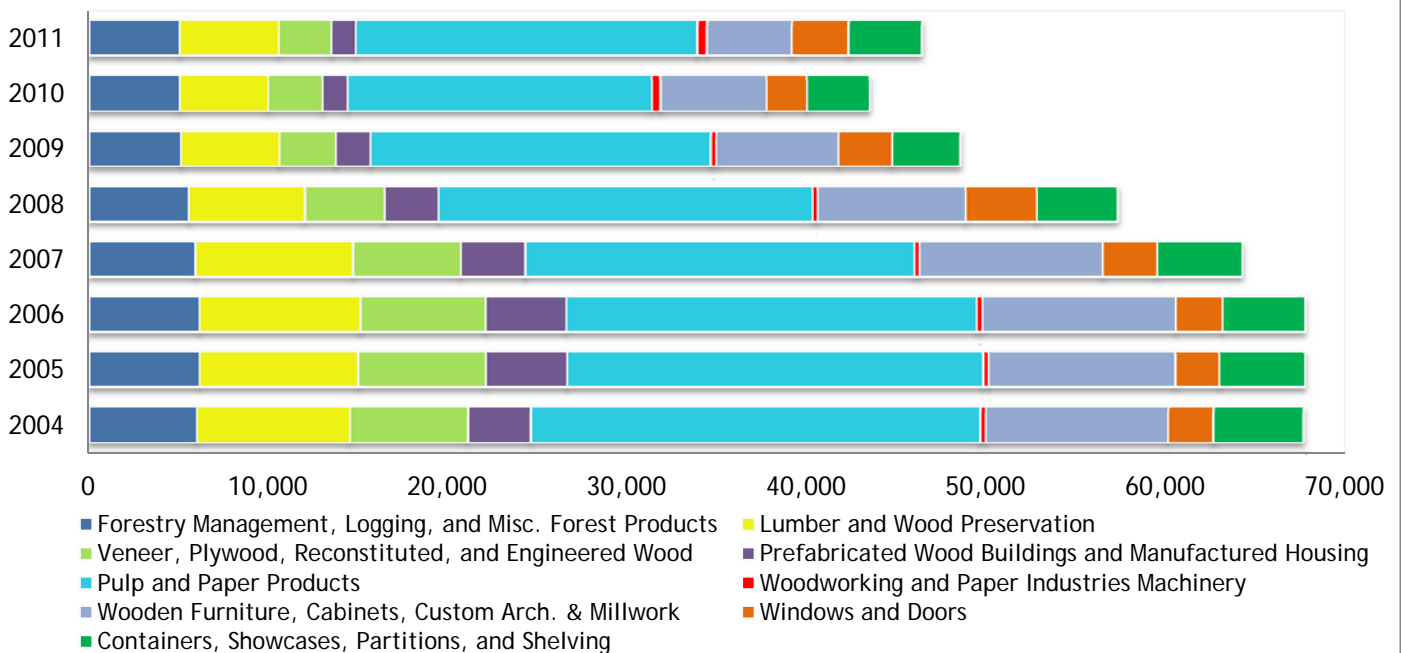
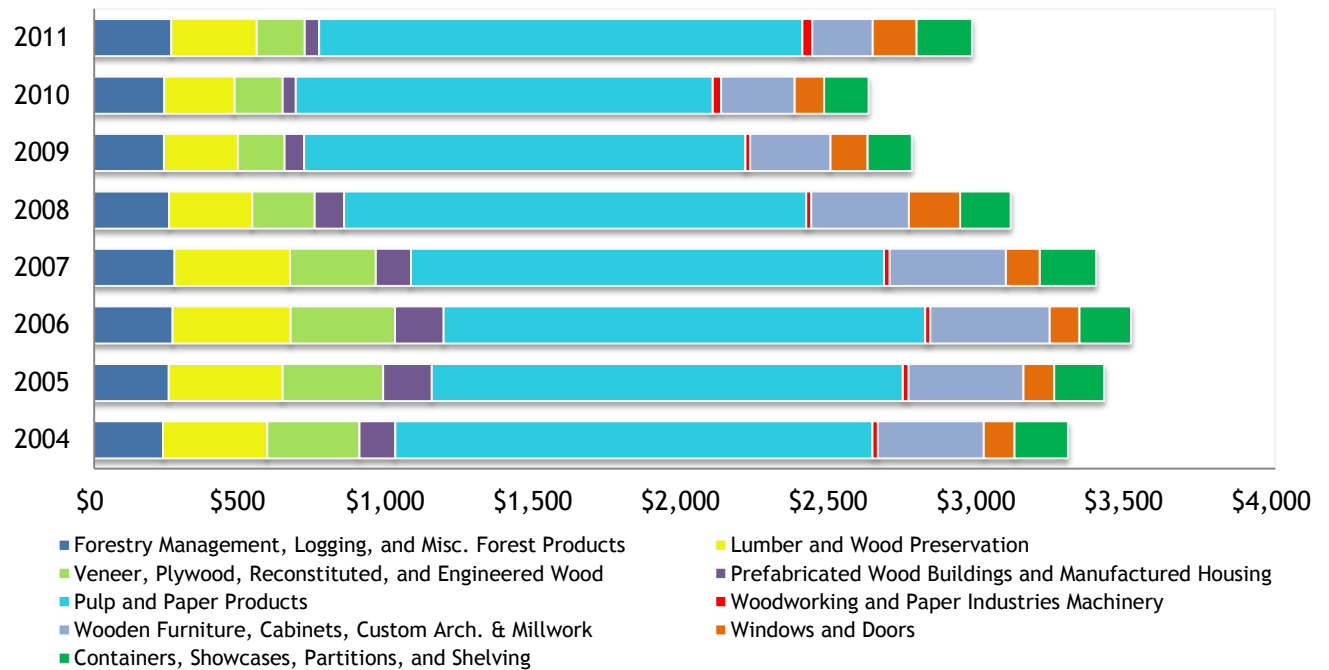


