

Freight Movement, Port Facilities and Economic Competitiveness

Determining critical corridors for freight movement

The Center for Quality Growth and Regional Development (CQGRD) is conducting research to assess the impact of increased port traffic on the megaregional transportation system. Critical transportation infrastructure needs can best be addressed at the megaregion scale through inter-jurisdictional cooperation which allows regions, cities and towns to compete globally as cohesive regions connected by efficient and reliable transportation links.

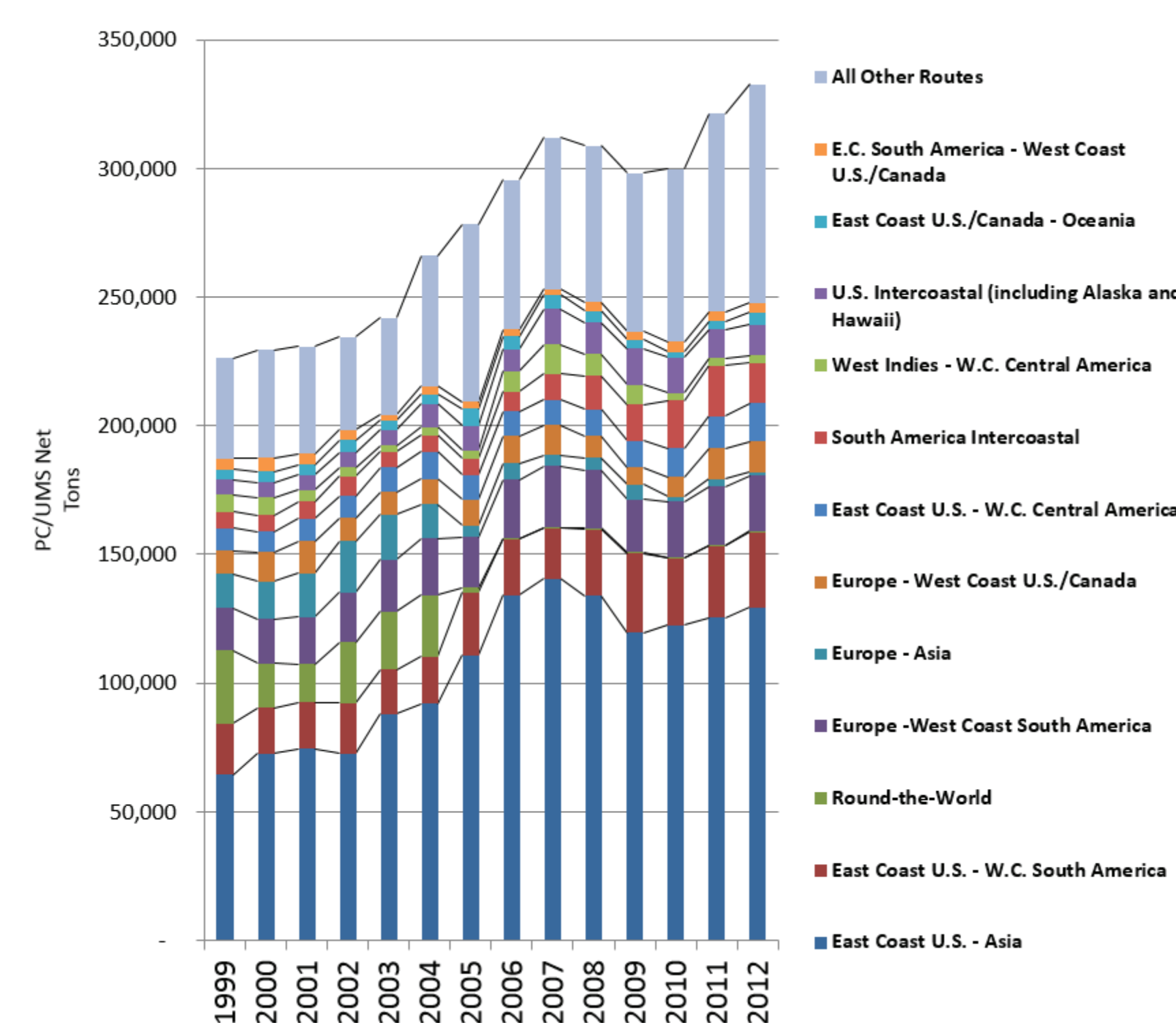
Research Questions

What is the current state of port-related trucking on the east coast.
How will increased port activity affect regional transportation networks?
How can we measure trucks' economic impact on counties?

