

# Economic Benefits of the Forestry Industry in Georgia: 2004

Final Report

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# Executive Summary

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Georgia's forestry industry has many components, which interact with all other sectors of the economy in complex ways. The purpose of this analysis is 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 activity in the forestry industry with other industries, and (4) assess the degree of forestry dependence of Georgia's counties.

The forestry industry components, and the level of economic activity represented by them, are shown in Table E-1 for 2004. Economic activity is measured by output (similar to sales revenue), employment, and income (defined as wages and salaries including benefits plus proprietor income). These measures are traditionally used in this type of analysis.

Table E-1 shows the forestry industry employed 67,633 in all industry sectors combined, paid an annual compensation (wages and salaries plus benefits) of almost \$3.3 billion, and had estimated total revenue of almost \$14.2 billion.

The activities in the sectors shown in Table E-1 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 direct impacts), is also measured by output, employment, and income (Table E-2).

Economic activity, including the multiplier effect and federal payments to landowners of about \$12.4 million, supported by the forestry industry in Georgia is over \$22.7 billion. This activity employs 144,944 people whose compensation is almost \$6.3 billion.

Another way to examine the forestry industry in Georgia is to compare it with other manufacturing sectors. Table E-3 lists the income and employment totals for each major industry sector sorted by total income for 2004. These data show that forestry ranks second in total income generated, and third in total employment. Food processing ranks first in income and employment; textiles (dominated by carpet) ranks second in employment and third in income. Forestry ranks third in employment and second in income, but is very close to first-ranked food processing in income, reflecting forestry's relatively higher average wages.

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 economic activity and subtracting the costs associated with providing state services to Georgia's households and companies. Revenues include individual and corporate income tax, sales and use taxes, highway taxes, fees, and

miscellaneous revenues. Costs estimated include education, public health, safety and welfare costs, highways, administration, and miscellaneous costs. Table E-4 provides these estimates for both direct and total impacts. The forestry industry generates an estimated \$548 million per year in revenues for the state budget. When the costs of providing services to the employees (such as educating their children) of the forestry industry, and the economic activity supported by the forestry industry, are deducted from these revenues, the net annual fiscal benefit from the forestry industry is almost \$155 million per year.

Table E-5 extracts information from several tables to present a comparison of the overall results obtained in 2003 and 2004. Most measures show healthy increases between 2003 and 2004, with industry activity output and compensation increasing by about 12 percent and 10 percent, respectively. Industry activity employment also showed growth, though at a more modest 3 percent pace. Total benefits, as measured by output and compensation, increased by about 12 percent with total employment increasing about 6 percent. All fiscal impact measures increased by about 6 percent with net revenues to the state government increasing from about \$147 million to \$155 million.

**Table E-1: Georgia Forestry Industry Economic Activity: 2004**

<u>Sector</u>	<u>Output</u>	<u>Employment</u>	<u>Compensation</u>
Logging and Nurseries	\$1,384,113,152	6,005	\$234,098,548
Lumber and Wood Preservation	\$1,481,513,824	8,505	\$352,721,316
Veneer, Plywood, Reconstituted, and Engineered Wood	\$1,062,298,144	6,588	\$312,041,524
Prefabricated Wood Buildings and Manufactured Housing	\$388,201,924	3,494	\$121,569,812
Pulp and Paper Products	\$7,887,861,361	25,032	\$1,616,422,198
Woodworking and Paper Industries Machinery	\$46,696,992	292	\$18,023,702
Wooden Furniture and Cabinets	\$841,050,860	8,685	\$301,810,254
Windows and Doors	\$343,669,472	2,522	\$104,148,424
Containers, Showcases, Partitions, and Shelving	\$453,711,824	5,031	\$180,908,656
Custom Architectural and Miscellaneous Wood Products	<u>\$273,554,243</u>	<u>1,479</u>	<u>\$57,467,145</u>
Total	\$14,162,671,796	67,633	\$3,299,211,578

Source: Georgia Department of Labor (ES202) and Georgia Tech's Office of Economic Development and Technology Ventures

**Table E-2: Total Benefits by Major Industry Sector, 2004**

Sector	Output	Employment	Compensation
Forestry, Fishing and Hunting	\$1,543,749,376	11,485	\$338,932,384
Mining	\$10,116,655	45	\$3,208,737
Utilities	\$535,731,520	845	\$109,603,768
Construction	\$75,519,600	932	\$35,359,572
Manufacturing	\$13,735,080,960	65,308	\$3,260,418,560
Wholesale Trade	\$1,189,933,696	7,684	\$476,812,768
Transportation and Warehousing	\$780,233,024	7,076	\$302,091,872
Retail Trade	\$554,662,400	10,108	\$251,341,248
Information	\$253,051,792	1,006	\$74,317,296
Finance and Insurance	\$659,256,448	3,566	\$213,347,440
Real Estate and Rental	\$457,419,872	2,565	\$78,783,544
Professional, Technical, and Scientific Services	\$383,716,768	3,991	\$223,531,520
Management of Companies	\$340,189,376	2,336	\$161,050,176
Administrative and Waste Services	\$204,484,496	3,864	\$100,509,704
Educational Services	\$65,824,872	1,257	\$36,333,568
Health and Social Services	\$492,226,720	6,614	\$271,219,904
Arts, Entertainment and Recreation	\$74,493,144	1,470	\$32,349,616
Accommodation and Food Services	\$284,008,288	6,727	\$109,443,504
Other Services	\$411,374,208	7,134	\$161,908,496
Government and Non-NAICS Industries	<u>\$674,359,168</u>	<u>932</u>	<u>\$35,653,716</u>
Total	\$22,729,379,114	144,944	\$6,276,217,393

Source: Georgia Department of Labor (ES202) and Georgia Tech's Office of Economic Development and Technology Ventures

