Chapter 3

Appalachian Trade Perspective

3.0 Appalachian Trade Perspective

The previous sections reviewed the history of the growth in world trade, the structural drivers of that growth, and the outlook for the continuation of these fundamental drivers of growth beyond the current recessionary period.

The following section will focus on a closer look at international trade characteristics and patterns as they specifically affect the Appalachian Region. The objective of this review is to identify and understand these characteristics and patterns as a foundation to assist in the identification of opportunities for transportation and trade development in the Region that can capitalize on the global and national trade trends in order to create economic development.

3.1 Demographics and Consumption

As indicated earlier, demographics are a key structural driver of the growth of trade. Population trends related to the aging of the population have driven labor conditions that have supported the outsourcing of manufacturing from the US. Population density impacts trade patterns in other ways including its impact on consumption patterns and the resulting location of transportation and distribution facilities.

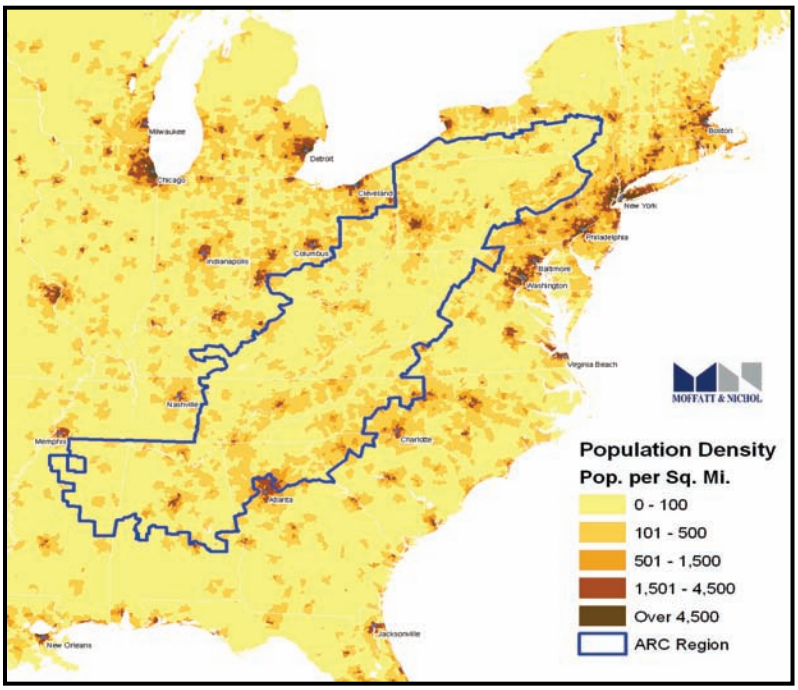

Figure 3.1: Population Density

Source: US Census Bureau

Figure 3.1 displays population density in the Appalachian Region at a county level. While the Region has a number of dense population centers on its periphery, it has relatively few such dense centers within its boundary. On the west the Region is bounded by Memphis, Nashville, Cincinnati, and Columbus, with the Northeast corridor, Charlotte, and Atlanta on the east. Within the Region, the major centers of population include Birmingham, Chattanooga, Knoxville and Pittsburgh.

Figure 3.2 displays the magnitude of retail sales by county and shows that retail consumption patterns, not surprisingly, follow population density. The value of retail sales in this analysis has been adjusted to reflect sales that correspond to commodities that might be shipped as containerized cargo. Gasoline sales, for example, are not included.

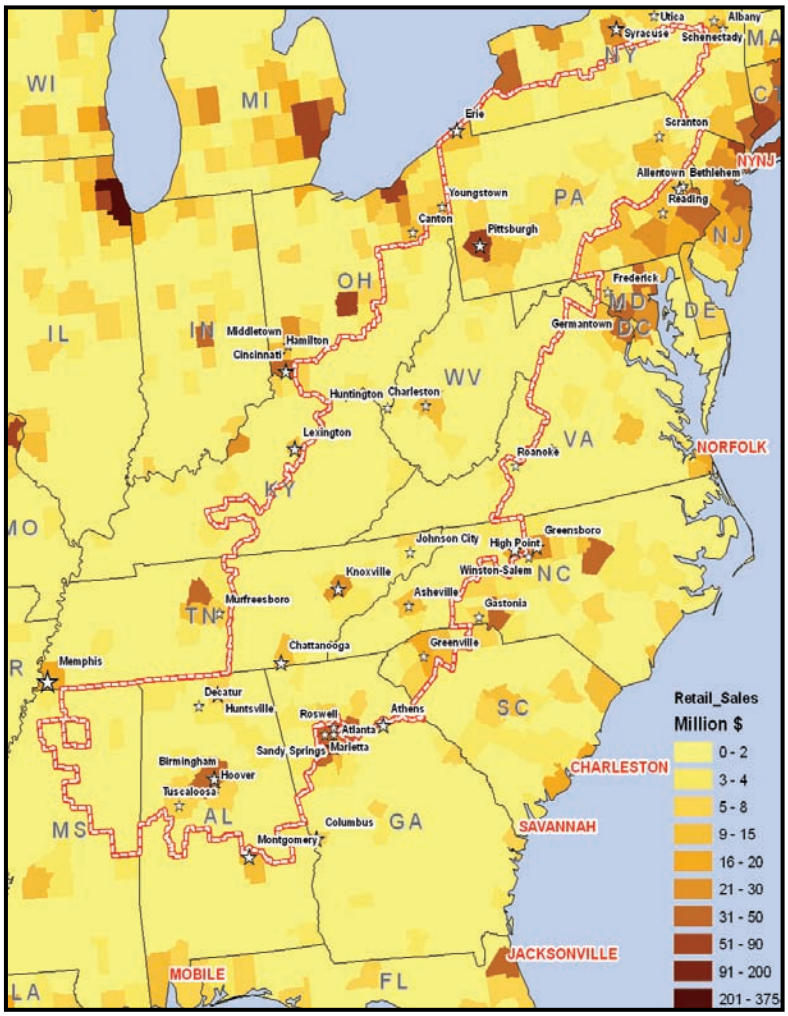

Figure 3.2: Retail Sales

Source: US Census Bureau

Similar patterns are seen in examining the geographic distribution of warehouse business revenue, as displayed in the Figure 3.3.