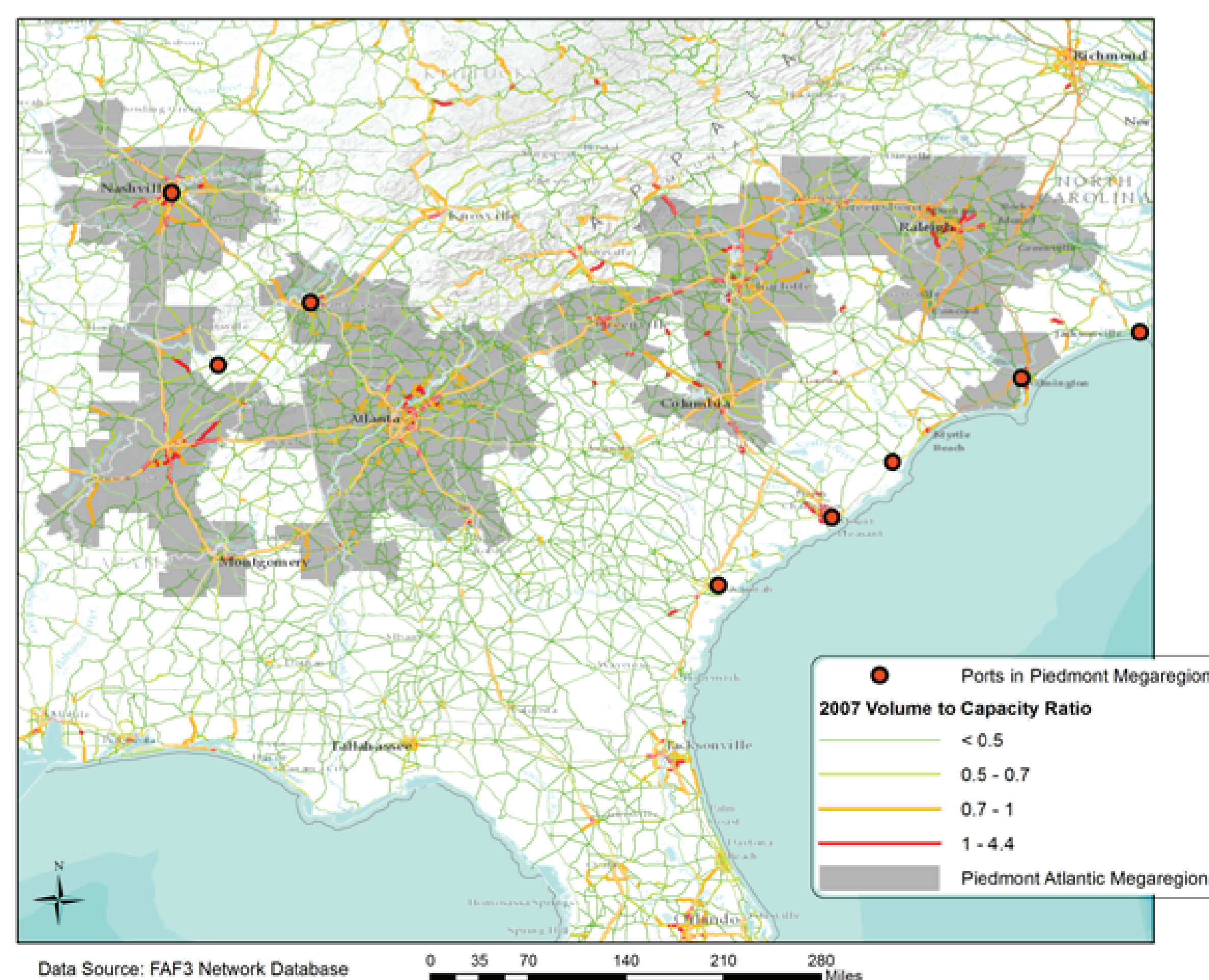
Panama Canal Expansion

The Panama Canal is undergoing an expansion that will increase the size of ships that can traverse the canal. This is expected to make it more efficient for ships from Asia to reach the eastern United States by an all-water route compared with a land-bridge between west coast ports and eastern destinations. The expansion is expected to be completed by 2015. Many east coast ports are deepening their harbors to accommodate the larger ships.

