Economic Impact Study of the Great Lakes St. Lawrence Seaway System

Prepared for
The U.S. Saint Lawrence Seaway Development Corporation

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EXECUTIVE SUMMARY

Martin Associates was retained by the Saint Lawrence Seaway Development Corporation (SLSDC) to estimate the economic impacts of the Great Lakes St. Lawrence Seaway System on 16 representative U.S. port communities throughout the eight states bordering the Great Lakes St. Lawrence Seaway System. The impacts were measured for activity at both public facilities and private facilities at each of the 16 U.S. ports. Also, the impacts were estimated for all cargo moving via each of the ports, including trans-lake and inter-lake cargo, as well as cargo moving through the St. Lawrence Seaway. Although a study of the economic impacts in Canada was beyond the scope of this study, industry located along the Canadian portion of the Great Lakes St. Lawrence Seaway System represents a significant portion of total Canadian industrial output.

The analysis is designed to provide the SLSDC with a realistic assessment of the contributions made by the Great Lakes St. Lawrence Seaway System and the individual ports to the local, state, regional, and national economies. In order to ensure defensibility and accuracy, the analysis was developed from a comprehensive telephone interview program of more than 380 individual firms providing maritime services at the ports. Separate impact analyses were conducted for each of the ports, and the results have been aggregated to the Great Lakes St. Lawrence Seaway System level for presentation purposes. Finally, a computerized model was developed for each port that can be used to update the port's specific impacts on a regular basis and to evaluate the sensitivity of impacts to changes in tonnage levels, commodity mix, the number of vessel calls (dockings) at the port, labor and port productivity, changes in inland distribution patterns (inland markets served by rail vs. truck) of the waterborne commodities and Great Lakes St. Lawrence Seaway System policy issues.

For the most part, the same methodology was used in 1992 to estimate the economic impacts of the Great Lakes St. Lawrence Seaway System. As a result, a direct comparison can be made with the 1991 economic impacts and the current economic impacts created by cargo and vessel activity on the Great Lakes.[1] In addition, the same methodology has been used by Martin Associates to estimate the economic impacts of seaport activity at more than 95 seaports in the U.S. and Canada.

The economic impacts generated by cargo and vessel activity in 2000 on the Great Lakes St. Lawrence Seaway System are summarized in the following table. The 1991 economic impacts are also included for comparison purposes.

[1] Martin Associates conducted an interim update of the economic impacts of the Great Lakes in 1994, but this update was not based on a comprehensive survey of port tenants, terminal operators, and members of the maritime communities at each of the 16 U.S. ports. Therefore, comparisons will be made with the 1992 study, since this earlier study was based on a comprehensive interim program similar to the 2000 study.

In 2000, 192.0 million tons moved on the U.S. Great Lakes St. Lawrence Seaway System, an increase from the 123.8 million moving on the system in 1991. International cargo moving to and from the 16 U.S. Great Lakes ports and passing through the St. Lawrence Seaway grew from 5.9 million tons in 1991 to 8.8 million tons in the year 2000.

Summary of Economic Impacts
2000 and 1991

IMPACTS				PERCENT
JOBS	**2000**	**1991**	**CHANGE**	**CHANGE**
DIRECT	43,968	33,716	10,252	30.41%
INDUCED	27,392	10,912	16,480	151.03%
SUB TOTAL	71,360	44,628	26,732	59.90%
INDIRECT	26,757	NA	NA	
TOTAL JOBS	**98,117**	**44,628**	**26,732**	
RELATED SHIPPER JOBS	**54,391**	NA	NA	
	ALL DOLLAR VALUES IN 1,000 DOLLARS			
PERSONAL INCOME (1000)				
DIRECT	$1,623,014	$1,050,128	$572,886	54.55%
INDUCED	$1,889,837	$854,180	$1,856,393	121.25%
INDIRECT	$820,736	NA	NA	
TOTAL INCOME IMPACT	**$4,333,586**	**$1,904,308**	**$2,429,278**	
REVENUE (1000)	**$3,385,243**	**$1,724,883**	**$1,660,360**	96.26%
FEDERAL, STATE, LOCAL TAXES (1000)	**$1,336,290**	**NA**	**NA**	

In 2000, the Great Lakes St. Lawrence Seaway System generated the following impacts:

