



NORTH CAROLINA PORTS

2018 ECONOMIC CONTRIBUTION STUDY

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2018 ECONOMIC IMPACT STUDY

A Report by the Institute for Transportation Research and Education at North Carolina State University for
the North Carolina State Ports Authority

Authors

Weston Head

Steve Bert, AICP

Daniel Findley, PhD, PE



EXECUTIVE SUMMARY

The North Carolina State Ports Authority (the Authority) owns and operates two ocean ports on the eastern seaboard: the Port of Wilmington and the Port of Morehead City. This study focused on identifying the current economic contribution of port services for these two publicly-owned ocean ports in North Carolina, both on a statewide and regional level.

North Carolina ports contribute approximately \$15.4 billion annually to the state's economy. This contribution is constituted by goods moving through the ports, with \$12.9 billion attributed to the Port of Wilmington and \$2.5 billion attributed to the Port of Morehead City. The ports directly and indirectly support more than 87,700 jobs across North Carolina, which comprises a substantial portion of the state's economy. The availability of the Port of Wilmington and the Port of Morehead City plays an important role in the supply chain decisions of companies which currently have operations in North Carolina and those considering locating manufacturing and distribution operations in North Carolina. The economic contribution of the existing deep water ports in North Carolina foster economic development across the state. Key components of economic contribution, including direct, indirect, and induced contributions to gross revenue (business output), employee compensation, jobs, and tax collections were analyzed. The direct contributions featured in this report were derived from commodity data, and IMPLAN® multipliers were used to generate estimates of the indirect and induced contributions of activity at the ports, as well as the analysis of tax contributions. IMPLAN® is a widely used software model for economic contribution studies of ports and other transportation assets.

In the study period, July 1, 2017 to June 30, 2018, the North Carolina Ports supported \$4.3 billion in employee compensation for North Carolina workers. Taxes generated by economic activity through the Ports provide additional contributions to local communities and the state of North Carolina. Approximately \$687 million in sales, property, corporate, and personal taxes was received by state and local governments due to activity supported by the Ports. The Port of Wilmington supported the collection of \$193 million in county property taxes, and the Port of Morehead City supported \$21 million. Together, the activities at the Ports supported \$343 million in sales tax collections across the state. Additionally, state corporate and personal taxes of more than \$119 million were collected due to activity supported by the Port of Wilmington and the Port of Morehead City.

North Carolina Ports Contribution:

\$15.4 B **87,700** **\$4.3 B** **\$687 M**

Economic Output to
NC

Jobs supported in
North Carolina

Employee
Compensation

Local and state tax
revenue



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ONE STATE. TWO PORTS.



**NORTH
CAROLINA
PORTS**

INTRODUCTION

Background

The North Carolina State Ports Authority (the “Authority”) owns and operates two ocean ports on the eastern seaboard, the Port of Wilmington and the Port of Morehead City. These two ports are used to move approximately 6.7 million of tons of commodities into and out of North Carolina annually. The objective of this study was to conduct an economic assessment of the two North Carolina ports and estimate their contribution to North Carolina’s economy.

This study builds on two previous studies, which analyzed the economic contributions of the North Carolina Ports in 2014 and 2009. (Findley et al 2014, Findley et al 2010). The economic contribution of the ports changes over time, just as the tonnage shipped through the ports changes over time. The changes in overall tonnage moving through the ports can be affected by numerous factors, such as fluctuations in the economy and, local demand for imports, the foreign demand for local exports, local wealth, and other factors which are correlated with microeconomic and macroeconomic trends.

The study examined the current economic contribution of port services for the two publicly-owned and operated deepwater ports in North Carolina, both statewide and for the state's seven economic development regions.

NC Ports Overview

Created in 1945, the Authority is charged with operating and promoting North Carolina's deep water ports and associated facilities. The Authority owns and maintains the Port of Wilmington, the Port of Morehead City as well as two inland facilities, the Charlotte Inland Terminal and the Piedmont Triad Inland Terminal.

The Port of Wilmington is North Carolina's largest port with an operating terminal of 284 acres. The Port of Wilmington handles containers and a variety of bulk and breakbulk cargo. The Port of Wilmington is equipped to handle refrigerated containers and recently constructed a 101,000 square foot cold storage facility to further support the state's agricultural and food industries. The Port of Morehead City is a slightly smaller port than the Port of Wilmington in terms of size and volume, and does not handle any container cargo. The Port of Morehead City serves breakbulk and bulk customers, including a tenant-operated liquid bulk facility on the Radio Island terminal and supports a thriving barge industry.

Each facility is served by a single Class I railroad (CSX for the Port of Wilmington and Norfolk Southern for the Port of Morehead City) and is well connected to the U.S. Interstate System (I-40 and I-95). Both ports offer cargo handling and storage facilities.

Jobs at the Authority's facilities include administration, security, longshoremen, river pilots, stevedores, and others. Businesses that facilitate trade through the ports include third party logistics (3PLs) providers, customs house brokers, freight forwarders, rail lines, truck lines, steamship lines, and tugboat operators. In addition, companies across the state and beyond its borders ship their cargo and products through NC ports.