Figure 2-3: Forestry Industry Economic Activity: Wages & Salaries by Sector
(Dollars in Millions)



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," which puts the brakes on the multiplier effect; the higher the leakage, the lower the multiplier effect.

The I/O model used in this analysis is called IMPLAN, devised by the Minnesota IMPLAN Group. It is a nationally recognized model that uses Georgia data to tailor its estimates to the state economy. Still, the model must be modified somewhat to account for differences in specific industry sectors revealed by more current data. For example, the wage and salary data used in this analysis is from 2011, whereas the wage and salary data available to IMPLAN is from 2010.

One area of uncertainty that persists, however, is the level of benefits provided to workers in each of the forestry 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 30.7 percent was assumed for this analysis, based on the latest available U.S. Bureau of Labor Statistics compensation cost data for all civilian employment.

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, allowing an estimate of the economic benefits occurring in 2011. It has the drawback, however, of not including single proprietorships (because they have no employees), and it also does not include employees not covered by unemployment insurance, such as some governmental employees.

The second task was to divide the forestry 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. Forestry industry output used as an input to another Georgia forestry-industry firm is already accounted for in the multiplier effect; counting it again would result in double-counting and would imply a level of production from the input-supplying industry higher than actually observed. 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, forestry industries that is 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 from recirculation of resources resulting from forestry 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 2011 - 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 forestry industry sectors contained in the industry's definition. These differ from the level of economic activity shown in Tables 2-2 and 2-3 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 forestry management, logging, and miscellaneous forest products 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, which includes all pulping and paper-making activities, continued to be the largest industry segment in 2011 representing 47 percent of the total industry in employment and 74 percent of the entire industry output. The entire forestry industry (totals in Table 3-1) exported (to a non-Georgia destination) output valued at \$13.1 billion in 2011. These activities supported 38,231 jobs with nearly \$2.5 billion in wages and salaries.

Table 3-1: Direct Impacts by Forest Industry Sector (2011)

Sector	Output	Employment	Wages and Salaries
Forestry Management, Logging, and Misc. Forest Products	\$181,583,246	425	\$32,188,740
Lumber and Wood Preservation	\$824,328,448	3,710	\$190,434,320
Veneer, Plywood, Reconstituted, and Engineered Wood	\$525,607,616	2,691	\$145,071,612
Prefabricated Wood Buildings and Manufactured Housing	\$173,794,212	1,358	\$47,374,676
Pulp and Paper Products	\$9,721,193,064	18,109	\$1,521,794,081
Woodworking and Paper Industries Machinery	\$109,763,736	510	\$31,512,900
Wooden Furniture, Cabinets, Custom Arch. & Millwork	\$611,144,820	4,697	\$199,552,987
Windows and Doors	\$452,253,257	2,976	\$136,662,060
Containers, Showcases, Partitions, and Shelving	\$524,171,904	3,755	\$170,461,184
Total	\$13,123,840,303	38,231	\$2,475,052,560

In addition to direct employment, Georgia's forestry 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 model to the direct impacts (provided in Table 3-1.) Table 3-2 summarizes the impacts by aggregated industry codes (used in the input-output model), which are roughly equivalent to two-digit NAICS codes.

As shown, all industries in Georgia are impacted by the activity of the forestry industry. Manufacturing continued to see the biggest benefits, with more than \$15 billion in output, 42,677 employees, and \$2.8 billion in wages and salaries in 2011. A distant second (in employment) was held by agriculture, forestry, fishing and hunting (which includes logging and nurseries), with 8,360 employees and \$405.3 million in compensation. The economic activity supported by Georgia's forestry industry totaled more than \$24.9 billion. This activity supported the employment of 118,459 people who earned nearly \$6.5 billion in 2011.