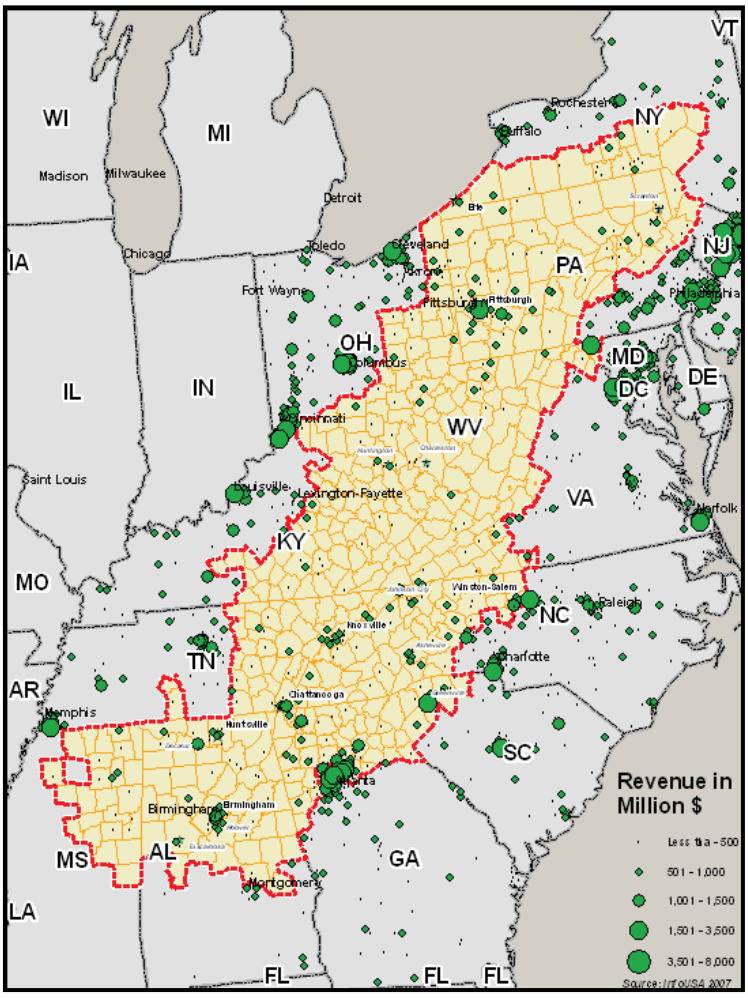

Figure 3.3: Density of Warehouse Businesses

Source: InfoUSA

In evaluating future development opportunities it is appropriate to also consider expected growth in population (and the consequent growth in consumption and business revenue.) Figures 3.4 and 3.5 display population growth in terms of absolute growth, as well as rates of growth on a county level, based on projections by the various states.

These projections are largely consistent with the national demographic trends discussed earlier. Population growth is higher in the southern parts of the Region, and particularly strong in counties bordering rapidly growing Atlanta, for example.