North Carolina Ports Fast Facts



Over 5,000 container gate moves per week



6.7 million tons of goods transported annually



101,000 Sqft. Cold Storage Facility



Over 950 ship calls a year

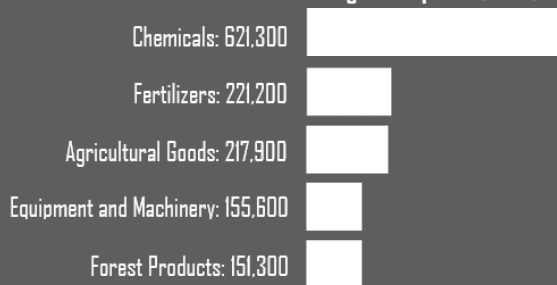
NC Ports Cargo Movement

The movement of cargo through the Authority's ports connects businesses and customers with distribution facilitators such as warehousing, transportation, financial, and insurance providers that support numerous jobs across North Carolina. In period of July 1, 2017 to June 30, 2018, over 314,000 TEUs (twenty-foot equivalent unit, a measurement of volume used in container transportation), 2.4 million tons of bulk, and 195,000 tons of break bulk commodities flowed through the Port of Wilmington in the study period. At the Port of Morehead City, over 269,000 tons of break bulk and almost 1.3 million tons of bulk cargo flowed through the port.

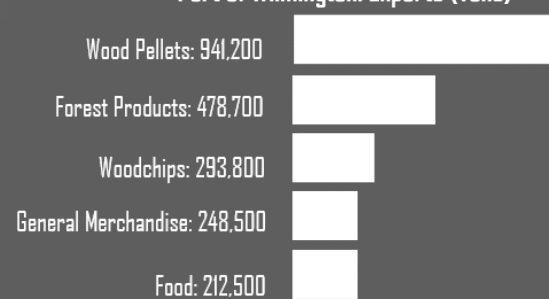
The ports serve a range of industries in North Carolina and surrounding states. These imports and exports provide critical support for many industries across North Carolina, including retail stores, agriculture, apparel, fertilizer manufacturing, textile mills, wood product manufacturing, and construction.

Exhibit 1: Top Five Commodities by Port in Fiscal Year 2017

Port of Wilmington: Imports (Tons)



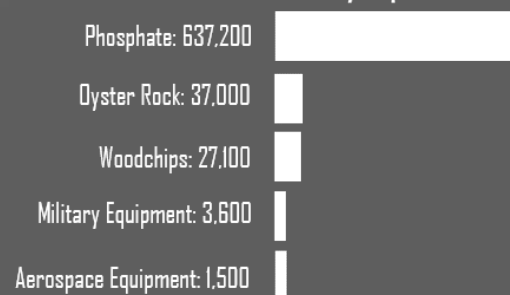
Port of Wilmington: Exports (Tons)



Port of Morehead City: Imports (Tons)



Port of Morehead City: Exports (Tons)





Economics of the Role of Ports in the Supply Chain

Each year, hundreds of billions of transactions occur across the globe. In today's global economy it's possible to purchase a good originating halfway around the world and receive it in a span of a few days or weeks. This high frequency movement of goods requires quick and efficient coordination to handle the load of goods and inputs being shipped each day. One of the most vital links of the supply chain network in today's global economy is ports. Ports provide access to foreign markets for both sellers and buyers, connecting each individual and business to the best products and production inputs from around the globe. Ports also provide a fast, large capacity option for companies to move products both internationally and domestically. This process allows firms to provide goods and services at the lowest possible price while also maintaining the flexibility to meet demand fluctuations. Furthermore, the magnitude of supply chain risk exposure is substantially affected by the efficiency and consistency of port operations. Predictable movement of goods through ports and productive connections with allied transportation networks can reduce business costs, increase competitiveness, and improve profitability. Responding to these needs has a noticeable economic effect on the businesses utilizing the ports.