- A total of 152,508 jobs are in some way related to the 192.0 million tons of cargo moving on the U.S. Great Lakes St. Lawrence Seaway System in 2000. Of the 152,508 jobs, 43,968 jobs are directly created as the result of Great Lakes St. Lawrence Seaway System activity. This represented an increase of 30 percent from the 1991 figures, surpassing the national increase in employment for that same period by 50 percent. The majority of the direct employees are with shippers/consignees and terminal operators directly dependent upon the Great Lakes St. Lawrence Seaway System for the receipt and shipment of raw materials (iron ore, limestone, sand and gravel, salt, etc.) and finished products (primarily steel products). As the result of supplying goods and services to the directly employed workers, another 27,392 induced jobs were supported in the local economy. The firms providing the transportation services and cargo handling services made $1.3 billion of

purchases in the Great Lakes region, which supported 26,757 indirect jobs.[2] Finally, 54,391 jobs are with shippers and consignees using the Great Lakes St. Lawrence Seaway System. These jobs do not have the same degree of dependency as do the direct, induced and indirect jobs, since the shippers and consignees using the Great Lakes St. Lawrence Seaway System can and do use other ports for shipment and receipt of cargo. However, if the Great Lakes St. Lawrence Seaway System were to shutdown, these related shippers and consignees would experience some degree of dislocation. Such a penalty would vary from a loss of employment opportunities in some cases to an increase in total transportation costs in other cases, which could, in turn, result in employment reductions.

  - The movement of iron ore on the Great Lakes St. Lawrence Seaway System creates the largest job impact, followed by the shipment and receipt of coal, iron and steel products, and sand and gravel/aggregates.

  - Iron and steel products generate the greatest job impact on a per 1,000 ton basis impact. For every 1,000 tons of steel moving on the Great Lakes St. Lawrence Seaway System, one job is directly generated.[3] Overall, general cargo commodities such as iron and steel products and project cargo (pieces/ units of cargo longer, taller, wider and/or heavier than cargo handling equipment such as boilers, specialized machines, modular buildings, etc.) create greater job impacts per 1,000 tons than do dry bulk cargoes (large volume shipments of non-packaged/contained dry products) and liquid bulk cargoes (large volume shipments of non-packaged/contained liquid products), due to the relatively greater labor intensive handling of the cargoes, particularly in the vessel load and discharge process and with terminal handling and storage at the ports.

- The maritime activity on the U.S. Great Lakes St. Lawrence Seaway System generated $3.4 billion of business revenue to firms providing transportation and cargo handling services. This excludes the value of the commodities moving on the Great Lakes St. Lawrence Seaway System.

  - The movement of iron ore created $982 million of business revenue, followed by iron and steel products ($786 million) and coal ($635 million).

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[2] Direct jobs are jobs directly generated by port activity; Induced jobs are jobs created due to the purchases of goods and services by those individuals directly dependent upon port activity; Indirect jobs are created due to the purchases of goods and services by firms, not individuals.

[3] It is to be emphasized that the job per ton measure is a static measure. The jobs per ton ratio should not be used to estimate the impacts for an increase in steel tonnage, since a large percentage of the steel generated jobs (i.e., forwarders, agents, chandlers (those who supply vessels with ship supplies), etc.) are fixed over the short term. To estimate incremental impacts of changes in tonnage, the individual port impact models should be used, as this is the designed purpose of the impact models.

- On a per ton basis, for every one ton of steel, $250 of business revenue is created. For every one ton of other general cargo commodities, $156 of business revenue is generated. Bulk commodities generate significantly less revenue per ton than do the general cargo commodities.

- The 43,968 directly employed residents of the U.S. Great Lakes region received $1.6 billion of direct wages and salaries. As the result of purchases by these directly employed workers, an additional $1.9 million of local purchases and consumption expenditures were created, supporting the 27,392 induced jobs.

- The firms providing the cargo handling and transportation services spent $1.3 billion on purchases for supplies, business services and maintenance and repair services, utilities, etc. These local purchases supported the 26,757 indirect jobs.

- The maritime activity on the U.S. Great Lakes St. Lawrence Seaway System created $1.3 billion of federal, state and local tax revenue in 2000.

