

ECONOMIC IMPACTS OF EXPANDED MARINE PORT  
OPERATIONS IN WASHINGTON COUNTY, MAINE

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School of Economics  
Staff Paper 619

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<sup>1</sup> This study was conducted under a Cooperative Agreement with Maine Department of Transportation. MDOT Staff provided guidance on the scope of work, and useful comments throughout the project. Gabe's involvement in the project is also supported, in part, by Hatch Multistate Grant # ME0-L-7-00525-13 (NE 1049) from the USDA National Institute of Food & Agriculture. Professors James McConnon and Caroline Noblet provided helpful comments on an earlier version of the report.



STATE OF MAINE  
DEPARTMENT OF TRANSPORTATION  
16 STATE HOUSE STATION  
AUGUSTA, MAINE 04333-0016

Paul R. LePage  
GOVERNOR

David Bernhardt  
COMMISSIONER

August 20, 2015

Mr. Christopher Gardner, Director  
Eastport Port Authority  
3 Madison Street  
Eastport, Maine 04631

Re: Economic Impacts of Expanded Marine Port Operations in Washington County, Maine – Final Report

Dear Mr. Gardiner,

Enclosed for your information are ten copies of the Final Report prepared by the University of Maine regarding Economic Impacts of Expanded Marine Port Operations in Washington County. As you know this effort was intended to determine the magnitude of potential statewide and county costs and benefits if such a port expansion were to be undertaken. Both short- and long-term impacts on labor, wages and multiplier effects are identified in the report.

Given that the need for and exact nature of future port operations and local infrastructure improvements are undetermined at this time, the economic impacts were developed for a range of hypothetical scenarios. These are based on the University's national research on port operations. Several tables are included in the report to illustrate the various impacts that might be expected for various capital investment levels.

While the report identifies potential positive economic statewide and county gains, it is important not to read too much into the numbers. In order to place the numbers in perspective, we all must recognize and understand that the report does not examine several major items that would need to be evaluated before any decisions on the feasibility of investing in expanded port operations in Washington County could be made. For instance, the following questions have not yet been addressed:

1. Is there a regional shortage of port capabilities and/or capacities that show a need for expanded port operations in Washington County and the northeast ports range?
2. What type(s) of cargo would be shipped into and out of the port?
3. Would international shippers see an overall economic benefit for them to use the port?
4. What impacts would the port have on existing regional ports, and would it have an adverse effect on the other two major Maine ports (Portland and Searsport)?
5. What would be the optimum size and location for the port?
6. Would existing land-based infrastructure (road and rail) require significant upgrades and/or expansions?
7. Would Maine's freight railroad providers, including New Brunswick Southern and national freight railroad providers be interested and able to economically serve the port?
8. What would be the environmental, social and other impacts of the port?
9. Would the expenditures for the port and land-based infrastructure improvements yield a positive benefit-to-cost ratio?
10. How would the infrastructure improvements be funded?



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These and other major questions would need to be addressed prior to determining if expanded port operations in Washington County would be beneficial to the State and would be economically feasible. In order to answer these and other questions, a major effort would be required to look into potential alternatives.

I would be happy to discuss the report findings with you to determine what if any next steps should be undertaken. A major question will be how to fund the next steps, as they will likely be quite costly.

Very truly yours,

A handwritten signature in purple ink that reads "Herb Thomson". The signature is fluid and cursive, with a long horizontal stroke at the end.

Herb Thomson, Director  
Bureau of Planning

Enc.

Cc w/Enc:

Carol Woodcock, on behalf of the Honorable Senator Susan Collins  
Adam Lachman and Chris Rector, on behalf of the Honorable Senator Angus King  
Samantha Warren, District Director for the Honorable Congressman Bruce Poliquin  
Commissioner George C. Gervais, Maine Department of Economic & Community Development  
Elaine Abbott, Eastport City Manager  
Kevin Raye  
John Henshaw, Maine Port Authority Director  
Jonathan Nass, MaineDOT Deputy Commissioner

ECONOMIC IMPACTS OF EXPANDED MARINE PORT  
OPERATIONS IN WASHINGTON COUNTY, MAINE

Executive Summary: This study examines the state and local economic impacts associated with expanded marine port operations in Washington County, Maine. Given that the exact nature of future port operations and local infrastructure improvements are unknown, we present economic impact figures for a range of hypothetical scenarios. Although the executive summary (see below) highlights the results associated with a port handling two million tons of cargo annually and, in a separate analysis, an expansion involving \$250 million of construction expenditures, the “most likely” scenarios of those examined later in the report would be determined through a feasibility study.

Results of the study show that an expanded port facility handling, for example, two million tons of cargo annually, could have a statewide economic impact—including multiplier effects—of an estimated 1,391 total (full-time, part-time, seasonal and temporary) jobs, and \$52.6 million of labor income. Further, it is possible that one person could hold multiple jobs. Economic impact results for other scenarios, in terms of post-expansion cargo volume, are shown in Table 1 of the report.

Increasing the volume of goods moving in and out of marine ports located in Washington County would likely require major investments in local infrastructure. A construction and infrastructure improvement project involving, for example, \$250 million of in-state expenditures (i.e., \$62.5 million per year over 4 years) would have an annual statewide economic impact—including multiplier effects—of an estimated 666 total (full-time, part-time, seasonal and temporary) jobs, and \$31.1 million of labor income. Further, it is possible that one person could hold multiple jobs. These construction-related impacts would be temporary in nature and would end at the conclusion of the construction project. Other scenarios, using different construction spending figures, are shown in Table 3 of the report.

ECONOMIC IMPACTS OF EXPANDED MARINE PORT  
OPERATIONS IN WASHINGTON COUNTY, MAINE

Executive Summary, continued:

The following caveats should be considered when reading this report and interpreting its findings.