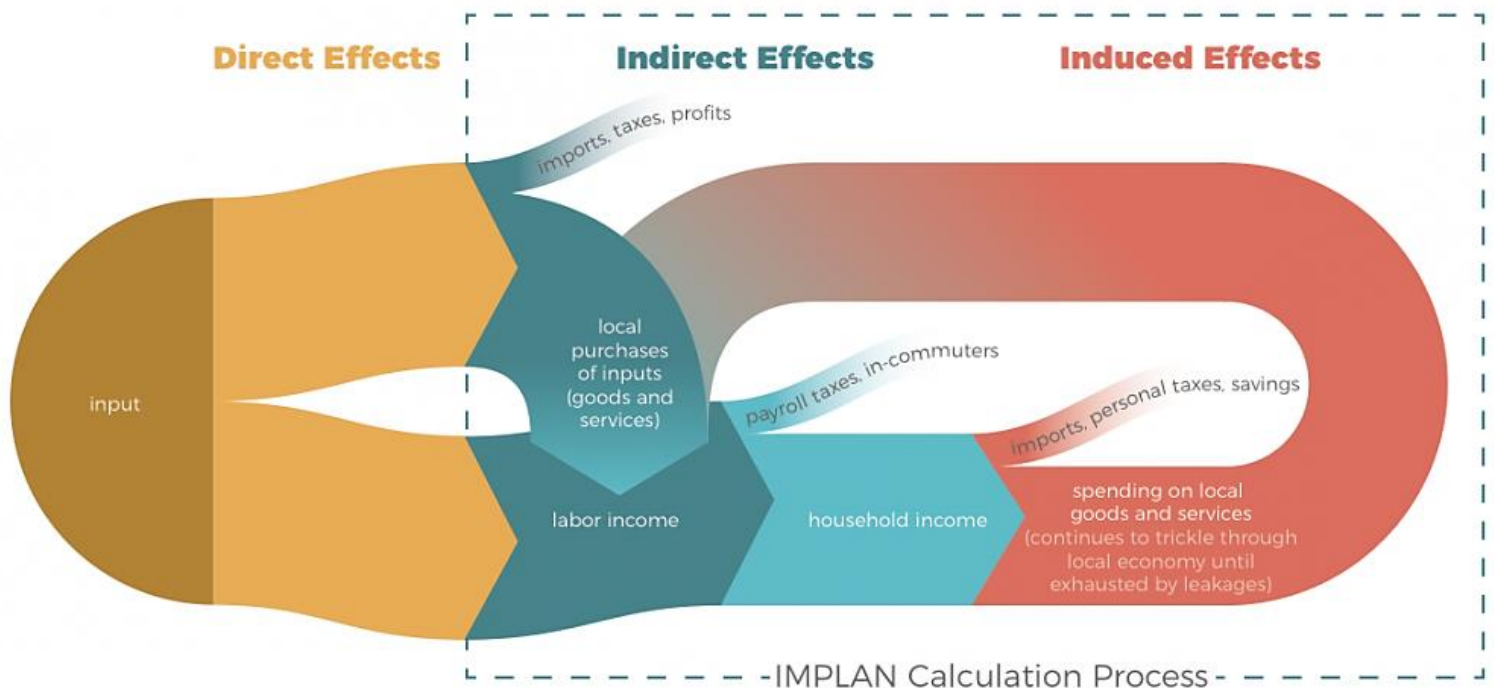
Ports connect buyers and sellers to provide efficient and reliable supply chain solutions. Through the movement of imports, exports, and domestic flows, ports have an impact on the economic output, employment, employee compensation, as well as, taxes within the state. Imports arriving in the United States at NC ports generate jobs and income through the transportation of goods from the ports to their next destination, further assembly or manufacture of raw or partially processed materials, and/or wholesale and retail selling of finished products in-state. Exports leaving the United States from North Carolina through NC ports similarly generate jobs and income for North Carolina from the growth, harvesting, and processing/packaging of in-state agricultural products, extraction of minerals and materials, assembling and manufacturing of products, and transportation of goods to the ports. Domestic flows include cargo being moved from one part of the United States to another region, which have similar impacts.

METHODOLOGY

To model the economic contribution that the Ports of Wilmington and Morehead City have on North Carolina, an Input-Output model was created. The model is based on the idea that an output of one sector can be the input for another sector, creating an indirect impact, and that money flows between sectors, creating an induced impact. This flow continues to run throughout the local economy until the stream of money passes out of an area of activity through imports, non-local spending, or other means. Throughout the years, the Input-Output model has been established as the primary tool used to estimate economic contribution.

The models developed in this study were used to project how the Ports of Wilmington and Morehead City affects other industries and local economies within North Carolina. The findings of this effort should be interpreted as the number of jobs, the level of output, employee compensation, and state and local tax revenue supported by the operations of the ports, as well as, the value added to North Carolina generated from the movement of imports, exports, and domestic flows through the ports.