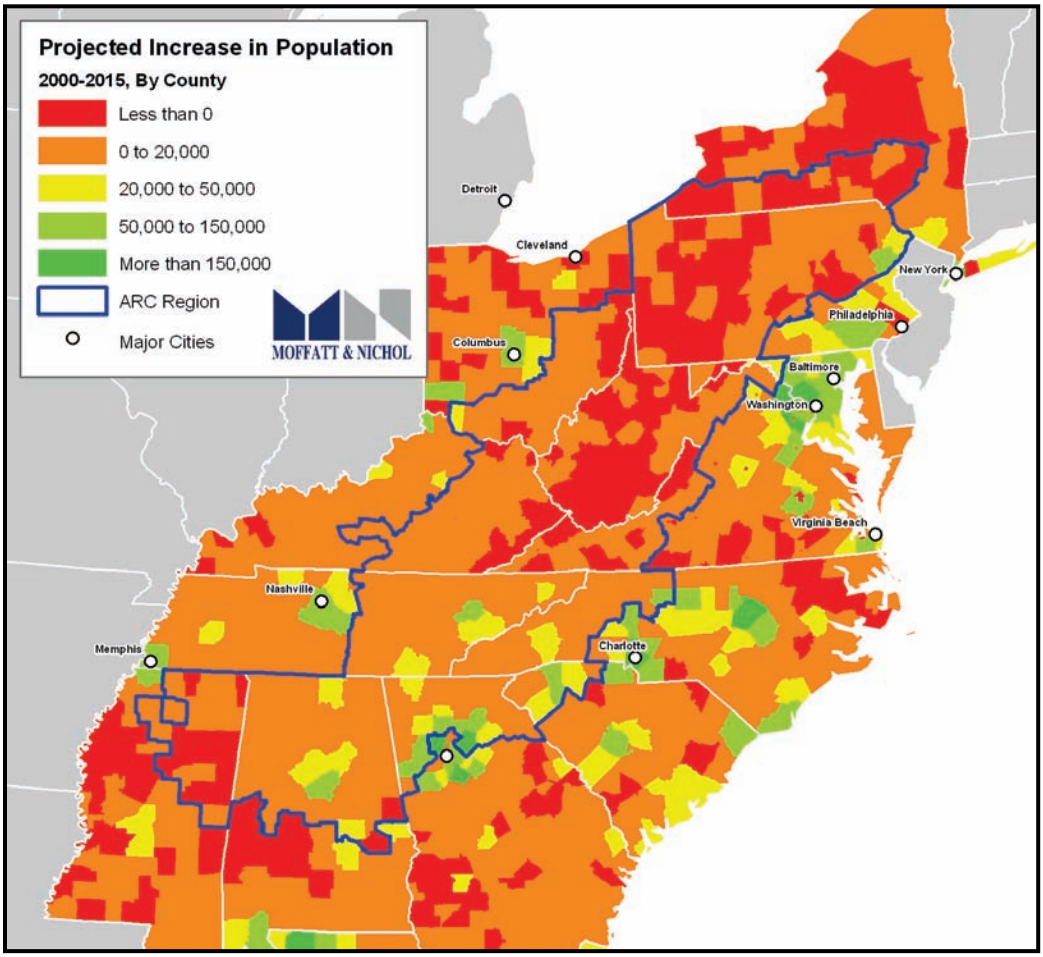

Figure 3.4: Projected Population Increase

Source: US Census Bureau

There is also growth in counties bordering the Region in the mid-Atlantic, northern Virginia area, as well as the Charlotte area. Similar patterns are evident in the Regional boundary areas near Memphis and Nashville. In the northern portion of the Region population growth is generally stagnant or even declining.

These population, and related consumption patterns and projections, can represent challenges for certain kinds of transportation and logistics development. However, there may be opportunities to develop facilities within the Region to serve the more densely populated and/or faster growing regions near the Regional boundary. International and regional distribution centers in northeastern Pennsylvania, for example, can serve the NY/NJ metropolitan region, bringing well-paying warehouse and transportation employment opportunities. With appropriate development, including additional transportation infrastructure investment, similar opportunities may exist in other parts of the Region. In addition, while the outlook for stagnant population and consumption growth can be viewed as a

challenge to certain types of development, the investment in enhanced freight mobility may have the effect of changing the growth outlook. The goal of enhancing these growth rates through transportation investments is consistent with the mission of the Appalachian Regional Commission as reflected by its investment in the ADHS.

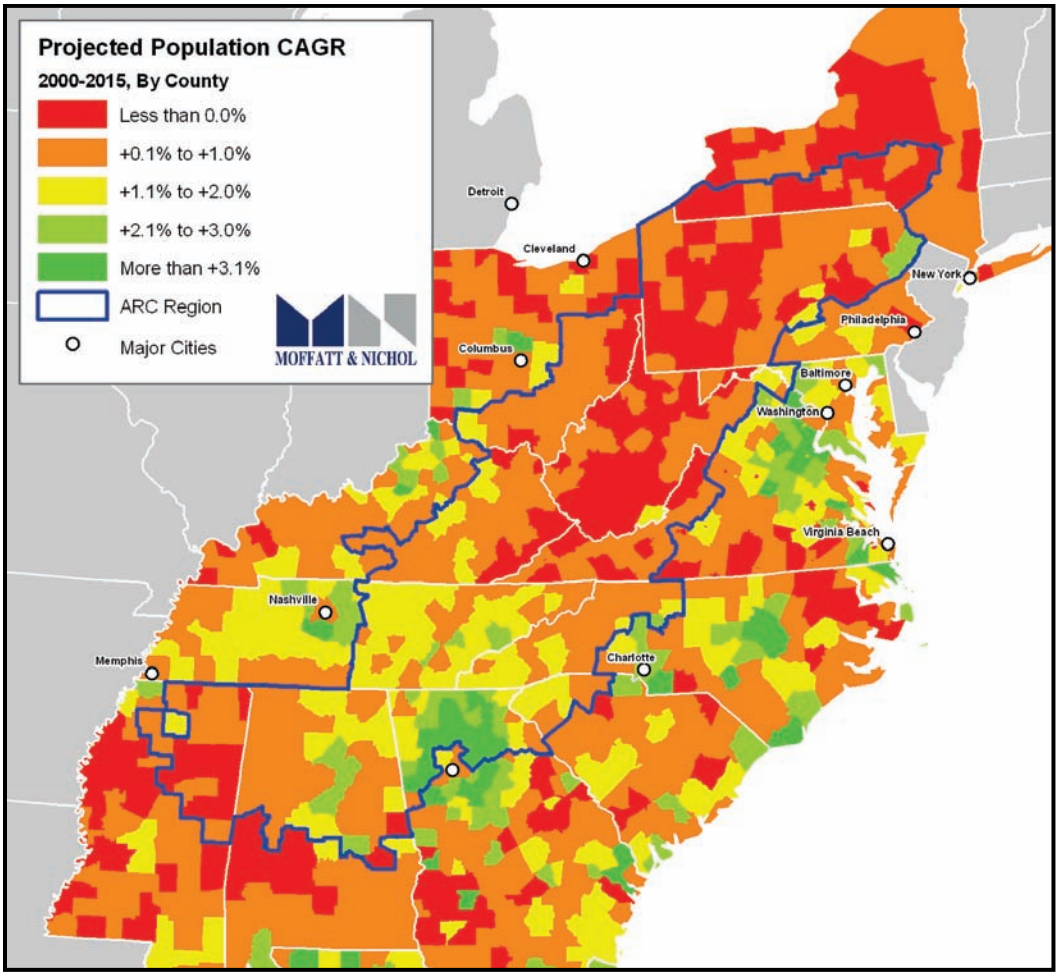

Figure 3.5: Projected Population Growth Rate

Source: US Census Bureau

3.2 Regional Transportation Infrastructure

Appalachia is served by a collection of highway, rail and inland waterway systems. These include the strategic highway system made up of the ADHS and connecting interstate highway routes in the Region. There are several other significant freight transportation resources to be considered in developing strategies and project proposals for enhancing freight mobility, particularly intermodal freight that would be utilizing the coastal deep water ports. These include the Region's strategic rail system, and the strategic waterway system.

3.3 Strategic Highway System

Appalachia's Strategic Highway System is comprised of the 3090 mile Appalachian Development Highway System (ADHS) and key interstate highway connections. ADHS is the first highway system in America authorized by Congress for the purpose of stimulating economic development. It features 31 individual corridors located throughout the 13 Appalachian states and is now approximately 85% complete. Appalachia's strategic highway system helps link the Region to key external markets and enhances the flow of commerce, opening often-isolated areas to new economic opportunity. The system also helps facilitate commutation to and from work and supports delivery of key social services to the residents of Appalachia.