The figure to the right shows the cargo volume trend by principal trade route. Over the years, the East Coast U.S. – Asia route has been the largest single route. Its proportion was between 30 and 40 percent in the early 2000s, but it increased up to the 45 percent in middle 2000s. After the global recession, the share of the East Coast – Asia route is about 40 percent. The East Coast U.S. – West Coast South and Central Americas comprises over 10 percent of the cargo volume and their size and share slightly increased in recent years. The share of routes involving West Coast U.S. is less than five percent.



Current State of Trucking



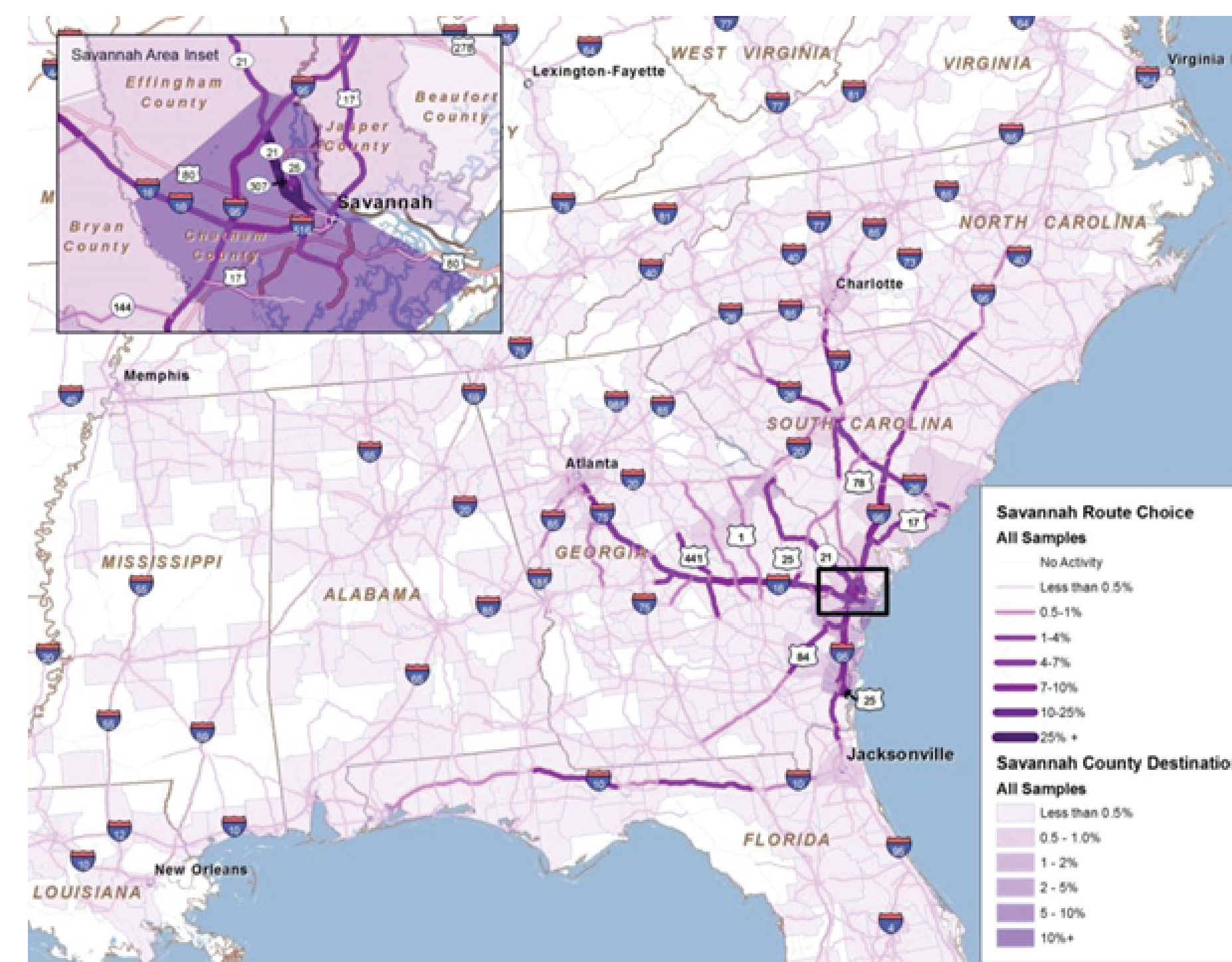
Many roadways connecting east coast ports to megaregion destinations are already nearing capacity or over capacity. Freight forecasts show the resulting congestion worsening. The map to the left depicts the volume to capacity ratio of highways in the Piedmont Atlantic Megaregion.