- ⇒ First, the study examines the impacts associated with expanded port operations, but the report does not estimate the amount of port activities that are likely to occur in the future.
- ⇒ Second, the analysis presented in this report does not consider the extent to which expanded port operations in Washington County would divert cargo from other Maine ports as opposed to facilitate cargo shipments that would have otherwise utilized ports located outside the state.
- ⇒ Third, this study is meant to provide “preliminary” estimates of the economic impacts to the State of Maine and host region associated with expanded port operations in Washington County. The study is characterized as “preliminary” due to the limited details about future port operations, infrastructure upgrades, and composition of shipping traffic.
- ⇒ Fourth, employment projections presented in this report count full-time, part-time, seasonal and temporary positions. Further, one person could hold multiple jobs.

In 2013, the Maine Department of Transportation commissioned a study examining the market for shipping via the Port of Eastport (Economic Development Research Group 2013). Although the focus of the 2013 study was a container port located in Eastport, the recommendations from that report would likely apply to any port located in Washington County—be it liquid, bulk or container. The full recommendations from the 2013 study are restated below.

- ⇒ Recommendation 1: Future proposals for investment in deepwater port facilities in Maine should carefully consider the role in that such a port would play in global trade patterns, and identify trade lanes currently underserved or with potential for expansion for which Maine could offer a potential, marketable competitive geographical advantage.

ECONOMIC IMPACTS OF EXPANDED MARINE PORT  
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Executive Summary, continued:

- ⇒ Recommendation 2: Any planning for new deepwater ports should carefully consider the economics of large vessel development and the likelihood that these larger vessels will consider calling on only those ports serving very large inland markets.
  
- ⇒ Recommendation 3: Connections to inland markets from any new deepwater port facility should carefully consider the services already provided by existing high-volume intermodal rail corridors and the connections to these existing corridors that will be required to support new or enhanced container port operations.
  
- ⇒ Recommendation 4: Ocean transit times to Maine ports, as well as the overland times to major inland markets, would need to be carefully determined to assess whether competitive inland time savings—including the added time for ocean transit to Eastport—would offer any time savings for rail or truck intermodal service to the U.S. Midwest compared to the three ports currently providing these services for Northern European shipments. The same assessment would need to be developed for Southern Asian services currently being offered through the Suez Canal.
  
- ⇒ Recommendation 5: Given the relatively close proximity of existing deepwater ports in the North Atlantic port range, proposals for new container ports should carefully examine the effects of port density on all ports within the competitive distance of target inland markets.
  
- ⇒ Recommendation 6: The location, direction and volume of containerized flow to the port should be evaluated carefully. This should include a realistic assessment of load densities likely to be achieved by a container terminal complex at Eastport. Cost comparisons with other port services available to inland shippers should be considered in this assessment.

ECONOMIC IMPACTS OF EXPANDED MARINE PORT  
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Executive Summary, continued:

- ⇒ Recommendation 7: Given the existing rail network density, proposals for development of a new deepwater port should carefully address how existing or new intermodal rail corridors can be developed and designed to meet requirements that cannot be met by the existing system.
  
- ⇒ Recommendation 8: Given the emerging trends in regions with high port and network density, like the North Atlantic port range, any proposal for developing new container port facilities should carefully consider the strategic importance of providing access to logistics support that addresses supply chain management requirements of the markets to be served through the port.

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1. BACKGROUND

National and international trade in the United States relies heavily on the movement of goods through U.S. ports. According to the American Association of Port Authorities (AAPA), ports and waterways in the United States handle more than two billion tons of domestic and international (i.e., import and export) cargo annually.<sup>2</sup> A recent study by Martin Associates found that marine cargo passing through U.S. coastal seaports generated \$4.6 trillion of total economic activity in 2014, equivalent to 26 percent of GDP, and supported 23.1 million U.S. jobs (Martin Associates 2015). AAPA projections show that international trade through U.S. seaports will increase substantially between 2015 and 2030.<sup>3</sup>

The outlook for increased trade through U.S. seaports is driven by the growth of Asian economies and by the anticipated opening of the expanded Panama Canal in 2016. The expanded Panama Canal will accommodate containerships in the range of 13,000 twenty foot equivalent units (TEU), a sizable increase compared to the current capacity of 5,000 TEUs.<sup>4</sup> The canal expansion, which will lower the shipping cost per TEU by use of larger ships, will increase the relative economic competitiveness of U.S. East and Gulf Coast ports via an all-water route from Asia as compared to North American West Coast routes that have an intermodal rail leg (Rodrigue and Notteboom 2015). Rodrigue and Notteboom (2015) note that this potential