- Between 1991 and 2000, tonnage on the U.S. Great Lakes St. Lawrence Seaway System increased from 123.8 million tons to 192.0 million tons. As a result of the growth in tonnage, direct jobs increased by more than 10,000 jobs, while induced jobs grew by nearly 16,500 jobs, reflecting higher earnings per direct job as well as a greater consumption multiplier effect. Direct personal income grew by 54.5 percent over the period, while induced income and consumption expenditures grew by 121.3 percent over the 1991-2000 period, far outstripping the rate of inflation for this period, which increased by 27.1 percent. Similarly, the revenue received by the businesses providing the transportation services as well as the cargo handling services nearly doubled, growing by 96.3 percent over the 1991-2000 period, compared to the 27.1 percent increase in inflation over the same time period:

  - The greatest growth in jobs was with truckers serving the Great Lakes St. Lawrence Seaway System (4,490 jobs), followed by a 4,188 increase with terminal operators and dependent shippers/consignees.

  - With respect to job growth by commodity, the largest growth was with jobs created by the movement of coal, 4,121 job increase, followed by growth in jobs created by stone and aggregates (2,204 direct job increase) and growth in jobs created by iron and steel products (1,367 direct jobs).

In 1991 indirect jobs and related jobs were not measured, and the tax impacts only included taxes paid by individuals. In this current study, the tax impact includes taxes generated from all sources at the federal, state and local levels. Therefore, comparisons of these tax impacts and indirect and related jobs cannot be made with the earlier study.

These summary findings, and the balance of the following report, highlight the importance of the Great Lakes St. Lawrence Seaway System as a key transportation system serving the United States. Further, the contribution of this transportation system to the national economy has continued to grow, providing jobs for nearly 100,000 direct, induced and indirectly held jobs.

I. INTRODUCTION AND OVERVIEW

Martin Associates was retained by the Saint Lawrence Seaway Development Corporation (SLSDC) to update the 1992 study of the economic impacts of the 16 U.S. ports on the Great Lakes St. Lawrence Seaway System.[1] The impacts are measured for activity at both public facilities and private facilities at each of the 16 U.S. ports. Also, the impacts are estimated for all cargo moving via each of the ports, including trans-lake and inter-lake cargo, as well as international overseas cargo moving through the St. Lawrence Seaway.

The analysis has been designed to provide the SLSDC with a realistic and defensible assessment of the contributions made by the Great Lakes St. Lawrence Seaway System and the ports to the local, state, regional, and national economies. In order to ensure defensibility and accuracy, the analysis was developed from a comprehensive telephone interview program of 380 individual firms providing maritime services at the ports. Separate impact analyses were conducted for each of the ports, and the results have been aggregated to a Lake/Regional level for presentation purposes. A computerized model was developed for each port that can be used to update the port's specific impacts on a regular basis and to evaluate the sensitivity of impacts to changes in tonnage levels, commodity mix, vessel call levels, labor and port productivity, changes in inland distribution patterns of the waterborne commodities and Great Lakes St. Lawrence Seaway System policy issues.

In addition to the 1992 study, an interim report was prepared in 1994.[2] The same methodology has been used by Martin Associates to estimate the economic impacts of more than 95 seaports. In the remainder of this chapter an overview of the analysis is presented.

