Georgia Department of Transportation
Office of Planning

Georgia Statewide Freight and Logistics Plan

Economic Evaluation and Projections




Table of Contents

List of Tables

List of Figures

Overview and Executive Summary

OVERVIEW

The second task of the Georgia Statewide Freight and Logistics Plan: "Strategic Need for Investing in Georgia's Freight Transportation System" made a broad case about historical contributions of freight transportation to the State's long-term development and the importance of freight to the competitiveness of the Georgia economy. It linked Georgia's legacy of strong economic growth to strategic transportation infrastructure investments that supported and nurtured the resulting growth. It also showed the State's success of the 1990s was not being replicated in the 2000s -- Georgia's transportation system not keeping pace with growth, resulting in higher levels of congestion and slower economic growth. These finds are consistent with Georgia's State Strategic Transportation Plan.

This Task 4 document offers further details about growth trajectories Georgia may take through the year 2050, underlining the importance of freight infrastructure as a key foundation for the State's future development. The pace of Georgia's growth, in turn, will influence long-term freight transportation demand. The first section of this task reviews three possible growth scenarios Georgia may take in coming decades and translates the scenarios into how they would impact freight volumes and thus place varying demands on Georgia's freight transportation system.

In order to provide greater detail about why freight transportation matters to Georgia's economy and its future competitiveness, three detailed industry profiles were developed on strategic industries that are intensive users of the State's transportation system. They included Warehousing and Distribution; Agriculture and Food Processing; and Transportation Equipment (i.e., aerospace and motor vehicles). The profiles demonstrate the growth trends in these industries, what Georgia's share of national production is over time, and the importance of the state's transportation network to support these industries' growth.

To provide a business perspective on how Georgia's freight transportation system is used on a day-to-day basis by Georgia employers, three company-specific case studies were developed describing their supply chains and use of transportation. The case studies discuss the logistics patterns for three industries crucial to the Georgia economy – agriculture and food processing, warehousing and distribution of consumer goods, and lumber and wood products. Issues examined include how supplies reach Georgia (asking what is their origin and modes of travel) and how the outputs produced by Georgia facilities are reaching their markets (what is their destination and modes used).

Georgia's economic future and the success of its major industries are intertwined with the capabilities of the State's freight transportation network. The capacity, accessibility, efficiency, and reliability of the transportation system will be a key contributor to economic competitiveness, enabling Georgia's industries to grow. The scale of that growth will be a determinant of both the relative prosperity levels of the State in coming decades as well as future freight volumes being transported by Georgia's network of roadways, rail lines, airports, and seaports.

EXECUTIVE SUMMARY

Scenario Planning: Georgia's "Alternative Futures"

Preserving and enhancing the efficiency of Georgia's freight transportation system is and will continue to be essential to supporting the State's economic competitiveness, opportunity, and quality of life. The extent and characteristics of Georgia's population and economic growth will directly influence the future infrastructure and capacity required within the Georgia freight transportation network to meet business and population needs and ultimately strengthen the State's economic vitality.

In order to estimate Georgia's future freight volumes and transportation needs, this report examines historic and forecast demographic and economic trends, and then develops three alternative future scenarios, each representing a distinct future for the State. The scenarios, ranging from low to high growth, translate into differing freight volumes that are to be handled by the Georgia freight transportation network in the future.

The three growth scenarios – high, medium, and low -- were each developed based on the following assumptions:

- **Medium Scenario –** This is the "business as usual" or "base case" and describes the most likely demographic and economic future for Georgia. The medium scenario includes no fundamental change in Georgia's long-term growth patterns; assumes that trends experienced by Georgia historically will continue without significant influence from policy changes or unforeseen economic or demographic circumstances. Under the medium scenario, Georgia's gross state product (GSP) is expected to grow 150 percent by 2050, or about 2.3 percent annually. Population over the same period would rise by 76 percent to just over 17 million.
- **Low Scenario –** The low-growth scenario is based on 2000-2010 growth rates, with some adjustments (between 2000 and 2010, Georgia grew far less than the State's historical averages). For the long-term low-growth forecast, these slower economic growth rates are assumed to extend into the future. Reflective of this, Georgia's GSP would increase by only 46 percent by 2050 and the pace of population growth falls from historic norms, increasing by 46 percent to 14.1 million in 2050.

- **High Scenario –** The high-growth scenario is based on the levels of growth Georgia experienced during the 1990s -- a period when the state was consolidating its position as one of the nation's primary growth centers. This growth was broad-based with traditional sectors like manufacturing posting large-scale gains. For the high-growth scenario, Georgia's GSP was assumed to expand 450 percent by 2050 and population would grow by 131 percent to over 22 million.

The movement of goods in Georgia is likely to be markedly different in 2050. Freight volumes could experience a very significant increase (high-growth scenario) posing challenges throughout Georgia's transportation network or they could be only minimally changed (low-growth scenario) and thus more easily accommodated. However, even in this instance, the use of the network will change, with shifts in modal usage and capacity constraints in some locations, while others will have excess capacity. A likelier outcome is for long-term moderate growth (medium-growth scenario) which would nonetheless require significant expansions of capacity to keep goods moving efficiently.

The implications of the growth scenarios on the rail and highway systems, as well as on seaport and air cargo, include the following:

- **Rail.** The growth of rail freight in Georgia, as shown in the medium scenario is expected to be moderate through the year 2050. The expansion of trade, retail, and manufacturing will feed increases in rail freight volumes. The trend is accentuated in the high-growth scenario that would represent a more than a doubling in rail freight by 2050. The low scenario actually shows a small decrease in overall rail freight volumes should Georgia continue to experience economic growth significantly below historical trends.
  - The development in rail traffic in the medium scenario implies a resumption of growth that is similar to the trends experienced prior to the recession of 2008-2009. This means that Class I railroads could continue making substantial investments to achieve a state of good repair and strategic capacity expansion. The short-line industry would generate sufficient returns to stay in business.
  - The low-growth scenario does not mean that all rail lines would see a drop in traffic. However, the overall impacts on the rail system would include consolidation and abandonment of some lines. It also is likely to accelerate the shift away from "loose car" short-line traffic, with investment for new capacity, to the extent there is any, concentrated on intermodal services.
  - The high-growth scenario would result in substantial investment across the entire rail industry, including the short lines to accommodate the traffic growth. The big new opportunity for railroads will be their successful entry into shorter-haul (250 to 500 miles) intermodal markets. However, even with substantial investments, it is unlikely that the railroads would be able to absorb all of the potential traffic that they

could profitably handle. Under this scenario, the competition for track capacity with passenger trains would intensify.

- **Truck.** The medium scenario calls for robust growth of highway traffic in Georgia through the year 2050. The expansion of trade, retail, manufacturing, and a revived construction sector will encourage substantial increases in truck freight volumes. The medium-growth trend is magnified in the high-growth scenario that would more than triple the truck freight on Georgia's roadways. The low scenario shows a very small increase largely due to little or no growth in both manufacturing and construction.
  - The impacts on the highway network across the three scenarios present some differences beyond just the growth in traffic. The capacity needs for the high-growth scenario reach into many regions of the State, beyond the key corridors and links around Atlanta. This is more subdued in the medium scenario, with capacity needs along the Interstate system and certain east-west linkages between the coastal regions, Atlanta, and the Midwest and West.
  - The primary difference across all three scenarios for highway carriage will be the level of investment in highway infrastructure. The public sector has traditionally performed this role, but in recent years its role has become increasingly unclear. Thus, in the slow-growth scenario, a trend may be that the U.S. Highway Trust Fund is only reauthorized at historically lower levels, with declining or flat revenues at best. Additionally, the increased use of more fuel efficient vehicles in coming years also will reduce revenues generated by fuel taxes. The net effect will be a disinvestment in highways, as states will not be willing or able to step up, and private investment fails to occur to a significant degree. For the medium scenario, a modest increase in Federal highway user fees enables sustainment but not expansion of existing programs. The high-freight demand scenario foresees a moderate increase in the Federal highway program, but with a national freight program that specifically will address freight-related facility needs.
- **Seaport Container Volumes.** The rapid emergence of the Port of Savannah as one of the leading container ports in the U.S. has given Georgia a great strategic transportation asset, giving the State a larger role in global trade. Seaport freight volumes, mostly in the form of containers have a direct impact on Georgia's highway and rail networks. As with the rail and truck modes, the pace of growth at the port through 2050 could go in different directions depending on a number of factors, including the overall competitiveness of the port's infrastructure relative to other U.S. container ports.
  - The medium scenario shows container volume more than doubling at the Port of Savannah to 6.5 million TEUs by 2050 and assumes the full utilization of capacity at the Garden City Terminal

  - The low scenario assumes growth of less than 700,000 containers over current records. In this scenario, the Port of Savannah would lose market share to competing ports.
  - The high scenario is an unconstrained container volume forecast and assumes the continued expansion of international trade and the U.S. economy maintaining at least moderate-growth levels. The high scenario represents a quintupling of the port's container volume to over 15 million units by the year 2050 and would require the building of additional dockside capacity (e.g., the Jasper Terminal).

- **Air Cargo.** By 2013, Atlanta's Hartsfield Jackson International Airport broke into the top 10 busiest air cargo hubs in the United States, with a volume of 659,000 metric tons. By 2050, depending on the overall pace of economic growth, under a medium-growth scenario these volumes are expected to increase to 1.6 million tons. The low scenario corresponds with a volume of 900,000 tons while the high scenario translates to 3.7 million metric tons. Benefiting from its ranking as the world's top passenger airport, Hartsfield Jackson is expected to maintain its momentum as a growing air freight hub in coming decades. However, it is becoming space-constrained which could limit accommodating the growth assumptions of a high forecast scenario.

Importance of Freight and Logistics to the Georgia Economy

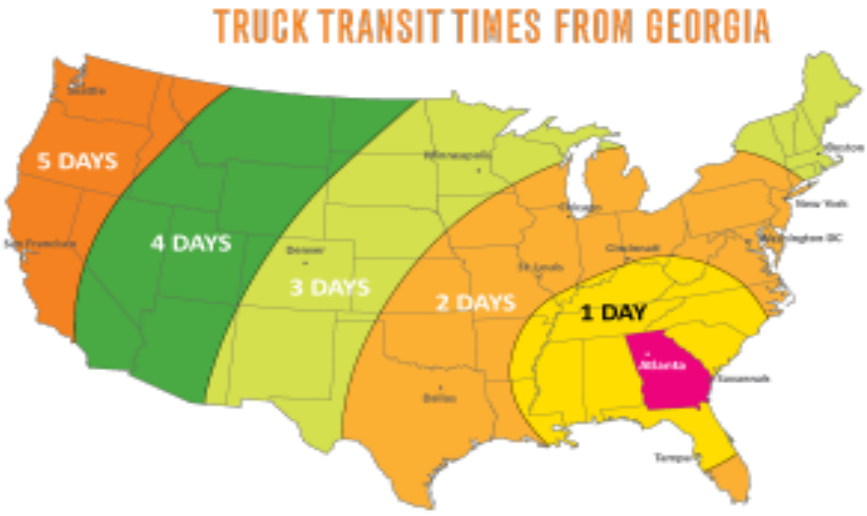
To demonstrate the importance of goods movement to the Georgia economy, three industry studies were developed going into detail on trends and the use of transportation by the State's warehousing and distribution, agriculture and food processing, and transportation equipment industries.

Warehousing and Distribution

The Warehousing and Distribution Industry in Georgia includes freight transportation and warehousing activities as well as businesses engaged in wholesale trade. Wholesale distributors are included as a key component of the industry because the storage and movement of goods is their primary function. Georgia is the sixth-largest warehouse distribution market in the U.S. and home to 780 major distribution locations employing more than 173,000 workers; in total, there are over 300,000 logistics workers in the state[1].

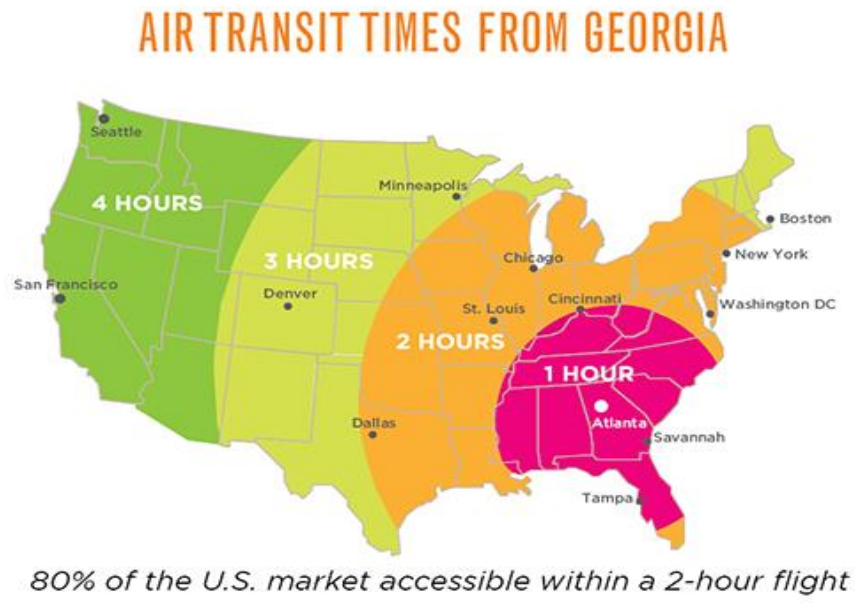
Georgia is strategically located as the main Southeastern hub for multimodal logistics and freight operations. This makes it an attractive location for companies looking for quick access to growing regional, national, and international markets. Georgia is within one-day's truck travel to Orlando, New Orleans, Memphis, Indianapolis, Cincinnati, Norfolk, and Charlotte.

[1] www.selectgeorgia.com/resources/publications/warehousing-and-logistics



Source: Georgia Dept. Of Economic Development

Additionally, the entire continental United States can be reached from Georgia within four hours by air. Numerous companies have recently built or expanded warehouse and distribution facilities in Georgia. Major facilities are concentrated in and around Atlanta and Savannah but also have a presence in counties throughout the State.



Source: Georgia Dept. Of Economic Development

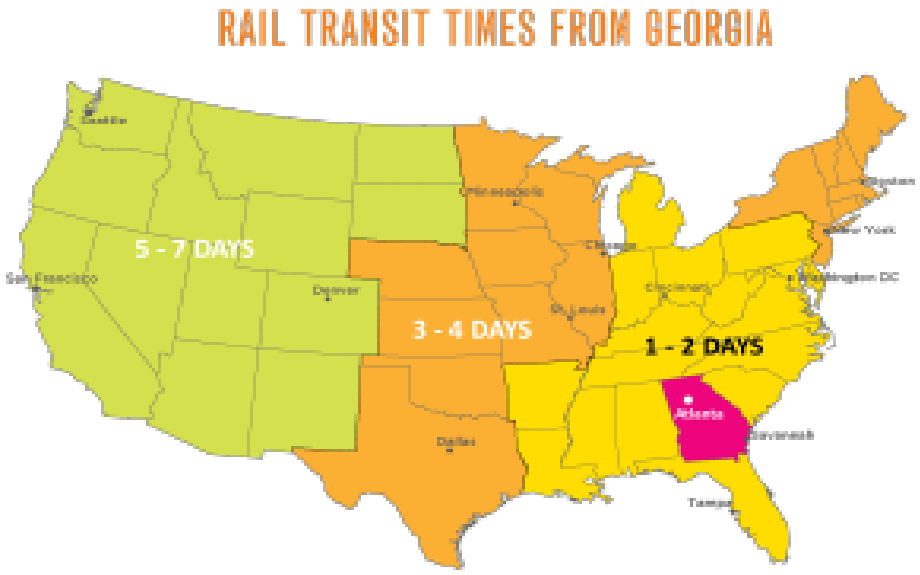
Warehousing and distribution centers are attracted to Georgia in part because the State has an extensive multimodal transportation system which facilitates the efficient movement of freight. Georgia's highway network is the eighth most extensive in the nation, at nearly 122,000 miles; the State's Interstate system is the ninth largest at 1,242 miles. Georgia has more than 4,700 miles of rail lines, ranking seventh in the country. The primary airports capable of handling freight

are in Atlanta and Savannah, with additional commercial airports located statewide in Albany, Athens, Augusta, Brunswick, Columbus, Macon, and Valdosta.

Finally, Georgia has two of the top-ranking seaports in the country for the transport of containers (Savannah) and motor vehicle import/export (Brunswick). In 2016, the Port of Savannah's economic impact on employment was 369,184 jobs[2] and retained its title as fastest-growing large container port in the country. The port's growth in market share can be correlated to the Savannah area's emergence as a favored location for major distribution centers.

The expansion of the Panama Canal will impact the Port of Savannah, the East Coast's second largest container port, and Georgia's logistics industry over the next decade depending on the extent of infrastructure investments at the Port of Savannah, effects of competition from other ports, and changes to the prevailing distribution patterns of Asian-made consumer goods within the U.S. market.

About 96 million tons of warehousing and distribution-related commodities are shipped into and out of Georgia by land modes on an annual basis (excludes local and through traffic). Not surprisingly, trucks are by far the leading mode accounting for 84 percent of inbound/outbound freight in these commodities. However, as distances become greater, the cost effectiveness of transporting warehousing and distribution-related goods by rail increases. Rail accounts for 12 percent of freight tonnage for trips less than 499 miles, but transports 18 percent of Georgia's warehousing and distribution goods on trips of more than 500 miles to, or from, the State.



Source: Georgia Dept. Of Economic Development

[2] www.gaports.com/moreimpact/#/state/overview

For longer-distance rail trips, leading goods include lumber and paper goods moving nationwide both out of and into Georgia. Consumer products dominate the long-distance truck trips, especially for goods going between Georgia and the Los Angeles area. The consumer product flows move in both directions, but volumes are greater eastbound from California to Georgia. Beyond mixed container shipments that include large volumes of consumer products going to and from Georgia's distribution centers, more specific warehousing and distribution-related commodities traveling long distances by truck include apparel, footwear, consumer electronics, housewares, garden equipment, etc.

A future increase in the use of rail service to carry warehouse and distribution-related goods into (and out of) Georgia would reduce congestion on Georgia's highways as well as lower transportation costs. This would include both longer and shorter distance shipments entering Georgia after coming into the country through gateways located elsewhere in the country.

Both rail and truck volumes will increase markedly in relationship to the transport of warehousing and distribution-related freight through the year 2050. Rail freight will more than double while truck freight will increase by about 150 percent. These growth rates represent a baseline, with actual volumes dependent on the scope and timing of the economic recovery as well as underlying changes in the structure of U.S. freight patterns that will be determined by regional growth as well as the competitiveness (efficiency, capacity, reliability, speed, and cost) of freight infrastructure around the country.

Agriculture and Food Processing

Agriculture and food are two interrelated industries. Agriculture (or "agricultural products") represents the growing of crops (e.g., soybeans, cotton, peanuts) and the raising of livestock (e.g., poultry, cattle), while "food" (or "food processing") represents the manufacture of the items commonly found on grocery store shelves (e.g., bread, juice, crackers, milk, cold cuts, soda, beer, etc.) other than fresh produce. Combined, agriculture and food employ about 115,000 people in Georgia. At the center of the nation's fertile Piedmont region, Georgia's agriculture industry is the 12th largest in the country, producing crops and livestock valued at $7.1 billion in 2007. The value of Georgia's manufactured food products output reached $8.5 billion in 2009, ranking sixth among the states.

Georgia is the nation's largest producer of broiler chickens. In 2016, Georgia raised nearly 1.4 billion chickens, accounting for about 16 percent of the national total[3]. Southwestern Georgia and neighboring southeastern Alabama is the nation's top peanut-growing region by far. Peanut production in the State has increased markedly during the last two decades; Georgia grows 42% of all peanuts[4]. Georgia

[3] www.nass.usda.gov/Charts_and_Maps/Poultry/brlmap.php

[4] http://aboutpeanuts.com/peanut-facts/growing-peanuts/where-peanuts-grow

is the third largest producer of cotton in the U.S.; cotton supports 53,000 jobs in the state and provides and overall impact exceeding $3 Billion[5].

International exports of Georgia-produced food products are growing at Georgia's ports -- one major food export example are broilers. Food import volumes are approximately half those of exports and also are growing. At the Brunswick port, exports of prepared animal feeds and oil grains (e.g., soybeans) have been major growth factors in recent years.

Export competition has become fierce for the types of agricultural products Georgia raises and grows—cotton and broilers as well as for numerous other crops (nuts, vegetables, and fruits). The reliability and cost of transportation comes to the forefront to keep Georgia competitive as transportation expenses are a major cost to produce agricultural goods. Today, every dollar of agricultural output requires about eight cents in transportation services – the highest among all industries. For this reason, agricultural shippers stress the importance of lower-cost and reliable rail and ship transportation over higher-cost truck transportation to keep their industry costs competitive.

About 19 million tons of agricultural products are shipped into and out of Georgia by land modes on an annual basis. Not surprisingly, trucks are the leading mode accounting for 60 percent of inbound/outbound agricultural freight. **These trucks rely on Georgia interstates as well as many rural corridors noted on the Georgia State Freight Corridors network** discussed in the Task 5 Recommendations document.

As distances become greater, the cost effectiveness of transporting agricultural goods by rail increases. Rail has a high share of the agricultural goods (grain) transported to Georgia from the Midwest corn belt. Corn is a primary feed for Georgia's broiler industry.

Driven by expected growth in population and output in Georgia and nationwide, freight flows related to ag and food products are expected to grow through 2050.

Transportation Equipment

The Georgia transportation equipment industry is dominated by the manufacture of motor vehicles, motor vehicle parts, and aerospace (airplanes and airplane parts), although it also includes the much smaller rail and shipbuilding industries. In most years, transportation equipment accounts for about 10 percent of the State's total manufacturing output.

In the 2000s, growth in Georgia's aerospace industry counteracted a contraction in motor vehicles associated with the closures of two major auto assembly plants in the Atlanta area (Ford in 2006 and GM in 2008). The opening the KIA plant in early 2010 in West Point, Georgia strengthened auto manufacturing in the state. Longer

[5] http://extension.uga.edu/topic-areas/field-crop-forage-turfgrass-production/cotton.html

term, Georgia is in a strategic geographic position to capitalize on U.S. motor vehicle production growth as the spatial concentration in the South and Midwest could reinforce and encourage future expansions to remain within the region.

A large number of new Asian and European auto assembly facilities are already located within a half-day drive of Georgia's borders in Kentucky, Tennessee, Mississippi, Alabama, and South Carolina, and the opening of the VW plant in 2011 just outside Chattanooga, Tennessee (only a few miles north of the Georgia border) also boost the transportation equipment industry in Georgia; examples include suppliers locating in Walker County[6] and Dublin[7] providing parts.

The focal points of Georgia's aerospace manufacturing include Lockheed Martin's facility located in Marietta in suburban Atlanta, Boeing in Macon, and Gulfstream in Savannah. While Lockheed Martin and Boeing build aircraft and parts for the military, Gulfstream is a leading maker of medium-to-large sized business jets. The growth of the aerospace industry in the future will depend on Georgia's success both at securing U.S. Department of Defense procurements as well as the demand for civilian aircraft throughout the world.

Georgia's automotive and aerospace manufacturers compete globally and nationally for market share for motor vehicle and aerospace expansions. To deliver success to its transportation equipment industry and become more attractive for industry locations, all modes of its transportation network must continue to make tangible contributions to reducing production costs via improvements in capacity, time savings, connectivity, and reliability.

About six million tons of transportation equipment are shipped into and out of Georgia by land modes on an annual basis. Not surprisingly, trucks are by far the leading mode accounting for 70 percent of inbound/outbound freight in transportation equipment. However, as distances become greater, the cost effectiveness of transporting transportation equipment by rail increases. Rail has a high share of the transportation equipment transported to Georgia from the Midwestern auto manufacturing region. Rail also dominates trips from Tuscaloosa, Alabama, the home of a Mercedes assembly plant that exports from Georgia's Port of Brunswick.

The Port of Brunswick also is a leading origin for Georgia's outbound transportation equipment shipments, and is a primary export point for southeastern-produced BMW, Volkswagen, Hyundai, and KIA, among others. On the import side, it was announced in October 2013 that the Port of Brunswick is the #1 auto import Port for new auto imports into the United States[8].

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[6] www.timesfreepress.com/news/business/aroundregion/story/2013/aug/13/volkswagen-supplier-to-add-plant-in-walker-co/115778

[7] www.macon.com/news/business/article28636564.html

[8] http://savannahnow.com/exchange/2013-10-09/gpa-now-no-1-new-auto-imports

Driven by expected growth in population and economic output within Georgia and in markets nationwide and globally, freight flows related to transportation equipment are expected to grow considerably through the year 2050.

Other International Exports

In Georgia, many of the industries just discussed have an export component likely to utilize heavy vehicles for goods transport. As shown in Table 1.1, the top four export commodity groups in Georgia are: wood pulp; paper and paperboard; food (previously discussed); and clay/kaolin. The wood pulp and paper/paperboard commodities are directly related to the state's large timber industry. Raw clay products are related to the state's unique kaolin mining industry.

The oil and gas component of the energy industry in Georgia is minimal. Recent technology in oil and gas drilling, known as hydraulic fracturing ("fracking"), has allowed for exploration of natural gas deposits in energy fields in northwest Georgia, but it is anticipated to be several years to potentially realize meaningful amounts of oil or natural gas will be produced in the state. Consequently, oil and gas is not currently a major export commodity or a major generator of heavy vehicles in Georgia. However, one segment of the Georgia wood industry that overlaps as a U.S energy industry is increasingly important to Georgia. A portion of the growth in the state's wood industry is being driven by the manufacture and international export of wood pellets as a source of renewable energy, primarily for residential heating; much of this is exported to Europe. These issues are discussed later in this document in more detail.

Table 1.0 Top Commodities Exported from the Port of Savannah: Historical Trend
by Fiscal Year, Loaded "Twenty Foot Equivalent Units" (TEUs)

Commodity Type	2008	2009	2010	2011	2012	Percent Growth (Five-Year)
Wood Pulp	177,491	165,960	175,653	160,735	178,654	1%
Food	120,487	121,246	129,639	144,117	157,531	31%
Paper and Paperboard	134,620	115,645	158,372	140,817	144,710	7%
Clay (kaolin)	96,201	82,690	99,919	92,424	97,054	1%
Automotive	46,454	47,727	52,969	75,888	87,778	89%
Machinery, Appliances, and Electronics	56,857	58,246	58,290	75,971	80,760	42%
Fabrics, including Raw Cotton	57,274	53,663	50,837	70,215	74,877	31%
Chemical	63,111	53,149	65,331	78,694	73,871	17%
Retail Consumer Goods	52,389	50,733	65,881	71,984	63,299	21%
Resins and Rubber	63,643	47,486	61,805	65,279	61,021	- 4%
Other	159,362	143,833	177,742	212,661	214,324	34%
Total	**1,027,890**	**940,376**	**1,096,437**	**1,188,786**	**1,233,877**	**20%**

Source: analysis of the Journal of Commerce PIERS data (Port Import Export Reporting Service)

Case Studies

Three case studies were conducted with Georgia businesses to demonstrate how they use the State's transportation system on a day-to-day basis. Key findings included:

- Congestion around Atlanta poses a challenge for supply chain efficiencies.
- Truckers work to avoid peak-hour travel through Georgia's metro areas.
  - This finding mirrors GDOT's Statewide Truck Only Lanes Needs Identification Study; during peak periods, heavy trucks average approximately 6% of total traffic volume on metro Atlanta interstates.
- The physical condition of Georgia's Interstates is excellent but the availability of quality secondary roads in some areas for tractor trailers is also important.
- Intermodal rail is used to transport consumer goods from the Port of Savannah to Atlanta area distribution centers. Decreasing container shipping costs at the port should strengthen competitiveness of key Georgia shippers.
- Distributors that had traditionally operated from the Northeast or Midwest are locating in Georgia to better serve the expanding Southeastern market.

1.0 Georgia's "Alternative Futures"

1.1 INTRODUCTION – SCENARIO PLANNING

Preserving and enhancing the efficiency of Georgia's freight transportation system is, and will continue to be, essential to supporting its economic competitiveness, opportunity, and quality of life. The State's freight network supports the daily functioning of Georgia's businesses by carrying the products of its manufacturers and farmers to markets throughout the Southeast, the United States as a whole, and the world. The freight system also supports the State's residents by delivering goods to stores and homes for consumption.

Anticipated growth in Georgia's population and economy will contribute to increased freight volumes highlighting the importance of planning for transportation system improvements to meet the future mobility requirements of the State's shippers and carriers. The extent and characteristics of this growth will directly influence the future infrastructure and capacity required within the Georgia freight transportation network to meet business needs and ultimately strengthen the State's economic competitiveness.

Georgia's future freight volumes and their corresponding infrastructure needs can be forecast by analyzing projected changes in population, economic growth, and industry structure, as well as any fundamental shifts in prevailing logistics patterns and practices. In order to estimate future freight volumes and transportation needs, this section of the report documents the scenario planning done in this project where demographic, economic and logistics trends were

examined, key factors influencing those trends were identified, and three alternative future scenarios were developed for hypothetical consideration:

- **Scenario 1** is a "medium-growth," baseline scenario that assumes moderate growth over the next 40 years;
- **Scenario 2** is a "low-growth" scenario assuming continuation of the 2000-2010 period that saw slower economic growth in Georgia relative to the previous decades; and
- **Scenario 3** is a "high-growth" scenario that is based on growth rates similar to those that occurred during Georgia's 1990-2000 period.

While the moderate, medium-growth scenario is expected to be closest to how Georgia will grow in future years in that it most reflects ongoing trends, both the low and high scenarios illustrate "what if" possibilities that both have recent historical precedent in the State. The medium scenario assumes that long-term growth patterns similar to those seen in Georgia historically (mixture of growth periods and recessions combined with relatively strong population growth) will continue without significant influence from policy changes or unforeseen economic or demographic circumstances. As such, it is a conservative projection of future conditions that will serve as a baseline from which policy recommendations will be developed later in this study. It also will serve as a baseline against which alternative assumptions about the future conditions and the impacts of different policy recommendations can be examined.

The high-level macroeconomic trends that underlie each of the scenarios will have specific impacts on Georgia's freight transportation system brought on not just by the varying traffic levels, but other trends and developments in the economy, the freight shipping sectors, the carriers, and governments. With many different trends at play, assessing their significance in each of the scenarios offers context in both their causality and their effects. Thus, trends that are not specifically indicated in the high-level macroeconomic forecasts can drive changes in the transportation sector, the effects of which will be similar across scenarios in some instances, and differ by scenario in others.

For example, in the low-growth scenario, flat or declining traffic on Georgia's short-line railroads may result in insufficient financial returns to maintain some of the lines, with the net result that the State's short-line network will shrink unless supported by public sector actions.

A tiered structure was developed to categorize the various factors, identify trends, and associate the implications for freight in each of the three scenarios. At the top tier, four classes of factors were defined. The first and most important factor – **economic** - reflects the large scale macroeconomic, demographic and trade trends that derive from the forecast. The other three classes affect the environment in which goods movement occurs, and are indicative of current national studies and other research. These three factors are as follows:

- **Logistics** – how goods are sourced, produced, stored, and distributed from point of origin to point of consumption;

- **Transportation –** a component of logistics, transportation is how freight is moved by carriers across the major freight modes at the vehicle, firm, terminal (such as port) and network levels; and
- **Policy, Regulation, and Governance** – how government policy affects the transportation system directly (such as through infrastructure investment) or indirectly (economic development strategies).

Within each of these four categories, up to two levels of additional specific factors were defined as shown in Table 1.1, and a trend indicated for each of the three scenarios. For example, under the key category Economic Factors, Production entails five elements, including Energy. In the case of the low-freight demand scenario, the associated trend for Energy is a steady increase in real energy costs, with a freight implication of diversion from long-haul truck to intermodal rail, and an increase in the density of distribution centers.

Table 1.1 Factors Driving Alternative Future Scenarios

Key Category	Component Factors	
Economic Factors	Consumption	• Population • Households • Income Lifestyle
	Production	• GSP • Industries • Technology • Labor • Energy
	Trade	• Demand • Trade Partners/Lanes
	Economic Geography	• Land Use
Logistics Factors	Supply Chains Sourcing Packaging Networks	
Transportation Factors	Motor Carriers/Highways	• Business • Services • Traffic Volume • Truck technology • Highways
	Railroads/Rail Lines	• Business • Services • Traffic Volume • Rail Lines
	Shipping Lines/Marine Ports	• Business • Services • Traffic Volume • Ships/Terminals
Policy, Regulation, and Governance Factors	National State City/Local	

While for many component factors trends will differ by scenarios, in other instances they are expected to be similar, due to the fundamental strength of the trend, irrespective of how strong or weak growth will be. This, for example, is the case with supply chain strategies – where the focus is on balancing *just-in-time* with *just-in-case* delivery – continued trends towards containerization, and ongoing consolidation in the motor carrier industry. These trends are likely to continue under any economic scenario. A detailed listing of trends and freight implications for each of the three alternative scenarios is in Appendix A.

The following sections in this Section discuss the three scenarios in more detail. The fundamental macroeconomic conditions are discussed first, followed by an analysis of the impacts on freight intensive industries, and the estimated impacts on freight flows across Georgia's transportation network. Throughout these sections, some of key differences in characteristic assumptions are highlighted.

1.2 THREE GROWTH SCENARIOS –– MEDIUM, LOW, AND HIGH

The main "change drivers" that will affect the future of goods movement in Georgia include population growth, gross state product, economic composition (gross product by industry), levels of trade, and the geographic distribution of economic activity. The degree and manner in which these factors change in coming decades will directly impact the demands placed on Georgia's transportation network.

Population growth will translate into higher levels of consumption affecting retail delivery systems and homebuilding affecting the movement of construction materials. Higher economic production will underscore the importance of Georgia's highways, airports, ports, and railroads to deliver inputs and bring finished goods to market, both domestically and overseas.

The ability of Georgia's transportation network and freight services to carry out these responsibilities reliably will have a direct bearing on Georgia's competitiveness and attractiveness as a place to operate a business or to expand. The levels of production in freight-intensive industries (e.g., agriculture, manufacturing, construction, utilities, and distribution) in particular will have direct effects on freight volumes in Georgia and the traffic handled by the State's gateways and on its transportation facilities.

Each of the three future growth scenarios laid out for Georgia reflect distinct possibilities for how the State may grow in terms of population, gross state product, and gross product by industry. While it is impossible to predict precisely what Georgia will be like 30 to 40 years from now, each scenario reflects a possibility and in actuality, the future is likely to combine aspects of each of the three growth scenarios. Some factors may grow as expected, others may grow more slowly, and some are likely to emerge as fast growers, increasing at a pace beyond the medium-growth, baseline expectation.

The medium-, low-, and high-growth scenarios were each developed, based on the following assumptions:

- **Medium Scenario –** This is the "business as usual" or "base case" and describes the most likely demographic and economic future for Georgia and which reflects the forecast provided by Economy.com. The low- and high-growth scenarios pivot from the medium-growth scenario toward either a more depressed or more robust outlook. This baseline assumes a normal level of growth, including the moderating effects of both up and down cycles taking place over a multi-decade period.

  The medium scenario includes no fundamental change in Georgia's long-term growth patterns; assumes that trends experienced by Georgia historically will continue without significant influence from policy changes or unforeseen economic or demographic circumstances. As such, it is a

conservative projection of future conditions. It will serve as a baseline from which policy recommendations will be developed later in this study. It also will serve as a baseline against which alternative assumptions about the future conditions and the impacts of different policy recommendations can be estimated. Under this scenario, GSP is expected to grow by 150 percent by the year 2050, or about 2.3 percent annually.

- **Low Scenario –** The low-growth scenario is based on 2000-2010 growth rates, with some adjustments. In real terms, the Georgia economy grew by less than 10 percent between 2000 and 2010, far less than the State's historical averages. Population growth also slowed during this period but not close to the degree as the overall economy. For the long-term low-growth forecast, the slow economic growth rates experienced between 2000 and 2010 are extended into the future. Reflective of this, key users of freight, including manufacturing and construction, both hit hard by the 2008-2010 recession, barely grow in the forecast. In response to a lackluster 45 percent GSP growth rate through 2050, population growth rates in this scenario slow significantly by 2030, with a cumulative increase of 46 percent by 2050.
- **High Scenario –** The high-growth scenario is based on the levels of growth Georgia experienced during the 1990s, a period when the State was consolidating its position as one of the nation's primary growth centers, both demographically and economically. Between 1990 and 2000, the Georgia economy grew by 67 percent in real terms. This growth was broad-based with traditional sectors like manufacturing posting large-scale gains. For the high-growth scenario, fast and broad-based economic growth in GSP of 450 percent is extended through the forecast horizon to 2050. Rapid population growth similar to the 1990s when Georgia ranked as the sixth-fastest growing state, also is replicated through 2050. In this instance, the projected value would be approximately 131 percent.

The following sections discuss the key drivers and assumptions behind each growth factor in each of three scenarios in greater detail. In addition, Appendix A summarizes the results from the scenarios.

1.3 POPULATION

Today, Georgia ranks among the faster growing states demographically and is adding people at a higher rate than the national average. Growth has recently slowed, however, but Georgia has maintained higher growth, even during the recession, than the U.S. average. The State is at the center of the South, the most populous and one of the fastest growing regions in the country. The Piedmont Atlantic "mega-region", one of 11 such mega-regions in the country, has Atlanta

as its principal metropolitan area and is expected to be a leader in national population and economic growth in coming decades according to America 2050.[9]

The pace of this growth puts pressure on all aspects of Georgia's infrastructure: its water systems, schools, healthcare facilities, etc. In particular, the State's freight transportation system must accommodate the logistics needs of an increasing number of residents, retirees, and workers, and do so reliably, safely, and efficiently. For these reasons, future baseline plans for Georgia's freight infrastructure and services needs to incorporate and respond to a set of what are likely to be relatively high-population growth conditions experienced by only a handful of other states. Georgia's population trends and the three possible future growth scenarios and their effects on freight are briefly described.

Linked to consumption, population growth has a direct impact on freight transportation demand. More people need more goods to sustain themselves, and Georgia's population continues to grow. Between 2010 and July 2016, the state population grew 6.4% to 10,310,680 inhabitants[10]. The majority of Georgia's population growth is focused in metropolitan Atlanta, with other high-growth counties dispersed throughout the State.

Figure 1.1 shows three paths Georgia's population growth may take over the next 40 years. The **medium-growth scenario**, basically a continuation of current trends, forecasts that Georgia will grow to just over 17 million by 2050. The 40-year gain is substantially larger than the 4.1 million net increases that took place between 1970 and 2010, though it is significantly lower in percentage terms (76 percent and 111 percent, respectively). The medium-growth scenario assumes Georgia will continue to be a preferred destination for domestic and international migrants and maintain higher birth rates than the national average. Key to this growth, the medium scenario assumes the United States will continue to maintain its allure for immigration from around the world in coming decades.

U.S. and Georgia demographic patterns are being affected by the recent economic downturn. Birth rates are declining, (a common economic response to bad economic times) domestic migration slowed as people were not successful finding jobs and/or selling their homes, and the allure of the United States as a destination for international migrants was waning. It is likely to be several years to see if these demographic changes are temporary or structural.

Georgia's **low-population growth scenario** (the bottom line in Figure 1.1) assumes the changes are more or less permanent which would have an impact on the State's long-term population growth. The low scenario forecasts that Georgia's population growth rate will decline in coming decades, falling from 18

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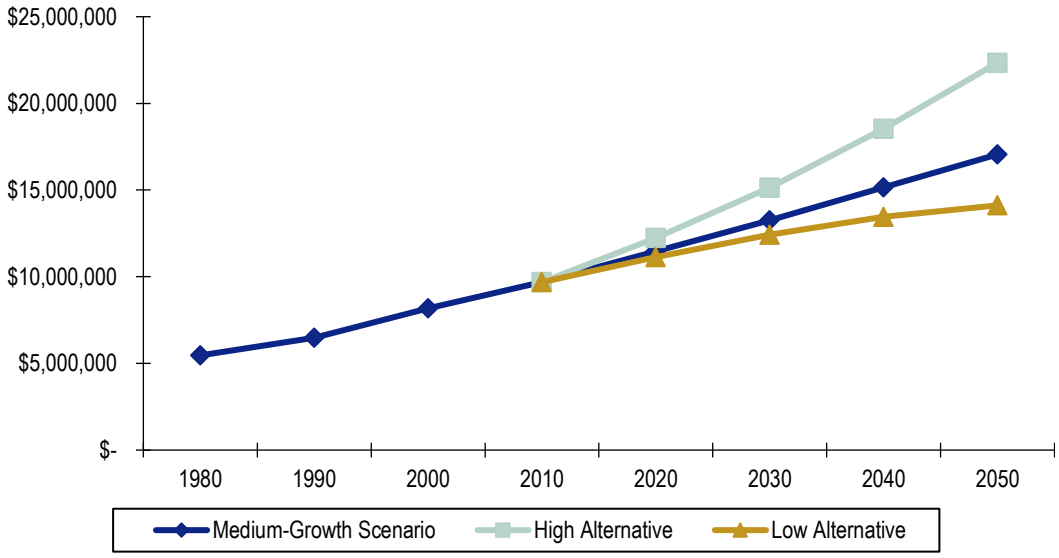
[9] America2050.org is a national initiative looking at infrastructure, economic development and environmental challenges if the population increases by 130 million by the year 2050. Growth is expected to be focused in 11 "megaregions".

[10] www.census.gov/quickfacts/GA

percent in 2000-2010, to less than 5 percent between 2040 and 2050. Population growth rates tend to respond only gradually to change. For this reason and despite the slowed migration, lower economic growth, and lower fertility rates, Georgia should still maintain moderate population growth overall through 2050, even if the more negative demographic conditions assumed within the low-growth scenario do transpire.

The low-growth scenario projects a population of 14.1 million in 2050, following a 46 percent rate of growth by the year 2050. Lower growth would mean less consumption and thus lower freight demands in the State.

Figure 1-1 Georgia Population
Alternative Growth Scenarios through the year 2050



Source: Economy.com (medium-growth scenario); Project team analysis (low and high alternatives).

The **high scenario** carries forward the growth rates Georgia's population achieved in the 1990s. During that decade, the State added 1.7 million people for a 10-year growth rate of 26 percent. If Georgia's population sustained similar growth over the next 40 years, the State's population would reach 22.3 million in 2050. That would represent more than a doubling of the current population and make Georgia substantially larger than Florida is today. For this magnitude of population growth to occur, it would need to be supported by very strong economic growth (also like the 1990s) with a robust flow of in-migrants moving into Georgia from other parts of the U.S. as well as from around the world. While the high scenario is unlikely, it does represent rates of growth that have been achieved in the recent past and underlines the importance of preparing for contingencies that may result in higher than expected demands on Georgia's freight transportation network.

1.4 GROSS STATE PRODUCT

Georgia's freight transportation system underpins the [May 2017 estimate of] State's $525 billion economy[11]. Gross state product (GSP, the value of goods and services produced by a state) is a universal measure of economic size and activity; for Georgia it grew at a significant rate:

Georgia was ranked the #1 state for business according to Site Selection in the years 2013 through 2017.[12] The Georgia freight transportation network provides the foundation on which industries crucial to the state economy can grow.

The pace of Georgia's economic growth will be a key determinant of overall freight demand throughout the forecast period to 2050. High growth tied to the increased production of goods and services will put great demand on Georgia's freight infrastructure to support the expansion of manufacturing, trade, agriculture, retail, distribution, and construction activities as well as to meet the State's energy needs. Each of these industries is particularly dependent on transportation in order to produce their goods and bring them to market. On the other hand, much slower than anticipated growth will lessen congestion

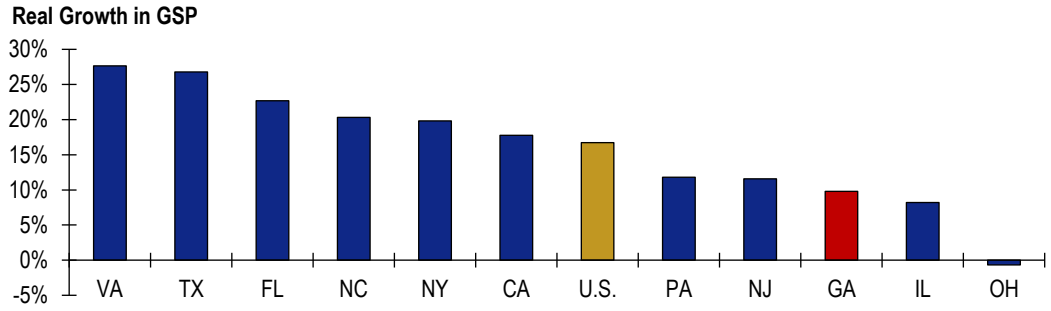
[11] https://fred.stlouisfed.org/series/GANGSP

[12] www.georgia.org/competitive-advantages/pro-business/number-1-for-business

pressures on the State's freight transportation system but would spur interest in strategic investments to stimulate economic growth.

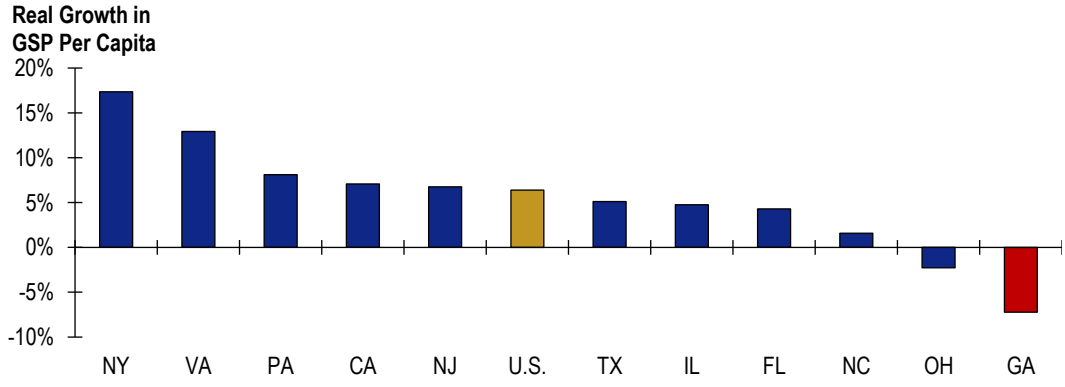
Due to the direct linkages between economic growth and future freight volumes, three growth scenarios were developed for Georgia's gross state product through 2050, a medium-growth baseline, a low, and a high forecast. As a starting point, Georgia (which is traditionally a fast-growing state economically) experienced comparatively slower-growth during 2000-2010 decade, a period when it lagged most other states (see Figure 1.2). Because Georgia combined fast population growth with slow economic growth, the State's per capita gross product (see Figure 1.3) was the worst among the large states, posting a 7.2 percent drop between 2000 and 2010. The medium-growth baseline forecast demonstrates a recovery in the Georgia economy and assumed the 2000-2010 decade was a temporary break from the State's generally more robust long-term economic expansion.

Figure 1-2 Historically, Georgia's Economy Grew More Slowly than Most Other Large States *2000-2010*



Source: Bureau of Economic Analysis (BEA).

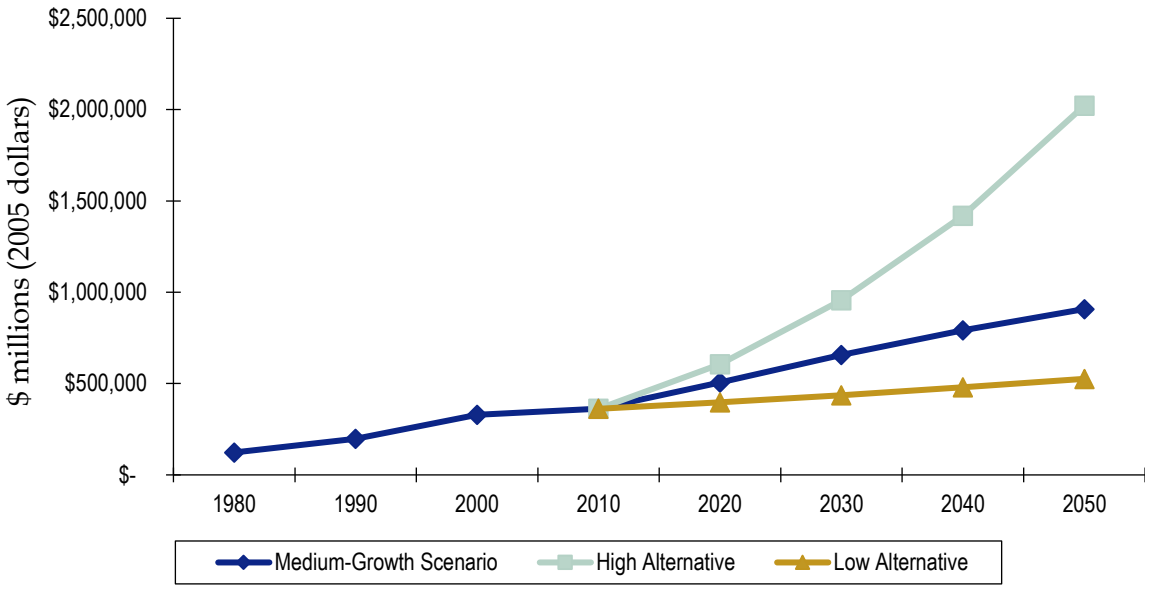
Figure 1-3 A Rising Population, Combined with Low Economic Growth Resulted, in a Decline in Georgia's per Capita GSP *2000-2010*



Source: Bureau of Economic Analysis (BEA). Change in per capita gross product in real 2005 dollars.

Figure 1.4 shows the low-, medium-, and high-growth scenarios for Georgia's gross state product through 2050. The extent to which Georgia's economic growth materializes would have a direct bearing on freight flows in the State.

Figure 1-4 Georgia Gross State Product
Alternative Growth Scenarios through year 2050



Source: Economy.com (medium-growth scenario); Project team analysis (low & high alternatives)

The baseline, **medium-growth** gross state product scenario assumed the Georgia economy will maintain long-term historical growth trends. Georgia's economy tripled in size from 1980 to 2010, growing to $362 billion (in 2005 dollars). By 2050, a medium-growth forecast estimates Georgia would have a $908 billion economy (in 2005 dollars) – a growth rate of 150 percent and net gain of $547 billion in economic activity. Growth of this level took into account the robust recovery from the 2008-2010 recession taking place through 2020, followed by moderating growth through 2050. The output levels of the baseline, medium-growth scenario signify substantial growth in the Georgia economy and will mean much larger freight volumes in future compared to current levels.

The **low** gross state product growth scenario is based on the premise that the Georgia economy, after very slow growth between 2000 and 2010, was unable to regain momentum in the future. In this scenario, the economy expanded but at a low rate. Between 2000 and 2010, Georgia's economy grew 9.8 percent, compared to growth rates above 60 percent for both 1980-1990 and 1990-2000. The low scenario forecasted that Georgia would continue expansion at less than 10 percent each decade through the 2050 forecast year. If Georgia's economic growth conformed to this trend, it would have a $526 billion economy in 2050. Low growth would still place increased demands on Georgia's freight

infrastructure and services, representing a 45 percent increase in the size of the state economy over the span of 40 years.

The **high** gross state product growth scenario represented a "what if" long-term expansion forecast showing what would happen if Georgia resumed a boom period, resembling the types of growth the State experienced during the 1980s and 1990s. During the post-World War II period, the Southeast, led by Georgia, Florida, and North Carolina was one of the regions of U.S. economic expansion. The State's geographic location, its favorable business climate, its attractiveness to immigrants, and the likelihood that the state will be able to supply businesses with needed labor (a growing concern nationally due to the coming retirement of the Baby Boom generation) could work together to foment a period of renewed fast economic growth in Georgia. The high-growth forecast, representing the resumption of boom-period growth rates, would mean Georgia's economy quadrupling in size by the year 2050 – raising raise the state's gross state product to over $ two trillion by 2050, which translates to an economy larger than California had in 2010.

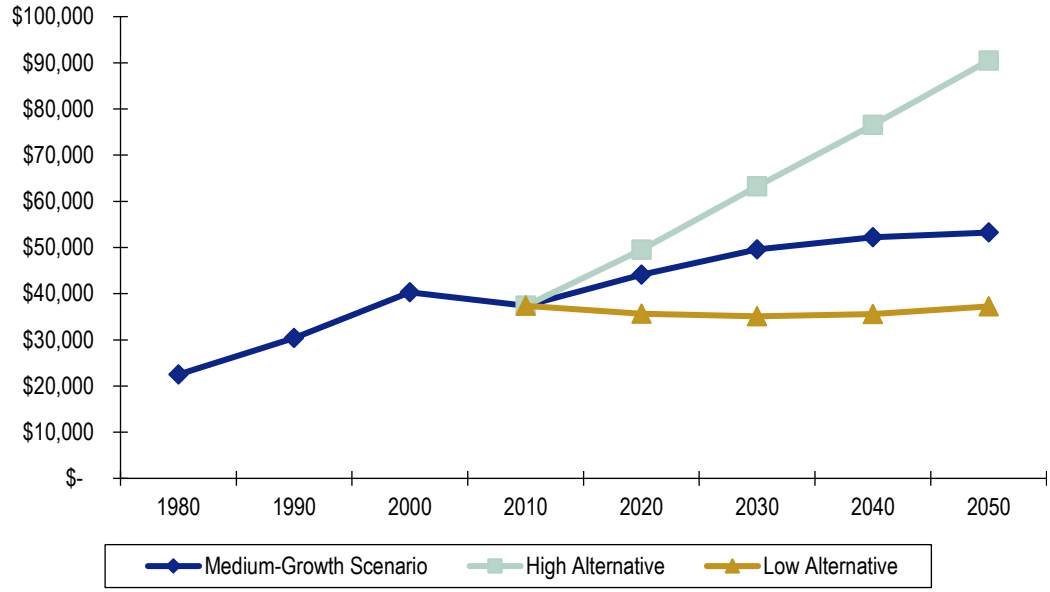
The implications of such growth would be enormous on Georgia's freight transportation system, even if boom period-type growth is achieved for only a single decade in the forecast period or if actual economic growth in Georgia falls somewhere between the medium- and the high-growth scenarios.

Each of the three gross state product growth scenarios demonstrated some degree of growth taking place in Georgia through 2050. Figure 1.5 shows Georgia's growth in gross state product per capita for each of the three scenarios. The per capita measure of gross state product illustrates the relative gains in affluence people may experience in future decades depending on the extent to which Georgia's economy and population grows. Both the medium and the high scenarios show a more affluent society in Georgia than today's population with gross state product outpacing population growth. A more affluent society would bring about more consumption, however buying patterns could also change as Georgia's population overall becomes older.

Georgia's 2010 per capita gross product was $37,366 -- a decline from 2000 as result of the State's population growth exceeding economic growth. The medium-growth scenario forecasts per capita gross product increasing to $53,240 (all figures are in 2005 dollars) by the year 2050. The low forecast essentially keeps per capita gross product constant.

The high-growth scenario places Georgia's future per capita gross product at over $90,000 by the year 2050 and would signify a much greater ability for Georgians to consume and increase discretionary spending on a range of products and services. Depending on consumption preferences (e.g., homes, furniture, retail, restaurants, travel), these would affect the already substantially increased freight flows of the high-growth scenario.

Figure 1-5 Georgia Gross State Product per Capita
Alternative Growth Scenarios through the year 2050



Source: Economy.com (medium-growth scenario); Project team analysis (low & high alternatives); in 2005 dollars.

1.5 GROWTH SCENARIOS FOR KEY FREIGHT-INTENSIVE INDUSTRIES

The growth rates for the industries that are the most intensive users of freight services were adjusted to reflect the conditions associated with the low and high economic growth scenarios. The intensive users of freight that were individually adjusted in the forecast include manufacturing, construction, retail, agriculture, and utilities. By making adjustments to the individual freight-intensive industries, the long-term freight flows of the low- and high-growth scenarios and their impacts on the Georgia freight transportation system will have a greater degree of accuracy than simply contracting or expanding the medium-growth scenario in accordance with overall growth in GSP.

The remaining industries and their commodities were factored-up based on their shares of Georgia output. The industry growth rates can be seen in Table 1.2 on the next page. The medium forecast stems from *Economy.com* growth rates in gross state product. The low forecast generally conforms to the 2000-2010 growth rates, a period that saw little or no growth in manufacturing and construction. The high scenario is based on growth rates similar to the 1990s when manufacturing, construction, agriculture, and utilities were all expanding robustly in Georgia as part of a broad-based economic boom period.

Table 1.2 Projected Growth for Key Freight-Intensive Industries
GDP by Industry, Low, Medium (Baseline), and High Scenarios

Growth Assumption, by Industry	Year 2007	Year 2050	Percent Change	Cmpd. Annl. Growth Rate
Medium (Baseline)				
Manufacturing	$46,471	$86,266	85.6%	1.449%
Construction	$17,591	$30,874	75.5%	1.317%
Retail	$25,800	$77,185	199.2%	2.581%
Agriculture	$2,062	$4,160	101.7%	1.645%
Utilities	$6,998	$15,274	118.3%	1.832%
TOTAL GA GSP	**$380,073**	**$908,063**	**138.9%**	**2.046%**
High				
Manufacturing	$46,471	$192,059	313.3%	3.355%
Construction	$17,591	$68,737	290.8%	3.220%
Retail	$25,800	$143,590	456.6%	4.073%
Agriculture	$2,062	$9,261	349.1%	3.555%
Utilities	$6,998	$25,771	268.3%	3.078%
TOTAL GA GSP	**$380,073**	**$2,021,679**	**431.9%**	**3.963%**
Low				
Manufacturing	$46,471	$49,965	7.5%	0.169%
Construction	$17,591	$17,882	1.7%	0.038%
Retail	$25,800	$33,484	29.8%	0.608%
Agriculture	$2,062	$2,409	16.8%	0.363%
Utilities	$6,998	$8,847	26.4%	0.547%
TOTAL GA GSP	**$380,073**	**$525,945**	**38.4%**	**0.758%**

Source: Economy.com and Project team analysis; CAGR-compound annual growth rate.

1.6 ESTIMATED IMPACTS ON FREIGHT FLOWS

The movement of goods in Georgia is likely to be markedly different in 2050 than it is today. Freight volumes, depending on the State's economic growth trajectory, could experience a very significant increase (high-growth scenario) posing challenges throughout Georgia's transportation network or they could be only minimally changed from the low-growth scenario, and thus more easily accommodated. However, even in this instance, the use of the network will change, with shifts in modal usage and capacity constraints in some locations, while others will have excess capacity. A likelier outcome is for long-term moderate growth (medium-growth scenario) in state freight volumes which will nonetheless require significant expansions of capacity to keep goods moving efficiently throughout Georgia.

Underlying the medium scenario is a Transearch freight flow dataset with a 2050 forecast derived from the Federal Highway Administration's *Freight Analysis Framework*. In the alternative scenarios, the population and GSP trends for commodities not specifically associated with the key freight intensive industries

were used to scale the traffic volumes for highway, and rail (water and air freight forecasts are handled separately at the end of this section). Where growth rates were developed for specific industries, those were used instead. This approach assumes that future growth (or contraction) reflects existing patterns and does not take into account potential changes in freight flows arising from shifts in international trade, logistics, modal economics, policies/regulation, and the geographic distribution of growth in Georgia.

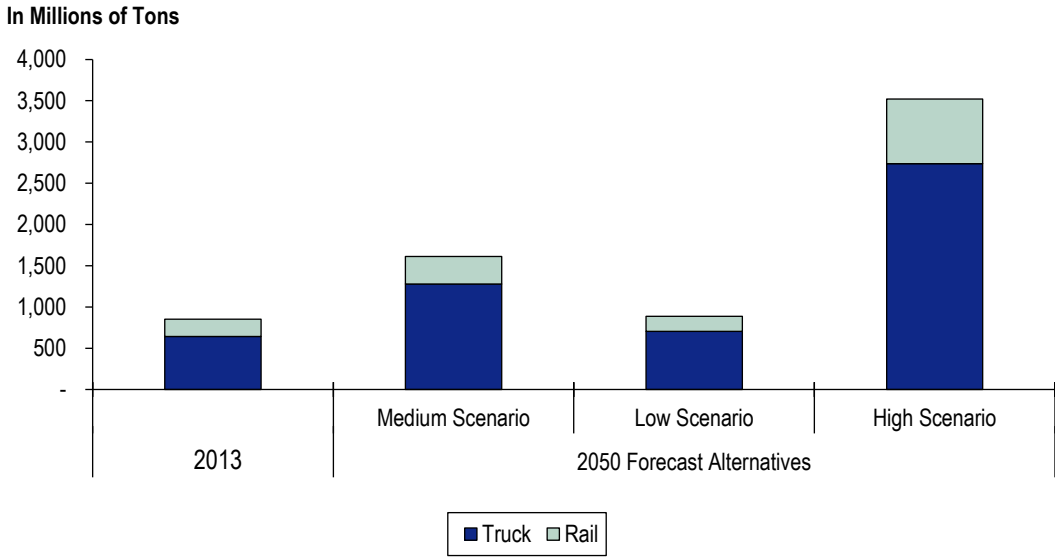
The following sections review the implications of the high- and low-growth scenarios on the rail and highway systems.

Georgia Rail Freight Growth Scenarios

The growth of rail freight in Georgia, as seen in the medium scenario shown in Figure 1.6, is expected to be moderate by the year 2050. The expansion of trade, retail, and manufacturing will feed increases in rail freight volumes. The trend is accentuated in the high-growth scenario that would represent a more than a doubling in rail freight over 40 years. As growth increases, the need for additional distribution centers to sustain production and consumption also rises and would encourage a modal diversion from long-haul truck to intermodal rail.

The low scenario actually shows a small decrease in overall rail freight volumes should Georgia continue to experience economic growth significantly below historical trends. In this scenario, the reduction is due to a shift in the feedstocks used by Georgia's power plants from coal to other forms of energy (e.g., natural gas, biofuels, wind, and solar). While overall growth in rail freight due to other factors (e.g., manufacturing expansion) counteracts this trend in both the medium and high alternatives, economic growth in the low scenario is insufficient to offset the substitution of coal with other fuels. Maps showing rail freight volumes corresponding to the three growth scenarios are included in Figures 1.7 through 1.12.