The Piedmont Atlantic Megaregion (PAM)'s most clustered industries are NAICS 31-33 (manufacturing), NAICS 11 (agriculture, forestry, fishing and hunting), and NAICS 48-49 (transportation and warehousing). Among the PAM's exports that are produced in the megaregion and leave through ports in Georgia and the Carolinas (type 1), the two largest contributors are pulp, newsprint, & paper with 3.5 million tons, and nonmetallic minerals with 3.4 million tons shipped in 2007.

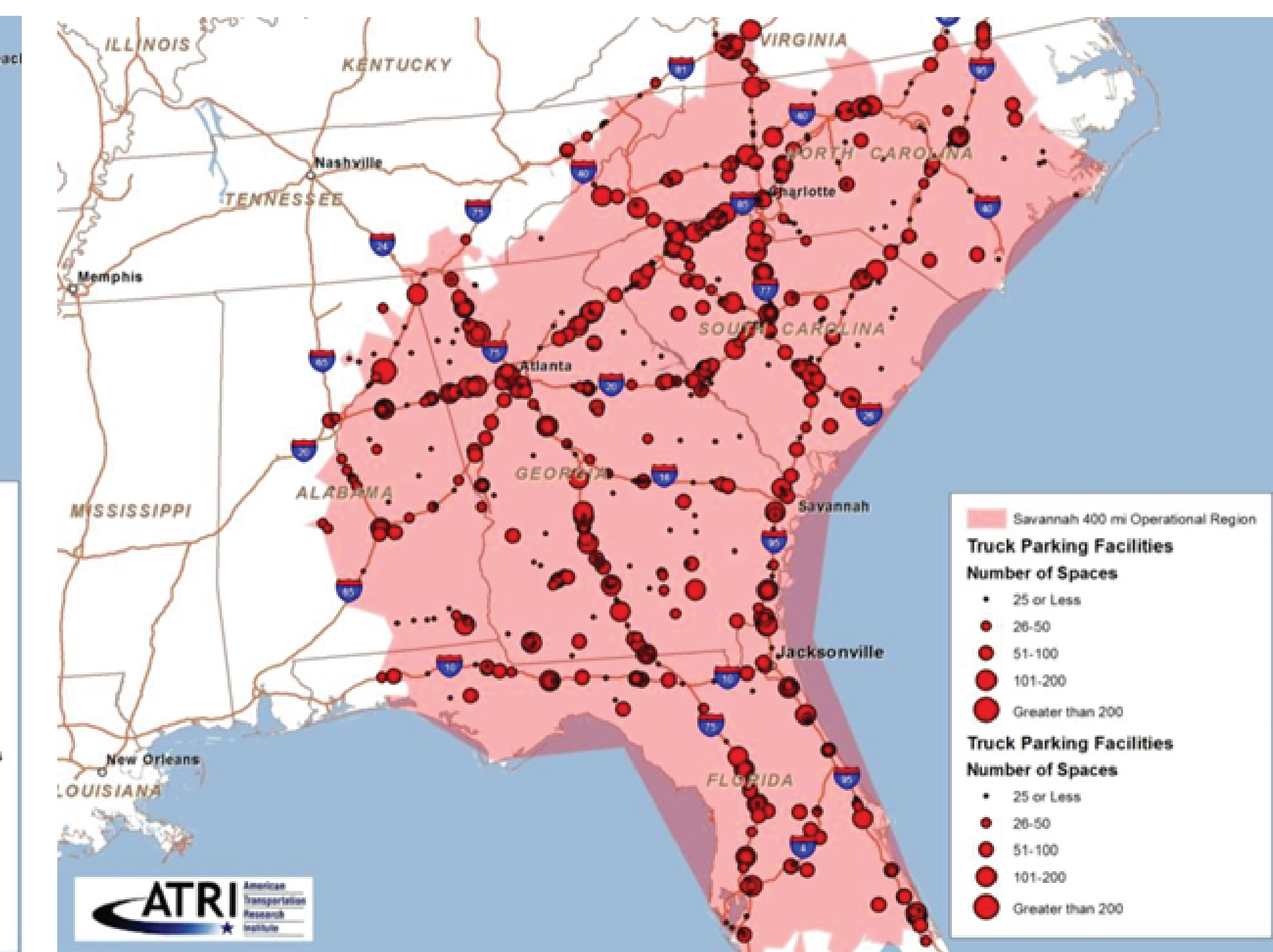
PI: Catherine L. Ross
Co-PI: David Jung-Hwi Lee
Researchers: Chelsea C. White III, Alan Erera, Dave Pierce, Peter Hylton, Fangru Wang, Yun Sang Lee