Table 3-2: Total Benefits by Major Industry (2011)

Sector	Output	Employment	Wages & Salaries
Agriculture, Forestry, Fish & Hunting	\$1,073,962,614	8,360	\$405,290,083
Mining	\$15,744,617	85	\$6,723,068
Utilities	\$634,659,959	996	\$107,153,389
Construction	\$198,300,892	1,649	\$72,571,782
Manufacturing	\$15,009,557,843	42,677	\$2,849,159,990
Wholesale Trade	\$847,162,691	4,948	\$397,368,784
Retail Trade	\$497,046,918	7,980	\$235,129,857
Transportation & Warehousing	\$733,658,348	5,358	\$297,174,214
Information	\$491,025,976	1,307	\$111,041,805
Finance & Insurance	\$990,912,492	4,648	\$307,895,398
Real Estate & Rental	\$1,201,879,091	3,715	\$82,762,101
Professional, Scientific & Tech Services	\$670,231,863	4,900	\$359,090,787
Management of Companies	\$365,686,708	1,903	\$194,913,672
Administrative & Waste Services	\$410,771,699	6,735	\$198,928,604
Educational Services	\$106,604,202	1,442	\$61,711,525
Health & Social services	\$725,565,196	7,393	\$395,061,984
Arts, Entertainment & Recreation	\$76,663,667	1,479	\$30,632,996
Accommodation & Food Services	\$321,199,877	5,673	\$110,896,425
Other Services	\$394,047,819	6,153	\$195,226,975
Government & non-NAICS Industries	\$210,099,466	1,057	\$71,779,630
TOTAL	\$24,974,781,938	118,459	\$6,490,513,069



Table 3-3 extracts information from several previous tables to compare the overall results obtained in each impact analysis conducted from 2003 through 2011. All measures show growth between 2003 and 2004 and between 2004 and 2005. The highest growth rates occurred in industry output which grew between 10 and 14 percent depending on the year and whether it was being calculated for forestry industry activity or total activity. Compensation also increased for these periods. In the 2003 to 2004 period, forestry industry compensation increased by 9.7 percent and total compensation increased by 12 percent, without considering inflation. From 2004 to 2005, the rate of increase was somewhat lower - 4 percent for the forestry industry and 9 percent for total impacts. Employment increases were more modest, increasing 3 percent and 7 percent for forestry industry and total impacts, respectively, in the 2003-to-2004 period. Although employment from total impacts grew an estimated 6 percent between 2004 and 2005, forestry industry employment was essentially flat.

In the 2008-to-2009 period, forestry industry output declined by 7.5 percent, and employment from total impacts fell by 16 and 11.5 percent, respectively. 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 forestry 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 5.3 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 forestry industry's activity picked up pace in 2011, showing growth after three years of continuous decline. Output increased by 4 percent, nearly the same growth rate as in the 2006-2007 period. Employment and compensation also showed improvement, with 7 percent and 13 percent growth rates, respectively. These improvements were also reflected in total impacts which showed higher growth in percentage terms than direct impact. 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.

The annual percent-change information in Table 3-3 is presented graphically below for output, employment, and compensation, measuring levels of direct economic activity (Figure 3-1). This followed by a similar graph measuring total economic impact (Figure 3-2). It should be noted that these data are in nominal dollars and have not been adjusted for inflation. As the graphs show, all metrics,

output, employment, and wages and salaries have stabilized, showing an upward trend.

Table 3-3: Comparison of Results 2003 to 2011

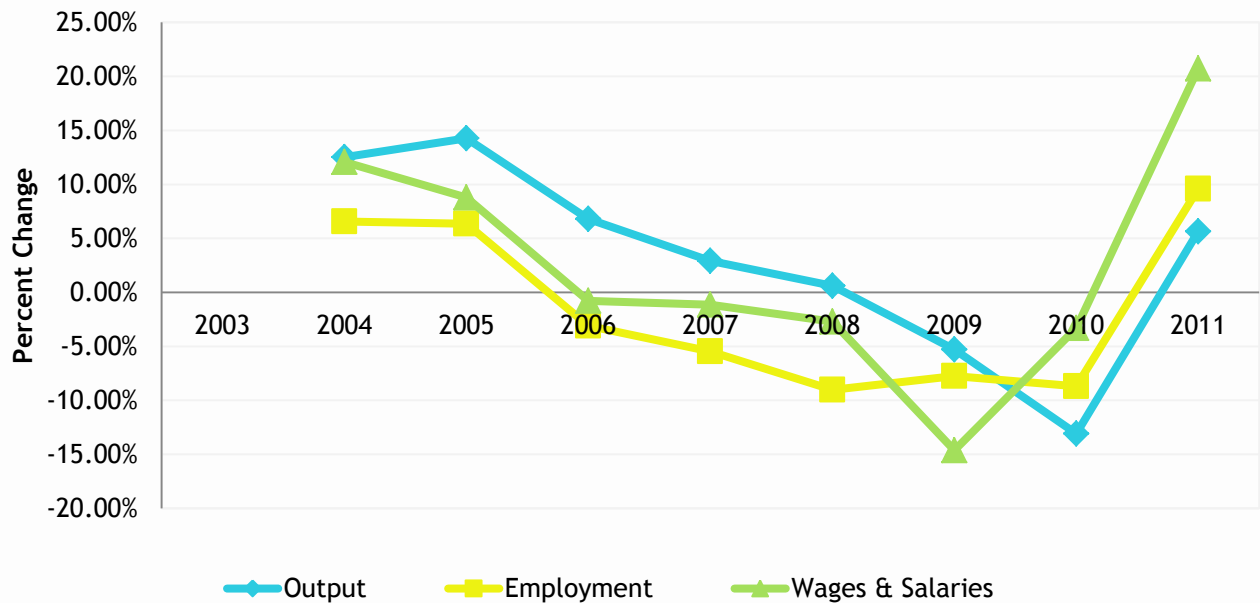
(Dollars in millions; Employment in persons)

