THE ECONOMIC IMPACT OF MARINE CARGO AT THE PORTS OF TACOMA AND SEATTLE

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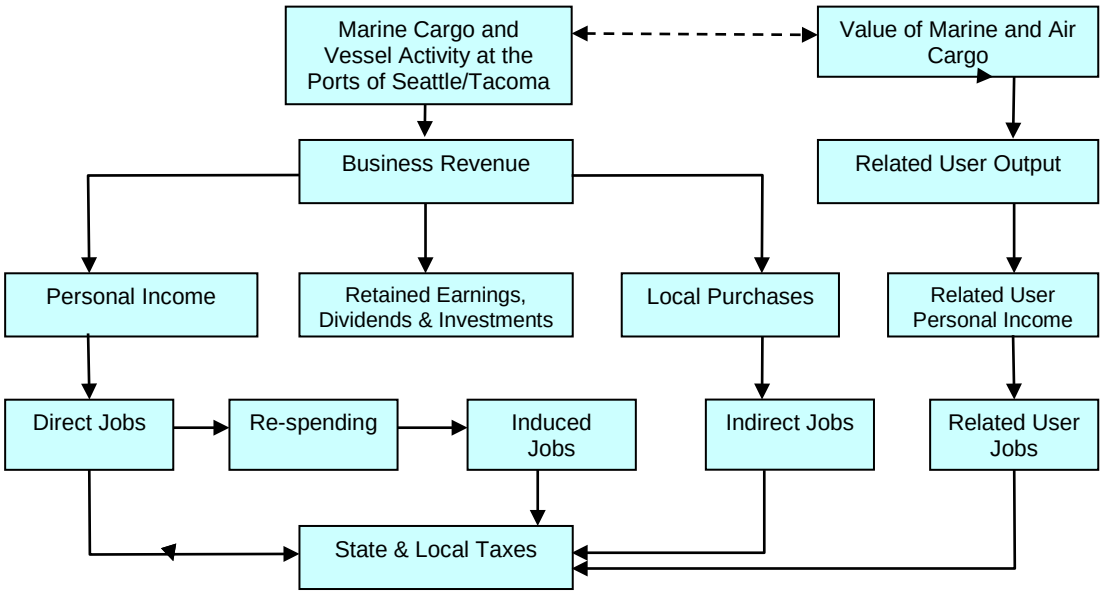
I. OVERVIEW OF THE ANALYSIS AND SUMMARY OF RESULTS

Martin Associates was retained by the Ports of Tacoma and Seattle to measure the combined local and regional economic impacts generated by maritime activity at the marine terminals owned and leased by the two ports. Impacts are estimated in terms of jobs, personal earnings, business revenue and state and local taxes. The impacts are estimated for marine cargo activity in calendar year 2013. Individual economic impact analyses have been developed for each port, as have separate reports detailing the economic impacts of the various lines of business operated by each port.

1. ECONOMIC IMPACT STRUCTURE

Waterborne cargo and vessel activity at the Ports of Tacoma and Seattle contribute to the local and regional economy by generating business revenue to local and national firms providing vessel and cargo handling services at the marine terminals. These firms, in turn, provide employment and income to individuals, and pay taxes to state and local governments. Exhibit I-1 shows how activity at marine terminals generates impacts throughout the local, state and national economies. As this exhibit indicates, the impact of a seaport on a local, state or national economy cannot be reduced to a single number, but instead, the seaport activity creates several impacts. These are the revenue impact, employment impact, personal income impact and tax impact. These impacts are non-additive. For example, the income impact is a part of the revenue impact, and adding these impacts together would result in double counting. Exhibit I-1 shows graphically how activity at the Ports' marine terminals generates the four impacts.

Exhibit I-1
Flow of Economic Impacts Generated by Maritime Activity



At the outset, activity at the ports generates business revenue for firms which provide services. This business revenue impact is dispersed throughout the economy in several ways. It is used to hire people to provide the services, to purchase goods and services, and to make federal, state and local tax payments. The remainder is used to pay stock-holders, retire debt, make investments or is held as retained earnings. It is to be emphasized that the only portions of the revenue impact that can be definitely identified as remaining in the local economy are those portions paid out in salaries to local employees, for local purchases by individuals and businesses directly dependent on the seaports, in contributions to state and local taxes, in lease payments to the Ports of Tacoma and Seattle by tenants and wharfage and dockage fees paid to the Ports.

The employment impact of seaport activity consists of four levels of job impacts.

- ***Direct employment impact*** -- jobs directly generated by seaport activity. Direct jobs generated by marine cargo include jobs with trucking companies and railroads moving cargo between inland origins and destinations and the marine terminals, longshoremen and dockworkers, steamship agents, freight forwarders, stevedores, etc. It is to be emphasized that these are classified as directly generated in the sense that these jobs would experience near term dislocation if the activity at the Ports of Tacoma and Seattle marine terminals were to be discontinued.