The Input-Output Model



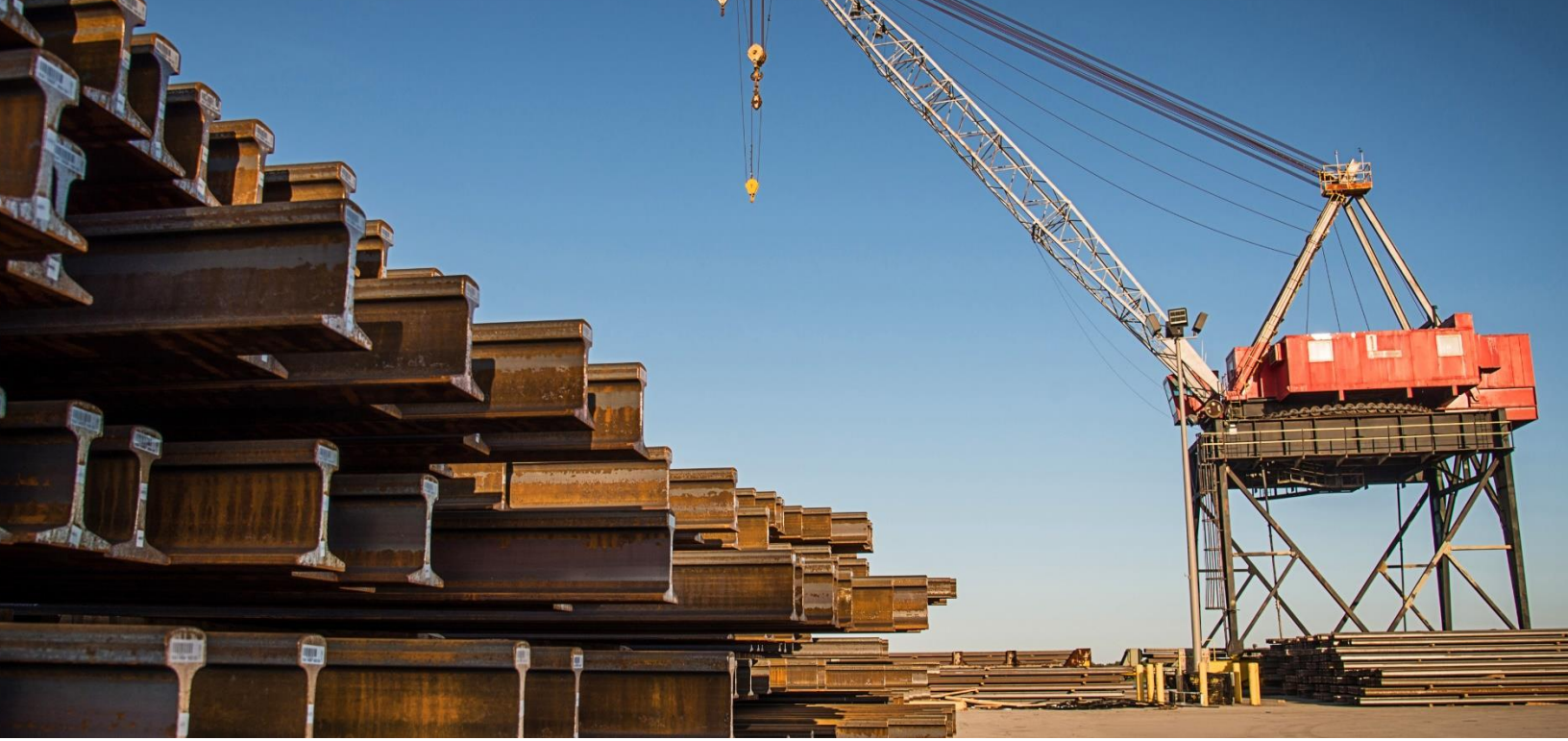
IMPLAN ©

To estimate the total economic contribution of the Ports of Wilmington and Morehead City, it was necessary to estimate the total direct output generated by the operations of the ports and the movement of imports, exports, and domestic flows. These numbers were then entered into a statewide Impact Analysis for Planning (IMPLAN) model, which is part of the modeling software used to estimate Input-Output relationships for the local economies, to estimate the indirect and induced effects of the ports.

To calculate the total direct output generated by the movement of imports, exports, and domestic flows, the goods being shipped through the ports needed to be classified into commodity types and valued per ton. The quantity of commodities used for the direct contributions was gathered using vessel manifest data supplied by the Authority. The values of and value-added to the commodities were estimated using data from the Commodity Flow Survey provided by the Bureau of Transportation Statistics with a conversion to 2018 dollars using the implicit gross domestic product deflator index (BTS 2018, BEA 2018). Using origin and destination pairs provided by the Authority for each shipment, it was possible to determine the percentage of each commodity type that was either originating or destined within North Carolina. This prevented the study from over-estimating the ports' impact on the State of North Carolina by including shipments being made to, or coming from, other states. At the end of the data processing, the research team estimated the total value added to North Carolina deriving from all of the imports, exports, and domestic flows moving through the Ports of Wilmington and Morehead City. This value was entered into IMPLAN as the direct output of the ports and was used to generate indirect and induced impacts within the state. The contributions were categorized by port and by the type of goods (container and bulk/break bulk) to gain a detailed view of the roles of the ports in the state.

In addition to the economic contribution generated from the movement of goods through North Carolina, operations at the ports represent a portion of the ports' economic contribution for North Carolina. Jobs at the Authority's facilities include administration, security, longshoremen, river pilots, stevedores, and many others. Businesses that facilitate trade through the ports include third party logistics (3PLs) providers, customs house brokers, freight forwarders, rail lines, truck lines, steamship lines, and tugboat operators. These jobs are associated with the operation of the ports and generate economic output, employee compensation, and state and local taxes for North Carolina. North Carolina port jobs data was provided by the Authority and were classified and entered into IMPLAN as direct jobs. IMPLAN calculated the indirect, induced, and total output, jobs, employee compensation, and taxes generated from these jobs.