Figure 3.6: Strategic Highway System

Importantly, the benefits of the Region's Strategic Highway System extend far beyond the boundaries of Appalachia. The system serves as an important part of longer-distance trade corridors extending to, from, and through the Region, providing important reliability, capacity and cost efficiency benefits to the entire nation. Appalachia's Strategic Highway System is illustrated in Figure 3.6.

3.4 Strategic Railway System

The "Strategic Railway System" of the Appalachian Region includes those mainline rail corridors providing the Region with key access to both domestic and international markets. While many of the routes were originally built to support mining and lumbering interests, the system today serves a diverse selection of both domestic and international commodities, including natural resources, manufactured goods, agricultural products, chemicals, and advanced technology components. Importantly, the Region's system of shortline railroads plays an important role in assuring continued access to these mainline rail corridors for hundreds of the Region's smaller towns and rural areas. Appalachia's Strategic Railway System is illustrated in Figure 3.7

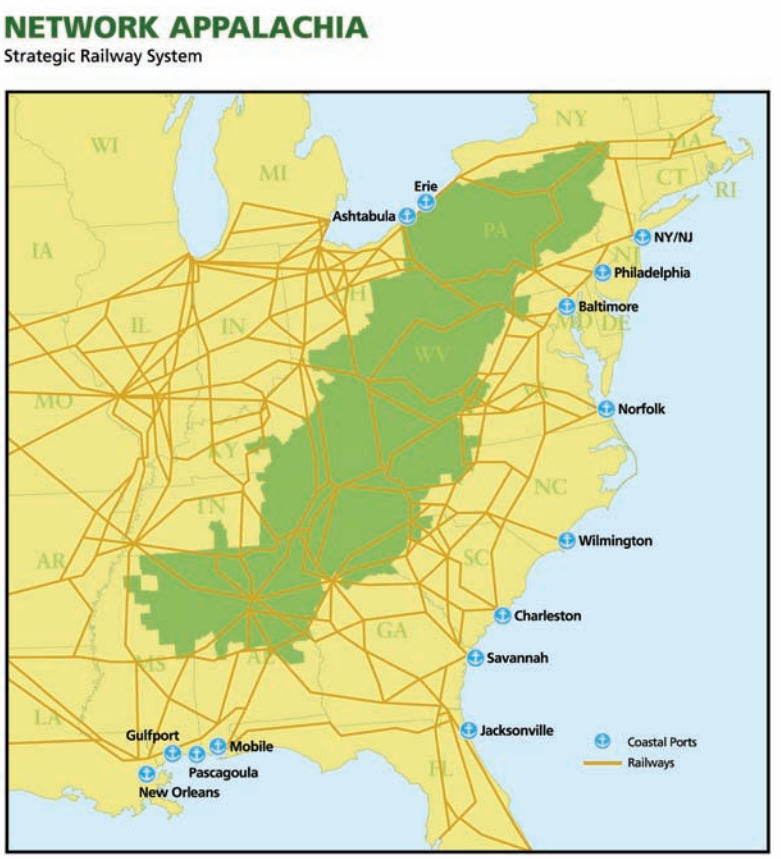

Figure 3.7: Strategic Railway System

Looking to the future, private and public sector interests are joining together in support of new emerging intermodal rail corridors that will significantly expand Appalachia's connections to both domestic and international markets. These emerging intermodal rail corridors improve access to key coastal ports and feature an expansion of new inland container ports throughout the Appalachian Region. These emerging corridors include the Norfolk Southern Heartland and

Crescent Corridor initiatives and the CSX National Gateway Corridor program. Figure 3.8 illustrates Appalachia's new emerging intermodal rail corridors.

Figure 3.8: Emerging Intermodal Rail Corridors

3.5 Strategic Waterway System

Appalachia benefits from a 1,500 mile network of inland waterways that include the Ohio River, the Tennessee River, the Cumberland River, and the Tennessee-Tombigbee Waterway. This system serves Pennsylvania, Ohio, West Virginia, Kentucky, Tennessee, Mississippi, Alabama, and northern Georgia. Historically the inland waterway system has primarily been used for the movement of large quantities of bulk commodities, raw materials and similar cargoes that require low cost transportation and can accept relatively slow transit times. Coal and petroleum (including crude oil and petroleum products) are the largest commodities by volume moving on the inland waterway system, followed by grain, aggregates, chemicals (including fertilizers) minerals, and products such as steel. The system is served by many terminals, including both private and public port facilities. Figure 3.9 illustrates Appalachia's Strategic Waterway System.

Figure 3.9: Strategic Waterway System

A recently updated report published by the Texas Transportation Institute for MARAD and the National Waterways Foundation indicates that in 2005 the inland waterways maintained by the U.S. Army Corps of Engineers handled over 624 million tons of freight resulting in an average transportation cost of $11/ton translating into more than $7 billion annually in transportation savings to America's economy. The report also estimated the public benefits of the entire National Waterway System in terms of congestion issues, emissions issues, energy efficiency, safety impacts and infrastructure impacts. Among the results of this study are:

- Major waterways help avoid the addition of 58 million truck trips to our highway systems annually.
- Cargo towed on the inland waterway system generates 19.27 tons of greenhouse gases per million ton-miles, while rail freight and truck freight generate 26.88 tons and 71.61 tons respectively.
- Inland freight towing achieves 576 miles per gallon of fuel per ton of cargo as compared to 413 miles for rail and 155 for truck.

- Inland marine freight has only one fatality per billion ton-miles while rail has 22.7 and truck has 155.