- ***Induced employment impact*** -- jobs created throughout the local economy because individuals directly employed due to seaport activity spend their wages locally on goods and services such as food, housing and clothing. These jobs are held by residents located throughout the region, since they are estimated based on local and regional purchases.

- ***Indirect Jobs*** -- are jobs created locally due to purchases of goods and services by firms, not individuals. These jobs are estimated directly from local purchases data supplied to Martin Associates by the companies interviewed as part of this study, and include jobs with local office supply firms, maintenance and repair firms, parts and equipment suppliers, etc. It is to be emphasized that special care was taken to avoid double counting, since the current study counts certain jobs as direct (i.e., trucking jobs, jobs with railroads, jobs with insurance companies and admiralty law firms, etc.) which are often classified as indirect by other approaches, notably the input/output model approach.

- ***Related shipper/consignee (related user) jobs*** -- jobs with shippers and consignees (exporters and importers) using the marine terminals for shipment and receipt of cargo.

The personal earnings impact is the measure of employee wages and salaries (excluding benefits) received by individuals directly employed due to seaport activity. Re-spending of these earnings throughout the regional economy for purchases of goods and services is also estimated. This, in turn, generates additional jobs -- the induced employment impact. This re-spending throughout the region is estimated using a regional personal earnings multiplier, which reflects the percentage of purchases by individuals that are made within the state of Washington. The re-spending effect varies by state -- a larger re-spending effect occurs in states that produce a relatively large proportion of the goods and services consumed by residents, while lower re-spending effects are associated with states that import a relatively large share of consumer goods and services (since personal earnings "leak out" of the region for these out-of-region purchases). The direct earnings are a measure of the local and state impact since they are received by those directly employed by seaport activity.

Tax impacts are payments to the state and local governments by firms and by individuals whose jobs are directly dependent upon and supported (induced and indirect jobs) by activity at the marine terminals.

2. ECONOMIC IMPACT SECTORS

The movement of cargo through the Ports of Tacoma and Seattle marine cargo terminals generates economic activity in various business sectors of the state and local economy. Specifically, four distinct economic sectors are involved in providing services to move the cargo through the Ports of Tacoma and Seattle marine terminals. These are the:

- Surface Transportation Sector

- Maritime Service Sector
- Port of Tacoma and Port of Seattle
- Shippers/Consignees Using the Port of Tacoma and Port of Seattle

Jobs, income, revenue and tax impacts are estimated for each sector, as well as for specific job categories within each sector.

Within each sector, various participants are involved. Separate impacts are estimated for each of the participants. A discussion of each of the four economic impact sectors is provided below, including a description of the major participants in each sector.

(1) The Surface Transportation Sector

The surface transportation sector consists of both the railroad and trucking industries. These sectors are responsible for moving the various cargoes between the marine terminals and their inland origins and destinations. Two mainline railroads serve the Ports of Tacoma and Seattle, the Burlington Northern/Santa Fe and the Union Pacific railroads. In general, the railroads play a key part in the Ports' ability to function as leading intermodal ports. Furthermore, the railroads are integral in the movement of grain and autos from Midwestern states to the Ports.

Many local and national trucking firms serve the marine terminals, as do numerous individual owner-operators. Trucking firms are involved in distributing local containerized cargo (both full container loads, as well as less-than-container load (LCL) cargo). Typically, trucks distribute the imported containers moving locally, as well as to Canada, and move export containers originating in the Tacoma/Seattle area to the marine terminals for export. Truck transportation is also the major mode used for moving Alaskan-bound cargo to the marine terminals; trucks are also a primary mode to distribute the dry bulk products, as well as logs.

(2) The Maritime Service Sector

This sector consists of numerous firms and participants performing functions related to the following maritime services:

- Cargo Marine Transportation;
- Vessel Operations;
- Cargo Handling; and
- Federal, State, and Local Government Agencies.

A brief description of the major participants in each of these categories is provided below:

- Cargo Marine Transportation - Participants in this category are involved in arranging for overland and water transportation for export or import freight through the seaport. The freight forwarder/customhouse broker is the major participant in this category. The freight forwarder/customhouse broker arranges for the freight to be delivered between the seaport and inland destinations, as well as the ocean transportation. This function performed by freight forwarders is most prevalent for general cargo commodities. For bulk cargo, arrangements are often made by the shipper/receiver, and the cargo passes over privately owned docks.

- Vessel Operations - This category consists of several participants. The steamship agents provide a number of services for the vessel as soon as it enters the Puget Sound; the agents arrange for pilot services and towing, for medical and dental care of the crew and for ship supplies. The agents are also responsible for vessel documentation. In addition to the steamship agents arranging for vessel services, those providing the services include:

  - Pilots - assist vessels navigating Puget Sound between Port Angeles and Tacoma and Seattle;

  - Chandlers - supply the vessels with ship supplies (food, clothing, nautical equipment, etc.);

  - Towing firms - provide tug assist service to vessels docking and undocking at a terminal;

  - Bunkering firms - provide fuel to the vessels;

  - Marine surveyors - inspect the vessels and the cargo; and

  - Shipyards/marine construction firms - provide repairs, either emergency or scheduled, as well as marine pier construction and dredging.