The methodology for the study is documented in this report and is a replication of the methodology applied to the North Carolina Ports using 2014 and 2009 data (Findley et al 2014, Findley et al 2011). The economic impact and contribution assessment techniques used in this study were consistent with methodologies applied in other states (Humphreys, J.M.2012, Humphreys, J.M.2017, Nessen 2015).



ECONOMIC CONTRIBUTION RESULTS

The final results of the study include values for output, employment, employee compensation, and taxes.

Exhibit 2 – Value of Goods Moving Through NC Ports by Total, NC Component, and Value Added

| Type of Goods | Port | Total Value of Goods moving through NC Ports (\$) | Value of Goods Remaining or Originating in NC (\$) | Value Added to NC Commodities (\$) | Total Tons |
|----------------------------------|---------------|---|--|------------------------------------|------------|
| Container | Wilmington | \$ 11,510,856,000 | \$ 10,515,568,000 | \$ 5,193,824,000 | 2,486,000 |
| Bulk/Breakbulk | Morehead City | \$ 3,821,250,000 | \$ 1,916,829,000 | \$ 1,541,517,000 | 1,652,000 |
| | Wilmington | \$ 6,147,790,000 | \$ 2,987,011,000 | \$ 2,043,407,000 | 2,604,000 |
| Port of Wilmington Subtotal | | \$ 17,658,646,000 | \$ 13,502,579,000 | \$ 7,237,231,000 | 5,090,000 |
| Port of Morehead City Subtotal | | \$ 3,821,250,000 | \$ 1,916,829,000 | \$ 1,541,517,000 | 1,652,000 |
| North Carolina State Ports Total | | \$ 21,479,896,000 | \$ 15,419,408,000 | \$ 8,778,748,000 | 6,742,000 |

Over 6.7 million tons of goods worth \$21.5 billion were transported through North Carolina ports (Exhibit 2). The direct economic impact of transported goods was derived from the value added to imported goods which originate from or remain

in the state, which totaled over \$8.7 billion. This value is the total value of goods moving through North Carolina multiplied by the percentage of imports destined for NC and the percentage of exports originating from NC. This limits the scope of the economic impact of the ports to just the impact it has on the state of North Carolina.

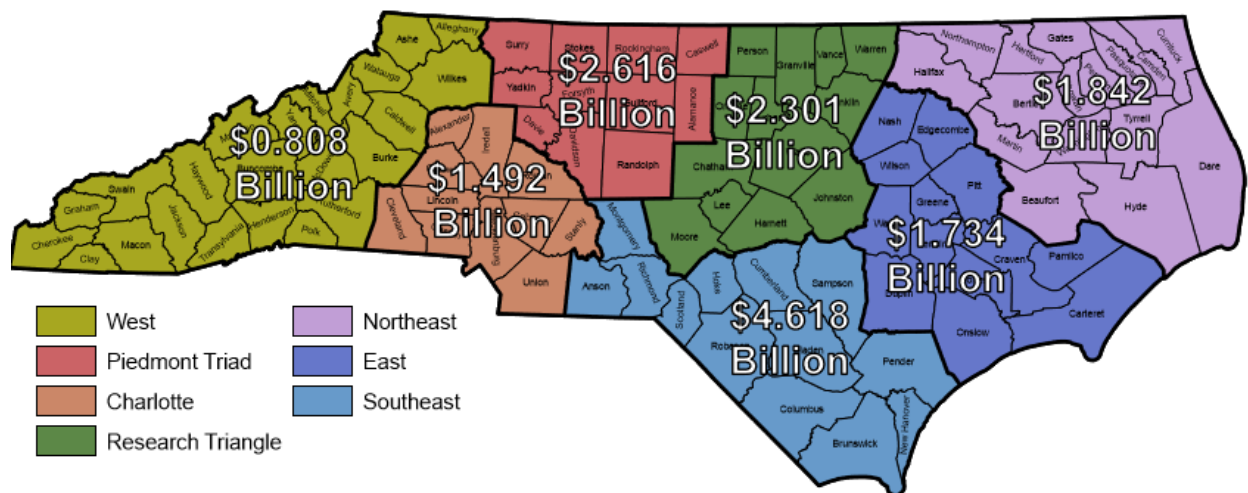
Output Contribution

Through the provision of goods' movement services at the deep water ports, the NC ports supported over \$15.4 billion in gross revenues for North Carolina businesses during the study period (Exhibit 3). The Authority's contribution to the gross revenues of North Carolina businesses results from the trade facilitated by the availability of transporting goods through the ports in Wilmington and Morehead City. These transported goods support a diverse set of industries across the state. The majority of the output contribution is derived from the container activity at the Port of Wilmington, with a contribution of \$9.15 billion. Exhibit 4 shows the distribution of output contribution across the state's seven economic development regions.