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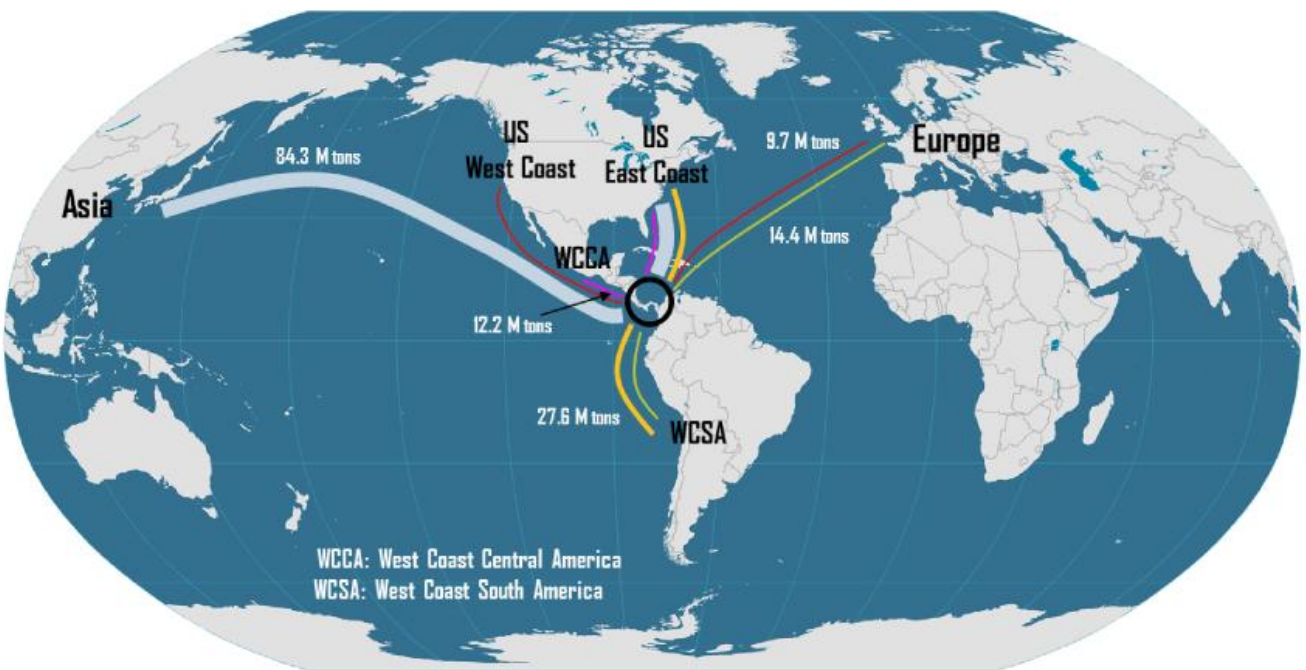
<sup>2</sup> This statistic is from the AAPA website, accessed on May 18, 2015:  
<http://aapa.files.cms-plus.com/PDFs/Awareness/US%20Economy%20Fact%20Sheet%2012-4-12.pdf>

<sup>3</sup> Ibid.

<sup>4</sup> Canal De Panama, <http://micanaldepanama.com/expansion/>



opportunity has led several U.S. East and Gulf Coast ports to plan and/or undergo major improvement projects related to channel clearance, port infrastructure, and access to “hinterland” markets. The maneuvering of existing ports, some of which already have improvement plans in place, is one of the many factors that will determine where the increased shipping activity associated with the expanded Panama Canal will occur.



*Source: Panama Canal Authority*

*([http://people.hofstra.edu/geotrans/eng/ch1en/appl1en/panama\\_trade\\_routes.html](http://people.hofstra.edu/geotrans/eng/ch1en/appl1en/panama_trade_routes.html))*

In 2014, Maine generated \$2.8 billion of exports sent to other nations (U.S. Department of Commerce: Office of Trade and Economic Analysis—International Trade Administration 2015). Exports from Maine supported over 2,200 companies in the state, with the vast majority

(84.5 percent) of them being small- and medium-sized (fewer than 500 employees) businesses. In 2014, the top five export industries in Maine were paper (\$484 million); fish and other marine products (\$434 million); oil and gas (\$278 million); computer and electronic products (\$260 million); and transportation equipment (\$209 million). The top five export markets for Maine products were Canada (\$1.5 billion), China (\$184 million), Malaysia (\$105 million), Japan (\$98 million) and Netherlands (\$64 million). The export of goods from Maine supported 17,120 jobs in 2014.<sup>5</sup>

In 2014, imports to Maine equaled \$3.8 billion, with the top five importing countries being Canada (\$2.1 billion), China (\$357 million), Netherlands (\$154 million), Germany (\$107 million), and Russian Federation (\$84 million) (U.S. Department of Commerce: International Trade Association 2015). The top five imports into Maine were oil and gas (\$634 million); electricity (\$318 million); wood products (\$280 million); lobsters (\$161 million); and clothing (\$124 million) (U.S. Census Bureau 2014). Trade with Canada, as documented above, currently accounts for about 75 percent of all Maine imports and exports.

Much of Maine's traded goods, with countries other than Canada, passes through the state's seaports. The growth of international trade via seaports expected nationally, combined with the state's location and proximity to many of the North American continent's major population centers, have generated optimism about the future of Maine's ports. The purpose of this study is to examine the state and local economic impacts associated with expanded marine port operations in Washington County, Maine. Economic impact is defined as the employment (i.e., jobs) and labor income (e.g., wages and salaries) that are directly associated with ports and

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<sup>5</sup> Hall, Jeffrey and Rasmussen Chris, Office of Trade and Economic Analysis International Trade Administration, Department of Commerce, "Jobs Supported by State Exports 2014," April 9, 2015, [http://trade.gov/mas/ian/build/groups/public/@tg\\_ian/documents/webcontent/tg\\_ian\\_005411.pdf](http://trade.gov/mas/ian/build/groups/public/@tg_ian/documents/webcontent/tg_ian_005411.pdf)

port-related businesses, as well as the multiplier effects supported by the expenditures made by these establishments and their workers.

The following caveats should be considered when reading this report and interpreting its findings.