There is a growing interest to more fully utilize the inland waterway system through moving containerized cargo along these marine corridors. Such container-on-barge services are common throughout Europe and Asia and are generating increased support in the United States as interest grows to find new transportation capacity and to achieve new transportation-related energy and environmental benefits. Encouraging such development, the U. S. Department of Transportation has launched its Marine Highway Corridor program, aimed at utilizing inland waterway capacity to help alleviate highway congestion along a growing number of interstate highway corridors. Appalachia's inland waterway interests are banding together to pursue such opportunities through an Intermodal Marine Highway Corridor, as illustrated in Figure 3.10 linking Pennsylvania, West Virginia and Ohio in the north to the Tenn-Tom Waterway serving Mississippi, Tennessee and Alabama and the new coastal container port in Mobile, AL.

Figure 3.10: Emerging Intermodal Marine Highway Corridor

3.6 Inland Ports

In addition to Appalachia's key highway, rail and waterway corridors, the Region is also served by a variety of transportation and logistics centers, referred to as inland ports that provide a direct link between Appalachia's businesses and its transportation system. These inland ports include both facilities designed to expedite the transfer and movement of containerized cargo, often referred to as Intermodal Container Transfer Facilities (ICTF), and facilities utilized to serve non-containerized cargo, often located in the Region's smaller towns and in rural areas. Regardless of design, these facilities help to streamline shipping costs for local businesses, thus enhancing their competitiveness. Because of such benefits, these facilities also support community efforts to attract new enterprise and employment.

3.7 Coastal Ports – Global Access

The strong historic growth of international trade and the fundamental structural drivers of this trade that are expected to continue after the current recessionary period have been discussed in earlier sections of this report. This growth trend of international containerized trade has had a significant impact on the transportation and logistics industry in the US presenting many challenges as well as opportunities, including development potential in the Appalachian Region.

The coastal deep water ports of the US that handle this containerized trade have experienced rapid growth in demand over the past several decades. As demand has grown, ports and other components of the transportation system have reacted by adding capacity to satisfy this growing demand. The railroads that transport many of the containers to and from inland locations, have been investing in new capacity, including the major emerging corridor projects discussed earlier. The growth of Asia as a source of a large share of imports has also had its effect. Many of the Asian imports destined for regions throughout the US arrive at west coast ports, including Los Angeles and Long Beach, which, until recently, have experienced some of the highest volume growth rates. The stress on port and rail infrastructure and labor at these ports has led to growing "all-water" ocean shipping services from Asia to the Gulf and East Coast ports. The Panama Canal is being expanded to accommodate this growth.

Ocean ports face some unique problems in handling growing volume demands. The relative scarcity of land adjacent to deep water makes adding acreage to existing ocean ports or developing new ocean ports environmentally sensitive and very costly. As volume at ocean ports increases, absent increases in acreage, there are only two alternatives for increasing capacity. Containers can be "turned-over" more rapidly - that is the time they spend dwelling at ports either waiting to be picked up for delivery to customers or loaded on ships - can be reduced. This is typically achieved by charging a higher rate for this dwell time – called demurrage. Or, containers being stored in the container yard can be stacked higher and closer together – that is the storage density can be increased. This is achieved at the expense of more costly equipment and more labor. Therefore, achieving higher container yard capacity comes at a cost to terminal operators and port authorities. There are other capacity limits at ports on the

water side, such as berth capacity, which is equally, if not more costly to address. On the land side, gate capacity and roadway capacity in the port vicinity and approaching the port can also become stressed with a variety of congestion and environmental challenges.

An alternative of moving containers off the port more quickly to increase capacity requires an inland storage and staging area for these containers – an inland port. This concept usually includes an intermodal rail facility and various other distribution and logistics functions. This may include warehousing, value-added facilities and transloading facilities to transfer cargo between international containers and domestic trucks or containers to serve the domestic customers. The Appalachian Region has locations that are potential sites for the development of these types of services. In the distribution economy, inland ports and distribution centers have become significant job creation and economic development generators. In addition to the opportunity for the development of new inland ports, the proximity of Appalachia to the coastal ports is an important variable in understanding and pursuing any development potential that relates to connectivity to the international economy, as shown in Figure 3.11.

Figure 3.11: Enhancing Access to International Ports

A first step in understanding the relationship of the Region to coastal ports is to examine origins and destinations of containerized cargo in and near the Region. The Journal of Commerce publishes data developed from Customs manifests for international trade through US ports. This data (Port Import Export Reporting System – PIERS) has been used to develop a data base of containerized trade in the Appalachian Region. Using the PIERS data, and statistically enhancing it to better identify inland origins and destination, a mapping of the total imports and exports of containerized international in the Region has been developed.