| Exhibit 3 – Output Contribution | | Output (2018 Dollars) | | | |
|----------------------------------|---------------|-----------------------|---------------|---------------|----------------|
| Type of Goods | Port | Direct | Indirect | Induced | Total |
| Container | Wilmington | 5,193,930,000 | 2,048,520,000 | 1,915,020,000 | 9,157,480,000 |
| Bulk/ Breakbulk | Morehead City | 1,545,540,000 | 566,870,000 | 372,420,000 | 2,484,830,000 |
| | Wilmington | 2,100,610,000 | 857,600,000 | 803,800,000 | 3,762,010,000 |
| Port of Wilmington Subtotal | | 7,294,540,000 | 2,906,120,000 | 2,718,820,000 | 12,919,490,000 |
| Port of Morehead City Subtotal | | 1,545,540,000 | 566,870,000 | 372,420,000 | 2,484,830,000 |
| North Carolina State Ports Total | | 8,840,080,000 | 3,472,990,000 | 3,091,240,000 | 15,404,320,000 |

Source: NCSPA 2018, IMPLAN 2018

Exhibit 4 – Output Contribution of NC Ports Across North Carolina Economic Development Regions



As a frame of reference for the magnitude of the Authority’s impact on the state’s economy, the contribution was compared to the North Carolina gross domestic product (GDP). North Carolina’s GDP in 2017 was \$538.3 billion (BEA 2017). Therefore, the Authority’s contribution of \$15.4 billion to the state’s GDP was approximately 3% of the total GDP. This is an approximation as the contribution is based on 2018 dollars.

Another useful comparison can be made to the impact of another important component of the state’s economy, namely, the construction industry. The 2017 economic impact of construction in North Carolina was \$16.4 billion (Statista 2017). Therefore, the contribution to North Carolina’s economy supported by activity at the Authority’s ports is approximately equivalent to the statewide impact of construction.

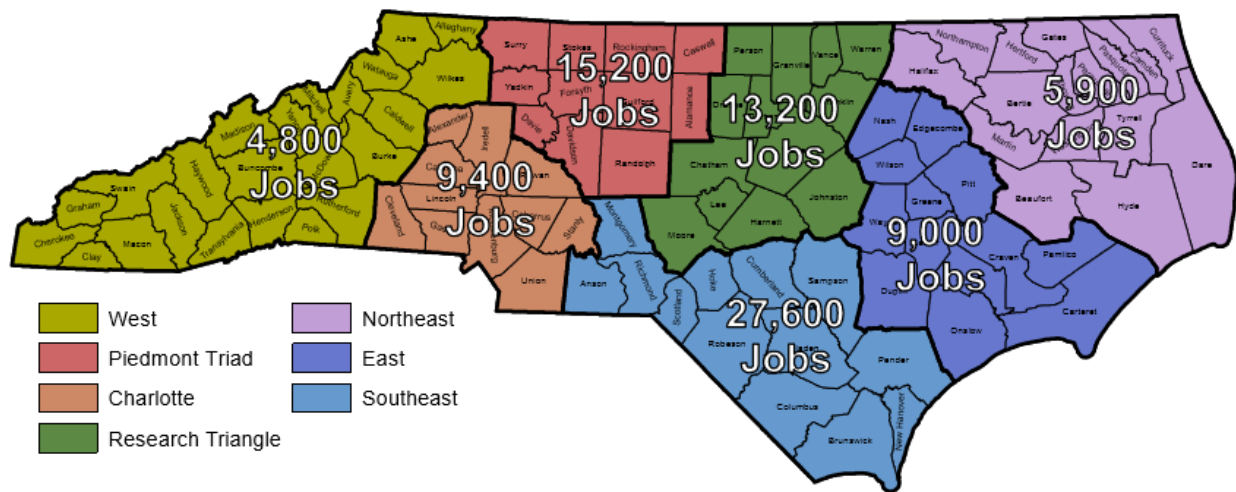
Employment Contribution

The North Carolina ports supported, through the provision of goods’ movement services at the two deep water ports, 87,700 full-time jobs at North Carolina businesses (Exhibit 5). The majority of the employment contribution is derived from the activity related to the movement of container shipments at the Port of Wilmington, with a contribution of over 59,200 jobs. The majority of jobs (44,600) were directly related to activity supported by the ports, while an additional 42,900 jobs were supported through indirect and induced activities. Exhibit 6 shows the distribution of employment contribution across the state’s seven economic development regions.

| Exhibit 5 – Employment Contribution | | Employment (Full-time Jobs) | | | |
|---|---------------|-----------------------------|---------------|---------------|---------------|
| Type of Goods | Port | Direct | Indirect | Induced | Total |
| Container | Wilmington | 33,200 | 12,100 | 13,900 | 59,200 |
| Bulk/Break-bulk | Morehead City | 3,400 | 3,000 | 2,700 | 9,100 |
| | Wilmington | 8,000 | 5,600 | 5,800 | 19,400 |
| Port of Wilmington Subtotal | | 41,200 | 17,700 | 19,700 | 78,600 |
| Port of Morehead City Subtotal | | 3,400 | 3,000 | 2,700 | 9,100 |
| North Carolina State Ports Total | | 44,600 | 20,700 | 22,400 | 87,700 |

Source: NCSPA 2018, IMPLAN 2018

Exhibit 6 – Employment Contribution of NC Ports Across North Carolina Economic Development Regions