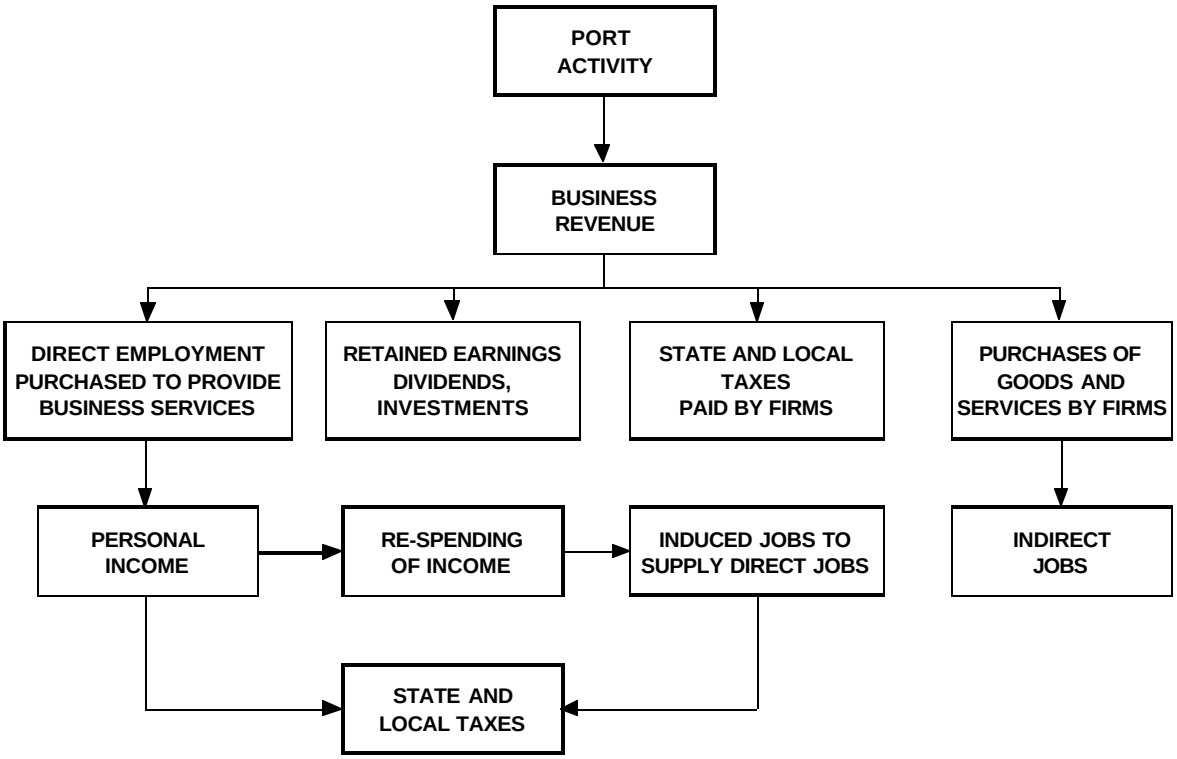
[1] "The Economic Impact of the Great Lakes St. Lawrence Seaway System", Prepared for the Saint Lawrence Seaway Development Corporation, by Martin Associates, September, 1992. The 1992 study is based on 1991 data.

[2] Martin Associates conducted an interim update of the economic impacts of the U.S. Great Lakes in 1994, but this update was not based on a comprehensive survey of port tenants, terminal operators, and members of the maritime communities at each of the 16 U.S. ports. Therefore, comparisons will be made with the 1991 study, since this earlier study was based on a comprehensive interim program similar to the 2000 study.

1. OVERVIEW OF IMPACT FLOWS

A port contributes to the local, regional, and national economies by providing employment and income to individuals, tax revenues to local, state, and federal governments, and revenue to businesses engaged in handling, shipping, and receiving cargo via the port. Exhibit I-1 illustrates the flows of economic impacts throughout the economy. As this figure shows, activity at a port (i.e., the handling of cargo and the servicing of vessels) initially creates business revenue to firms

Exhibit I-1
Flows of Economic Activity Through the Economy



providing those cargo handling and vessel services. This revenue is in turn used for several purposes:

- To hire employees to provide the services
- To pay stockholders dividends, retire debt, and invest
- To buy goods from other firms
- To pay federal, state, and local taxes

The hiring of employees generates personal income. This personal income is in turn spent throughout the local, state and national economies to purchase goods and services. This respending of income is known as the multiplier effect, which in turn creates induced jobs throughout the state, regional, and national economies. Finally, federal, state, and local taxes are paid by those directly employed due to port activity and those employed as a result of the purchases of goods and services by those individuals directly employed.

As can be seen from Exhibit I-1, and the previous discussion, the flow of economic impacts throughout an economy creates four *separate* and *non-additive* types of impacts. These are:

- Employment Impact - the number of full-time equivalent jobs generated by activity at the individual port. This consists of jobs directly generated by port activity as well as induced jobs, or jobs created due to the purchase of goods and services by those individuals directly dependent upon port activity. Indirect jobs are created due to the purchases of goods and services by firms, not individuals. Related jobs are jobs with users of the Great Lakes St. Lawrence Seaway System, and these users of the Great Lakes St. Lawrence Seaway System can and do use other ports and modes of transportation to ship and receive products.

- Income Impact - the level of wages and salaries associated with the jobs created by port activity, and adjusted to reflect respending throughout the regional economy. The income impact includes the income received by those directly employed due to port activity, as well as the income received by individuals holding induced jobs as well as the indirect jobholders.