- ⇒ First, the study examines the impacts associated with expanded port operations in Washington County, but the report does not estimate the amount of port activities that are likely to occur in the future. Such calculations would require a port feasibility analysis, which is beyond the scope of the project. A port feasibility analysis would address many of the recommendations, listed below, from a 2013 study commissioned by the Maine Department of Transportation. In the absence of a feasibility analysis, the economic impact numbers presented in this report cover a range of hypothetical port operations scenarios.
- ⇒ Second, the analysis presented in this report does not consider the extent to which expanded port operations in Washington County would divert cargo from other places in Maine, as opposed to facilitate cargo shipments that would have otherwise been made outside the state. The impacts on the entire state would depend on whether or not the expanded port operations in Washington County handle cargo that would have otherwise used ports located outside of Maine.
- ⇒ Third, this study is meant to provide “preliminary” estimates of the economic impacts to the State of Maine and host region (e.g., Washington County) associated with expanded port operations. The study is characterized as “preliminary” due to the limited details about future port operations, infrastructure upgrades, and composition of shipping traffic (e.g. bulk commodities or shipping containers). The results of this study will, therefore,

provide a range of potential impacts that could be determined more precisely with an in-depth feasibility and impact assessment.

⇒ Fourth, employment projections presented in this report count full-time, part-time, seasonal and temporary positions. Further, one person could hold multiple jobs.

## 2. SIZE DISTRIBUTION OF U.S. PORTS

A key factor influencing the state and regional economic impacts of marine port operations is the amount of cargo moving in and out of the port. To provide a frame of reference to the scenarios examined later in the report, Figure 1 shows the distribution of annual cargo volume by U.S. ports.<sup>6</sup> The figure indicates that about 41 percent of U.S. ports handled ten million tons or more of cargo in 2013, and another 38 percent of U.S. ports handled between 2.6 million and ten million tons of cargo.<sup>7</sup> The rest of the ports, about 21 percent, appear to have handled less than 2.6 million tons of cargo. These “small” ports were identified, despite the fact that they were missing from a list of the top 99 ports by cargo volume, by their inclusion on a broader list of 125 U.S. ports from the U.S. Department of Transportation, Maritime Administration.

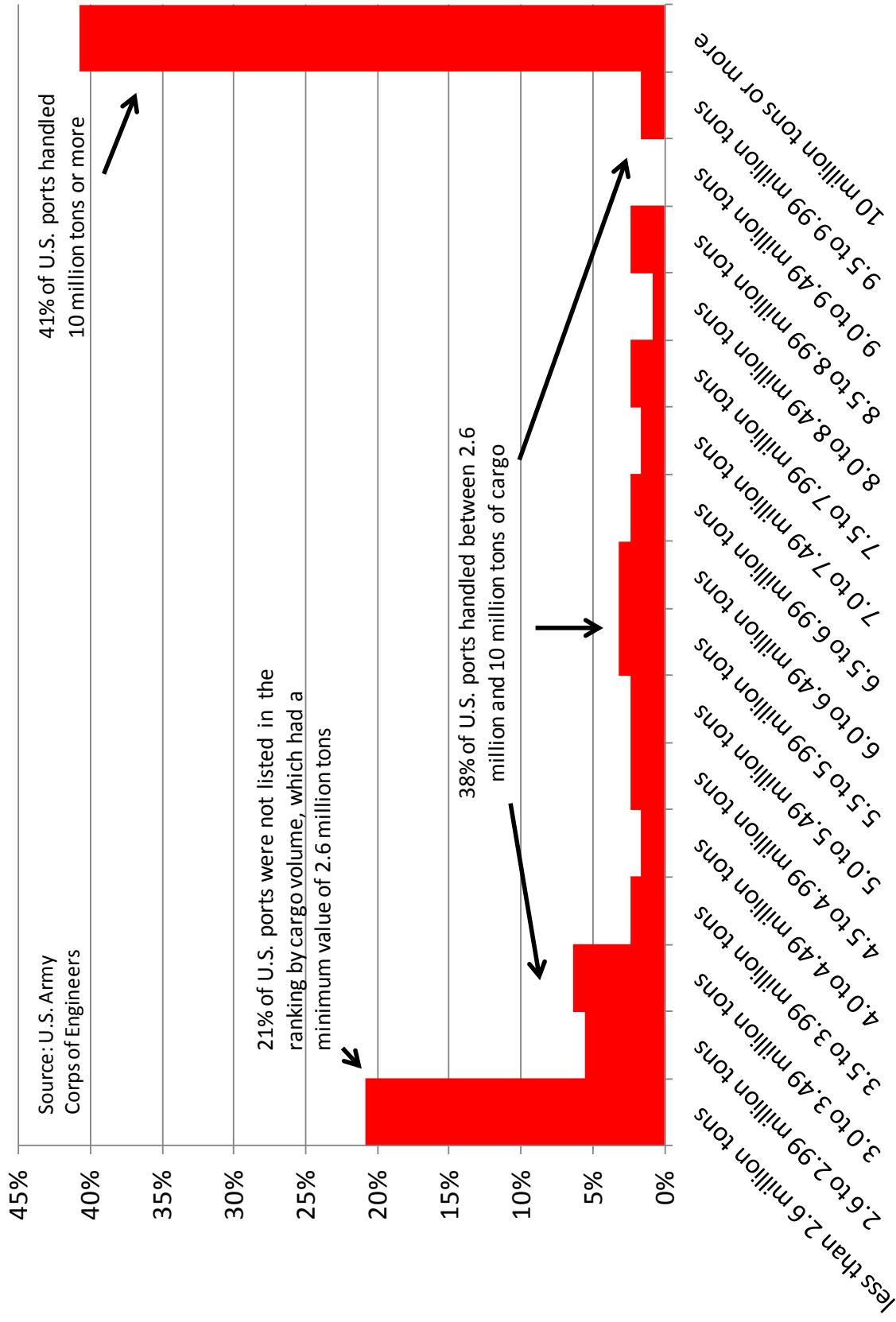
As an example of the amount of port activity currently taking place in Washington County, the Port of Eastport handled over 400,000 tons of cargo in 2010, which was an annual record at that time (Mack 2010). This means that the Port of Eastport falls within the smallest category of U.S. ports, since it does not reach the threshold of 2.6 million tons. In order to achieve an annual cargo volume of about 2.8 million tons, which is equivalent to the 25<sup>th</sup> percentile of all U.S. ports, the Port of Eastport would require a sevenfold increase in shipments relative to its record-setting total in 2010. An eleven-fold expansion in annual cargo volume relative to 2010, which would increase the port’s total to 4.4 million tons, would place Eastport around the 37<sup>h</sup> percentile of all U.S. ports.