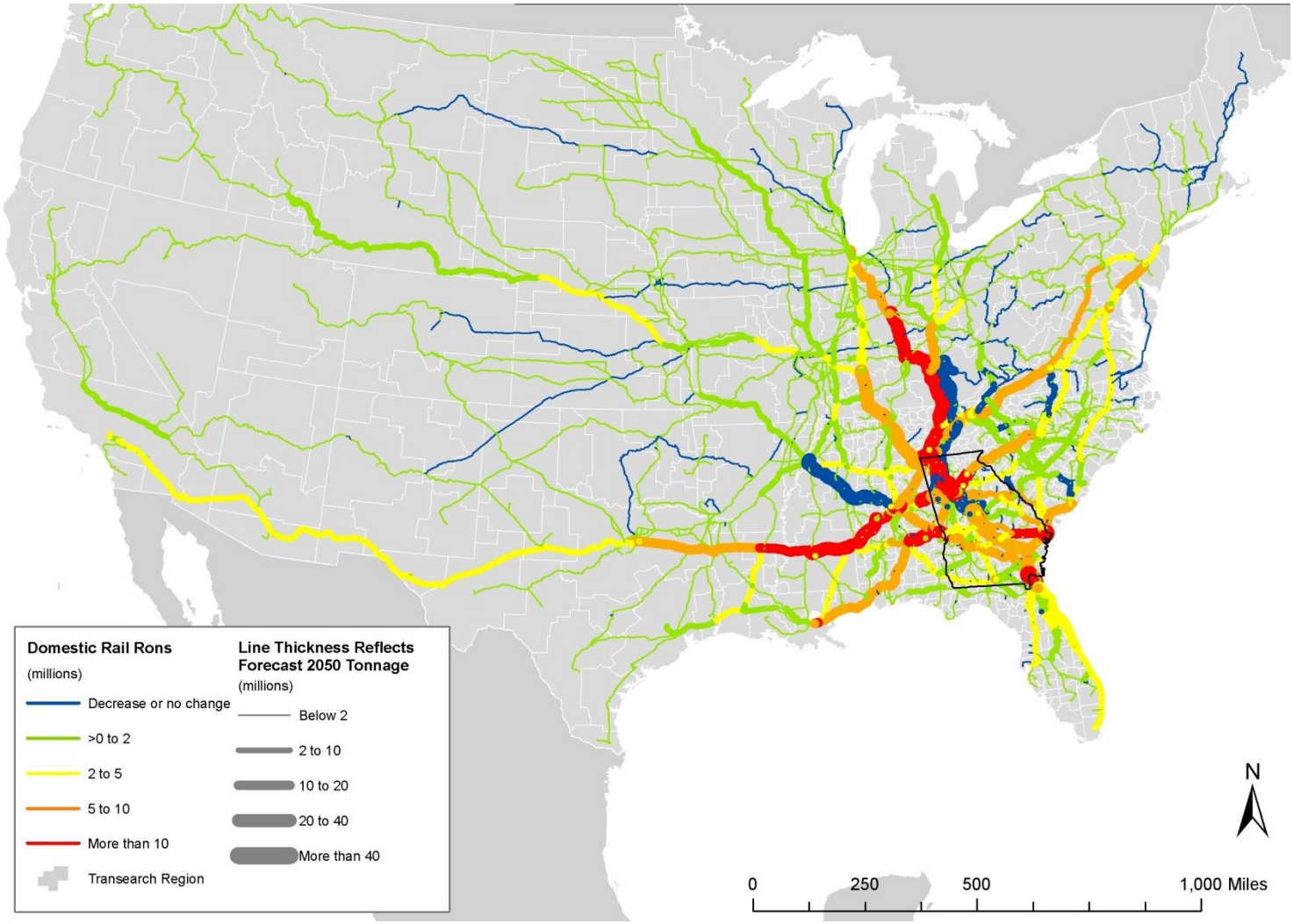
Figure 1-6 Georgia Rail Volume Forecast
Low, Medium, and High Scenarios by the year 2050



The development in rail traffic in the medium-growth scenario implies a resumption of growth that is similar to the trends experienced prior to the recession. Operationally, this would allow the large Class I railroads to continue to make substantial investments to achieve a state of good repair and strategic capacity expansion, with an emphasis on intermodal. Moderate growth in longer-haul (500+ miles) intermodal services will continue, with terminal capacity expansion more or less keeping up with demand.

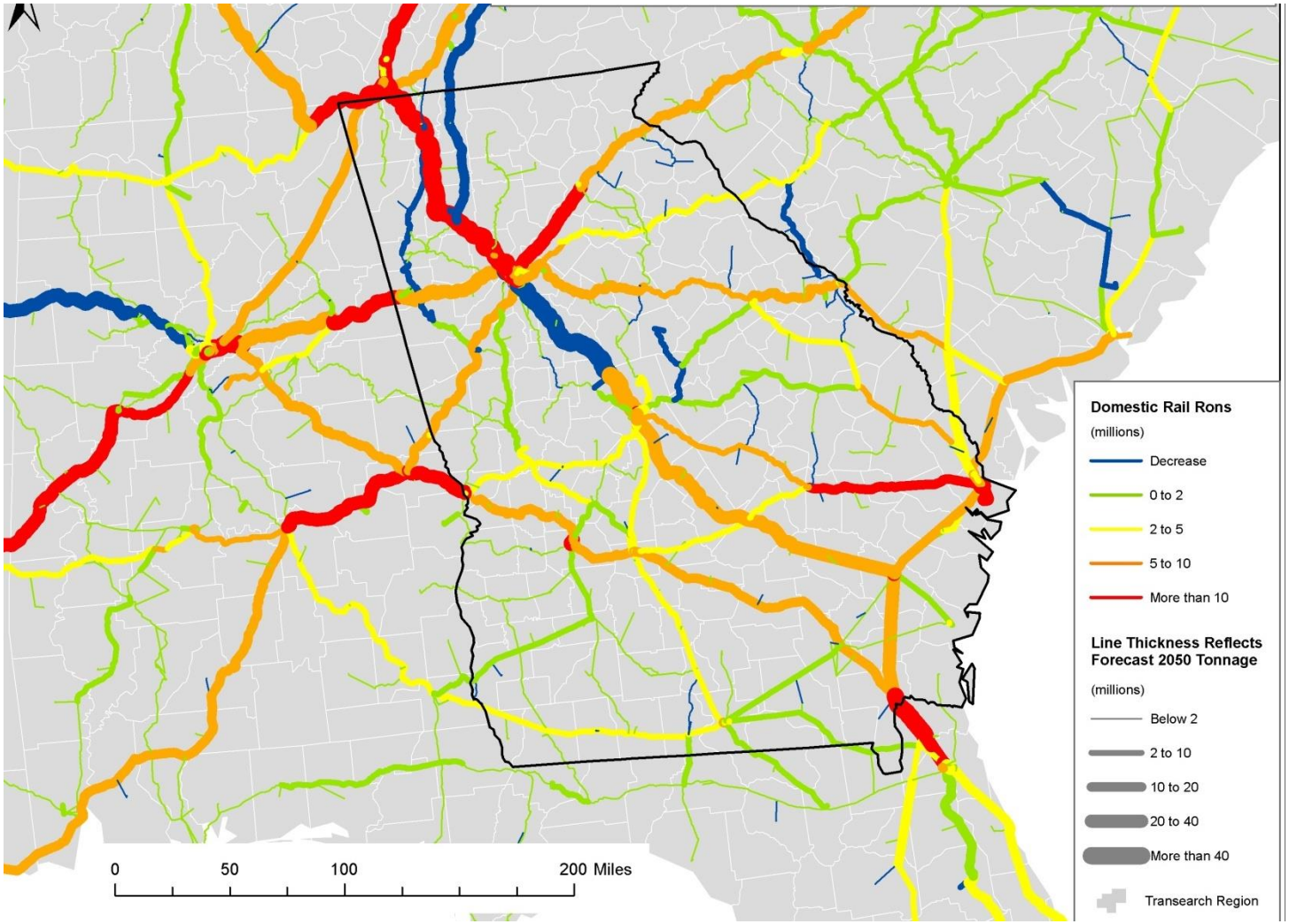
Carload or "loose car" service will remain largely as it has been, with the short-line industry generating sufficient returns to stay in business. Higher-growth rates and an enhanced revenue stream, longer-term, would allow Class I railroads to invest in intermodal service over shorter distance routes and would encourage the short lines to enter the intermodal business. Lower than expected economic growth, however, would result in reduced rail investments to match market growth and may force some short lines to fold.

Figure 1-7 ***Medium*** **Scenario Rail Freight Growth**
by the year 2050



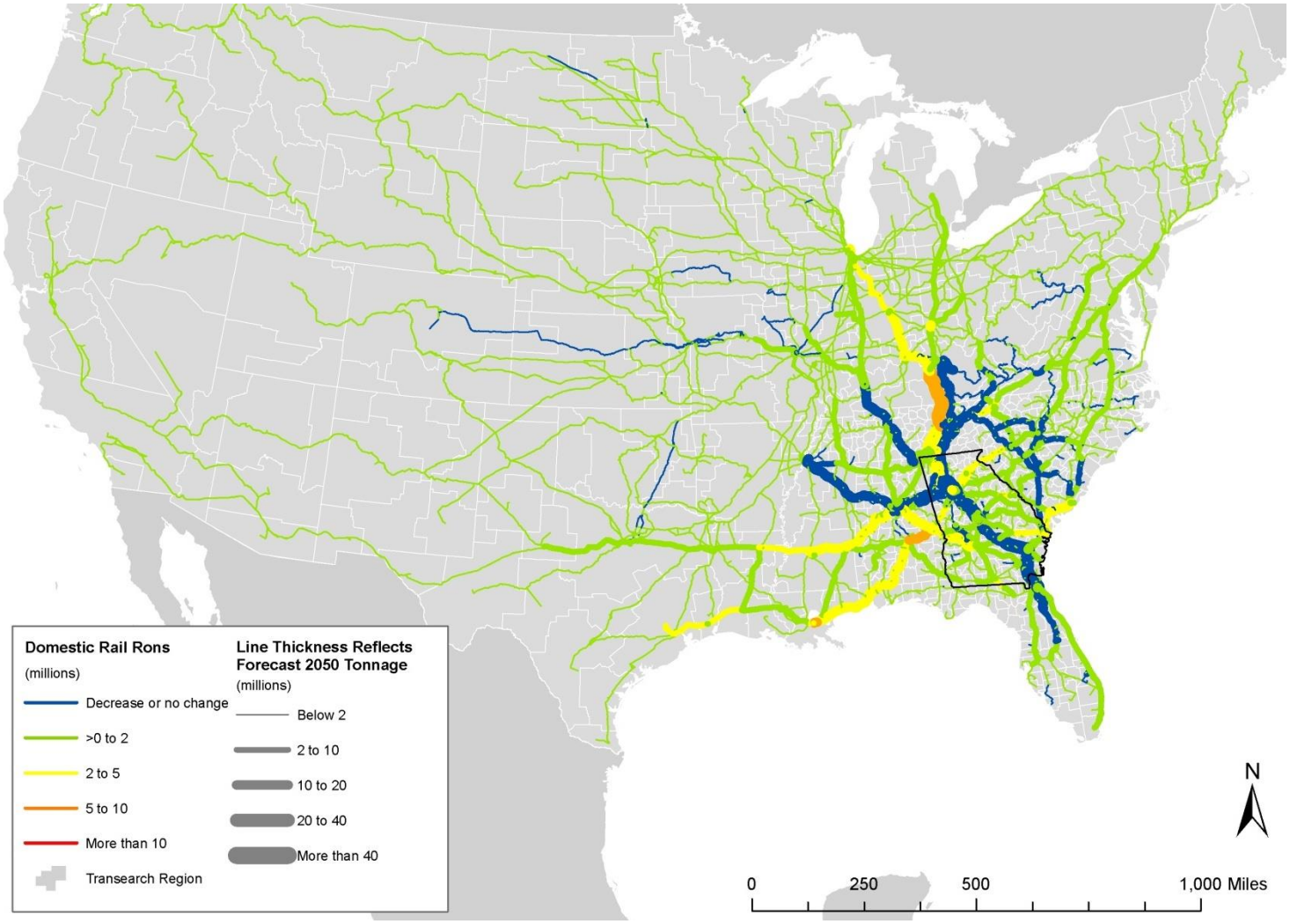
Source: Transearch

Figure 1-8 ***Medium*** **Scenario Rail Freight Growth**
by the year 2050 (Zoomed Image)



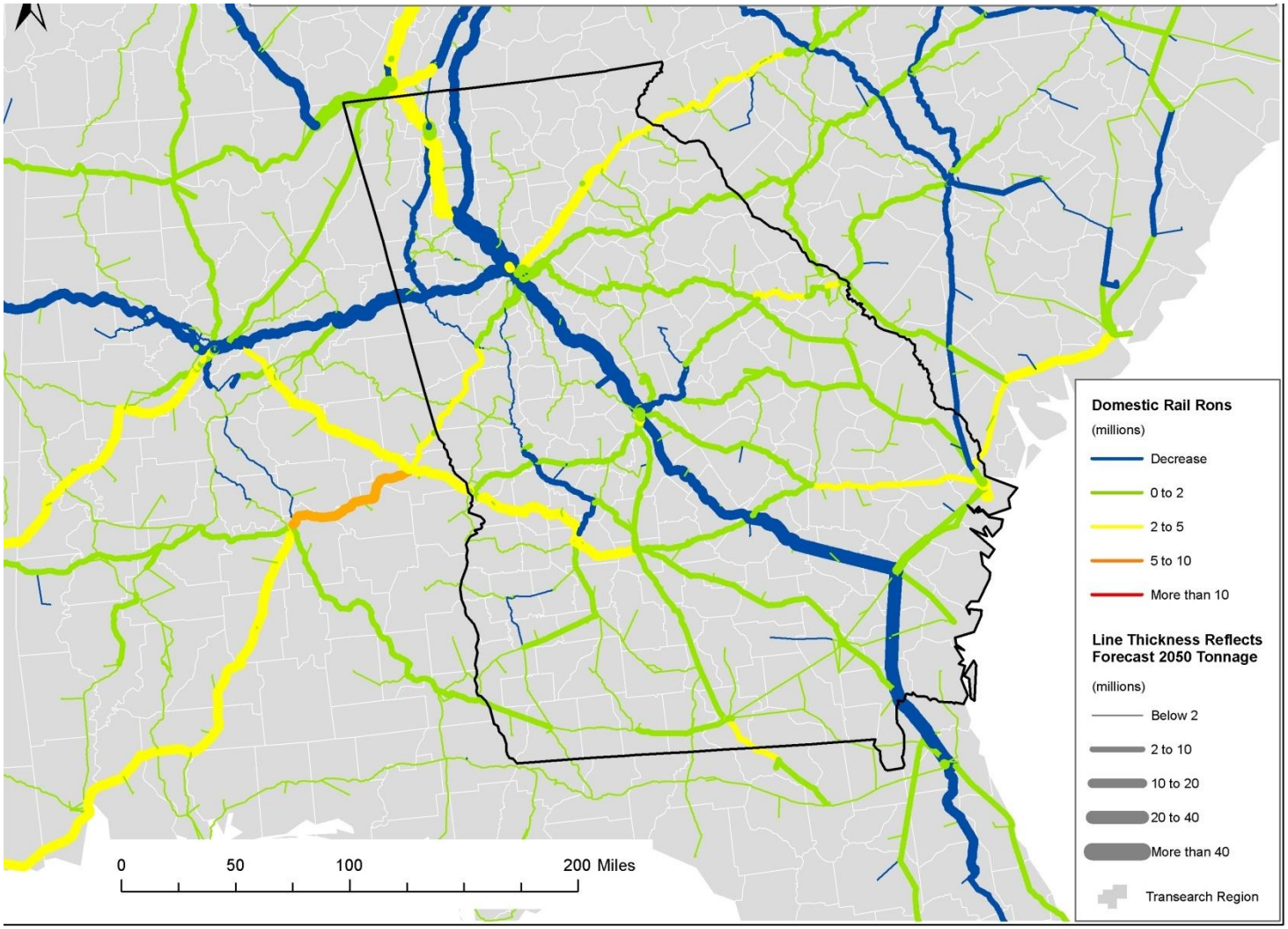
Source: Transearch

Figure 1-9 ***Low*** **Scenario Rail Freight Growth**
by the year 2050



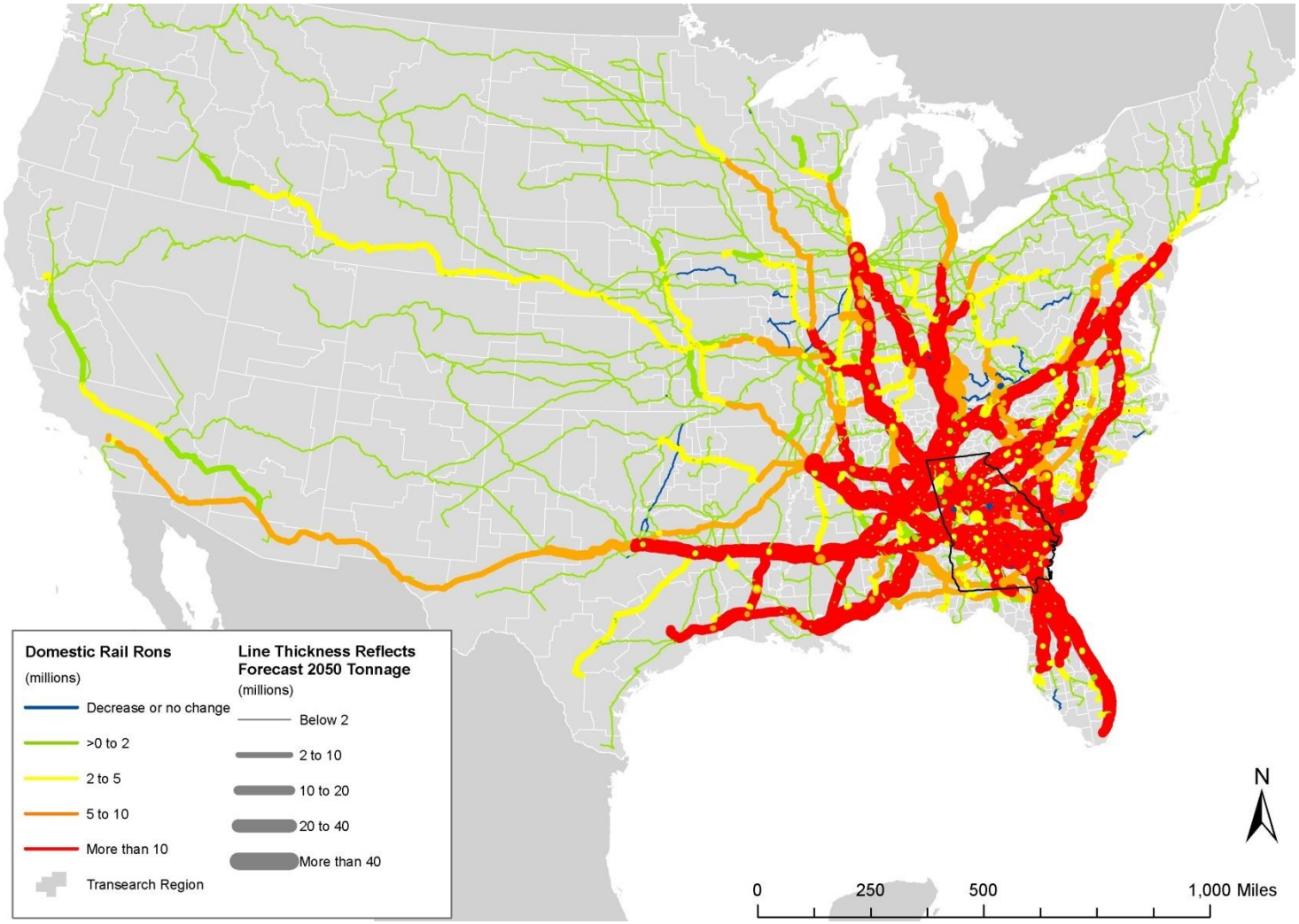
Source: Transearch

Figure 1-10 *Low* Scenario Rail Freight Growth
by the year 2050 (Zoomed Image)



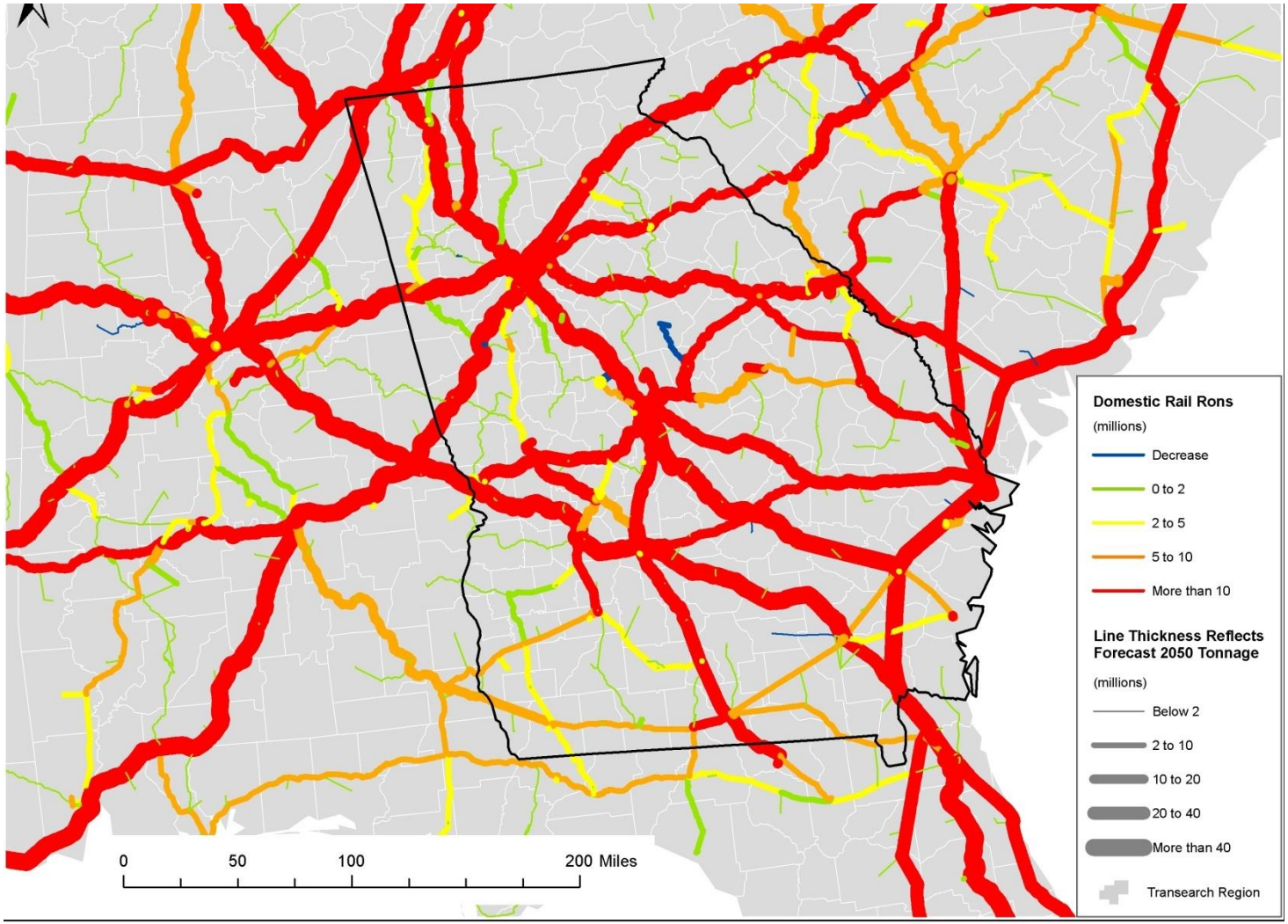
Source: Transearch

Figure 1-11 *High* Scenario Rail Freight Growth
by the year 2050



Source: Transearch

Figure 1-12 *High* Scenario Rail Freight Growth
by the year 2050 (Zoomed Image)



Source: Transearch

The low-growth scenario does not mean that all lines will see a drop in traffic. In Figure 1.9, a few segments indeed have some growth (shown in red). However, the overall impacts on the rail system would include consolidation and abandonment of some light density lines as lack of revenue growth fails to provide sufficient incentives to reinvest in plant and equipment. It likely accelerates shift away from "loose car" traffic, with investment for new capacity, if any, on intermodal services.

The high-growth scenario would result in substantial investment across the entire rail industry, including the short lines to accommodate the anticipated traffic. The big new opportunity for railroads will be their successful entry into shorter-haul intermodal markets (250 to 500 miles), of which heavy congestion on the highways will be a major driver. However, even with substantial investments, it is unlikely that the railroads will be able to keep capacity up with demand, with the net result being that they will not be able to absorb all of the potential traffic that they could profitably handle. Under this scenario, the competition for track capacity with passenger trains also will be most severe, as population growth drives development of new and expanded services.

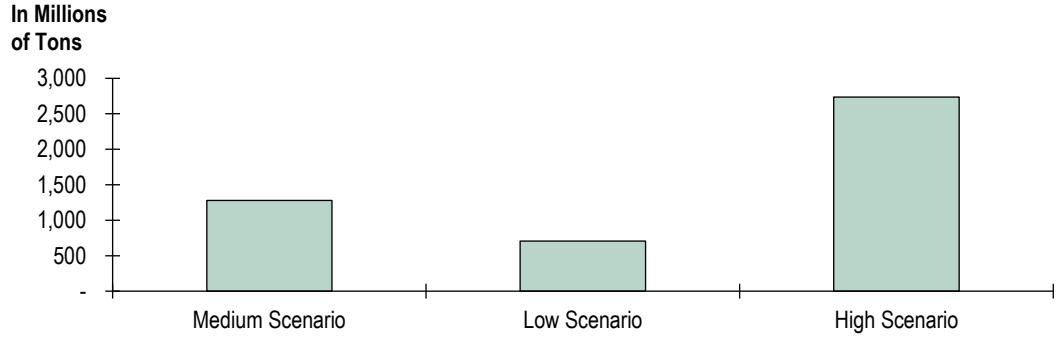
Georgia Truck Freight Growth Scenarios

In Figure 1.13, the medium scenario calls for robust growth of highway traffic in Georgia by the year 2050, assuming moderate economic growth. Expansion of trade, retail, manufacturing, and a revived construction sector encourages substantial increases in truck freight volumes. The medium-growth, baseline trend is magnified in the high-growth scenario that would represent a more than a tripling in truck freight on Georgia's roadways over the next 40 years. The low scenario shows a small increase of 10 percent truck freight by 2050 due to limited growth assumption for both manufacturing and construction -- two intensive users of trucking in Georgia.

Freight flow maps for trucks corresponding to the three growth scenarios are in Figures 1.14 through 1.19. Even medium growth, as apparent in the maps, will result in significantly more truck VMT (vehicle-miles traveled) to handle the higher freight volumes and more general congestion on Georgia's roadways.

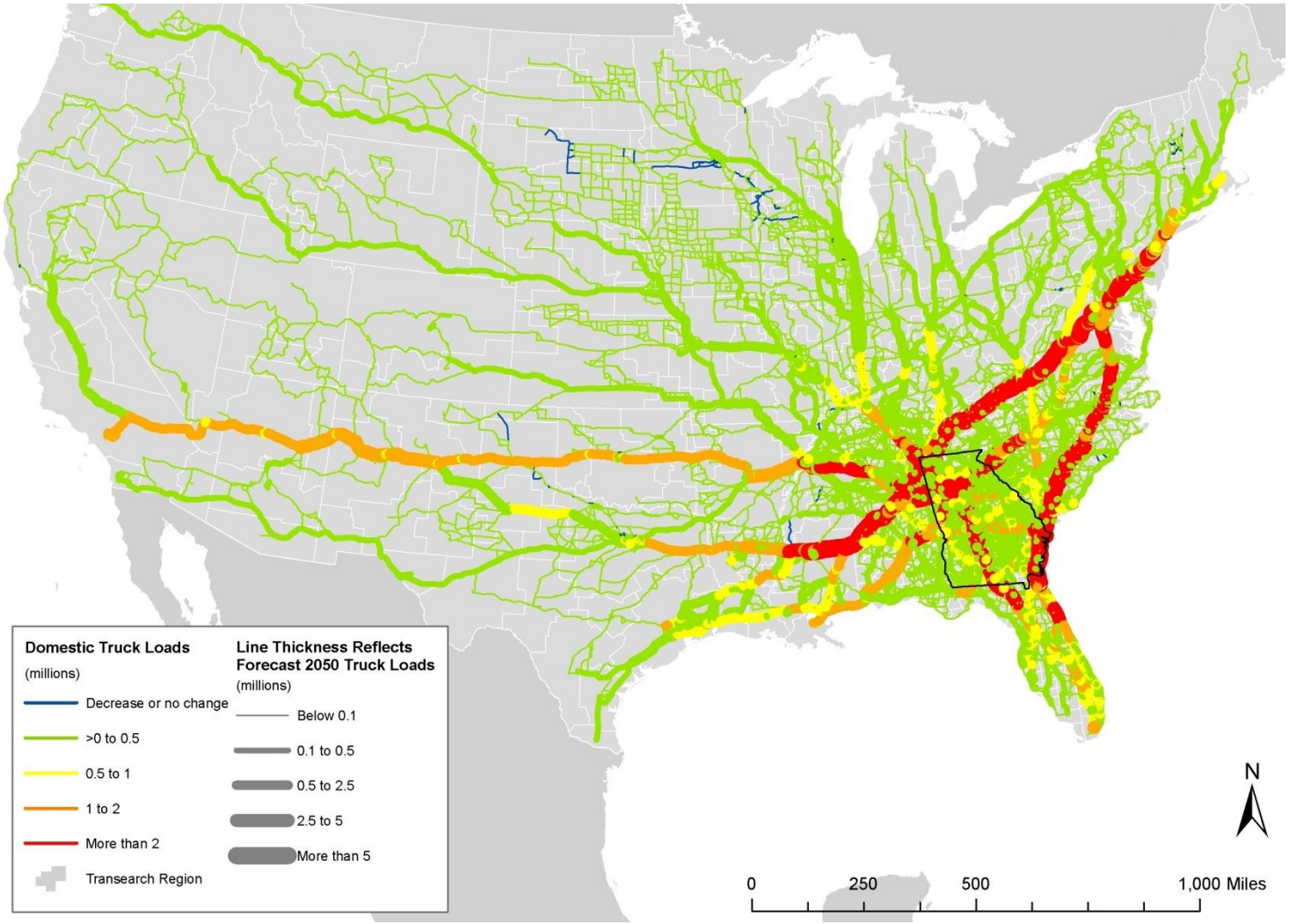
Figure 1-13 Georgia Truck Volume Forecast

Low, Medium, and High Scenarios by the year 2050



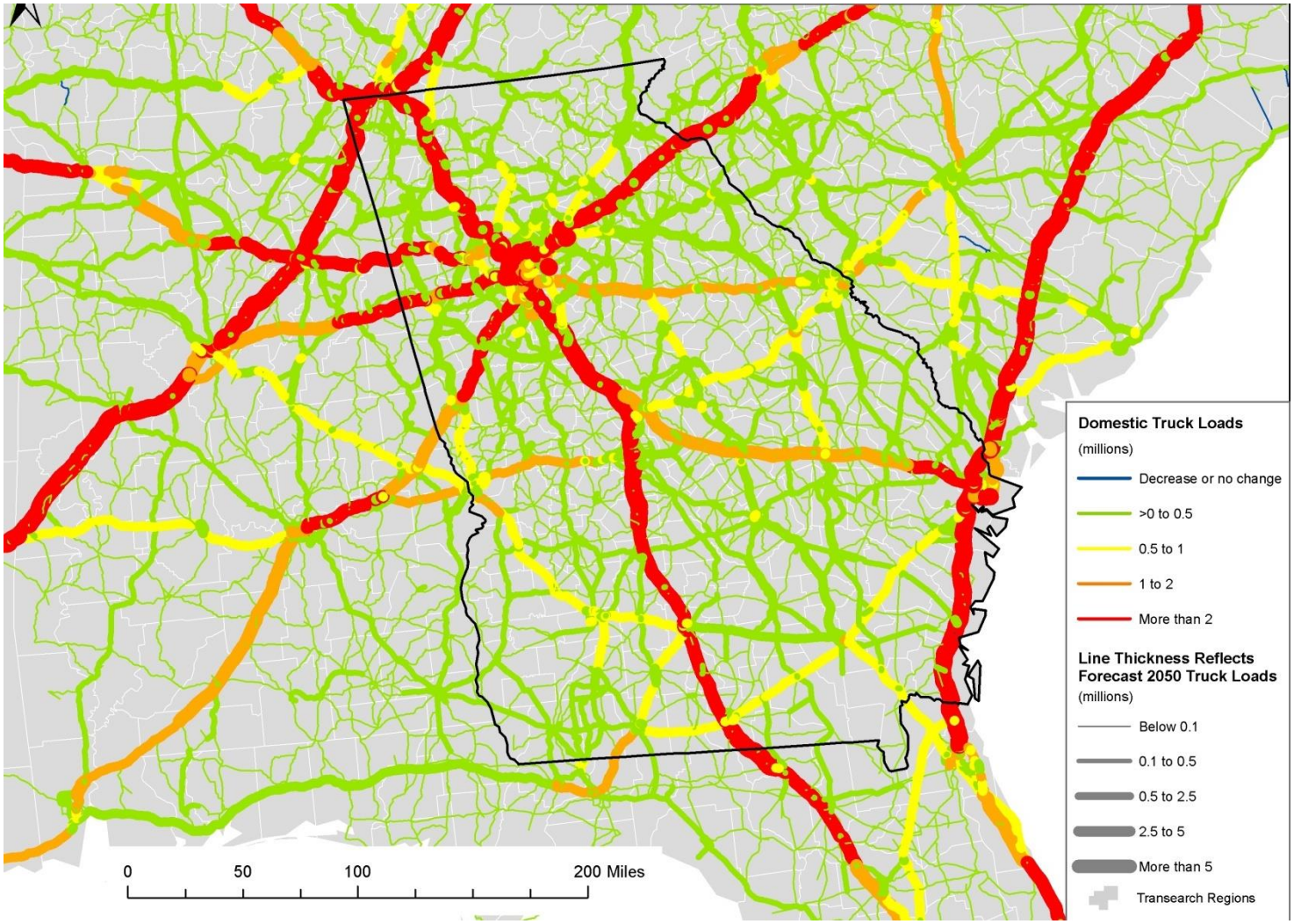
Source: Project Team Analysis

Figure 1-14 *Medium* Scenario Truck Freight Growth
by the year 2050



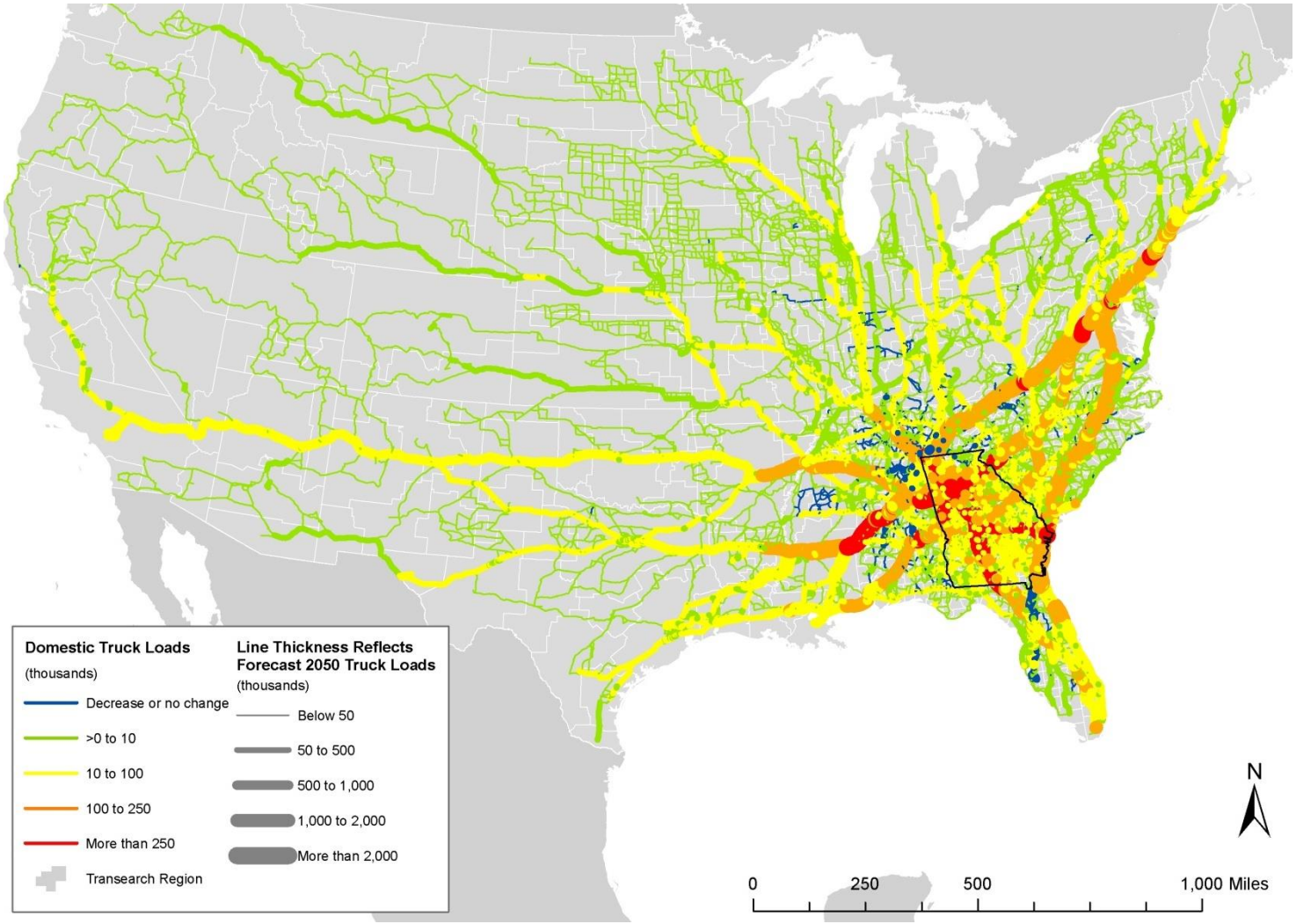
Source: Transearch

Figure 1-15 *Medium* Scenario Truck Freight Growth
by the year 2050 (Zoomed Image)



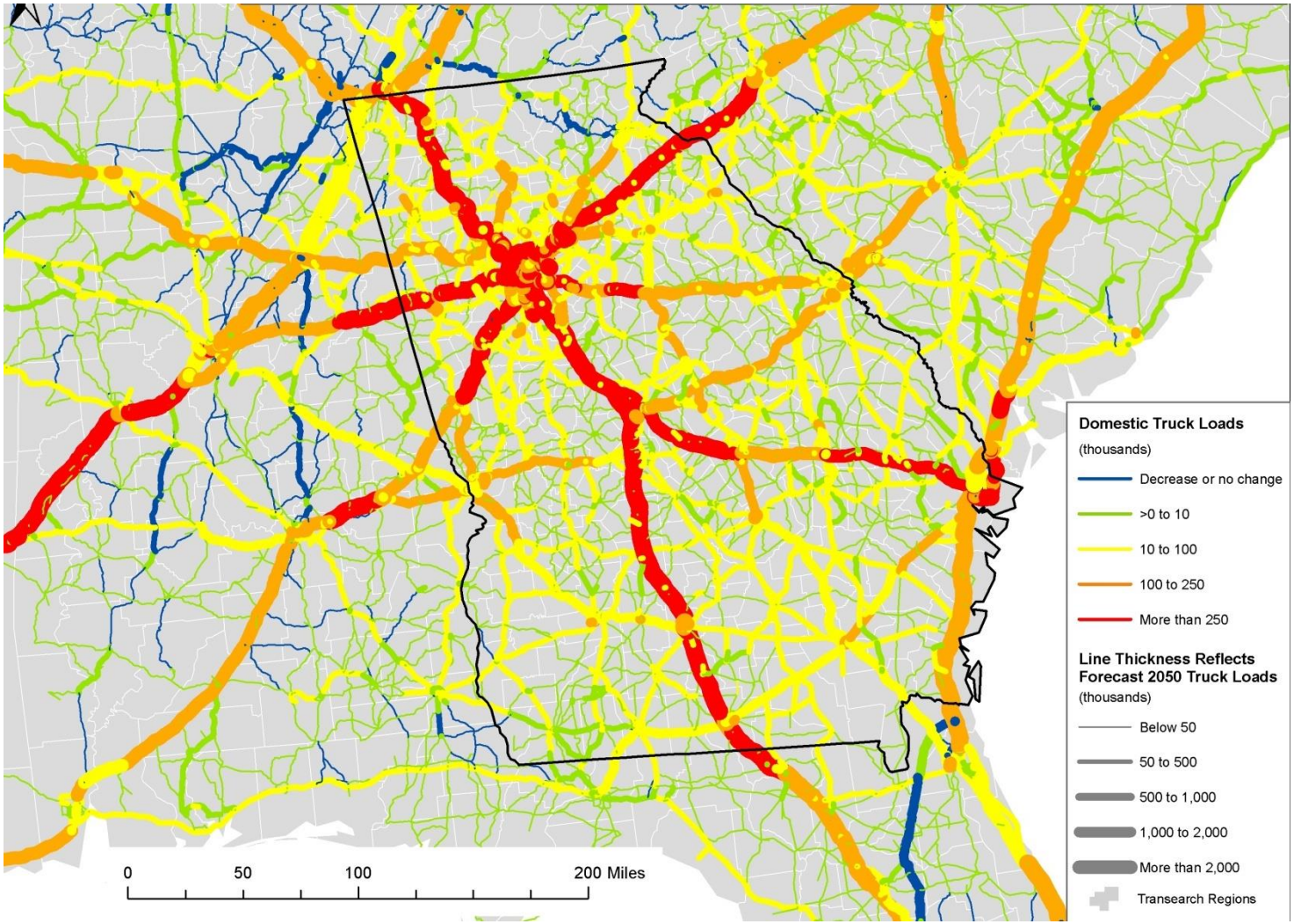
Source: Transearch

Figure 1-16 *Low* Scenario Truck Freight Growth
by the year 2050



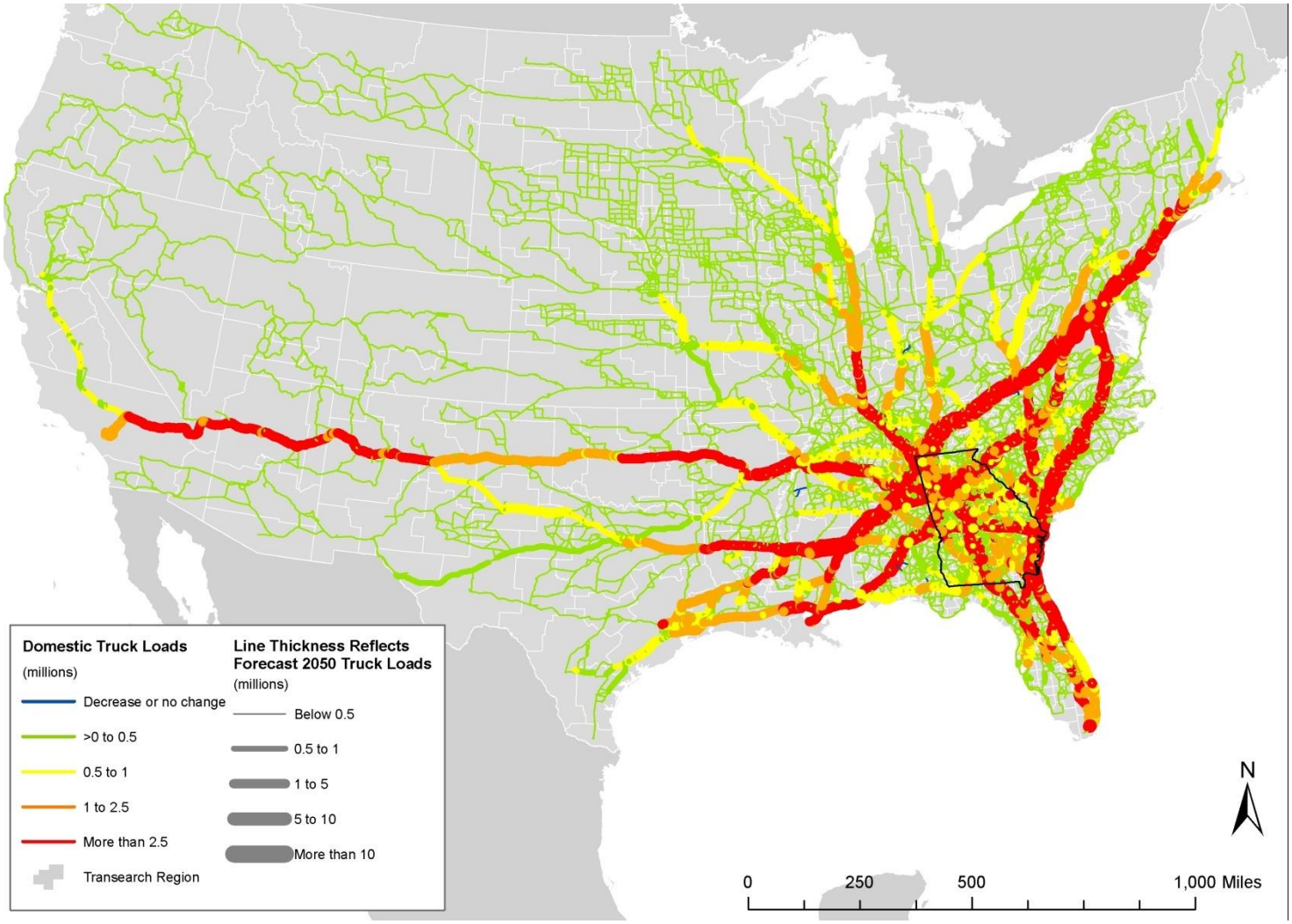
Source: Transearch

Figure 1-17 *Low* Scenario Truck Freight Growth
by the year 2050 (Zoomed Image)



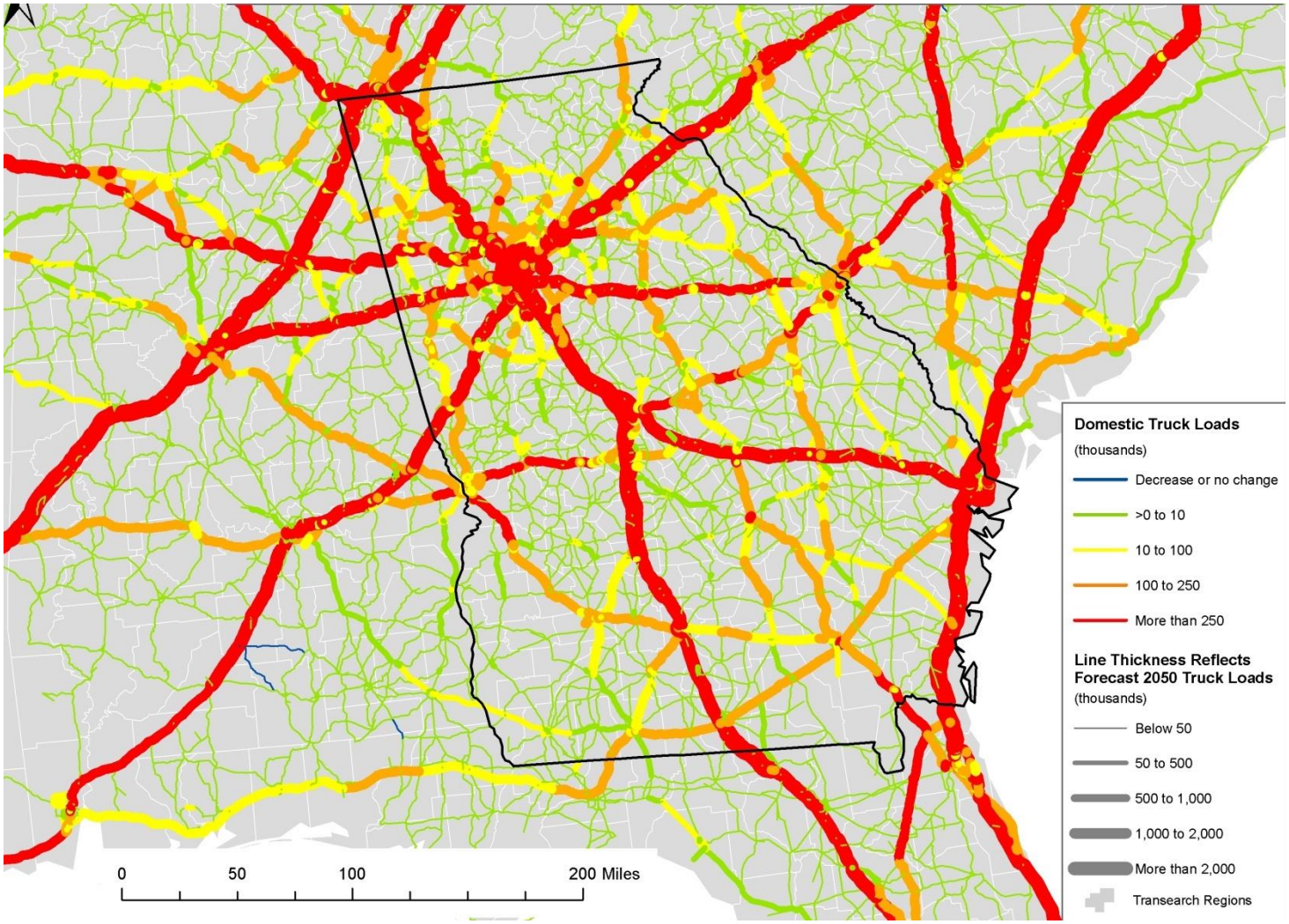
Source: Transearch

Figure 1-18 *High* Scenario Truck Freight Growth
by the year 2050



Source: Transearch

Figure 1-19 *High* Scenario Truck Freight Growth
by the year 2050 (Zoomed Image)



Source: Transearch

The impacts on the highway network across the three scenarios present some differences beyond just the growth in traffic. The capacity needs for the high-growth scenario reach into many regions of the State, beyond just the key interstate corridors and links around the Atlanta region. This effect is more subdued with the medium-growth scenario, with capacity needs along the Interstate system and certain east-west linkages between the coastal regions, Atlanta, and the Midwest and West.

While the guideway and operations are the responsibility of a combination of public and private sector entities, the relationships are more complex and less commercially driven than is the case with most North American railroads. Among the motor carriers, the key concerns across all three scenarios will be matching capacity with demand, and since their capital costs are modest, they can respond quickly to changes in demand. Technology will play an important role, with an expectation that economic and political pressures to reduce fuel consumption will drive adoption of more efficient vehicles (such as hybrid urban truck fleets), and increasing size and weight.

The primary difference across all three scenarios for highway carriage will be the level of investment in highway infrastructure. The public sector has traditionally performed this role, but in recent years its leadership to fund and improve infrastructure has become increasingly unclear.

Thus, in the slow-growth scenario, a trend may be that the U.S. Highway Trust Fund is reauthorized at historic baseline example 2008 levels, with declining or flat revenues at best. Additionally, the increased use of more fuel efficient vehicles in coming years also will reduce revenues generated by fuel taxes. The net effect may be a disinvestment in highways, as states will not be able to identify increased resources, and private investment fails to occur to a significant degree.

For the medium scenario, a modest increase in Federal highway user fees enables sustainment but not expansion of existing programs. The high-freight demand scenario foresees a moderate increase in the Federal highway program, but with a national freight program that specifically will address freight-related facility needs. This would be required simply to handle the four-fold projected growth in demand.

Georgia Seaport Container Volumes Growth Scenarios

The rapid emergence of the Port of Savannah as one of the leading container ports in the United States has given Georgia a great strategic transportation asset, giving the State a larger role in global trade. Savannah's growth also has introduced a range of economic development opportunities, particularly for distribution, warehousing, and manufacturing.

The freight volumes, mostly in the form of "containers" (i.e. 20-foot equivalent units / TEUs) handled by the port also have a direct impact on Georgia's

highway and rail networks. Containers arriving at the port from overseas are transported to markets throughout the country by truck and rail. Domestic shippers using Savannah as a gateway for exports must also transport their products to the port by either truck or rail. For these reasons, the number of containers handled by the Port of Savannah will have a material bearing on the freight volumes that will need to be accommodated by Georgia's highways and rail lines in the future.

As with the other modes, the pace of growth at the port through 2050 could go in different directions depending on a number of factors, including growth in the U.S. economy, changes in international trade and sourcing patterns, and the overall competitiveness of the port's infrastructure relative to other U.S. container ports, particularly along the Eastern Seaboard.

Table 1.3, below, describes three growth scenarios for possible 2050 container volumes at the Port of Savannah. The same scenarios, low, medium, and high, also are illustrated graphically in Figure 1.20.

- The **low scenario** assumes limited container growth at the Port of Savannah, rising by one-million units (and less than a 700,000 TEU increase compared to 2010s record volume) by the year 2050. The low scenario assumed that major infrastructure improvements that would add capacity – the Savannah Harbor Expansion project to accommodate larger vessels and the Jasper Terminal – would not be made. In this scenario, the port would lose significant market share to competing ports that can handle deeper draft post-Panamax ships and associated growth in trade volumes.
- The **medium scenario** shows container volume would more than double at the Port of Savannah to 6.5 million TEUs by the year 2050. This growth represents the full utilization of the port's Garden City terminal and the Savannah Harbor Deepening project, but assumes the Jasper Terminal would not be built. Even without the new terminal, it is assumed that growth of this scale would be enabled by the port continuing to capitalize on its competitive strengths relative to other ports.
- The **high scenario** is the unconstrained TEU volume forecast included in the Marine Modal Profile of this study. It assumes no constraints on capacity emerge at the Port of Savannah, international trade continues to expand at a significant rate, and the U.S. economy maintains at least moderate-growth levels. In order to allow for this more rapid growth, the Savannah Harbor Expansion project and additional dockside capacity (e.g., the Jasper Terminal) would be built. The high scenario represents a quintupling of the port region's container volume to over 15 million units by 2050.

Table 1.3 Long-Term Forecast Alternatives for Savannah Container Volumes *by the year 2050*

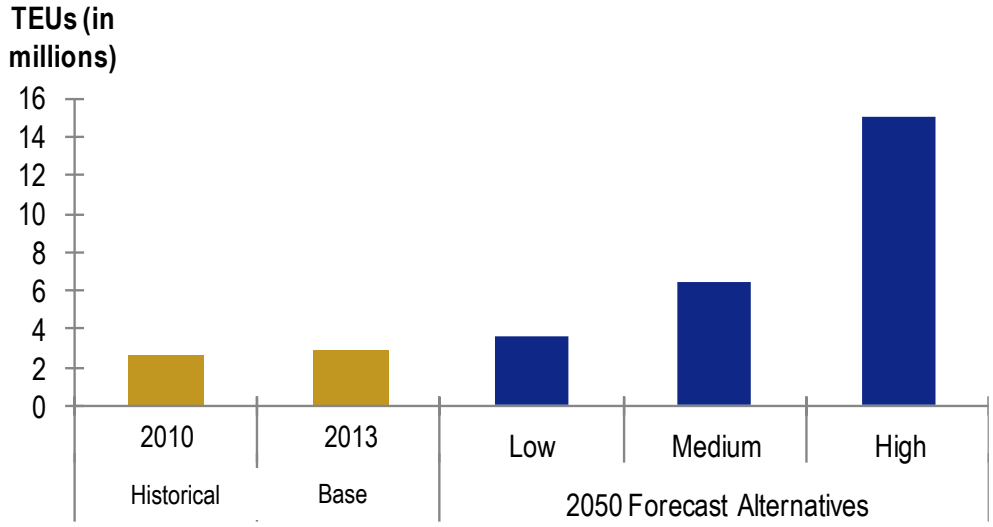
Year	Scenario	Total Tons (In Millions)	TEUs (In Millions)	TEU Tons (In Millions)	TEU Tons Share of Total	Scenario Assumptions
2013	-	60.2	2.6	23.4	39%	baseline
2050	Low	71.0	3.6	32.0	45%	No Jasper Terminal expansion or SHEP; One-third of growth of medium alternative
2050	Medium	128.7	6.5	58.5	45%	No Jasper Terminal expansion but SHEP happens; Capacity of Garden City Terminal reached
2050	High	251.0	15.0	135.0	54%	Jasper Terminal built and SHEP happens; Unconstrained TEU volume forecast

Source: Transearch, Project team analysis, and Moffett & Nichol (unconstrained TEU forecast).

In addition to showing the container volumes handled by the Port of Savannah in the year 2050 for each of the three growth alternatives, Table 1.3, also relates those volumes to the total tons of truck and rail freight going into and out of Chatham County as estimated by TRANSEARCH (and adjusted for each of the growth scenarios). Assuming that each TEU holds nine tons of freight, the TEUs handled by the Port of Savannah presently account for approximately 40 percent of the total freight volume going into and out of Chatham County as well as contributing empty truck moves, which adds to local traffic conditions.

In the year 2050 forecasts, TEUs' share of total tons increases to 45 percent. In the high-growth scenario, however, container tonnage accounts for an estimated 54 percent of total tons, a greater share due in part to the larger relative contribution of international trade to freight volumes that would be accompanied by the dramatic growth in container traffic handled by the Port of Savannah.

Figure 1-20 Long-Term Forecast Alternatives for Savannah Container Volumes
by the year 2050



Source: American Association of Port Authorities (base-year data) and Project team analysis

Georgia Air Cargo Growth Scenarios

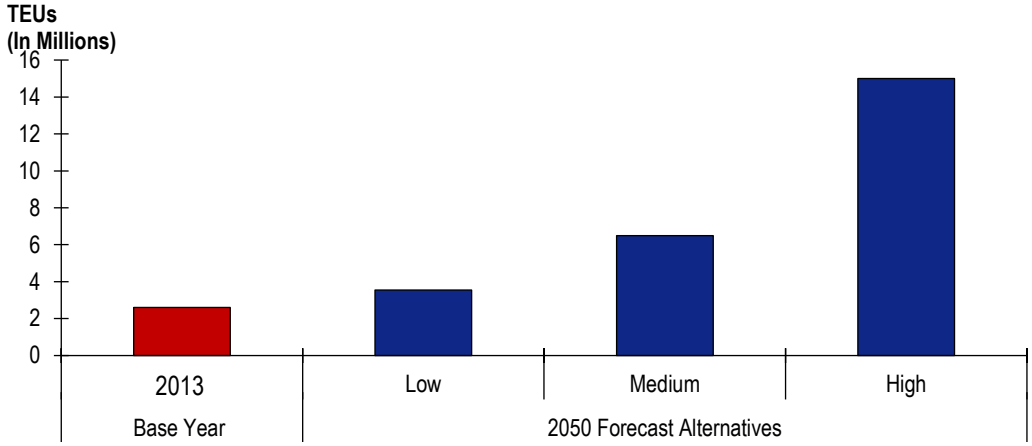
According to the FAA, air cargo generally tracks gross domestic product in terms of growth. Fuel price volatility, security regulations, and globalization are additional factors that will affect air cargo growth through the year 2050. Due to air cargo's focus on high-value, time-sensitive, and lightweight goods, it accounts for a fraction of total freight in Georgia's transportation network. As such, air freight's contribution to truck freight volumes on Georgia's roads will be small.

However, as air freight is dependent on reliability and speed, efficiency of roadway ingress and egress to and from Georgia's airports is crucial to future competitiveness of individual airports as well as businesses relying on moving goods around the nation and world quickly. So, even as air cargo-related truck traffic may comprise a small share of total truck traffic in Georgia, operational performance remains important to Georgia's economy in coming decades. Expansion of Georgia's air cargo volumes may contribute to both landside and airside infrastructure capacity constraints depending on pace of future growth.

FAA's 2011 forecast projects moderate growth in "regional ton miles" (RTM) for domestic air cargo (2.8 percent annual growth by the year 2030) and faster growth for international air cargo (5.5 percent). The FAA does not have a pure forecast for total metric tons that does not incorporate the distance concept captured in RTMs. The air cargo forecast developed for this report applies Georgia's real gross state product growth rates through the year 2050 to estimate future air freight volumes.

Following this method, ATL could grow to 955,000 tons of air cargo by 2050 in the low-growth scenario in Figure 1.21 (this forecast level would not be different from 2000 and 2004 when it processed 900,000 metric tons of cargo.) The medium forecast has ATL handling 1.6 million metric tons (equivalent to the amount of cargo currently handled by LAX) while the high forecast translates to ATL handling an annual volume of 3.7 million metric tons (smaller than present-day Memphis, the second busiest air cargo hub in the world after Hong Kong).

Figure 1-21 Long-Term Forecast Alternatives for ATL Air Cargo Volumes
by the year 2050



Source: Project team analysis

ATL remains the busiest passenger airport in the world but attaining the freight volumes in the high scenario would be a considerable challenge. Improvements to passenger ingress and egress, both roadway and transit, as well as additional terminal capacity are likely to be future priorities reinforcing ATL's position among top tier global air hubs. For these reasons, it is expected to maintain its status as a significant air freight hub but very challenged to grow into a future among the world's largest centers for the handling of air freight.

The airport's emphasis on passenger traffic is further borne out by recent trends. Air cargo volumes at ATL declined 36 percent between 2000 and 2010 (from 894,000 to 659,000 metric tons according to Airports Council International) while the number of passenger traffic increased 11 percent (from 80.1 million in 2000 to 89.3 million in 2010.) Although the capacity and worldwide network offered by ATL's passenger air service connotes significant air freight capacity as well as overall logistical competitiveness at ATL, air freight carried by passenger airlines accounts for 13 percent of all air cargo carried in the U.S. domestically and 31 percent of total international air freight.

In order to attain long-range high-growth rates in air cargo, ATL would need to become a hub for an integrated freight carrier (e.g., UPS in Louisville or FedEx in Memphis). However, an integrated freight carrier would compete with passenger needs for space and infrastructure at the airport.

2.0 Importance of Freight and Logistics to the Georgia Economy

This section provides detail concerning strategic Georgia industries, their growth trends, and future prospects. Each of the three example industries -- warehousing and distribution, agriculture and food processing, and transportation equipment -- are intensive users of freight services and depend on the Georgia transportation network to conduct their operations.