- Revenue Impact - the sales generated by firms engaged in providing handling and transportation services to the cargo moving via the 16 U.S. ports on the Great Lakes St. Lawrence Seaway System. The value of shipments through a port is not included as a revenue impact for the purposes of this analysis, since the port is not responsible for such revenue. Instead, it is the demand for the product, which creates the value of the products.[3]

- Tax Impacts - the federal, state, and local tax revenues generated by the cargo activity at each of the 16 U.S. ports.

2. BUSINESS SECTORS ANALYZED

Shipments through a port generate economic activity in various business sectors of the state and local economy. The following distinct business sectors are involved in activity at each of the 16 U.S. ports. These are the:

- Transportation Sector
- Maritime Service Sector
- Port Organizations
- Dependent Shippers/Consignees
- Banking/Insurance/Admiralty Law Sector
- Related Users

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

2.1 Transportation Sector

The transportation sector consists of the railroad and trucking industries. These industries are responsible for moving the various cargoes between the individual ports and their inland origins and destinations. The railroads are typically involved in moving bulk cargoes to and from the ports. These cargoes include grain, coal and iron ore.

[3] If shipment value were included, then a port would be given credit for the value of the product. This assumes that the product is not driven by final demand, and furthermore, that the shipment would not move via any other port or mode of transportation.

Many local and national trucking firms serve the individual ports, as do numerous individual owner-operators. The trucking industry's major involvement is in moving general cargo commodities (packaged/contained products handled one piece/unit at a time), primarily steel and break bulk cargo (such as products packed in crates, barrels, cartons, etc.), and in the local distribution of dry bulk commodities (large volume shipments of non-packaged/contained dry products), such as salt, limestone, cement, and liquid bulk commodities (large volume shipments of non-packaged/contained liquid products), including petroleum products.

2.2 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
- 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 inland and water transportation of freight through the 16 U.S. ports of the Great Lakes St. Lawrence Seaway System. 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 port and inland destinations, as well as the ocean transportation.

- 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 port; 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:

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

  - Towing firms - provide the tug service to guide the vessel to and from port.

- Laker and barge services - include jobs with U.S. and Canadian laker fleets moving commodities between lake ports and between lake ports and the St. Lawrence River ports for transshipment to salties on the St. Lawrence River.

  Also, jobs with towing firms providing linehaul towing on the Lakes are included in this category.

- Bunkering firms - provide fuel to the vessels.

- Marine surveyors - inspect the vessels and the cargo.

- Launch services - provide transportation for the crew between land and vessel.

- Chemical testing services - test cargo, such as coal, for proper chemical composition, water content, etc.

- 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 port between the land and the vessel. Included in this category are the following participants:

  - Longshoremen - include members of the International Longshoremen's Association (ILA) as well as other dockworkers involved in the loading and unloading of cargo from the vessels, and the handling of the cargo prior to loading and after unloading.

  - 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. Terminal operators also include private marine terminals such as petroleum terminals, private stone and aggregate operations, limestone quarries, and cement terminals.

  - Warehouse operators - store cargo after discharge or prior to loading and consolidate cargo units into shipment lots.

- Government Agencies

  This service sector involves federal, state and local government agencies that perform services related to cargo handling and vessel operations at the port such as immigration, customs and grain inspection.

2.3 Port Organizations

This category includes those individuals employed by the local port authority whose purpose is to oversee port activity and to lease terminals, land and equipment to operators. Also included in this category are employees of the Saint Lawrence Seaway Development Corporation.

2.4 Dependent Shippers/Consignees

Shippers and consignees consist of private manufacturing plants that are dependent on the use of the Great Lakes St. Lawrence Seaway System for the receipt and shipment of raw materials and products. The shippers and consignees are dominated by steel mills dependent upon the U.S. Great Lakes ports for the receipt of iron ore and limestone. These plants were established on the Great Lakes because of the transportation cost advantage of using water transportation for the receipt of low value raw materials. It is likely that if the plants could no longer use the Great Lakes St. Lawrence Seaway System, the manufacturing facilities would cease operations in the long run. It is to be emphasized that the revenue impact associated with the value of the products produced by the dependent shippers/consignees is not included in this study, since the price for the products is based on the demand for the product, not the fact that the cargo and raw materials move on the Great Lakes.