Forestry Industry Direct Economic Impact									
	2003	2004	2005	2006	2007	2008	2009	2010	2011
Output	\$12,679	\$14,163	\$16,150	\$17,760	\$18,459	\$18,270	\$16,906	\$14,495	\$15,082
Employment	65,706	67,633	67,694	67,733	64,192	57,812	48,519	43,425	46,378
Wages & Salaries	\$3,007	\$3,299	\$3,422	\$3,513	\$3,394	\$3,131	\$2,770	\$2,624	\$2,972
Year-to-Year Percent Change									
Output		11.7%	14.0%	10.0%	3.9%	-1.0%	-7.5%	-14.3%	4.0%
Employment		2.9%	0.1%	0.1%	-5.2%	-9.9%	-16.1%	-10.5%	6.8%
Wages & Salaries		9.7%	3.7%	2.7%	-3.4%	-7.7%	-11.5%	-5.3%	13.3%
Total Impacts									
	2003	2004	2005	2006	2007	2008	2009	2010	2011
Output	\$20,199	\$22,729	\$25,972	\$27,738	\$28,547	\$28,723	\$27,200	\$23,643	24,975
Employment	136,022	144,944	154,147	149,347	141,155	128,388	118,423	108,112	118,459
Wages & Salaries	\$5,600	\$6,276	\$6,827	\$6,773	\$6,696	\$6,514	\$5,561	\$5,377	\$6,491
Year-to-Year Percent Change									
Output		12.53%	14.27%	6.80%	2.92%	0.62%	-5.30%	-13.08%	5.63%
Employment		6.56%	6.35%	-3.11%	-5.49%	-9.04%	-7.76%	-8.71%	9.57%
Wages & Salaries		12.07%	8.78%	-0.79%	-1.14%	-2.72%	-14.63%	-3.31%	20.72%
Forestry Industry Fiscal Impact									
	2003	2004	2005	2006	2007	2008	2009	2010	2011
State Revenues	\$514	\$546	\$591	\$580	\$566	\$539	\$472	\$448	\$487
State Costs	\$368	\$392	\$414	\$400	\$373	\$333	\$314	\$282	\$308
Net Revenues	\$147	\$155	\$176	\$180	\$193	\$206	\$158	\$166	\$179
Source: E ^l impact assessments and Georgia Department of Labor, Current Employment and Wages									

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



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



Comparison of the Forestry Industry with Other Industry Sectors

It is difficult to appreciate the significance of the impacts generated by the forestry industry without some basis of comparison. This comparison is provided in Table 3-4, which shows that the forestry industry is the third largest industry sector in Georgia (behind food processing and textiles) in employment and the second largest industry in wages and salaries.

Table 3-4: Comparison of Georgia Industries: 2011

Industry Sectors	Employment	Wages & Salaries
Food Processing	52,497	\$1,806,012,334
Textiles	46,911	\$1,772,642,285
Forestry Industry	46,378	\$2,231,474,553
Transportation Equipment	35,793	\$2,353,487,988
Fabricated Metal Products	21,141	\$905,576,138
Chemicals	17,548	\$1,179,864,629
Machinery	15,486	\$798,561,876
Printing	14,162	\$653,028,915
Computers and Electronic Products	9,613	\$957,866,229
Electrical Equipment and Appliances	8,663	\$566,010,698
Apparel	3,288	\$94,225,181

SECTION 4

Economic Impact By Region

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.

Forestry 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 forestry, may not have significant effects. However, in those communities where forestry 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 forestry industry. Instead, this report shows the forestry industry's impact of Georgia's 12 regional commissions. Table 4.1 shows a list of the regional commissions and their respective counties.