Employee Compensation Contribution

The North Carolina ports supported, through the provision of goods' movement services at the two deep water ports, over \$4.37 billion in employee compensation for North Carolina workers (Exhibit 7). Employee compensation is the total payroll cost, including salary, benefits, and payroll taxes. More than half of the employee compensation generated from the two deep water ports is from employment directly supported by activity related to the North Carolina ports.

| Exhibit 7 – Employee Compensation | | Employee Compensation (2018 dollars) | | | |
|---|---------------|--------------------------------------|----------------------|--------------------|----------------------|
| Type of Goods | Port | Direct | Indirect | Induced | Total |
| Container | Wilmington | 1,451,300,000 | 670,360,000 | 587,180,000 | 2,708,840,000 |
| Bulk/ Break-bulk | Morehead City | 242,470,000 | 170,210,000 | 114,190,000 | 526,880,000 |
| | Wilmington | 597,150,000 | 293,860,000 | 247,010,000 | 1,139,630,000 |
| Port of Wilmington Subtotal | | 2,048,450,000 | 964,220,000 | 834,190,000 | 3,848,470,000 |
| Port of Morehead City Subtotal | | 242,470,000 | 170,210,000 | 114,190,000 | 526,880,000 |
| North Carolina State Ports Total | | 2,290,920,000 | 1,134,430,000 | 948,380,000 | 4,375,350,000 |

Source: NCSA 2018, IMPLAN 2018

State and Local Tax Contribution

State and local governments in North Carolina received \$687 million in annual sales, county property, corporate, and personal tax collections due to activity supported by the two deep water ports (Exhibit 8). The county property tax related to activity at the Port of Wilmington is over \$192 million, and the activity at the Port of Morehead City is \$32 million. The activity supported by the two deep water ports resulted in over \$343 million in business sales tax collections across the state (Exhibit 9).

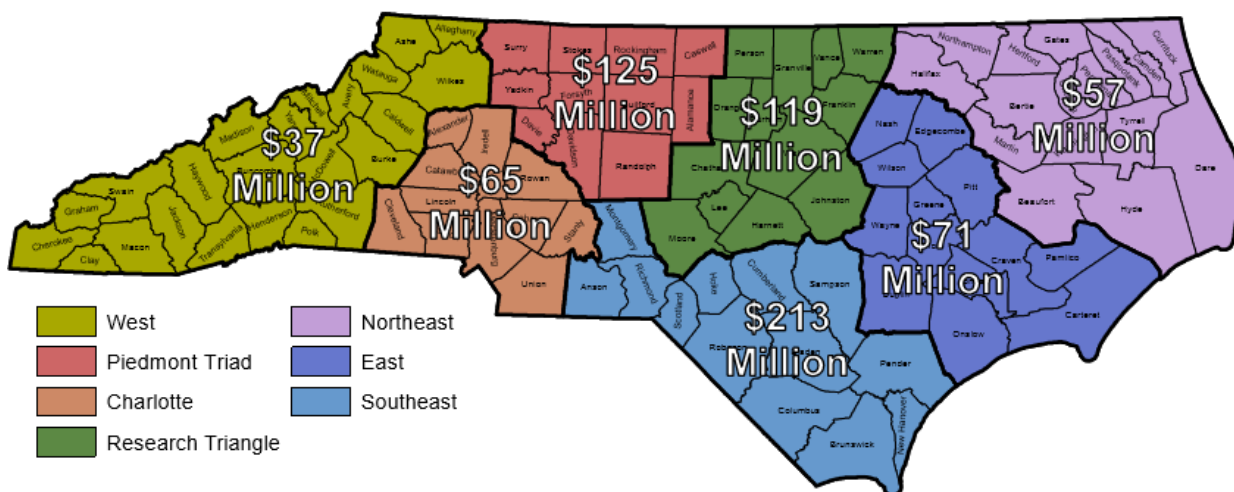
Exhibit 8 – NC Ports State and Local Tax Contributions

| Tax Description | Port of Wilmington (2018 dollars) | Port of Morehead City (2018 dollars) | Total (2018 dollars) |
|----------------------------------|--------------------------------------|---|-------------------------|
| Business Sales Tax | 294,150,000 | 49,450,000 | 343,600,000 |
| Property Tax | 192,540,000 | 32,370,000 | 224,910,000 |
| State Corporate and Personal Tax | 102,810,000 | 15,910,000 | 118,720,000 |
| Total | 589,500,000 | 97,720,000 | 687,220,000 |

Source: NCSPA 2018, IMPLAN 2018

The estimated property tax collections supported by the Authority can be used to determine the equivalent tax base. The weighted average county property tax rate, based on total taxable real estate, in the state was \$0.661 per \$100 valuation (NCDDR 2017). The total property tax collections of \$224.9 million would equate to a tax base of \$34.04 billion, which is approximately 4% of the value of total taxable real estate statewide.