- Cargo Handling - This category involves the physical handling of the cargo at the seaport between the land and the vessel. Included in this category are the following participants:

  - Longshoremen - are members of the International Longshore and Warehouse Union, and are involved in the loading and unloading of cargo from the vessels, as well as handling the cargo prior to loading and after unloading, including stuffing and stripping containers;

- Stevedoring firms - manage the longshoremen and cargo-handling activities;
- Terminal operators - are often stevedoring firms who operate the maritime terminals where cargo is loaded and off-loaded;
- Warehouse operators - store cargo after discharge or prior to loading and consolidate cargo units into shipment lots. Transload operations are also included in the warehouse category;
- Distribution centers - include large wholesale and retail distribution centers that receive cargo through the Ports and then store and provide value added services for distribution to local and regional retail outlets; and
- Container leasing and repair firms - provide containers to steamship lines and shippers/consignees and repair damaged containers.

- Government Agencies - This maritime service sector category involves federal, state and local government agencies that perform services related to cargo handling and vessel operations at the Port. U.S. Customs and Border Protection, U.S. Department of Labor, U.S. Department of Agriculture and U.S. Department of Commerce employees are involved. In addition, both civilian and military personnel with the U.S. Coast Guard, U.S. Navy and the U.S. Army Corps of Engineers dedicated to the marine cargo moved via Ports of Tacoma and Seattle marine terminals are included, as are members of the Military Sealift Command. The city police and fire departments are also included, as are federal grain inspectors.

(3) Ports of Tacoma and Seattle Administrations

This sector includes those individuals employed by the Ports of Tacoma and Seattle whose purpose is to oversee port activity. The Ports lease terminal space to steamship lines and terminal operators and also lease equipment to the terminal operators.

(4) Shippers/Consignees Using the Ports of Tacoma and Seattle Marine Cargo Facilities

Shippers/Consignees included in this category are those shippers and consignees located throughout the state of Washington, whose businesses use the marine cargo facilities for the export and import of cargo. These users also ship and/or receive materials via other ports such as Los Angeles/Long Beach, Oakland and Vancouver, BC. It is to be emphasized that these shippers/consignees are not dependent upon the use of the Ports of Seattle and Tacoma, since they are users of other ports as well. Since these users are not dependent upon the Ports of Tacoma and Seattle, employment with these shippers/consignees is considered port-related and not port-generated.

3. COMMODITIES INCLUDED IN THE ANALYSIS

A major use of an economic impact analysis is to provide a tool for port development planning. As a port grows, available land and other resources for port facilities become scarce, and decisions must be made as to how to develop the land and utilize the resources in the most efficient manner. Various types of facility configurations are associated with different commodities. For example, automobiles require a large area for storage, while containerized cargo requires container cranes and on-, or near-dock rail. Covered storage is needed for break bulk cargo such as steel and lumber. Silos are needed for grain storage.

An understanding of the commodity's relative economic value in terms of employment and income to the local community, the cost of providing the facilities and the relative demand for the different commodities is essential in making future port development plans. Because of this need for understanding relative commodity impacts, economic impacts are estimated for the following commodities handled at the Ports of Tacoma and Seattle:

- Containerized Cargo:
  - International
  - Domestic (Alaskan and Hawaiian)
- Automobiles
- Break Bulk Cargo
- Liquid Bulk
- Petroleum
- Grain
- Logs
- Gypsum
- Other Dry Bulk

It should be emphasized that commodity-specific impacts are not estimated for each of the economic sectors described in the last section. Specific impacts could not be allocated to individual commodities with any degree of accuracy for the banking/insurance/law job category, marine construction and the government category.

4. DATA COLLECTION

This combined economic impact is based on a combined telephone and personal interview program of members of each of the economic sectors described above. Participants were identified by the individual Ports, the Pacific Northwest Ports Handbook 2014, Washington Public Ports Association Directory and internal Port of Tacoma and Seattle tenant lists and Martin Associates' internal data bases from the previous economic impact studies conducted by Martin Associates for the Ports of Tacoma

(2004) and Seattle (2007). Telephone and personal interviews were used to achieve a 95 percent response rate in all sectors. Table I-1 summarizes the 610 firms interviewed.

Table I-1
Summary of Interviews

Category	Number of Interviews
Terminals/Stevedores	27
Warehouse/Container Repair	98
Surveyors	46
Lines & Agents	69
Tug & Barge	47
Shipyards/Marine Construction	78
Maritime Services	213
Pilot	1
Railroads	5
Government Agencies	24
Port Authorities	2
Total	610

*Martin Associates has also developed a data base for 116 freight forwarders providing services in the PNW. Data from this source was also used in formulating the freight forwarder impacts.