These three industries are example sectors targeted by state, regional, and local economic development agencies throughout Georgia, underlining both their current importance to the state economy as well as the anticipated opportunities the industries are expected to bring to Georgia in the future. These industries have prospered, in part, due to the assets they have found in Georgia – its labor force, costs, location, resources, and infrastructure. Georgia's freight transportation network comprises one of these key assets, providing the foundation on which goods bound for or originating from the State can efficiently reach Georgia businesses or be shipped to markets throughout the United States and world.

The three industry profiles demonstrate in tangible terms the importance of these industries to Georgia and their reliance on the State's freight transportation system to compete effectively with other states and countries. They also include maps depicting the rail and truck flows related to the industries both entering and leaving the State. The maps show major routings with domestic trading partners and depict expected (baseline) growth in freight volumes through the year 2050.

2.1 WAREHOUSING AND DISTRIBUTION – INDUSTRY PROFILE

The **Warehousing and Distribution Industry** in Georgia includes freight transportation and warehousing activities as well as businesses engaged in wholesale trade. Wholesale distributors are included here since the storage and movement of goods is their primary function. According to the U.S. Department of Labor's Bureau of Labor Statistics, over 356,000 Georgia residents are employed in warehousing and distribution industries.

Georgia is strategically located as the main Southeastern hub for multimodal logistics and freight operations. This makes it an attractive location for

companies looking for quick access to growing regional, national, and international markets. Large retailers like Home Depot, Target, IKEA, and Wal-Mart as well as consumer product companies like Procter & Gamble, Kraft, and Clorox operate major distribution centers in the State. Companies like IKEA explicitly indicate that they serve Georgia, U.S. Southeast, and Texas locations from Georgia (their Savannah distribution facility, opened in 2005, is nearby the port). Target has an import warehouse in Savannah (one of four in the country) that receives shipments directly from overseas suppliers as well as several regional distribution centers – one of which is in Midway, Georgia (adjacent to I-95 just south of Savannah) that receives shipments of store merchandise and ships directly to Target stores.

Nearly 100 distribution centers in Georgia have over 500,000 square feet of floor space, with several larger than two million square feet.[13] According to the Georgia Department of Economic Development, there are almost 1,000 warehousing and distribution facilities totaling over 200 million square feet of storage used by, and for, the logistics industry.

Several new or expanded distribution centers larger than 400,000 square feet have been constructed in Georgia in recent years; here are just a few examples:

- **General Mills** opened a 1,500,000 square-foot warehousing and distribution center in Social Circle in May 2010, strategically located on I-20 approximately 10 miles east of the company's production facility in Covington to save on transportation and fuel costs. The facility uses a transportation management system to optimize the number of products that can fit on one truck, thereby reducing the number of trucks required to ship the same amount of freight. From Social Circle, General Mills products are transported throughout the Southeast.
- **Clorox** opened a 1.2 million square-foot warehouse in 2011 in Fairburn. The warehouse is located near I-85 south of Atlanta Hartsfield-Jackson International Airport.
- **Electrolux** also opened a large warehouse and distribution facility (600,000 square feet) in 2011 in Fairburn. This is Electrolux's main home appliance and commercial equipment distribution center for the Southeast. After searching an 11-state area, Electrolux chose to relocate Southeastern distribution to Fairburn from Chattanooga.
- **Dollar Tree,** a nationwide operator of discount variety stores is adding 400,000 square feet to a 600,000 square-foot facility it opened in Savannah in 2000. The distribution center serves the growing Southeastern U.S. market. The expansion will allow Dollar Tree to increase its annual container volume at the Port of Savannah from 8,000 today to 15,000 by 2014.

These operations are attracted to Georgia in part because the state has an extensive multimodal transportation system which facilitates the efficient

[13] Georgia Power Community and Economic Development.

movement of freight. Georgia's highway network is the eighth most extensive in the nation at nearly 122,000 miles; the state's Interstate system is the ninth largest at 1,242 miles. Georgia has more than 4,700 miles of rail lines, ranking seventh in the country.

The primary airports capable of handling freight are in Atlanta and Savannah, with additional commercial airports located statewide in Albany, Athens, Augusta, Brunswick, Columbus, Macon, and Valdosta. Finally, Georgia has two of the top-ranking seaports in the country for the transport of containers (Savannah) and motor vehicles (Brunswick).

Table 2.1 Georgia Industry Profile
Warehousing and Distribution

Item	Description
Industry Definition (NAICS Codes)	42: Wholesale Trade 48-49: Transportation and Warehousing
Employment	Wholesale Trade-196,400; Transportation and Warehousing-159,300
Contribution to GSP	Wholesale Trade-$31.0 billion; Transportation and Warehousing-$13.3 billion (2010, in $2005)
Trend	Short-term – Moderate growth as the domestic economy slowly recovers from the recession Long-term – More rapid growth driven by intermodal corridor/terminal investments and expanding domestic and foreign trade
Suppliers	Fuel, vehicles machinery, all transportation modes
Markets	Distribution facilities, retailers, manufacturers
Georgia International Trade	Georgia-origin exports were $28.7 billion while Georgia-destined imports reached $60.2 billion
Transportation Use	All modes

Georgia's warehousing and distribution industry has grown markedly as a preferred location for a number of reasons. These include the state's historic role as the transportation hub of the Southeast with numerous rail lines and interstates converging from around the country, as well as the global network of flights radiating from Atlanta Hartsfield-Jackson International Airport. Strategic decisions to expand infrastructure at the Ports of Savannah and Brunswick have also yielded substantial increases in volume, making the two ports key nodes in the national network for handling containers and automobiles.

The development of the Crescent Corridor and large-scale intermodal facilities in Georgia also bode well for the long-term growth of the distribution and logistics industry in the State. The expansion of the Panama Canal will impact the Port of Savannah (the East Coast's second largest container port) and Georgia's logistics industries over the next decade depending on the extent of infrastructure investments at the port, the effects of competition from other ports, and changes to the prevailing distribution patterns of Asian-made consumer goods within the U.S.

Metro Atlanta. Atlanta grew as a rail center serving the transportation needs of the Southeastern quadrant of the United States. Today, the metropolitan area's rail network is further complemented by connections to deep-sea shipping via Savannah, interstate linkages to some of the fastest growing parts of the country and the industrial Midwest, and the world's busiest passenger airport. The strong domestic and global connections have made Georgia a preferred location for warehousing and distribution facilities. Metro Atlanta ranks 5th among the top warehouse markets in the country[14] alongside its national competitors of Chicago, Los Angeles-Riverside, Dallas-Fort Worth, and northern New Jersey.

Beyond its top ranking in passenger volume, Atlanta's airport broke into the top 10 busiest U.S. air cargo airports in 2010 with 660,000 metric tons of freight that year, which represented 2.6 percent of the national total. Looking into the future, Atlanta's location and transportation network, if managed well and expanded to accommodate growth where appropriate, should enable it to continue to attract growth in warehousing and distribution and rebound from the recession.

A recent study by the U.S. Department of Commerce ("U.S. Metro Area Exports, 2013") shows how significant metro Atlanta is in accounting for all of Georgia's exports. In 2013, Atlanta accounted for 54.6% of Georgia's share of state exports.[15] Compared to all U.S. metro areas, the study also showed that the value of good exported from metro Atlanta ranks it 18th nationally.

Ports of Savannah and Brunswick. In fiscal year 2011, the Port of Savannah handled over 2.9 million containers (see Figure 2.1), ranking the port fourth in the country following Los Angeles, Long Beach, and New York/New Jersey. The port is particularly strong on exports, exceeded only by the Port of Los Angeles based on tonnage of containerized exports. The Port of Brunswick ranked fourth in the number of automobiles handled in 2010, and has seen volumes nearly double since 2000. Brunswick's vehicle volumes surged further in the GPA's 2011 fiscal year, reaching a record 477,000 vehicles. The Port of Savannah's growth (TEU volume nearly tripled between fiscal years 2002 and 2011) can be linked to efforts by the Georgia Ports Authority and the Savannah Economic Development Agency to attract distribution center operators wishing to capitalize on port proximity.

In cooperation with land owners, trucking and rail companies, and state incentives, Georgia has succeeded in attracting a wide range of distribution centers to the Savannah area, including Home Depot, Pier 1, IKEA, and Target, among many others. The massing of distribution centers nearby Savannah has created economies of scale that help to lower costs and make the area more attractive to additional distribution centers. In the Georgia Port Authority's 2011 fiscal year, the Port of Savannah handled 8.7 percent of total U.S. containerized trade based on tonnage, and the port has grown far faster than any other top 10 container port since 2000.

[14] Georgia Power Community and Economic Development, January 2014.

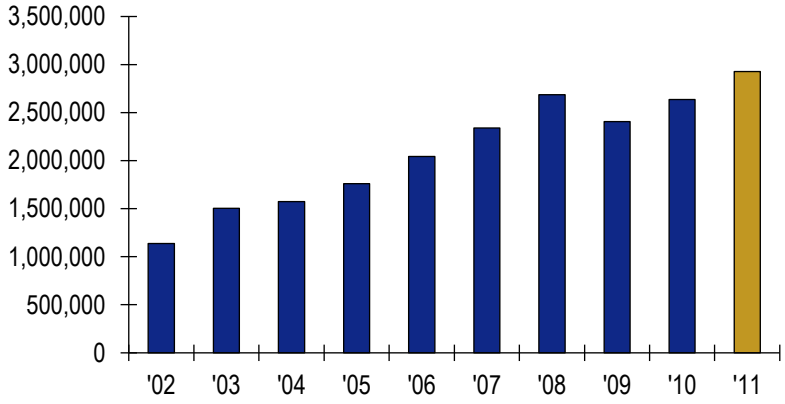
[15] www.trade.gov/mas/ian/build/groups/public/@tg_ian/documents/webcontent/tg_ian_005379.pdf

The port's increases in market share can be attributed, in part, to the Savannah area's emergence as a favored location for major distribution centers focusing on consumer goods.

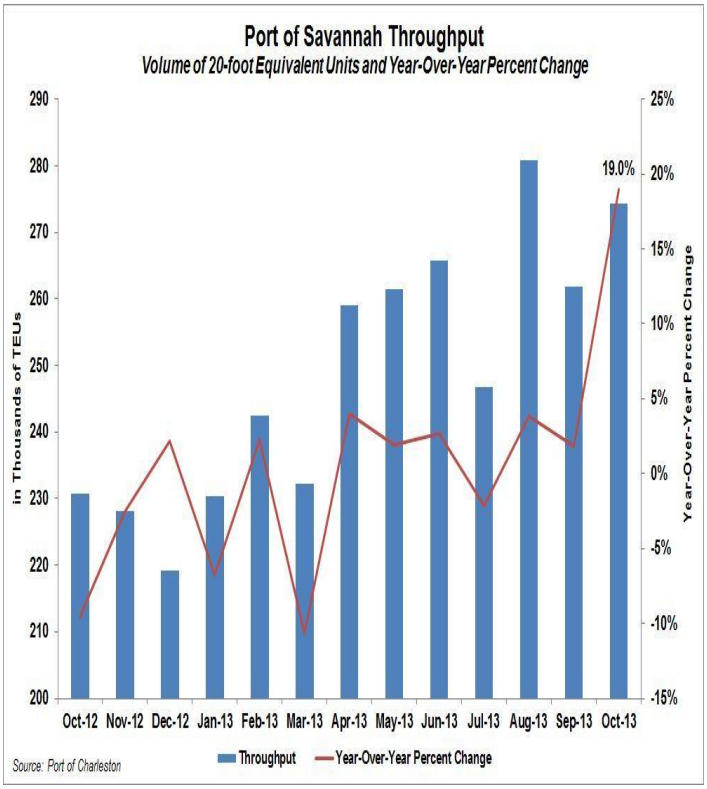
A single distribution center like Dollar Tree's processes roughly 15,000 containers per year that use the Port of Savannah as a gateway for goods originating overseas. The growth of a robust multimodal transportation network connecting Savannah to Atlanta and markets throughout the southeast is imporant to the growth of the distribution center industry in the region.

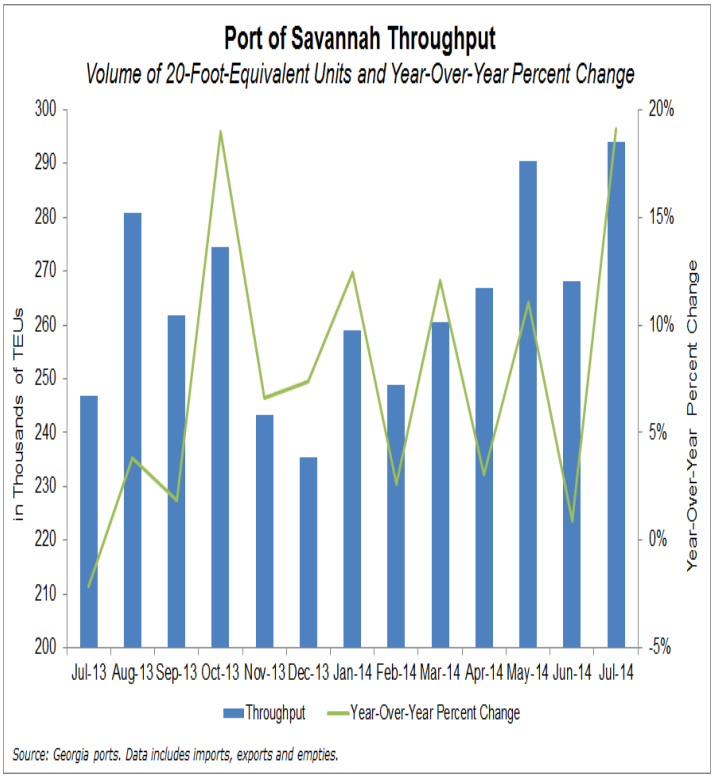
Figure 2-1 Port of Savannah Container Volume

Port Container Volume 2002 - 2011, 2012-2013, and 2013-2014



Source: Georgia Ports Authority, container volumes are for fiscal year.





Crescent Corridor. Launched in 2007, the Crescent Corridor is a public-private partnership between Norfolk Southern Railroad and the states to build a rail corridor from Louisiana to New Jersey. The Crescent Corridor goes through Louisiana, Mississippi, Alabama, Tennessee, Georgia, South Carolina, North Carolina, Virginia, Maryland, Pennsylvania, and New Jersey. It includes the construction of new passing and double tracks, new or expanded rail intermodal terminals, improvements to accommodate fast trains, and the purchase of new locomotives and freight cars.

It is anticipated that the corridor will help to shift truck freight traffic to rail in some of the most populated and fast growing areas of the country, including northern Georgia. As part of the infrastructure improvements, Norfolk Southern's Austell Inman terminal north of Atlanta would be expanded. The Crescent Corridor will add to Georgia's competitiveness as a warehousing and distribution center by adding rail freight capacity and lowering highway congestion, particularly on the heavily used Interstates going into and out of the Atlanta area. A Norfolk Southern study estimates about 750,000 long-haul truck trips could be diverted from Georgia's highways by 2020 due to the Crescent Corridor.[16]

Panama Canal Expansion. Deeper draft vessels are able to transit the Panama Canal, allowing accommodation of 12,600 TEU container ships -- up from maximum TEU capacities today of between 5,000 and 5,500 TEUs. Larger, more efficient ships generate transportation cost savings for Savannah's Asia-U.S. trade relative to intermodal rail service from the West Coast. The Port of Savannah, however, will need to be deepened to handle the larger ships. Federal and non-Federal funding options are being explored to pay for the balance of the project. Competition between ports for the Federal funding to prepare ship channels for larger ships is intense.

Overall, projects like the Crescent Corridor combined with Georgia's nation-leading assets in airport and seaport infrastructure reinforce the State's role as the hub for the entire Southeast. Certain issues the trucking industry – such as a shortage of drivers and high/volatile fuel costs – will continue to focus interest in intermodal traffic for longer-haul shipments to, from, and through Georgia.

Employment

Employment levels related to Georgia's distribution and warehousing sector is at around 303,000[17] in 2016. Employment in both wholesale trade and transportation and warehousing declined somewhat due to the recession. Data indicate that wholesale trade employment fell by 10 percent between 2007 and 2010 as the recession took hold, while transportation and warehousing jobs

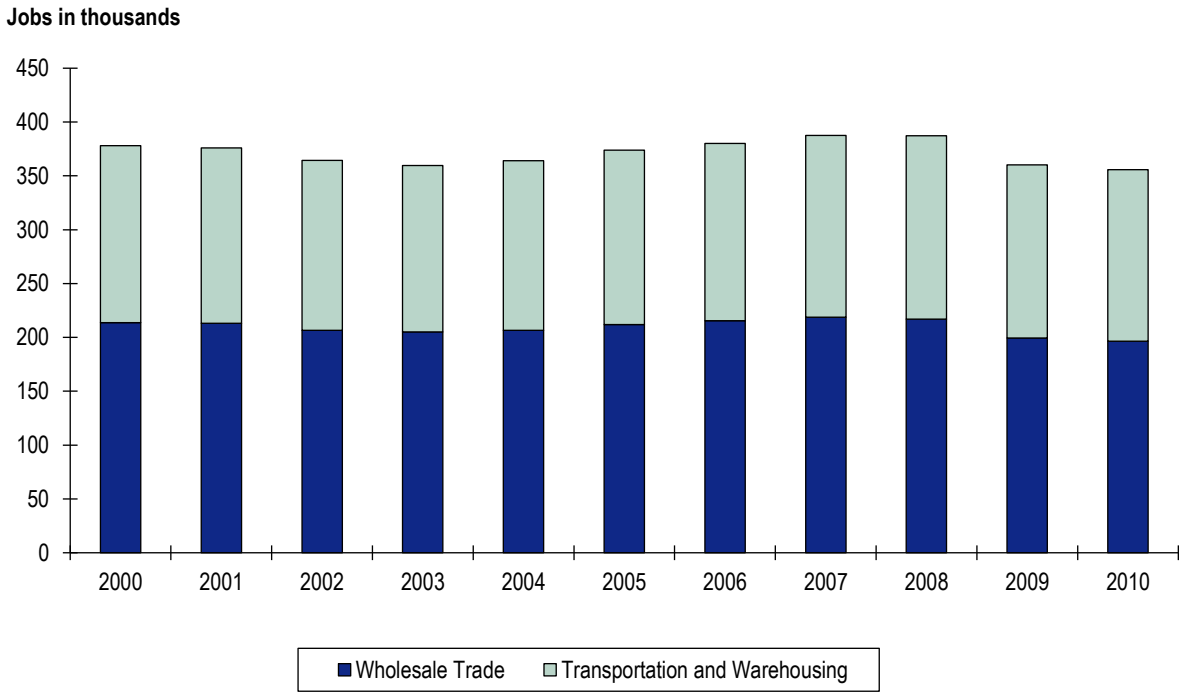
[16] www.thefutureneedsus.com/crescent-corridor/state-profiles/georgia

[17] www.selectgeorgia.com/resources/publications/warehousing-and-logistics

declined by 6 percent. These declines are in line with national trends, and Georgia has maintained a constant 3.7 percent share of all U.S. jobs in warehousing and distribution.

As shown in Figure 2.3, logistics sector economic output has mostly been growing in the last decade and has even grown as job numbers posted a small decline. This implies that even if employment is declining, warehousing and distribution businesses continue to realize economies of scale and output efficiencies which enable them to grow. Logistics and distribution activity will continue to be a major contributor to the Georgia economy, with output likely to continue rising more quickly than job levels.

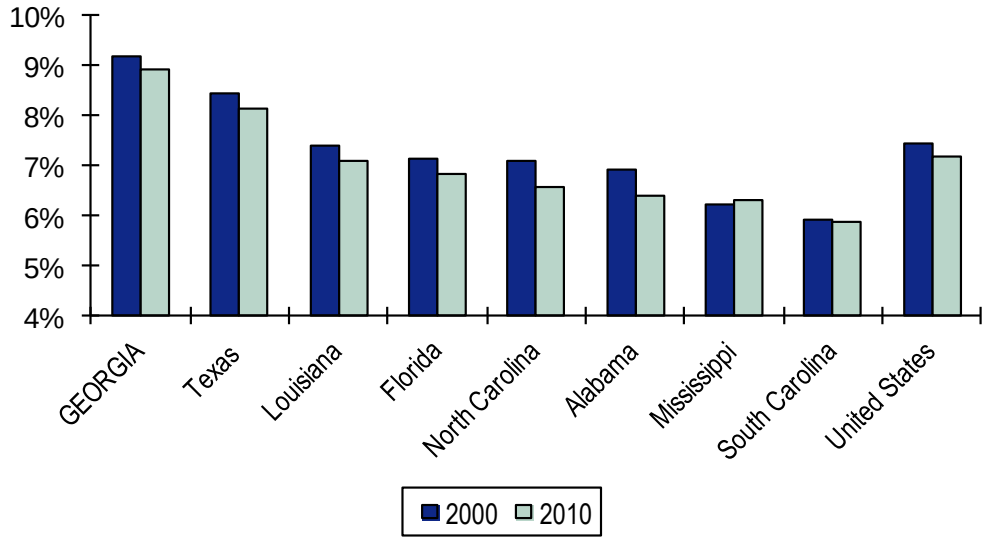
Figure 2-2 Employment Trends in Georgia's Warehousing and Distribution: Historic Trend: *2000 to 2010*



Source: Bureau of Labor Statistics

As mentioned with the contribution to gross product values, the warehousing and distribution industry in terms of jobs also is much more concentrated in Georgia than in the United States. Warehousing and distribution accounted for about 9 percent of total Georgia jobs, compared to just over 7 percent for the country. The industry remains more concentrated in Georgia compared to other Southeastern coastal states as shown in Figure 2.3.

Figure 2-3 Georgia Leads Southeast Coastal States in Share of Jobs in Warehousing and Distribution Industries
Historic Trend, 2000 and 2010



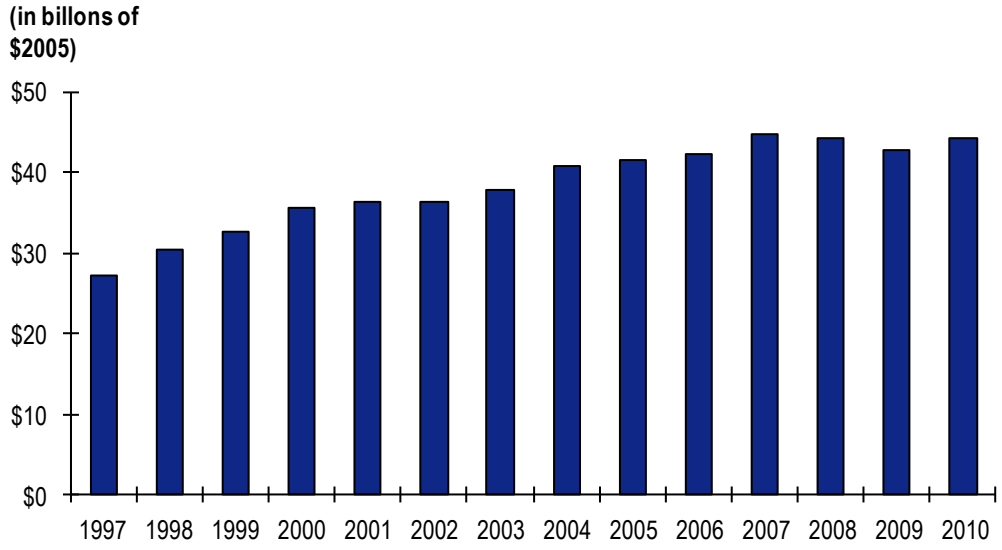
Source: Bureau of Labor Statistics; data represent share of employment in wholesale trade and transportation and warehousing.

Contribution to Georgia Economy

The economic output of warehousing and distribution-related activities has grown in past years as shown in Figure 2.4. These industries account for over 12 percent of the Georgia economy -- significantly higher than their 9 percent share of the U.S. economy. Freight demand is driven in part by changes in industrial output, so it is no surprise that Georgia's growth in warehousing and distribution slowed in conjunction with the U.S. economy and the economic slowdown several years before improving again.

Even as Georgia's share of national output in this industry has stayed relatively constant, total state output has followed a generally upward trend. Longer term, competition between the states is fierce for warehousing and distribution activity and Georgia will need to work actively to strengthen its competitiveness and maintain its position as a leading state for the industry.

Figure 2-4 Warehousing and Distribution's Contribution to Georgia GDP
Historical trend: 1997 to 2010



Source: Bureau of Economic Analysis.

Geographical Distribution of Georgia's Warehousing and Distribution Industry

Georgia's warehousing and distribution is dispersed throughout the State with particular concentrations in metropolitan Atlanta and the Savannah/Chatham County area (see Figure 2.5).

In the Atlanta area, numerous distribution centers and logistics-related activities are located in Fulton and Gwinnett Counties. Fulton County effectively connects high-capacity railway (CSX), trucking (I-85), and air (Hartsfield-Jackson Airport straddles the county border) modes, making it one of the favored warehousing and distribution locations in the country. Trucking companies, supermarket chains, auto parts, and lumber distributors have set up warehouse facilities in Gwinnett County, also served by CSX and with convenient access to I-85.

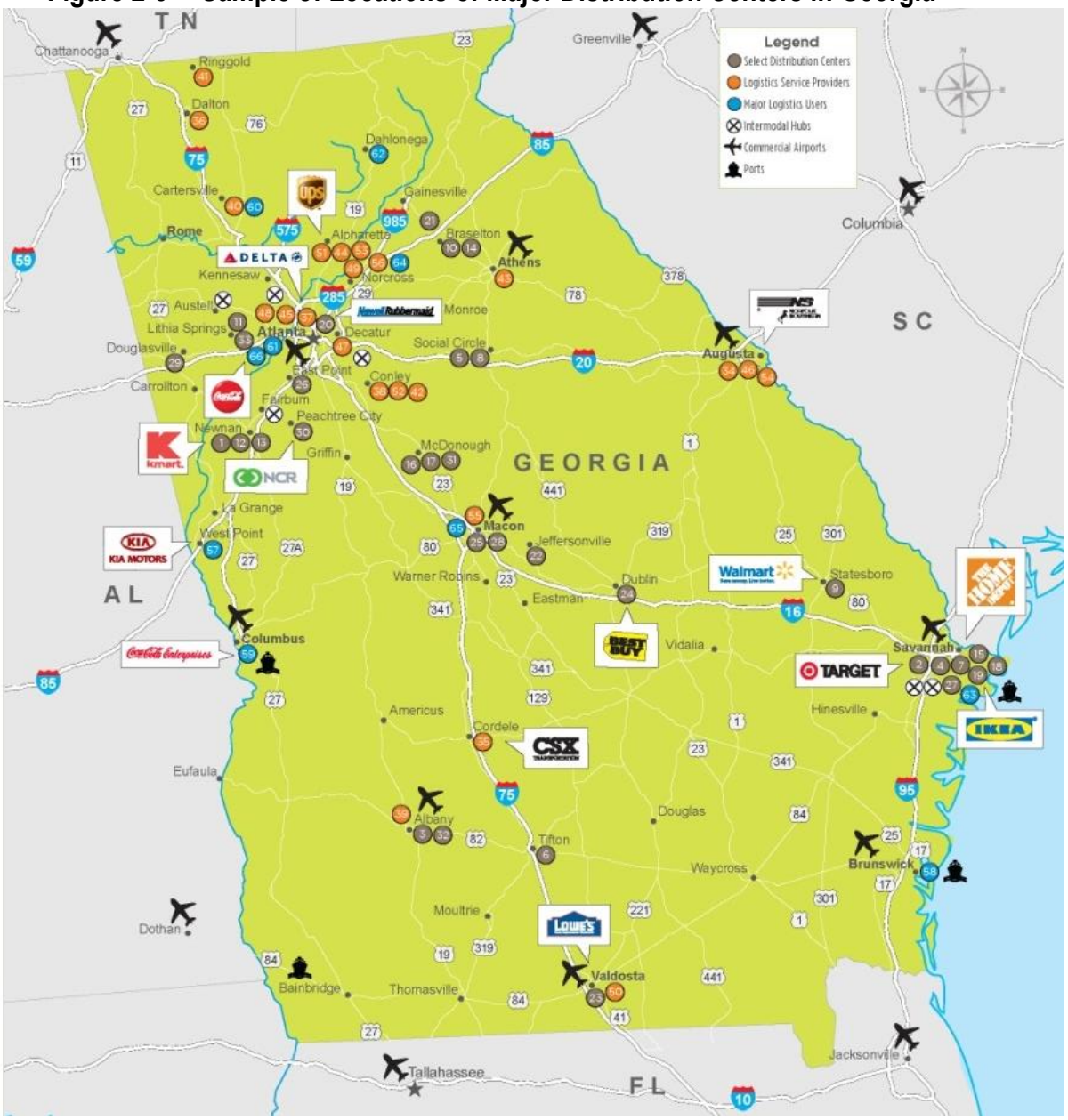
Over the past few years, the Savannah area has experienced a rapid ramp-up of distribution facilities coinciding with continued expansion of the port. The warehouse and distribution centers in southeast Georgia cater to imported consumer merchandise entering through the Port of Savannah gateway. The Savannah area warehousing and distribution cluster provides companies such as Target and The Home Depot, as well as third-party logistics ('3PL') firms handling goods from the port, with access to the national transportation system via interstates 95 & 16 and CSX and Norfolk Southern railroads.

Warehousing and distribution also has also brought economic opportunities to counties outside of the Atlanta and Savannah areas. For example, Wal-Mart has located an expanded distribution center in Statesboro in Bulloch County while a

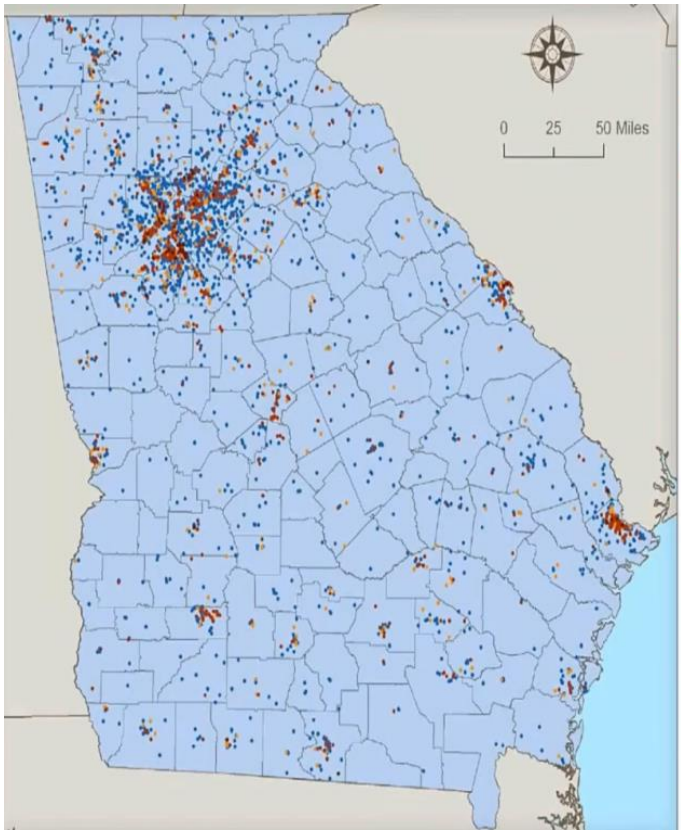
large Best Buy distribution center is located in Laurens County in the central part of the State. The Valdosta area, with proximity to I-75 and the Florida market, also has emerged as a regional center for distribution and is home to a major facility of The Home Depot in the southern end of the county.

Approximately ninety miles to the north, the relatively new Cordele Intermodal Center in Crisp County transfers containers moving by shortline rail to/from the Port of Savannah, bringing additional warehousing and distribution economic development opportunities to south-central Georgia.

Figure 2-5 Sample of Locations of Major Distribution Centers in Georgia

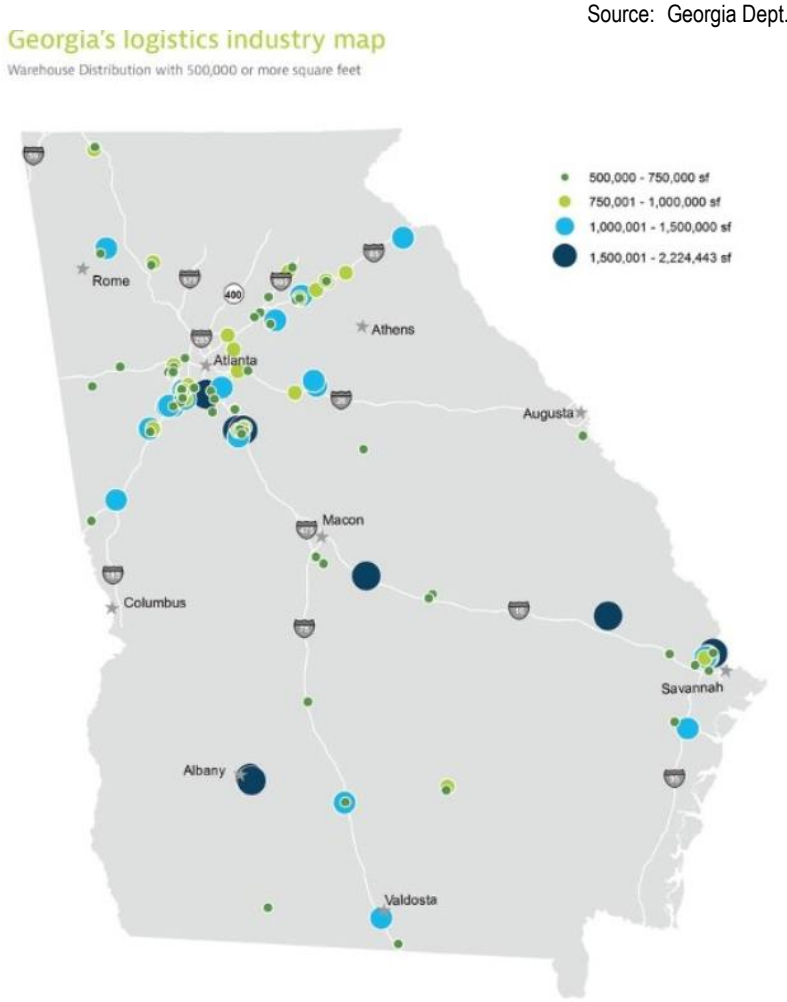


Source: Georgia Department of Economic Development.



Location of Core, Related, and Support Logistics Industries in Georgia (by employment)

Source: Georgia Dept. of Econ. Devel. -- Center of Innovation for Logistics



Source: Georgia Power – Community & Economic Development office, April 2017

Market Access and Georgia's Location as the Hub of the Southeast

Because of its central location within the Southeast, Georgia is equidistant from large and the growing population centers throughout the region, Florida, and the Midwest (Figure 2.6). In fact, Georgia lies within one-day's travel time by truck of such cities as Orlando, Tampa, New Orleans, Memphis, Louisville, Indianapolis, Cincinnati, Norfolk, and Charlotte. This makes it efficient for carriers to ship consumer goods, construction materials, and industrial supplies to major markets and manufacturing centers in a timely manner. Just under one-quarter of the nation's population -- 75 million people -- live within a day's truck drive of Georgia.

Additionally, the entire continental United States can be reached from Georgia by air within four hours (see Figure 2.7). These services, with their corresponding connections, allow for the development of specific corridor or integrated supply chains for various shippers to leverage traffic activity in Georgia through improved intermodal options. Dedicated all-cargo carriers and passenger planes that carry freight in their cargo holds can reach nearly all major cities in North America from Atlanta on nonstop flights, in addition to numerous global centers in Latin America, Africa, Europe, and Asia.

Figure 2-6 Georgia's Access to Major Population Centers: *Truck Transit Times*

Source: Georgia Department of Economic Development.

Figure 2-7 Georgia's Access to Major Population Centers: *Air Transit Times*

Source: Georgia Department of Economic Development.

International Trade

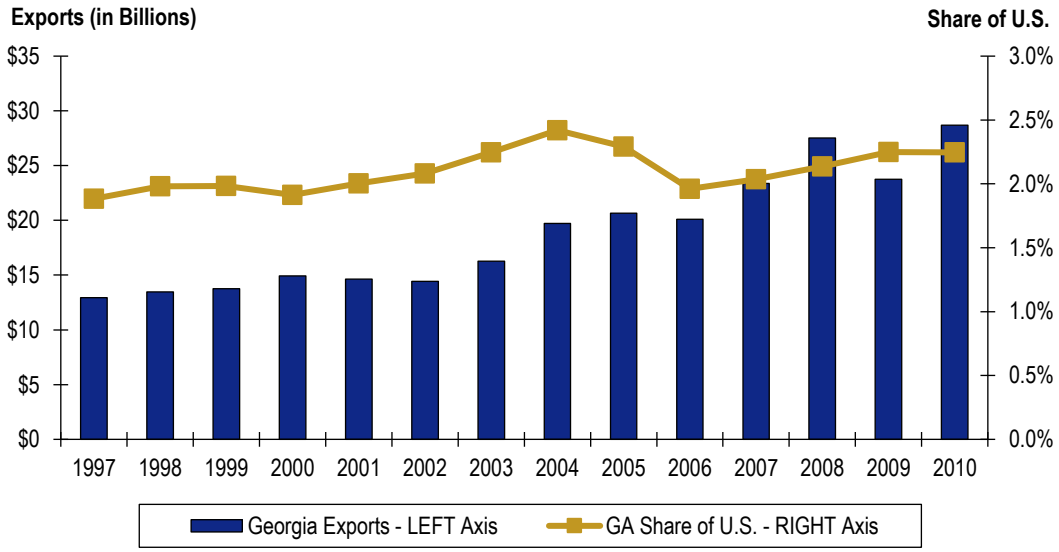
Virtually all commodities and manufactured products must be shipped to and processed at warehouse facilities nearby or on-location at Georgia's gateways for international trade. For this reason, the total volume and value of all Georgia's international exports and imports ultimately represents the foreign trade activity of the State's warehousing and distribution sector.

Historically, the value of Georgia-originated exports (i.e. goods produced in Georgia that are shipped to overseas markets) climbed steadily from 1997 to 2008, reaching $27.5 billion in 2008 before falling sharply in 2009 due to the national economic slowdown (Figure 2.8). Georgia's exports quickly rebounded, however, to a new record starting in 2010.

International imports destined for Georgia (for which data are only available for 2008 to 2010) grew to some $60.2 billion in 2010, up significantly from $47.4 billion the previous year.

Based on their value, Georgia-originated exports accounted for about 2.2 percent of the U.S. total while imports destined for Georgia accounted for 3.1 percent.

Figure 2-8 Georgia-Origin Exports -- Historical Trend: *1997 to 2010*



Source: WISERTrade, Origin of Movement Exports.

Georgia's exports leave the U.S. by rail and truck (within North America), ships, and air. Based on dollar value (weights are not available for overland trade), 41 percent of Georgia's exports are by ship and 25 percent are by air. The remainder of Georgia's exports are overland (by truck and rail) to Canada or Mexico as well as exports that go under their own propulsion (e.g., the business and military jets that are a core strength of Georgia's exports and economy).

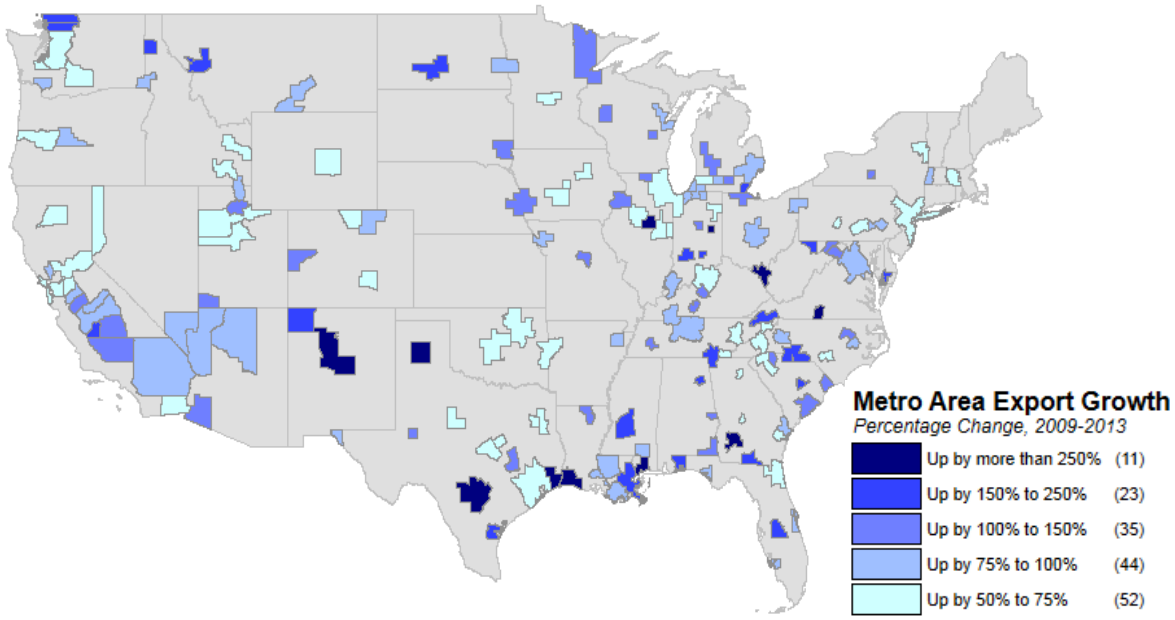
The leading gateways for Georgia's exports are the Port of Savannah, Atlanta Hartsfield-Jackson International Airport, and the Port of Brunswick which

handle over half of Georgia exports. Other major export gateways for Georgia-originated products include the Port of Charleston as well as land crossings at Detroit, Michigan; Laredo, Texas; and Buffalo, New York.[18] The top destinations for Georgia exports are Canada, China, Mexico, Japan, and Germany.

While the previous discussion on international trade focused on Georgia-origin exports and Georgia-destined imports that can leave or enter the country through any gateway (airport, port, or border crossing), the State acts as a major gateway through its port and airport facilities for *national* trade by handling exports and imports going to or from all states in the country. In 2010, Georgia's three major gateways, Savannah, Brunswick, and Atlanta handled nearly $106 billion in international trade. (This figure represents total exports and imports regardless of ultimate origin or destination).

Between 2003 and 2010 (see Figure 2.9), the historical trend for the total value imports and exports handled by Georgia gateways increased by 133 percent which was far beyond the U.S. growth rate of 61 percent. The share of U.S. trade going through Georgia gateways also rose from 2.3 percent in 2003 to 3.3 percent in 2010, a substantial gain.

More recently (as of 2013), several Georgia metro areas saw significant export increases:

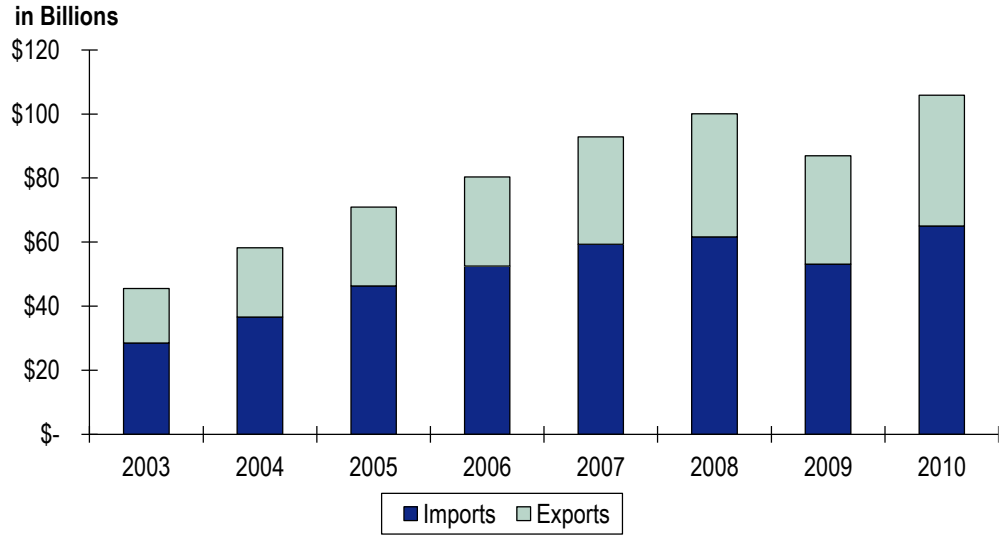


Source: U.S. Department of Commerce "U.S. Metro Area Exports, 2013"
www.trade.gov/mas/ian/build/groups/public/@tg_ian/documents/webcontent/tg_ian_005379.pdf

[18] Gateway data are for 2009, as prepared by the Institute for Trade and Transportation Studies www.itts.org and based on WISERTrade data.

The value of imports and exports handled by Georgia's gateways with China has grown markedly in the 2000s. According to tabulations by the Institute for Trade and Transportation Studies (ITTS), China, Germany, Ireland, and Japan are the leading origins for imports handled by Georgia's gateways. China, Germany, Australia, and the United Kingdom are the leading export destinations.

Figure 2-9 Georgia-Gateways (Ports and Airports) Total Trade Historic Trend: *2003 to 2010*



Source: WISERTrade.

Freight Characteristics of Georgia Warehousing and Distribution Industry

The trade volumes, distances, and main markets of Georgia's warehousing and distribution sector influence mode (truck/rail) shares and the potential to shift goods to rail to both reduce transportation costs and lower congestion on Georgia's roadways. This section shows modal shares by distance, the main out-of-state origin and destination markets for warehousing and distribution commodities, and the expected growth in trade flows associated with these industries through 2050. These commodities include consumer goods as well as industrial components that are commonly warehoused prior to being sold at a retail outlet or used as an input in a factory. It does not include the movement of food and agricultural products which are discussed separately in a subsequent section.

Warehousing and Distribution – Distance and Volume by Mode

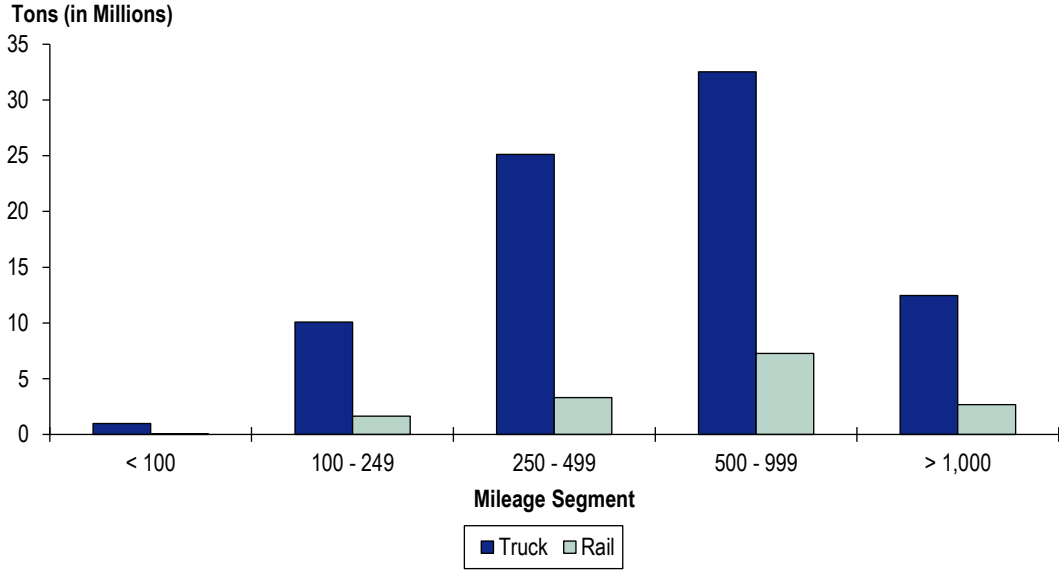
About 96 million tons of warehousing and distribution-related commodities are shipped into and out of Georgia by land modes on an annual basis (excludes local and through traffic). Not surprisingly, trucks are by far the leading mode accounting for 84 percent of inbound/outbound freight in these commodities. However, as distances become greater, the cost effectiveness of transporting warehousing and distribution-related goods by rail increases (see Figure 2.10). Rail only accounts for 12 percent of freight tonnage for trips less than 499 miles, but transports 18 percent of Georgia's warehousing and distribution goods on trips of more than 500 miles to or from the State.

Rail has a high share of the warehousing and distribution goods classified as consolidated shipments ("freight all kind" or "FAK", i.e., a range of goods for different buyers and sellers packed into a single container) transported to and from Georgia on trips of less than 999 miles. Top origin-destination areas in this category include locations in Alabama, Tennessee, Texas, and Florida. Following consolidated shipments, other top goods include lumber related products and such consumer products as detergents and cooking equipment.

Total volume (truck and rail) for very long-distance trips (greater than 1,000 miles) is much lower than volumes in the 250 to 999 mile range. For these longer distance trips, rail accounts for 18 percent of total freight volume for warehousing and distribution commodities. For the longer-distance trips, leading goods include lumber and paper goods moving nationwide both out of and into Georgia by rail. In particular, large volumes of lumber come into Georgia from Canada.

While lumber products are the main long-distance rail commodities, consumer products dominate the long-distance truck trips, especially for goods going between Georgia and the Los Angeles area. The consumer product flows move in both directions, but volumes are greater eastbound from California to Georgia. Beyond mixed container shipments that include large volumes of consumer products going to/from Georgia's distribution centers, more specific warehousing and distribution-related commodities traveling long distances by truck include apparel, footwear, consumer electronics, housewares, garden equipment, etc.

Figure 2-10 Volume of Warehousing and Distribution Commodities to/from Georgia by Mode and Distance



Source: Transearch; excludes through-traffic and local movements.

Warehousing and Distribution – Top Origins of Inbound Freight

Georgia is one of the nation's leading consumer markets in its own right and its location combined with its transportation network make it a hub for the distribution of products throughout the Southeast and the United States. As such, consumer products are transported to the State from locations around the United States, predominantly by truck (see Table 2.3).

There is a very large truck flow of consumer products coming into the country at the ports of Los Angeles and Long Beach and then transported to Georgia by truck. Miami, Charleston, and Mobile also are significant gateways that bring in goods ultimately bound, at least initially prior to wider redistribution, to locations in Georgia.

Although trucks dominate the top inbound freight flows of warehousing and distribution commodities primarily due to large-scale movements of a range of consumer goods, rail (see Table 2.2) also plays an important role carrying containers holding a mix of goods. The inbound flow of these containers comes into Georgia by rail in significant volumes from nearby states, including Tennessee, Alabama, and South Carolina. The Dallas and Chicago areas, the two largest midcontinent cities and major freight centers, also are major origins of mixed container shipments bound for Georgia by rail.

A future increase in the use of rail service to carry warehouse and distribution-related goods into (and out of) Georgia would reduce congestion on Georgia's highways as well as lower transportation costs. This would include both longer and shorter distance shipments entering Georgia after coming into the country through gateways located elsewhere in the country.

Table 2.2 Rail – Top Origins of Inbound Warehousing and Distribution Commodities

Class	Origin	Rail Tons	Percentage of Inbound Share
Inbound	Shelby County, Tennessee	981,920	12%
Inbound	Louisiana Part of New Orleans BEA	709,040	9%
Inbound	Jefferson County, Alabama	669,640	8%
Inbound	Illinois Part of Chicago BEA	540,160	7%
Inbound	Texas Part of Dallas BEA	369,600	5%
Inbound	Bay County, Florida	207,000	3%
Inbound	Charleston County, South Carolina	182,280	2%
Inbound	Russell County, Alabama	176,280	2%
Inbound	McMinn County, Tennessee	162,480	2%
Inbound	California Part of Los Angeles BEA	158,836	2%
	Elsewhere	3,781,840	48%

Source: Transearch; excludes through-traffic and local movements.

Table 2.3 Truck – Top Origins of Inbound Warehousing and Distribution Commodities

Class	Origin	Truck Tons	Percentage of Inbound Share
Inbound	California Part of Los Angeles BEA	2,995,698	7%
Inbound	Mobile County, Alabama	1,454,864	4%
Inbound	Illinois Part of Chicago BEA	1,408,444	3%
Inbound	Mississippi Part of Jackson BEA	1,165,829	3%
Inbound	Miami-Dade County, Florida	1,017,780	2%
Inbound	Charleston County, South Carolina	829,392	2%
Inbound	Shelby County, Tennessee	789,099	2%
Inbound	Texas Part of Dallas BEA	768,289	2%
Inbound	Jefferson County, Alabama	738,857	2%
Inbound	Mississippi Part of Greenville BEA	669,880	2%
	Elsewhere	29,342,517	71%

Source: Transearch; excludes through-traffic and local movements.

Warehousing and Distribution – Top Destinations of Outbound Freight

Similar to the inbound warehousing and distribution-related movements into Georgia, trucks also dominate the outbound shipment of goods from the State. Major outbound destinations, for both rail and truck, include larger U.S. consumer markets such as Miami, Dallas, Los Angeles, New York, and Chicago (see Tables 2.4 and 2.5). Closer to Georgia, there are large volume flows of goods

originating in Georgia destined for cities in neighboring states, including Birmingham, Charlotte, Memphis, and Charleston.

Fulton County, the location of several of the Atlanta area's main transportation facilities, is the leading origin of goods leaving Georgia for other states. Cobb and Gwinnett (suburban Atlanta) and Chatham (Savannah) counties also are among the top origin counties in Georgia. Many of these goods are going from warehouse and distribution centers in Georgia to other distribution centers elsewhere in the country.

Given the high volumes and the long distance of the warehouse and distribution-related trips required to reach many large U.S. markets from Georgia, increasing the use of rail would add to efficiencies and lessen roadway congestion throughout the State, notably on the Interstates.

Table 2.4 Rail – Top Destinations of Outbound Warehousing and Distribution Commodities

Class	Destination	Rail Tons	Percentage of Outbound Share
Outbound	Illinois Part of Chicago BEA	532,440	8%
Outbound	Shelby County, Tennessee	402,200	6%
Outbound	Jefferson County, Alabama	381,080	5%
Outbound	Louisiana Part of New Orleans BEA	357,600	5%
Outbound	Miami-Dade County, Florida	339,440	5%
Outbound	Texas Part of Dallas BEA	280,440	4%
Outbound	Charleston County, South Carolina	254,160	4%
Outbound	California Part of Los Angeles BEA	235,640	3%
Outbound	New Jersey Part of New York BEA	209,240	3%
Outbound	Michigan Part of Detroit BEA	207,920	3%
	Elsewhere	3,832,152	54%

Source: Transearch; excludes through-traffic and local movements.

Table 2.5 Truck – Top Destinations of Outbound Warehousing and Distribution Commodities

Class	Destination	Truck Tons	Percentage of Outbound Share
Outbound	Miami-Dade County, Florida	1,643,567	4%
Outbound	California Part of Los Angeles BEA	1,208,697	3%
Outbound	Texas Part of Dallas BEA	1,195,773	3%
Outbound	New Jersey Part of New York BEA	1,059,715	3%
Outbound	Louisiana Part of New Orleans BEA	1,014,201	3%
Outbound	Mecklenburg County, North Carolina	858,501	2%
Outbound	Jefferson County, Alabama	824,327	2%
Outbound	New York Part of New York BEA	785,377	2%
Outbound	Shelby County, Tennessee	775,152	2%
Outbound	Texas Part of Houston BEA	752,475	2%
	Elsewhere	29,853,506	75%

Forecast Growth in Warehousing and Distribution Freight Flows

Driven by expected growth in population and economic output within Georgia and in markets both nationwide and globally, freight flows related to distribution and warehousing are expected to grow considerably by 2050 (see Tables 2.6 and 2.7). The expansion of truck flows on the Georgia roadway network, in particular, will increase congestion, reduce reliability, and could eventually threaten the competitiveness of Georgia's warehousing industry. As warehousing and distribution represents a step in the overall supply chain on which retailers and manufacturers depend, any drops in the efficiency of Georgia's transportation network as it relates to the distribution of goods also will reverberate through the overall Georgia economy.

The structure of the warehousing and distribution will also depend on the extent of Georgia and U.S. growth in future years. If growth is low, distribution centers may consolidate to compensate for lower volumes. As overall growth increases, however, distribution centers will more aggressively expand and decentralize to serve higher-density markets.

Georgia's strategic regional position within the United States and the Southeast also means that any decline in performance within the State could have negative implications well beyond Georgia's own borders. The diversion of a portion of the growth in warehousing and distribution-related freight from truck to rail would help to mitigate roadway congestion in Georgia, enhancing long-term economic competitiveness of the warehousing and distribution industry as well as the range of other Georgia industries sharing the same roadways. Figures 2.11-2.14 and Tables 2.6 and 2.7 present the warehousing and

distribution industry, demonstrate the effects that this industry will have on the future flow of freight, by rail and by truck, into and out of Georgia. Both rail and truck volumes will increase markedly in relationship to the transport of warehousing and distribution-related freight.

Rail freight is expected to more than double while truck freight will increase by about 150 percent. These growth rates represent a baseline, with actual volumes dependent on the scope and timing of the continuing economic recovery as well as underlying changes in the structure of U.S. freight patterns that will be determined by regional growth as well as the competitiveness (efficiency, capacity, reliability, speed, and cost) of freight infrastructure around the country.

Warehousing and Distribution Freight Flow Forecast – Rail

Table 2.6 Georgia Rail Freight Volume Forecast for Warehousing and Distribution Commodities, *In Tons*

	2007	2050	Percent Change
Total	31,025,472	77,602,222	150%
Inbound	7,939,076	25,330,987	219%
Outbound	7,032,312	10,565,863	50%
Through	14,822,164	39,906,042	169%
Intrastate	1,231,920	1,799,331	46%

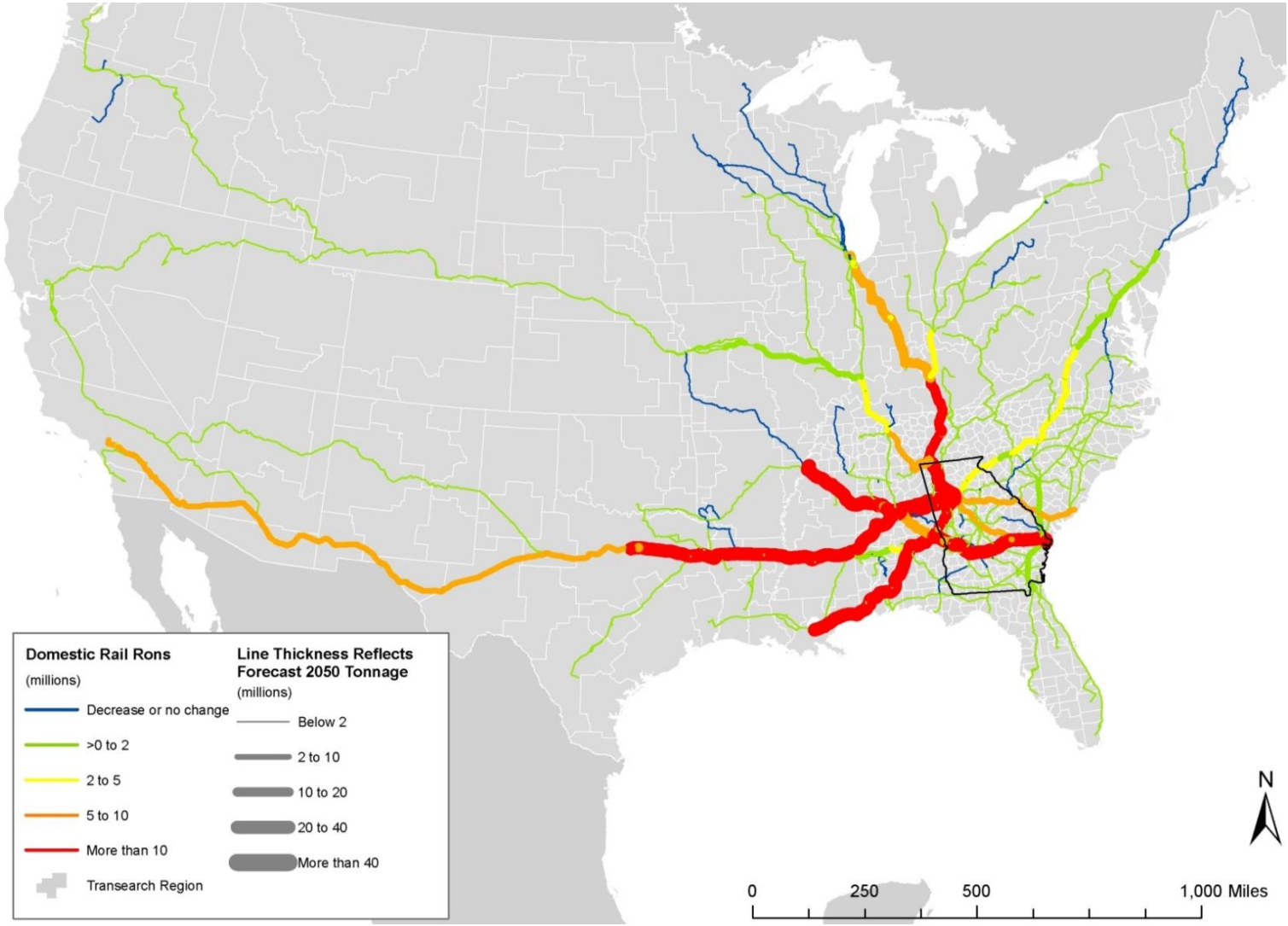
Source: Transearch.