GPS-Analysis

GPS truck data revealed the main truck routes for each of the three ports: Savannah, Norfolk, and New Orleans. The figure below shows main truck routes from the Port of Savannah. Planners should pay particular attention to these routes because truck increases that might not have been incorporated into past forecasts are likely to increase wear and congestion on these truck routes. Agencies need to take steps to mitigate congestion and improve safety.



Researchers overlaid GPS truck movement data with a truck parking database to determine the adequacy of truck parking along the main trucking corridors in each of the three megaregions. The figure below shows truck parking in the operations area of the Port of Savannah. The region has 652 parking facilities with approximately 32,000 spaces. While this appears to be a large amount, it is equal to only one space per every 2,380 daily truck miles traveled. Researchers calculated parking availability for each route.

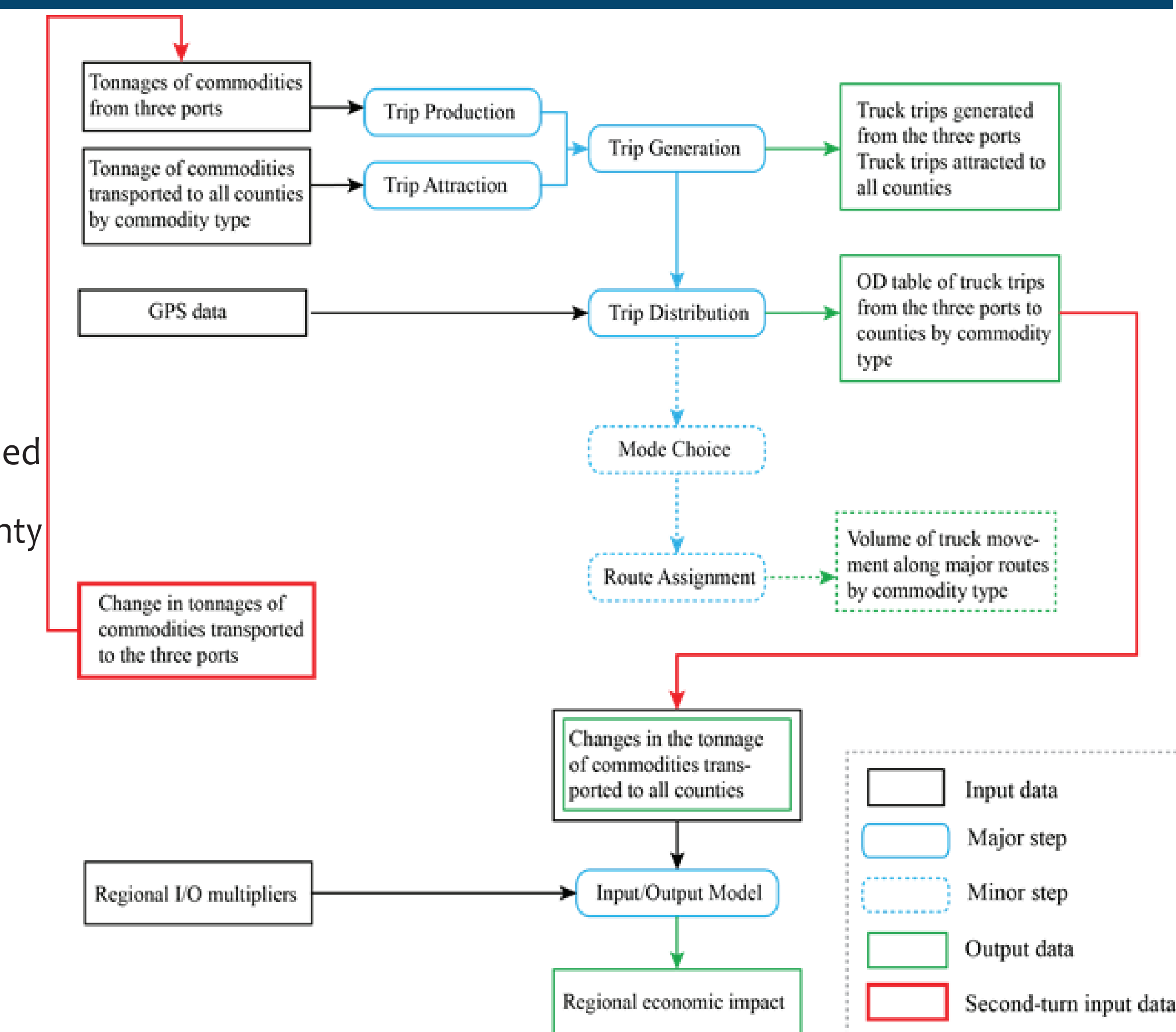


Economic Impact

The expected freight increases are spurring many states and communities to invest in their transportation systems to accommodate freight increases. Community benefits depend on economic stimulus caused by the freight. GPS data specific to individual trucks permits a more thorough examination of county-level economic benefits of the increased freight by providing fine-grained destination information.

The researchers developed a methodology for predicting county level economic benefits using both GPS data and county-level economic activity. The figure to the right illustrates the proposed methodology's steps. It uses GPS data to calibrate expected commodity movements based on commodity needs to sustain county economic activity.

It includes several basic steps:
Generation: Commodity productions coming into the port and attractions needed for each county's economic activity are generated.
Distribution: Productions and attractions are matched based on a cost-function gravity model.
Calibration: GPS data calibrate the commodity distribution.