In addition to data collected from the 610 interviews, published data was collected from several sources. These publications include:

- Census of Wholesale Trade
- Census of Retail Trade
- Census of Construction
- Census of Service Industries
- Annual Survey of Manufacturers

Other published data was obtained from the U.S. Census Bureau, County Business Patterns; U.S. Bureau of Economic Analysis, Regional Income Division; and U.S. Bureau of Labor Statistics, "Consumer Expenditure Survey, 2013".

II. ECONOMIC IMPACTS OF MARITIME CARGO OPERATIONS AT THE PORTS OF TACOMA AND SEATTLE

In 2013, a total of 36.1 million short tons of cargo moved over marine facilities owned by the Ports of Tacoma and Seattle. Examples of these facilities include Terminal 5, Terminal 18, Terminal 30 and Terminal 46 in Seattle; and Olympic Container Terminal, Washington United Terminals, TOTE and Marshall Ave. Auto Facility in Tacoma. Of the 36.1 million tons of cargo, international containerized cargo accounted for 21.2 million tons and domestic containerized cargo moving accounted for another 7.0 million tons, 95% of which moves to and from Alaska. In addition, about 4.3 million tons of grain moved by rail to the ports' grain elevators. About 1.6 million tons of other dry bulk cargo, primarily cement, were also handled at the Port of Seattle. Table II-1 shows the cargo by type handled at the two ports.

Table II-1
Cargo Handled at the Ports of Tacoma and Seattle
(1,000 Short Tons)

Commodity	Tacoma 1,000 Tons	Seattle 1,000 Tons	Total
Containerized Cargo			
International	12,208	8,955	21,164
Domestic	1,867	5,151	7,018
Break Bulk	205	32	237
Autos	250		250
Grain	2,746	1,490	4,235
Logs	429		429
Gypsum	234		234
Petroleum		869	869
Other Dry Bulk		1,585	1,585
Other Liquid Bulk		53	53
Total	**17,939**	**18,136**	**36,074**

Note: Totals may not add due to rounding

The economic impacts generated by the 36.1 million tons of cargo are summarized in Table II-2.

Table II-2
Economic Impacts of Cargo Activity at
Port of Tacoma and Seattle Marine Terminals

	Port of Tacoma Marine Cargo	Port of Seattle Marine Cargo	Total
Jobs			
Direct	9,984	8,902	18,886
Induced	9,467	8,644	18,111
Indirect	5,274	5,863	11,136
Total Jobs	24,725	23,409	48,134
Personal Income ($1,000)			
Direct	$572,711	$527,232	$1,099,943
Re-spending/Local Consumption	$1,258,818	$1,158,857	$2,417,675
Indirect	$265,188	$289,158	$554,346
Total	$2,096,717	$1,975,247	$4,071,964
Business Revenue ($1,000)	$2,472,679	$1,832,303	$4,304,982
Local Purchases ($1,000)	$542,666	$581,098	$1,123,765
State and Local Taxes ($1,000)	$194,995	$183,698	$378,693

Note: Totals may not add due to rounding. Induced income cannot be estimated by dividing the re-spending impact by the induced jobs, as the re-spending impact includes the value of the local consumption expenditures by those directly employed, and hence would over-state the induced income impact.

As this table indicates, maritime activity (cargo and vessel activity) at the Ports of Tacoma and Seattle marine terminals created the following economic impacts.

A total of 48,134 direct, induced and indirect jobs were generated, of these, 18,886 direct jobs were generated by the activity at the marine terminals at the two ports. As the result of the local consumption expenditures and re-spending impact of the 18,886 direct job holders, 18,111 induced jobs were supported in the local and state economies. The firms providing the services to the cargo and vessels calling the marine terminals made about $1.1 billion of local purchases, in turn supporting 11,136 indirect jobs.

Nearly $4.1 billion of total income and re-spending were generated, of which $1.1 billion was received as direct income by the 18,886 direct job holders, for an average annual income of $58,240. As the result of the re-spending of the direct income for personal consumption of goods and

services by those directly employed, an additional $2.4 billion of re-spending and local consumption was generated, supporting the 18,111 induced jobs. The indirect job holders received $554.3 million of wages and salaries.

A total of $378.7 million of state and local taxes were generated by marine cargo activity at the two ports, of which $231.0 million was received by the state and $147.7 million by county and municipal authorities.

442,563 jobs in the state of Washington were related to the cargo moving via the Ports of Tacoma and Seattle marine terminals, the majority of which were related to international and domestic containerized cargo. The economic value to the state of Washington of the cargo operations is estimated at $138.1 billion, of which $133.8 billion was the value of the marine cargo operations to the related users. The 442,563 related users received $18.7 billion in personal income, and $1.7 billion of state and local taxes were supported by the related shippers/consignees in the state of Washington.