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<sup>6</sup> Two common metrics of the amount of cargo passing through a port are cargo volume and the number of twenty-foot equivalent unit (TEU) containers. The analysis presented in this report focuses on cargo volume.

<sup>7</sup> This information is available from the U.S. Army Corps of Engineers for 99 ports.

Figure 1. Distribution of U.S. Ports by Cargo Volume, 2013



### 3. ECONOMIC IMPACTS OF MARINE PORT OPERATIONS

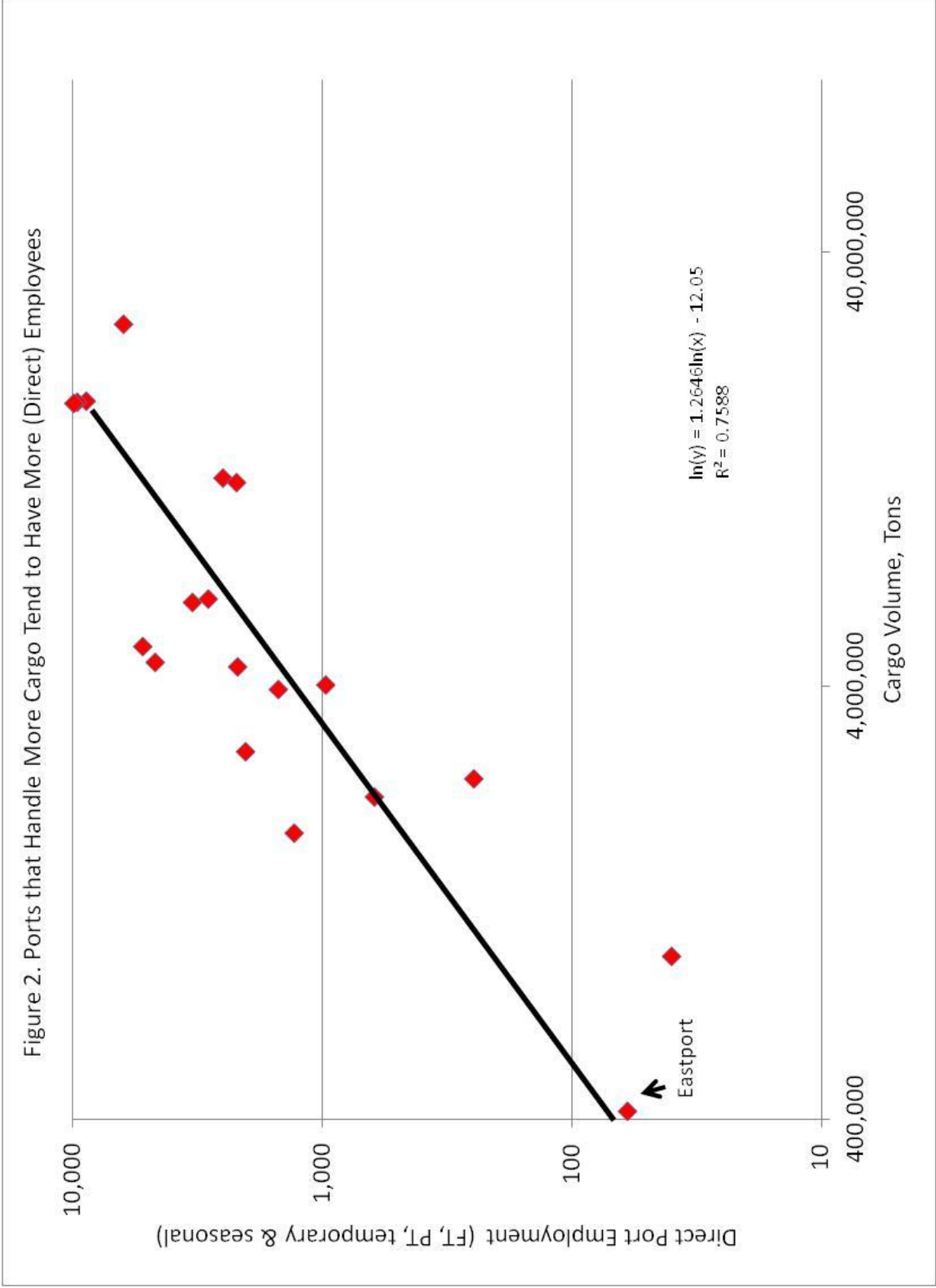
The economic impacts of marine port operations are characterized by a port’s direct impact—that is, the amount of jobs and labor income that are directly related to the port and its operations—and its employment and labor income multiplier effects. These multiplier effects are supported by the expenditures made by the port and port-related businesses, and their workers.

Figure 2 shows the relationship between the numbers of workers (full-time, part-time, seasonal and temporary) directly associated with ports (shown on the vertical axis) and their annual cargo volumes (shown on the horizontal axis).<sup>8</sup> The diamond-shaped points represent 19 U.S. ports, including the Port of Eastport located in Washington County, with cargo volume statistics and direct employment figures from the ports and other economic impact studies.<sup>9</sup> The trend line that intersects the figure characterizes the relationship between the annual volume of shipments and direct port employment. This trend line and the equation shown in the bottom right corner of the figure can be used to estimate the direct employment associated with ports of various sizes.