Table 2.7 Georgia Truck Freight Forecast for Warehousing and Distribution Commodities, *In Tons*

	2007	2050	Percent Change
Total	206,774,406	504,707,074	144%
Inbound	41,180,649	115,790,931	181%
Outbound	39,971,291	83,155,254	108%
Through	70,184,719	181,338,096	158%
Intrastate	55,437,747	124,422,792	124%

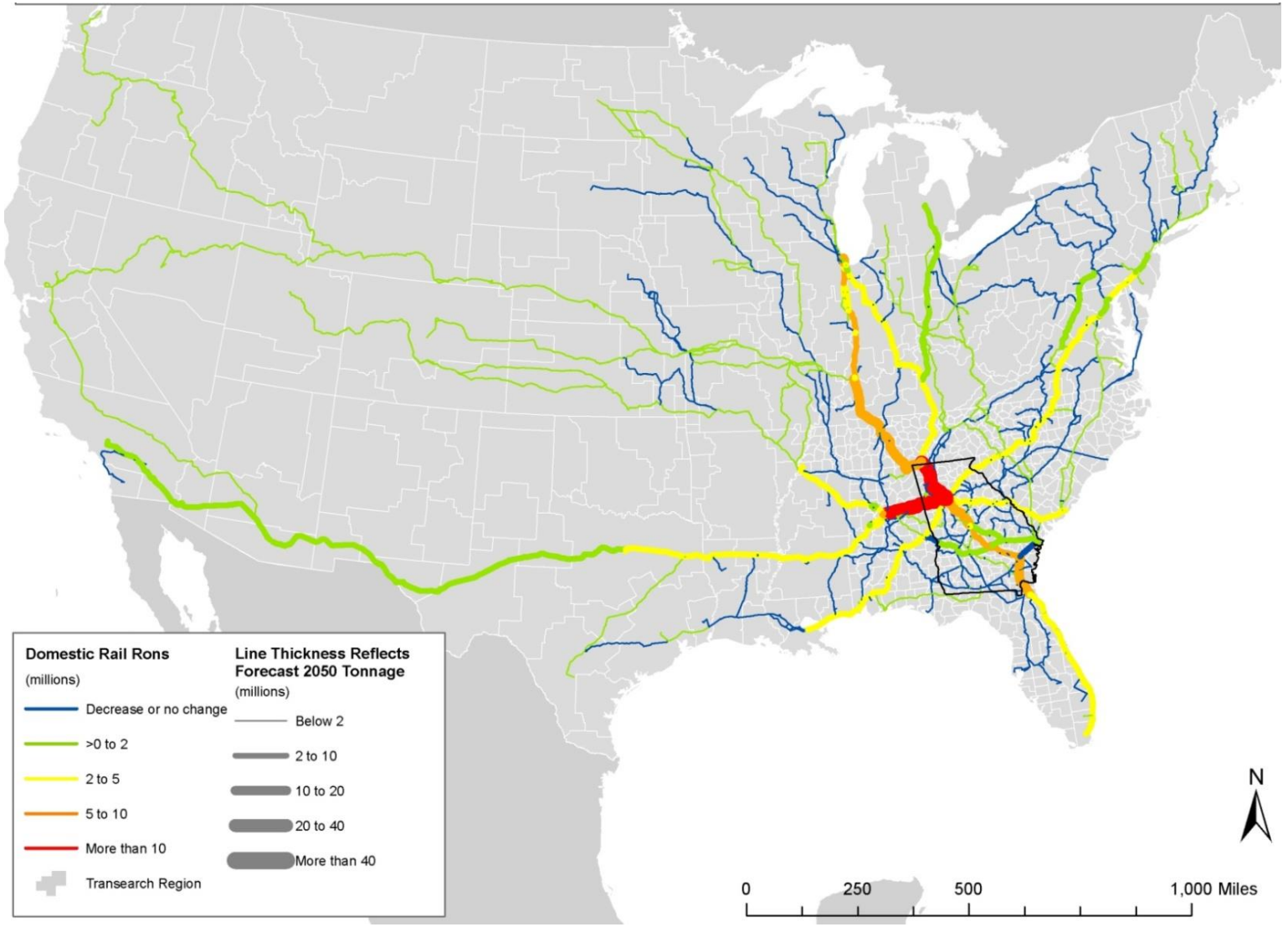
Source: Transearch.

Figure 2-11 Total Rail Tons for Warehousing and Distribution Commodities Bound for Georgia, *by 2050*



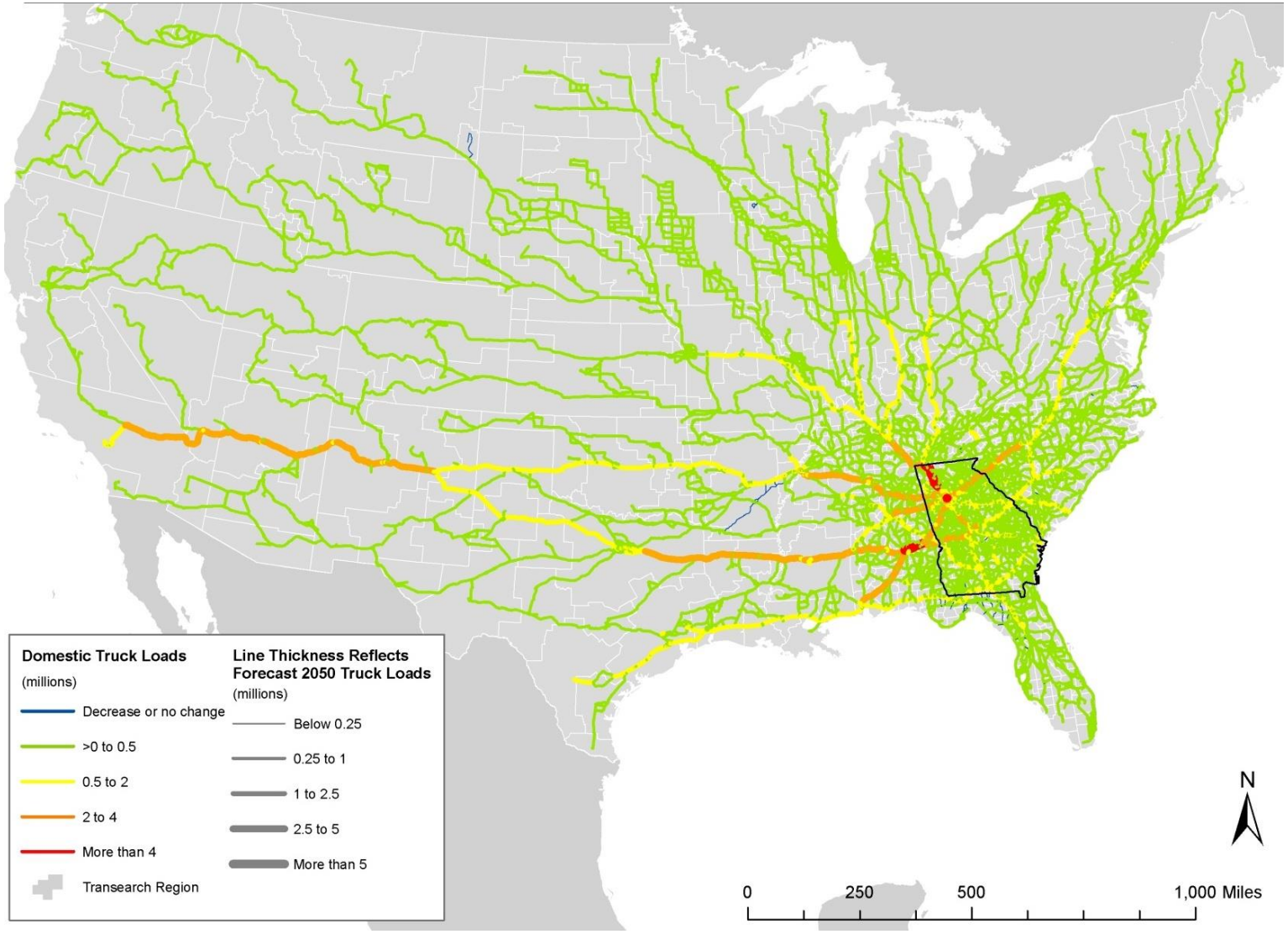
Source: Transearch.

Figure 2-12 Total Rail Tons for Warehousing and Distribution Commodities Outbound from Georgia, *by 2050*



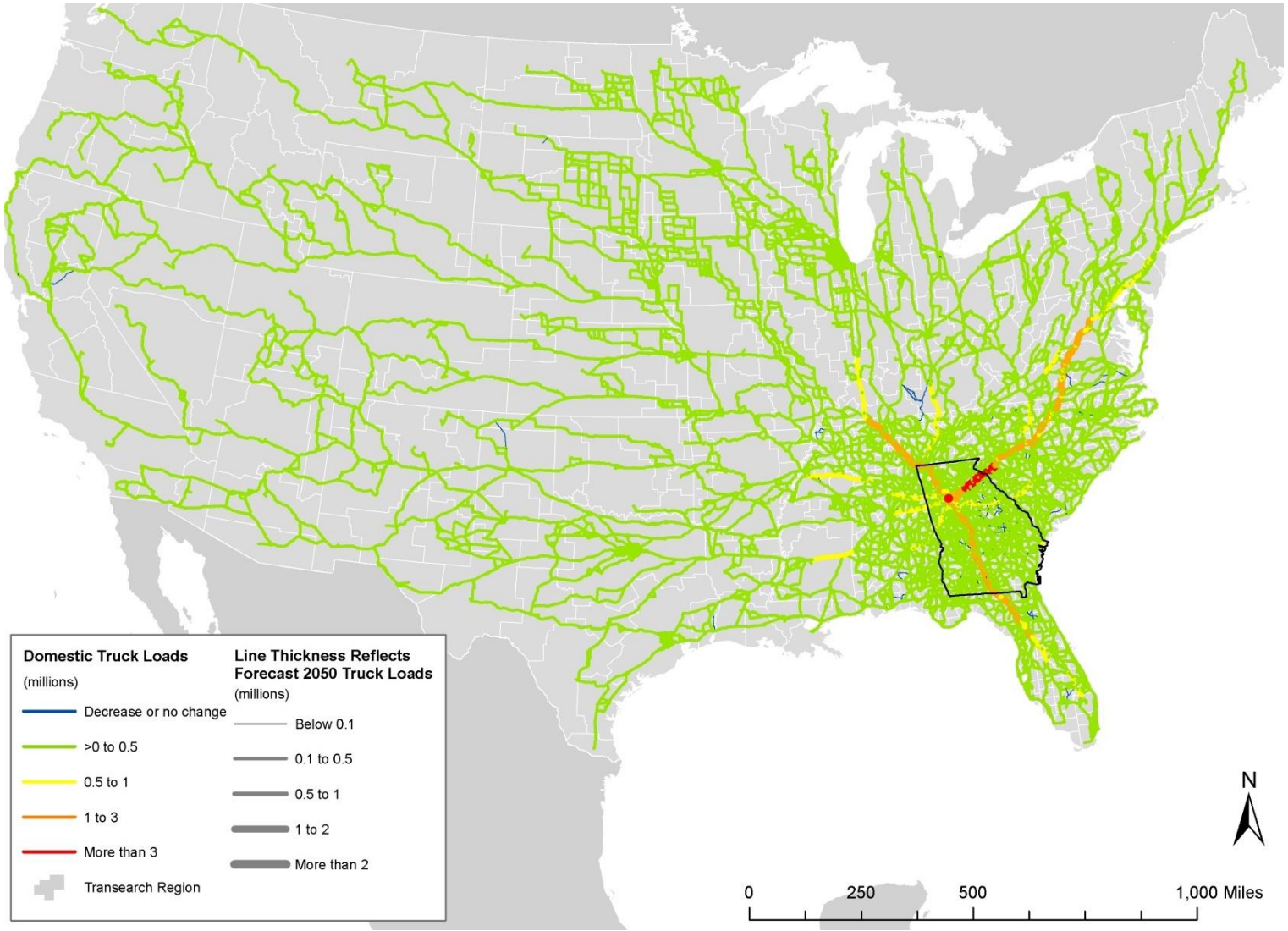
Source: Transearch.

Figure 2-13 Total Truck Loads for Warehousing and Distribution Commodities Bound for Georgia, *by 2050*



Source: Transearch.

Figure 2-14 Total Truck Loads for Warehousing and Distribution Commodities Outbound from Georgia, *by 2050*



Source: Transearch.

2.2 AGRICULTURE AND FOOD PROCESSING – INDUSTRY PROFILE

Industry Definition and Summary

Agriculture and food are two interrelated industries. Agriculture (or "agricultural products") represents the growing of crops such as (e.g., soybeans, cotton, peanuts) and the raising of livestock (e.g., poultry, cattle), while food (or "food processing") represents the manufacture of the items commonly found on grocery store shelves (e.g., bread, juice, crackers, milk, cold cuts, soda, beer, etc.) other than fresh produce. Combined, the agriculture and food industries employ about 115,000 people in Georgia.

At the center of the nation's fertile Piedmont region, Georgia's agriculture industry is the 12th largest in the country, producing crops and livestock valued at $8.4 billion in 2011. The top agricultural commodities in Georgia are broilers and cotton. Broilers are chickens that are raised specifically for the purpose of meat consumption.

Broilers and cotton commodities account for over half of the total receipts from 2011 as shown in Table 2.8. Georgia is the nation's top producer of broilers, peanuts, and pecans. Other major commodities produced in Georgia are vegetables, melons, chicken eggs, blueberries, and peaches.

Table 2.8 Highlighted Top Agricultural Commodities in Georgia

Commodity	Cash Receipts ($ millions)	Percent of Total	Ranking Relative to Other States
Broilers	3,460	41%	1st
Cotton	1,180	14%	2nd
Vegetables and Melons	640	8%	6th
Chicken and Eggs	491	6%	3rd
Peanuts	432	5%	1st
Pecans	265	3%	1st
Blueberries	93	1%	5th
Peaches	31	0%	3rd
Other Commodities	1,758	21%	–
Total	**8,350**	**100%**	**–**

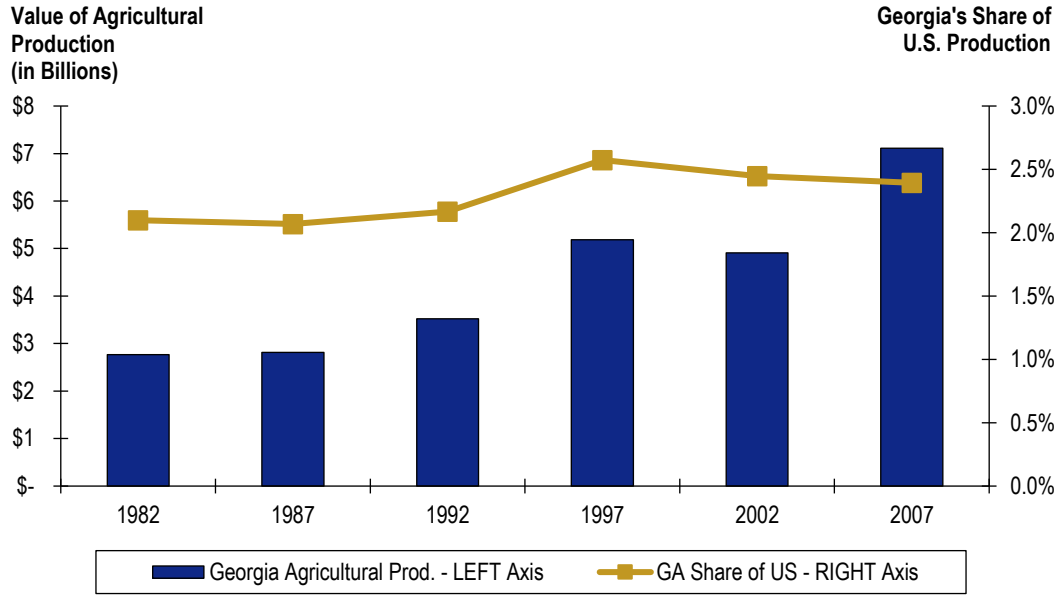
Source: U.S. Department of Agriculture, National Agricultural Statistical Service, 2011.

Approximately 70 percent of Georgia's agriculture industry, based on value, is livestock production -- namely broilers which are chickens raised specifically for meat production. In 2007, the value of Georgia livestock reached $5 billion and the state ranked first in broiler production. Georgia's broiler production has been on an upward trend during the last decade as poultry farmers around the nation have increased production in response to Americans' increased consumption of chicken. Not surprisingly, Georgia also is a leading egg producer.

Although livestock dominates Georgia's agricultural production, the State is a top producer of numerous crops as well, including peanuts number (#1 in nation) and cotton (#2 after Texas). The manufacture of food products is of crucial importance to the State's manufacturing industry and accounts for 18 percent of all manufacturing jobs. Georgia is the top ranking meat processing State in the United States, largely due to poultry processing.

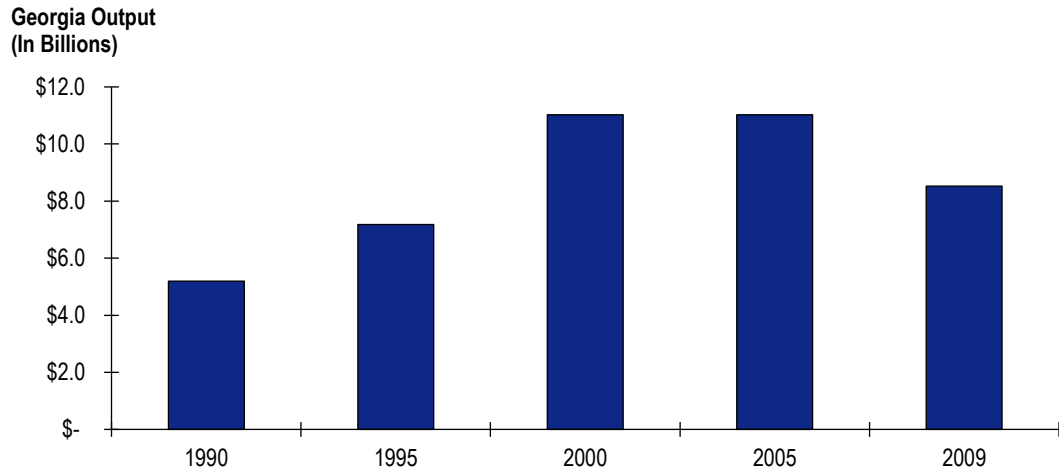
The U.S. Census of Agriculture (Figure 2-15) shows that Georgia's agricultural production.

Figure 2-15 Georgia Agricultural Production and State's Share of U.S. Production: Historical Trend 1982 to 2007



Source: U.S. Census of Agriculture.

Georgia Food Manufacturing Output, Historical Trend *1990-2009*



Source: Economy.com based on Bureau of Economic Analysis data.

Georgia Industry Profile: *Agriculture and Food Processing*

Item	Description
Industry Definition (NAICS Codes)	11: Agriculture and Forestry 311: Food Processing 312: Beverages
Employment	Agriculture-57,000; Food-64,000; Beverage-3,500
Contribution to GSP	Agriculture-$3.5 billion[a]; Food and Beverages-$8.5 billion
Trends	Georgia's main agricultural commodities, including broilers, cotton, and peanuts are experiencing rising levels of production Food and beverage production have been affected negatively by the recession
Suppliers	Machinery, packaging, fertilizers, chemicals, crops, livestock
Markets	Agriculture: food processors, wholesalers Food and beverages: grocery wholesalers
Georgia Exports	$1.3 billion
Transportation Use	Road: Georgia's road system is important for the transport of broilers and crops from fields to storage facilities, wholesalers, and markets Rail: The movement of feed grains into Georgia to support raising broilers Air: for perishable, high-value food products Water: large scale exports via overseas' gateways, including Savannah

[a] *The value of Georgia's agricultural receipts (a measurement of total agricultural sales), $7.1 billion in 2007, is a common comparative measure for agricultural output.*

2.3 OVERVIEW OF GEORGIA AGRICULTURE

Broilers and cotton commodities account for over half of the state's total agricultural receipts. Georgia is the nation's top producer of broilers, peanuts, and pecans. Other major commodities produced in Georgia are vegetables, melons, chicken eggs, blueberries, and peaches.

2.4 GEOGRAPHIC DISTRIBUTION OF GEORGIA'S AGRICULTURAL PRODUCTION

Geographical Distribution of Georgia Agricultural Production

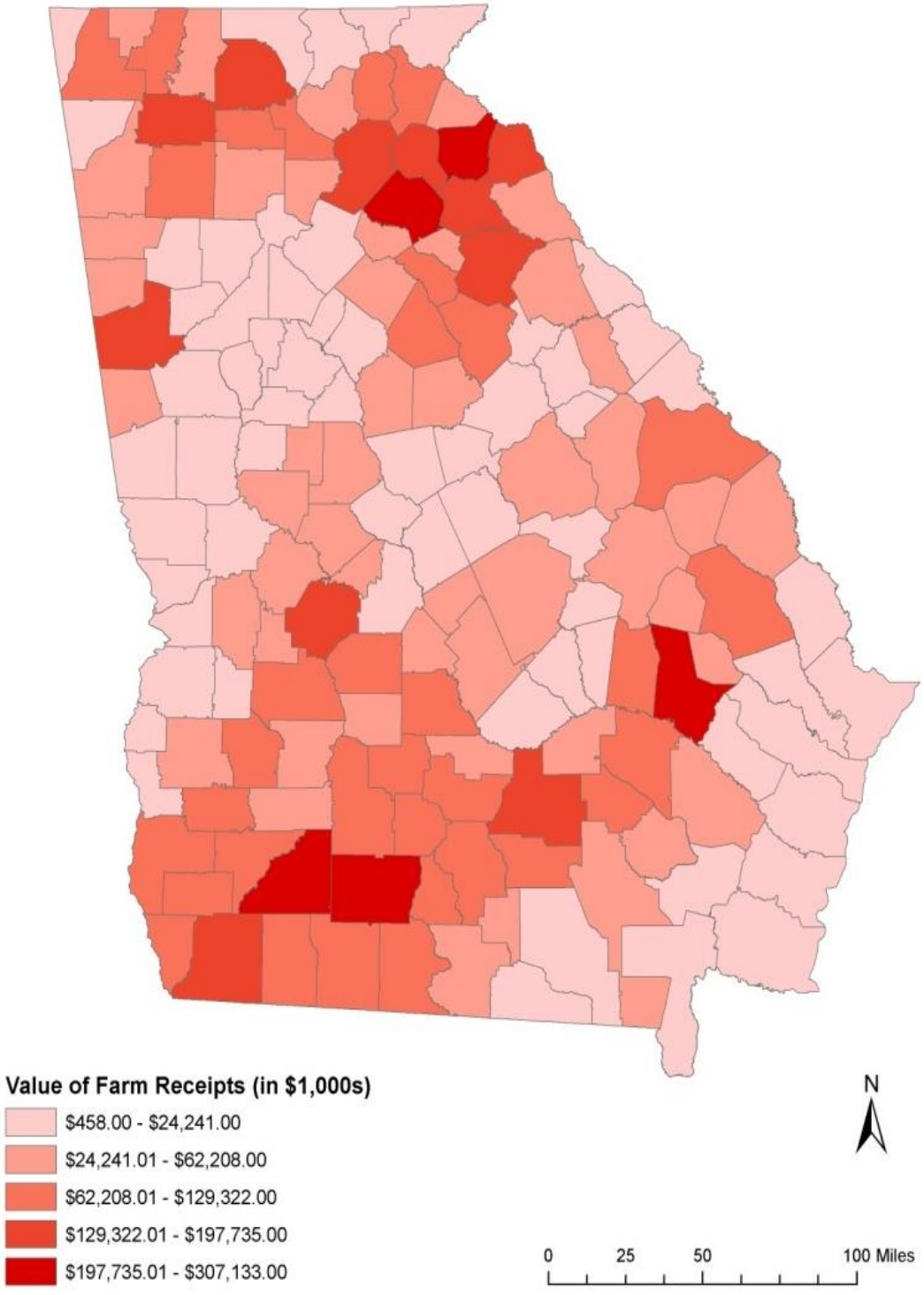
Georgia's top counties based on the value of agricultural production are concentrated in two areas – the State's northeast and its southwest. The northeast is the primary concentration of broiler production, the most significant agricultural commodity produced in Georgia. The southwest corner of Georgia, nearby Florida and Alabama, is the top peanut-producing part of the State. Georgia is the national leader, by far, in peanut production.

Southwest Georgia also leads the State in cotton production. In east-central Georgia, Tattnall County stands out as a leading agricultural producer, primarily due to a combination of broiler raising and onion farming. The efficient movement of agricultural goods as well as other freight into and out of Georgia's farming and livestock areas is crucial for strengthening economic opportunity in the State's rural areas.

In east-central Georgia, Tattnall County stands out as a leading agricultural producing county, primarily due to a combination of broiler raising and onion farming.

The efficient movement of agricultural goods as well as other freight into and out of Georgia's farming and livestock areas is crucial for supporting economic activity and opportunity in the state's rural areas.

Value of Agricultural Production in Georgia, by County



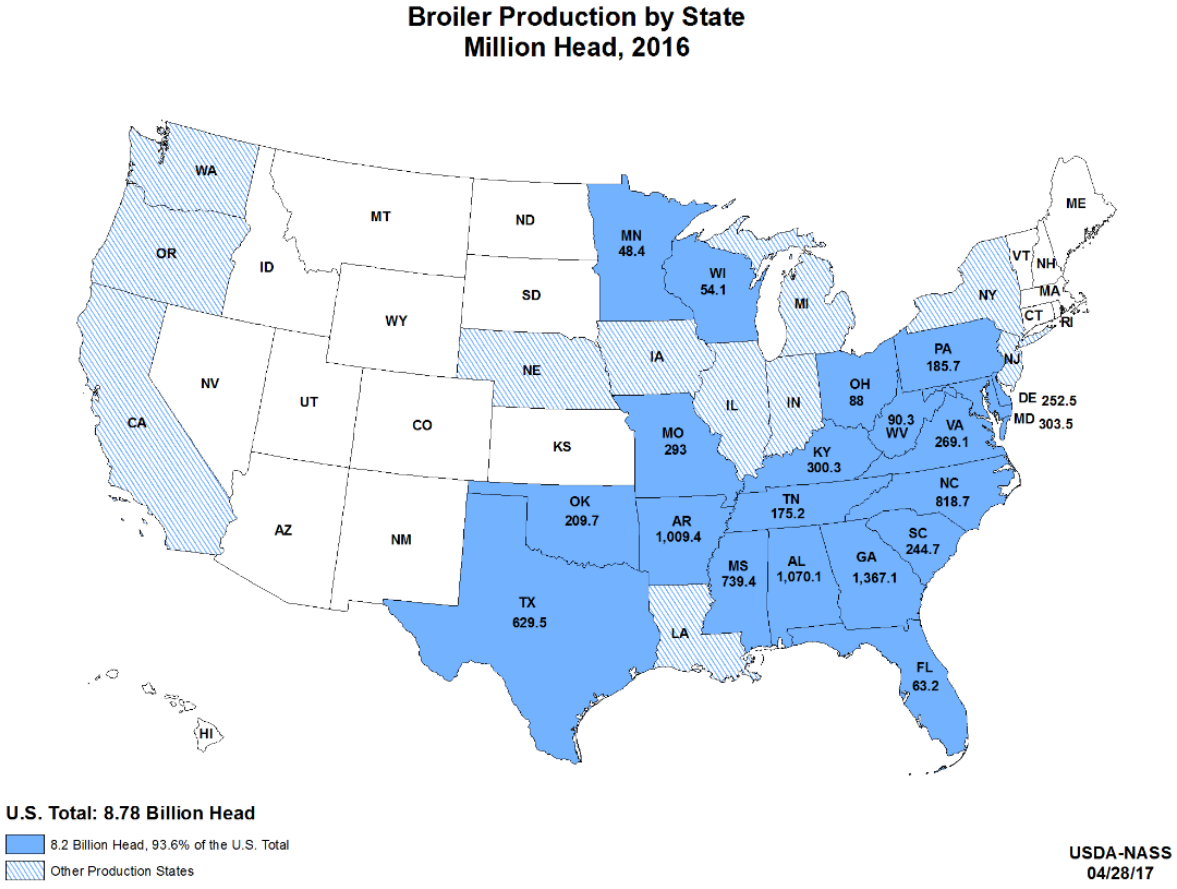
Source: University of Georgia, GeorgiaStats, 2008.

Broiler Production

Georgia is the nation's largest producer of broiler chickens (see Figure 2-16). As the nation's consumption of chickens has steadily increased, Georgia's broiler production expanded by 113 million chickens, representing a 9 percent increase between 2000 and 2010. In 2012, Georgia raised nearly 1.4 billion chickens, accounting for about 16 percent of the national total.

Even with the expansion of production during the 2000-2010 period, Georgia's share of national broiler production has remained constant, ranging from 15 to 16 percent of the U.S. total on an annual basis.

Figure 2-16

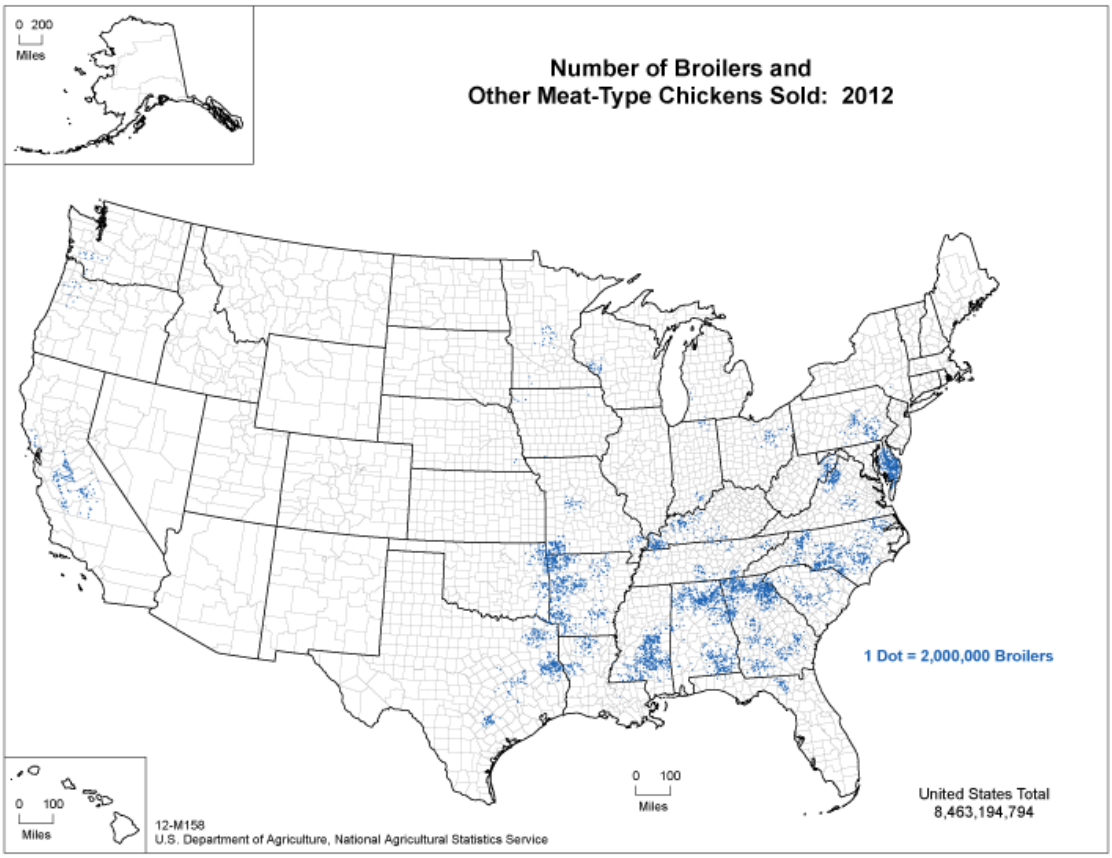


Source: U.S. Department of Agriculture's National Agricultural Statistics Services

Georgia's leading counties for broiler production (see Figure 2.17) are generally located between the northeast part of state to just north of Atlanta metro.

Nationally, chicken and broiler production is concentrated in a region that spreads from the southern portion of Virginia across the southeast and ending in eastern Texas. Georgia and Alabama are the leading producers of broilers in the U.S.

Figure 2-17 Origin of U.S. Broilers and Other Meat-Type Chickens, 2012



Source: U.S. Department of Agriculture

Georgia Broiler Production: *Top 10 Georgia Counties*

County	Broiler Production (In Millions)
Franklin	104.1
Gilmer	67.8
Gordon	61.8
Hart	60.2
Oglethorpe	54.1
Carroll	53.0
Jackson	49.4
Madison	48.2
Mitchell	44.4
Colquitt	42.6
Rest of Georgia	813.4
Georgia Total	**1,398.9**

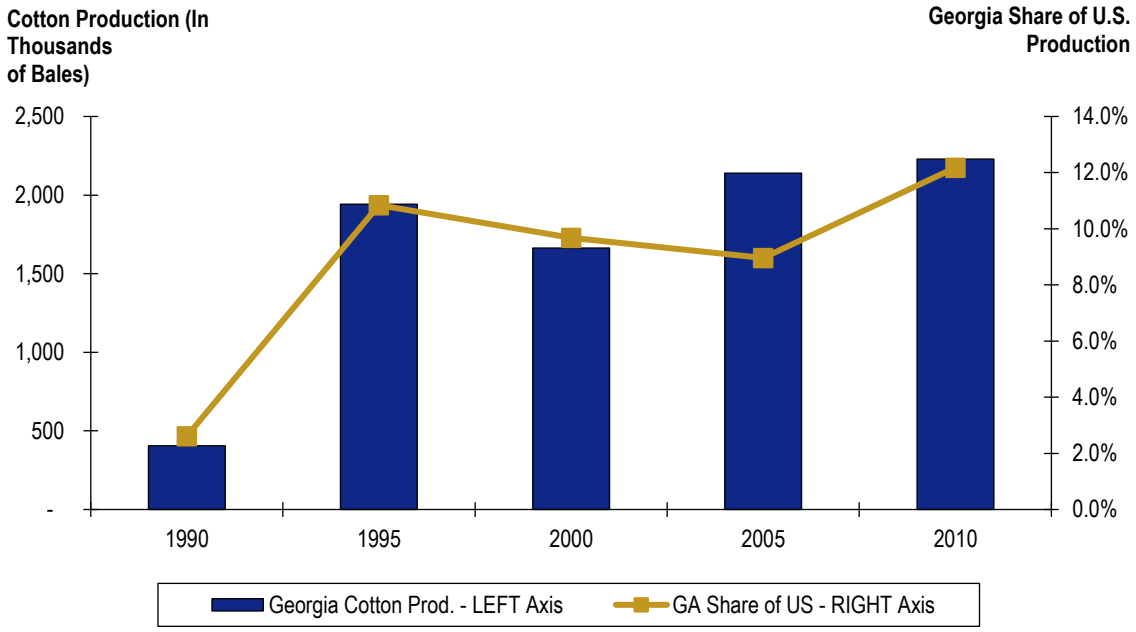
Source: U.S. Department of Agriculture's Census of Agriculture, 2007.

Cotton Production

Georgia is the second largest producer of cotton in the United States, following Texas. Table 2.9 shows Georgia's leading cotton-producing counties where recent cotton harvests have seen strong gains. Cotton production during the latter part of the last decade was generally 10 to 20 percent higher than those of the 1990s. Today, typical cotton harvests average 1.9 million bales per year.

In 2010, Georgia produced over 2.2 million bales, the second highest on record, after 2006. As Georgia's cotton harvest rises, the State is commanding a gradually greater share of U.S. production (see Figure 2-18), recently hitting about 12 percent of the national total compared to typical shares of about 10 percent during the 1990s. Overseas demand from China has stimulated an increase in cotton production in Georgia and nationally.

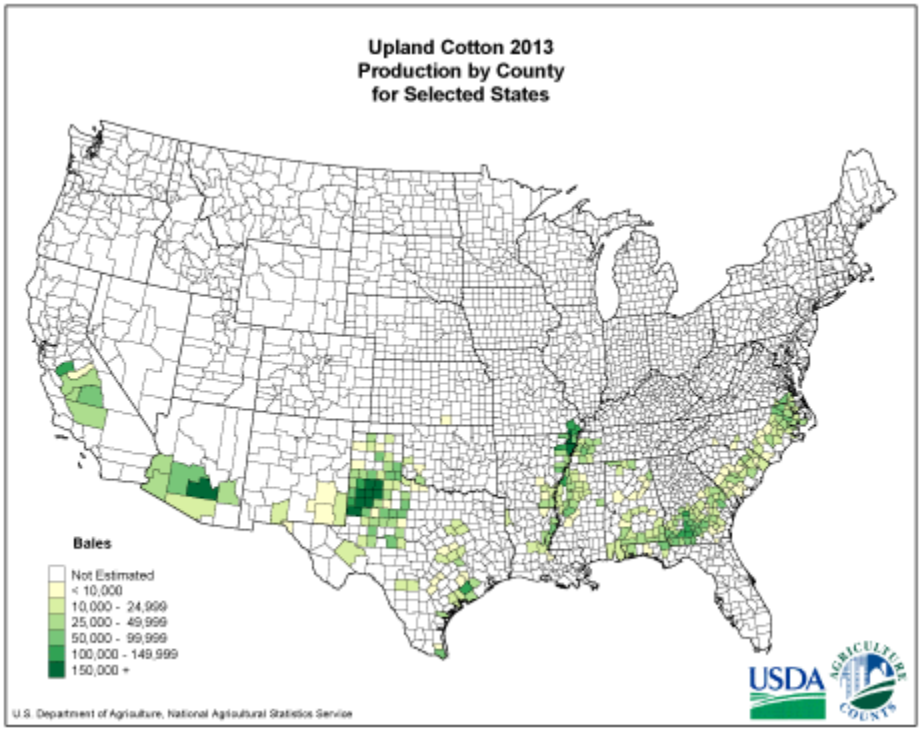
Figure 2-18 Georgia Cotton Production: Historical Trend *1990-2010*



Source: U.S. Department of Agriculture.

Figure 2-19 shows the location of cotton production throughout the U.S. There is a cotton belt that runs along the eastern Virginia, the Carolinas, and Georgia that wraps around southern Georgia, with its highest concentration in S.W. Georgia. Other significant cotton producing states are Louisiana, Texas and California.

Figure 2-19 Location of U.S. Upland Cotton Production, 2013



Source: U.S. Department of Agriculture

The table below shows Georgia's leading cotton-producing counties. Similar to peanuts, these crops are primarily grown in the southwest part of the state.

Table 2.9 Georgia Cotton Production: *Top 10 Georgia Counties*

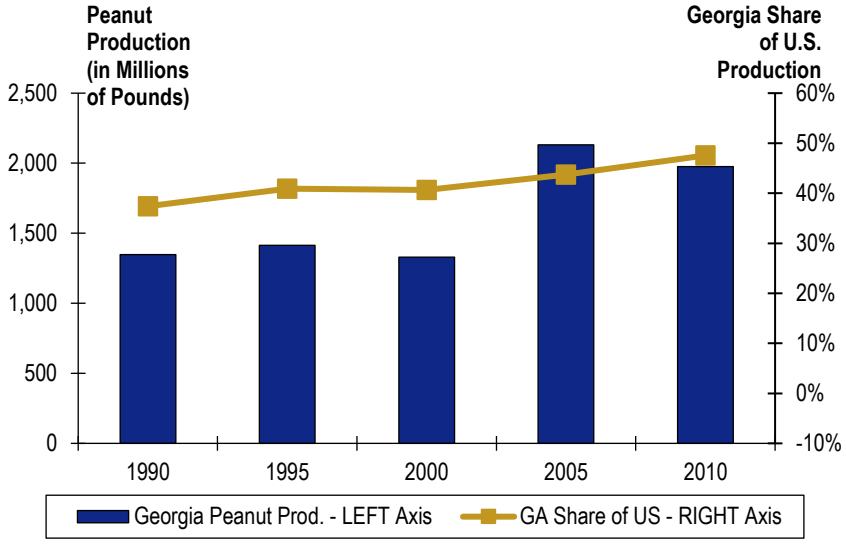
County	Cotton Production (Bales)
Colquitt	130,400
Dooly	124,400
Worth	121,200
Mitchell	112,000
Brooks	87,600
Irwin	76,100
Coffee	72,100
Decatur	70,300
Bulloch	66,600
Thomas	63,900

Source: National Cotton Council of America, 2013. www.cotton.org/econ/cropinfo/cropdata/county-db.cfm

Peanut Production

Depending on growing conditions, annual peanut production in Georgia can vary but there is an overall trend towards growth. Georgia also has seen its share of U.S. peanut production grow from roughly 40 percent in most years during the 1990s to 48 percent in recent years (see Figure 2-20).

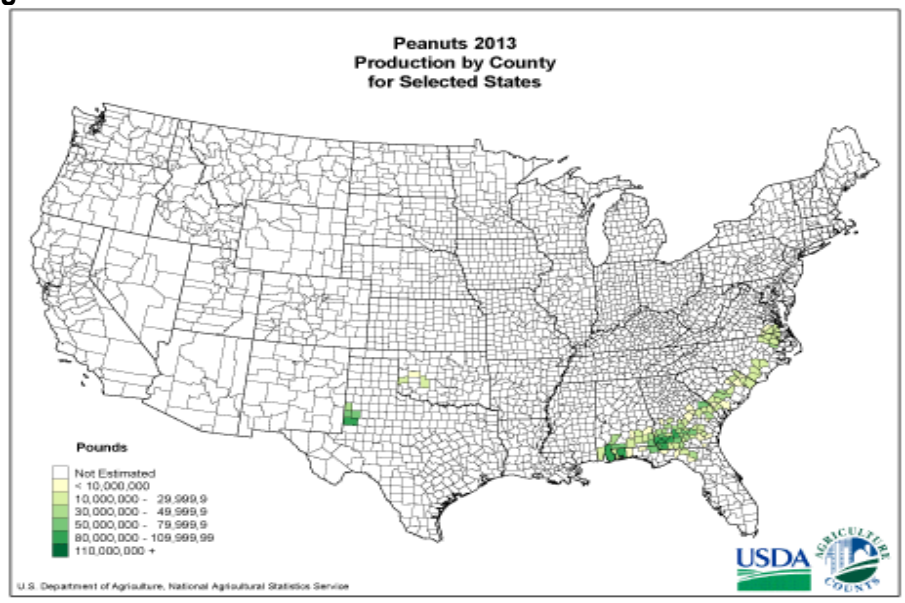
Figure 2-20 Georgia Peanut Production, Historical Trend *1990-2010*



Source: U.S. Department of Agriculture.

Peanut production in Georgia is concentrated along the same geographic region as the cotton belt in the southeastern part of the state (see Figure 2-21). Unlike cotton, there are few other places in the U.S. where peanuts are produced.

Figure 2-21 Location of U.S. Peanut Production



Source: U.S. Department of Agriculture, 2013

Southwest Georgia and southeastern Alabama comprise the nation's top peanut-growing region by far. Peanut production in Georgia increased markedly during the last two decades, rising from 1.3 billion pounds in 1990 to 2 billion pounds. Georgia's top peanut-producing counties are listed below:

Table 2.10 Georgia Peanut Production: *Top 10 Georgia Counties*

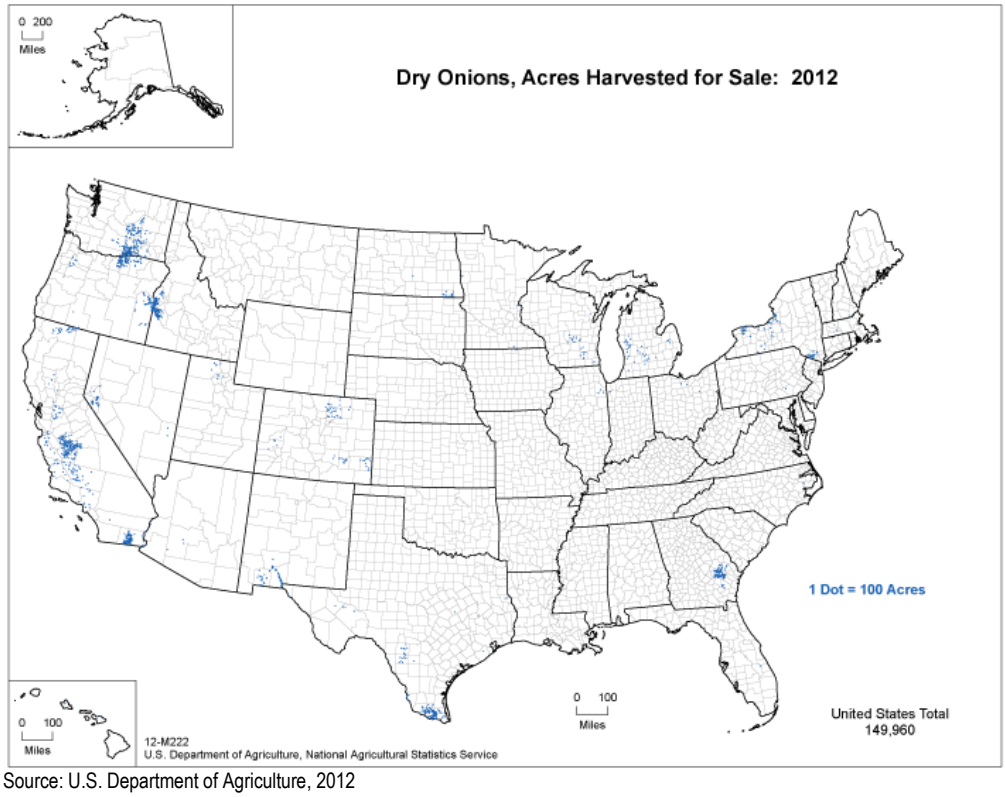
County	Peanut Acreage
Mitchell	41,611
Worth	35,045
Early	32,208
Colquitt	31,851
Miller	31,116
Decatur	30,475
Coffee	28,601
Bulloch	27,742
Irwin	25,741
Seminole	23,886

Source: Georgia Peanut Commission, 2015

Onion Production

Vidalia onions represent about 40% of total national spring onion production and have an estimated value of about $90 million in annual gross sales.

Figure 2-22 Location of U.S. Onion Acres Harvested

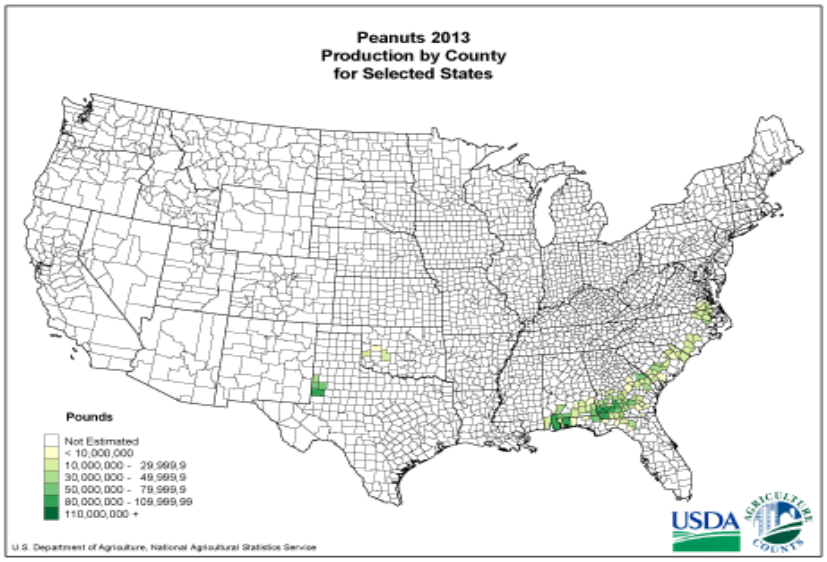


Source: U.S. Department of Agriculture, 2012

Peach Production

Figure 2-23 shows the peach producing acreage in the United States. Georgia is one leading producer of peaches, but in terms of acreage, California has the most.

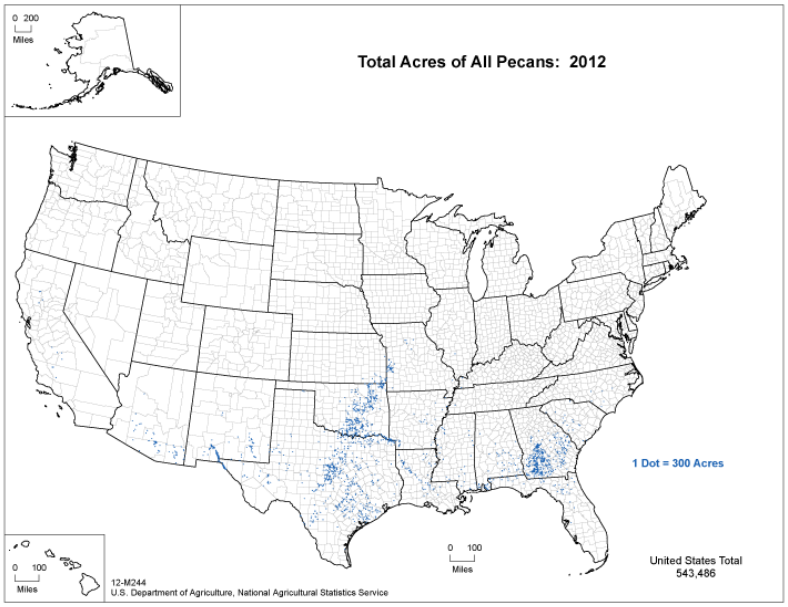
Figure 2-23 Location of U.S. Peach Acres Harvested



Pecan Production

The southern half of Georgia is focused on producing pecans (Figure 2-24). Besides Georgia, Texas and Oklahoma are also major producers of this crop.

Figure 2-24 Location of U.S. Pecans Acres Harvested

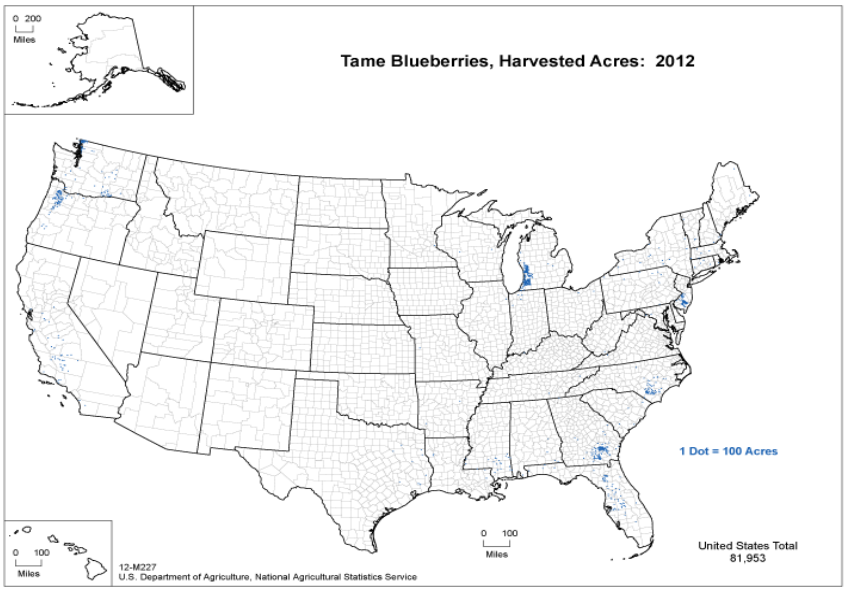


Source: U.S. Department of Agriculture, 2012

Blueberry and Watermelon Production

Figure 2-25 and Figure 2-26 show the acreage devoted to blueberries and watermelons, respectively. As a leading production state; it is #1 for blueberries.[19]

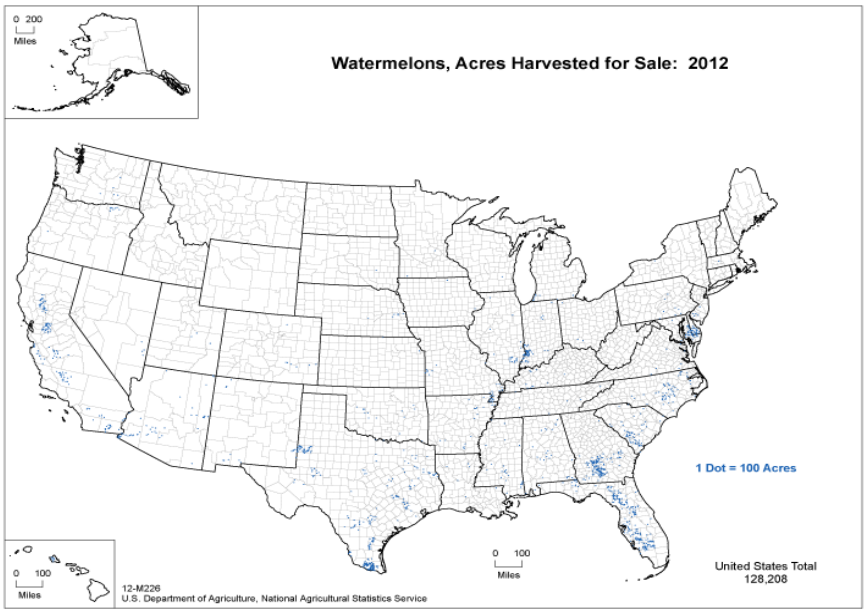
Figure 2-25 Location of U.S. Blueberry Acres Harvested



Source: U.S. Department of Agriculture, 2012

[19] Atlanta Journal Constitution: Oct. 21, 2014 www.ajc.com/news/business/were-no-1-in-blueberries/nhn5Q

Figure 2-26 Location of U.S. Watermelon Acres Harvested

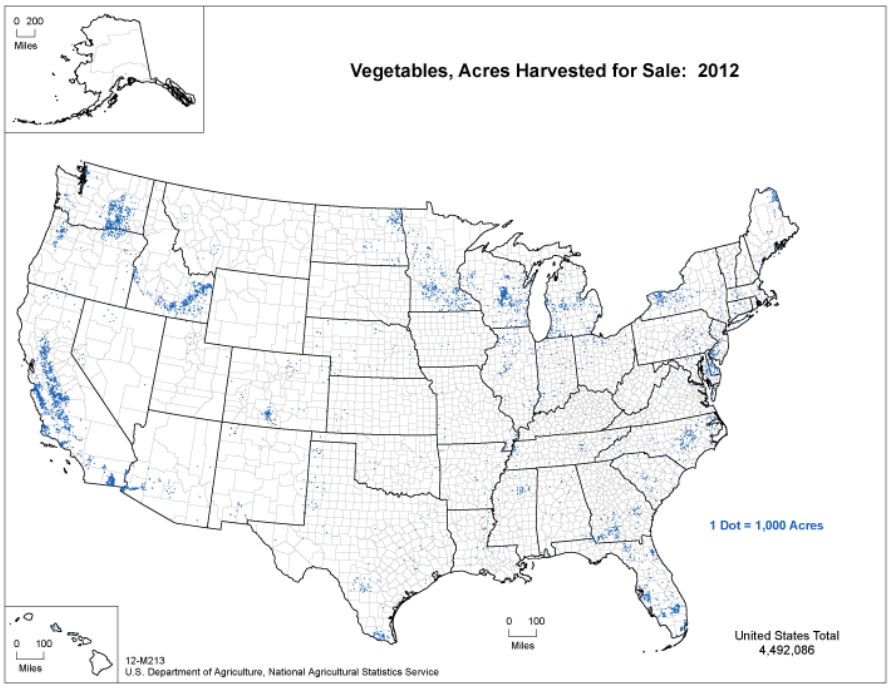


Source: U.S. Department of Agriculture, 2012

Vegetable Production

For vegetables, California has the most acres of farmland, while Georgia is one of the major states raising vegetables in the U.S.

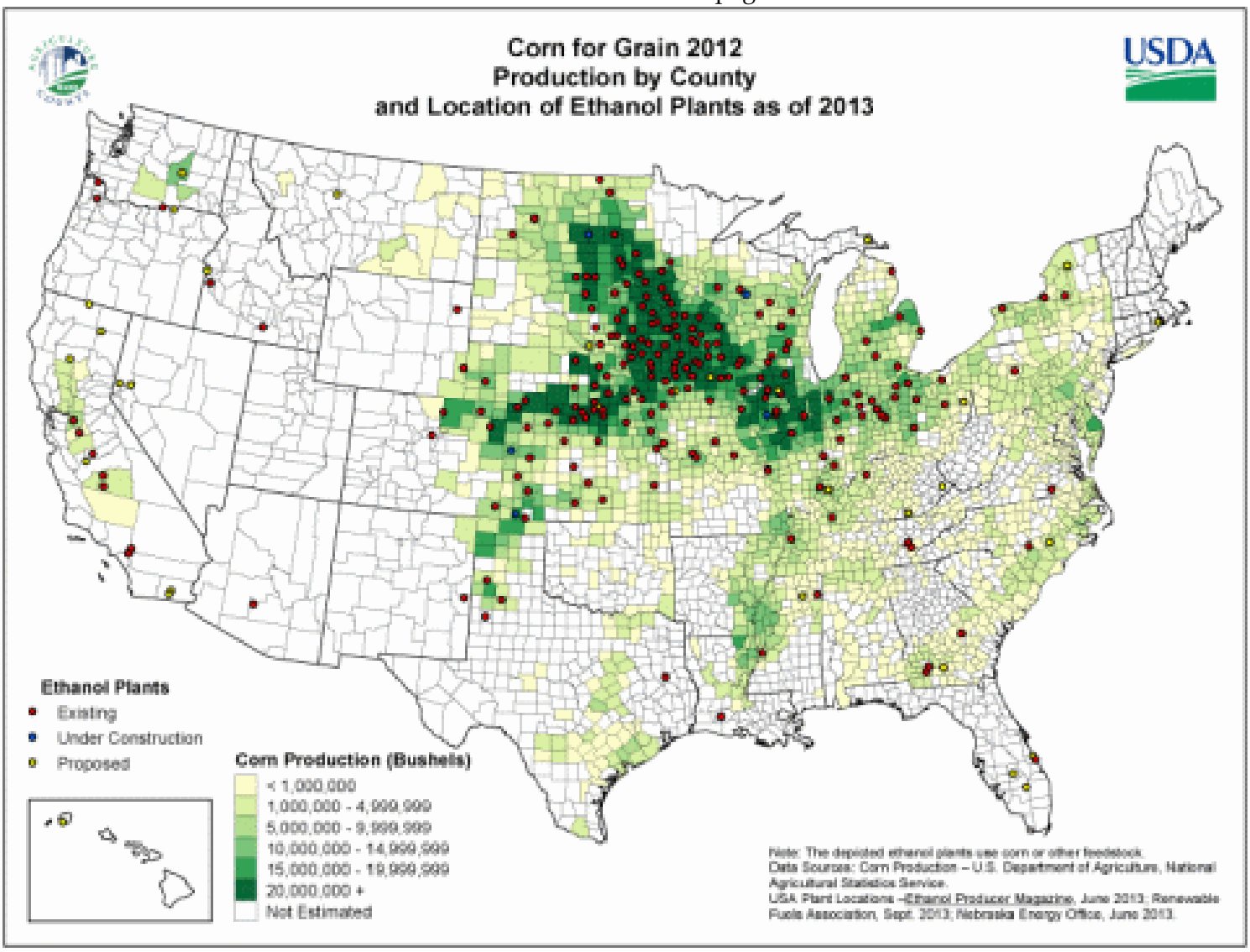
Figure 2-27 Location of U.S. Vegetables Acres Harvested



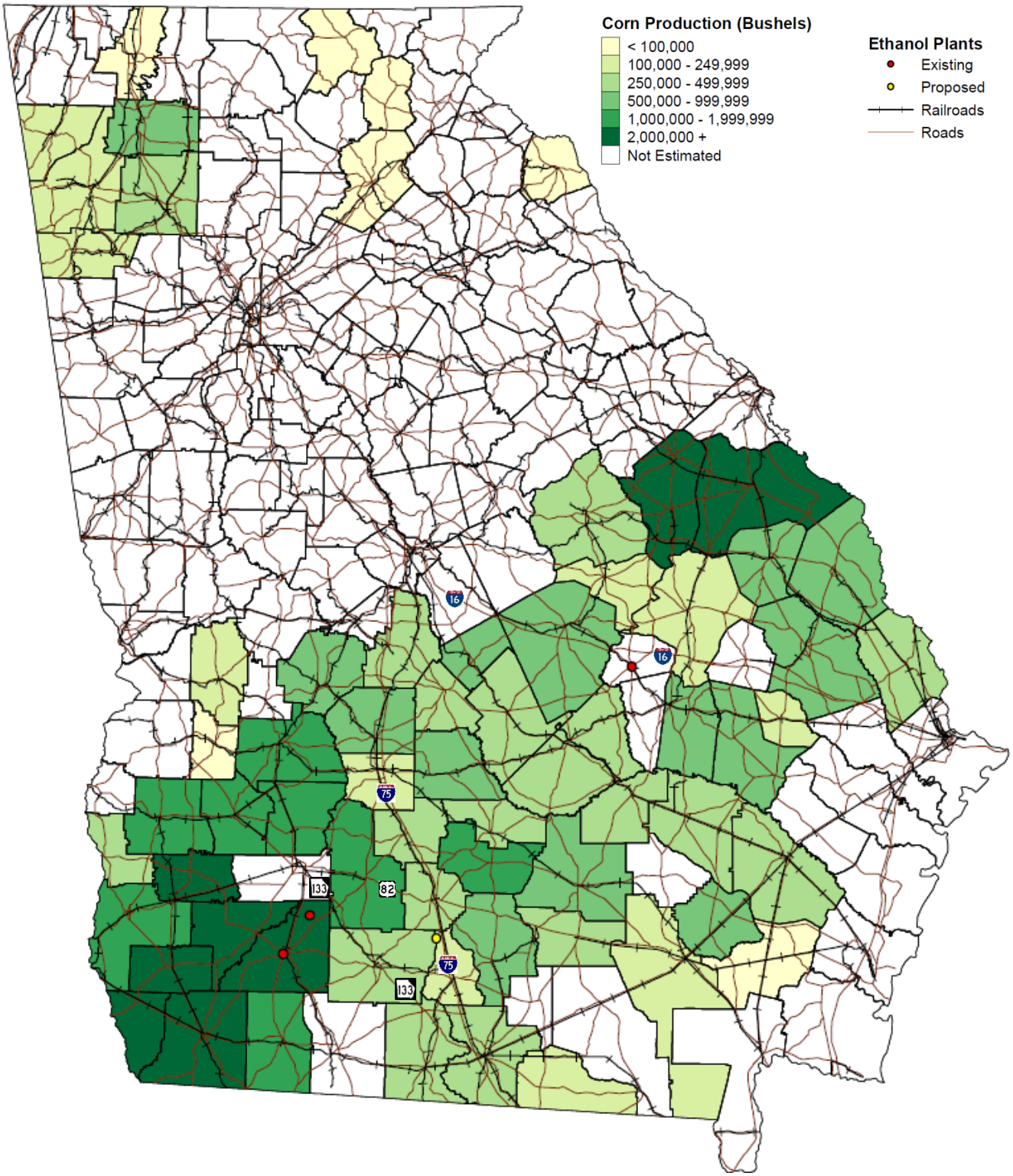
Source: U.S. Department of Agriculture, 2012

Corn and Ethanol Production

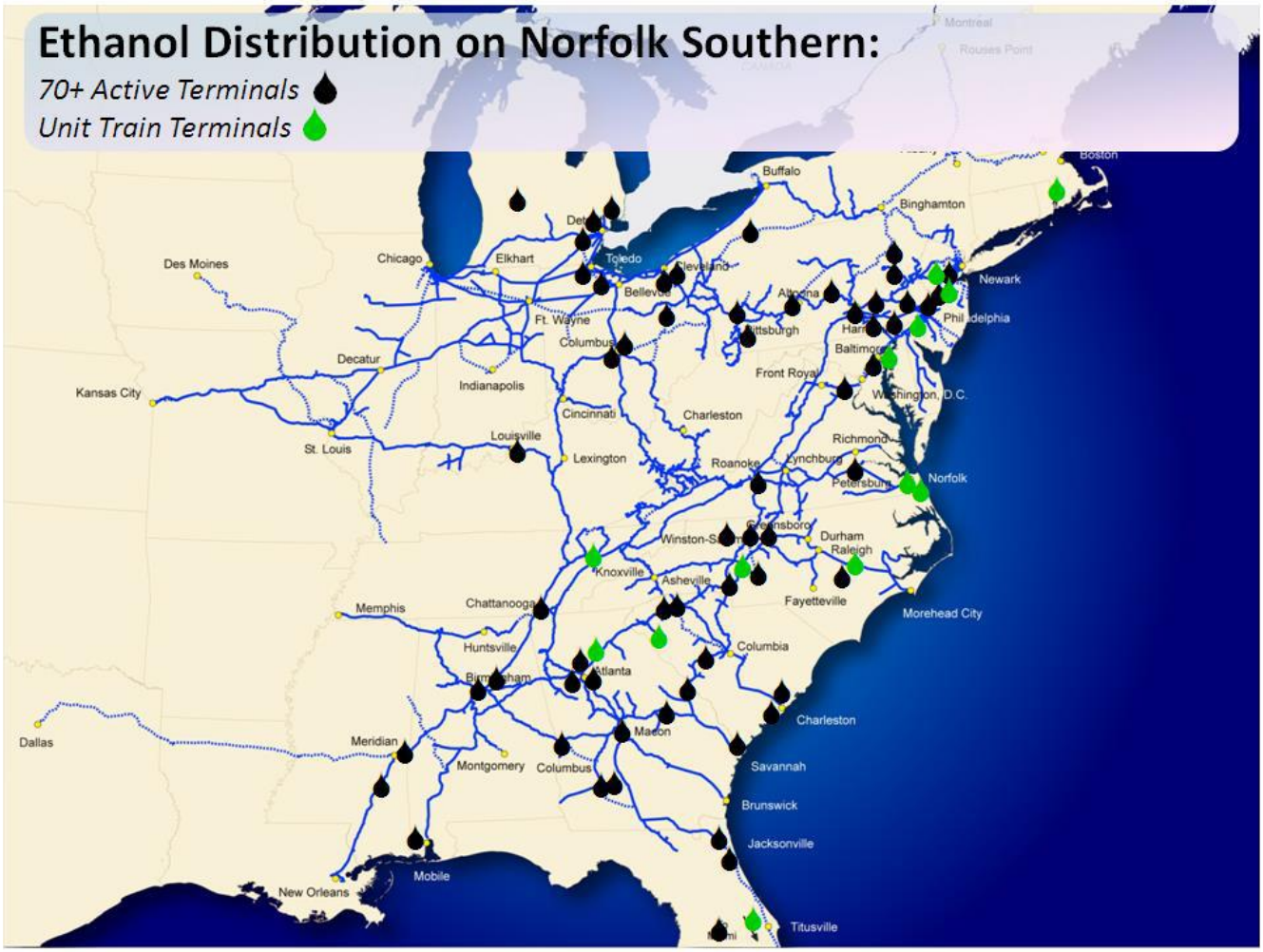
Southern Georgia is the state's main corn and ethanol production area. These areas are reflected below and on the next page.