**Table E-3: Comparison of Georgia Industries**

Sector	Employment	Wages & Salaries
Food Products	74,010	\$2,732,457,209
Forestry Industry	67,633	\$2,577,509,046
Textile Products	77,250	\$2,490,004,725
Transportation Equipment	46,410	\$2,354,768,959
Chemicals	21,579	\$1,160,566,913
Machinery	23,674	\$941,868,614
Fabricated Metal Products	26,174	\$917,068,781
Plastic and Rubber Products	25,364	\$912,979,772
Printing	20,885	\$866,960,426
Electrical Equipment	16,382	\$851,499,984
Computer and Electronic Products	13,533	\$788,798,762
Non-Metallic Minerals	20,008	\$784,336,505
Miscellaneous Manufacturing	13,973	\$572,517,254
Primary Metals	8,121	\$341,534,613
Apparel	8,868	\$218,147,641
Petroleum Products	1,195	\$58,577,420

Source: Georgia Department of Labor (ES202)

<b>Table E-4: Fiscal Impact Analysis Results</b>	
	<b>Average Annual</b>
State Government Revenues	\$546,833,396
State Government Costs	<u>\$391,943,929</u>
Net Revenues	\$154,889,467

Source: Georgia Tech's Office of Economic Development and Technology Ventures

<b>Table E-5: Comparison of Results, 2003 and 2004</b>		
<b>Industry Economic Activity</b>	<b>2003</b>	<b>2004</b>
Output	\$12,679,309,984	\$14,162,671,796
Employment	65,706	67,633
Compensation	\$3,007,249,626	\$3,299,211,578
<b>Total Benefits</b>	<b>2003</b>	<b>2004</b>
Output	\$20,199,375,517	\$22,729,379,114
Employment	136,022	144,944
Compensation	\$5,600,491,974	\$6,276,217,393
<b>Fiscal Impact</b>	<b>2003</b>	<b>2004</b>
State Revenues	\$514,089,031	\$546,361,719
State Costs	<u>\$367,579,485</u>	<u>\$391,523,592</u>
Net Revenues	\$146,509,546	\$154,838,126

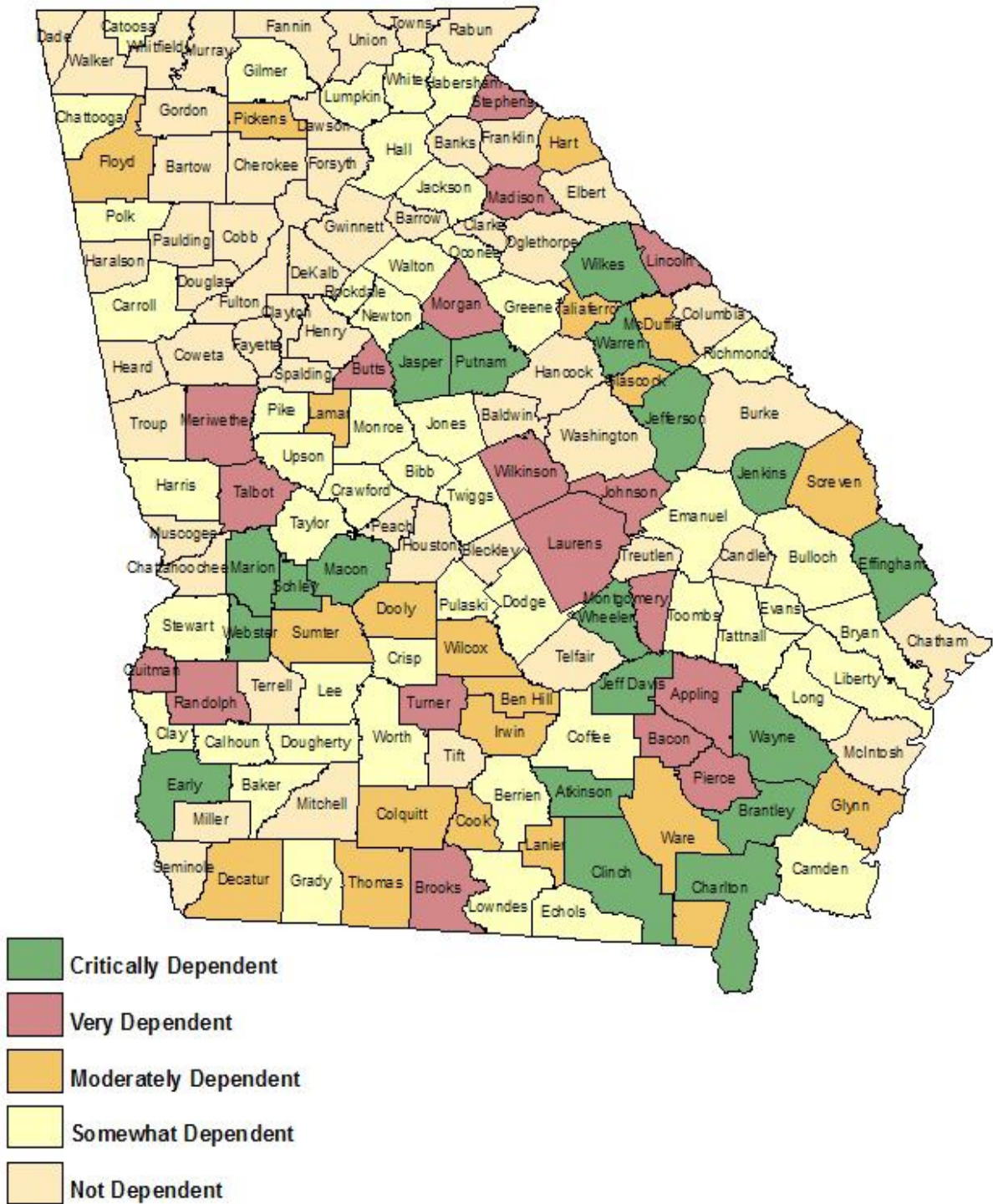
Source: Georgia Tech's Office of Economic Development and Technology Ventures