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<sup>8</sup> In port economic impact studies (e.g., see those conducted by Martin Associates), direct employment figures include—among other types of jobs—terminal and warehouse workers, transportation workers involved in moving cargo to and from the terminal, tug boat operators, inspection agents, etc.

<sup>9</sup> The other economic impact studies are listed in the references section. Information on the Port of Eastport is from a 2010 *Bangor Daily News* article (Mack 2010).





The validity of predicting direct employment from this equation depends on the accuracy of the underlying studies that estimate employment at other ports. Additionally, given the dispersion of data points around the trend line, any particular port expansion project can be expected to have a range of possible outcomes. Thus, we present the expected, or “average,” outcome. Another factor to consider is whether or not ports in Washington County would employ people at the same rate as other ports or whether operations would continue the trend towards increasing use of automation as seen at the ports of Los Angeles and Long Beach (not included in Figure 2). These ports have installed remote-controlled cranes that transfer containers to automated trucks and, if similar technologies were deployed in Washington County, it would result in a smaller employment impact than what is estimated in this report.<sup>10</sup>

### *Statewide Economic Impact*

Table 1 shows the estimated annual statewide economic impacts associated with marine ports of different-sized cargo volumes. The direct employment figures shown in the second column are the number of port and port-related jobs that would be needed to operate a port of a given amount of annual cargo volume. For example, a port processing about 4.5 million tons, which would place it near the 40<sup>th</sup> percentile of all U.S. ports, could have an estimated 1,515 “total” port and port-related employees. It is important to note that, in this analysis, “total” jobs include full-time, part-time, seasonal and temporary positions. Further, it is possible that one person could hold multiple jobs. The total employment effect, which is the sum of the direct (port and port-related) employment and multiplier effects, ranges from an estimated 241 total

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<sup>10</sup> See Bloomberg News: <http://www.bloomberg.com/news/articles/2015-05-18/driverless-trucks-hired-at-california-ports-losing-market-share>.

jobs to 4,432 total jobs for port activities spanning between 0.5 million and 5.0 million tons of annual shipments.<sup>11</sup>

The labor income figures are the estimated amounts of wages and salaries received by the port and port-related employees (i.e., direct labor income) and those who are impacted by the spending of these businesses and workers (i.e., labor income multiplier effects). The total labor income impacts, including multiplier effects, range from \$9.1 million per year to \$167.5 million annually for port cargo volumes of 0.5 million to 5.0 million tons handled per year.

The information presented in Table 1 suggests that a port with an annual cargo volume of two million tons could have an annual economic impact, including multiplier effects, of an estimated 1,391 total (full-time, part-time, seasonal and temporary) jobs and \$52.6 million of labor income. As another example, a port with an annual cargo volume of four million tons could have an economic impact, including multiplier effects, of an estimated 3,342 total jobs, and \$126.2 million of labor income.

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<sup>11</sup> The IMPLAN model is based on an employment headcount, which does not distinguish between full-time, part-time, seasonal and temporary workers.

Table 1. Estimated Statewide Economic Impacts of Ports of Different-Sized Cargo Volumes

Cargo Volume, tons	Direct Employment	Multiplier Effects	Total Employment	Direct Labor Income	Multiplier Effects	Total Labor Income
0.5 million	94	147	241	\$2.7 million	\$6.4 million	\$9.1 million
1 million	226	353	579	\$6.4 million	\$15.4 million	\$21.8 million
1.5 million	378	589	967	\$10.8 million	\$25.8 million	\$36.6 million
2 million	543	848	1,391	\$15.5 million	\$37.1 million	\$52.6 million
2.5 million	720	1,124	1,845	\$20.5 million	\$49.1 million	\$69.6 million
3 million	907	1,416	2,323	\$25.9 million	\$61.9 million	\$87.8 million
3.5 million	1,103	1,721	2,823	\$31.4 million	\$75.2 million	\$106.6 million
4 million	1,305	2,037	3,342	\$37.2 million	\$89.0 million	\$126.2 million
4.5 million	1,515	2,364	3,879	\$43.2 million	\$103.3 million	\$146.5 million
5 million	1,731	2,701	4,432	\$49.4 million	\$118.1 million	\$167.5 million

Notes. Direct employment figures, which include full-time, part-time, seasonal and temporary jobs, are estimated using the trend line shown in Figure 2. One person could hold multiple part-time, seasonal and temporary jobs. Direct labor income figures and multiplier effects are estimated using the Maine IMPLAN model. Figures are subject to rounding.

The employment multiplier effects are the additional jobs in Maine that would be supported by the spending of the port and port-related businesses, and their employees. These multiplier effects are estimated using the Maine IMPLAN model, which is an input-output framework (based on U.S. input-output tables) that traces the flows of expenditures and income through the Maine economy with a complex system of accounts that are uniquely tailored to the region. Underlying these accounts is information regarding transactions occurring among businesses located in Maine, the spending patterns of households, and transactions occurring between Maine business and households and the rest of the world. Some of the data sources used to develop the IMPLAN model include County Business Patterns of the U.S. Census Bureau, Regional Economic Information System (REIS) data and input-output accounts from the U.S. Bureau of Economic Analysis, and ES-202 statistics from the U.S. Bureau of Labor Statistics.

The statewide employment multiplier, defined as the total employment impact divided by the number of direct port and port-related jobs, is 2.56. This implies that the shipping activity associated with each port and port-related employee would support a total of 2.56 Maine jobs; that is, the person directly related to the port (full-time, part-time, seasonal and/or temporary) and another 1.56 full-time, part-time, seasonal and/or temporary jobs in other sectors of the Maine economy. Because the multiplier effects are supported, in part, by the expenditures made by workers and their households, the specific industries impacted cover a wide range of retail, services (e.g., healthcare, education, recreation) and most other sectors of the economy.