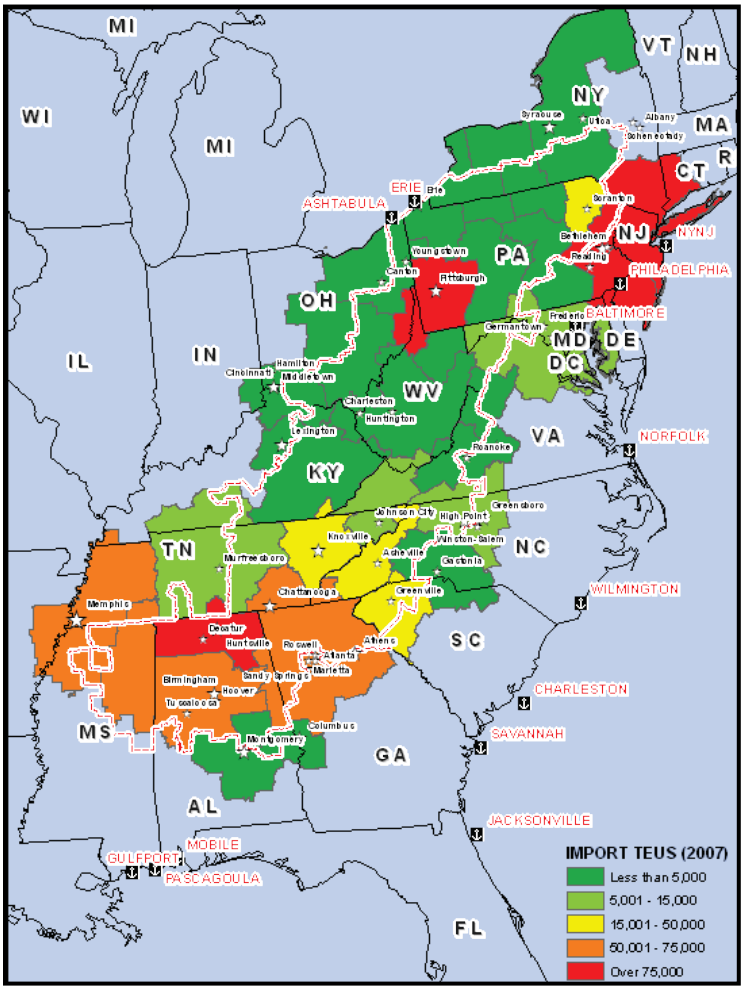

Figure 3.12: ARC 2007 Import Volumes

Figures 3.12 and 3.13, display the density of imports and exports at a BEA, (Bureau of Economic Analysis Region) level throughout Appalachia. Imports are typically shipped inland to centers of distribution resulting in high activity in a relatively few locations, generally close to population centers. However, some shipments do move directly to their ultimate destination. Exports are

much more widely distributed, following the locations of manufacturing and production locations. This difference in the origin and destinations of containers leads to issues in having sufficient empties available for exports. The containers are owned by the shipping lines and they bear the cost of repositioning the containers. The costs involved in getting empties to locations where exporters may need them might not be justified in some cases by the shipping rate that can be charged.

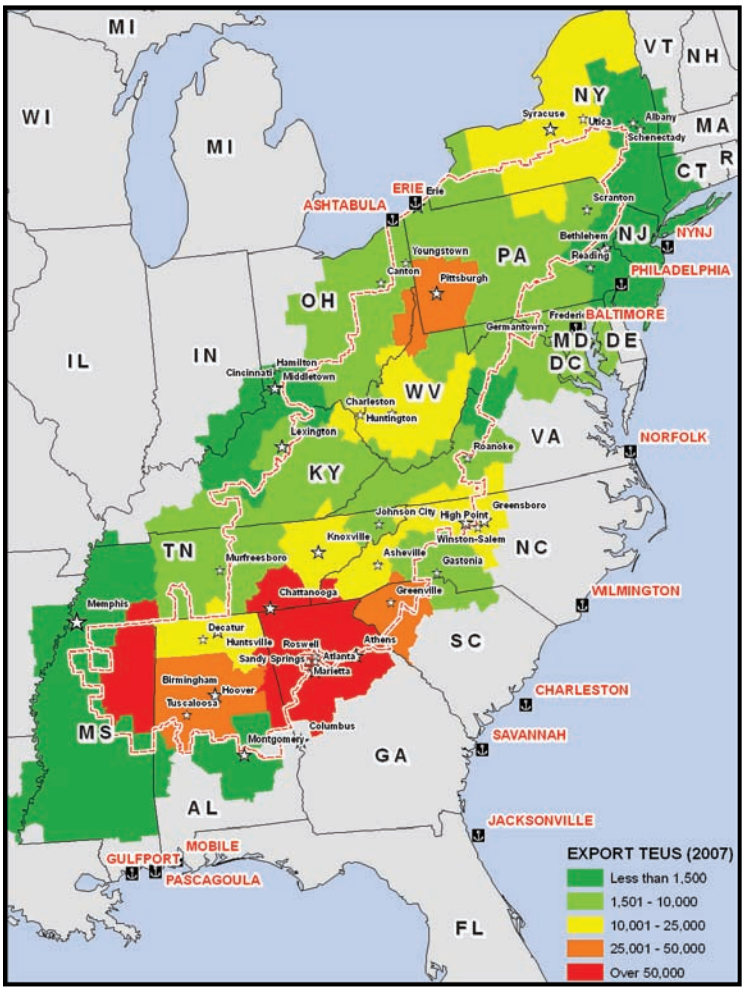

Figure 3.13: ARC 2007 Export Volumes

A summary of all imports and exports in the Appalachian Region by foreign trade region, commodity, shipper (company) and port of import/export is presented in Figure 3.14. It can be seen from these summaries that for 2007 North Asia was the dominant origin for imports with 65% of the imports in the Region, followed by Europe with 17%. For exports, North Asia was also the most popular foreign destination, although it did not dominate as greatly as on the import side. North Asia was the destination of 25% of the exports closely followed by Europe

Top ARC Imports by Trade Routes			
Rank	Trade Route	TEUS	Share
1	NORTH ASIA	355,800	65%
2	EUROPE	94,073	17%
3	SOUTH EAST ASIA	29,562	5%
4	MEDITERRANEAN	26,671	5%
5	EAST COAST OF SOUTH AMERICA	12,165	2%
	OTHERS	28,366	5%
	Total	546,636	100%

Top ARC Imports by Commodity			
Rank	Trade Route	TEUS	Share
1	AUTO PARTS	31,823	6%
2	FURNITURE	30,819	6%
3	MISCELLANEOUS GENERAL CARGO	25,676	5%
4	FOOTWARE	19,247	4%
5	AUTO & TRUCK, TIRE & TUBES	16,868	3%
	OTHERS	422,202	77%
	Total	546,636	100%

Top ARC Imports by Company			
Rank	COMPANY	TEUS	Share
1	ORDER	78,959	14%
2	DAIMLERCHRYSLER MFG INTL	14,928	3%
3	L G SOURCING	10,820	2%
4	ADIDAS	10,556	2%
5	RED BULL	8,148	1%
	OTHERS	423,225	77%
	Total	546,636	100%