## Forestry Dependent Communities

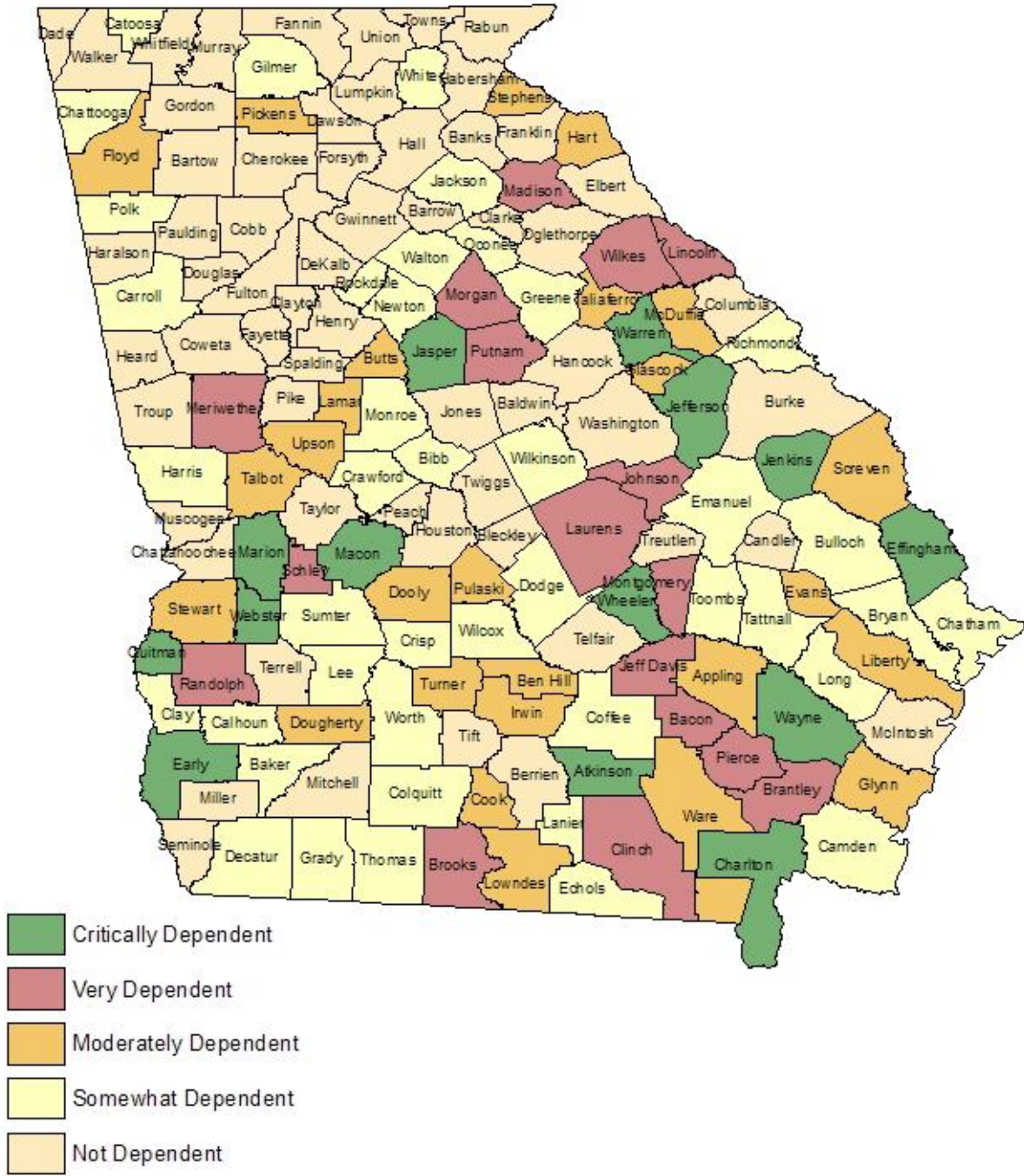
The economies of Georgia's counties are all dependent upon their ability to bring resources into their areas. There is no clear definition of "dependence" so two measures were developed. The first is based on employment where "critically dependent" counties have more than 10 percent of their total private-sector employment (according to ES202 data) in the forestry industry. "Very dependent" counties have between 6 percent and 10 percent of their employment in forestry industries and "moderately dependent", "somewhat dependent" and "not dependent have between 4 percent and 5.9 percent, 1.6 percent and 3.9 percent, and less than 1.6 percent of their employment in forestry industries, respectively. Figure E-1 depicts the degree of economic dependence on forestry, as measured by its proportion of total employment.

Another measure of dependence is provided by wages and salaries. For this measure, counties are considered "critically dependent" if more than 15 percent of total private-sector wages and salaries are from forestry-related industries. "Very dependent" counties have between 10 percent and 15 percent of their employment in forestry industries and "moderately dependent", "somewhat dependent" and "not dependent have between 5 percent and 10 percent, 2 percent and 5 percent, and less than 2 percent of their wages and salaries from forestry industries, respectively. Figure E-2 depicts the degree of economic dependence on forestry, as measured by its proportion of total wages and salaries.

**Figure E-1: Forestry-Dependent Communities Based on Employment**



**Figure E-2: Forestry-Dependent Communities Based on Income**





## SECTION 1

# Introduction

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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 household income where economic output is defined as business revenues and household income is defined as wages, salaries (including benefits), and proprietor income. Additional factors considered include how the manufacturing components in the forestry industry compare to other manufacturing sectors, and how the industry affects state government costs and revenues.