Table 2. Estimated County-Level Economic Impacts of Ports of Different-Sized Cargo Volumes

Cargo Volume, tons	Direct Employment	Multiplier Effects	Total Employment	Direct Labor Income	Multiplier Effects	Total Labor Income
0.5 million	94	113	207	\$2.7 million	\$3.7 million	\$6.4 million
1 million	226	272	498	\$6.4 million	\$8.8 million	\$15.2 million
1.5 million	378	454	831	\$10.8 million	\$14.7 million	\$25.5 million
2 million	543	653	1,196	\$15.5 million	\$21.1 million	\$36.6 million
2.5 million	720	865	1,586	\$20.5 million	\$28.0 million	\$48.5 million
3 million	907	1,090	1,997	\$25.9 million	\$35.3 million	\$61.2 million
3.5 million	1,103	1,324	2,427	\$31.4 million	\$42.9 million	\$74.3 million
4 million	1,305	1,568	2,873	\$37.2 million	\$50.7 million	\$87.9 million
4.5 million	1,515	1,820	3,335	\$43.2 million	\$58.9 million	\$102.1 million
5 million	1,731	2,079	3,810	\$49.4 million	\$67.3 million	\$116.7 million

Notes. Direct employment figures, which include full-time, part-time, seasonal and temporary jobs, are estimated using the trend line shown in Figure 2. One person could hold multiple part-time, seasonal and temporary jobs. Direct labor income figures are estimated using the Maine IMPLAN model and multiplier effects are estimated using the Washington County IMPLAN model. Figures are subject to rounding.

*County-Level Economic Impact*

Table 2 shows the local (i.e., county-level) economic impacts associated with the different scenarios of port cargo volumes. The direct employment and labor income figures are identical to those shown in Table 1. The multiplier effects, however, are smaller in the county-level analysis than in the statewide assessment. This is because, as compared to Washington County, the entire state offers a wider variety of products and services that could be purchased by the port and port-related businesses, and their employees.

The results shown in Table 2 indicate that a port handling four million tons of cargo annually could have a county-level economic impact, including multiplier effects, of an estimated 2,873 total jobs, and \$87.9 million of labor income. As noted above, “total” jobs include full-time, part-time, seasonal and temporary positions. Furthermore, one person could hold multiple jobs. Under a more modest scenario, a port handling an annual volume of 1.5 million tons of cargo could generate a county-level economic impact—including multiplier effects—of an estimated 831 total jobs, and \$25.5 million of labor income.

The county-level employment multiplier, defined as the total employment impact divided by the number of direct port and port-related jobs, is 2.20. This implies that the shipping activity associated with each port and port-related employee would support a total of 2.20 jobs in Washington County; the person directly related to the port (full-time, part-time, seasonal and/or temporary) and another 1.20 full-time, part-time, seasonal and/or temporary jobs in other sectors of the economy.

#### 4. ECONOMIC IMPACTS OF LOCAL INFRASTRUCTURE IMPROVEMENTS

Increasing the volume of goods moving in and out of marine ports located in Washington County would likely require major investments in local infrastructure. In this section, we examine the potential economic impacts associated with local infrastructure improvements. Similar to the previous analysis regarding the impacts of port operations, we present the results for several different scenarios; in this case, they differ in terms of the total amount of spending on infrastructure upgrades. Unlike the previous analysis, which focused on the permanent and ongoing impacts associated with port operations, the analysis of construction expenditures examines impacts that are temporary in nature.

##### *Statewide Economic Impact*

Table 3 shows the estimated statewide economic impacts associated with different levels (i.e., capital investment spending) of local infrastructure improvements. The scenarios shown in the table range from a total of \$100 million to \$500 million of construction-related expenditures, with—for the purposes of the economic impact analysis—15 percent of the total amount allocated to engineering, 20 percent to buildings and structures (e.g., port structures), and 65 percent to transportation infrastructure (e.g., roads, railroads). In each of the scenarios, the impacts are spread evenly over a four-year construction schedule. Thus, \$100 million in overall infrastructure spending would amount to \$25 million per year, and \$500 million in overall spending would be \$125 million per year.

The economic impacts of local infrastructure improvements are estimated using the Maine IMPLAN model. The results should be interpreted such that the given amount of spending (e.g., \$25 million per year) takes place in the state. Of course, an actual construction project would include in-state and out-of-state spending. Thus, if an actual project involves, for example,

\$900 million of spending and \$400 million of this amount occurs out of state, the impacts would be estimated assuming an in-state direct impact of \$500 million—or, \$125 million annually over four years.

As shown in Table 3, we see that \$25 million of annual spending on infrastructure improvements could generate a statewide direct employment impact of an estimated 157 total jobs. Recall from the earlier examples that, in this analysis, “total” jobs include full-time, part-time, seasonal and temporary positions. Further, it is possible that one person could hold multiple jobs. The direct labor impact would be an estimated \$7.9 million. The total statewide economic impact—including multiplier effects—from \$25 million of local infrastructure improvements could be an estimated 266 total jobs, and \$12.5 million of labor income.

At the higher end of the construction spending spectrum shown in Table 3, the statewide economic impacts from \$125 million of annual spending on infrastructure improvements—including multiplier effects—could be an estimated 1,331 total jobs, and \$62.5 million of labor income. As noted earlier in this section, the economic impacts of infrastructure improvements would be temporary and are shown over a 4-year construction period.