Georgia Corn Production by County in 2012, and Location of Ethanol Plants in 2013



Source: U.S. Department of Agriculture, National Agricultural Statistics Services: *"The depicted corn ethanol plants use corn or other feedstock. Data sources: Corn production – USDA National Ag Statistics Service…Plant locations – Ethanol Producers Magazine June 2013, Renewable Fuels Assoc. Sept 2013, Nebraska Energy Office June 2013."*



Source: Norfolk Southern presentation at Critical Commodities Conference held April 2015 in New Orleans, LA.

2.5 OVERVIEW OF GEORGIA'S FOOD PROCESSING INDUSTRY

The manufacture of food products is of crucial importance to the state's manufacturing industry, accounting for $9.3 billion of Georgia's gross state product and employing 61,000 people in 2010. Food processing also accounts for 18 percent of all manufacturing jobs in Georgia. Georgia is the top ranking meat processing state in the United States, largely due to the poultry processing industry.

Data reveal a strong clustering of food processing facilities in urban areas as evidenced in Figure 2-28. The end customer for food products tend to be individuals, so locating near population/consumption centers minimizes shipping distances from the food processing facilities to the end customer.

There are a few large food processing locations in rural areas. These are typically located due to the need to be close to the farm source of agricultural products. Ultimately, most of the outbound shipments from rural food processing facilities will also be to urbanized areas. Therefore, a key transportation component of both the agricultural and food supply chains is the transport from the rural agricultural production locations to urbanized agricultural production locations.

Figure 2-29 shows that food production in Georgia peaked in the middle of the last decade, and dropped off somewhat at the beginning of the most recent economic downturn. Data also reveals that they are distributed across the state.

Table 2.11 shows the 17 large company locations and expansions in Georgia between 2006 and the first quarter of 2011. There are facilities throughout the state and most of these new locations were located along the interstates, however, notable exceptions include new facilities in Douglas and Lyons. In addition, there were generally no newer facilities in the eastern part of the state between I-85 and I-16.

In addition to the expansions listed in Table 2.11, Tyson foods announced in January of 2015 a major expansion of its facility in Vienna, located in Dooly County immediately adjacent to I-75 in middle Georgia.[20] This expansion is anticipated to create over 500 jobs, and registers as one of the largest food processing expansions in the state over the past decade. GDOT has an interchange reconstruction programmed to be started in 2015 on I-75, less than a mil e from the facility.

GEORGIA'S TOP FOOD MANUFACTURING SECTORS

Sector	Employment
Poultry Processing	32,066
Bakeries	10,673
Beverages	8,268
Snacks, Sugar and Candy	4,513

Source: EMSI 2015

TOP GEORGIA FOOD PROCESSING EMPLOYERS

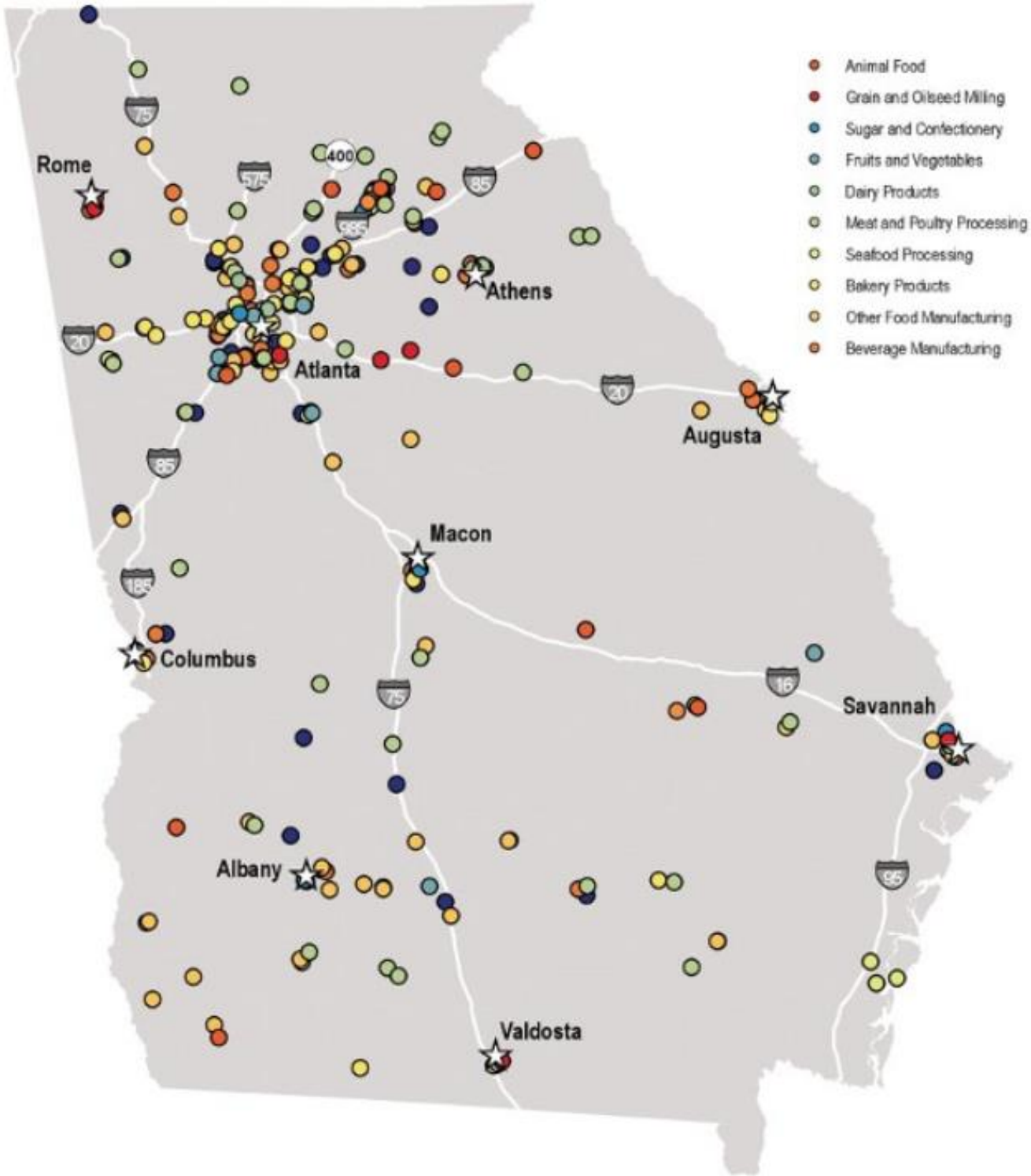
Employer	Employees
The Coca-Cola Company/CCEP	11,200
Pilgrim's	6,850
Fieldale Farms Corporation	4,535
Tyson Foods	3,900
Perdue Farms	2,600
Keystone Foods	2,570
Koch Foods	1,800
Claxton Poultry	1,800
Sanderson Farms	1,580
Frito-Lay	1,352

Source: Hoover's, GDEcD, Georgia Poultry Federation

Source: Ga. Department of Economic Development, 2016 *http://online.flowpaper.com/79590748/foodprocessingbrochure*

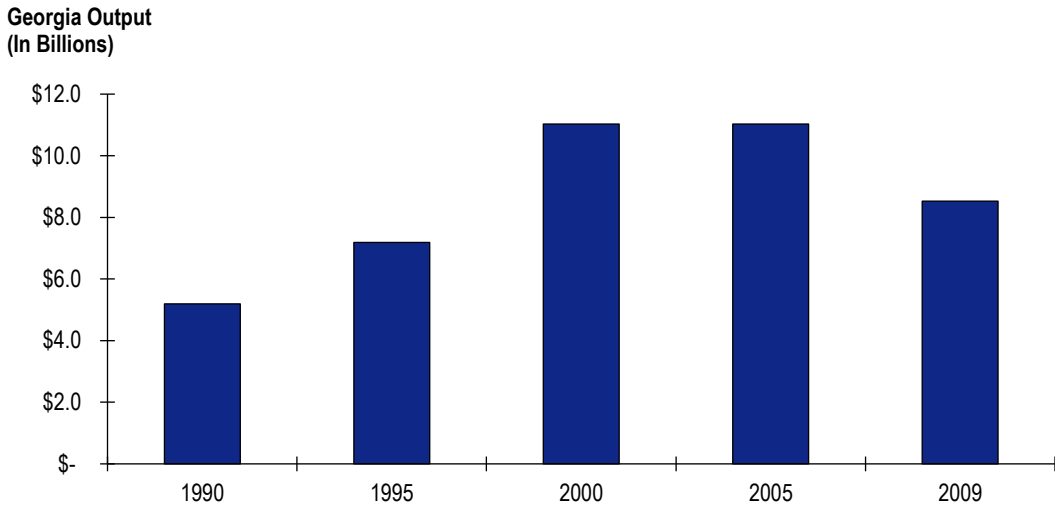
[20]www.bizjournals.com/atlanta/news/2015/01/27/tyson-foodsto-expand-in-vienna-create-500-jobs.html

Figure 2-28 Georgia's Major Food Processing Locations
More than 50 Employees



Source: Georgia Power Community and Economic Development, Food Processing in Georgia: 2016

Figure 2-29 Georgia Food Manufacturing Output: Historical Trend *1990-2009*



Source: Economy.com based on Bureau of Economic Analysis data.

Table 2.11 Large Company Locations or Expansions in Georgia

Companies with 100+ Employees

Company	City	Number of Employees
Pilgrim's Pride	Douglas	900
Allen's (*two expansions*)	Montezuma	428
Kellogg Company (*expansion*)	Columbus	300
QT Kitchens	Ellenwood	250
De Wafelbakkers	McDonough	242
Kellogg Company (*expansion*)	Augusta	226
California Cereal Products, Inc.	Macon	225
Kellogg Company (*expansion*)	Rome	220
Chicken of the Sea	Lyons	200
Lehui Enterprises	Newnan	200
Wrigley (*expansion*)	Gainesville	194
Organic Milling Company	Valdosta	175
Martin's Famous Pastry Shoppe	Valdosta	150
Turano Bakery	Villa Rica	150
King's Hawaiian	Oakwood	126
Bell Plantation (*now Protein Plus LLC*)	Fitzgerald	100
Premium Waters	Douglas	100
Total		**4,186**

Source: Georgia Power Economic and Community Development, "2011 Food Processing in Georgia"

2.6 FREIGHT CHARACTERISTICS OF GEORGIA AGRICULTURAL AND FOOD PRODUCTS

The trade volumes, distances, and main markets of Georgia's agricultural and food products influence transport mode (truck/rail) shares and the potential to shift goods to rail to reduce transportation costs and lower congestion on Georgia's roadways. This section shows modal shares by distance, the main out-of-state origin and destination markets for agriculture and food products.

About 19 million tons of agricultural products are shipped into and out of Georgia by land modes on an annual basis (excludes local and through traffic). Not surprisingly, trucks are the leading mode accounting for 60 percent of inbound/outbound agricultural freight. However, as distances become greater, the cost-effectiveness of transporting agricultural goods by rail increases (see Figure 2-30). While accounting for less than 10 percent of freight tonnage for trips less than 499 miles, rail transports 60 percent of Georgia agricultural goods on trips between 500 and 999 miles to/from the state.

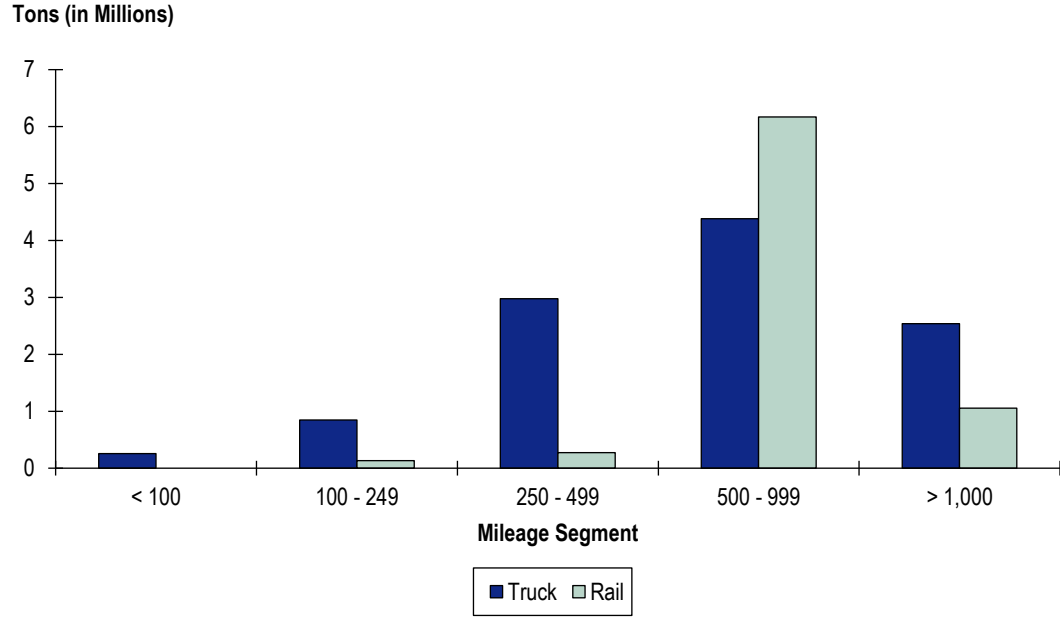
Rail has a high share of the agricultural goods (grain) transported to Georgia from the Midwest corn belt, much of which is located less than 999 miles from Georgia. (e.g., Indianapolis is one of the largest transport origins of grain coming to Georgia). This is understandable considering that corn is a primary feed for Georgia's broiler industry.

Total volume (truck and rail) for very long-distance trips (1,000 miles+) is much lower than volumes in the 500 to 999-mile range. For these longer distance trips, rail accounts for 29 percent of total freight volume for agricultural goods. Leading agricultural commodities such as field crops and fresh fruits and vegetables come to Georgia from California, Washington, and parts of the Midwest primarily by truck.

Similar to agricultural products, rail share increases with distance for food products as well. Accounting for less than 6 percent of freight volume traveling less than 249 miles, rail represents a much higher share, 20 percent, of food product movements of more than 500 miles (see Figure 2-31).

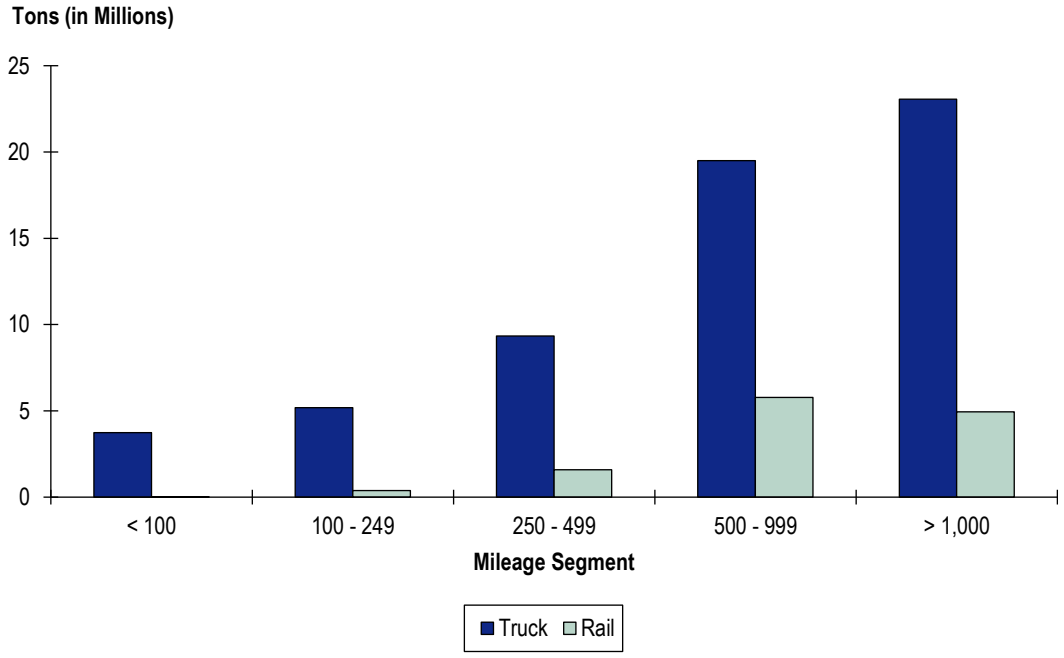
Overall, however, trucks dominate the movement of food, carrying 83 percent of freight volume.

Figure 2-30 Volume of Agricultural Movements to/from Georgia
By Mode and Distance



Source: TRANSEARCH; excludes through-traffic and local movements.

Figure 2-31 Volume of Food Product Movements to/from Georgia
By Mode and Distance



Source: TRANSEARCH; excludes through-traffic and local movements.

2.7 GEORGIA AGRICULTURAL AND FOOD EXPORTS

As shown in Figure 2-32, Georgia's agricultural exports and food products sectors have increased markedly since 1997. The historical upward trend has been particularly strong since 2006 with agricultural and food exports surging in 2010 after experiencing a slight decline in 2009, coinciding with the economic downturn that affected major Georgia export markets as well as the United States. From 1997 through 2005, exports of these commodities from Georgia hovered in the $1.3 billion-to-$1.5 billion range. However, starting in 2006 exports began increasing quickly -- essentially doubling to $2.8 billion by 2010. Georgia's top export markets for agriculture and food products are Canada, Hong Kong/China, Mexico, Turkey, and Taiwan. Agriculture and food products accounted for about 10 percent of total Georgia-origin exports by value in 2010.

Georgia agriculture and food products exports leave the U.S. by rail and truck ("overland"), ships/vessel, and air. Based on dollar value, (weights are not available for overland trade) 75 percent of Georgia's exports in these commodities is by ships. Most of the remainder, indicating strong truck and rail movements, is destined to either Canada or Mexico.

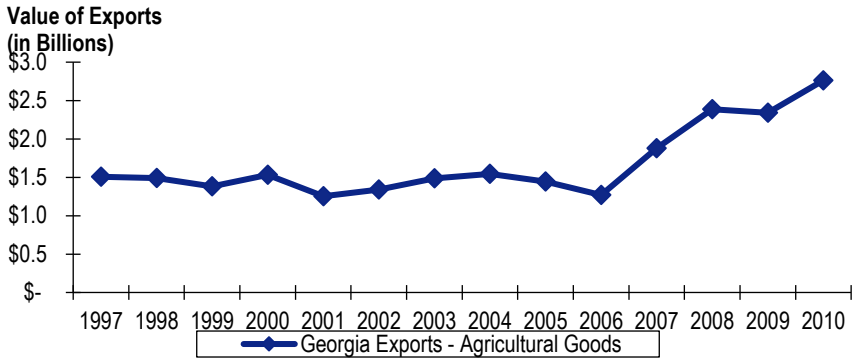
As one of the nation's largest producers of globally-traded commodities (e.g., broilers and cotton), Georgia's agriculture and food products are shipped to markets worldwide. These goods begin their export journeys from West and East Coast gateways (including the Savannah and Brunswick Ports) after transloading from Georgia-originated rail or truck journeys. Food exports are growing at Georgia's ports; they doubled between 2006 and 2010 at the Port of Savannah. In 2010, the Port of Savannah exported 129,635 long tons of food products, accounting for about 12 percent of the port's exports by weight. Food was the number two export commodity at the Port of Savannah, and food exports were double the level of imports.

At the Port of Brunswick, exports of prepared animal feeds and oil grains (e.g., soybeans) have been major growth factors in recent years while wheat exports have declined. Due to high weight and bulk of agricultural products, air freight is not highly used (air accounts for less than 3 percent of Georgia agriculture and food exports), except for higher-cost specialty food items and perishable goods.

Export competition from other countries such as Brazil and Mexico has grown significantly for the types of agricultural products Georgia raises and grows, cotton and broilers, as well as for numerous other crops (nuts, vegetables, and fruits). The reliability and cost of transportation comes to the forefront to keep Georgia competitive as transportation expenses are a major cost to produce agricultural goods. According to the U.S. Transportation Satellite Accounts data, every dollar of agricultural output in the U.S. requires about eight cents in transportation services – the highest among all industries.[21]

[21] Bureau of Transportation Statistics, Transportation Satellite Accounts.

Figure 2-32 Georgia Exports of Agricultural and Food Products, Historical Trend 1997-2010



Source: WISERTrade, Origin of Movement Exports.

2.8 AG. & FOOD PROCESSING IMPORTANT CORRIDORS

The production of agricultural and food processing is spread throughout the state, with pockets of clustered product development for these industries. While the major agricultural locations are in northeast area (broilers) and the southwest (peanuts and cotton), food processing facilities are clustered around metro Atlanta with smaller clusters around the state. Consequently, there are several important corridors serving distinct Georgia ag and food processing industries:

- I-85 between Atlanta metro region and South Carolina -- shipment of broilers;
- I-75 -- shipments of peanuts and cotton;
- US 84 -- east-west shipment of peanuts and cotton to I-75;
- US 319 from state line to I-75 -- northbound shipments of peanuts and cotton;
- US 27 to access I-10/Florida--ship peanuts & cotton to Florida locations; and
- SR 133 to access points west of Georgia.

Food processing is one of the major products in the Atlanta metropolitan region, so the same interstate network that is important to overall mobility in the Atlanta region is also important for the food processing industry. This industry continues growing in metro Atlanta; several recent examples highlight this trend:

- Kroger's new 1 million square foot distribution center in Forest Park that creates 120 jobs and invests over $175 million in the following five years[22].
- New large-scale fresh-cut fruit and vegetable processing/distribution center in Conley (near airport) creates 300 jobs and invests $52 million[23].

[22] www.georgia.org/newsroom/press-releases/governor-kroger-will-create-120-jobs-clayton-county

[23] gov.georgia.gov/press-releases/2014-12-08/deal-castellini-group-create-300-jobs-clayton-county

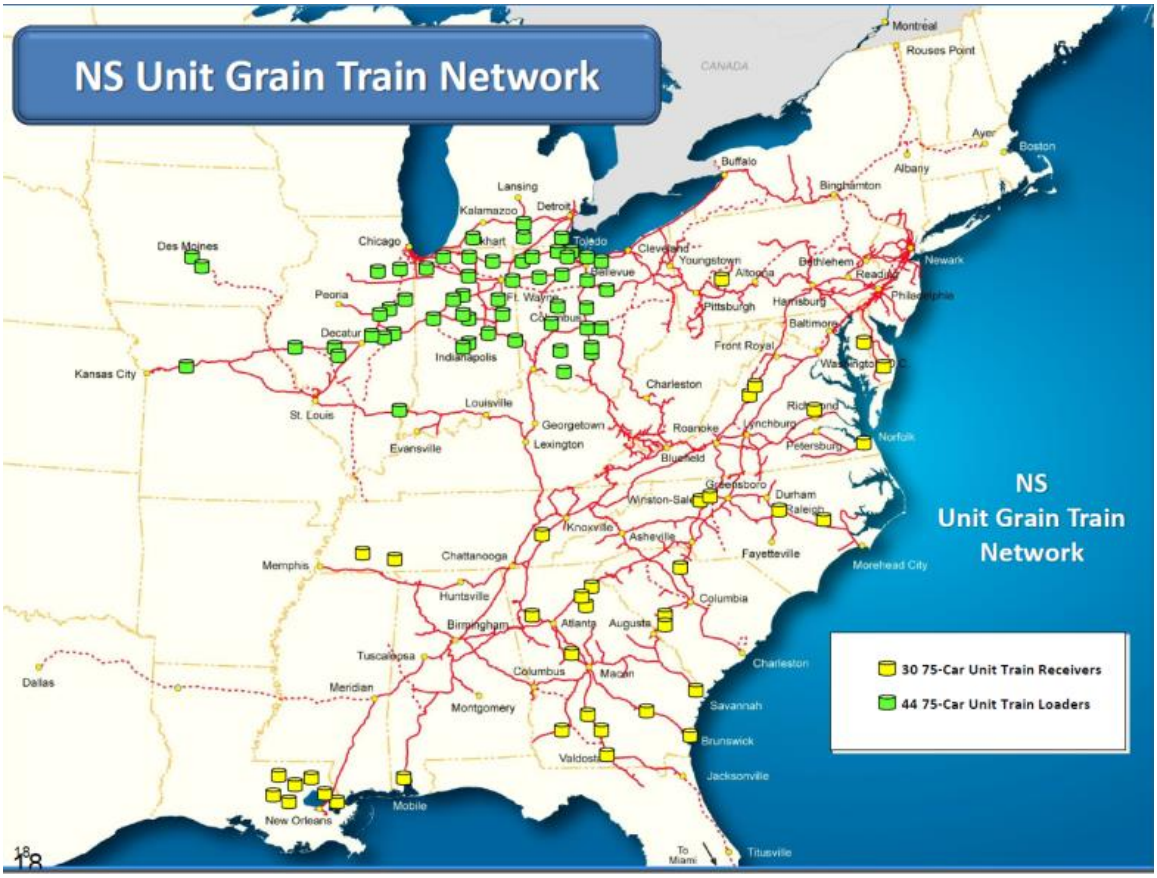
Additionally, because all of the roadways noted above connect agricultural locations to food processing locations, they are considered important corridors to Georgia's food processing industry as well.

The Georgia Freight and Logistics Plan identified I-85 north of metro Atlanta as one of the most important Georgia interstate sections to expand in the state. The broiler and food processing industries that are located in the northeastern part of the state would benefit from this expansion. As mentioned earlier, needs exist on I-75 from the Macon area northwards. However, I-75 south of Macon area should have sufficient capacity through the year 2050.

US routes 84, 319, and 27 are currently all four-lane facilities that perform satisfactorily. State Route 133 is currently two-lanes for a majority of its length; improvement to four-lanes is currently in development which will support the movement of agricultural and food products in the southwest corner of the state.

Agricultural Products – Top Origins of Inbound Freight

Georgia is the nation's top ranking producer of broiler chickens. The main input to support the raising of chicken is corn-based grain feed. The needs of Georgia's poultry industry are reflected in the top origins of agricultural products entering the State by rail, with an example from Norfolk Southern:



Source: Norfolk Southern's presentation at Critical Commodities Conference, April 2015 New Orleans, LA

Among the top 10 regions for inbound agricultural goods, all are in the Midwestern cornbelt, including Indiana, Illinois, Iowa, Ohio, and Michigan (see Table 2.12). Reflecting the distance (greater than 500 miles) and main commodity (grain) of these trips, rail is the leading mode.

There also is a particularly large truck flow of agricultural goods originating in Palm Beach County, Florida (see Table 2.13) in southeastern Florida. The Port of Palm Beach is responsible for considerable volumes of trade with the Caribbean, Central, and South America, including imports of fruits and vegetables. This produce is then trucked to Georgia to either serve the state's market or be redistributed from Georgia warehouse facilities to other parts of the country. Trucks handle 100 percent of this long-distance market.

Introducing rail service to carry agricultural goods between these markets could support Georgia's and Florida's highways as well are lower transportation costs. A primary issue for these types of perishable goods, speed and reliability would be paramount to making this work, which is why trucks currently dominate this particular market.

Table 2.12 Rail – Top Origins of Inbound (to Ga.) Agricultural Products

Class	Origin	Rail Tons	Percentage of Inbound Share
Inbound	Indiana Part of Indianapolis BEA	2,003,905	28%
Inbound	Indiana Part of Fort Wayne BEA	821,896	11%
Inbound	Illinois Part of Chicago BEA	420,513	6%
Inbound	Iowa Part of Des Moines BEA	414,083	6%
Inbound	Indiana Part of Evansville BEA	378,369	5%
Inbound	Ohio Part of Columbus BEA	300,079	4%
Inbound	Ohio Part of Toledo BEA	295,080	4%
Inbound	Michigan Part of Detroit BEA	282,322	4%
Inbound	Illinois Part of Indianapolis BEA	217,641	3%
Inbound	Illinois Part of Champaign BEA	217,490	3%
	Elsewhere	1,805,745	25%

Source: Transearch; excludes through-traffic and local movements.

Table 2.13 Truck – Top Origins of Inbound (to Ga.) Agricultural Products

Class	Origin	Truck Tons	Percentage of Inbound Share
Inbound	Palm Beach County, Florida	1,909,305	25%
Inbound	California Part of San Francisco BEA	289,212	4%
Inbound	Loudon County, Tennessee	267,988	4%
Inbound	Missouri Part of Springfield BEA	226,273	3%
Inbound	Pennsylvania Part of Pittsburgh BEA	224,445	3%

Inbound	California Part of Los Angeles BEA	223,108	3%
Inbound	Missouri Part of Kansas City BEA	221,068	3%
Inbound	Washington Part of Richland BEA	163,283	2%
Inbound	Kansas Part of Kansas City BEA	159,602	2%
Inbound	Michigan Part of Detroit BEA	150,263	2%
	Elsewhere	3,728,665	49%

Source: Transearch; excludes through-traffic and local movements.

Agricultural Products – Top Destinations of Outbound Freight

While inbound grain movements mean a relatively larger rail share of inbound movements of agricultural goods, trucks dominate outbound movements. Large northeast and midwestern markets (i.e. New York, Chicago, Boston, Detroit) are the leading out-of-state destinations for Georgia shipments of agricultural products -- mostly vegetables, fruits, cotton, and nuts moved by truck (see Table 2.15). The top rail destinations for agricultural products -- primarily nuts and vegetables -- include Kentucky, Tennessee, and Arkansas (see Table 2.14).

Table 2.14 Rail – Top Destinations of Outbound Ga. Agricultural Products

Class	Destination	Rail Tons	Percentage of Outbound Share
Outbound	Kentucky Part of Lexington BEA	132,640	28%
Outbound	Shelby County, Tennessee	80,760	17%
Outbound	Arkansas Part of Little Rock BEA	59,120	12%
Outbound	Arkansas Part of Fort Smith BEA	37,960	8%
Outbound	Hamilton County, Tennessee	28,108	6%
Outbound	Virginia Part of Staunton BEA	19,160	4%
Outbound	Montgomery County, Alabama	15,200	3%
Outbound	Pike County, Alabama	13,200	3%
Outbound	Ohio Part of Toledo BEA	12,252	3%
Outbound	Pennsylvania Part of Pittsburgh BEA	8,520	2%
	Elsewhere	68,440	14%

Source: Transearch; excludes through-traffic and local movements.

Table 2.15 Truck – Top Destinations of Outbound Ga. Agricultural Products

Class	Destination	Truck Tons	Percentage of Outbound Share
Outbound	Illinois Part of Chicago BEA	190,393	6%
Outbound	New Jersey Part of New York BEA	130,268	4%
Outbound	Massachusetts Part of Boston BEA	129,692	4%
Outbound	Hamilton County, Florida	127,441	4%

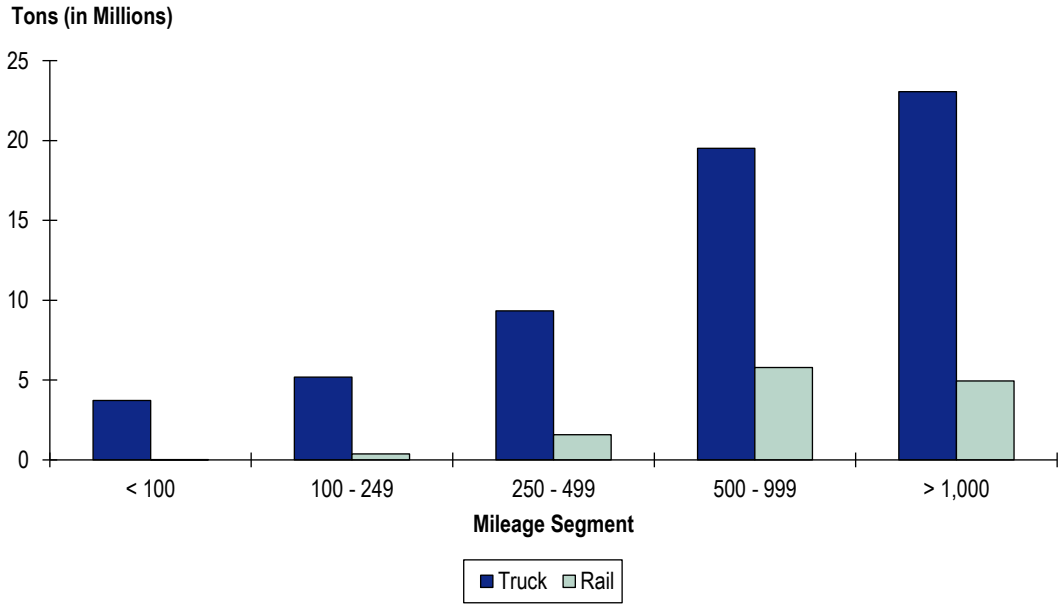
Outbound	New York Part of New York BEA	121,780	4%
Outbound	Texas Part of Dallas BEA	121,660	4%
Outbound	Michigan Part of Detroit BEA	102,372	3%
Outbound	Pennsylvania Part of Pittsburgh BEA	101,681	3%
Outbound	Maryland Part of Washington BEA	95,071	3%
Outbound	Duval County, Florida	94,023	3%
	Elsewhere	2,224,912	65%

Source: Transearch; excludes through-traffic and local movements.

Food Products – Distance and Volume by Mode

Similar to agricultural products, rail share increases with distance for food products as well. Accounting for less than 6 percent of freight volume traveling less than 249 miles, rail represents a much higher share (20 percent) of food product movements of more than 500 miles (see Figure 2-33). Overall, however, trucks dominate the movement of food, carrying 83 percent of freight volume. Although rail volumes increase with distance, there is could be opportunity to shift a portion of food-related freight from trucks to rail if the rail services could meet the stringent speed and reliability requirements of the food industry.

Figure 2-33 Volume of Food Product Movements to/from Georgia , by Mode and Distance



Source: Transearch; excludes through-traffic and local movements.

Food Products – Top Origins of Inbound Freight

The top food product origins for rail and truck (see Table 2.16 and Table 2.17) reflect consumer food items to serve the Georgia market, including produce growing areas in California and Florida as well as processed feeds coming into the market from the Midwest. Rail is the primary mode for food products originating from the Illinois-Indiana area while trucks rise in share for goods entering Georgia from Louisiana and Florida, in particular. There may be an opportunity to explore shifting a portion of the food products originating in Florida to rail. Other distant markets with high volumes of food transported by trucks, including Dallas and Chicago, also may be suitable for increasing the rail modal share.

Table 2.16 Rail – Top Origins of Inbound (to Ga.) Food Products

Class	Origin	Rail Tons	Percentage of Inbound Share
Inbound	Indiana Part of Indianapolis BEA	744,349	17%
Inbound	Illinois Part of Champaign BEA	640,104	14%
Inbound	Illinois Part of Chicago BEA	576,388	13%
Inbound	Morgan County, Alabama	289,600	6%
Inbound	Shelby County, Tennessee	239,120	5%
Inbound	Washington Part of Richland BEA	175,960	4%
Inbound	California Part of San Francisco BEA	167,880	4%
Inbound	Ohio Part of Toledo BEA	162,900	4%
Inbound	Illinois Part of St. Louis BEA	142,000	3%
Inbound	Lancaster County, South Carolina	100,760	2%
	Elsewhere	1,247,708	28%

Source: Transearch; excludes through-traffic and local movements.

Table 2.17 Truck – Top Origins of Inbound (to Ga.) Food Products

Class	Origin	Truck Tons	Percentage of Inbound Share
Inbound	Louisiana Part of New Orleans BEA	416,464	5%
Inbound	Hillsborough County, Florida	301,354	3%
Inbound	Charleston County, South Carolina	300,277	3%
Inbound	Texas Part of Dallas BEA	275,861	3%
Inbound	Miami-Dade County, Florida	271,959	3%
Inbound	Palm Beach County, Florida	266,319	3%
Inbound	Illinois Part of Chicago BEA	248,999	3%
Inbound	Polk County, Florida	242,515	3%
Inbound	Pasco County, Florida	227,882	3%
Inbound	Orange County, Florida	209,531	2%
	Elsewhere	6,060,729	69%

Source: Transearch; excludes through-traffic and local movements.

Food Products – Top Destinations of Outbound Freight

Rail accounts for a much lower share (less than 8 percent) of Georgia's outbound trade flows in food products compared to its share (20 percent) of inbound flows. This reflects the perishability of Georgia's main food commodities, processed meat (chicken) and packaged fruits and vegetables. The broiler industry relies on refrigerated trucks to carry meat products to markets throughout the U.S. as well as to gateways for export. The leading destinations for Georgia food products are very populated U.S. markets, including New York City, Los Angeles, Miami, Cleveland, Detroit, and Minneapolis (see Table 2.18 and Table 2.19). For some instances such as Miami and Detroit, the major markets also may be serving as gateways for exports of Georgia food products. Considerable volumes headed to the Northeast and Midwest by truck point to a potentially greater role for rail.

Not tabulated in these tables that capture flows going from and to Georgia, the Port of Savannah handles the most containerized poultry in the nation and the most refrigerated containerized exports on the East Coast. The port is accommodating significant increases in refrigerated cargo by adding new electrified refrigerated container racks. It has at least 44 racks able to power over 1,000 refrigerated containers. The port exports poultry from Georgia while importing refrigerated fruits and vegetables from South America.

Table 2.18 Rail – Top Destinations of Outbound Georgia Food Products

Class	Destination	Rail Tons	Percentage of Outbound Share
Outbound	Mecklenburg County, North Carolina	152,120	14%
Outbound	Louisiana Part of New Orleans BEA	127,364	12%
Outbound	Okeechobee County, Florida	64,360	6%
Outbound	Miami-Dade County, Florida	60,880	6%
Outbound	Virginia Part of Staunton BEA	58,240	5%
Outbound	Broward County, Florida	43,560	4%
Outbound	Illinois Part of Chicago BEA	40,520	4%
Outbound	Duval County, Florida	40,320	4%
Outbound	California Part of Los Angeles BEA	34,480	3%
Outbound	Palm Beach County, Florida	32,160	3%
	Elsewhere	430,760	40%

Source: Transearch; excludes through-traffic and local movements.

Table 2.19 Truck – Top Destinations of Outbound Georgia Food Products

Class	Destination	Truck Tons	Percentage of Outbound Share
Outbound	Connecticut Part of New York BEA	1,337,613	8%
Outbound	New York Part of New York BEA	1,221,397	7%
Outbound	Miami-Dade County, Florida	1,038,971	6%
Outbound	Ohio Part of Cleveland BEA	532,424	3%
Outbound	Michigan Part of Detroit BEA	462,323	3%
Outbound	Shelby County, Tennessee	417,727	3%
Outbound	Minnesota Part of Minneapolis BEA	416,358	3%
Outbound	Kentucky Part of Louisville BEA	412,155	3%
Outbound	California Part of Los Angeles BEA	398,566	2%
Outbound	Massachusetts Part of Boston BEA	378,342	2%
	Elsewhere	9,746,437	60%

Source: Transearch; excludes through-traffic and local movements.

Forecast Growth in Agriculture and Food Products Freight Flows

Driven by expected growth in population and output both within Georgia and nationwide, freight flows related to agriculture and food products are expected to grow considerably by 2050. The expansion of truck flows on the Georgia roadway network, in particular, will increase congestion, reduce reliability, and could eventually threaten the competitiveness of Georgia's key agricultural and food processing industries. The diversion of a portion of this growth from truck to rail would help mitigate roadway congestion in the State, enhancing long-term economic competitiveness of the agriculture and food industries as well as the range of other Georgia industries sharing the same roadways.

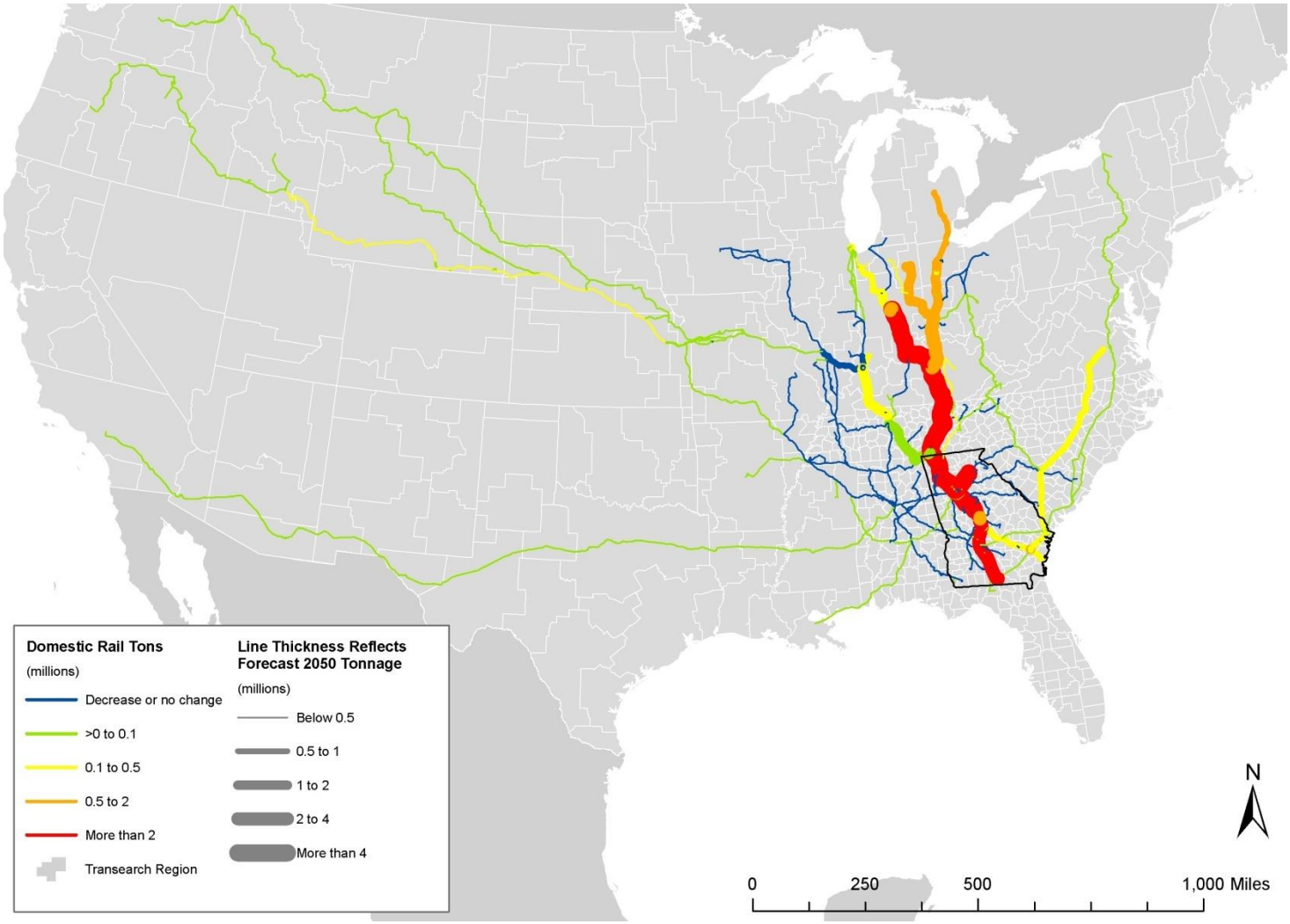
The following maps and tables, presented both for agricultural products and food products, demonstrate the effects that these industries could possibly have on the flow of freight, by rail and by truck, into, out of, and through Georgia.

Agricultural Product Freight Flow Forecast – Rail

Table 2.20 Georgia Rail Freight Volume (tons) Forecast for Agricultural Products

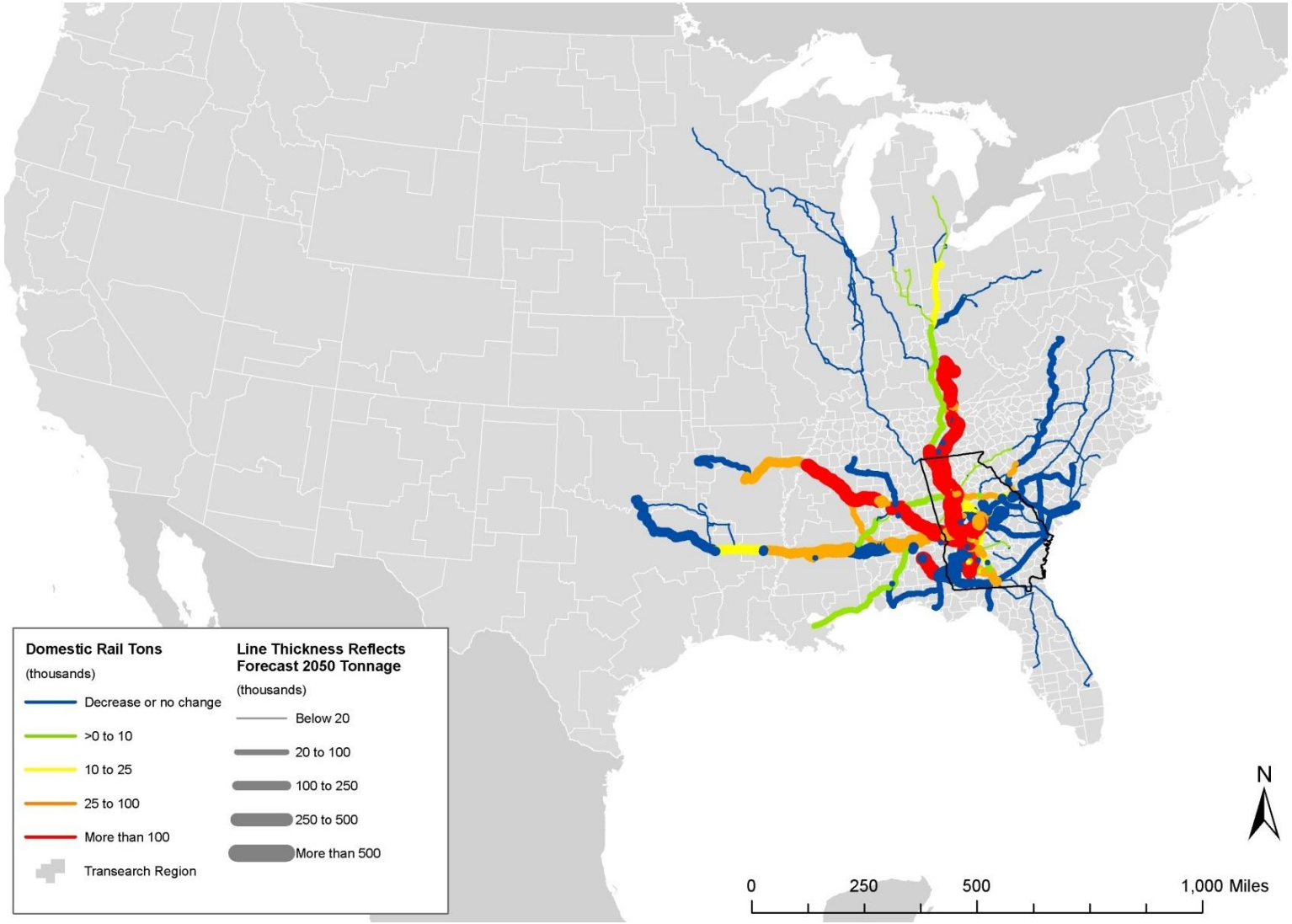
Trip Types	2007	2050	Percent Change
Inbound	7,157,123	10,926,339	53%
Outbound	475,360	1,425,729	200%
Through	4,131,544	8,145,456	97%
Intrastate	111,780	368,801	230%
All	*11,875,807*	*20,866,325*	*76%*

Figure 2-34 Total Rail Tons for Agricultural Products Bound for Georgia
by 2050



Source: Transearch.

Figure 2-35 Total Rail Tons for Agricultural Products Outbound from Georgia *by 2050*



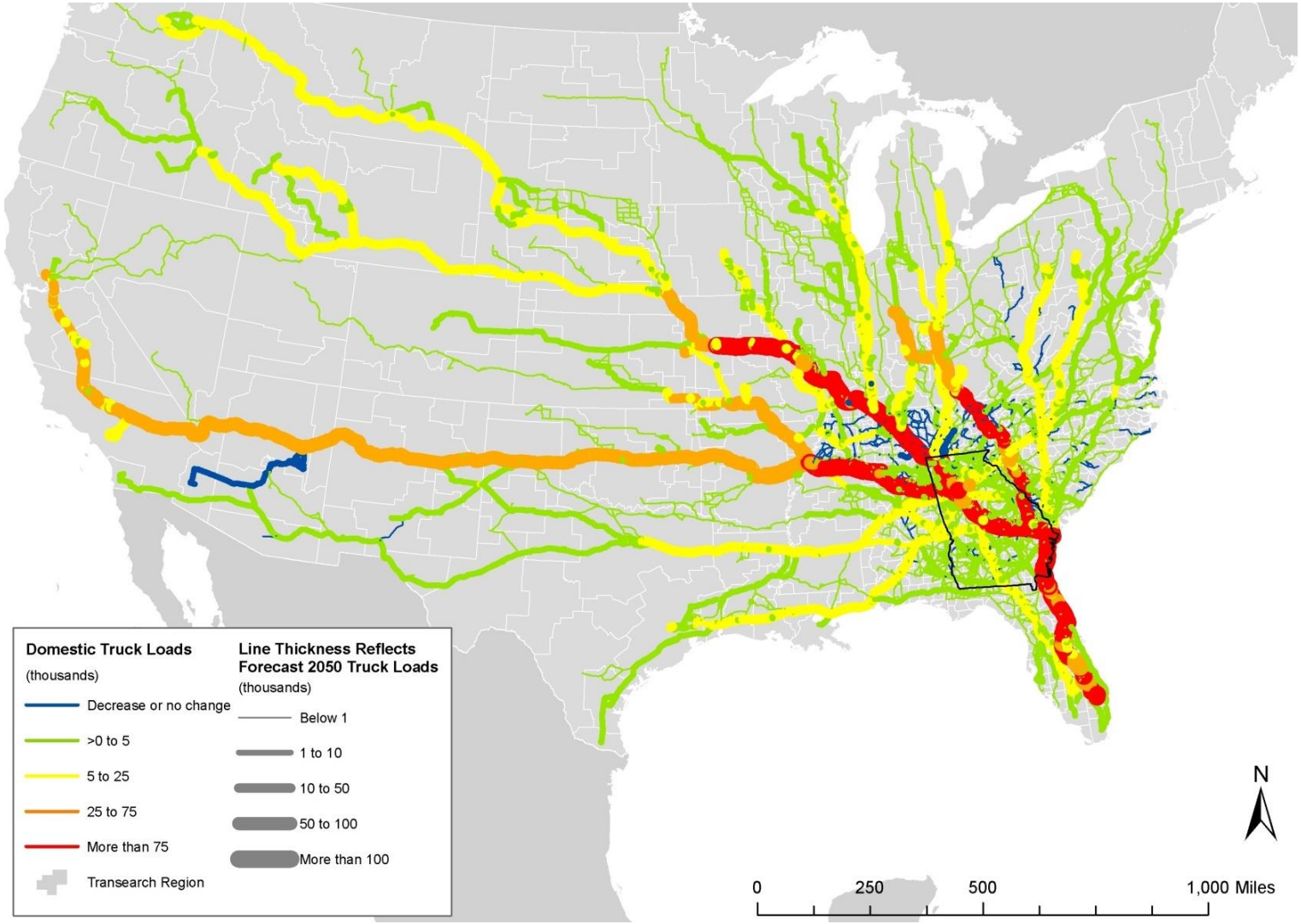
Source: Transearch.

Agricultural Product Freight Flow Forecast – Truck

Table 2.21 Georgia Truck Load Forecast for Agricultural Goods

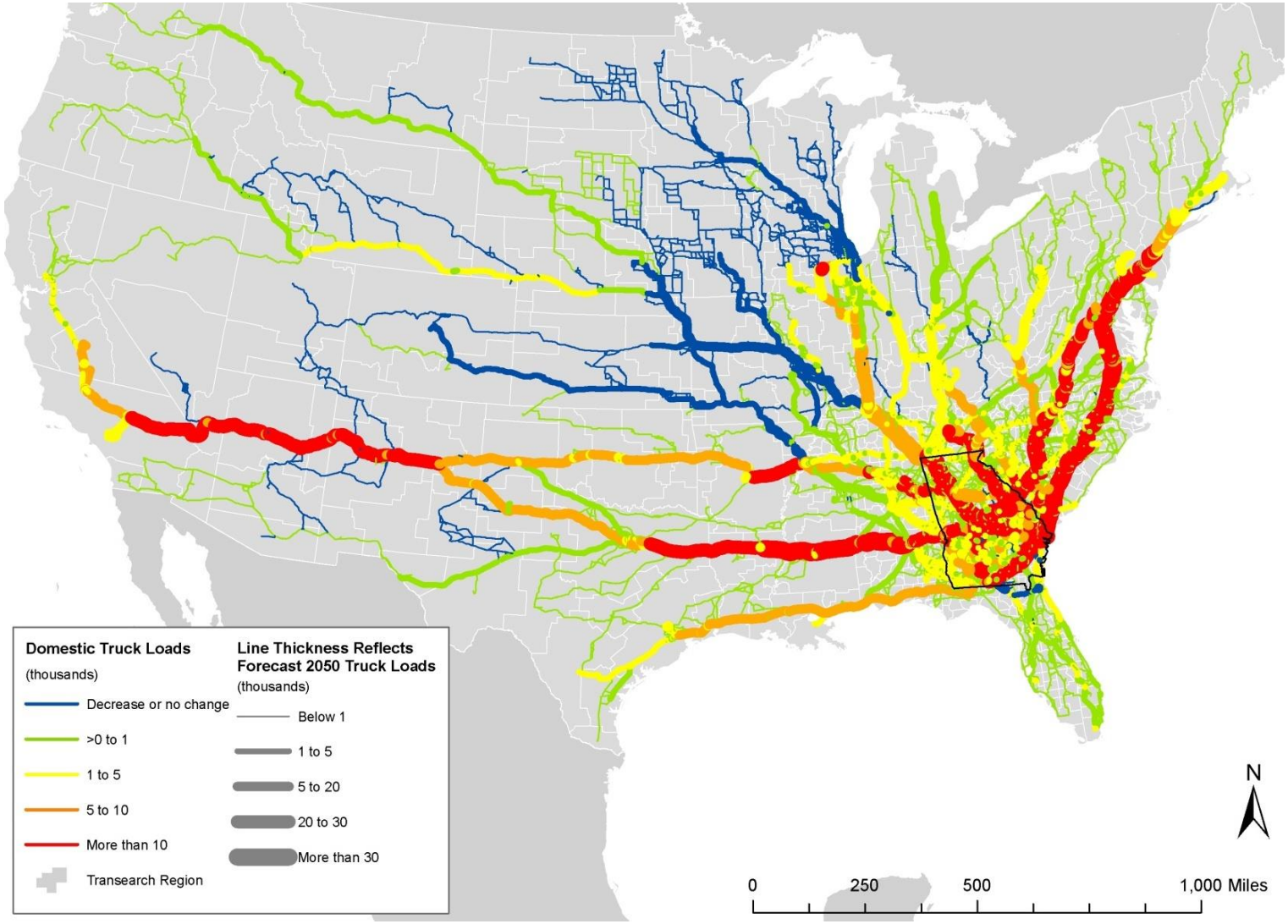
	2007	2050	Percent Change
Total	24,183,020	58,640,350	142%
Inbound	7,563,212	20,213,107	167%
Outbound	3,439,293	7,254,554	111%
Through	10,644,741	25,157,138	136%
Intrastate	2,535,774	6,015,551	137%

Figure 2-36 Total Truck Loads for Agricultural Products Bound for Georgia, *by 2050*



Source: Transearch.

Figure 2-37 Total Truck Loads for Agricultural Products Outbound from Georgia, *by 2050*



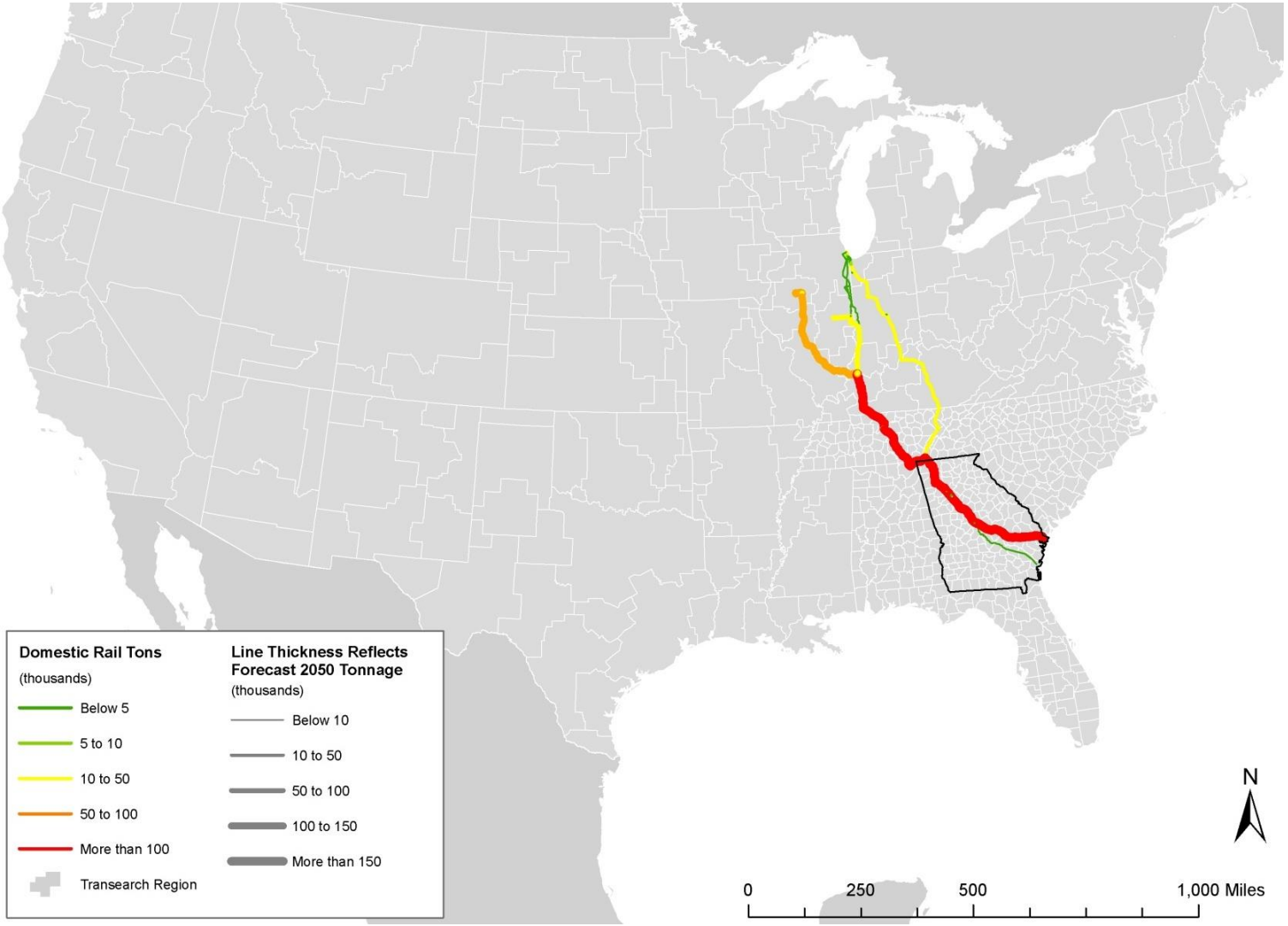
Source: Transearch.