The next section details the employment impacts generated by the Ports of Tacoma and Seattle marine cargo operations.

1. EMPLOYMENT IMPACTS

The employment impacts generated by the marine terminals are estimated:

- By sector of the local and regional economy, e.g., maritime service sector, surface transportation sector, banking and insurance sector, etc.;
- By commodity group, i.e., containerized cargo, break bulk cargo, automobiles, grain, logs and gypsum
- By the residency of individuals directly employed by the activity at the Ports of Tacoma and Seattle marine terminals.

1.1 Direct Job Impacts

As a result of port activity, 18,886 full-time jobs were directly created by activity at the two ports.

1.1.1 Direct Jobs by Category

Table II-3 presents the distribution of the 18,886 direct jobs by category. As this table shows, the largest job impacts are with local warehousing and distribution firms, followed by trucking firms

bringing cargo to and from the marine terminals. The cargo activity supported 2,069 members of the ILWU and other dockworkers followed by jobs with the rail roads and terminal employees.

Table II-3
Direct Employment Impacts by Job Category

Maritime Sectors	Direct Jobs
Surface Transportation	
Rail	1,831
Truck	3,689
Maritime Services	
Terminal Employees	1,801
ILWU/Dockworkers	2,069
Towing/Bunkers/Tug Assists	585
Pilots	46
Agents	169
Surveyors/Chandlers/Misc.Services	543
Forwarders	573
Warehouse/Distribution Centers	4,018
Government	1,560
Shipyards/Ship Repair/Marine Construction	1,693
Port Authorities	311
Totals	18,886

Note: Totals may not add due to rounding

1.1.2 Job Impacts by Commodity

Most of the 18,886 jobs considered to be generated by port activity are generated by the handling of specific commodities or commodity groups. Employment with certain types of firms and organizations such as federal, state and local government agencies and marine construction/ship repair operations is difficult to assign to specific commodity groups, and if such an assignment is made, it is often done so arbitrarily. Therefore, jobs in these categories are classified as not-allocated.

Table II-4 presents the employment impacts in terms of commodity/commodity group, and for maritime activity at the Ports of Tacoma and Seattle marine terminals.

Table II-4
Distribution of Direct Job Impact by Commodity

Commodity	Total
Containerized Cargo	
International	9,816
Domestic	3,626
Break Bulk	174
Autos	277
Grain	211
Logs	93
Gypsum	115
Petroleum	78
Other Dry Bulk	393
Other Liquid Bulk	14
Not Allocated	4,089
Total	18,886

Note: Totals may not add due to rounding

This table indicates that in the year 2013, international containerized cargo generated the largest number of direct jobs, 9,816 jobs; and domestic containers created 3,626 direct jobs. Dry bulk cargo supported 393 jobs and autos generated 277 direct jobs.

1.1.3 Direct Jobs by Place of Residence

Table II-5 shows the distribution of the direct jobs by place of residence of the job holders. As this table shows, about 42.4 percent of the direct job hodlers reside in King County and 32.4 percent reside Pierce County. Nearly 11 percent of the direct jobs holders reside in Puyallup, and about 8 percent reside in Seattle.

Table II-5
Distribution of the Direct Jobs by Place of Residency

Place of Residency	Percentage	Total
Auburn	6.17%	1,165
Bellevue	0.67%	127
Bothell	1.70%	320
Burien	0.60%	113
Des Moines	3.96%	747
Enumclaw	0.49%	93
Federal Way	7.09%	1,339
Issaquah	0.76%	143
Kent	5.68%	1,072
Kirkland	3.39%	640
Mercer Island	0.06%	11
Redmond	0.10%	18
Renton	1.64%	309
Sea-Tac	1.37%	258
Seattle	7.77%	1,467
Tukwila	0.53%	100
Vashon	0.02%	4
Other King Co.	0.43%	81
Edmonds	2.65%	500
Everett	4.06%	767
Mt. Lake Terrace	6.23%	1,176
Other Snohomish Co.	0.49%	92
Tacoma	4.42%	835
Fife	3.20%	605
Sumner	9.09%	1,717
Puyallup	10.81%	2,042
Other Pierce Co.	4.85%	916
Kitsap Co.	0.93%	175
Thurston Co.	0.33%	62
Other WA	9.03%	1,706
Other US	1.51%	284
Total	100%	18,886

Note: Totals may not add due to rounding

1.2. Induced Jobs

The regional purchases by the 18,886 direct jobholders with the direct income earned from port activity create additional jobs throughout the state of Washington. In calendar year 2013, $1.1 billion was received by those 18,886 directly employed by activity at the Ports of Tacoma and Seattle marine terminals. As the result of the re-spending of a portion of this income for purchases in the state of Washington, an additional 18,111 induced jobs were generated.