2.5 Banking/Insurance/Admiralty Law Sector

While this sector is not directly involved in cargo or vessel operations, it nonetheless does provide services such as financing export/import transactions and insuring cargo and vessels.

2.6 Related Shippers/Consignees

Related jobs are jobs with shippers and consignees using the Great Lakes St. Lawrence Seaway System. These jobs do not have the same degree of dependency as do the direct, induced and indirect jobs, since the shippers and consignees using the Great Lakes St. Lawrence Seaway System can and do use other ports for shipment and receipt of cargo. However, if the system were to shutdown, these related shippers and consignees would experience some degree of dislocation. Such a penalty would vary from a loss of employment opportunities in some cases to an increase in total transportation costs in other cases, which could, in turn, result in employment reductions.

3. PORTS ANALYZED

The 16 U.S. ports included in the analysis are:

- Ashtabula, OH
- Buffalo, NY
- Burns Harbor, IN
- Chicago, IL
- Cleveland, OH
- Conneaut, OH
- Detroit, MI
- Duluth, MN/Superior, WI
- Erie, PA
- Gary, IN
- Green Bay, WI
- Lorain, OH
- Milwaukee, WI
- Ogdensburg, NY
- Oswego, NY
- Toledo, OH

A separate impact analysis has been conducted for each of these ports. The three separate impacts of jobs, income and revenue were estimated by detailed commodity handled and by detailed job category, and for each of the economic impact business sectors. The job impacts for each port consist of direct jobs and induced jobs. Indirect jobs are estimated at the regional level only. Similarly, the personal income impact for each port consists of the direct income received by those directly employed due to port activity, as well as that portion of the direct income re-spent within the 8-state Great Lakes region. Indirect income is estimated at the regional level only.

As stated previously, the revenue created by port activity is used for many purposes, such as retained earnings, purchases of goods and services, payment of labor, and taxes. The actual expenditure patterns by type and geographic region cannot be defensibly identified. Therefore, the revenue impact of each port should be treated as a national impact, a part of which can be attributed to the region, rather than just solely be attributed as a regional impact.

Taxes are not estimated at the commodity specific level of detail, but instead are based on the total income (including the respending impact) generated by the port in the state in which it is located. Per capita federal, state and local taxes from all sources are developed by state from the Tax Foundation.[4] The impacts generated by the individual ports are then aggregated to estimate total Great Lakes St. Lawrence Seaway System impacts.

[4] The Tax Foundation is an educational organization formed in 1937 to provide Americans with a better understanding of their tax system and the effects of the tax policy by using objective and reliable data.

The impacts associated with the Saint Lawrence Seaway Development Corporation are also included in the analysis at the total Great Lakes St. Lawrence Seaway System level.

4. COMMODITIES ANALYZED

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, steel coils require a large covered area for storage with reinforced flooring, while certain types of dry bulk cargoes, e.g., fertilizer, require covered storage and reclamation systems.

An understanding of the commodity's relative economic value in terms of employment and income to the state, regional and national economies, 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/commodity types handled via the Great Lakes St. Lawrence Seaway System:

- Steel
- General Cargo (excluding steel)
- Grain
- Ore
- Coal
- Cement
- Stone/Aggregates
- Petroleum
- Other Dry Bulk (including other ores and minerals, fertilizers and scrap)
- Salt
- Other Liquid Bulk (including liquid fertilizer, asphalt and tallow).

It should be emphasized that commodity-specific impacts are not estimated for each of the five business sectors described in the last section. Specific impacts by commodity could not be allocated with any degree of accuracy for the banking/insurance/law sector, shipyards and marine construction and the government sector.

Finally, an estimate of economic impacts for specific commodities and employment sectors can serve as a useful guide to assist with the evaluation and planning of new facilities construction, harbor dredging and government policies.

5. METHODOLOGY

The economic impacts created by the Great Lakes St. Lawrence Seaway System are estimated using a combination of multiple telephone interviews with 380 firms providing maritime services at the 16 U.S. Great Lakes ports, published economic data from the U.S. Department of Commerce, Census Bureau, Bureau of Economic Analysis, and the U.S. Department of Labor.