Food Product Freight Flow Forecast – Rail

Table 2.22 Georgia Rail Freight Volume (tons) Forecast for Food Products

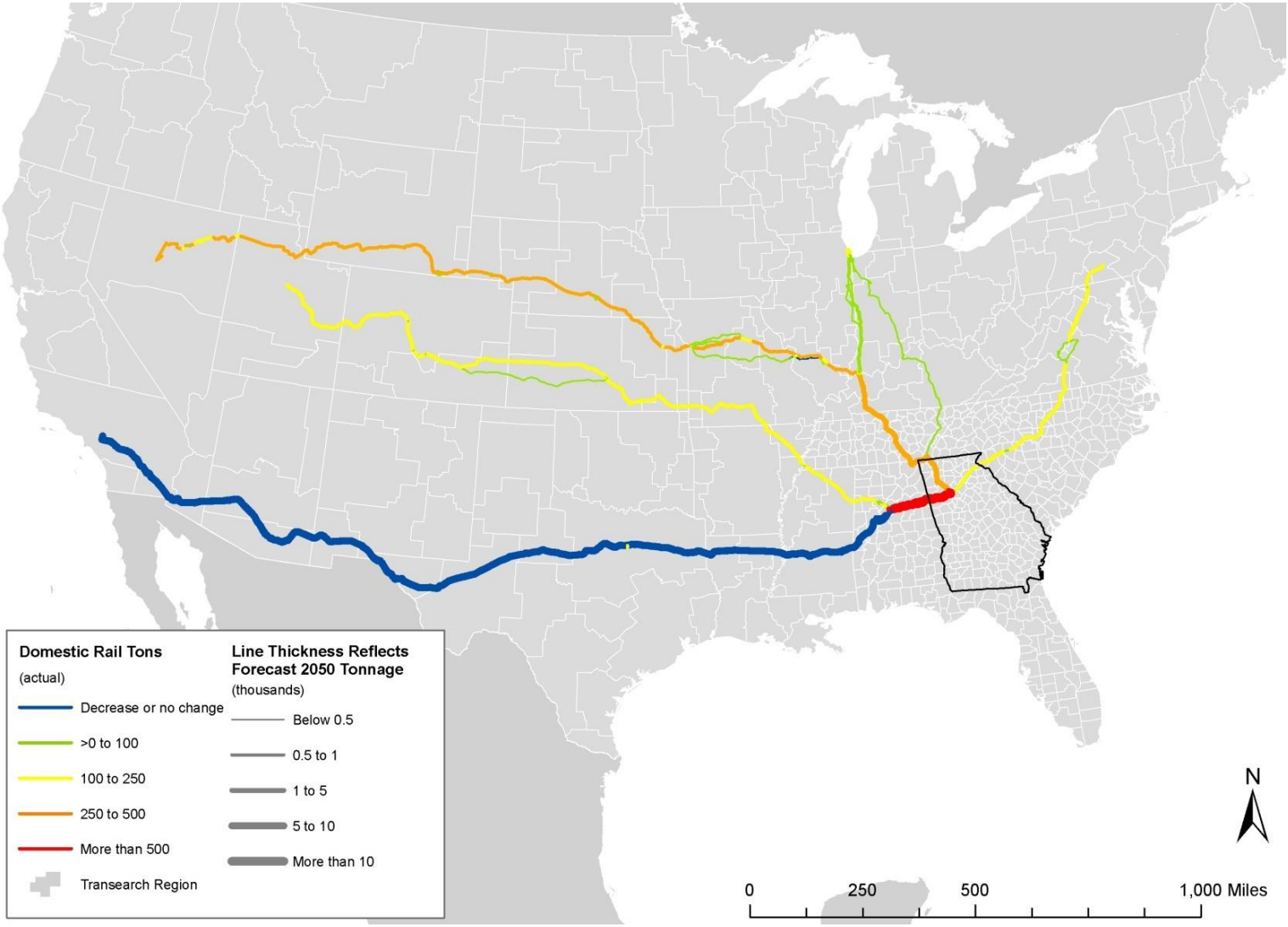
	2007	2050	Percent Change
Total	12,685,025	28,267,848	123%
Inbound	4,486,769	11,477,981	156%
Outbound	1,084,764	1,487,538	37%
Through	6,991,268	15,143,901	117%
Intrastate	122,224	158,428	30%

Figure 2-38 Total Rail Tons for Food Products Bound for Georgia, *by 2050*



Source: Transearch.

Figure 2-39 Total Rail Tons for Food Products Outbound from Georgia, *by 2050*



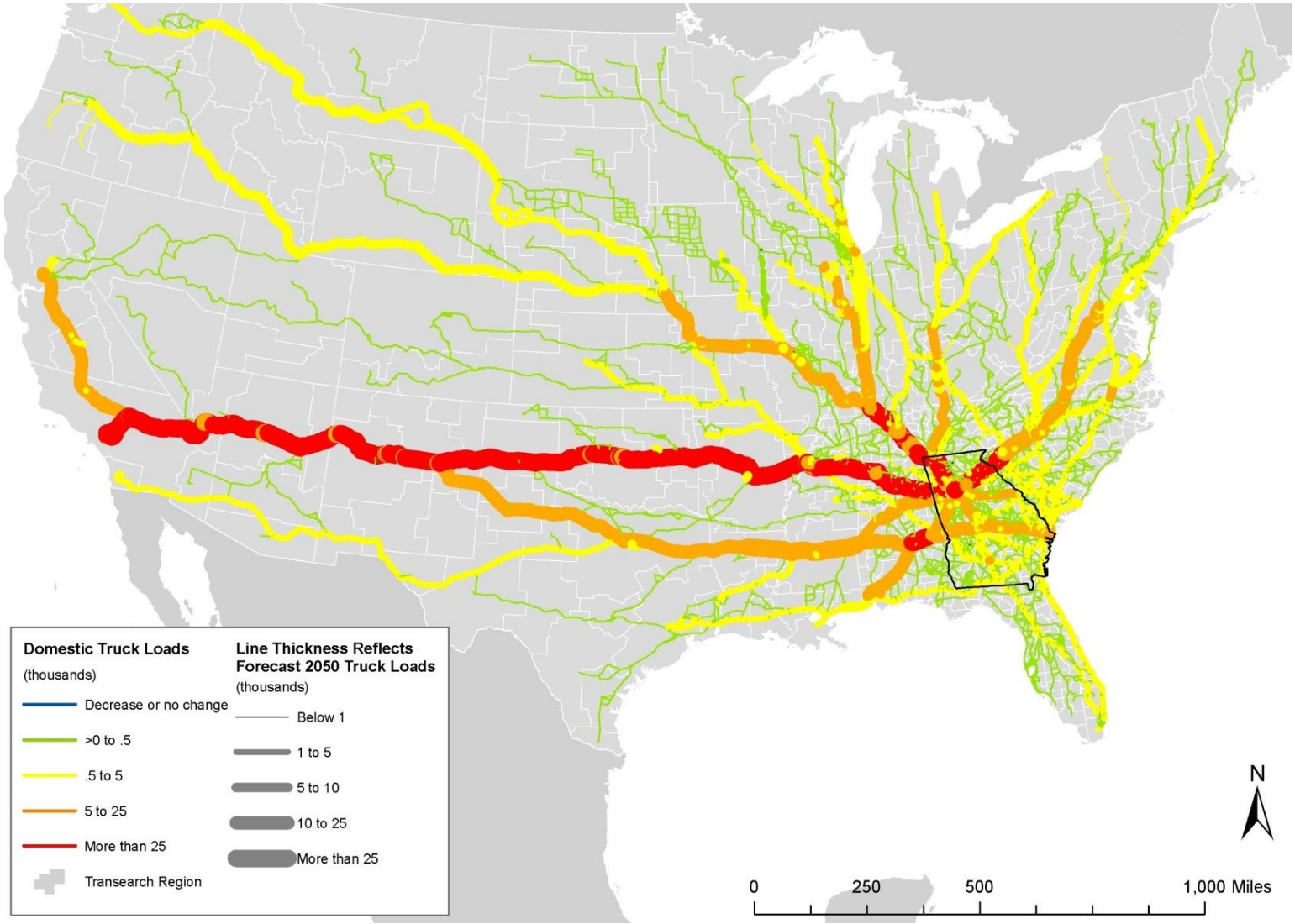
Source: Transearch.

Food Product Freight Flow Forecast – Truck

Table 2.23 Georgia Truck Freight (in tons) Forecast for Food Products

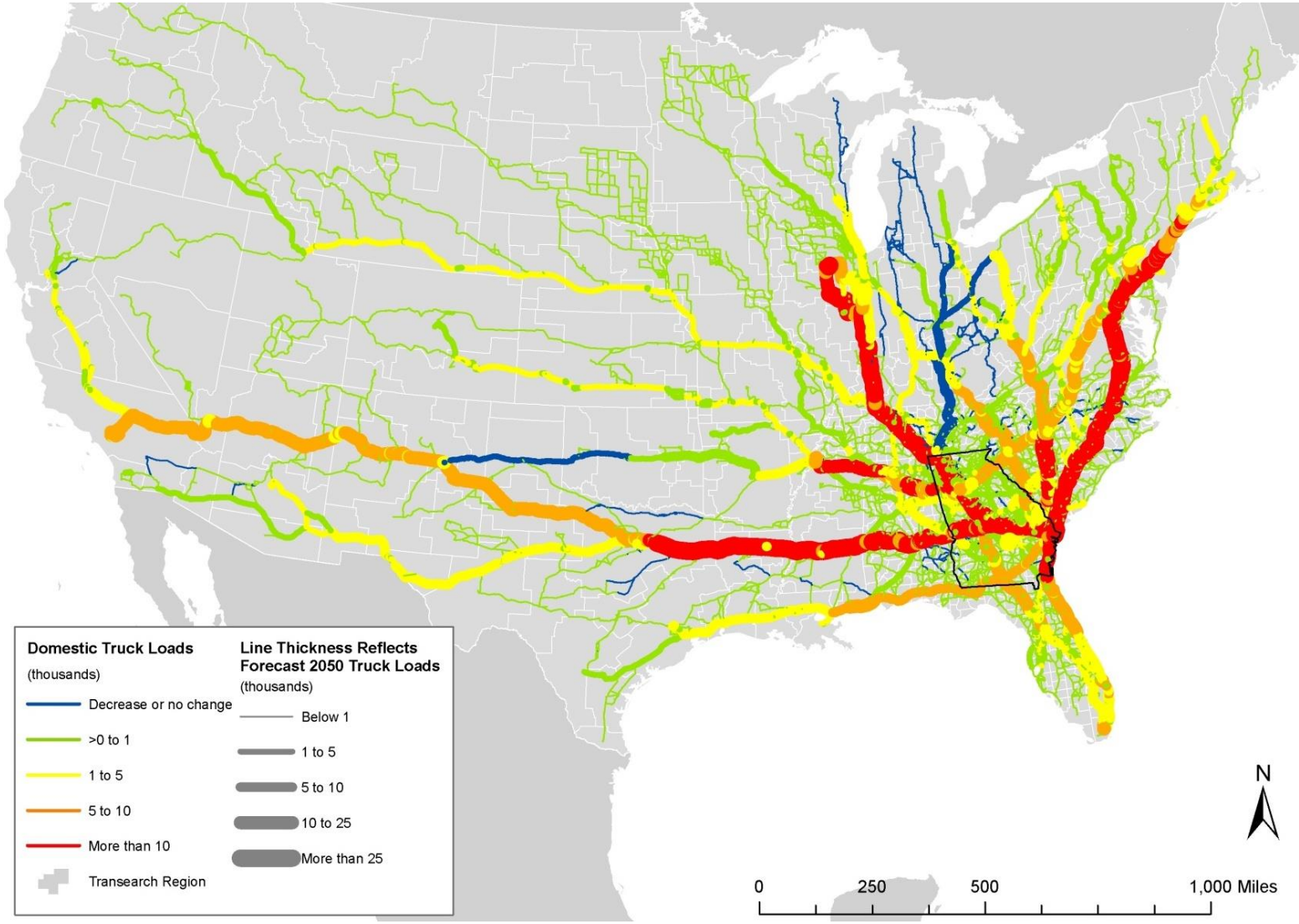
	2007	2050	Percent Change
Total	60,818,780	128,303,692	111%
Inbound	8,821,890	19,495,689	121%
Outbound	16,362,313	31,338,662	92%
Through	27,996,090	64,306,422	130%
Intrastate	7,638,487	13,162,919	72%

Figure 2-40 Total Truck Loads for Food Products Bound for Georgia, *by 2050*



Source: Transearch.

Figure 2-41 Total Truck Loads for Food Products Outbound from Georgia, *by 2050*



Source: Transearch.

3.0 Mining Industry

3.1 OVERVIEW

The mining sector can be considered to be comprised of metallic mining and nonmetallic mining. Metallic mining is the extraction of gold, silver, copper, or similar materials. Nonmetallic mining is the extraction of stone, sand, rock or similar materials from natural deposits; examples of nonmetallic mines are quarries and pits. A broad range of nonmetallic mining industry products include:

- Kaolin clay used in ceramics, paints, and paper production;
- Aggregate for construction;
- Gravel and crushed stone (including limestone and dolomite) for road construction;
- Dimension stone for monuments;
- Volcanic andesite for shingles;
- Peat for horticulture and landscaping;
- Titanium dioxide used in paints and varnishes
- Industrial sand for the oil industry; and
- Coal for power generation.

3.2 MINES BY COUNTY

There are over 160 active mines in Georgia, geographically spread across all portions of the state (Table 3.1). Elbert County's mines are the most of any county in Georgia. Bartow and Pickens Counties both have seven active mines each. Over 80 percent of active mines in Georgia are co-located with processing plants to develop commercially viable products from the material extracted at the mine (Table 3.2).

As shown in Table 3.3, the vast majority of active mines in Georgia are used for producing goods used in construction. There are over 75 active mines that extract crushed stone and about 25 mines that extract sand and gravel. These products are commonly used for road and building construction. It is typical for transportation costs to be the determining factor for which mines are used to service different construction projects. Therefore, mines are located across the state, so that they can be closer to construction activity thereby minimizing transportation costs.

Table 3.1 Active Georgia Mines by County

County	Number of Mines and Plants for Processing Mined Materials
Elbert County	8
Bartow County	7
Pickens County	7
Bibb County	5
Fulton County	5
Washington County	5
Floyd County	4
Forsyth County	4
Greene County	4
Oglethorpe County	4
Richmond County	4
Brantley County	3
Cherokee County	3
Decatur County	3
DeKalb County	3
Douglas County	3
Hall County	3
Houston County	3
Thomas County	3
Twiggs County	3
Unspecified Counties	3
Columbia County	2
Effingham County	2
Fayette County	2
Gilmer County	2
Gwinnett County	2
Hart County	2
Jones County	2
Lee County	2
Long County	2
Monroe County	2
Newton County	2
Talbot County	2
Towns County	2
Walker County	2
Warren County	2

County	Number of Mines and Plants for Processing Mined Materials
Whitfield County	2
Wilkinson County	2
41 Other Counties	1
Total	**161**

Source: U.S.G.S. as of May of 2013

Table 3.2 Mines by Operation Type

Type of Operations	Number of Facilities
Mine and Plant	132
Plant Only	20
Mine Only	9
Total	**161**

Source: U.S.G.S. as of May of 2013

Table 3.3 Mines by Commodity

Commodity	Number of Mines and/or Plants
Crushed Stone	76
Sand and Gravel	27
Dimension Stone	15
Kaolin	12
Common Clay and Stone	9
Fullers Earth	7
Mica	4
Barite	2
Cement	2
Perlite	2
Feldspar	1
Strontium	1
Titanium Dioxide	1
Titanium Minerals	1
Zircon	1
Total	**161**

Source: U.S.G.S. as of May of 2013

The most recently available data on tonnage and value by commodity was for the year 2003 from a joint study of the U.S. Geological Society and the Georgia Geological Society. Table 3.4 shows the summarized totals for tonnage and value for each commodity. The table shows that 71.5 million metric tons of crushed stone were produced in Georgia in 2003. This is consistent with the large number of crushed stone mines in the state. Sand and gravel was the next largest commodity in terms of tonnage with 7.1 million tons extracted in 2003.

While there are only 12 kaolin mines in the state, this commodity is the largest in terms of value of extracted material. This is because kaolin has a much higher value-to-ton ratio than other minerals. The estimated value of the 6.8 million metric tons of kaolin produced in 2003 was $893 million (Table 3.4). There was more than 10 times as much crushed stone that was produced in 2003, but the value of that crushed stone was significantly less than kaolin at $479 million dollars. The high value of kaolin produced makes the commodity strategically important for Georgia.

Table 3.4 Quantity & Value of Nonfuel Minerals Produced in Ga., Historical Trend 2001-2003

Mineral	2001		2002		2003[p]	
	Quantity (thousands of tons)	Value ($ thousands)	Quantity (thousands of tons)	Value ($ thousands)	Quantity (thousands of tons)	Value ($ thousands)
Clays						
Common	1,360	4,580	1,310	5,500	1,310	5,500
Fuller's Earth	879	80,600	979	93,800	979	93,800
Kaolin	7,020	816,000	6,830	893,000	6,830	893,000
Gemstones	N/A	8	N/A	8	N/A	8
Sand and Gravel						
Construction	7,060	28,800	6,600	27,200	7,100	29,500
Industrial	W	W	606	12,200	759	12,400
Stone						
Crushed[a]	76,900[r]	465,000[r]	69,100	454,000	71,500	479,000
Dimension	108	26,500	111	18,200	103	21,100
Combined values of barite, cement, clays (bentonite, feldspar), iron oxide pigments (crude), lime, mica (crude), stone (crushed marble), and values indicated by symbol "W"	n/a	150,000	n/a	138,000	n/a	139,000
Total	**n/a**	**1,570,000[r]**	**n/a**	**1,64,000**	**n/a**	**1,670,000**

Source: U.S. Geological Survey Minerals Yearbook, 2003

Note: Production as measured by mine shipments, sales, or marketable production (including consumption by producers). Data are rounded to no more than three significant digits; may not add to totals shown.

[a] Excludes certain stones; kind and value included with "Combined values" data.

[p] Preliminary. [r] Revised. N/A – Not Available. XX – Not Applicable.

W – Withheld to avoid disclosing company proprietary data; value included with "Combined values" data.

3.3 KAOLIN SHIPMENT PATTERNS

As the dominant producer of kaolin in this country, in the year 2010 Georgia produced 5.05 million tons of kaolin out of a total of 5.4 million tons produced in the entire U.S. As shown in Table 3.5, the next highest state was South Carolina, which produced 158,000 tons.

This large production activity in Georgia also makes the United States the top kaolin producing country in the world. Table 3.6 shows that while the U.S. output has been declining, it was still just ahead of Uzbekistan in terms of

tonnage output, making it the largest producer. Other countries that produce over 1,000,000 tons of kaolin include Germany, the Czech Republic, Brazil, Ukraine, and Turkey. Georgia produces 15 percent of the world's total kaolin.

Table 3.5 Kaolin by State

	2009		2010	
	Quantity (thousands of tons)	Value ($ thousands)	Quantity (thousands of tons)	Value ($ thousands)
Georgia	4,970	693,000	5,050	757,000
South Carolina	144	8,590	158	10,500
Other[a]	180	12,700	214	20,500
Total	**5,290**	**714,000**	**5,420**	**788,000**

Source: U.S. Geological Society, 2011
Note: Data are rounded to no more than three significant digits; may not add to totals shown.
[a] Includes Alabama, Arkansas, California, Florida, Nevada, North Carolina, and Texas.

Table 3.6 Kaolin Production by Country (tons)

Country[2]	2006	2007	2008	2009	2010[e]	2011	2012[e]
United States[4]	7,470,000	7,110,000	6,740,000	5,290,000	5,420,000	5,770,000	5,900,000
Uzbekistan[e]	5,500,000	5,500,000	5,500,000	5,500,000	5,500,000	5,500,000	5,500,000
Germany	3,815,173	3,842,514	3,622,159	4,513,753	4,500,000	4,900,000	4,500,000
Czech Republic	3,768,000	3,604,000	3,833,000	2,886,000	3,493,000	3,610,000	3,600,000
Brazil, Beneficiated	2,455,000	2,456,000	2,674,000	1,987,000	2,000,000	2,200,000	2,250,000
Ukraine	1,731,000	2,172,000	1,775,000	1,119,000	1,120,000	1,100,000	1,300,000
Bulgaria	1,658,000	1,631,000	1,530,000	939,000	940,000	N/A	N/A
Turkey	1,064,107	914,117	792,044	727,649	800,000	700,000	1,000,000
United Kingdom, Sales	1,800,000	1,800,000	1,800,000	1,800,000	900,000	900,000	900,000
Pakistan	443,402	756,536	750,000	760,000	770,000	N/A[4]	N/A
Korea, Republic of	2,399,458	688,330	954,584	659,351	764,008	N/A	N/A
Other	7,101,843	6,841,478	6,933,777	7,290,475	7,000,916	8,410,000	8,300,000
Total	**39,200,000**	**37,300,000**	**36,900,000**	**33,500,000**	**33,200,000**	**33,900,000**	**34,000,000**

Source: U.S. Geological Society, 2011
[e] Estimated. [p] Preliminary. [r] Revised – Zero.
[1] Table includes data available through September 25, 2011.
[2] In addition to the countries listed, China, Morocco, and Suriname may also have produced kaolin, but information is inadequate to make reliable estimates of output levels.
[3] Kaolin sold or used by producers. Items marked as "N/A" are included in the other category.

Kaolin is consumed both domestically and internationally. In 2010, the U.S. Census Bureau estimated that 2.5 million tons of kaolin were exported from the United States. The primary destinations for these exports were Japan (17 percent), Canada (13 percent), Chile (11 percent), Finland (11 percent), and Mexico (11 percent). The value of these exports totaled $537 million.

Most of the exported bulk kaolin is processed through private terminals owned by Colonial Group Inc. The Colonial Group operates two kaolin dedicated terminals in Savannah: Colonial Terminals Inc. (CTI) and Georgia Kaolin Terminals (GKT). Kaolin reaches these terminals via the Norfolk Southern or Sandersville Railroad. Railcars are typically loaded to 100 tons per car and they are discharged into grade-specific silos at CTI or GKT or into a bagging system at GKT. At GKT, the product can be loaded for export in break-bulk at GKT or put into intermodal containers and moved by truck to one of the Port of Savannah's intermodal container terminals. Both CTI and GKT export bulk loads of kaolin.

As shown in Table 1.1, the Port of Savannah reported 97,054 TEUs of clay exports in 2012. This translates to 53,918 containers using the industry standard 1.8 conversion rate. Assuming the average container is filled to 40,000 lbs., the amount of annual intermodal container shipments of kaolin through the Port of Savannah is 1.1 million tons. As mentioned above, much of this comes from the bagging operations at GKT. However, some of this product is also shipped by container directly from plants in Central Georgia to the Port of Savannah. The remaining 1.4 million tons is exported using the private Colonial Terminal bulk and break-bulk operations.

Domestically consumed kaolin products can be delivered by either bulk or break-bulk using domestic railroads. They may also be delivered in slurry form using tank trucks and railcars. Alternatively, they may be delivered in bag form, which can be done intermodally. These domestic shipments typically are destined for either paper coating facilities or ceramic manufacturing facilities. Table 3.7 shows the distribution of domestic uses of kaolin. Because kaolin is one of many inputs used in these facilities, they can be located anywhere in the U.S. and are not particularly clustered in Georgia.

Table 3.7 Uses of Domestic Georgia Kaolin (thousands of tons)

Domestic	2009	2010
Ceramics and Glass		
Catalysts (Oil-Refining)	W	W
Fiberglass, Mineral Wool	217	185
Roofing Granules	34	27
Other[a]	296	820
Fillers, Extenders, Binders		
Adhesives	17	19
Paint	164	176
Paper Coating	1,560	1,460
Paper Filling	196	75
Plastic	57	21
Rubber	121	118
Other[b]	38	48
Heavy-Clay Products[c]	W	W
Refractories[d]	W	W
Undistributed[e]	757	785
Total	**3,460**	**3,730**

Source: U.S. Geological Society, 2011.

Note: Data are rounded to no more than three significant digits; may not add to totals shown.
W – Withheld to avoid disclosing company proprietary data; included in "Domestic: Undistributed."

[a] Includes catalysts (oil-refining), electrical porcelain, fine china/dinnerware, pottery, miscellaneous ceramics, and sanitaryware.

[b] Includes animal feed; asphalt tile; fertilizers; medical, pharmaceuticals, and cosmetics; pesticides and related products; and miscellaneous fillers, extenders, and binders.

[c] Includes brick (common and face), portland cement, and miscellaneous clay products.

[d] Includes firebricks, blocks and shapes, grogs and calcines, high-alumina specialties, kiln furniture, and miscellaneous refractories.

[e] Includes absorbents, chemical manufacturing, floor and wall tiles, heavy-clay products, refractory products, waterproofing seals, and other unknown uses.

3.4 KAOLIN PRODUCTION LOCATIONS

There are 12 kaolin mines in Georgia as shown in Table 3.8. These locations also have accompanying plants that process the material extracted from the mine. All of these facilities are located in the "kaolin belt" of Georgia that extends from the Macon metropolitan region to the Augusta metropolitan region.

Table 3.8 Location of Kaolin Mines and Plants in Georgia

Site Name	County	Company	Operation Type
Hephzibah Plant	Richmond	Unimin Corporation	Mine and Plant
Mulcoa	Sumter	CE Minerals	Mine and Plant
Dry Branch Mine	Twiggs	Dry Branch Kaolin	Mine and Plant
Operations In Twiggs County, Georgia	Twiggs	Wilkinson Kaolin Association	Mine and Plant
Tharpe Clay Mine	Twiggs	AP Green Indus Inc.	Mine and Plant
All Georgia Operations	Various Counties	JM Huber Corp	Mine and Plant
Kaolin Operations in Georgia	Various Counties	Engelhard Corp	Mine and Plant
Various Sites (Not Specified In Database)	Various Counties	English China Clay Group	Mine and Plant
Amoco Minerals	Washington	Kentucky Tennessee Clat Co	Mine and Plant
Sandersville Operation	Washington	Thiele Kaolin Co.	Mine and Plant
Hardie Mine	Wilkinson	Brown Trucking Co.	Mine and Plant
McIntyre Mine & Mill Ka-Unp	Wilkinson	M&M Clay Co.	Mine and Plant

Source: U.S. Geological Society, 2011.

Kaolin belt in Georgia (along the "Fall Line")
Source: Georgia Mining Association www.georgiamining.org/GMA-georgia-kaolin-mining.php

3.5 OUTREACH TO KAOLIN INDUSTRY

As part of earlier tasks of the GDOT Connect Central Georgia Study, the project team interviewed motor carriers, shippers, and other organizations involved in the Kaolin industry. Organizations interviewed include:

- B&H Transfer (trucking firm);
- J&M Tank Lines (trucking firm);
- Howard Sheppard, Inc (trucking firm);
- Burgess Pigment Company (Kaolin miner/processor);
- Georgia Industrial Minerals (Kaolin miner/processor);
- Imerys (Kaolin miner/processor);
- Active Minerals (Kaolin miner/processor); and
- Thiele Kaolin Company (Kaolin miner/processor, interviewee is also the head of the Clay Producers Traffic Association).

Brief discussions were also conducted with the Georgia Ports Authority (oversize/overweight permitting), Hempel (coatings supplier), and the third-party logistics provider (3PL) responsible for dispatch to the BASF Kaolin warehouse in Gordon, Georgia.

A summary of the primary findings of these interviews are as follows:

- The industry is dominated by large-scale miners/processors, including Imerys, Thiele, KaMin, and BASF. Kaolin product transported from the mine to the processing facility is either handled by truck or pipeline. Kaolin products typically ship in dry bulk, slurry (70 percent clay/30 percent water), and in bags (50-pound paper bags and 2,205-pound "super sacks").
- From the processing plant, kaolin is transported by either truck or rail to customers both domestically or internationally. Sometimes product is processed at the mine site or at a separate processing plant. Product is packed by the shipper, carrier, or "3PL" (3rd party logistics provider – i.e. warehouse.
- International intermodal exports of kaolin products are typically transported to the Port of Savannah or Port of Charleston by truck in containers, dry vans, or tanker trucks. Some bagging and packing of shipping containers happens at the port. Trucks that deliver containers to the port filled with kaolin products will generally return back to the kaolin area empty ready for repacking. Trucks that travel to ports often operate at weights up to 100,000 pounds, and must receive a Georgia state permit to do so.
- Domestic customers at long-haul distances (i.e., greater than 2,500 miles) are served by either long-haul truck or rail. The Sandersville Railroad serves

customer sites in the kaolin area and connects shippers to Norfolk Southern at Tennille, Georgia.

Trucks are not typically cost-effective alternatives for most shippers, consequently a large proportion of the business for the top shippers is rail (greater than 75 percent). Shippers monitor rail rates to stay competitive in international markets. NS sometimes consolidates rail shipments from multiple shippers into a "clay train" bound for Midwest or Northeast.

- Domestic shipments in Kaolin products are transported to customers throughout the contiguous United States with no major concentration of customers, however, one interviewee noted that shipments to the Northeast have been dwindling in recent years due to competition from Brazilian-sourced clay, which is offloaded from ships arriving at Northeast U.S. ports and trucked to final customers in the region.
- In recent years the South Carolina DOT adopted the same 100,000 pound maximum truck weight that Georgia has had. This resulted in a marginal increase in traffic to the Port of Charleston for some shippers but only as an alternative to using Savannah.
- The industry has been maintaining itself in recent years, seeing no substantial overall change, but there is measurable growth in many markets. Producers are targeting growth in markets for kaolin products such as concrete, paint, and rubber while recognizing the declining demand for paper products.

3.6 IMPORTANT CORRIDORS FOR MINING INDUSTRY

Due to the short distance of haul for sand, gravel, and stone components of the mining industry, the vast majority of these shipments are done by truck. These components of the mining industry are spread throughout the state and rely on a wide range of roads to access their end markets. Most of the end markets are local and therefore the local roads are the most important segments of these trips.

The kaolin component of the mining industry has a broader range of customers that are spread throughout the U.S. and shipped internationally. Shipments to domestic customers tend to occur by rail as it is the most cost-effective for travelling long distances. Much of these domestic shipments are bound for locations in the population centers of the northeast. The kaolin that is brought to Georgia ports for export tends to occur by a combination of rail and truck.

Kaolin is a strategically important industry for Georgia as it competes with several other countries to access both faraway domestic markets and international customers. Therefore, the transportation system for the kaolin industry represents the important corridors for the mining industry in Georgia.

The corridors include the Interstate System that is used to connect the "kaolin belt" to the rest of the country and the roadways that are used to access the Port of Savannah. These corridors are:

- I-16, which connects to the Port of Savannah (via "last-mile" routes);
- I-75, which connects to Atlanta and locations further north in the traditional industrial heartland of the country;
- I-20, which connects to Atlanta and provides the first connection to the Port of Charleston and East Coast states;
- The Fall Line Freeway from Macon to Columbus corridor, which ultimately can connect to I-85 via U.S. 80 to Tuskegee and provides access to the Gulf Coast and the western U.S.;
- Georgia State Route 15 (SR 15), which connects Sandersville (the heart of Georgia's kaolin belt) to I-16 and I-20; and
- US 441, which connects I-16 to I-20 just west of SR 15 in the western portion of the state's kaolin belt.

As mentioned in the forestry industry section, the Georgia Freight and Logistics Plan recently conducted an analysis of Georgia's interstate system for meeting the needs of freight industries. It forecasts sufficient capacity to meet trucking needs through the year 2050 on both I-16 and I-20 between Atlanta and Augusta. On I-75, improvements may be needed between Macon and Chattanooga.

Most of the trucking industry moves for the mining industry in Georgia occur using for-hire motor carriers. These carriers include small owner-operators where all logistics decisions are made by the truck drivers, but tend to be dominated by small and medium sized trucking firms, where routes are decided by a central dispatching office. Data and analysis of current and future needs on the non-interstate routes were supplemented through stakeholder and private-sector interviews conducted as part of the Georgia Freight and Logistics Plan:

- **SR 15** Several carriers and shippers (including B&H Transfer, Howard Sheppard, and Thiele) noted that improvements SR 15 between I-20 and I-16 would be extremely beneficial, with the most crucial section being between Sandersville and I-16. The major issues identified on this route focused south of Sandersville and included discussion of the existing two-lane route, limited passing opportunities and travel delay, especially through the cities of Wrightsville and Adrian. These concerns were not as predominant on SR 15 between Sandersville and I-20.

  The interviewee from Howard Sheppard estimated that improving SR 15 could save up to 15 minutes from a Sandersville-to-Savannah trip for truck drivers hauling Kaolin; this could possibly amount to cumulative time savings amounting to an additional round trip hauled over the course of a week. He also reported noticing more trucks using SR 15 as the highway of choice to access the growing North Georgia market from the Savannah area.

They noticed trucks moving between Athens and Savannah on SR 15 and expect this to increase, especially with the new Caterpillar plant near Athens.

- **US 441** Interviewees from B&H Bulk Transfer and Active Minerals noted that much of US 441 is already four-laned, and ultimate corridor completion would likely assist shippers and carriers in the Gordon area by providing a more efficient connection to I-16. The Active Minerals interviewee expects that some drivers use US 441 through Dublin and the Fall Line Freeway through Macon to access the interstate. Shipments going west and north will benefit from the Fall Line Freeway, however international shipments amount to a large proportion of cargo for Thiele, Active Minerals, Imerys, and other large shippers in the area.
- **Fall Line Freeway from Sandersville to Macon** The Fall Line Freeway benefits shippers from the area with large proportions of domestic cargo bound for Atlanta or other markets to the U.S. North, Midwest, and West. Companies that use these market lanes are Burgess Pigment and Imerys. However, it was noted by the interviewee from Active Minerals that he did not think the Fall Line Freeway would be used by businesses sending large volumes of container cargo bound for the Port of Savannah (a major component of many shippers' business) for ultimate export from the U.S.
- **Highway projects improving travel through, or around, the towns along SR 15** (i.e. Sparta, Sandersville, Wrightsville, Adrian). Interviewees noted this would help save travel time. In addition to adding capacity and/or bypasses, improvements such as passing lanes would provide meaningful benefits to the industry. It was noted by interviewees from Thiele and Active Minerals that truck delays on that roadway are generally not associated with congestion, rather adhering to lower speed limits (35 mph on roadways through towns and being delayed at signalized intersections or at stop signs.)
- **Signage improvements.** Interviewees noted that truck routes are adequately marked on the major highways used by kaolin producers/carriers (i.e. SR 15, US 441), however, one interviewee (Georgia Industrial Minerals) noted that on some local roadways, such as Old Hwy 85 that connects SR 24 and Deepstep Road, there are an inadequate number of signs denoting narrow bridges and upcoming turns for trucks.
- **Other transportation issues include construction and maintenance projects on I-20**, especially where one lane is temporarily closed, which can delay access to I-75 and points north and west and maintenance issues on I-16, due to overweight truck traffic. This could be addressed by more effective use of travel operation data services such as Georgia Navigator http://www.511ga.org.

4.0 Transportation Equipment-Industry Profile

Industry Definition and Summary

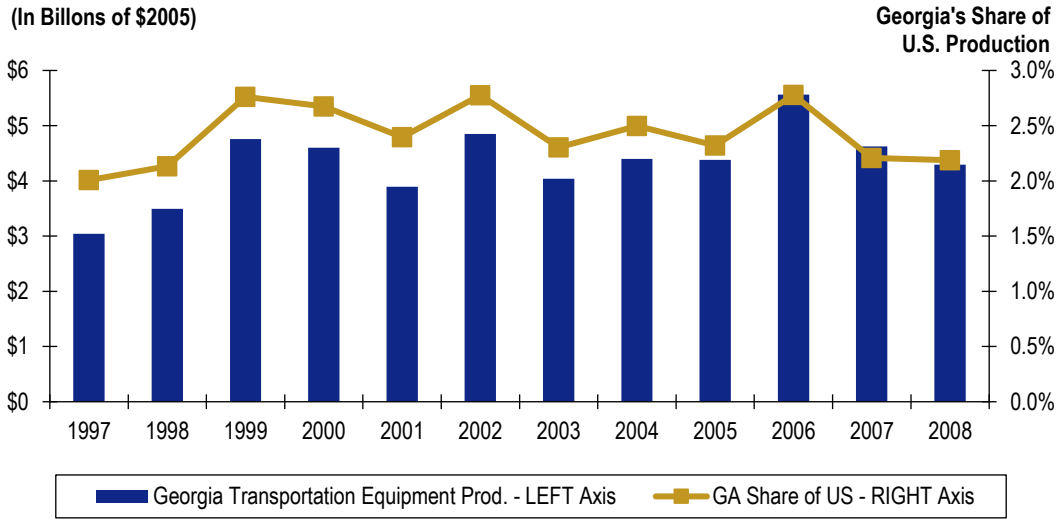
The Georgia transportation equipment industry is dominated by the manufacture of motor vehicles, motor vehicle parts, and aerospace (airplanes and airplane parts), although it also includes the much smaller rail and shipbuilding industries. This profile concentrates on motor vehicles and aerospace, the two transportation equipment industries targeted as strategic for the long-term economic competitiveness of Georgia. In most years, transportation equipment accounts for about 10 percent of the state's total manufacturing output.

Table 4.1 Georgia Industry Profile
Transportation Equipment

Item	Description
Industry Definition (NAICS Codes)	336: Transportation Equipment (includes motor vehicles and aerospace products)
Employment	36,000 (2009)
Contribution to GSP	$4.3 billion (2008)
Trends	Motor vehicles and parts rebounding from previous decade's closures due in part to new KIA assembly plant in West Point Aerospace industry continues to show resilience and long-term growth in Georgia
Suppliers	Plastics and rubber, specialized metals, fabricated metals, electronics, machinery, instruments, glass, textiles
Markets	Motor vehicles are destined primarily to North American consumer markets Finished business jets and aerospace parts have a worldwide market U.S. and international air forces are the main markets for military aircraft and parts
Georgia Exports	$6.0 billion (2010)
Transportation Use	*Road:* frequent, "just-in-time" deliveries; "last mile" intermodal; high value, small loads *Rail:* high volume or heavy supplies; distribution of completed motor vehicles; delivery of "oversize" components (e.g., wings) for aircraft *Air:* light, high-value, time-sensitive supplies and products *Water:* vehicle exports; inputs for intermediate goods used by industry

In the 2000s, growth in Georgia's aerospace industry counteracted a contraction in motor vehicles associated with the closures of two major auto assembly plants in the Atlanta area (Ford in 2006 and GM in 2008). In real terms, Georgia's transportation equipment production value has remained relatively constant for about 10 years (see Figure 2.32) but can change markedly on a year-to-year basis due to variations in high-value aircraft deliveries. In most years, Georgia accounts for between 2.2 and 2.5 percent of U.S. transportation equipment output.

Figure 4-1 Georgia Transportation Equipment Production and State Share of U.S., Historical Trend *1997-2008*



Source: U.S. Bureau of Economic Analysis.

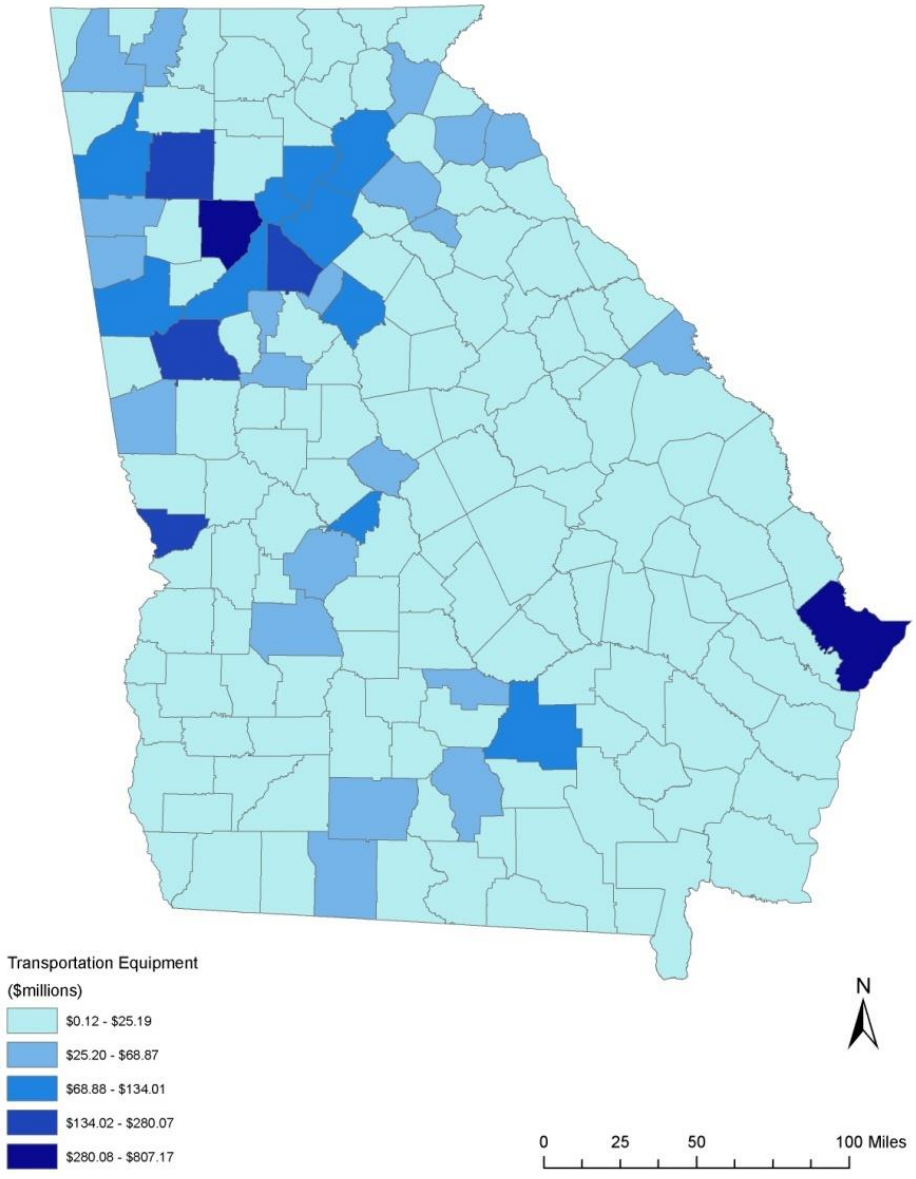
Geographical Distribution of Georgia's Transportation Equipment Production

Georgia's top counties based on the value of transportation equipment production are concentrated in the Atlanta area in the northern part of the State (Figure 4-2). A particular concentration is in Cobb County, home of an expansive Lockheed-Martin facility that manufactures subassemblies and completed military planes. The greater Atlanta area also includes major manufacturers of aircraft turbines and railcars.

Savannah International Airport is the headquarters of Gulfstream, one of the world's largest manufacturers of business jets, and makes Chatham County a state leader in transportation equipment production. Manufacturers of aircraft engine parts make rural Coffee County in south central Georgia and Muscogee County in the western part of the State large producers of transportation equipment. In terms of motor vehicles, a large bus producer, Blue Bird Body Company, is located in Peach County in the Macon area. The location of the KIA assembly plant in West Point (Troup County) and its suppliers are shown on Figure 2.39.2; many suppliers are located near interstate highways and

manufacture parts for the KIA plant and Hyundai plant in Montgomery, Alabama. They contribute significantly to the emerging motor vehicle cluster along I-85 in west central Georgia. Their presence, along with the new Caterpillar assembly plant in Athens will certainly be reflected in future datasets.

Figure 4-2 Value of Transportation Equipment Production by County



Source: Economy.com

Aerospace

The aerospace industry in Georgia consists of companies that produce aircraft as well as components like aircraft engines and parts. Georgia has a substantial presence in the making of both military and civilian aircraft. According to the

Harvard Business School Institute for Strategy and Competitiveness Cluster Mapping Project, Georgia's aerospace vehicles and defense cluster made it the 20th largest state in terms of employment in the aerospace engine cluster.

The focal points of Georgia's aerospace manufacturing are Lockheed Martin's facility located in Marietta in suburban Atlanta, Boeing in Macon, and Gulfstream in Savannah. While Lockheed Martin and Boeing build aircraft and parts for the military, Gulfstream is a leading maker of medium-to-large sized business jets. Georgia also has smaller aircraft makers such as Maule Aircraft, a producer of small "short takeoff and landing" aircraft in Moultrie, as well as hundreds of suppliers of aircraft parts, including Pratt & Whitney (Columbus, military and commercial jet engines) and Vought Aircraft (Milledgeville, composite components for Boeing commercial aircraft and others).

Georgia has an array of academic institutions focusing on aerospace and aviation, notably Georgia Tech, as well as one of the nation's largest Air Force bases, Warner Robins AFB, both of which help to advance aerospace technologies and create a pool of highly trained workers. These strengths provided resiliency during the economic downturn and are helping the industry to continue to grow in Georgia. Georgia has recently been outperforming the nation in terms of aerospace jobs growth.

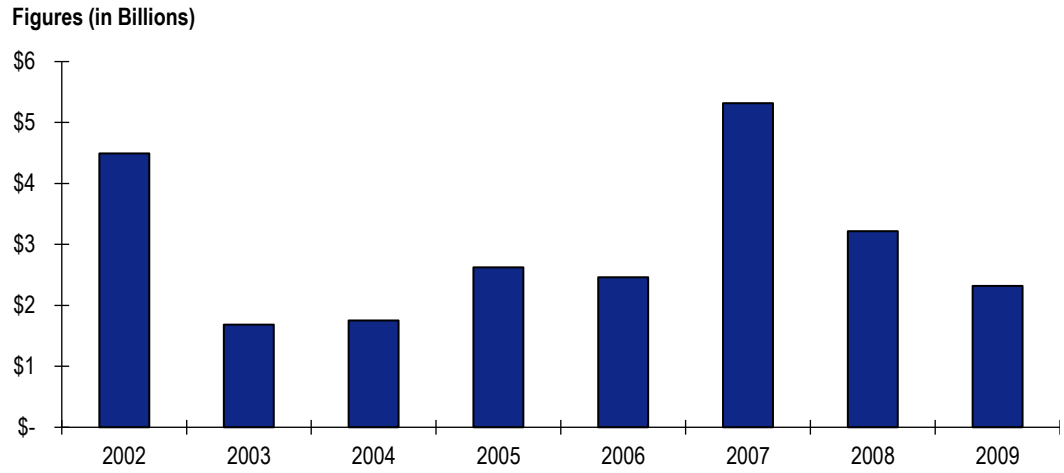
Air Force Procurement Contracts

Georgia's aerospace industry includes substantial portions tied to the military as well as a very significant presence of manufacturers focusing on the commercial market. The growth of the aerospace industry in the future will depend on Georgia's success both at securing U.S. Department of Defense (DoD) procurements as well as the demand for civilian aircraft throughout the world.

The aerospace industry in Georgia relies in part on DoD contracts. On a year-to-year basis, Air Force procurements in Georgia can vary substantially depending on the delivery schedules of major Air Force programs like the F-22 fighter and C-130 transport plane, both made by Lockheed-Martin in Marietta. Georgia's share of total U.S. Air Force procurement contracts is generally in the 3.5 to 4.0 percent range, but recently has been as high as 8.0 percent in 2007.

Historically, U.S. Air Force procurements have been on an upward trend, increasing by 43 percent nationally between 2002 and 2009. The annual variance for Georgia makes it difficult to discern a trend but it does underline the variability of military contracts and the intense competition to win contracts around the country among major suppliers like Lockheed-Martin in Marietta.

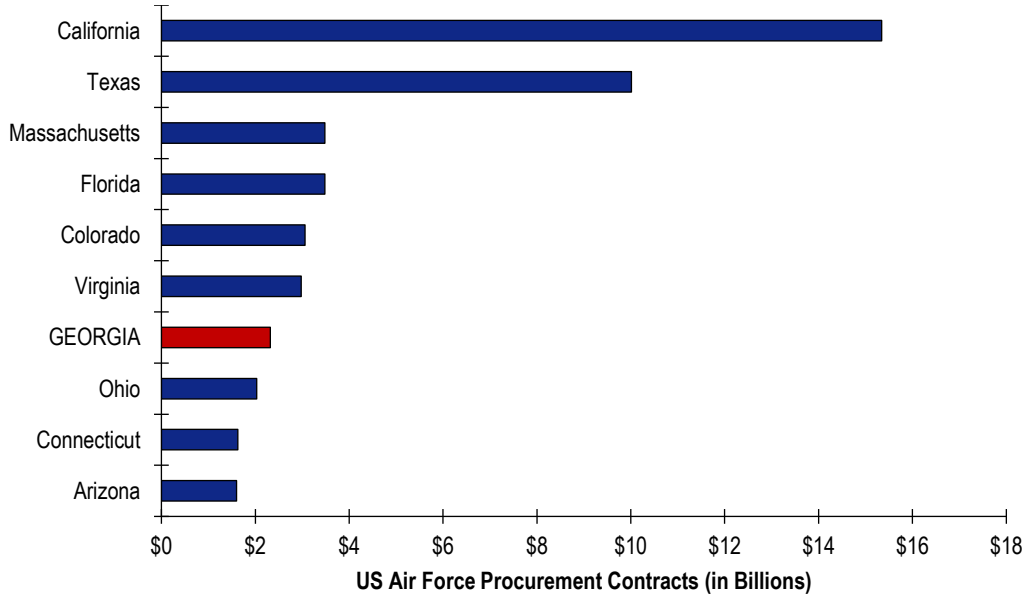
Figure 4-3 Value of Air Force Procurement Contracts to Georgia, Historical Trend *2002-2009*



Source: U.S. Department of Defense.

Air Force procurements represent a key portion of Georgia's aerospace industry cluster and generally comprise about half of all U.S. Department of Defense procurement spending in the State. In 2009, Georgia was the seventh ranking state for Air Force procurements (see Figure 4-4), but as recently as 2007, the State ranked third, following California and Texas.

Figure 4-4 U.S. Air Force Procurement Contracts: *Top States*



Source: U.S. Department of Defense, 2009

Business Aircraft

The production of business jets by Gulfstream at Savannah International Airport is the other foundation of the Georgia aerospace industry, complementing the State's strengths in military aircraft and parts. Gulfstream specializes in the high end of the business jet market, emphasizing larger, higher-speed, long-range jets that tend to command higher prices in the market. The company's emphasis on the top end of the market has helped it weather the economic downturn better than makers producing smaller aircraft. A rise in foreign sales also has helped to buoy the outlook for Gulfstream.

As one of the nation's top producers, future orders for business jets will have a strong bearing on the aerospace industry in Georgia. As mentioned previously, Gulfstream came through the economic downturn in relatively good shape. However, the future will continue to bring challenges due to a host of factors, including fuel price volatility, uncertainty in the financial markets, and slow economic growth in many developed economies. Business jet demand will respond in part to how each of these factors evolves in coming years. High demand from emerging markets, particularly in Asia, is a main contributor to sales. In addition to strong overseas demand, Gulfstream's Savannah operations are being further strengthened by an expansion of the company's maintenance, repair, and overhaul operations at the airport location.

Motor Vehicle and Motor Vehicle Parts

Motor vehicle and motor vehicle parts manufacturing is the other major component of the Georgia transportation equipment industry. In general terms, it includes two types of activities: the production of parts and the assembly of vehicles. According to the Harvard Business School Institute for Strategy and Competitiveness Cluster Mapping Project, Georgia's automotive cluster made it the 17th largest state in the U.S. in terms of employment in the automotive cluster.

Georgia is at the center of the U.S. South's strengthening motor vehicle manufacturing industry. A large number of new Asian and European auto assembly facilities are located within a half-day drive of Georgia's borders in Kentucky, Tennessee, Mississippi, Alabama, and South Carolina. Within Georgia, KIA already is producing at capacity at the plant it opened in West Point in 2010, its first in the United States. After the closures of Atlanta-area Ford and GM plants in 2006 and 2008, the Georgia motor vehicle industry is again strengthening as KIA and its suppliers expand to meet demand for smaller, more fuel efficient vehicles. The opening of the VW plant in Chattanooga, Tennessee in recent years (only a few miles north of the Georgia border) also has the potential to boost the transportation equipment industry in Georgia, as existing auto plant suppliers look to increase their customer base and new suppliers decide to locate in Georgia.

Several factors will play into the performance of the motor vehicles industry in Georgia, including auto sales trends and the long-term shift of the industry toward locations in the southern United States, including Georgia.

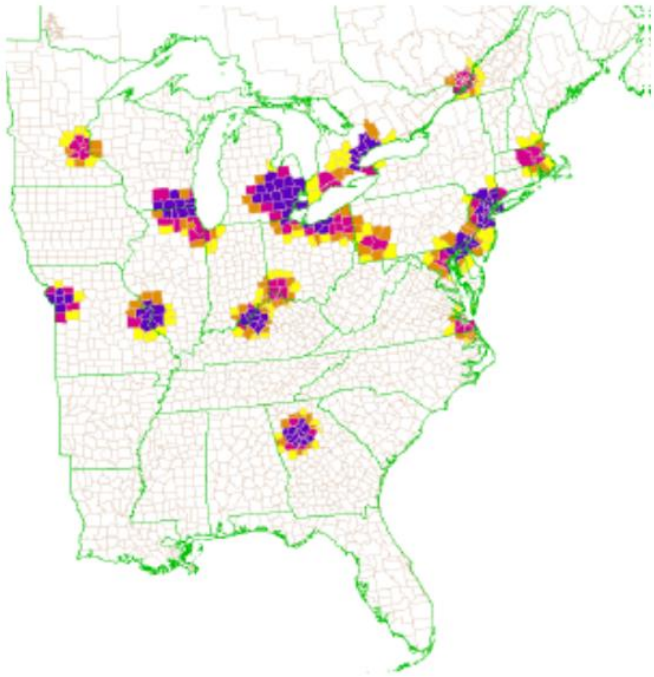
Auto Sales. Although Georgia and neighboring states have been the recipients of significant auto manufacturing investments in recent years, the health of the motor vehicle industry in the State will ultimately hinge on the strength of the domestic auto market. During the 2000s, annual U.S. auto sales generally hovered in the 17 million unit range -- a level that many believed would be sustained into the future. The 2009 recession, however, pushed annual auto sales down to fewer than 10 million, levels not seen since the early 1980s. Structural shifts to lower sales volumes did not have a strong effect on the Georgia motor vehicle industry as its main manufacturer, KIA, saw significant sales growth and increases in market share.

Assembly Plant Closure and Location Trends. The 2008-2009 recession brought a restructuring of the North American auto industry, the demise of well-known car brands and the closure of numerous assembly plants, including GM's Doraville, Georgia plant. Despite this setback and Ford's closure of its Atlanta plant in 2006, Georgia is now benefiting from the shift of auto production to the South. In the 1990s and 2000s, foreign makers located new assembly plants in the southeastern United States – Alabama, Georgia, Mississippi, South Carolina, and Tennessee, continuing a long-term shift toward increased production (both assembly and parts) in the South.

Although the South has emerged as a stronger player in North American auto production over the past few decades, notably for foreign makers, the South's growth is part of a longer-term shift in production that includes a consolidation of domestic production into the Midwest. The Domestic 3 have closed their coastal assembly plants and have consolidated a formerly nationwide network of plants into the Midwest, primarily Ohio, Michigan, and Indiana. The expansion of the auto industry to the U.S. South as well as a parallel consolidation into the Midwest over the past 30 years is illustrated in Figures 2.36 and 2.37, comparing industry concentrations in 1980 with 2010.

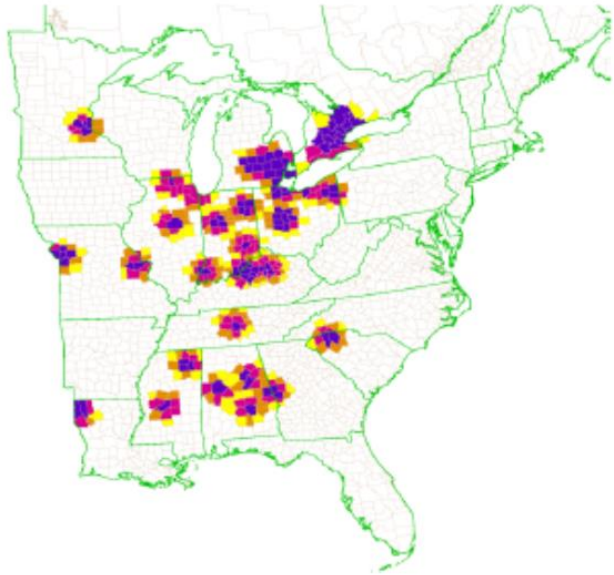
The changes over the last 30 years, including the loss of Atlanta's assembly plants and the emergence of other facilities, including KIA in West Point, are apparent. These changes indicate that for the transportation equipment industry, the freight infrastructure to the north (e.g., I-75) remains important, the freight infrastructure to the west (e.g., I-85 and I-20) are becoming increasingly important, and the freight infrastructure to the east (I-85 and I-20) are becoming somewhat less important.

Figure 4-5 Distribution of Light Vehicle Assembly in U.S. and Canada: *1980*



Source: Ward's AutoInfobank as presented in Federal Reserve Bank of Chicago, "The Changing Geography of North American Vehicle Production," April 2010.

Figure 4-6 Distribution of Light Vehicle Assembly in U.S. and Canada: *2010*



Source: Ward's AutoInfobank as presented by Federal Reserve Bank of Chicago, "The Changing Geography of North American Vehicle Production," April 2010.

Longer term, Georgia is in a strategic geographic position to capitalize on any growth in the U.S. motor vehicle industry as the spatial concentration in the South and Midwest will be self-reinforcing, encouraging future expansions to remain within the region. Modern logistics, inventory control, and production techniques in the motor vehicle industry require proximity to suppliers and no other parts of the U.S. can offer that beyond the South and Midwest. Suppliers of major automotive subassemblies, ranging from seating manufacturers to some stamping and trim shops, need to be located within a one-hour drive of an assembly plant. For most other suppliers, close linkage means a physical location within a one-day delivery range of the assembly plant.

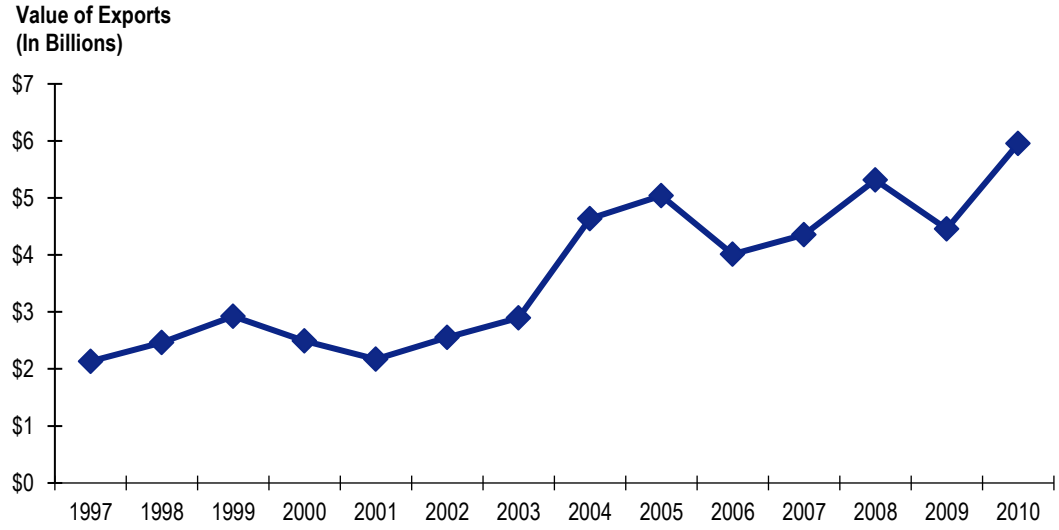
Suppliers located in the auto corridor stretching from the Midwest to the central part of the South (Kentucky, Tennessee, Mississippi, Alabama, and Georgia) can reach most U.S. assembly plants within a single truck driver shift. For example, ZF Industries, a German maker of transmissions has a plant in Gainesville that can readily supply assembly plants throughout the Southeast, including Mercedes Benz in Alabama, one of its main customers. For these reasons, the motor vehicle industry will likely remain spatially concentrated in parts of the South and the Midwest for the foreseeable future.

International Trade

As shown in Figure 4-7, the historical trend for Georgia's export of transportation equipment increased markedly since 1997. The upward trend was particularly strong starting in since 2003 with transportation equipment exports surging in 2010 after experiencing a slight decline in 2009 coinciding with the recession that affected major Georgia export markets as well as the United States. From 1997 through 2003, exports of these Georgia-manufactured products hovered in the $2.1 billion to $3.0 billion range. However, starting in 2004 exports began increasing quickly, essentially doubling to $6.0 billion by 2010 and accounting for nearly 18 percent of the Southeast U.S. total.

Georgia's top export markets for transportation equipment are Canada, Singapore, Hong Kong/China, and South Korea. Major deliveries from Lockheed-Martin and Gulfstream can change the top export destinations on a year-to-year basis. Georgia-made automotive products also have worldwide demand. GM's Australian subsidiary imports Georgia-made transmissions for its vehicles. Transportation equipment is the State's top exporting industry and accounted for about 21 percent of total Georgia-origin exports by value.

Figure 4-7 Georgia-Origin Exports of Transportation Equipment, Historical Trend *1997-2010*



Source: WISERTrade, Origin of Movement Exports.

Georgia's exports of transportation equipment leave the United States by rail and truck ("overland"), ships/vessel, and air. Based on dollar value (weights are not available for overland trade), 40 percent of Georgia's exports in transportation equipment is by air and 17 percent is by ship. Given the high value of aerospace and motor vehicle parts, air is the preferred mode to reach overseas markets quickly and reliably.