These induced jobs are estimated based on the current expenditure profile of residents in the Tacoma/Seattle metropolitan region as estimated by the U.S. Bureau of Labor Statistics, "Consumer Expenditure Survey", 2011-12. This survey indicates the distribution of consumer expenditures over key consumption categories for residents of the Tacoma/Seattle metropolitan area. The consumption categories are:

- Housing
- Food at Restaurants
- Food at Home
- Entertainment
- Health Care
- Home Furnishings
- Transportation Equipment and Services

The estimated consumption expenditures generated as a result of the re-spending impact is distributed across these consumption categories. Associated with each consumption category is the relevant retail and wholesale industry. Jobs to sales ratios in each industry are then computed for the Tacoma/Seattle metropolitan area and for the state of Washington, and induced jobs are estimated for the relevant consumption categories. It is to be emphasized that induced jobs are only estimated at the retail and wholesale level, since these jobs are most likely generated initially in the Tacoma/ Seattle metropolitan area and subsequently in the state of Washington. Further levels of induced jobs are not estimated since it is not possible to defensibly identify geographically where the subsequent rounds of purchasing occur.

"The Consumer Expenditure Survey" does not include information to estimate the job impact with supporting business services, legal, social services and educational services. To estimate this induced impact, a ratio of state of Washington employment in these key service industries to total state of Washington employment was developed. This ratio is then used with the direct and induced consumption jobs to estimate induced jobs with business/financial services, legal, educational and other social services.

2. INDIRECT JOBS

The firms directly dependent upon the vessel and cargo activity at the Ports of Tacoma and Seattle marine terminals made $1.1 billion of purchases from local (in-state) suppliers of parts and equipment, business services, maintenance and repair services, communications and utilities, office equipment and fuel. These purchases supported 11,136 indirect jobs.

If maritime activity at the Ports of Tacoma and Seattle were to cease, these indirect jobs would also be lost. To estimate these indirect jobs, actual local expenditures by port-dependent firms were estimated from the in-person and telephone surveys. To estimate the indirect jobs, the local expenditures were used as inputs into the RIMS II model developed for the state of Washington for Martin Associates by the U.S. Bureau of Economic Analysis, Regional Input-Output Modeling System, 2014.

3. RELATED USER JOBS

Related user jobs are jobs with users of the two ports' marine terminals. These industries produce and use containerized cargo, both domestic and international; the forest products industry exports logs, and farmers produce the grain for export. It is to be emphasized that these users are related to the Port of Tacoma and Seattle marine terminals in that if these facilities were not available, the users could ship and receive cargo via other ports. In fact, the majority of these users currently use multiple ports for export and import, especially those moving containerized cargo through the Port. Furthermore, the level of employment with the related users is driven by the demand for the products produced by these firms, and not as the result of providing cargo handling or vessel support services at the marine terminals. In contrast, the level of direct jobs generated by the marine terminals is driven by the vessel and cargo activity.

To estimate the related user impact, average values per ton of specific key commodities were developed from USA Trade On-Line. The share of each cargo type originating or consumed in the state of Washington was developed from the terminal interviews. A weighted average dollar value per ton of containerized cargo moving via each Port was next developed from this data for both imported and exported international containerized cargo.

For export containerized cargo, employment to value of output coefficients for the export producing industries related to the export containerized cargoes were then computed from Bureau of Economic Analysis, Regional Input-Output Model for the state of Washington. These coefficients include direct, indirect and induced jobs required to deliver one dollar of export containerized cargo through the Ports of Tacoma and Seattle. Next, the average value per ton of containerized export cargo was multiplied by the tons of containerized cargo exported via the Ports of Tacoma and Seattle, and the share of containerized cargo that originated in Washington State. The weighted average job coefficients corresponding to the export containerized commodities produced in Washington were next

multiplied by the value of the containerized cargo exports via the Port originating in the state of Washington to estimate the related jobs with exported containerized cargo.

For import containerized cargo, the majority of the cargo is either a finished or an intermediate product, which is consumed either by individuals or industry. Therefore, the wholesale jobs to value of output coefficients for the state of Washington was used to estimate related jobs with imported containerized cargo. It is important to note that the wholesale margin was next applied to the value of the imported products as it is the "value added to the commodity that supports the wholesale jobs in the state and in the domestic economy". The wholesale job coefficient also accounts for the various stages involved in the wholesale process, including warehousing and distribution activities associated with the imported cargo.