The first step in this process is to define the limits of what constitutes the "forestry industry." This is not as simple a task as it may appear 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 examines how important the forestry components are to the existing industry base in each of Georgia's counties and divides counties into four categories according to their degree of dependence on forestry.

## SECTION 2

# Definition of the Forestry Industry in Georgia

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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 coding system follows the North American Industrial Classification System (NAICS) that replaced the Standard Industrial Classification (SIC) system in 1997. The NAICS codes and descriptions comprising the detailed definition appear in Table 2-1.

The organization of the industries on this list resembles the SIC system in that the number of digits of the NAICS codes increases as the level of detail increases. The highest level of detail practicable is the six-digit level, which roughly equals the four-digit level in the older SIC system. In some cases, however, the six-digit industry is the same as the five-digit industry, so these duplications are not presented in Table 2-1. For example, industry 11311 (timber tract operations) does not break down into smaller components, so the six-digit industry (which would be 113110) is omitted because it's redundant.

In some cases, the higher-level NAICS industries contain components that are not a part of the forestry industry. For example, metal furniture is included in NAICS 3371, but is not included at the six-digit level. Each component containing only forestry-related industries is indicated by italicized text in the table. Non-forestry-related components have been eliminated.

**Table 2-1: Forestry Industry Definition Components: NAICS**

NAICS	Description
113	<i>Forestry and Logging</i>
1131	<i>Timber Tract Operations</i>
11311	<i>Timber Tract Operations</i>
1132	<i>Forest Nurseries and Gathering of Forest Products</i>
11321	<i>Forest Nurseries and Gathering of Forest Products</i>
1133	<i>Logging</i>
11331	<i>Logging</i>
321	<i>Wood Product Manufacturing</i>
3211	<i>Sawmills and Wood Preservation</i>

32111 *Sawmills and Wood Preservation*  
 321113 *Sawmills*  
 321114 *Wood Preservation*  
     3212 *Veneer, Plywood, and Engineered Wood Product Manufacturing*  
         32121 *Veneer, Plywood, and Engineered Wood Product Manufacturing*  
 321211 *Hardwood Veneer and Plywood Manufacturing*  
 321212 *Softwood Veneer and Plywood Manufacturing*  
 321213 *Engineered Wood Member (except Truss) Manufacturing*  
 321214 *Truss Manufacturing*  
 321219 *Reconstituted Wood Product Manufacturing*  
     3219 *Other Wood Product Manufacturing*  
     32191 *Millwork*  
         321911 *Wood Window and Door Manufacturing*  
         321912 *Cut Stock, Resawing Lumber, and Planing*  
         321918 *Other Millwork (including Flooring)*  
         32192 *Wood Container and Pallet Manufacturing*  
         32199 *All Other Wood Product Manufacturing*  
 321991 *Mobile Homes*  
 321992 *Prefabricated Wood Building Manufacturing*  
 321999 *All Other Miscellaneous Wood Product Manufacturing*  
     322 *Paper Manufacturing*  
         3221 *Pulp, Paper, and Paperboard Mills*  
         32211 *Pulp Mills*  
         32212 *Paper Mills*  
         322121 *Paper (except Newsprint) Mills*  
         322122 *Newsprint Mills*  
         32213 *Paperboard Mills*  
         3222 *Converted Paper Product Manufacturing*  
         32221 *Paperboard Container Manufacturing*  
         322211 *Corrugated and Solid Fiber Box Manufacturing*  
         322212 *Folding Paperboard Box Manufacturing*  
         322213 *Setup Paperboard Box Manufacturing*  
         322214 *Fiber Can, Tube, Drum, and Similar Products Manufacturing*  
         322215 *Non-folding Sanitary Food Container Manufacturing*  
         32222 *Paper Bag and Coated and Treated Paper Manufacturing*  
         322221 *Coated and Laminated Packaging Paper and Plastics Film Manufacturing*  
         322222 *Coated and Laminated Paper Manufacturing*  
         322223 *Plastics, Foil, and Coated Paper Bag Manufacturing*  
         322224 *Uncoated Paper and Multiwall Bag Manufacturing*  
         322225 *Laminated with Foil for Flexible Packaging*  
         322226 *Surface-Coated Paperboard Manufacturing*  
         32223 *Stationery Product Manufacturing*  
         322231 *Die-Cut Paper and Paperboard Office Supplies Manufacturing*  
         322232 *Envelope Manufacturing*  
         322233 *Stationery, Tablet, and Related Product Manufacturing*  
         32229 *Other Converted Paper Product Manufacturing*  
         322291 *Sanitary Paper Product Manufacturing*  
         322299 *All Other Converted Paper Product Manufacturing*  
     33321 *Sawmill and Woodworking Machinery Manufacturing*  
     333291 *Paper Industry Machinery Manufacturing*

337	Furniture & Related Product Manufacturing
3371	Household and Institutional Furniture and Kitchen Cabinet Manufacturing
33711	<i>Wood Kitchen Cabinet and Countertop Manufacturing</i>
33712	Household and Institutional Furniture Making
337121	<i>Upholstered Household Furniture Manufacturing</i>
337122	<i>Non-Upholstered Wood Household Furniture Manufacturing</i>
337127	<i>Institutional Furniture Manufacturing</i>
337129	<i>Wood Television, Radio, and Sewing Machine Cabinet Manufacturing</i>
337211	<i>Wood Office Furniture Manufacturing</i>
337212	<i>Custom Architectural Woodwork and Millwork Manufacturing</i>
337215	<i>Showcase, Partition, Shelving, and Locker Manufacturing</i>
333	Machinery Manufacturing
3332	Industrial Machinery Manufacturing
33321	<i>Sawmill and Woodworking Machinery Manufacturing</i>
33329	Other Industrial Machinery Manufacturing
333291	<i>Paper Industry Machinery Manufacturing</i>
339	Miscellaneous Manufacturing
3399	Other Miscellaneous Manufacturing
33999	All Other Miscellaneous Manufacturing
339995	<i>Burial Casket Manufacturing</i>