The remainder of Georgia's transportation exports are overland (by truck and rail) to Canada or Mexico as well as exports that go under their own propulsion (e.g., the business and military jets that are a core strength of Georgia's transportation sector). Aircraft that fly from Georgia to their exports destinations are not included within the "air cargo" category.

Industry Competitiveness

The just-in-time delivery and lean production processes now being applied by a host of industries were initially developed by the motor vehicle industry to reduce their inventory costs and improve quality by streamlining the production system. Georgia's automotive and aerospace manufacturers compete globally for market share, and the State itself competes with other locations throughout the United States and world for motor vehicle and aerospace expansions.

For Georgia to deliver success to its transportation equipment industry and to become more attractive for industry locations, all modes of its transportation network – roadway, rail, water, and air – must continue to make tangible contributions to reducing production costs via improvements in capacity, time savings, connectivity, and reliability.

Freight Characteristics of Ga. Transportation Equipment Industry

The trade volumes, distances, and main markets of Georgia's transportation equipment products influence mode (truck/rail) shares and the potential to shift goods to rail to both reduce transportation costs and lower congestion on Georgia's roadways. This section shows modal shares by distance, the main out-of-state origin and destination markets for transportation equipment, and the expected growth in trade flows associated with these industries through 2050.

It is worthwhile to note that logistics is a key consideration for the location of transportation equipment industries. For the automotive industry, the Institute of Trade and Transportation Statistics ("ITTS") report on The Southern Automotive Industry found it to be one of a handful of site selection criteria used. This report also highlights the importance of interstate access to site selection. It notes that the recently opened Volkswagen facility in Chattanooga required construction of a new interchange and it is required that suppliers locate along an interstate or four-lane limited access divided highway.

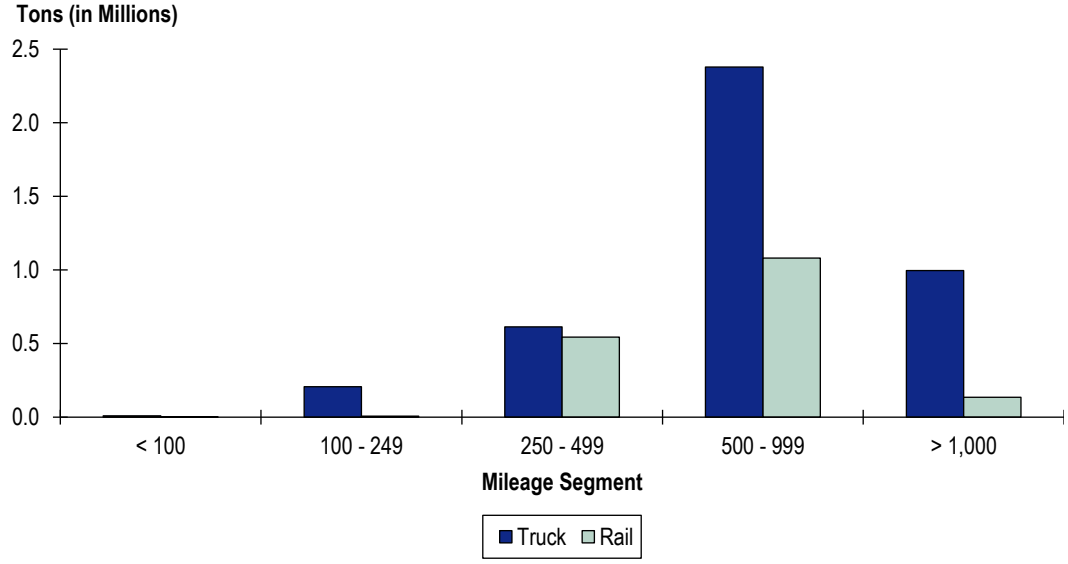
Transportation Equipment – Distance and Volume by Mode

About six million tons of transportation equipment are shipped into and out of Georgia by land modes on an annual basis (excludes local and through traffic). Not surprisingly, trucks are by far the leading mode accounting for 70 percent of inbound/outbound freight in transportation equipment. However, as distances become greater, the cost effectiveness of transporting transportation equipment by rail increases (see Figure 4-8). While only accounting for 4 percent of freight tonnage for trips of less than 249 miles, rail transports 35 percent of Georgia's transportation equipment on trips between 250 and 999 miles to/from the State.

Rail has a high share of the transportation equipment transported to Georgia from Midwestern auto manufacturing areas (e.g., Ohio, Indiana, Kentucky), much of which is located less than 1,000 miles from Georgia. Following Detroit (just over 1,000 miles from Georgia), the second ranking origin is Tuscaloosa, Alabama, the home of a Mercedes assembly plant that exports out of Georgia's Port of Brunswick. Rail dominates freight movements from these auto manufacturing areas to Georgia.

Total volume (truck and rail) for very long-distance trips (greater than 1,000 miles) is much lower than volumes in the 250 to 999 mile range. For these longer distance trips, rail accounts for 14 percent of total freight volume for transportation equipment. For the longer-distance trips, leading transportation equipment goods include motor vehicle parts and motor vehicles going from Georgia, primarily suburban Atlanta, to large consumer markets (e.g., New York) and auto manufacturing areas (Detroit, Milwaukee) by truck. There also is considerable rail traffic carrying motor vehicles into Georgia from the Detroit and Kansas City area (Kansas City is home to high volume GM and Ford plants.)

Figure 4-8 Volume of Transportation Equipment Movements to/from Georgia by Mode and Distance



Source: Transearch; excludes through-traffic and local movements.

Transportation Equipment – Top Origins of Inbound Freight

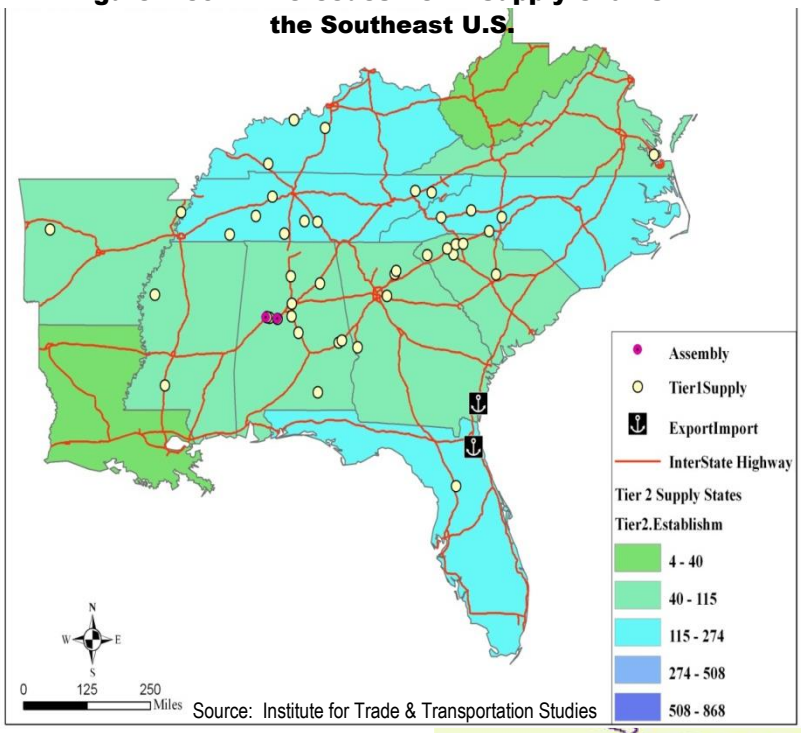
Georgia is one of the nation's leading consumer markets and thus is a principal market for motor vehicles. As such, finished motor vehicles are transported to the State, mostly by rail, from Midwestern and Southern auto assembly plants, including those around Detroit, Louisville, and Kansas City.

There also is a very large rail flow of motor vehicles originating in Tuscaloosa, Alabama, and destined for Brunswick, Georgia, an export gateway for Alabama-assembled Mercedes Benzes (see Table 2.39.1)

Although rail dominates the top inbound freight flows of transportation equipment primarily due to large-scale movements of completed motor vehicles, one-third of inbound transportation equipment shipments are by truck. These include parts for motor vehicles and aircraft, originating from around the United States. The inbound flow of transportation equipment carried by truck is more geographically diverse (see Table 4.3) than the rail flow that enters Georgia primarily from the Midwest.

The increased use of rail service to carry transportation equipment into (and out of) Georgia would reduce congestion on Georgia's highways as well as lower transportation costs. For manufacturers in particular, speed and reliability would be paramount to making this work.

Figure 2.39.1 Mercedes Benz' Supply Chains in the Southeast U.S.



Source: Institute for Trade & Transportation Studies

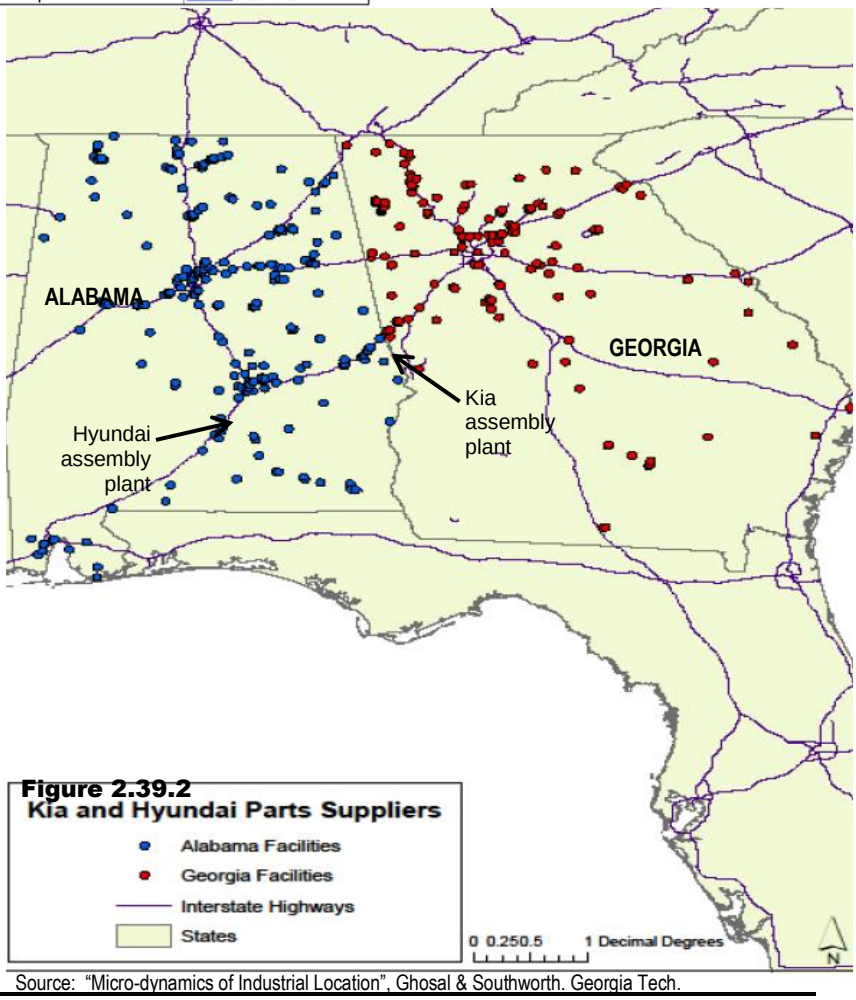


Figure 2.39.2

Source: "Micro-dynamics of Industrial Location", Ghosal & Southworth. Georgia Tech.

Table 4.2 Rail – Top Origins of Inbound Transportation Equipment

Class	Origin	Rail Tons	Percentage of Inbound Share
Inbound	Michigan Part of Detroit BEA	196,040	15%
Inbound	Tuscaloosa County, Alabama	170,400	13%
Inbound	Kentucky Part of Louisville BEA	159,800	12%
Inbound	Louisiana Part of New Orleans BEA	130,840	10%
Inbound	Shelby County, Tennessee	76,480	6%
Inbound	Kentucky Part of Lexington BEA	75,200	6%
Inbound	Ohio Part of Cleveland BEA	72,500	6%
Inbound	Missouri Part of Kansas City BEA	67,920	5%
Inbound	Indiana Part of Evansville BEA	54,400	4%
Inbound	Ohio Part of Toledo BEA	49,640	4%
	Elsewhere	255,612	20%

Source: Transearch; excludes through-traffic and local movements.

Table 4.3 Truck – Top Origins of Inbound Transportation Equipment

Class	Origin	Truck Tons	Percentage of Inbound Share
Inbound	California Part of Los Angeles BEA	79,575	12%
Inbound	Duval County, Florida	31,960	5%
Inbound	Madison County, Tennessee	30,025	4%
Inbound	Charleston County, South Carolina	27,339	4%
Inbound	Washington Part of Seattle BEA	21,896	3%
Inbound	Wisconsin Part of Milwaukee BEA	18,384	3%
Inbound	Maryland Part of Washington BEA	16,617	2%
Inbound	Virginia Part of Norfolk BEA	16,498	2%
Inbound	Arkansas Part of Jonesboro BEA	15,438	2%
Inbound	Arkansas Part of Little Rock BEA	15,143	2%
	Elsewhere	401,049	60%

Source: Transearch; excludes through-traffic and local movements.

Transportation Equipment – Top Destinations of Outbound Freight

While inbound transportation equipment movements into Georgia favor the use of rail by a 2-to-1 ratio, trucks dominate the outbound movements of transportation equipment from the State. Major outbound destinations by rail and truck include large U.S. markets such as New York and Los Angeles, and major manufacturing centers, including Detroit, Cleveland, Chicago, and Indianapolis (see Tables 2.27and 2.28).

Glynn County, the location of the Port of Brunswick, is a leading origin for Georgia's outbound transportation equipment shipments. Brunswick imports some of the largest volume of vehicles of any port in the United States, following the Port of New York/New Jersey and the Port of Baltimore. It imports vehicles which are then distributed throughout the U.S. by truck and rail. Exports are important to Brunswick; it is the primary port of export for transportation equipment, especially for those assembled in the Southeast -- Mercedes Benz (Alabama), BMW (South Carolina), Volkswagen (Tennessee), Hyundai (Alabama), KIA (Georgia) and Caterpillar (Georgia), among others.

The Port of Savannah handles containerized auto parts for VW to supply its plant in Chattanooga, Tennessee, just over the Georgia border. These shipments show up in freight flows from Chatham County traveling through Atlanta on I-75 towards Tennessee.

Given the high volumes and the long distance of the trips required to reach many large U.S. markets from Brunswick, increasing the use of rail adds to efficiencies and lessen roadway congestion in Georgia.

Table 4.4 Rail – Top Destinations of Outbound Transportation Equipment

Class	Destination	Rail Tons	Percentage of Outbound Share
Outbound	Illinois Part of Chicago BEA	97,330	21%
Outbound	Michigan Part of Detroit BEA	82,840	18%
Outbound	New York Part of Buffalo BEA	68,000	15%
Outbound	Louisiana Part of New Orleans BEA	34,296	7%
Outbound	Illinois Part of St. Louis BEA	23,000	5%
Outbound	Indiana Part of Indianapolis BEA	11,512	2%
Outbound	Kentucky Part of Lexington BEA	10,668	2%
Outbound	Ohio Part of Cleveland BEA	8,320	2%
Outbound	New Jersey Part of New York BEA	8,000	2%
Outbound	Texas Part of Corpus Christi BEA	8,000	2%
	Elsewhere	108,856	24%

Source: Transearch; excludes through-traffic and local movements.

Table 4.5 Truck – Top Destinations of Outbound Transportation Equipment

Class	Destination	Truck Tons	Percentage of Outbound Share
Outbound	New York Part of New York BEA	517,965	15%
Outbound	Michigan Part of Detroit BEA	251,288	7%
Outbound	Ohio Part of Cleveland BEA	223,985	6%
Outbound	California Part of Los Angeles BEA	182,420	5%
Outbound	Connecticut Part of New York BEA	179,552	5%
Outbound	Miami-Dade County, Florida	149,117	4%
Outbound	Shelby County, Tennessee	103,239	3%
Outbound	New York Part of Syracuse BEA	93,074	3%
Outbound	Pennsylvania Part of Philadelphia BEA	83,285	2%
Outbound	Indiana Part of Indianapolis BEA	82,904	2%
	Elsewhere	1,663,004	47%

Source: Transearch; excludes through-traffic and local movements.

Forecast Growth in Transportation Equipment Freight Flows

Driven by expected growth in population and economic output within Georgia and in markets both nationwide and globally, freight flows related to transportation equipment are expected to grow considerably by 2050. The expansion of truck flows on the Georgia roadway network, in particular, will increase congestion, reduce reliability, and could eventually threaten the competitiveness of Georgia's motor vehicle and aerospace industries.

The diversion of a portion of this growth from truck to rail could provide an alternative to roadway travel in the State, enhancing long-term economic competitiveness of the transportation equipment industry as well as the range of other Georgia industries sharing the same roadways. The following maps and tables, presented both for the transportation equipment industry demonstrate the effects that this industry will have on the flow of freight, by rail and by truck, into and out of Georgia. Of particular note is the importance of Georgia's Interstate system to the transportation equipment industry.

For Georgia's outbound truck flows, I-75, I-85, I-20, I-16, and I-95 are all relied upon heavily. Therefore, the efficient operation of the Interstate system can be considered important to the transportation equipment industry. Additionally, Figure 2.42 shows that there is the potential for a large amount of growth on the non-Interstate alignment between Columbus, Macon, and Augusta. This is likely due, in part, to the growth of the KIA plant in Lagrange, Georgia as vehicles move from the plant to I-75 and I-16 as well as to I-20 to link with mid-Atlantic and northeastern markets.

Figure 2.40 shows that the rail shipments for the transportation equipment industry are traveling along rail segments that already are congested as identified in the rail modal profile completed in an earlier task for this project.

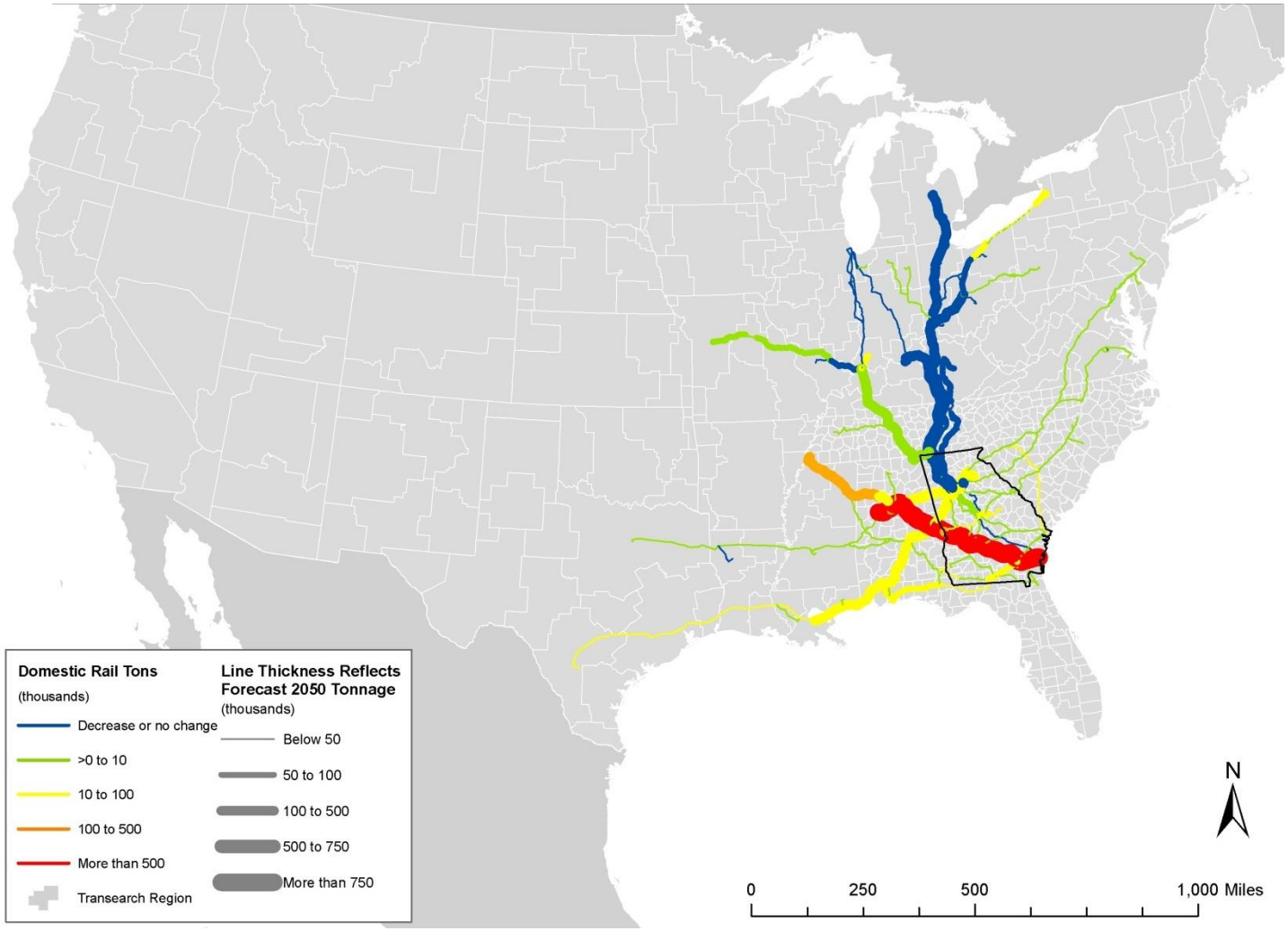
Transportation Equipment Freight Flow Forecast – Rail

Table 4.6 Georgia Rail Freight Volume Forecast for Transportation Equipment
In Tons

	2007	2050	Percent Change
Total	5,256,586	9,770,651	86%
Inbound	1,308,832	2,179,444	67%
Outbound	460,822	1,568,476	240%
Through	3,451,676	5,928,688	72%
Intrastate	35,256	94,043	167%

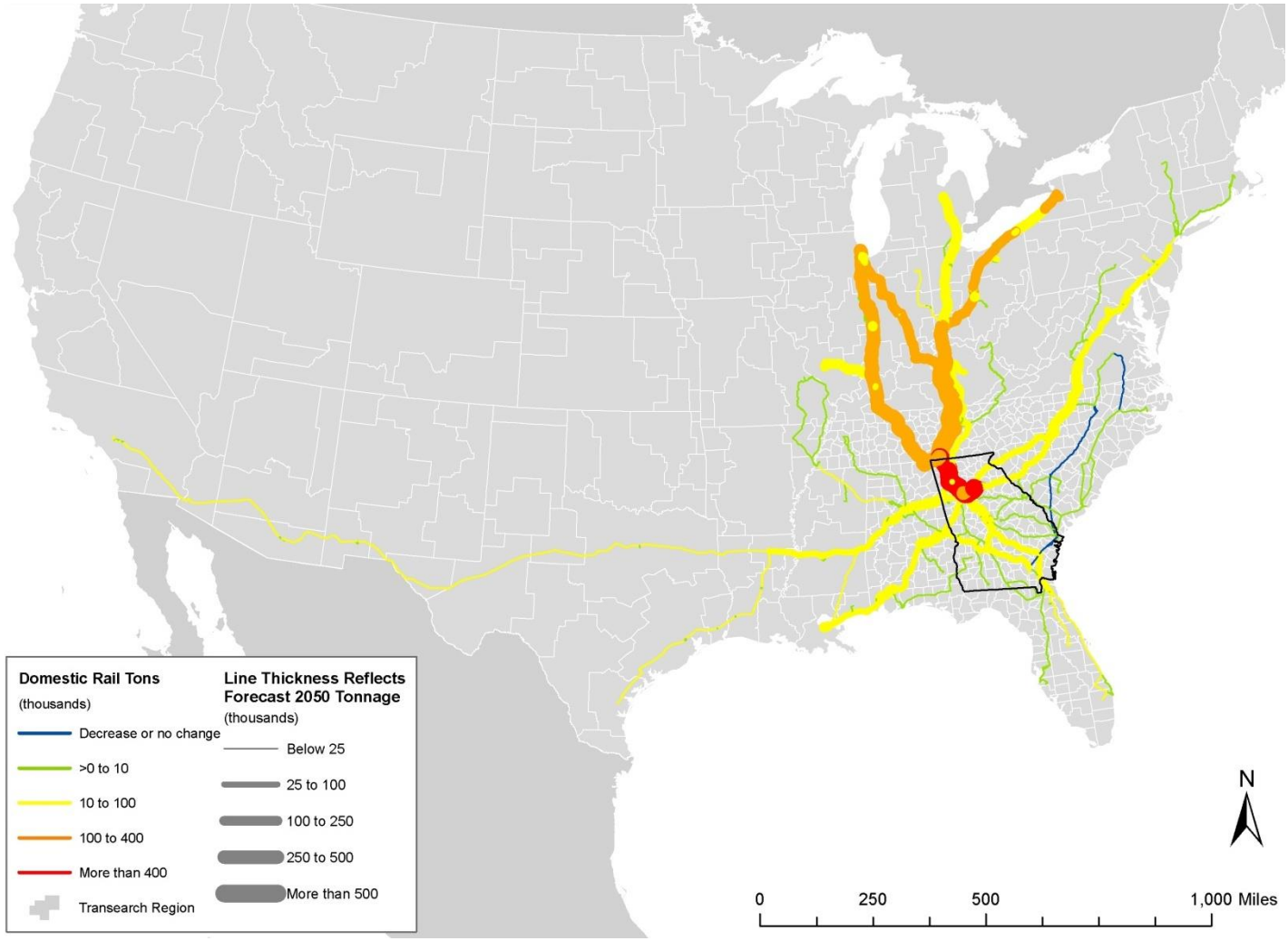
Source: Transearch.

Figure 4-9 Total Rail Tons for Transportation Equipment Bound for Georgia *by 2050*



Source: Transearch.

Figure 4-10 Total Rail Tons for Transportation Equipment Outbound from Georgia *by 2050*



Source: Transearch.

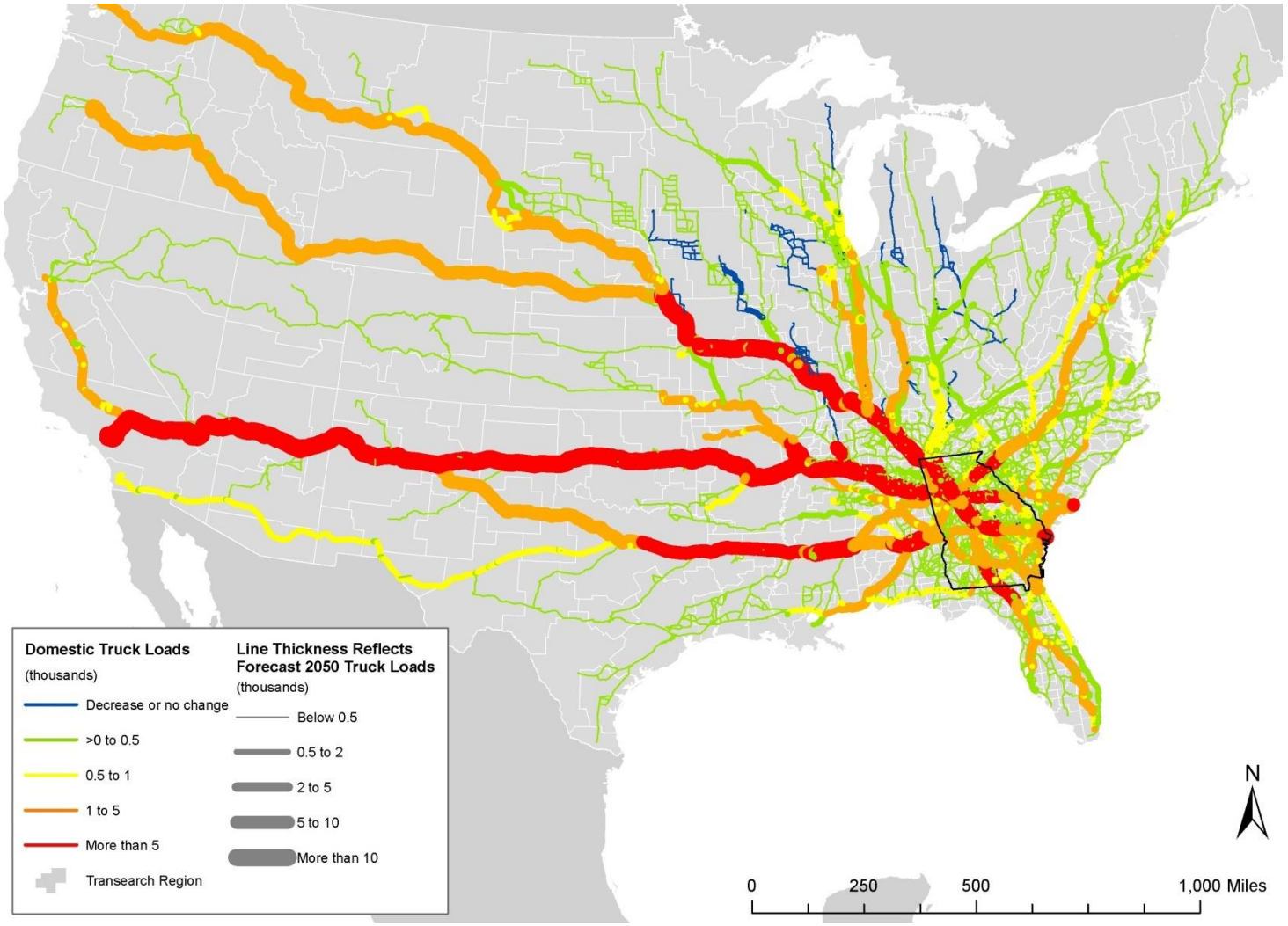
Transportation Equipment Freight Flow Forecast – Truck

Table 4.7 Georgia Truck Freight Forecast for Transportation Equipment
In Tons

	2007	2050	Percent Change
Total	9,720,847	32,452,008	234%
Inbound	673,924	1,986,894	195%
Outbound	3,529,834	7,848,286	122%
Through	5,005,792	21,400,282	328%
Intrastate	511,297	1,216,547	138%

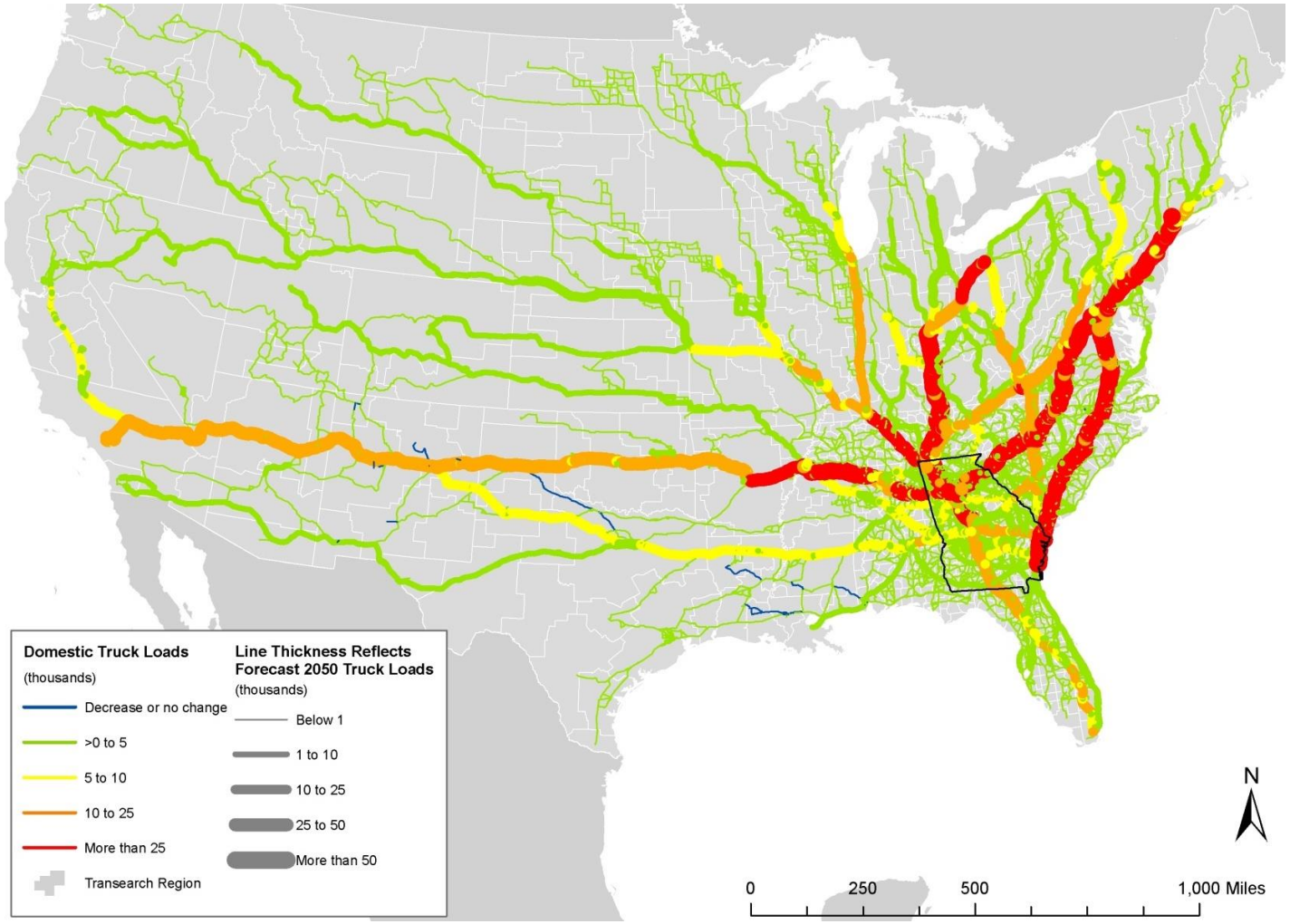
Source: Transearch.

Figure 4-11 Total Truck Loads for Transportation Equipment Bound for Georgia *by 2050*



Source: Transearch.

Figure 4-12 Total Truck Loads for Transportation Equipment Outbound from Georgia *by 2050*



Source: Transearch.

5.0 Timber Industry

5.1 BACKGROUND ON INDUSTRY

The timber industry is one of Georgia's largest industries. In 2014, its fiscal impact to the state was $28.7 billion (a 2.4% increase over 2013) and supported 48,470 jobs -- ranking 3rd among manufacturing sectors behind food processing and textile industries – with the pulp and paper industry dominating all sectors within the industry.[24]

There are five types of activities associated with the forestry industry:

1. **Forest Management and Logging –** This includes the cultivating/ maintaining/developing forests and the physical harvesting of trees.
2. **Lumber and Wood Preservation –** Measures taken to ensure the long life of wood, timber, wood structures or engineered wood. This includes developing and applying chemical preservatives and measures taken to increase durability and resistance damage from insects or fungus.
3. **Veneer, Plywood, and Engineered Wood –** The development of various wood products. Veneer is typically a thin sheet of wood produced from whole logs of uniform thickness by peeling or slicing logs. Plywood is produced by gluing and compressing together three or more sheets of veneer, with the grain of alternate sheets usually laid crosswise; it is the most commonly used building product sourced from wood. Engineered wood is made by laminating, joining, and/or assembling wood components according to specified design criteria. Engineered wood can often be used for joists and beams instead of steel in many building projects.
4. **Pulp and Paper –** Wood pulp has historically been used to create paper and paper-related products. More recently, processed wood pulp has been used in a wide range of applications including flexible electronic displays, components for computers, lightweight body armor,[25] and food additives/ preservatives.[26]

   It is also being used as a renewable source of energy; as part of the European Union Climate and Energy Package proposal of 2008, member countries are required to provide an average of 20 percent of all final energy consumption from a renewable energy source. Countries are encouraged to complete

[24]Georgia Forestry Commission, *Economic Benefits of the Forest Industry in Georgia: 2014* http://gatrees.org/resources/media/news/1-6-16%20GEORGIA'S%20FORESTRY%20INDUSTRY%20RECORDS%20CONTINUED%20GROWTH%20IN%202014.pdf

[25] New Scientist Magazine, *Why Wood Pulp Is the New Wonder Material*, December 2012.

[26] Wall Street Journal, *Why Wood Pulp Makes Ice Cream Creamier*, May 4, 2011.

biomass templates to examine the supplies of domestic and imported biomass from three biomass sources: forest-based sector, agriculture, and municipal waste. In the future, it is anticipated that municipal waste and agriculture will be the largest suppliers of biomass renewable energy. In the interim, wood pulp is the most easily available source to meet this directive. As mentioned in the first section of this report and shown in Table 1.1, wood pulp is also the top export product from the Port of Savannah.

5. **Secondary Products –** The use of primary wood products to create a wide range of articles such as wooden furniture, doors, decorative paneling, siding, moldings, knobs, toys, musical instruments, laminated beams, and tool handles.

5.2 LOCATION OF WOOD MILL ACTIVITIES

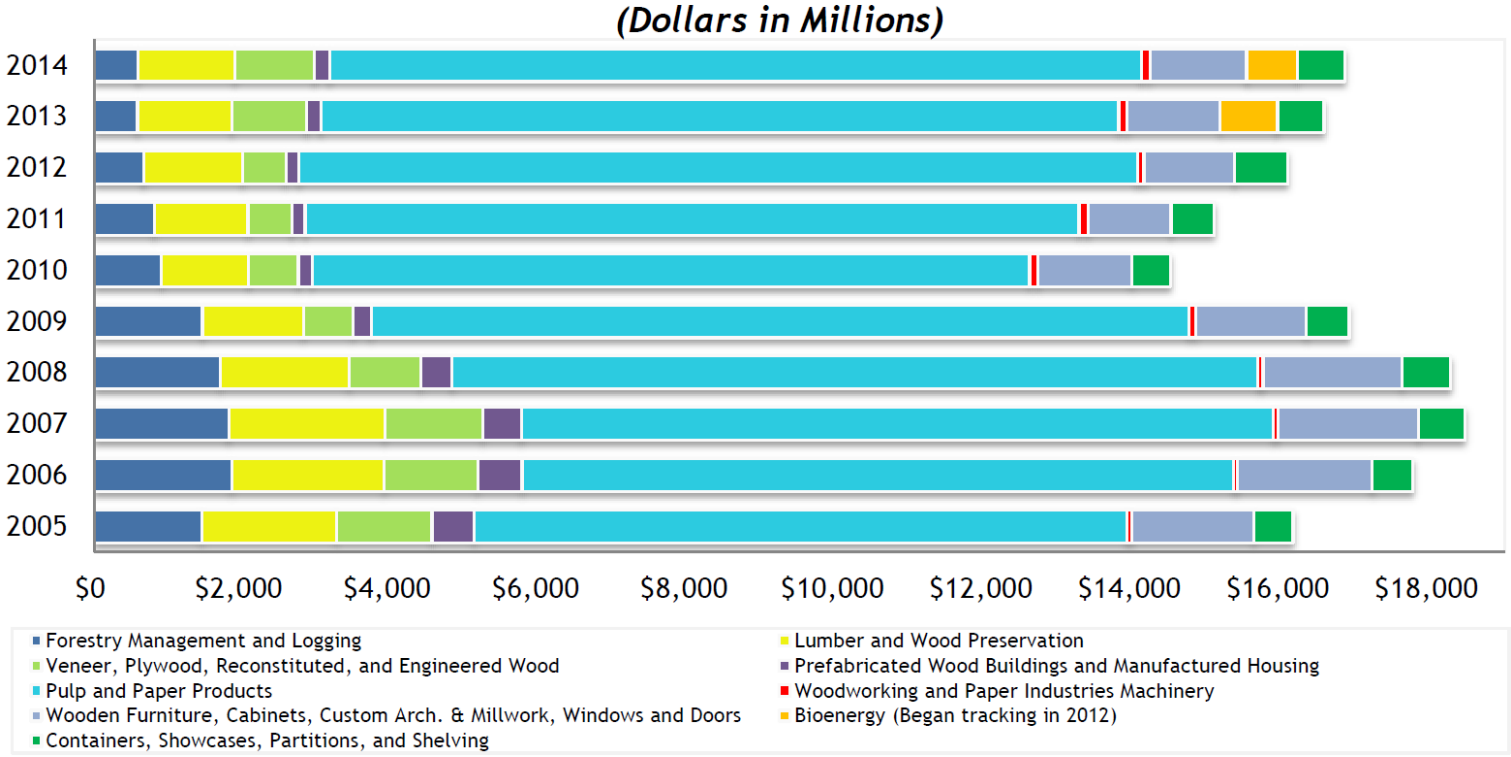
Figure 2.1 shows the distribution of economic output by each of the timber subsectors in Georgia. Over two-thirds of the timber industry is the development of pulp and paper products. The next highest activity is the development of secondary wood products with a little over 10 percent of the total timber activity. The remaining subsectors are all less than 10 percent. The pulp and paper subsector is also the largest employer within the forestry industry.

Table 2.1 shows the amount of employment by various Georgia regions. The map depicting each of the regions is shown in Figure 2.2. The table shows that the benefits of the timber, wood, and paper industries are dispersed throughout the state. This is likely due to the fact that there are several administrative, marketing, and sales jobs for each of these industries that are spread evenly across the state. It is also due to the fact that there are wood mills spread across the state.

Figure 2.3 shows the locations of active wood mills in Georgia. The mills are shown as gray rectangular bars with the name of the mills inside of the bars. There is a higher concentration of these mills in southeast Georgia and only a few mills in the Atlanta metropolitan region. However, there are mills in each corner of the state reflecting some employment activity in this industry.

Figures 2.4 and 2.5 show that most of the current forestry acreage and tree harvesting areas are located in the southeastern part of the state – especially east of I-75 and south of I-20. Note that it is also possible that trees from South Carolina and Alabama are used for mills in the north and west parts of the state.

Figure 5-1 Distribution of Ga. Forestry Economic Activity by Sector



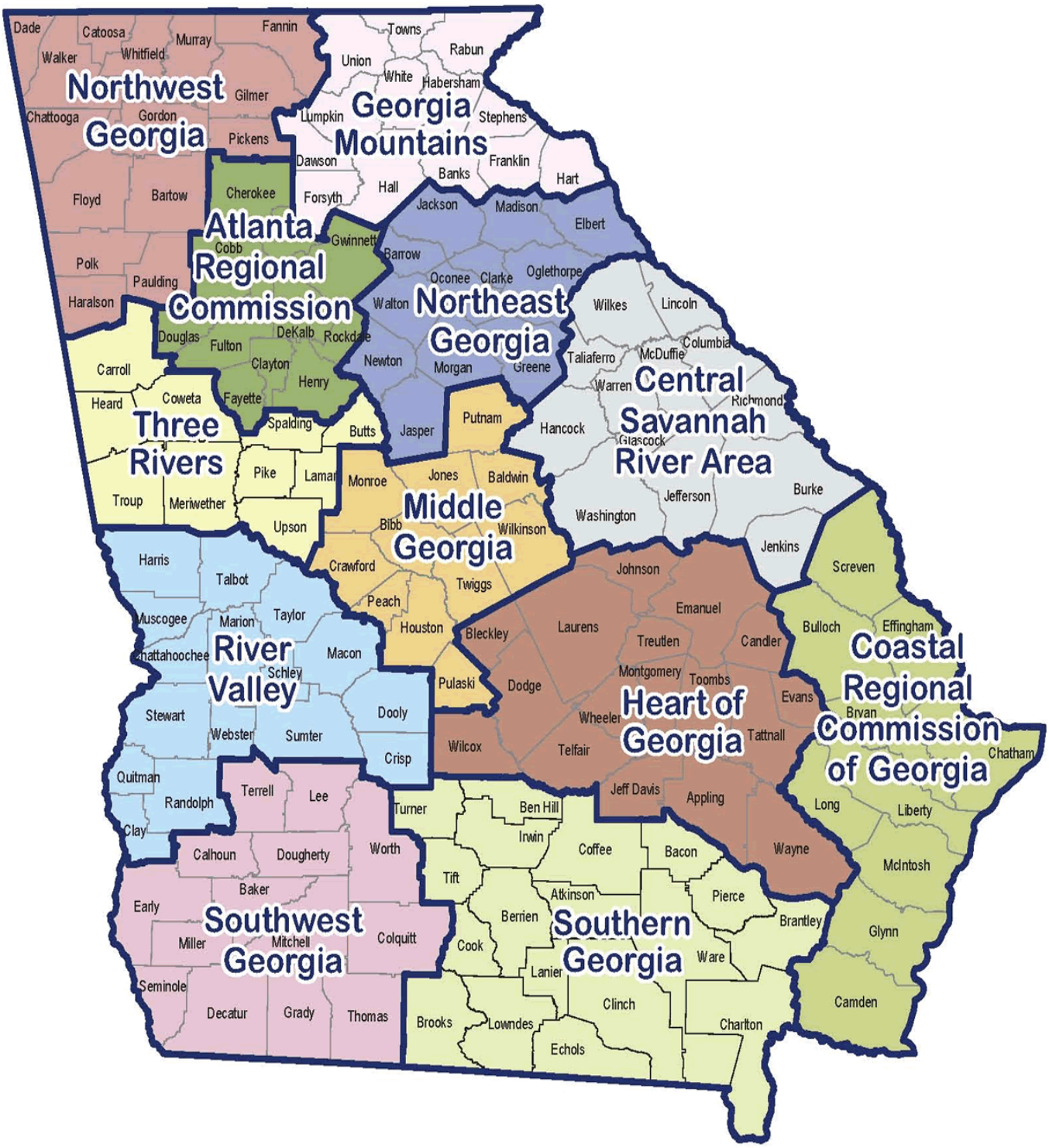
Source: Georgia Forestry Commission's *Economic Benefits of Forestry Industry,*. 2014

Table 5.1 Forestry-Related Employment by Georgia Region, 2010 & 2014

	Employment		Approx. Percent of Total Forestry Employment	
Georgia Regions	**2010**	**2014**	**2010**	**2014**
Atlanta Regional Commission	9,855		21%	22%
Heart of the Georgia Altamaha	4,493		10%	9%
Northwest Georgia	4,383		9%	9%
Coastal	4,294		9%	9%
Southern	3,927		8%	10%
Central Savannah River Area	3,795		8%	8%
Southwest Georgia	3,362		7%	8%
Middle Georgia	2,892		6%	5%
Three Rivers	2,713		6%	7%
River Valley	2,268		5%	5%
Northeast Georgia	2,252		5%	6%
Georgia Mountains	2,143		5%	5%
Total	**46,377**			

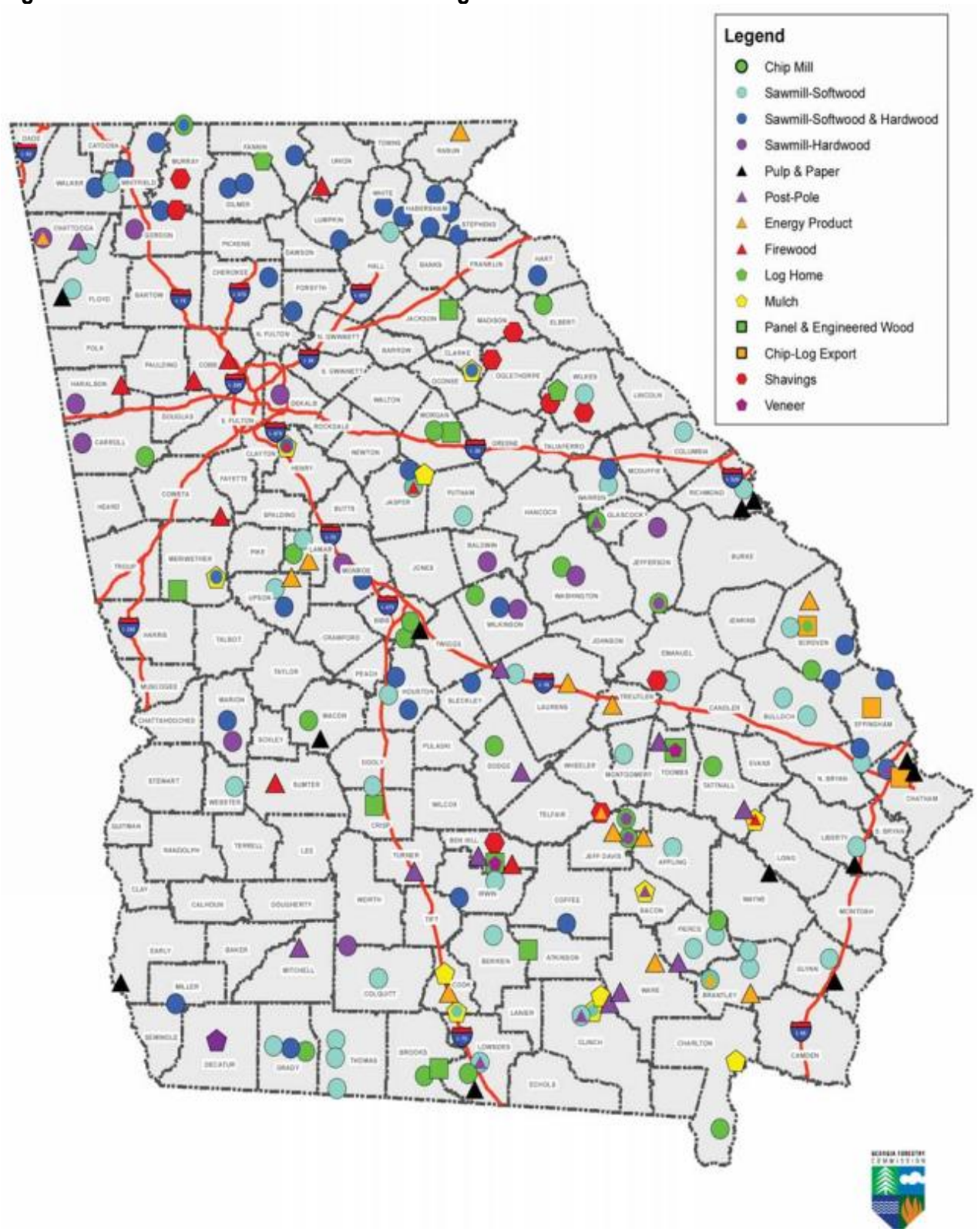
Source: Georgia Forestry Commission's *Economic Benefits of Forestry Industry*.

Figure 5-2 Map of Georgia Regions Used for Employment Analysis



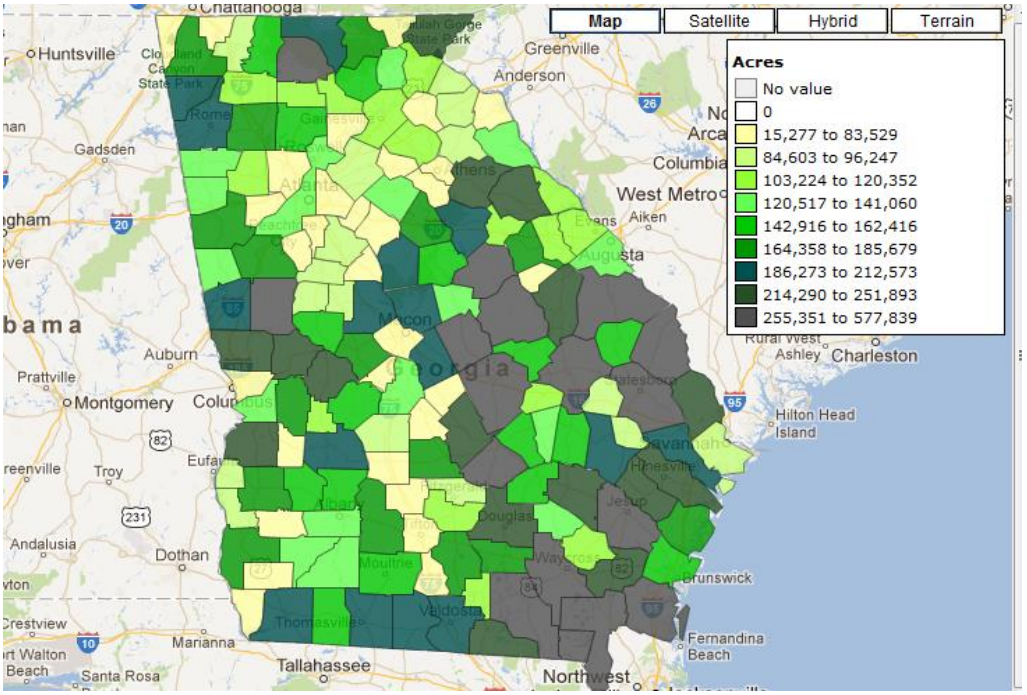
Source: Georgia Department of Community Affairs

Figure 5-3 Location of Wood Mills in Georgia



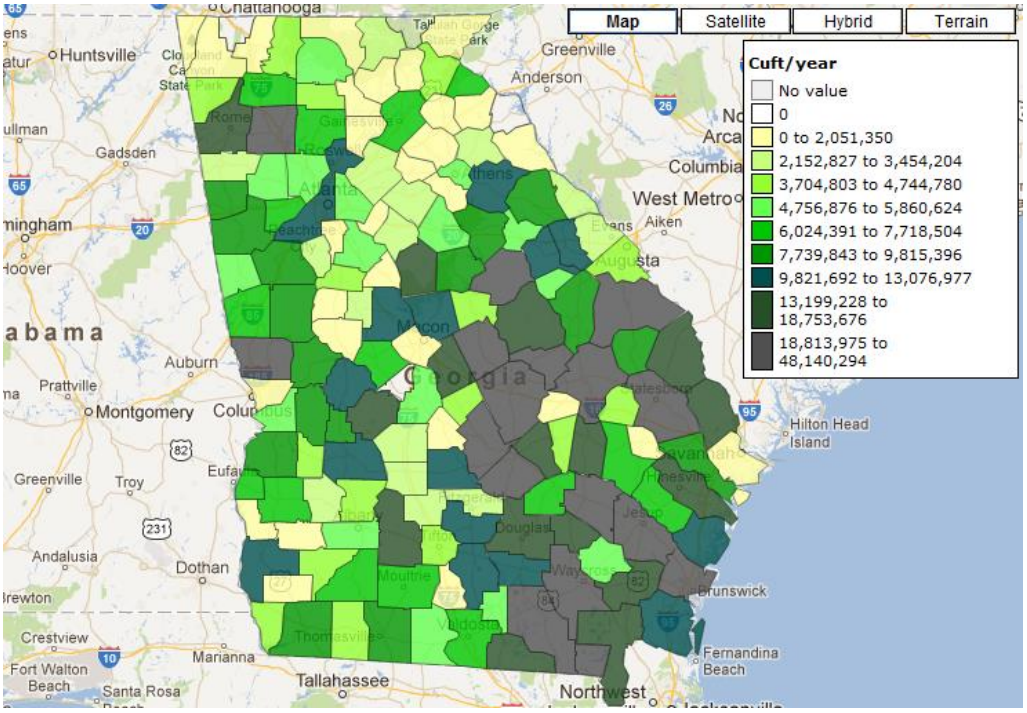
Source: Southeastern Wood Producers Association, 2015.

Figure 5-4 Forested Acres in Georgia, by County



Source: USDA Forest Service Forest Inventory and Analysis, 2011.

Figure 5-5 Average Annual Tree Removals, by County (in Cubic Feet)



Source: USDA Forest Service Forest Inventory and Analysis, 2011.

Note: Includes trees that are at least 5" diameter at 4.5' above the ground.

5.3 TYPES OF WOOD MILLS

Historically, the total number of mills in the state has decreased by 62 percent between 1971 and 2009: the declines in sawmills and veneer mills were each over 70 percent, the decline in pulp mills was much less steep with a 20 percent decline from 15 to 12, and the number of miscellaneous mills has actually increased by 38 percent and ended 2009 with 40 mills.[27] Below are the current number of mills, by type.

Table 5.2 Number of Mills, by Type

	Number of Mills
Mill Type	**2015**
Chip Mill	23
Chip – Log Export	3
Energy Product	14
Firewood	10
Log Home	2
Mulch	11
Panel & Engineered Wood	8
Post – Pole	16
Pulp – Paper	12
Sawmill – Hardwood	15
Sawmill – Softwood&Hardwood	39
Sawmill – Softwood	41
Shavings	9
Veneer	3
Total	**206**

Source: Georgia Forestry Commission's *Georgia Wood-Using Industries Update 2010.*

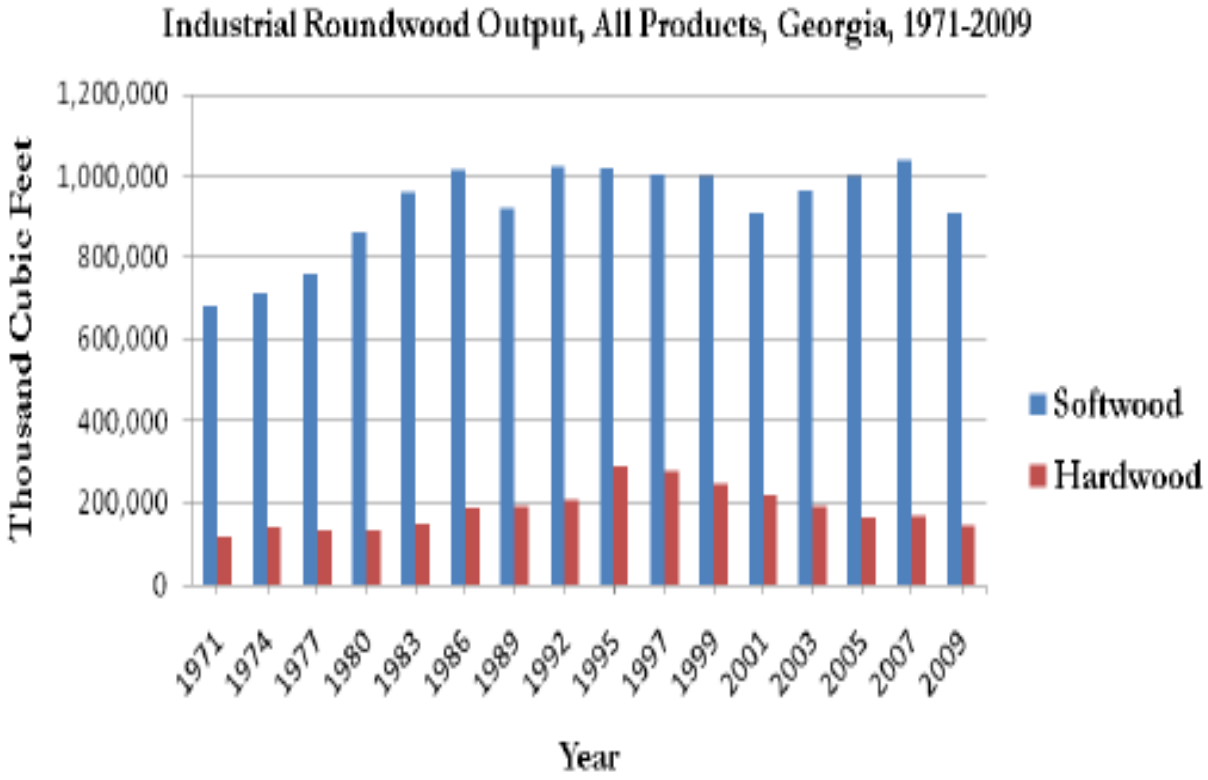
Historical production of softwood increased from 600 to 1,000 million cubic feet between the years 1971 to 1986, and then fluctuated between 900 and 1,000 million cubic feet between 1986 and 2009 (Figure 2.6). Production of hardwood has fluctuated between 100 and 300 million cubic feet. Changes in the number of mills and production rates indicate the industry is consolidating facilities and significantly improving productivity at remaining mills, allowing output to remain relatively constant.

The vast majority of wood milling activity occurs at the largest wood mills; the largest 16 of these sawmills produced 79 percent of the softwood product and

[27] Georgia Forestry Commission's *Georgia Wood-Using Industries Update 2010*

another 11 produced another 21 percent. The other mills produced significantly less. Hardwood and joint hardwood/softwood mills produced 334 produced 55 percent of this product category, while the top 5 mills produced 74 percent.

Figure 5-6



Source: Georgia Forestry Commission's *Georgia Wood-Using Industries Update 2010*

By focusing on the largest companies in the milling industries, a general sense of commodity flows for wood products can be generated. Table 2.3 shows the largest wood mills in Georgia. These are mills that have the capacity to consume over 350,000 tons of wood per year and produce over 50 MMBF per year of wood products.

The table also shows that the mills are located in every corner of the state and several locations in the middle of the state. For example, there are three large mills in the Augusta area; two in Rome; two in Brunswick; one in Savannah; one in Macon; and one in Valdosta. Augusta, Rome, and Brunswick are the only areas with more than one large mill.