Table 4.1: Regional Commissions

Regions	Counties
Northwest GA	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

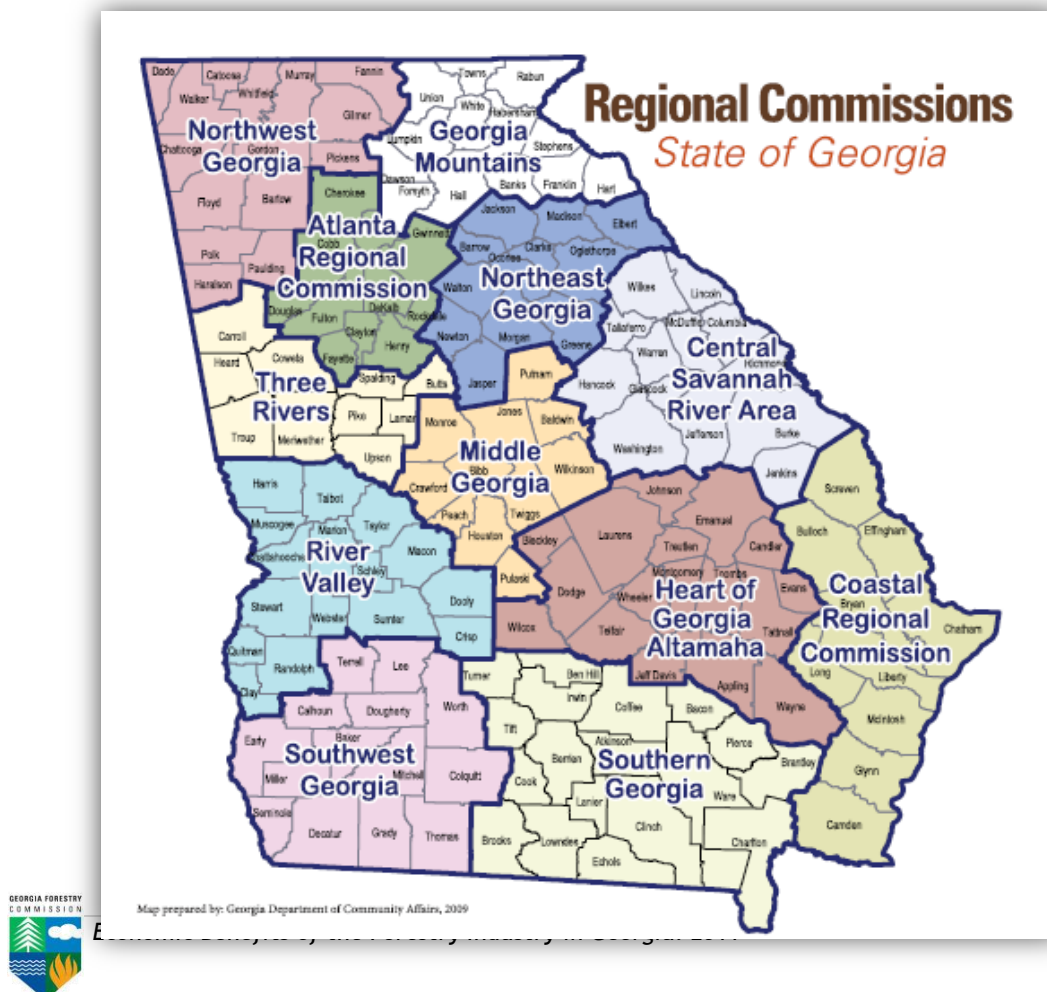
ATL Regional Commission	Cherokee, Clayton, Cobb, DeKalb, Douglas, Fayette, Fulton, Gwinnett, Henry, Rockdale
Three Rivers	Butts, Carroll, Coweta, Heard, Lamar, Meriwether, Pike, Spalding, Troup, Upson
Northeast Georgia	Barrow, Clarke, Elbert, Green, Jackson, Jasper, Madison, Morgan, Newton, Oconee, Oglethorpe, 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
<i>Source: Georgia Department of Community Affairs</i>	

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 forestry industries. Table 4-2 shows that the Atlanta Regional Commission, the Heart of the Georgia Altamaha and Northwest Georgia are the top three regions with the largest employment in the forestry industry. See Figures A-1 through A-3 in the Appendix for maps showing each region's output, employment, and wages and salaries.