Source: North American Industrial Classification System, and Georgia Tech's Economic Development Institute

The level of economic activity in each forestry industry component is measured by output, employment, and income. Measures for the 2004 calendar year 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 is 67,633 and these jobs earned annual compensation (total wages and salaries including benefits) of almost \$3.2 billion from estimated total revenue of almost \$14.2 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 25,032 workers followed by wooden furniture and cabinets with 8,685. Many segments have employment exceeding 5,000, including wood lumber and wood preservation, veneer and plywood, logging and nurseries, and containers, showcases, partitions and shelving. Compensation, like employment, is dominated by pulp and paper with over \$1.6 billion (about half the total) followed distantly by lumber and wood preservation (almost \$353 million) and veneer and plywood at over \$312 million. The largest outputs are produced by pulp and paper (about \$7.9 billion) followed by lumber and plywood, (about \$1.4 billion) and logging and nurseries at almost \$1.4 billion.

**Table 2-2: Georgia Forestry Industry Economic Activity: 2004**

<b>Sector</b>	<b>Output</b>	<b>Employment</b>	<b>Compensation</b>
Logging and Nurseries	\$1,384,113,152	6,005	\$234,098,548
Lumber and Wood Preservation	\$1,481,513,824	8,505	\$352,721,316
Veneer, Plywood, Reconstituted, and Engineered Wood	\$1,062,298,144	6,588	\$312,041,524
Prefabricated Wood Buildings and Manufactured Housing	\$388,201,924	3,494	\$121,569,812
Pulp and Paper Products	\$7,887,861,361	25,032	\$1,616,422,198
Woodworking and Paper Industries Machinery	\$46,696,992	292	\$18,023,702
Wooden Furniture and Cabinets	\$841,050,860	8,685	\$301,810,254
Windows and Doors	\$343,669,472	2,522	\$104,148,424
Containers, Showcases, Partitions, and Shelving	\$453,711,824	5,031	\$180,908,656
Custom Architectural and Miscellaneous Wood Products	<u>\$273,554,243</u>	<u>1,479</u>	<u>\$57,467,145</u>
Total	\$14,162,671,796	67,633	\$3,299,211,578

Source: Georgia Tech's Office of Economic Development and Technology Ventures

Table 2-3 provides a comparison of the forestry industry activity for 2003 and 2004. Three measures are included in the comparison: output, employment, and compensation. Output increased in all industry segments except prefabricated wooden buildings and manufactured housing, and windows and doors. The overall increase was a healthy 12 percent. Employment also increased in most sectors except for prefabricated buildings, windows and doors, and wood furniture and cabinets. Compensation, however, appears to have increased in all sectors with an overall increase of about 10 percent.

**Table 2-3: Forestry Industry Activity 2003 and 2004 Comparison**

<b>Sector</b>	<b>Output</b>	
	<b>2003</b>	<b>2004</b>
Logging and Nurseries	\$1,191,966,272	\$1,384,113,152
Lumber and Wood Preservation	\$1,442,919,488	\$1,481,513,824
Veneer, Plywood, Reconstituted, and Engineered Wood	\$918,940,784	\$1,062,298,144
Prefabricated Wood Buildings and Manufactured Housing	\$436,562,636	\$388,201,924
Pulp and Paper Products	\$6,979,274,805	\$7,887,861,361
Woodworking and Paper Industries Machinery	\$35,781,917	\$46,696,992
Wooden Furniture and Cabinets	\$760,820,518	\$841,050,860
Windows and Doors	\$396,587,968	\$343,669,472
Containers, Showcases, Partitions, and Shelving	\$365,839,808	\$453,711,824
Custom Architectural and Miscellaneous Wood Products	<u>\$150,615,788</u>	<u>\$273,554,243</u>
<b>Total</b>	<b>\$12,679,311,987</b>	<b>\$14,162,671,796</b>

	<b>Employment</b>	
	<b>2003</b>	<b>2004</b>
Logging and Nurseries	5,859	6,005
Lumber and Wood Preservation	8,580	8,505
Veneer, Plywood, Reconstituted, and Engineered Wood	5,748	6,588
Prefabricated Wood Buildings and Manufactured Housing	3,736	3,494
Pulp and Paper Products	23,541	25,032
Woodworking and Paper Industries Machinery	284	292
Wooden Furniture and Cabinets	9,174	8,685
Windows and Doors	2,810	2,522
Containers, Showcases, Partitions, and Shelving	4,856	5,031
Custom Architectural and Miscellaneous Wood Products	<u>1,118</u>	<u>1,479</u>
<b>Total</b>	<b>65,706</b>	<b>67,633</b>

	<b>Compensation</b>	
	<b>2003</b>	<b>2004</b>
Logging and Nurseries	\$204,834,608	\$234,098,548
Lumber and Wood Preservation	\$324,879,239	\$352,721,316
Veneer, Plywood, Reconstituted, and Engineered Wood	\$255,885,812	\$312,041,524
Prefabricated Wood Buildings and Manufactured Housing	\$113,877,434	\$121,569,812
Pulp and Paper Products	\$1,528,539,233	\$1,616,422,198
Woodworking and Paper Industries Machinery	\$17,445,573	\$18,023,702
Wooden Furniture and Cabinets	\$273,922,091	\$301,810,254
Windows and Doors	\$90,458,888	\$104,148,424
Containers, Showcases, Partitions, and Shelving	\$158,887,832	\$180,908,656
Custom Architectural and Miscellaneous Wood Products	<u>\$38,518,917</u>	<u>\$57,467,145</u>
<b>Total</b>	<b>\$3,007,251,629</b>	<b>\$3,299,211,578</b>

Source: Georgia Tech's Office of Economic Development and Technology Ventures

## SECTION 3

# Economic Benefits

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Economic impact analyses have used basically the same methods for over 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 model (I/O).