A similar method was used to estimate related jobs with domestic containers. Based on interviews with the carriers moving the domestic freight, the share consumed or produced in Washington was estimated. It is to be emphasized that a majority of the domestic cargo receipts consists of personal household items or military items which do not have a transaction value. Other than the non-transaction commodities, the key inbound domestic containerized cargo is frozen and canned fish. The outbound domestic containerized cargo consists of items such as groceries, department store items, construction materials, as well as personal items. For the most part, the outbound domestic products are associated with wholesale operations in the state of Washington. The weighted average value per ton of domestic inbound and outbound containerized cargo was then estimated, and applied to the tonnage moving via the Port. The weighted average job to sales coefficients (based on the cargo distribution by commodity type) were then applied to the value of the inbound and outbound containerized domestic cargo to estimate total related jobs.

Finally, the direct, induced and indirect job impacts associated with the international and domestic containerized cargo movements were subtracted from the total related jobs to avoid double counting, as the related jobs include job impacts at each stage of handling the imported and exported cargo and domestic cargo, such as the port activity and the trucking and rail activity to move the cargo to and from the port and the induced and indirect jobs associated with the direct port activity.

A similar method was used to estimate jobs related to the shipment of logs and grain.

Using this methodology, it is estimated that 442,563 jobs within Washington are related to the cargo moving via the Ports of Tacoma and Seattle marine terminals.

4. REVENUE, INCOME AND TAX IMPACTS

The maritime activity at the Ports of Tacoma and Seattle marine terminals generate revenue for the directly dependent firms. For example, revenue is received by surface transportation firms (both railroads and trucks) as a result of moving export cargo to the marine terminals and then distributing the imported commodities inland after receipt at the terminals. The firms in the maritime service sector

receive revenue from arranging for transportation services, cargo handling and providing services to vessels in port. Ship repair yards and marine construction firms receive revenue by providing repair services to vessels and new construction and repair work at the marine terminals. The Ports of Tacoma and Seattle receive revenue from leases at the terminals. In addition, revenue is received by shippers/consignees from the sales of cargo shipped or received via the marine cargo facilities and from the sales of products made with raw materials received through the ports. Since this section is concerned with the revenue generated from providing maritime services, the shipper/consignee revenue (i.e., the value of the cargo shipped or received through each port) will be excluded from the remaining discussion.

The revenue generated by port activity consists of many components. For example, gross revenue is used to pay employee salaries and taxes, distributed to stockholders, used to retire debts, held as retained earnings and used for the purchases of equipment and maintenance services. Of these components, only three can be isolated geographically with any degree of accuracy. The personal income component of revenue can be traced to geographic locations based on the residence of those receiving the income. The local purchases by firms dependent upon maritime activity at marine terminals are identified through the interviews and used to estimate the indirect job impacts. Finally, state and local taxes paid by individuals and businesses can be traced to a geographic location based on the residency of the individuals directly employed and the location of the firms dependent on maritime activity. The balance of the revenue is distributed in the form of non-local payments to firms providing goods and services to the different sectors, for the distribution of company profits to shareholders and payment of federal taxes. Many of these firms and owners are located outside of Washington State, and, thus, it is difficult to trace the ultimate location of the distributed revenue (other than personal income, taxes and local purchases).

5. TOTAL REVENUE IMPACT

The revenue impact is a measure of the ***total economic activity*** in the state that is associated at a given point in time with the cargo moving via the Ports of Tacoma and Seattle. In 2013, $138.1 billion of total economic activity in the state of Washington was associated with marine cargo activity at the Ports of Tacoma and Seattle. Of the $138.1 billion, $4.3 billion is the direct business revenue received by the firms directly dependent upon the Ports and providing maritime services and inland transportation services to the cargo handled at the marine terminals and the vessels calling the port. The remaining $133.8 billion represents the value of the output to the state of Washington that is created due to the cargo moving via the Ports of Tacoma and Seattle marine terminals. This includes the value added at each stage of producing an export cargo, as well as the value added at each stage of production for the firms using imported raw materials and intermediate products that flow via the marine terminals and are consumed by industries within the state.

The balance of the discussion focuses on the $4.3 billion of direct business revenue generated from the provision of services to the cargo and vessels handled at the Ports of Tacoma and Seattle marine terminals.

5.1 Revenue by Category

Table II-6 presents the revenue impact generated by impact category for maritime activity at the Ports of Tacoma and Seattle marine terminals.

Table II-6
Revenue Impacts by Category

Maritime Sectors	Direct Revenue ($1,000)
Surface Transportation	
Rail	$2,236,619
Truck	$379,871
Maritime Services	
Terminals	$392,194
Towing/Tug Assists/Bunkers	$26,238
Pilots	$15,330
Agents	$4,574
Surveyors/Chandlers/Misc. Services	$91,155
Forwarders	$143,465
Warehouse	$362,142
Shipyards/Ship Repair/Marine Construction	$361,993
Barge/Bunkers	$59,696
Port Authorities	$231,705
Total	$4,304,982

Note: Totals may not add due to rounding. Revenue for ILWU/dockworkers is included in terminal operator revenue. Revenue for the distribution centers is not included since these are cost centers for the users of the Port of Tacoma, and will be reflected in the value of the user impacts

Firms in the surface transportation sector (railroads and trucking) received 61 percent of the $4.3 billion impact, and the majority of the surface transportation revenue was received by the railroads. Truck operations earned $379.9 million in revenue. Marine terminals received $392.2 million, while the warehousing and transload operations received $362.1 million. Ship repair and marine construction operations received $362.0 million.