Table 4-2: Forestry Industry's Regional Impact

Regions	Output	Employment	Wages & Salaries
Three Rivers	\$882,157,403	2,713	\$173,865,119
Southwest Georgia	\$1,093,360,945	3,362	\$215,491,397
Southern Georgia	\$1,277,016,199	3,927	\$251,688,160
River Valley	\$737,681,937	2,268	\$145,390,332
Northwest Georgia	\$1,425,470,863	4,383	\$280,947,210
Northeast Georgia	\$732,478,371	2,252	\$144,364,757
Middle Georgia	\$940,620,992	2,892	\$185,387,756
Heart of the Georgia Altamaha	\$1,461,283,637	4,493	\$288,005,579
Georgia Mountains	\$696,971,689	2,143	\$137,366,716
Coastal	\$1,396,392,114	4,294	\$275,216,056
Central Savannah River Area	\$1,234,163,306	3,795	\$243,242,249
Atlanta Regional Commission	\$3,204,784,181	9,855	\$631,633,518
Total	\$15,082,381,638	46,378	\$2,972,598,850

Figure 4-1: Map of Regional Commissions



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<http://www.census.gov/epcd/www/naicstab.htm>

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Appendix

Figure A-1: Forestry Industry Output: 2011

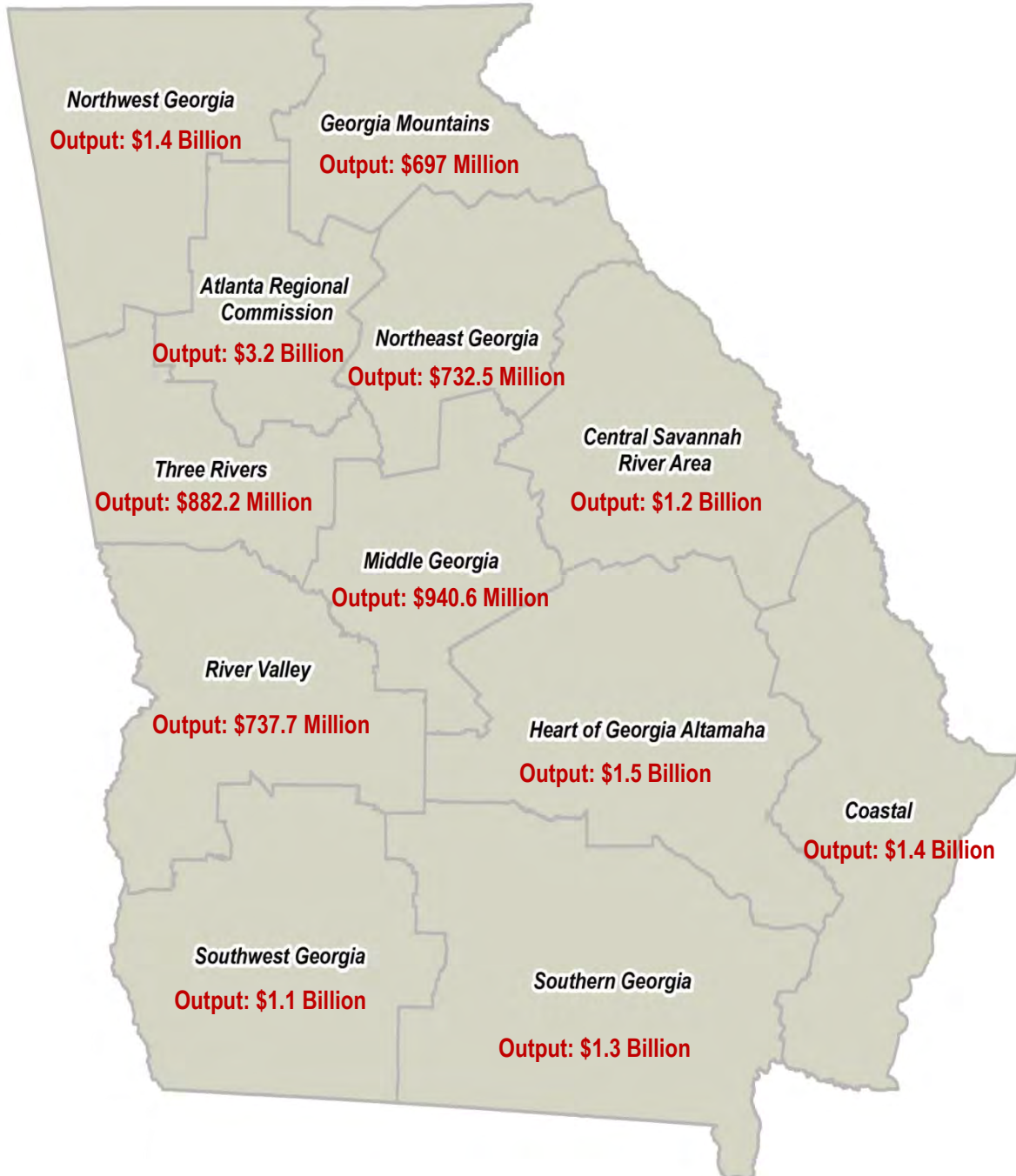


Figure A-2: Forestry Industry Employment: 2011

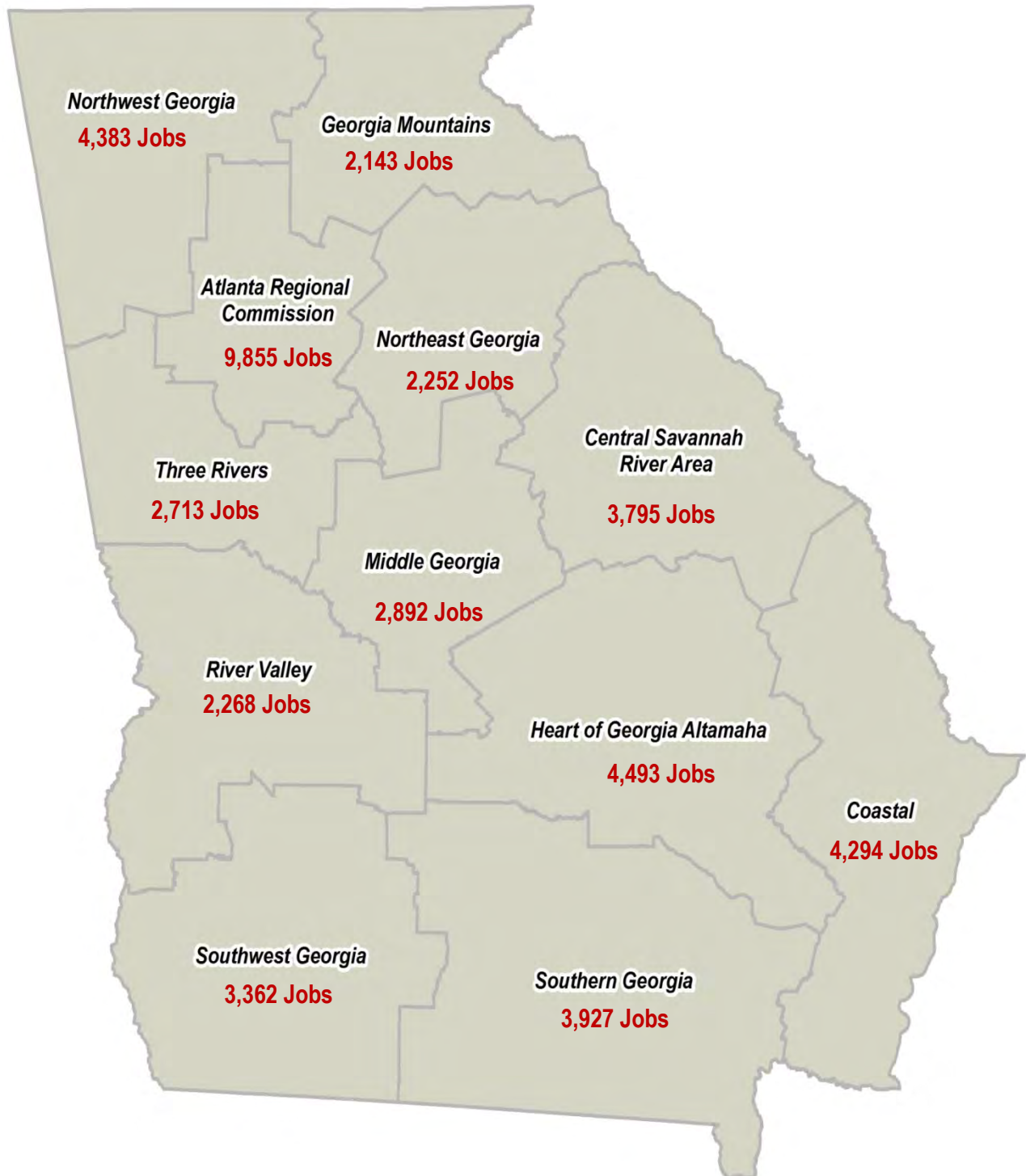


Figure A-3: Forestry Industry Wages and Salaries: 2011

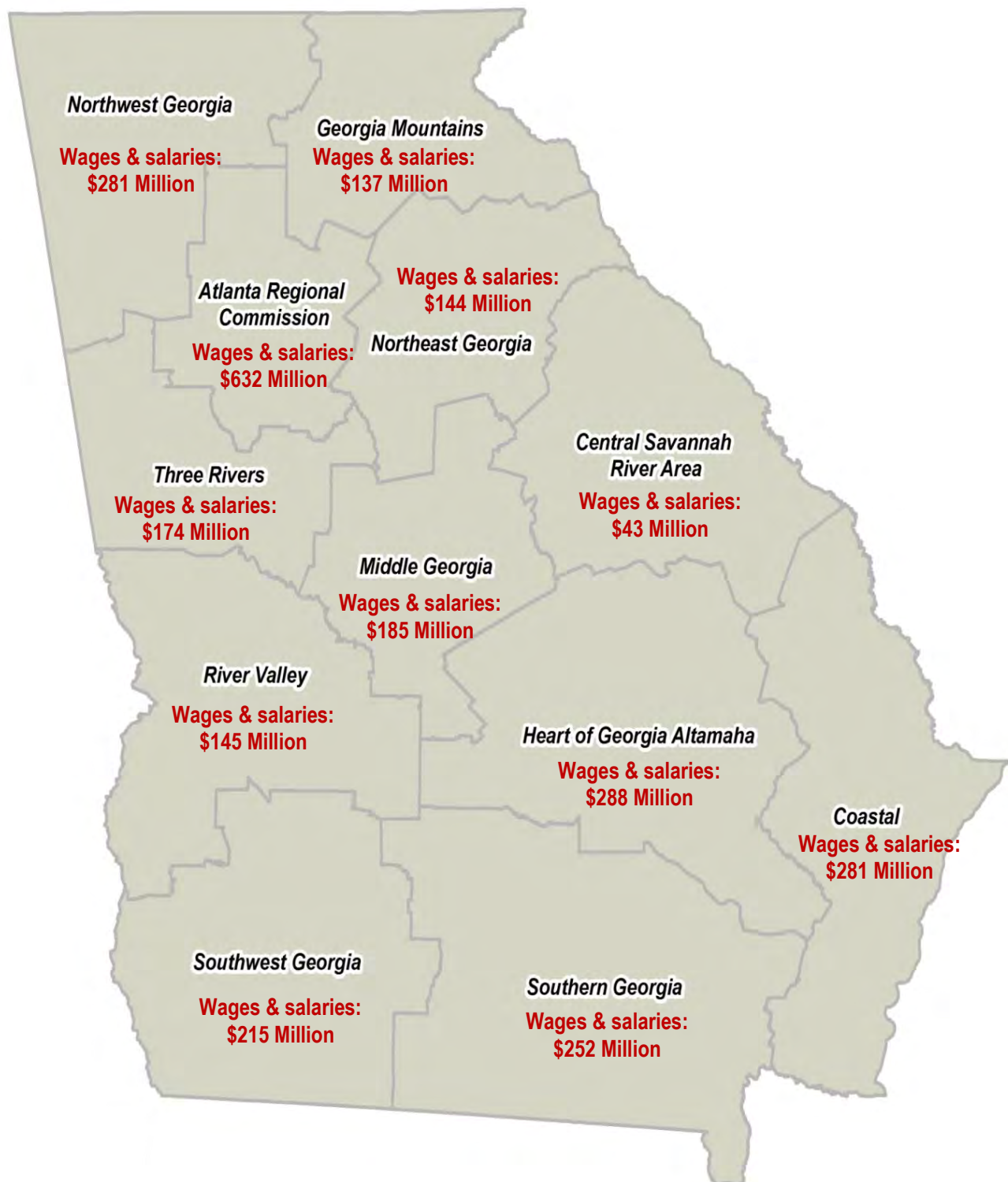


Table A-1: Regions' Dependence on Forestry Industry based on Employment (2011)

Regions	2011 ALL Employment	2011 Forestry Employment	% of Region's Total Employment
Three Rivers	145,064	2,713	1.9%
Southwest Georgia	126,043	3,362	2.7%
Southern Georgia	130,947	3,927	3.0%
River Valley	131,431	2,268	1.7%
Northwest Georgia	240,719	4,383	1.8%
Northeast Georgia	166,305	2,252	1.4%
Middle Georgia	184,288	2,892	1.6%
Heart of Georgia Altamaha	85,929	4,493	5.2%
Georgia Mountains	191,378	2,143	1.1%
Coastal	239,942	4,294	1.8%
Central Savannah	160,417	3,795	2.4%
Atlanta Regional Commission	1,887,820	9,855	0.5%
TOTAL*	3,690,283	46,378	

*** Total does not include jobs not assigned to any county**

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

Table A-2: Regions' Dependence on Forestry Industry based on Compensation (2011)

Regions	2011 ALL Employment	2011 Forestry Employment	% of Region's Total Employment
Three Rivers	\$5,128,961,727	\$173,865,119	3.4%
Southwest Georgia	\$4,216,263,101	\$215,491,397	5.1%
Southern Georgia	\$3,981,882,529	\$251,688,160	6.3%
River Valley	\$4,750,207,704	\$145,390,332	3.1%
Northwest Georgia	\$8,269,235,790	\$280,947,210	3.4%
Northeast Georgia	\$5,877,648,429	\$144,364,757	2.5%
Middle Georgia	\$6,970,648,027	\$185,387,756	2.7%
Heart of Georgia Altamaha	\$2,659,123,049	\$288,005,579	10.8%
Georgia Mountains	\$7,195,849,380	\$137,366,716	1.9%
Coastal	\$9,091,668,835	\$275,216,056	3.0%
Central Savannah	\$6,007,391,969	\$243,242,249	4.0%
Atlanta Regional Commission	\$100,244,174,666	\$631,633,518	0.6%
TOTAL*	\$164,393,055,206	\$2,972,598,850	

*** Total does not include wages and salaries of jobs not assigned to any county**

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