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 2003, whereas the wage and salary data available to IMPLAN is from 2001.

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 25 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 after the industry sectors are defined, 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 are used to accomplish this.

The best source for employment and wages is the employment security data collected and maintained by the Georgia Department of Labor. Commonly called ES202 data, it has the advantage of being current, allowing an estimate of the economic benefits occurring in 2004. 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 governmental employees.

The second task is to divide the forestry industry output into two categories, (1) output that is 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 is 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 are exported to entities outside Georgia. These are considered exports even if they only go to Alabama.

The third step is to use the I/O model to estimate total impacts, which are 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 benefits.

Three measures of economic benefits are provided. The first, output, is a measure of how much each industry or sector produced in 2003 – roughly equivalent to a measure of sales revenue. The second measure is income, including all household income and employee benefits. The third measure is employment provided by the firms in each forestry-related industry.

## Results

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 Table 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 logging and nurseries industry segment because most of it seems 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.

The largest industry segment by far is “Pulp and Paper”, which includes all pulping and paper-making activities representing about half of the total industry. Together, the forestry industry exports over \$12 billion with this activity supporting 58,347 jobs with an employee compensation of over \$2.9 billion.

Recirculation of dollars brought into Georgia’s economy (as measured by the direct impacts) support a higher level of economic activity. This higher level is estimated by applying the IMPLAN input-output model to the direct impacts provided in Table 3-1. The results of this analysis are presented in Table 3-2. Because all industries in Georgia are affected by the forestry industry, Table 3-2 summarizes the benefits by aggregated industry codes (used in the input-output model), which are roughly equivalent to two-digit NAICS code.

**Table 3-1: Direct Impacts by Forest Industry Sector**

Sector	Output	Employment	Compensation
Logging and Nurseries	\$255,351,816	354	\$25,972,577
Lumber and Wood Preservation	\$1,034,212,604	6,195	\$258,178,896
Veneer, Plywood, Reconstituted, and Engineered Wood	\$949,240,288	6,020	\$280,726,360
Prefabricated Wood Buildings and Manufactured Housing	\$388,072,968	3,493	\$121,535,415
Pulp and Paper Products	\$7,871,199,072	24,974	\$1,613,138,955
Woodworking and Paper Industries Machinery	\$40,033,857	256	\$15,336,980
Wooden Furniture and Cabinets	\$818,867,020	8,459	\$294,079,856
Windows and Doors	\$335,902,208	2,465	\$101,794,568
Containers, Showcases, Partitions, and Shelving	\$434,137,312	4,808	\$173,029,344
Custom Architectural and Miscellaneous Wood Products	<u>\$249,837,715</u>	<u>1,323</u>	<u>\$51,379,919</u>
Total	\$12,376,854,860	58,347	\$2,935,172,869

Source: Georgia Tech’s Office of Economic Development and Technology Ventures

The largest sector benefits are seen, not surprisingly, in the manufacturing sector, with some \$13.7 billion in output, 65,304 employees, and about \$3.3 billion in compensation. A distant second is held by forestry, fishing and hunting (which includes logging and nurseries), with over \$1.5 billion in output, 11,484 employees, and almost \$339 million in compensation. Together, the economic activity supported by Georgia’s forestry industry (including federal payments to landowners of about \$12.4 million) totals over \$22.7 billion, involving employment of 144,944 people whose compensation approaches \$6.3 billion. This employment represents about 3.6 percent of total Georgia employment and 3.3 percent of household income when compared to 2004 ES202 totals.

**Table 3-2: Total Benefits by Major Industry Sector**

<b>Sector</b>	<b>Output</b>	<b>Employment</b>	<b>Compensation</b>
Forestry, Fishing and Hunting	\$1,543,749,376	11,485	\$338,932,384
Mining	\$10,116,655	45	\$3,208,737
Utilities	\$535,731,520	845	\$109,603,768
Construction	\$75,519,600	932	\$35,359,572
Manufacturing	\$13,735,080,960	65,308	\$3,260,418,560
Wholesale Trade	\$1,189,933,696	7,684	\$476,812,768
Transportation and Warehousing	\$780,233,024	7,076	\$302,091,872
Retail Trade	\$554,662,400	10,108	\$251,341,248
Information	\$253,051,792	1,006	\$74,317,296
Finance and Insurance	\$659,256,448	3,566	\$213,347,440
Real Estate and Rental	\$457,419,872	2,565	\$78,783,544
Professional, Technical, and Scientific Services	\$383,716,768	3,991	\$223,531,520
Management of Companies	\$340,189,376	2,336	\$161,050,176
Administrative and Waste Services	\$204,484,496	3,864	\$100,509,704
Educational Services	\$65,824,872	1,257	\$36,333,568
Health and Social Services	\$492,226,720	6,614	\$271,219,904
Arts, Entertainment and Recreation	\$74,493,144	1,470	\$32,349,616
Accommodation and Food Services	\$284,008,288	6,727	\$109,443,504
Other Services	\$411,374,208	7,134	\$161,908,496
Government and Non-NAICS Industries	<u>\$674,359,168</u>	<u>932</u>	<u>\$35,653,716</u>
<b>Total</b>	<b>\$22,729,379,114</b>	<b>144,944</b>	<b>\$6,276,217,393</b>

Source: Georgia Tech's Office of Economic Development and Technology Ventures

Table 3-3 provides a comparison between the output, employment and compensation estimates derived in the 2003 and current study. All sectors showed increases over the 2003 estimates, with the largest increases seen in the manufacturing sector.