Table 5.3 List of Largest Mills in Ga. (Over 350,000-Ton Annual Capacity)

Company Name	City/Area	Mill Type
Balfour Lumber Company, Inc	Thomasville	Sawmill – softwood
Battle Lumber Company, Inc.	Wadley	Sawmill – hardwood, softwood, chip mill
Beadles Lumber Company	Moultrie	Sawmill – softwood
Beasley Forest Products, Inc.	Hazlehurst	Sawmill – hardwood, softwood, chip mill
port Cellulose, Inc.	Brunswick	Pulp and Paper – pulp
Georgia-Pacific LLC	Cedar Springs	Pulp and Paper – containerboard
Georgia-Pacific LLC (Madison Plywood)	Madison	Plywood
Georgia-Pacific LLC (Sterling CNS)	Brunswick	Sawmill – softwood
Georgia-Pacific LLC (Warm Springs Plywood)	Warm Springs	Plywood
Georgia-Pacific LLC (Warrenton CNS)	Warrenton	Sawmill – softwood
Gilman Building Products Company	Blackshear	Sawmill – softwood
Gilman Building Products Company	Fitzgerald	Sawmill – softwood
Gilman Building Products Company	Dudley	Sawmill – softwood
Graphic Packaging International, Inc.	Macon	Pulp and Paper – paperboard
Hood Industries	Metcalf	Sawmill – softwood
Howard, Claude Lumber Company, Inc.	Statesboro	Sawmill – softwood
International Paper Company	Savannah	Pulp and Paper – containerboard
International Paper Company	Augusta	Pulp and Paper – coated paperboard
International Paper Company	Rome	Pulp and Paper – containerboard
Interstate Paper LLC	Riceboro	Pulp and Paper – linerboard
Jordan Forest Products, LLC	Barnesville	Sawmill – softwood
Keadle Lumber Enterprises, Inc.	Thomaston	Sawmill – softwood
Langboard Inc.	Quitman	OSB
Langdale Forest Products Company, Inc.	Valdosta	Sawmill – softwood and pole
Norbord Georgia LLC	Cordele	OSB
Ohio Mulch Supply	Homerville	Mulch
Packaging Corporation of America	Clyattville	Pulp and Paper – containerboard
Rayonier, Inc.	Jesup	Pulp and Paper – pulp
Rayonier, Inc. (Purchased by Interfor)	Eatonton	Sawmill – softwood
Rayonier, Inc. (Purchased by Interfor)	Baxley	Sawmill – softwood
Rayonier, Inc. (Purchased by Interfor)	Swainsboro	Sawmill – softwood
Resolute FP Augusta LLC	Augusta	Pulp and Paper – newsprint
Simpson Lumber Company, LLC	Meldrim	Sawmill – softwood
Southern Forest Industries	Smarr	Sawmill – hardwood
Temple Inland Inc. (Purchased by G-P)	Rome	Sawmill – softwood
Tolleson Lumber Company	Perry	Sawmill – softwood
Tolleson Lumber Company	Preston	Sawmill – softwood
Vern Wood Products, LLC	Hoboken	Sawmill – softwood and energy product
West Fraser, Inc.	Augusta	Sawmill – softwood
Weyerhaeuser Company	Oglethorpe	Pulp and Paper – pulp
Weyerhaeuser Company	Port Wentworth	Pulp and Paper – pulp

Source: Georgia Forestry Commission's *Georgia Wood-Using Industries Directory, 2013.*

This indicates that there is no geographic clustering of mills in Georgia. Instead the *industry as a whole relies on an efficient transportation system across the state*. Comparing the location of tree removal in the southeast portion of the state and the corresponding location of mills, it appears likely that many trees harvested in the southeast are taken to mills throughout the state. Therefore, it is likely that the timber industry uses a wide variety of Georgia roads (along with rail) as part of their supply chain.

It further indicates that wood products similarly use a wide range of Georgia roads to access their downstream customers that are most likely in construction, furniture, and other secondary wood product markets. Therefore, at this level of analysis, it is difficult to identify specific roads as being important to the existing Georgia timber market. Further analysis, including interviews and potentially surveys of forestry industry stakeholders, could be used to develop this information.

It is likely that the lack of geographic clustering of this industry is the result of the historical pattern of development. In the 1970s, it was likely more economical to have a wood mill close to every urban area regardless of size, so that transportation costs could be minimized. There was sufficient forest land throughout the state to make access to source material everywhere without significant additional transportation cost.

However, as more advanced technology was developed in this industry (such as thin saws that allow less log to be lost to sawdust and sawmills that utilize laser technology to identify the best cutting locations, the geographic locations for deployment of the technology were likely based on individual companies that had access to capital and technological resources to install and maintain this equipment. Therefore, the deployment did not unfold with any respect to geography. However, the cost advantages of the new technologies allowed them to produce lower-cost wood products that could successfully compete even in distant markets relative to older technologies even with higher transportation costs. As the mills with older technology closed, the surviving facilities were as spread out across the state as they were prior to the era of consolidation.

5.4 WOOD FOR BIOMASS/ENERGY PURPOSES

One of the more dynamic forestry industry developments in very recent years is the use of wood for energy-related purposes. One forestry industry consulting firm known as Forisk tracks energy-related wood processing projects across the country in four separate categories: 1) electricity, 2) combined heat and power (CHP), 3) pellets, and 4) liquid fuels[28]. Forisk has also identified development

[28] www.forisk.com

projects across the country related to bioenergy; they represent over 132 million tons per year of incremental wood use anticipated between by the year 2023 (Figure 2.7). Approximately half of the announced projects, or 156, have been announced to be located in the southeastern U.S. (Table 5.4); wood pellet plants represent 40 percent of the 156.

In Georgia, there are 10 mills that produce energy-related products. As listed in Table 5.5, there is some geographic clustering of these mills: seven are located in the southeastern part of the state –- south of I-20 and east of I-75 – of which the one in Ware County/Waycross (Georgia Biomass LLC) is the world's largest pellet production site[29]; two are near the Macon area; and one is in Rabun County in the northeast corner of the state. Seven of the 10 mills generate wood pellets while the other three produce ethanol or electricity. Therefore, based on current production of energy-related wood products, wood pellets are by far the largest wood-based energy product developed in Georgia and one of the most important parts of energy-related wood products activity in the state.

Table 5.6 lists new additional Georgia mills that have been announced; nine will be located in the southeast portion of Georgia and some along the I-75 corridor. Of the 10 new mills, six will be developing wood pellets, three will be producing biomass electricity, and one will produce wood chips. This indicates that the future growth of the wood products industry is energy-focused. It also indicates that the development of wood pellets will be the largest component of this growth. It is also likely that some of the existing mills could convert some of their current output to energy-related production, so future projections may understate growth of this subsector.

According to the Georgia Department of Economic Development, Georgia leads the U.S. in exports to the European Union of wood pellets, as well as woodpulp, kraft paper & paperboard and kaolin clay[30]. In addition, in 2013 the Georgia Ports Authority (GPA) noted that its Port in Brunswick is one of only a handful of U.S. east coast ports that export wood pellets[31]; most of <Georgia's> wood pellet exports are bound for Northern Europe, where they are used to improve emissions at power plants. In 2013, GPA noted that its Ports of Savannah and Brunswick shipped just over a million metric tons of pellets last year, compared to the Port of Jacksonville which does not currently handle these products[32].

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[29] http://members.jacksonville.com/news/georgia/2014-11-09/story/cut-carbon-their-power-plants-europeans-cutting-trees-south-sparking

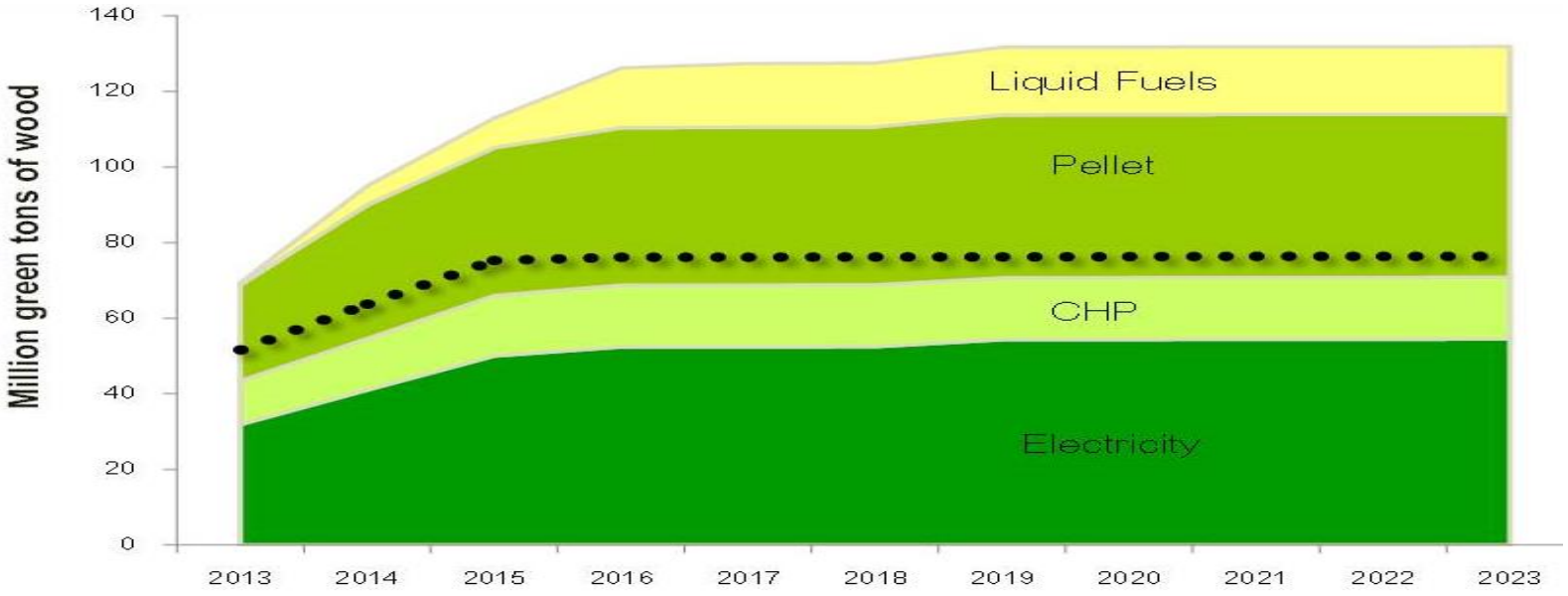
[30] www.georgia.org/SiteCollectionDocuments/Business/International/Country_Connections/Georgia_European_Union_Connection_2013.pdf

[18] www.starnewsonline.com/article/20130406/ARTICLES/130409747/1002/news06?p=all&tc=pgall

[32] http://members.jacksonville.com/news/georgia/2014-11-09/story/cut-carbon-their-power-plants-europeans-cutting-trees-south-sparking

The International Trade Administration estimate, which predict rising demand in Korea as well as Europe, said the need for American exports in 2020 could range from 25 million to 70 million metric tons[19].

Figure 5-7 Wood Requirements Forecast for U.S. Bioenergy Wood-Related Mills



Source: Forisk Consulting, 2012 (*dotted line represents the announced projects considered to be extremely viable)*

Table 5.4 Percentage of Announced (Near-Term) Energy-Related Wood Projects in the Southern U.S., by Type

Type of Project	Number of Projects	Percent of Total
Pellets	62	40%
Electricity	39	25%
Combined Heat and Power (CHP)	23	15%
Liquid Fuel	22	14%
Thermal	10	6%
Total	***156***	***100%***

Source: Forisk Consulting 2012.

Table 5.5 Energy-Related Mills in Georgia

Company	County	Mill Type	Mill Size	Species
Appling County Pellets, LLC	Appling	Energy Product – wood pellets	L	HOW and SW
Briar Creek Wood Fibers, LLC	Screven	Energy Product – wood pellets	M	SW
Georgia Biomass, LLC	Ware	Energy Product – wood pellets	L	SW
LanzaTech Freedom Pines Biorefinery	Treutlen	Energy Product – cellulosic ethanol, chemicals	S	SW
Multitrade Rabun Gap, LLC	Rabun	Energy Product – electricity	L	HOW and SW
Piedmont Green Power, Inc.	Lamar	Energy Product – electricity	L	HOW, SW
Rockwood Premium Fuel Pellets	Upson	Energy Product – wood pellets	S	HOW
SEGA Biofuels, LLC	Brantley	Energy Product – wood pellets	M-L	SW
Telfair Forest Products, LLC	Telfair	Shavings and Energy Product – wood pellets	M	SW
Vern Wood Products, LLC	Brantley	Sawmill–Softwood & Energy Product – wood pellets	M-L	SW

Source: Georgia Forestry Commission's *Georgia Wood-Using Directory 2010*

Table 5.6 Newest Wood Mills in Georgia

Company	County	Mill Type	Operational Timeframe	Feedstock	Feedstock Amount
First Georgia BioEnergy, LLC	Brantley	Wood pellets: 550,000 tons/ year	2011	Sawmill residues, roundwood	900,000 tons per year
Rayonier, Inc.	Brooks	Chip mill	2nd Q. 2013	Hardwood pulpwood logs	Unknown
Fram Renewable Fuels	Jeff Davis	Wood pellets: 550,000 tons/year	4th Q. 2013	Pine logs, sawmill residues	1,100,000 tons per year
Vega Biofuels, Inc.	Crisp	Torrefied wood pellets	2013	Sawmill sawdust	N/A
General Biofuels Georgia[33]	Washington	Wood pellets: 440,000 tons/year	1st Q. 2014	Timber, sawmill residues	880,000 tons per year
Piedmont Wood Pellet, Warrenton LLC	Warren	Wood pellets: 500,000 tons/year	2014	Pine pulpwood	1,000,000 tons per year
Enova Wood Pellet Group LLC	Wilkinson	Wood pellets	2014+	N/A	N/A
Green Power Solutions	Laurens	Biomass electricity: 56 MW/year	2015	Hardwood sawmill resid., roundwood	1,000,000 tons per year
North Star Jefferson, LLC	Jefferson	Biomass electricity: 21 MW/year	2015	Woody biomass, tire derived fuel	133,500 tons per year
Greenway Renewable Power	Troup	Biomass electricity: 53.5 MW/year	2016	Logging residues	500,000 tons per year
E-pellets	Clarke	Convert mill to pellets: 450,000 metric tons/year[34]	tbd		

Source: Georgia Forestry Commission's *Georgia Wood-Using Directory 2010*

[33] http://gov.georgia.gov/press-releases/2012-09-18/deal-general-biofuels-georgia-locate-sandersville-investing-60-million

[34] www.bizjournals.com/atlanta/news/2014/07/17/e-pellets-buys-athens-mill-for-13-million.html

Case Studies of Three Georgia Freight-Intensive Companies

The forecasts and industry profiles in earlier sections point to how Georgia may grow in the next 40 years. It also demonstrates the importance of the State's freight transportation network to those crucial industries on which the State will rely on to support the future growth. This section includes three case studies demonstrating how specific Georgia businesses use the State's transportation system on a day-to-day basis to conduct their operations. This includes information of where the companies are sourcing key inputs and how they are transported to Georgia facilities for further processing and distribution. Distribution includes how those Georgia businesses ship goods from their facilities to markets statewide; within the Southeast; the United States; and overseas.

The companies were asked about what they view as the advantages and weaknesses of Georgia's transportation system and how they adjust to particular issues such as congestion in metropolitan Atlanta. Case studies were conducted with Perdue Farms, Home Depot, and Weyerhaeuser. These three companies are involved in the agriculture and food processing, retail trade, and lumber, paper, and wood products industries.

5.5 CASE STUDY 1: PERDUE FARMS, PERRY, GA.

Supply Chain of a Perry, Georgia Distribution Center

The agriculture and food industry is one of the major business sectors in Georgia. Key to this industry is the State's national prominence in poultry production. Georgia is the biggest producer of broilers in the United States and also includes large-scale production of poultry meat products that are distributed throughout the Southeast and overseas. This case study details the use of transportation by Perdue Farms at its Perry, Georgia location. Personnel at the facility were interviewed to understand the plant's logistics patterns and, specifically, its use of the Georgia freight transportation system. Maps are included to illustrate Perdue's supply chains and the importance of the State's transportation network to bring supplies into Perry and to ship poultry products to regional and global markets.

Background

Perdue Farms is a large agribusiness company that is primarily engaged in the manufacture of poultry products, such as prepared, frozen, and ready for use fresh chicken. The company markets under the Perdue brand name in more

than 100 countries and offers retail poultry products in grocery stores and national chains throughout most of the United States but with limited distribution in the West.[35]

While it is headquartered in Maryland, it has a large facility located in Perry, Georgia that has primarily three functional units: row broiler (poultry) processing, cook facility, and distribution center. Perdue Farms bought the Perry operation in 2004 and the distribution center opened in 2006. Its purpose is to act as a distribution hub in the Southeast to cover the Georgia, Florida, Alabama, Mississippi, Tennessee, and South Carolina markets. There are approximately 2,500 people employed at the Perry location. Richmond Cold Storage, LLC is the primary 3PL contracted to handle logistics and distribution at the Perry location.

Similar to other food processors and the agriculture industry, overall, Perdue's Perry, Georgia facility is dependent on freight transportation and the efficient movement of goods to run its operation. Broiler processing involves inbound shipments of live chickens to the facility from farms; outbound shipments include processed chicken to the U.S. Southeast and abroad (via the Port of Jacksonville). In addition, the Perry location also acts as a cross-docking facility where processed chicken from other Perdue-affiliated facilities is transferred from one truck to another before reaching Southeastern markets. The sections below provide additional detail regarding the Perry facility's supply chain and logistics operations.

Inbound Shipment Characteristics

The primary inbound shipments are live birds from farms, which are processed at the facility. The majority of the live chickens come from Georgia and Alabama. Because the chickens are raised by contracted farmers, the origins of the live chickens are dispersed. Figure 5-8 is a schematic that shows the supply chain movements at the Perdue facility. The green dotted lines show the general areas from where the live chickens originate.

In addition, processed chicken and parts also are shipped from other Perdue processing facilities located in Milford and Georgetown, Delaware; Petersburg, Virginia; Rockingham, North Carolina; Dillon, South Carolina; and Dothan, Alabama. The main suppliers are the two plants in Dillon, South Carolina and Dothan, Alabama. Finished products that are cross-docked for delivery in the Southeast come to the plant from the Delaware locations. There also are packaging materials, boxes and other secondary shipments coming into the facility, which add to the freight traffic. The plant handles about 200 to 250 inbound trucks per week adding up to an annual volume of 400 million pounds. Figure 5-8 shows (blue dotted lines) the inbound shipments accessing the Perry plant from the northern supply locations via I-20, and U.S. and state highways.

[35]www.docstoc.com/search/perdue-incorporated-swot-analysis-and-company-profile?&resourcetype=1&docfilters=30#

From Alabama, suppliers rely solely on U.S. and state highways to reach the Perry plant by truck.

Outbound Shipment Characteristics

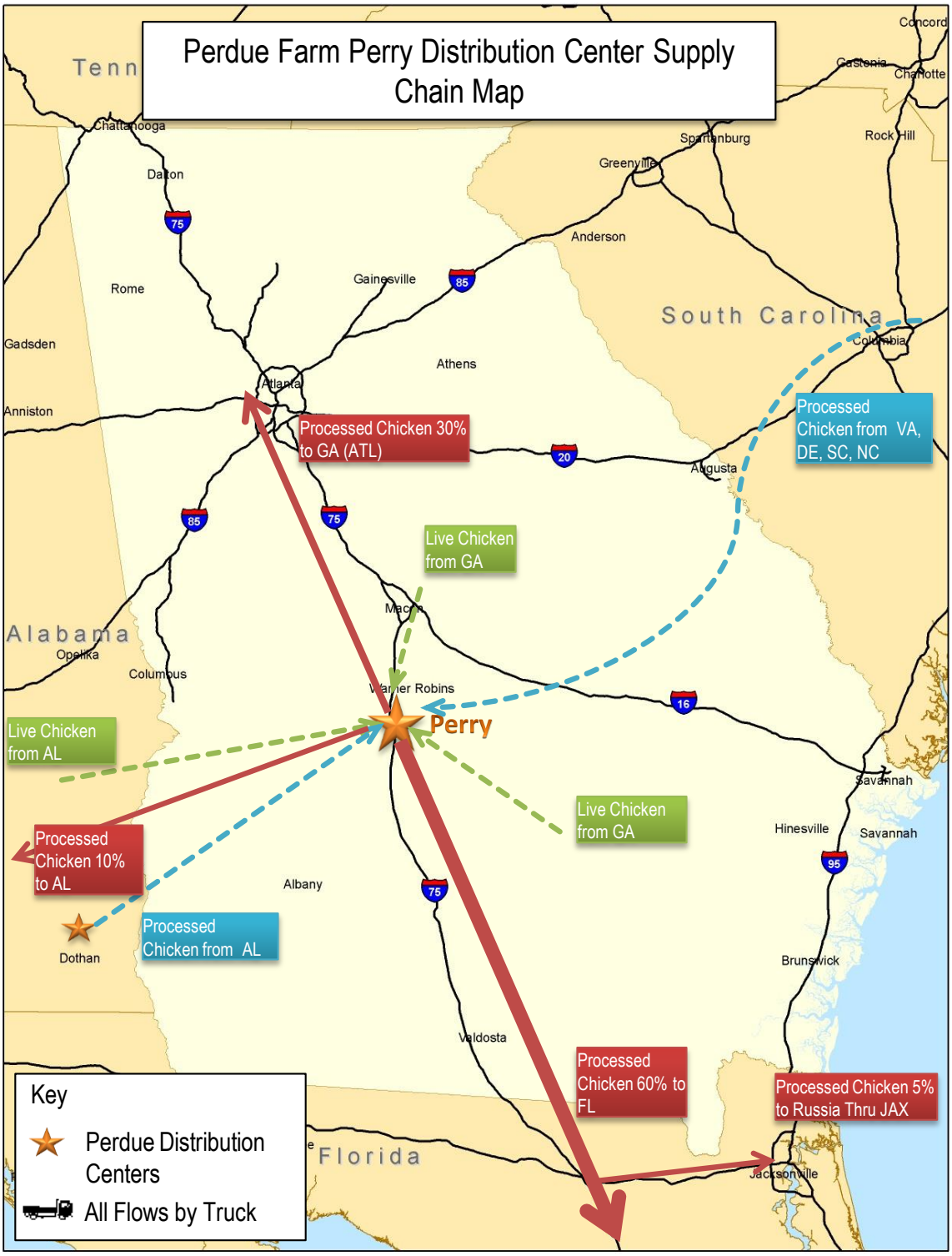
Finished, or processed poultry goods are the outbound commodities transported from the Perry location. This includes fresh, frozen, and cooked poultry. On an annual basis 400 million pounds of finished poultry leave the facility, entirely by truck as well. This translates to about 200 to 250 trucks per week.

Wal-Mart and Chick-Fil-A distribution centers are the destinations for 80 percent of the outbound shipments originating from Perdue's Perry operation. Richmond Cold Storage ships the chicken products to the distribution centers, and other 3PLs then take over delivery to individual stores and restaurants. Wal-Mart has its own truck fleet to bring goods from its warehouses to its retail outlets. Supermarket chains (e.g., Publix, Costco) account for most of the remaining 20 percent outbound shipments.

The Southeast accounts for 95 percent of outbound flows from the Perry facility, led by Florida and Georgia. As Figure 5-8 shows, roughly 60 percent of shipments are destined to Florida and 30 percent to Georgia (predominantly greater Atlanta). The remaining domestic distribution is destined for other Southeastern states. The truck trips from the distribution centers to individual store locations are dispersed and are more intensive users of smaller arterial and local roads. Perdue is certified for exporting to Russia and about 5 percent of total shipments from Perry are exported through the Port of Jacksonville to Russia. Existing service (port of call) at Jacksonville is the reason Perdue uses that particular port.

I-75 is the main Interstate used for all shipments north to Atlanta and south to Florida. Like the inbound shipments, Alabama-bound products use U.S. and state highways, since there is not a direct interstate between Perry and major Alabama cities.

Figure 5-8 Logistics Map for Perdue Farms in Perry
Georgia Distribution Center



IMPORTANT GEORGIA CORRIDORS FOR ITS POULTRY INDUSTRY

Perdue, and the poultry industry as a whole, almost exclusively relies on trucks to transport finished poultry goods due to the relatively short shelf-life of the product and because the distribution centers of its customers are typically located directly on, or very near, Interstates. With a high emphasis placed on road access, most distribution centers were not designed to be accessible by rail.

For the case study, trucks leaving Purdue's Perry distribution center average about 2.5 stops per trip. Truck drivers actively plan to avoid peak-hour travel through metro areas like Atlanta and also try to minimize "empty" miles as much as possible.

A majority of the truck trips are on I-75, and there are no significant issues with either mobility or pavement quality. However, the availability of quality secondary roads to carry products west and southwest from Perry to destinations in Alabama is a consideration. Not all public roads are considered suitable for the tractor-trailers due to concerns about road condition possibly affecting wear-and-tear on trucks.

In this case study, considering improvements to the east-west roadways connecting Central Georgia to Alabama could benefit the operations of Perdue Farms, likely resulting in time savings and more reliable deliveries.

5.6 CASE STUDY 2: THE HOME DEPOT – SUPPLY CHAIN FOR GEORGIA OPERATIONS

This case study describes Home Depot's supply chain in Georgia. It also discusses how the Georgia freight transportation network supports the flow of goods for the company.

General Information

Home Depot was founded in 1978 in Atlanta where the first store opened as a do-it-yourself center. It has since become the largest home improvement retailer in the world and the second largest retail chain in the United States. Home Depot has nearly 2,300 locations in the United States, and international locations in China, Mexico, and Canada.[36]

Home Depot's supply chain includes stocking distribution centers (SDC), bulk distribution centers (BDC), and rapid deployment centers (RDC). Stocking distribution centers (SDC) are used to store imported and domestically sourced goods and distribute goods to local stores. Bulk distribution centers receive

[36] www.myajc.com/business/atlanta-based-home-depot-grows-without-adding-stores

inbound shipments of lumber and other building materials for distribution to stores. Rapid deployment centers are the newest addition to the Home Depot supply chain. They were initiated in 2006 as part of the company's strategy to centralize its distributing process, increase just-in-time delivery, and provide fast inventory turns. The Home Depot has opened 19 RDCs throughout the country, each serving approximately 100 stores. Products flow rapidly through the RDCs. This differs from the more traditional warehouse role of the SDCs that store products not suitable for cross-docking.

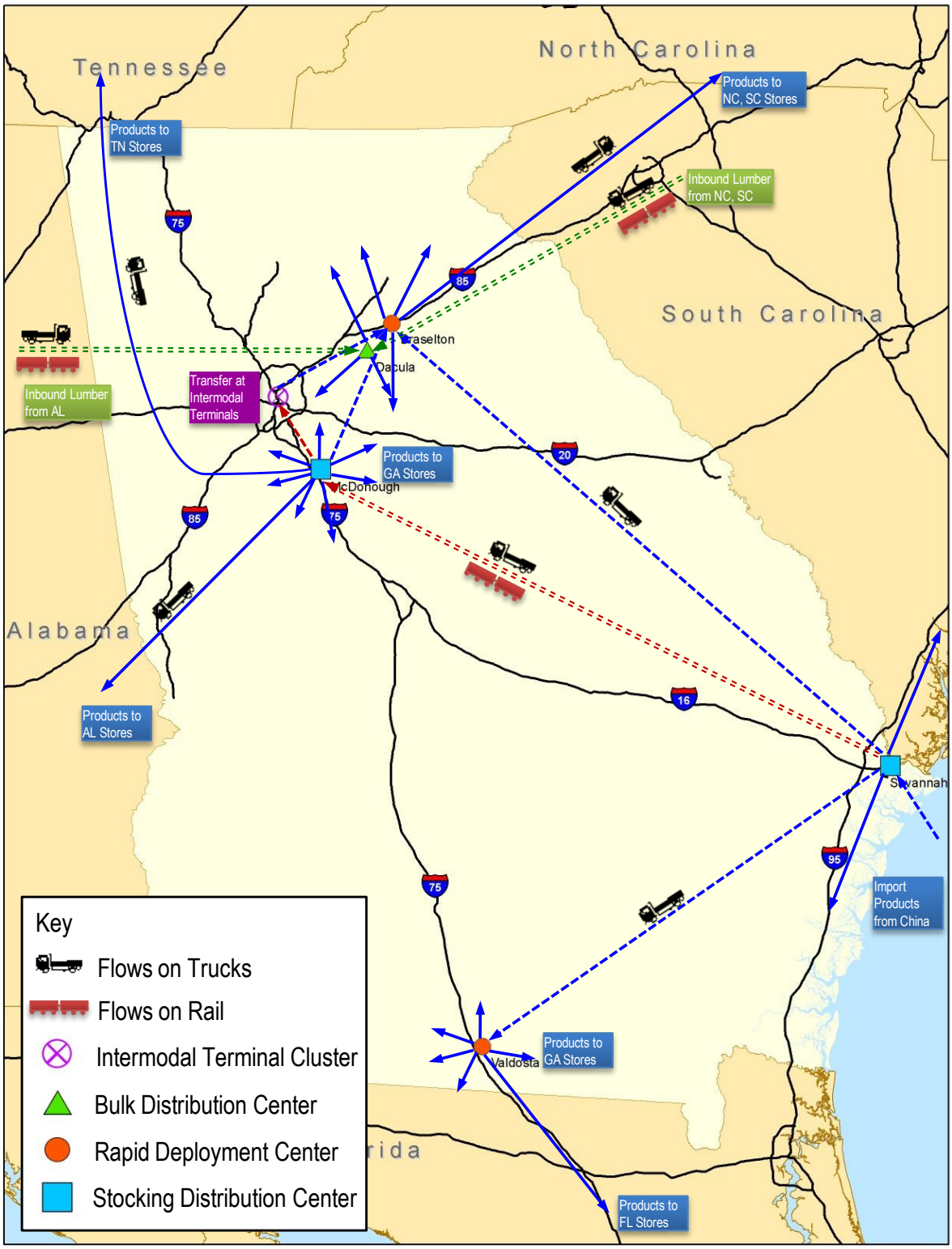
Georgia Supply Chain Characteristics

The supply chain operations of Home Depot in Georgia revolve around activities taking place at five distribution centers. The operations at each of the distribution centers are discussed in more detail below. Figure 5-9 provides a map of these operations.

Savannah SDC – The Port of Savannah handles an average of 15 to 20 percent of all of Home Depot's imported goods. The vast majority of the goods handled at Savannah come from Asia and Europe. After unloading from container vessels, these goods are immediately transferred and stored at the Savannah SDC to be shipped either to Florida or to the other SDCs and RDCs in Georgia. Shipments to the Braselton and Valdosta RDCs are by truck, while shipments to McDonough travel both by truck and by rail. The Savannah SDC also ships directly to stores in the Savannah area by truck. The Port of Savannah is one of the key gateway ports used by Home Depot along with the ports of Seattle-Tacoma, Los Angeles-Long Beach, and New York-New Jersey.

- **McDonough SDC** – This SDC receives inbound shipments from the Port of Savannah via rail and truck. It then distributes the products on trucks to stores in Georgia, the Carolinas, and Alabama.
- **Braselton RDC –** The Braselton RDC is a cross-docking facility that serves stores in Georgia, Alabama, and South Carolina. It receives inbound shipments by truck from the Savannah and McDonough SDCs. In addition, it gets intermodal shipments from McDonough that have previously been transloaded from rail to truck at the intermodal rail yards in the Atlanta metropolitan region. It then distributes these goods to stores in Georgia and the Carolinas by truck.
- **Lake Park RDC –** This cross-docking RDC gets inbound shipments from the Savannah SDC by truck and serves primarily the south Georgia and Florida markets by truck as well.
- **Dacula BDC –** This bulk distribution center receives inbound lumber and building materials from Alabama and the Carolinas mainly on rail, and then distributes them to stores located in Atlanta and the rest of Georgia on trucks.

Figure 5-9 Supply Chain Map for Home Depot's Georgia Operations



IMPORTANT GEORGIA CORRIDORS FOR THE HOME DEPOT

Similar for most retail store distribution, Home Depot's Georgia supply chain utilizes the truck, rail, and water modes. For the truck mode, the entire Interstate system is important to deliver goods to the retail stores. I-16 and I-75 are primary roadways used for shipments between Atlanta and Savannah. This means that congestion on the system impacts a company's supply chain, thereby increasing costs for the company and end customers across the State. Urban congestion in the Atlanta metropolitan region is particularly challenging to the efficient operation of the supply chain.

Both carload and intermodal rail are important, including for Home Depot. Intermodal rail is used to ship goods imported at through the Port of Savannah and Atlanta. Domestic rail is being used to supply the BDCs and SDCs. For the example of Home Depot, they have initiatives in place to attempt to divert some of its truck traffic to intermodal rail. Due to the growing emphasis of RDCs in the Home Depot supply chain, the operational performance of intermodal rail is important to maximize its share of container traffic in Georgia.

The significant share of imported goods that is processed by most retailers, including Home Depot, the Port of Savannah underscores the importance of the port in that industry's supply chain. Efforts to reduce the costs to move goods through the port also will help those companies become more competitive; in particular, the deepening of Savannah Harbor has the potential to decrease per container shipping costs and therefore decrease costs for a significant component of retail supply chain. Additionally, maintaining efficient last-mile road and rail connectors to the port is important.

5.7 CASE STUDY 3: WEYERHAEUSER – SUPPLY CHAIN FOR GEORGIA OPERATIONS

Paper and wood products are traditional strengths of Georgia and are intensive users of the State's freight transportation system. This case study details the supply chain characteristics of Weyerhaeuser, a forest products company with extensive operations in Georgia. They own land that is harvested for trees, mills that develop wood products, and distribution centers that aggregate wood products from mills and distribute them to retail outlets.

The complexity of this operation is shown in Figure 2.8. The vast majority of the operation occurs by trucks, but movement of the harvested logs between the forests and the mills for processing may have a segment accomplished by rail.

Background Information

Weyerhaeuser is a forest products company primarily engaged in growing and harvesting trees, building homes, and making a range of lumber/wood-derived products. With operations in 10 countries and customers worldwide, it is based

in metro Seattle and manages over 20 million acres of forests, of which it owns about 6 million acres, leases just under 1 million acres, and has renewable, long-term licenses on approximately 14 million acres.

Weyerhaeuser operates five divisions: Timberlands, which includes logs, timber, minerals, oil and gas, and international wood products; Wood Products, which includes softwood lumber, engineered lumber, structural panels, hardwood lumber, and building materials distribution; Cellulose Fibers, which includes pulp and liquid packaging board; Real Estate, which includes real estate development, construction, and sales; and Corporate.

Three of these divisions have operations in Georgia, including Cellulose Fibers manufacturing, Wood Products distribution and Timberlands (seed orchard). Specifically, the activities of Weyerhaeuser's Georgia locations include:

- **Oglethorpe (Flint River) –** Pulp cellulose fiber for products like diapers.
- **Savannah (Port Wentworth**) – Pulp mill similar to Oglethorpe manufactures finished cellulose fiber products such as diapers, papers, tissues.
- **Dacula –** Distribution Center and Customer Service Center for various wood products throughout Georgia.
- **Lyons** – Seed orchard.

Weyerhaeuser's Georgia operations thus include two freight-dependent industries: cellulose fiber products manufacturing (pulp mills), and the distribution of wood products.

Two wood product manufacturing plants, one in Valdosta, Georgia and the other in Colbert, Georgia closed within the past few years. Now the manufactured wood products going into the Dacula, Georgia (in northeast metro Atlanta) distribution center originate from out of state.

Weyerhaeuser Pulp Mills Supply Chain

There are two Weyerhaeuser pulp mills in Georgia: the Flint River Pulp Mill (located in Oglethorpe, Georgia) and the Port Wentworth Pulp Mill (located near Savannah). The mills have a capacity of 370 and 330 thousand metric tons, respectively, and are comparable to three other pulp mills in the Southeast.[37]

The raw material that enters the pulp mills are logs. Figure 5-10 below shows the forest lands operated by Weyerhaeuser in the Southeast (North Carolina, Alabama, Mississippi, Louisiana, Arkansas, and Texas). Since there are no company-controlled lands in Georgia, it is assumed that the logs need to be transported in from Alabama or North Carolina (indicated by dashed green lines on Figure 5-11). At the mills, the logs are debarked and cut into chips and pulped, where the chips are transformed into a slurry-like mixture. This mixture is then bleached, shaped into sheets and put into rolls.

[37] Weyerhaeuser 2015 Factbook.

From the Oglethorpe location, semi-finished rolls are transported via truck and rail to the mill in Savannah to be turned into finished products, which can then be exported to Europe. The Savannah mill itself also gets logs from North Carolina and transforms them into finished paper products exported to Europe.

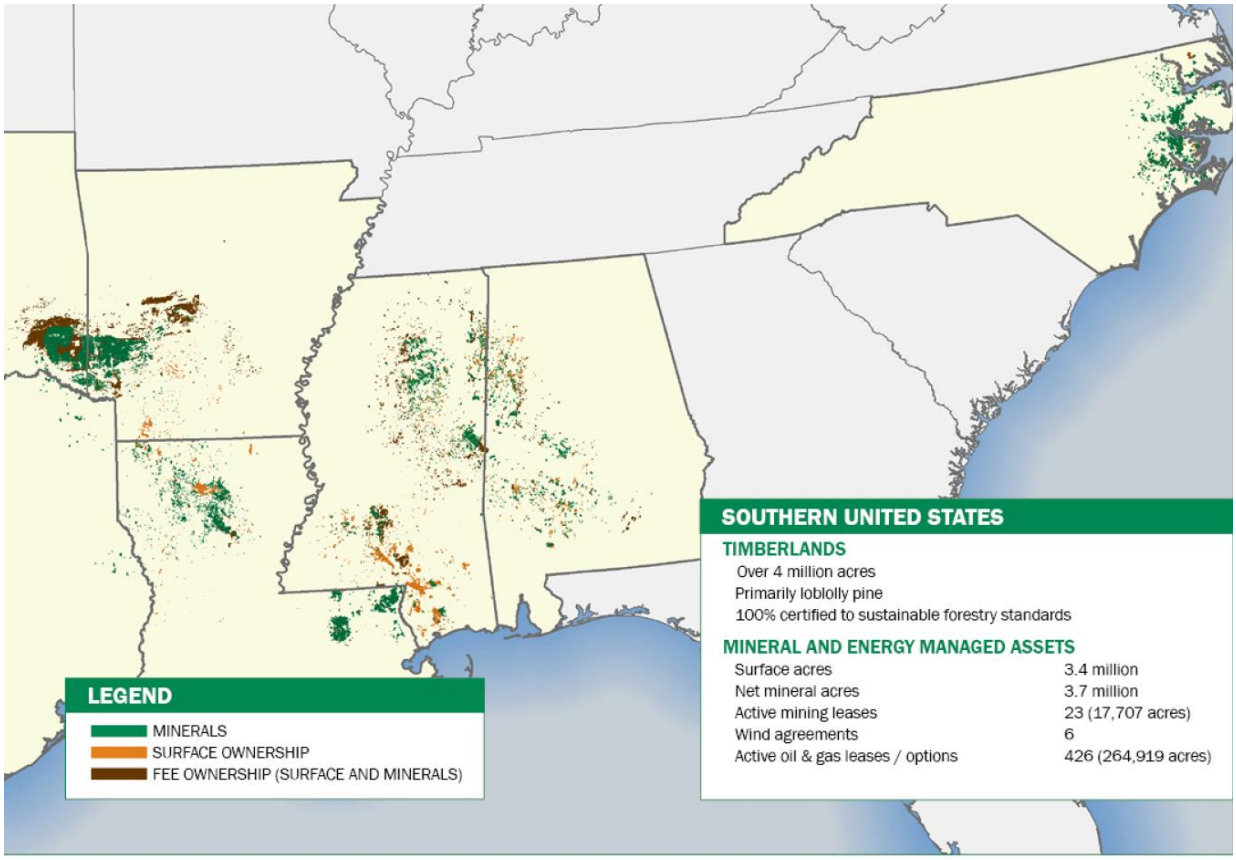
Weyerhaeuser Distribution Center Supply Chain

Weyerhaeuser also operates a Georgia distribution center in Dacula that receives wood products from surrounding states for distribution throughout Georgia (as shown by dashed green lines on Figure 3.4). Since the wood product manufacturing plants in Valdosta and Colbert are now closed, it is assumed that the finished products are sourced from other southeast states such as Alabama. Finished products are transported by trucks because they are smaller size, higher in value, and more time-sensitive than raw products, having to respond to the sequenced production needs of customers, notably the construction industry.

Weyerhaeuser Use of the Regional Transportation system

Trucks and rail are likely used to transport harvested logs from timberlands in North Carolina and Alabama (see below) to the two mill locations.

Figure 5-10 Weyerhaeuser Timberlands in the Southern U.S.



Source: Weyerhaeuser Factbook, 2015

The movement of logs and semi-finished products on rail are handled by Class I and shortline railroads between the proceeding origin and destination pairs: Alabama and Oglethorpe (Norfolk Southern or Georgia Southwestern Railways); Oglethorpe and Savannah (Georgia Central Railway, and Norfolk Southern); North Carolina and Oglethorpe (mainly Norfolk Southern); and North Carolina and Savannah (CSXT). Capacity or service changes on any one of the rail lines could potentially affect the operations of the Weyerhaeuser supply chain.

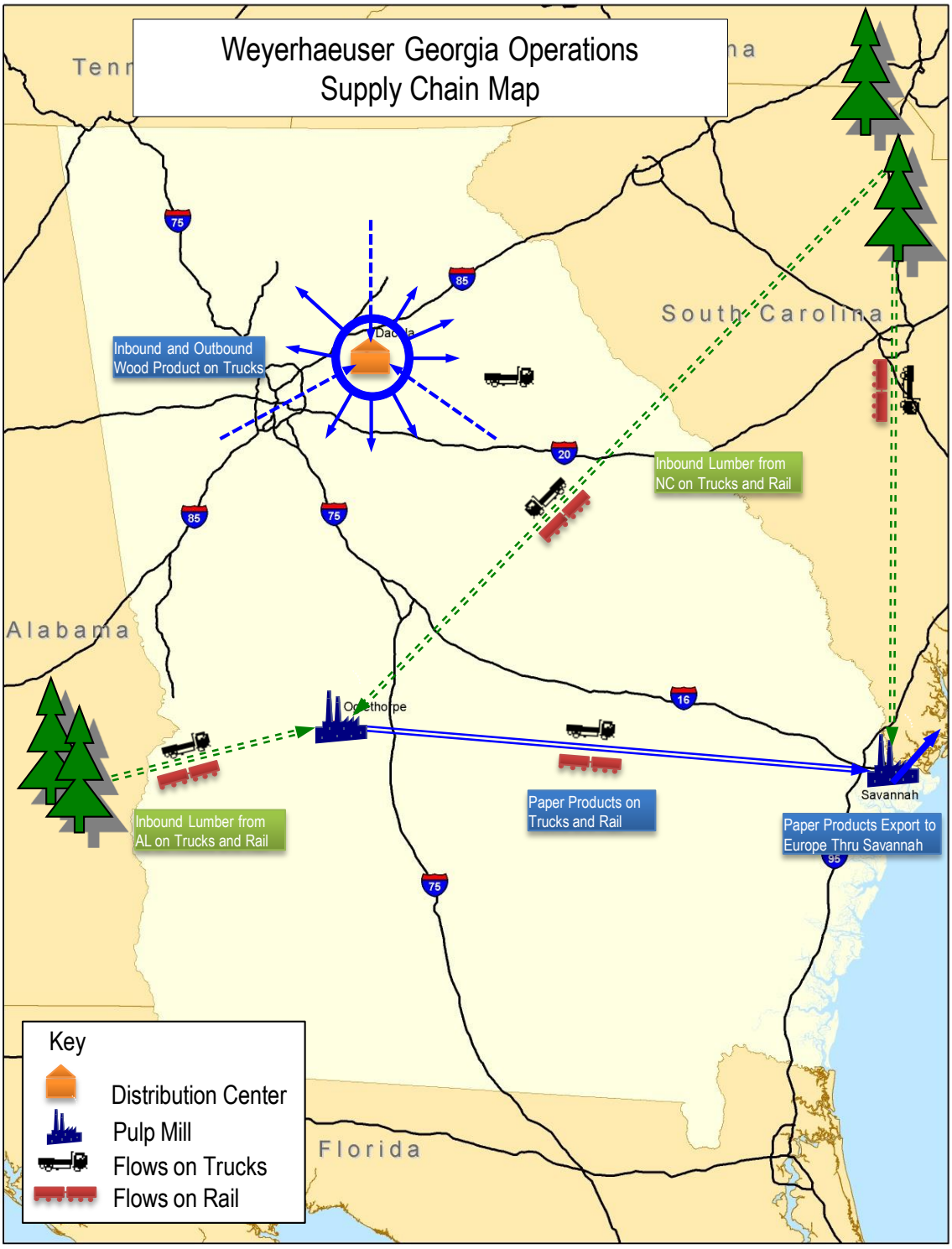
Trucking is the primary mode of transportation for Weyerhaeuser, as the company operates a fleet of almost 300 trucks that collectively travel more than 10 million miles in the country on an annual basis. From North Carolina to Savannah, trucks can take I-95, where current congestion levels are low and will only worsen slightly by 2050. From North Carolina to Oglethorpe, the trucks use I-20, several secondary roads and then I-75, where congestion levels also currently are low and are not expected to change dramatically in the future.

Logs shipped between Alabama and Oglethorpe on the other hand is entirely done on secondary roads, which can be difficult to navigate and results in longer travel times. Travel to Savannah from Oglethorpe is mainly along I-16 which remains relatively uncongested. Improvements on the secondary roads can potentially benefit Weyerhaeuser's operations as it would other shippers transporting goods to or from central and southwest Georgia to Alabama.

The trucks traveling to and from the Dacula, Georgia distribution center, however, are more affected by the transportation system's reliability, as proximity to Atlanta can translate to more congestion causing disruption in the supply chain. Thus, reducing congestion in the Atlanta metro area and increasing the use of off-peak deliveries would offer potential to benefit the operations of the distribution center.

In summary, Weyerhaeuser operates a very efficient set of supply chains in Georgia, with strategically located distribution centers (proximity to the large Atlanta consumer market), pulp mills (proximity to timber sources and a deep sea port for exports overseas). Although Weyerhaeuser does not have major issues with the transportation system in Georgia, improvements on secondary roads connecting to Alabama and reducing congestion in metro Atlanta could foster support greater efficiency, improve timeliness, and yield cost savings.

Figure 5-11 Supply Chain for Weyerhaeuser Georgia Operations



IMPORTANT CORRIDORS FOR ITS FORESTRY INDUSTRY

Due to the location of forests throughout the state and the location of wood mills across the state, it is not a surprise that forestry industry activities occur across the entire state. Therefore, it is likely that the forestry industry relies on a range of roads across the state.

The emerging wood products industry is focused on the development of energy primarily using wood pellets. These pellets are in demand across the U.S. and throughout the world due to their relatively low price and their status as a renewable energy source. The vast majority of the current and announced energy-related mills are in the southeastern portion of the state -- the area bounded by I-16, I-75, the Georgia-Florida border, and the Atlantic coast.

This concentration of energy-related facilities is likely due to the availability of raw logs in this region combined with the proximity to the Port of Savannah, which provides easy access to international customers where demand for wood pellets is particularly large. Additionally, the Brunswick Port also exports wood pellets in bulk and the proximity to this port is also available from the southeast Georgia area.

The corridors for the wood products produced in southeastern Georgia are:

- I-75 to access the Midwest and Central Florida; I-16 to connect to the Port of Savannah and I-95 to connect with coastal Georgia and Florida.
- US 82, which connects southeast Georgia to I-75 at Tifton to go to points north and connects southeast Georgia to the Brunswick Port for export shipments.
- US 84, which connects southeast Georgia to I-75 at Valdosta to go to points south and is used as one of the roadways to go to the Port of Savannah.
- US 441, which connects southeast Georgia to I-16 to go to points further west and north. It also connects southeast Georgia to US 82 and US 84 to meet with I-75 and travel to points connected via this Interstate.

The GDOT Freight and Logistics Plan analyzed each of these corridors using the statewide travel demand model and determined that I-16, and most likely I-95, in their existing configurations should both should have sufficient long-term capacity through 2050 to handle projected increases in volumes from autos and trucks; interchange bottlenecks identified in the Freight and Logistics Plan are still important operational projects to pursue.

I-75 south of Macon should have sufficient long-term capacity through the year 2050, however between Macon and Chattanooga future capacity and operations needs exist.

The GDOT Freight and Logistics Plan also considered rural corridors, including US 82, US 84, and US 441. This plan identified US 84 as an important freight corridor based on current total truck volumes and connections to key facilities.

GDOT is in the process of completing the statewide four-laning of this corridor throughout the state. The segment between Waycross and Homerville remains to be widened and could be considered an important segment for the forestry industry.

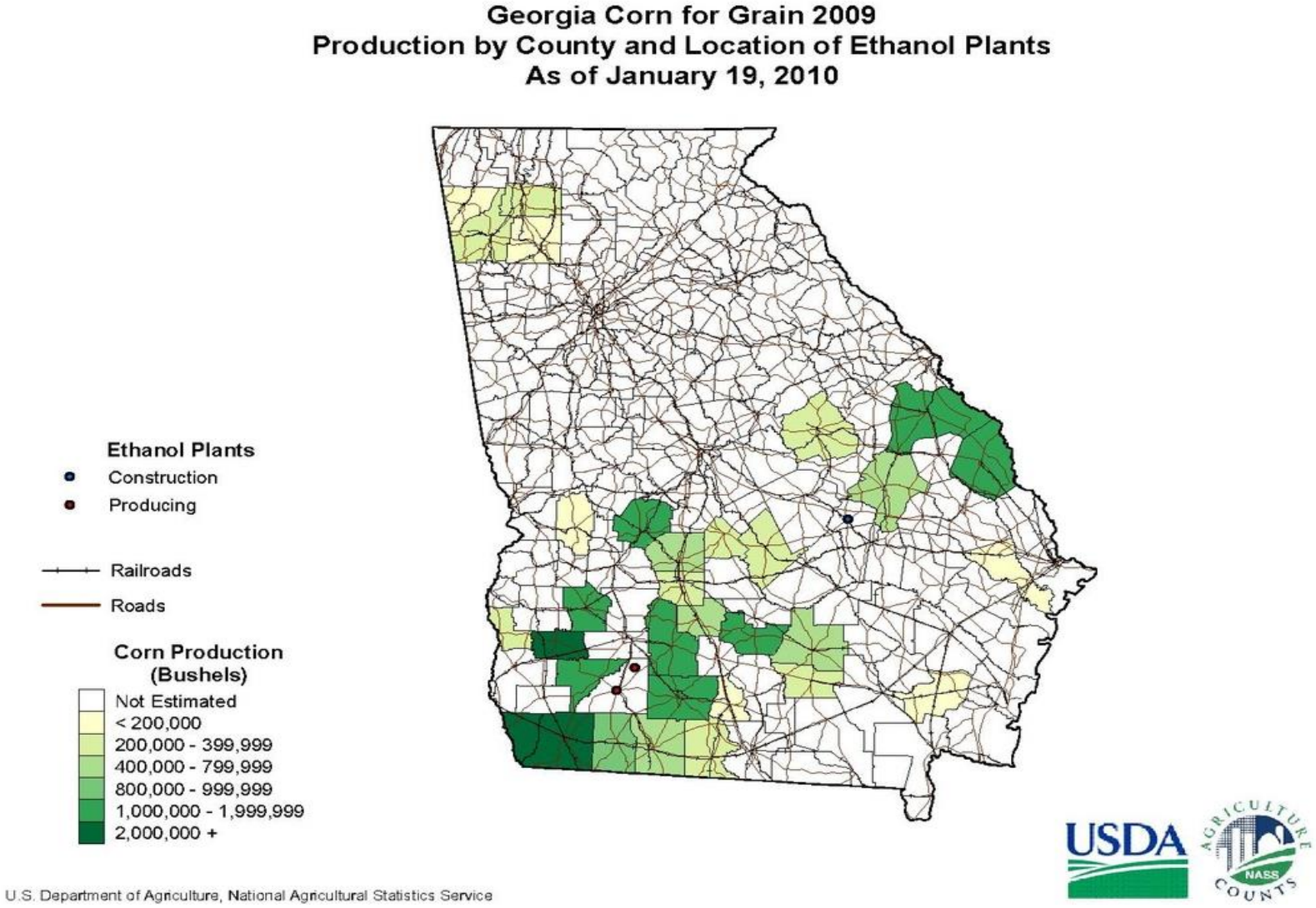
All of US 82 in Georgia has already been widened to a four-lane facility, which allows it to operate at a very good level of service. The GDOT statewide travel demand model also indicates that it will continue to operate well through the year 2050.

US 441 is also an important freight corridor for the forestry industry. In southeast Georgia, portions of US 441 are currently under development to be widened to four lanes. A small portion of the corridor is currently four lanes in southeast Georgia; the remaining sections are being developed as for four lanes in the future (either under right-of-way acquisition or under preliminary engineering for development). The GDOT Freight and Logistics Plan identified the portion of US 441 between I-16 and I-85 as especially important freight corridor based on connectivity between key locations in the state along with truck volumes, as well as providing an alternative east side "bypass" around metro Atlanta. In addition, this section will provide improved access for a new biofuel plan in near Athens that exports its product from the Port of Savannah.[38] Improving US 441 from I-85 to the Georgia-Florida border could create significantly improved connectivity to I-85 and the northeast portion of the country for wood products developed in Georgia.

[38] www.bizjournals.com/atlanta/news/2014/07/17/e-pellets-buys-athens-mill-for-13-million.html

IMPORTANT GEORGIA CORRIDORS FOR ITS ETHANOL INDUSTRY

Ethanol production is a growing industry in the state. As shown below, most ethanol production is focused in the southern Georgia (southwest quadrant, west of I-75). There is also a location very near I-16.



The figure also shows the locations are relatively near to I-75 and very near I-16, so these two interstates are important corridors to serve these industries. In addition, in southwest Georgia several locations are proximal to State Route 133 which provides access to I-75 for destinations in Florida or along the I-10 corridor (the nearest east-west interstate route in the region). For this reason, State Route 133 is important to provide this area with access to I-75.

Appendix A

Table 5.7 Georgia Statewide Freight and Logistics Plan
Scenario Planning: "Alternative Futures"

Factors Affecting Goods Movement			Low Freight Demand Scenario		Medium Freight Demand Scenario		High Freight Demand Scenario	
			Trend	**Freight Implications**	**Trend**	**Freight Implications**	**Trend**	**Freight Implications**
Economic Factors	Consumption	Population	Low growth 51 percent. Less international in-migration. Some domestic out-migration.	Freight demand declines. Tonnage grows about 4 percent by 2050.	Moderate growth 82 percent. Less international in-migration. Some domestic in-migration.	Freight demand grows apace with economy. Tonnage grows about 90 percent by 2050.	High growth 138 percent. Strong international and domestic in-migration.	Freight demand grows faster than economy. Tonnage grows about 314 percent by 2050.
		Households	Slight decrease.		Small increase.		Moderate increase.	
		Income	Flat or declining household and personal incomes.		Modest growth in household and personal incomes.		Significantly more disposable income and affluent households.	
		Lifestyle	Older population. Smaller working-age population. Less consumption		Older population. Greener lifestyle.		Older population. "Greener" lifestyle. More leisure expenditures.	
	Production	GSP	38 percent	Less high-value, time-sensitive freight.	139 percent	More high-value, time-sensitive freight.	432 percent	More high-value, time-sensitive freight.
		Industries	Industries less competitive. Decline in mfg. Continuing shift to services.		Some growth in higher-tech manufacturing, construction sectors. Continuing shift to services.		Strong shift toward high-tech manufacturing. Growth in construction, leisure/hospitality and retail. Continuing shift to services.	
		Technology	Limited capital investment.		Moderate investment in automation.		High investment in automation.	
		Labor	Lower wages. High unemployment.		Relatively low labor costs. Underemployment.		Near full employment. Rising labor costs.	
		Energy	Steady increase in real energy costs.	Diversion from long-haul truck to IMX rail. More DCs.	Steady increase in real energy costs.	Diversion from long-haul truck to IMX rail. More DCs.	Stronger and more volatile increases in real energy costs. More alternative energy sources.	Diversion from long-haul truck to IMX rail. More DCs.
	Trade	Demand	Pace of globalization declines due to political instability and low GDP growth rates.	Shrinking trade volumes through Savannah and Brunswick terminals.	Continuing globalization. Slow return to long-term trend.	Increasing trade volumes through Savannah and Brunswick terminals.	Strong globalization. Low dollar value encourages international trade.	High and relatively balanced trade volumes through Savannah and Brunswick terminals.
		Trade Partners/ Lanes	Greater diversity of trading partners.		Greater diversity of trading partners. Expanding exports.		Greater diversity of trading partners. Expanding exports.	
	Economic Geography	Land Use	Slowing urbanization. Some growth in Atlanta area with in-migration for service jobs.	More truck VMT in Atlanta metro area. Rest of state in decline	Increasing urbanization, primarily in Atlanta area.	More truck VMT in urban area and mega-region.	Increasing urbanization. Growth in all metro areas across state.	Significantly more truck VMT in urban area and throughout state and megaregion.
			Slow ex-urbanization of distribution centers.		Continued ex-urbanization of distribution centers.		Continued ex-urbanization of distribution centers.	

Factors Affecting Goods Movement			Low Freight Demand Scenario		Medium Freight Demand Scenario		High Freight Demand Scenario	
			Trend	**Freight Implications**	**Trend**	**Freight Implications**	**Trend**	**Freight Implications**
Logistics Factors		Supply Chains	More robust (balancing JIT with JIC).	Travel time, reliability, and cost of trucking remain important. Focus on cost reduction.	More robust (balancing JIT with JIC).	Travel time, reliability, and cost of trucking important.	More robust (balancing JIT with JIC).	Travel time, reliability, and cost of trucking remain important.
		Sourcing	Continued globalization. Limited near- and in-sourcing.	Georgia retains distribution industries.	Continued globalization. Selective near- and in-sourcing.	Atlanta region continues as distribution and manufacturing center.	Continued globalization. Selective near- and in-sourcing.	Georgia becomes major high-tech manufacturing source.
		Packaging	Continued containerization.	More intermodal freight moves.	Continued containerization.	More intermodal freight moves.	Continued containerization.	More intermodal freight moves.
		Networks	Consolidation of existing DCs to compensate for lower volumes.	More DCs supplied by IMX rail.	Decentralization of DCs to serve higher-density markets.	More regional and local truck traffic.	Aggressive expansion and decentralization of DCs to serve higher-density markets.	More out-state DCs and IMX terminals; More statewide and local truck traffic.
Transportation Factors	Motor Carriers/ Highways	Business	Consolidation.	More efficient routing and shipment tracking.	Consolidation.	More efficient routing and shipment tracking.	Consolidation.	More efficient routing and shipment tracking.
		Services	More IT.		More IT.		More IT.	
		Traffic Volume	Flat or declining.	707 million tons. $2,230 billion.	Moderate growth.	1,279 million tons. $5,505 billion.	Strong growth	2,737 million tons. $18,177 billion.
		Trucks	Conversion of urban trucks to hybrids.	Limited greening of urban truck fleets.	Conversion of urban trucks to hybrids.	Some greening of urban truck fleets.	Conversion of urban trucks to hybrids.	Greening of urban truck fleets.
		Highways	Increase in size and weight of long-haul trucks.	More truck VMT but limited general congestion.	Increase in size and weight of long-haul trucks.	More truck VMT and more general congestion.	Increase in size and weight of long-haul trucks.	Significantly more truck VMT and more general congestion.
			Disinvestment in highways.	More truck VMT but limited general congestion. Less long-haul truck traffic. More regional and local drayage traffic.	Limited investment in highways.	More truck VMT and more general congestion. Less long-haul truck traffic. More regional and local drayage traffic.	Increased investment in highways.	Significantly more truck VMT and more general congestion. Less long-haul truck traffic. Significantly more regional and local drayage traffic.
	Railroads/ Rail Lines	Business	Short-line RRs fold.	IMX terminals consolidated. Carload services reduced. Number of captive shippers increase.	Class I RRs resume growth. Short-line RR industry stabilizes.	Moderate growth in IMX services. Carload services retained.	Class I RRs expand. Short-line RRs industry grows.	Strong growth in IMX services.
		Services	RRs cut back on marginal carload and IMX services.		Class I RRs expand long-haul IMX services and terminals.		Class I RRs enter midhaul IMX market. Short-line RRs enter IMX business.	
		Traffic Volume	Declining.	179 million tons (154 million carload tons, 25 million intermodal tons). $245 billion.	Moderate growth.	335 million tons (279 million carload tons, 56 million intermodal tons). $525 billion.	Strong growth.	786 million tons (662 million carload tons, 124 million intermodal tons). $1,362 billion.
		Rail Lines	Investment declines to match market growth.	Potential for abandonment of low-volume lines.	Moderate to strong investment by Class Is; continuing choke points.	Limited capacity; competition for time/space slots with pax rail	Increased investment to match market growth; new ex-urban terminals; some urban terminal retrofits.	Limited capacity in urban areas; increasing competition for time/space slots with pax rail.

Factors Affecting Goods Movement			Low Freight Demand Scenario		Medium Freight Demand Scenario		High Freight Demand Scenario	
			Trend	Freight Implications	Trend	Freight Implications	Trend	Freight Implications
Transportation Factors (continued)	Shipping Lines/ Marine Ports	Business	Consolidation of liner sector.	Savannah in competition for limited Southeast port traffic.	Consolidation of liner sector.	More direct competition with New York, Virginia, North Carolina, South Carolina, and Florida ports.	Consolidation of liner sector	Savannah emerges as major load-center port for Southeast
		Services	Consolidation to two-three East Coast ports	3.6 million TEUs.	Consolidation to two-three East Coast ports.	6.5 million TEUs.	Higher traffic permits economical expansion of a larger number of Atlantic ports.	15 million TEUs.
		Traffic Volume	Declining or little growth.		Moderate growth.		Strong growth.	
		Ships	Mostly feeder vessels calling at Savannah.	Limited increase in regional and local drayage traffic.	More high-TEU capacity vessels calling at Savannah.	More regional and local drayage traffic.	Significantly more high-TEU capacity vessels calling at Savannah.	Major growth in regional and local drayage traffic.
		Terminals						
Policy, Regulation, and Governance Factors		National	Reauthorization funds HTF at 2008 levels.	Limited funding for highways and freight projects of regional and national significance. Continuing devolution of funding responsibility to states.	Reauthorization funds HTF with limited increases and creates largely unfunded national freight program.	Some funding for highways and freight projects of regional and national significance.	Reauthorization funds HTF with moderate increases and creates national freight program.	Moderate funding for highways and freight projects of regional and national significance.
		State	Limited regulation of GHG emissions.	Some urban trucks (MDV) go hybrid, no change in VMT. Cost pressures on long-haul trucks (HDV) forces some freight to rail.	Increased regulation of GHG emissions.	More urban trucks (MDV) go hybrid, no change in VMT. Cost pressures on long-haul trucks (HDV) forces some freight to rail.	Increased regulation of GHG emissions.	Most urban trucks (MDV) go hybrid, no change in VMT. Capacity pressures on long-haul trucks (HDV) forces more freight to rail.
			Less local financing of transportation sales taxes, tolls, etc.).	Limited state investment in freight infrastructure.	More local financing of transportation (sales taxes, tolls, etc.).	Some limited expansion of investment capacity.	Substantial local financing of transportation (sales taxes, tolls, etc.).	Expansion of investment capacity.
		City/Local	Limited coordination of transportation and economic development planning.	Less attention to freight transportation at regional level.	Better coordination of transportation and economic development planning.	More attention to freight transportation at regional level.	Better coordination of transportation and economic development planning.	More attention to freight transportation at regional level.
			Focus on jobs of any kind.	"Beggar thy neighbor" economic development policies.	Focus on "livability."	"Get the trucks off the road."	Focus on "livability."	"Get the trucks off the road and out of my neighborhood."