5.2 Revenue Impact by Commodity

Table II-7 shows the revenue impact by commodity moving over the Ports of Tacoma and Seattle owned and leased terminals. The not-allocated revenue includes revenue from shipyard and ship repair operations and marine construction. In terms of total revenue, international containerized cargo generates the largest total revenue impact, followed by domestic (primarily Alaskan) containerized cargo and then grain.

Table II-7
Revenue Impacts by Commodity

Commodity	Total Revenue $1,000
Containerized Cargo	
International	$2,641,418
Domestic	$625,632
Break Bulk	$10,229
Autos	$43,860
Grain	$197,185
Logs	$6,783
Gypsum	$3,136
Petroleum	$40,737
Other Dry Bulk	$52,355
Other Liquid Bulk	$1,760
Not Allocated	$681,888
Total	$4,304,982

Note: Totals may not add due to rounding

6. PERSONAL INCOME IMPACTS

In the previous section of this chapter, the total revenue generated by port activity was identified. As described earlier, the personal income received by those directly dependent upon port activity is one of the components of revenue that can be traced to the Tacoma/Seattle area. The income impact is estimated by multiplying the average annual earnings of each port participant, i.e., railroad employees, truckers, steamship agents, freight forwarders, bankers, insurance agents, etc., by the corresponding number of jobs in each category. The individual annual earnings in each category

multiplied by the corresponding job impact resulted in $1.1 billion in personal income. This represents an average salary of $58,240.

Based on data developed by the U.S. Bureau of Economic Analysis[1], it is assumed that for every one dollar earned by Tacoma/Seattle area residents as a result of jobs directly generated by port activity, an additional $2.198 of income would be created as a result of re-spending the direct income for purchases of goods and services in the state of Washington. Applying this multiplier to the direct income impact, the re-spending generated an additional $2.4 billion of personal income and consumption expenditures in business and service providers located throughout the state. This additional re-spending of the direct income generates the induced job impact described in the previous chapter. According to the Bureau of Economic Analysis, for every one dollar earned in the Tacoma/Seattle regional economy, about 69 percent is spent on goods and services within the region, while the remaining 31 percent is used to purchase items produced out-of-area, or to pay federal, state and local taxes or held as savings. The full income multiplier effect results from successive rounds of re-spending. For example, in the initial round, one dollar is earned. Of that $1.00, nearly $.69 is used to purchase goods and services. Of that $.69, 69 percent, or about $.47, will be used for the next round of purchases of goods and services. Of this $.47, again 69 percent, or about $.32 will be used for further regional purchases. These successive re-spending rounds will continue until an additional $2.198 of spending in the Tacoma/Seattle economy is generated for every dollar of income. At each stage of the re-spending, additional jobs are created. These are the induced jobs described in the employment section.[2]

The indirect jobholders received $554.3 million of personal wages and salaries. Combining the direct, induced and indirect income impacts, maritime cargo activity at the Ports of Tacoma and Seattle marine terminals created $4.1 billion of wages and salaries and consumption expenditures in the state of Washington.

The 442,563 related users of the Ports of Tacoma and Seattle marine terminals received $18.7 billion of personal income.

7. LOCAL PURCHASES

The firms directly dependent upon the maritime activity at the Ports of Tacoma and Seattle marine terminals made $1.1 billion of purchases in the state of Washington. These purchases were for maintenance and repair services, utilities, communications services, office products, parts and

[1] U.S. Department of Commerce, Bureau of Economic Analysis, RIMS II, 2014.

[2] It is to be emphasized that the re-spending impact of $2.4 billion million does not represent the earnings of the 18,111 induced jobs. The $2.4 billion re-spending impact does include the direct earnings received by the employees holding the induced jobs, but the re-spending impact also includes the revenue received by the firms providing the goods and services to the 18,886 directly employed.

equipment, fuel, etc. The $1.1 billion of purchases generated the 11,136 indirect jobs described in the previous chapter.

8. TAX IMPACTS

State and local tax impacts are based on state and local tax burdens for the state of Washington, which are developed from data provided by the Tax Foundation.[3] The tax burdens are the ***total*** state and local taxes collected divided by total state income. Maritime activity at the Ports of Tacoma and Seattle marine terminals generated $378.7 million of state and local taxes, of which about $231.0 million was collected at the state level, and $147.7 million at the county and local level.

3 The Tax Foundation is an educational organization formed in 1937 to provide American citizens with a better understanding of the tax system and the effects of tax policy. (www.taxfoundation.org)