**Table 3-3: Benefits by Major Sector, Comparison of 2003 and 2004**

Sector	Output	
	2003	2004
Agriculture	\$1,360,602,624	\$1,553,836,160
Mining	\$440,894,336	\$612,409,472
Construction	\$4,043,117	\$4,999,219
Manufacturing	\$15,696,871,424	\$17,525,110,784
Transportation, Communication, Utilities	\$385,775,520	\$391,299,520
Retail and Wholesale Trade	\$367,677,952	\$529,759,104
Finance, Insurance, Real Estate	\$130,927,760	\$152,917,152
Services	<u>\$1,812,582,784</u>	<u>\$1,955,100,928</u>
Total	\$20,199,375,517	\$22,729,379,070

Sector	Employment	
	2003	2004
Agriculture	10,631	11,530
Mining	1,538	1,780
Construction	6	8
Manufacturing	91,820	96,814
Transportation, Communication, Utilities	3,596	3,663
Retail and Wholesale Trade	4,714	5,382
Finance, Insurance, Real Estate	2,448	2,614
Services	<u>21,268</u>	<u>23,154</u>
Total	136,022	144,944

Sector	Compensation	
	2003	2004
Agriculture	\$293,088,928	\$342,135,648
Mining	\$110,110,824	\$145,096,208
Construction	\$325,294	\$395,829
Manufacturing	\$4,163,787,008	\$4,637,560,832
Transportation, Communication, Utilities	\$187,341,440	\$208,758,032
Retail and Wholesale Trade	\$210,949,728	\$252,744,736
Finance, Insurance, Real Estate	\$65,357,040	\$71,216,608
Services	<u>\$569,531,712</u>	<u>\$618,309,504</u>
Total	\$5,600,491,974	\$6,276,217,397

Source: Georgia Tech's Office of Economic Development and Technology Ventures

### 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, and exceeding industries such as transportation equipment.

**Table 3-4: Comparison of Georgia Industries**

Sector	Employment	Payroll
Food Processing	72,659	\$2,696,173,701
Textiles	77,593	\$2,308,892,621
Apparel	9,594	\$232,474,697
Printing	21,254	\$831,154,795
Chemicals	22,462	\$1,144,543,886
Machinery	23,550	\$905,308,291
Computers and Electronic Products	14,939	\$838,923,851
Transportation Equipment	43,821	\$2,144,050,645
Forestry Industry	65,706	\$2,241,929,734

Source: Georgia Department of Labor

## SECTION 4

# Economic Dependence

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### What Is Economic Dependence?

Economies are interwoven in a complex web. In general, however, a local economy's economic health depends on the flow of resources into and out of it. Economic base theory calls those sectors within an economy that are 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, and it also pays wages to its employees who are available to be spent 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 of economic support activities, such as retail, are likewise generally dependent.

### Approach

There is no clear delineation between economic dependence and non-dependence, and there are many possible facets that can be examined to depict the spectrum that describes the degree of dependence. This analysis examines the proportion of the county-level employment and income (as defined by wages and salaries) indicated by the ES202 data that is attributable directly to forestry industries. Multiplier effects are difficult to distribute to individual counties, and were therefore not included in the definition of forestry-related industries. This exclusion serves to underestimate the true proportion of the county economy supported by forestry.

The ranges of county employment attributable to forestry-related industries used to define the degree of dependence is provided in Table 4-1, which also provided the definitions used to define dependence according to the percentage of income (wages and salaries) attributable to forestry-related industries. These ranges were developed judgmentally, and are intended to define "dependence" in a very general sense.

Applying these criteria to Georgia's counties results in a distribution of counties as depicted in Table 4-2 for employment and income. While most (102) counties are considered either not, or somewhat, dependent on forestry industries, the remaining 59, concentrated in south Georgia, owe significant proportions of their livelihood to forestry.

Figure 4-1 depicts the degree of forestry-related dependence based on employment and Figure 4-2 depicts the degree of dependence based on income. Table 4-3 provides the percentages of forestry to county employment and wages and salaries used to assign the degree of dependence.

<b>Table 4-1: Definitions of Levels of Dependence</b>		
	Percentage of County Direct Forestry:	
	Employment	Wages & Salaries
Critically Dependent	> 10%	> 15%
Very Dependent	6% - 9.9%	10% - 14.9%
Moderately Dependent	4% - 5.9%	9.9% - 5%
Somewhat Dependent	1.6% - 3.9%	2% - 4.9%
Not Dependent	< 1.6%	< 2%

Source: Georgia Tech's Office of Economic Development and Technology Ventures

<b>Table 4-2: Distribution of Georgia Counties by Level of Dependence</b>		
	Number of Counties Based On:	
	Employment	Wages & Salaries
Critically Dependent	19	14
Very Dependent	18	17
Moderately Dependent	20	26
Somewhat Dependent	49	42
Not Dependent	<u>53</u>	<u>60</u>
Total	159	159