Top ARC Imports by Port			
Rank	Trade Route	TEUS	Share
1	NEW YORK	156,597	29%
2	CHARLESTON	78,025	14%
3	SAVANNAH	73,073	13%
4	LOS ANGELES	65,413	12%
5	LONG BEACH	56,851	10%
	OTHERS	116,678	21%
	Total	546,636	100%

Top ARC Exports by Trade Routes			
Rank	Trade Route	TEUS	Share
1	NORTH ASIA	111,284	25%
2	EUROPE	110,573	24%
3	CARIBBEAN	75,442	17%
4	MEDITERRANEAN	43,517	10%
5	CENTRAL AMERICA	30,386	7%
	OTHERS	80,814	18%
	Total	452,016	100%

Top ARC Exports by Commodity			
Rank	Trade Route	TEUS	Share
1	SYNTHETIC RESINS	34,426	8%
2	PAPER & PAPERBOARD (+ WASTE)	30,651	7%
3	AUTO PARTS	17,935	4%
4	MISCELLANEOUS GENERAL CARGO	16,299	4%
5	FABRICS (+ RAW COTTON)	15,043	3%
	Others	337,661	75%
	Total	452,016	100%

Top ARC Exports by Company			
Rank	COMPANY	TEUS	Share
1	MERCEDES BENZ	14,169	3%
2	E I DUPONT DE NEMOURS	10,720	2%
3	ORDER	7,802	2%
4	R J REYNOLDS TOBACCO	6,106	1%
5	EXXON CHEMICAL	5,717	1%
	Others	407,503	90%
	Total	452,016	100%

Top ARC Exports by Port			
Rank	Trade Route	TEUS	Share
1	CHARLESTON	97,534	22%
2	HOUSTON	58,050	13%
3	SAVANNAH	51,846	11%
4	JACKSONVILLE	41,680	9%
5	NEW YORK	38,478	9%
	Others	164,429	36%
	Total	452,016	100%

Figure 3.14: Top ARC Import Volumes

with 24%. Imports to the Region were most likely to arrive through the port of NY/NJ, followed by Charleston and Savannah, with exports moving through Charleston, Houston and Savannah. Imported commodities include auto parts, furniture, footwear and other general cargo, while exports also include resins, waste paper, and also auto parts. The major companies identified for both imports and exports are consistent with the commodities, including auto companies, chemical companies, and consumer products.

It should be understood that the origin and destinations identified in these analyses are for the international containers themselves and not necessarily the ultimate destinations of the contents of the containers. For example, many international marine containers come to the Port of Savannah and are then transloaded into domestic vans or domestic containers at major international distribution centers in the immediate vicinity of the port. These “domesticized” products are then shipped by road or rail to regional distribution centers that ultimately supply retail stores. Much of these domestic shipments could be bound for the Appalachian Region. This phenomenon is less likely to occur on the export side, although there are cases where some products may be shipped in bulk to a central point where it is consolidated and stuffed into containers.

3.8 Connectivity: Inland and Coastal Links

Further analysis of the relationship between the various regions of Appalachia and the coastal ports that serve the inland regions can be aided through the identification of the most economical routing of international containerized cargo between foreign ports and domestic inland points. For this analysis a "Least Cost Market Area" (LCMA) is developed for each port. An LCMA analysis is based on estimating the total cost to deliver an import (or export) from the foreign port to each inland point (zip code) through each alternative domestic port. Each zip code is assigned to the least cost port and the collection of all the least cost zip codes for a particular port make up its LCMA. The cost estimation incorporates ocean freight costs, port

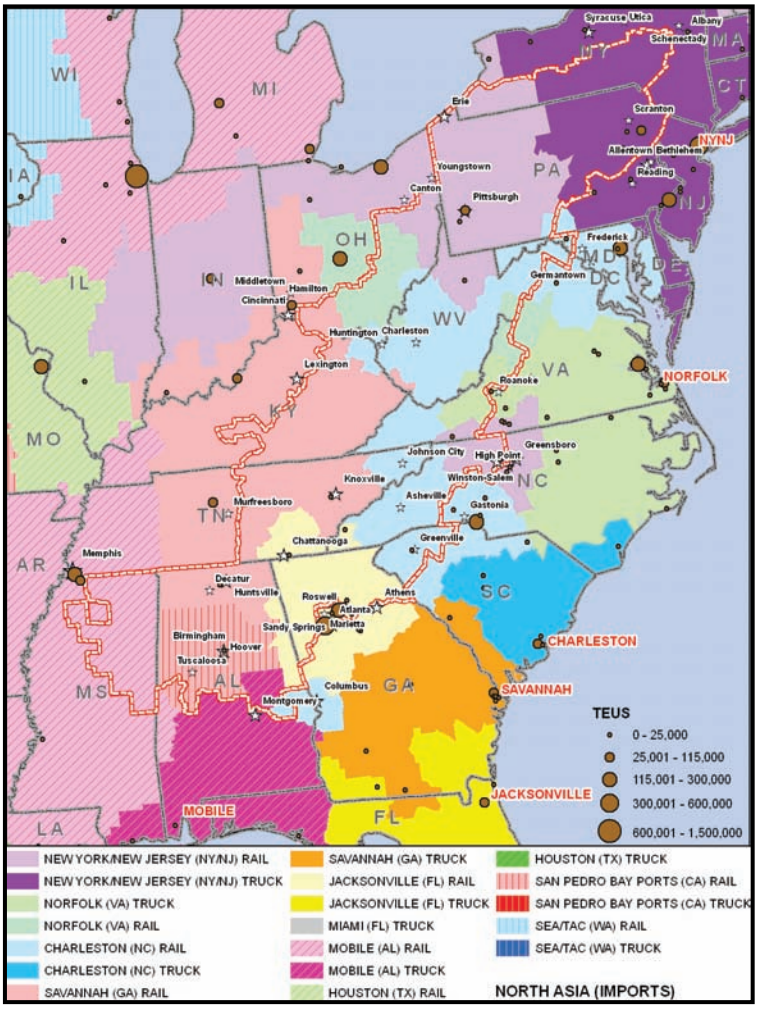

Figure 3.15: North Asia LCMA and 2007 Import Volumes

costs, and inland transportation by truck or rail. Well established cost models are used to estimate each of these cost components. Because the ocean costs vary depending on the foreign region, LCMA's are developed for each of the major foreign trade regions.