Exhibit 9 – Tax Contribution from Goods Moving Through NC Ports Across North Carolina Economic Development Regions





COMPARISON TO NEIGHBORING STATES' PORTS

To gain a sense of perspective of the contribution of the NC ports, the following discussion includes an assessment of ports in Georgia and South Carolina. The comparisons evaluated several characteristics of the ports, including static measures such as port access and dynamic measures such as port operations and economic contribution, which change from year to year.

Port Access and Operations

By total trade, the Georgia Port moves the most cargo among North Carolina's neighboring ports (Exhibit 10). The Ports of North Carolina move approximately one-sixth of the tonnage at the Georgia ports, and about one-fourth of the tonnage at the South Carolina ports. The port operations comparison can provide valuable insight into the economic contribution values presented in Exhibit 11 and Exhibit 12. Although economic contribution levels are strongly related to the quantity of goods shipped through a port, other factors play an important role in the economic contribution of a port, including the value of the goods, import and export balance, quality of available landside transportation access, nearby consumer markets, and many other dynamics.

Exhibit 10 – Neighboring Ports Operations Comparison

| Port | 2018 Total Trade (metric tons) | 2018 Container Traffic (TEUs) |
|---|-----------------------------------|----------------------------------|
| North Carolina (Port of Wilmington and Port of Morehead City) | 6,600,000 | 179,800 |
| Georgia | 36,430,000 | 4,770,000 |
| South Carolina | 22,718,000 | 2,140,000 |

Source: Census 2018a, Census 2018b & Respective State's Port Authority's Websites

Comparing the volume of goods moving through North Carolina Ports with the ports of Georgia and South Carolina, North Carolina moves roughly 6% of the Twenty-foot Equivalent units (TEU) and 30% of the metric tons that South Carolina moves in a year and roughly 4% of the TEUs and 18% of the metric tons that Georgia moves in a year through their ports. The differences in volumes should be taken into consideration when reviewing the following comparison of jobs and economic contributions associated with the three ports.

Port Economic Contribution

The neighboring ports in Georgia (Humphreys 2017, Humphreys 2012) and South Carolina (Joseph Nessen, 2015) have each conducted economic contribution studies in recent years to document the role of their state's ports in the statewide economy. Those two port studies, as well as this study, utilized IMPLAN® for the development of indirect and induced impacts. A comparison of the economic contribution of neighboring ports on their respective states is shown in Exhibit 11. One caveat to note is that the studies were conducted in different years, and accordingly, comparisons are approximate.

Exhibit 11 – Neighboring Ports Output Contribution Comparison

| Port | Study Base Year | Economic Output (Millions of Dollars) | | | |
|---|-----------------|---------------------------------------|-----------|------------|------------|
| | | Direct | Indirect | Induced | Total |
| North Carolina (Port of Wilmington and Port of Morehead City) | 2017 | \$ 8,800 | \$ 3,500 | \$ 3,100 | \$ 15,400 |
| Georgia | 2017 | \$ 63,400 | | \$ 43,000* | \$ 106,400 |
| South Carolina | 2015 | \$ 36,000 | \$ 11,000 | 6,000 | \$ 53,000 |

Source: NCSPA 2014, IMPLAN 2014, Humphreys, J.M. 2012, Wilbur Smith Associates 2008

*Indirect and Induced output. Georgia study combined both.

A comparison of the economic contribution in terms of jobs, of neighboring ports in their respective states is shown in Exhibit 12. As study dates are different, the comparisons are approximate. In relation to the neighboring ports, the Authority's total employment contribution is approximately one-fifth to one-half of that of neighboring ports. The relative contribution of North Carolina ports to the state economy and neighboring ports to their respective economies varies in terms of output and employment contributions because of the types of goods, value of goods, availability of in-state producers and consumers of goods, and other economic factors.

The large difference in the Authority facilities' output and employment contribution compared to that of other South Atlantic ports mainly reflects differences in existing transportation infrastructure. Neighboring ports benefit from better rail and highway connections than Wilmington and Morehead City. Inadequate hinterland connectivity is a major factor limiting the geographical area that a port can serve. Given the inland connectivity, it is no surprise that Wilmington and Morehead City have a noticeably smaller economic impact than competing ports that are better supported. It is highly likely that if North Carolina were to improve the infrastructure that impacts Authority's ability to attract cargo, there would be an increase in employment, output, income and tax collections that would exceed the cost of the investment.

Exhibit 12 – Neighboring Ports Employment Contribution Comparison

| Port | Study Base Year | Employment (Jobs) | | | |
|---|-----------------|-------------------|----------|---------|---------|
| | | Direct | Indirect | Induced | Total |
| North Carolina (Port of Wilmington and Port of Morehead City) | 2017 | 44,600 | 20,700 | 22,400 | 87,700 |
| Georgia | 2017 | 180,189 | 259,031* | | 439,220 |
| South Carolina | 2015 | 77,335 | 61,881 | 47,990 | 187,206 |

Source: NCSPA 2014, IMPLAN 2014, Humphreys, J.M. 2017, Nessen 2015

*Indirect and Induced employment. Georgia study combined into one general secondary effects category.



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NC STATE UNIVERSITY