Source: Georgia Tech's Office of Economic Development and Technology Ventures







**Table 4-3: Percent of Forestry in County Economies Based on Employment and Income**

County	Percent of Forestry to Total:	
	Employment	Wages and Salaries
Appling	6.7%	7.0%
Atkinson	29.3%	40.8%
Bacon	9.9%	11.5%
Baker	2.5%	2.7%
Baldwin	1.2%	1.1%
Banks	1.4%	1.4%
Barrow	1.0%	1.5%
Bartow	1.1%	0.9%
Ben Hill	4.8%	5.4%
Berrien	1.9%	1.8%
Bibb	2.6%	3.0%
Bleckley	1.0%	1.0%
Brantley	11.3%	11.3%
Brooks	7.3%	11.3%
Bryan	2.2%	2.7%
Bulloch	1.6%	2.0%
Burke	0.7%	0.5%
Butts	9.4%	9.7%
Calhoun	1.7%	2.5%
Camden	1.9%	2.2%
Candler	1.1%	1.0%
Carroll	2.8%	4.1%
Catoosa	2.0%	2.1%
Charlton	16.7%	20.0%
Chatham	1.4%	2.7%
Chattahoochee	0.0%	0.0%
Chattooga	2.2%	2.6%
Cherokee	1.5%	1.5%
Clarke	0.9%	1.0%
Clay	3.0%	3.0%
Clayton	0.5%	0.5%
Clinch	11.4%	12.3%
Cobb	1.0%	0.9%
Coffee	3.1%	3.2%
Colquitt	5.1%	4.8%
Columbia	1.5%	1.8%
Cook	4.6%	5.6%
Coweta	0.5%	0.6%
Crawford	2.3%	3.2%
Crisp	1.9%	2.4%
Dade	0.5%	0.5%

Dawson	0.7%	0.7%
Decatur	4.4%	4.4%
DeKalb	0.8%	0.8%
Dodge	2.3%	2.5%
Dooly	4.4%	8.0%
Dougherty	3.0%	5.5%
Douglas	0.3%	0.3%
Early	17.7%	35.7%
Echols	3.5%	4.4%
Effingham	20.7%	35.4%
Elbert	0.7%	0.7%
Emanuel	2.9%	4.0%
Evans	3.6%	5.5%
Fannin	1.1%	0.9%
Fayette	1.2%	1.9%
Floyd	4.6%	6.3%
Forsyth	1.4%	1.3%
Franklin	1.6%	1.5%
Fulton	0.5%	0.4%
Gilmer	3.1%	3.2%
Glascok	5.7%	5.5%
Glynn	4.7%	5.8%
Gordon	0.8%	0.7%
Grady	3.3%	3.3%
Greene	3.0%	3.0%
Gwinnett	1.0%	0.9%
Habersham	2.3%	2.0%
Hall	1.7%	1.8%
Hancock	0.5%	0.8%
Haralson	0.2%	0.2%
Harris	2.4%	3.6%
Hart	4.4%	7.0%
Heard	1.0%	0.9%
Henry	1.1%	1.2%
Houston	0.7%	0.7%
Irwin	5.5%	5.6%
Jackson	3.5%	4.5%
Jasper	24.0%	32.9%
Jeff Davis	13.2%	14.4%
Jefferson	10.2%	15.7%
Jenkins	14.5%	15.3%
Johnson	9.5%	10.9%
Jones	2.1%	1.7%
Lamar	5.4%	5.8%
Lanier	5.2%	5.0%
Laurens	6.3%	10.6%
Lee	2.7%	3.3%
Liberty	2.8%	5.0%
Lincoln	9.5%	12.7%
Long	2.9%	3.6%

Lowndes	3.3%	5.1%
Lumpkin	2.3%	1.6%
McDuffie	4.4%	6.3%
McIntosh	0.3%	0.4%
Macon	11.1%	23.1%
Madison	7.1%	11.0%
Marion	14.9%	17.6%
Meriwether	7.5%	10.7%
Miller	0.2%	0.2%
Mitchell	1.2%	0.9%
Monroe	4.0%	4.3%
Montgomery	6.4%	10.5%
Morgan	8.1%	11.7%
Murray	1.0%	0.8%
Muscogee	0.6%	0.7%
Newton	2.1%	2.2%
Oconee	1.9%	2.5%
Oglethorpe	1.3%	1.2%
Paulding	0.9%	0.9%
Peach	0.1%	0.1%
Pickens	4.1%	6.3%
Pierce	9.7%	12.1%
Pike	1.9%	1.9%
Polk	2.7%	3.6%
Pulaski	2.5%	5.1%
Putnam	12.3%	13.3%
Quitman	9.5%	15.7%
Rabun	0.5%	0.5%
Randolph	9.4%	11.1%
Richmond	1.9%	3.2%
Rockdale	3.7%	4.6%
Schley	10.7%	10.9%
Screven	4.7%	5.1%
Seminole	0.2%	0.3%
Spalding	1.1%	1.3%
Stephens	6.0%	7.2%
Stewart	3.6%	6.0%
Sumter	4.8%	4.1%
Talbot	7.2%	5.9%
Taliaferro	4.4%	7.6%
Tattnall	2.3%	2.8%
Taylor	2.3%	1.6%
Telfair	1.4%	1.8%
Terrell	1.3%	1.2%
Thomas	4.7%	4.3%
Tift	1.5%	1.8%
Toombs	2.2%	2.5%
Towns	0.2%	0.2%
Treutlen	0.8%	1.1%
Troup	1.0%	1.1%

Turner	7.0%	8.7%
Twiggs	2.6%	1.8%
Union	0.4%	0.3%
Upson	3.8%	5.2%
Walker	0.2%	0.2%
Walton	2.7%	2.7%
Ware	4.9%	5.5%
Warren	20.1%	24.8%
Washington	0.9%	0.9%
Wayne	13.3%	26.9%
Webster	29.1%	37.4%
Wheeler	16.4%	20.5%
White	2.6%	2.3%
Whitfield	1.0%	1.1%
Wilcox	4.5%	3.8%
Wilkes	11.7%	12.2%
Wilkinson	6.6%	4.9%
Worth	2.6%	2.2%

Source: Georgia Department of Labor (ES202) and Georgia Tech's Office of Economic Development and Technology Ventures

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