Input/output model: The input/output model converts the economic activity generated by the freight into other supporting economic activity in each county.



Conclusions & Future Research Needs

Detailed freight movement data was combined with researcher's study of the Panama Canal expansion's effects and the state of truck-based freight in each megaregion to depict the needs for road and parking infrastructure to safely and efficiently accommodate freight increases from east coast ports. The research offers several conclusions and directions for future research.

Conclusions

- The Panama Canal expansion is expected to increase truck traffic on corridors leading to and from east coast ports in the near future. However, the exact size, timing, and character of increases depend on global supply chain configurations and economic signals that are outside of the control of any one company or government.
- Truck parking on some heavily trafficked routes is already insufficient to safely allow drivers to rest, particularly under new stricter driver rest guidelines. Unless public or private entities increase truck parking on these routes, disruptions are likely to become more severe.

- Many trucks visit local warehouses and facilities around the port. If the trend of shorter truck trips and destinations closer to the ports continues, it will require upgrades to the local and regional transportation network as more and more trucks utilize these secondary roads to reach key warehousing and distribution facilities.

Future Research Needs

Future research should examine several points related to implementing and expanding the analysis performed here. Other east coast ports would benefit from analysis of the locations that are likely to experience the greatest increases in truck traffic due to port expansion to allow local and state authorities to make appropriate improvements. Future research should also evaluate parking needs and other safety-related measures in each of these locations. Future research should implement the economic impact methodology proposed here, with particular attention on improving methodologies for calibrating commodity flows based on GPS data.