Figures 3.15 and 3.16 display the LCMA's for North Asian imports and exports respectively, indicating the least cost port for imports and exports for the entire Appalachian Region in accessing a selection of major coastal ports. It can be seen that for some sub-regions access to a particular port is least costly by rail and for others truck would be the optimal mode. Similar analysis and maps have been prepared for other major foreign trade regions and are included in the appendix. In addition to the North Asian analyses shown here, further analyses of 2007 actual trade in the region, broken out for each significant foreign trade region was reviewed. All of these analyses and maps were used in the regional workshop sessions to supplement the local knowledge and experience of the workshop participants in identifying initial specific project or strategic concepts for enhancing Appalachian connectivity to the international marketplace and spurring economic development.

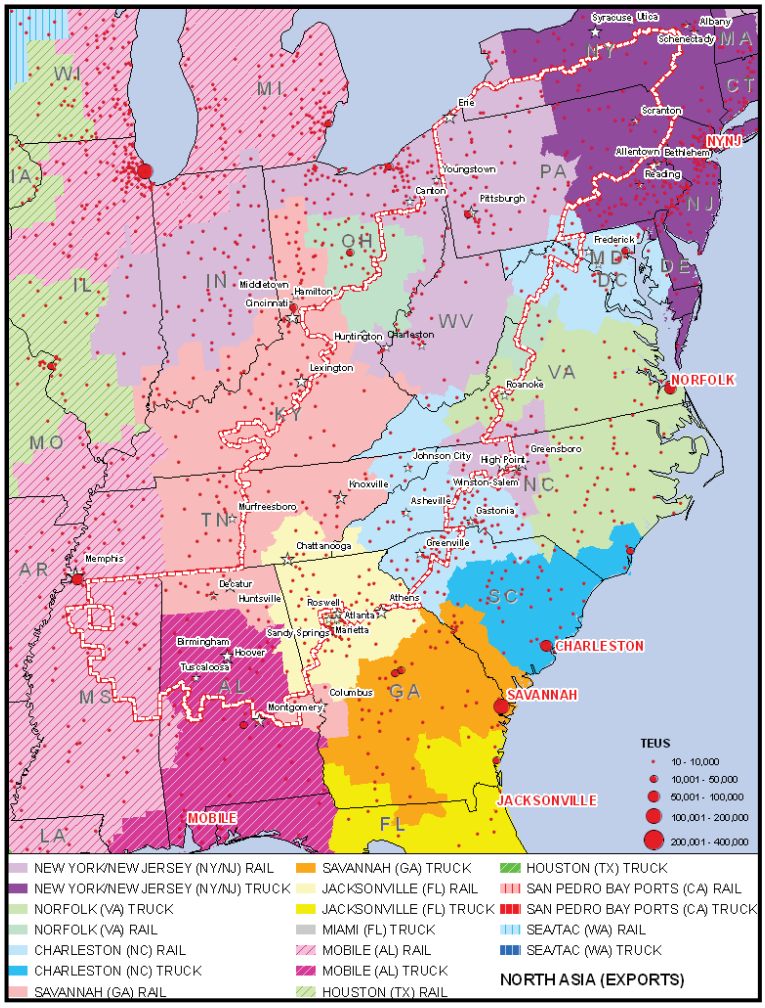

Figure 3.16: North Asia LCMA and 2007 Export Volumes

It should be noted that the LCMA analysis reflects a somewhat simplified model of the criteria that effect the routing of cargo. The cost modeling in this process is based on average costs for example, and in the marketplace, actual prices paid by various customers reflect a myriad of variables and great complexity. In addition, transportation cost is not the only criteria in determining routing decisions. Time, reliability, convenience and many other issues come into play. The PIERS data is also not a perfect representation of the actual shipments in any specific region. The source data itself is replete with gaps and the process for enhancing it, while carefully thought out, is fundamentally based on "educated guesses." Nonetheless, these analyses and data provide additional insight and guidance, that combined with local knowledge and experience can contribute to the development of useful project and strategy concepts.

3.9 Economic, Energy, and Environmental Success – And Expanded Capacity

Transportation plays an important role in shaping economic success, while at the same time it is recognized as a major factor in addressing the energy and environmental challenges facing both Appalachia and America. While Appalachia enjoys well-developed highway, railway and waterway systems, these systems tend to be disjointed and offer too few connections between the individual modes. By better integrating the individual modes into a single, coordinated intermodal network it is possible to not only generate new economic benefits to the Region, but to also improve the energy and environmental performance of the system, as well. Through better coordination, shippers have more alternatives in how and where freight moves. They are better able to select the most appropriate mode of transport, depending on the cargo itself and its destination. While some cargos and trip distances are particularly well-suited for highway movement, others can be more cost-efficiently moved by rail and/or water transportation services, if such services are both available and accessible to the shipper.

Beyond economic considerations, the energy and environmental benefits of rail and water, especially over longer-distance trips, can generate increasingly important new benefits in reducing energy consumption and improving the overall environmental impact of the transportation system. As an example, studies indicate that moving one ton of cargo by rail is more than twice as energy efficient as by highway trip. Further, inland waterway energy efficiency for such a movement can be three times more efficient than over-the-road transportation. Both railways and waterways can also offer significant environmental benefits in terms of greenhouse gas emissions, as well.

While each mode of transportation provides critically important benefits to shippers, by better coordinating the transportation system, and the commodities that move throughout this network, it is possible to achieve important economic, energy, and environmental benefits, while at the same time expanding the overall capacity of the network.