Table 3. Estimated Statewide Economic Impacts of Different-Sized Infrastructure Improvements

Annual Expenditures	Direct Employment	Multiplier Effects	Total Employment	Direct Labor Income	Multiplier Effects	Total Labor Income
\$25,000,000	157	109	266	\$7.9 million	\$4.6 million	\$12.5 million
\$62,500,000	392	273	666	\$19.7 million	\$11.6 million	\$31.3 million
\$125,000,000	785	546	1,331	\$39.4 million	\$23.1 million	\$62.5 million

Notes. Figures are estimated using the Maine IMPLAN model. The results shown in the table should be interpreted such that the given amount of spending (e.g., \$25 million per year) takes place in the state. Of course, an actual construction project would include in-state and out-of-state spending. Thus, if an actual project involves, for example, \$900 million of spending and \$400 million of this amount occurs out of state, the impacts would be estimated assuming an in-state direct impact of \$500 million—or, \$125 million annually over four years. In the impact analysis, 15 percent of expenditures are allocated to engineering, 20 percent to buildings and structures, and 65 percent to transportation infrastructure. The employment figures include full-time, part-time, seasonal and temporary jobs. One person could hold multiple part-time, seasonal and temporary jobs. Figures are subject to rounding.

Table 4. Estimated County-Level Economic Impacts of Different-Sized Infrastructure Improvements

Annual Expenditures	Direct Employment	Multiplier Effects	Total Employment	Direct Labor Income	Multiplier Effects	Total Labor Income
\$25,000,000	157	66	223	\$7.9 million	\$2.2 million	\$10.1 million
\$62,500,000	392	166	558	\$19.7 million	\$5.6 million	\$25.3 million
\$125,000,000	785	331	1,116	\$39.4 million	\$11.2 million	\$50.6 million

Notes. Direct employment and labor income are estimated using the Maine IMPLAN model. Multiplier effects are estimated using the Washington County IMPLAN model. The results shown in the table should be interpreted such that the given amount of spending (e.g., \$25 million per year) takes place in the region. Of course, an actual construction project would include in-state and out-of-state spending. Thus, if an actual project involves, for example, \$900 million of spending and \$400 million of this amount occurs outside the region, the impacts would be estimated assuming a direct impact of \$500 million—or, \$125 million annually over four years. In the impact analysis, 15 percent of expenditures are allocated to engineering, 20 percent to buildings and structures, and 65 percent to transportation infrastructure. The employment figures include full-time, part-time, seasonal and temporary jobs. One person could hold multiple part-time, seasonal and temporary jobs. Figures are subject to rounding.

*County-Level Economic Impact*

Table 4 shows the estimated county-level economic impacts associated with the various scenarios of infrastructure-related expenditures. These impacts are lower than those estimated for the entire state. As was the case in the analysis of port operations, the multipliers are higher for Maine than Washington County because the state offers a wider variety of products and services that could be purchased by the businesses involved in the infrastructure improvements, and their employees.

The information presented in Table 4 indicates that a \$25 million (annually, continuing over four years) local infrastructure improvements project could have a county-level economic impact—including multiplier effects—of an estimated 223 total jobs, and \$10.1 million of labor income. As it has been defined throughout the report, “total” jobs include full-time, part-time, seasonal and temporary positions. Further, it is possible that one person could hold multiple jobs. A larger construction project of \$125 million of expenditures per year would have a county-level economic impact—including multiplier effects—of an estimated 1,116 total jobs, and \$50.6 million of labor income. These construction-related impacts, like those estimated earlier for the entire state, would be temporary in nature and would end at the conclusion of the construction project.<sup>12</sup>

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<sup>12</sup> As noted earlier in the text, these results should be interpreted such that the given amount of spending (e.g., \$25 million per year) takes place in the region. Of course, an actual construction project would include in-state and out-of-state spending. Thus, if an actual project involves, for example, \$900 million of spending and \$400 million of this amount occurs outside the region, the impacts would be estimated assuming a direct impact of \$500 million—or, \$125 million annually over four years.

## 5. SUMMARY AND CONCLUSIONS

The purpose of this study was to examine the state and local economic impacts associated with expanded marine port operations in Washington County. Throughout the report, the impact analysis considered a wide spectrum of expansion scenarios—ranging from relatively modest to quite substantial. Although we summarize below the results associated with a port handling two million tons of cargo annually and, in a separate analysis, an expansion involving \$250 million of in-state expenditures, the “most likely” scenarios of those examined previously in the report would be determined through a feasibility study.

Results of the study show that an expanded port facility handling, for example, two million tons of cargo annually, could have a statewide economic impact—including multiplier effects—of an estimated 1,391 total (full-time, part-time, seasonal and temporary) jobs, and \$52.6 million of labor income. Further, it is possible that one person could hold multiple jobs. Economic impact results for other scenarios, in terms of post-expansion cargo volume, are shown in Table 1 of the report.

Increasing the volume of goods moving in and out of marine ports located in Washington County would likely require major investments in local infrastructure. A construction and infrastructure improvement project involving, for example, \$250 million of in-state expenditures (i.e., \$62.5 million per year over 4 years) would have an annual statewide economic impact—including multiplier effects—of an estimated 666 total (full-time, part-time, seasonal and temporary) jobs, and \$31.1 million of labor income. Further, it is possible that one person could hold multiple jobs. These construction-related impacts would be temporary in nature and would

end at the conclusion of the construction project. Other scenarios, using different construction spending figures, are shown in Table 3 of the report.

As a final point to consider, it is important to understand that there may be other economic and non-economic impacts beyond those covered in this report. Other issues that were not addressed in the report include—but are not limited to—the environmental impacts of port facilities and the local infrastructure improvements, and the impacts on businesses located throughout Maine that import and export goods outside the state. Thus, findings presented in this report should be interpreted as a part, but not the whole, of the evidence in evaluating the effect of expanded port operations in Washington County.

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