5.1 Direct Impact Methodology

The direct job, income and revenue impacts are estimated directly from the results of telephone surveys conducted with the members of the maritime community of each of the 16 U.S. ports. For each of the ports, members of the maritime community were identified from the Greenwood's Guide to Great Lakes Shipping, the Journal of Commerce Port Telephone "Tickler" Directory, and inputs from the individual ports. Telephone interviews were used to achieve a greater than 95 percent response rate in all categories for each port. In all, a total of more than 600 interviews with 380 firms and terminals were conducted to gather data for this study.

5.2 Induced Impact Methodology

Models were developed for each of the 16 U.S. ports to estimate the induced job impacts and the respending of the direct personal income (created directly by activity at each port). These models are based on data collected from the U.S. Bureau of Labor Statistics, U.S. Bureau of Economic Analysis, and the U.S. Census Bureau. The respending models include two basic components:

- The Respending Component; and
- The Induced Job Component.

The respending component uses a regional personal income multiplier developed from data supplied by the U.S. Bureau of Economic Analysis. The income multiplier measures the respending of the directly created income throughout the 8-state region in which the ports are located. The total income impact created by a specific port is the sum of the direct income impact received by those directly employed at the given port, plus the income re-spent in that state.[5]

It is the respending of the income, within the region that creates induced jobs which are

[5] The total income impact thus includes the income received by those directly employed by the port, the income received by those induced employees, as well as revenue received by firms supplying goods and services to meet the successive rounds of purchases by individuals. Indirect wages and salaries are also included in the total income impact at the Great Lakes St. Lawrence Seaway System level.

estimated in the induced job component of the models. The induced job component consists of typical expenditure patterns by individuals located in a port city and job to sales ratios corresponding to the sectors of the economy in which consumption occurs. Essentially, the respending of the direct income is converted into purchases by individuals in various consumption sectors of the economy. The job to sales ratios are then combined with estimated consumption expenditures, to estimate induced jobs created by activity at each Great Lakes St. Lawrence Seaway port.

Indirect jobs, or the jobs created by purchases by firms, not individuals are estimated from purchase data provided to Martin Associates by each firm during the interview process. These purchases are for retail goods, parts and equipment, office supplies, maintenance and repair activity, utilities, fuel, etc. The U.S. Bureau of Economic Analysis, Regional Input-Output Modeling System (RIMSII) was used to develop job multipliers to convert the local purchases into indirect jobs in the relevant supplying industries in the eight state region. Indirect personal income multipliers were also developed for each supplying industry located in the 8-state region of study.

5.3 Tax Impact Methodology

Tax impacts are estimated using per capita income indices developed by the Tax Foundation for each of the eight states in the region. Total taxes collected at the federal, state and local levels are included in this index. The total port-specific income impact (direct, induced and indirect income impacts are multiplied by the respective tax indices to estimate the tax impacts. These impacts are then aggregated across the ports in each Lake region.

5.4 Related Jobs

To estimate the related user impact, the types of commodities exported from the marine terminals at each port were identified from port records, U.S. Army Corps of Engineers Waterborne Commerce Statistics, and interviews with private terminal operators at each port. The average value per ton of each commodity type was then estimated using U.S. Bureau of Census, Foreign Trade Statistics and data collected from individual shippers and consignees and terminal operators. Employment to value of output coefficients for the producing industries related to the cargo shipped from each port were then computed from Bureau of Economic Analysis, Regional Input-Output Model for the 8-state region. To estimate the related jobs, the average value per ton of each cargo shipped was multiplied by the tons of that cargo handled at each of the 16 U.S. ports. The job coefficients corresponding to the shipped commodities were next multiplied by the value of the shipped cargo to estimate the related jobs.

II. EMPLOYMENT IMPACTS

In this chapter, the employment impacts created by the 16 U.S. ports located on the Great Lakes St. Lawrence Seaway System are presented.

1. TOTAL EMPLOYMENT IMPACTS

For the 2000 Great Lakes shipping season, 152,508 jobs were in some way related to the marine cargo and vessel activity of the Great Lakes St. Lawrence Seaway System. Of the 152,508 jobs:

- 43,968 were directly generated by activities of the Great Lakes St. Lawrence Seaway System (direct job impact), and if such activities should cease, these jobs would be discontinued over the short term. These are full-time equivalent jobs and include jobs in each of the business sectors such as with railroads, trucking firms, longshoremen, terminal operators and dependent shippers/consignees, vessel agents, freight forwarders, pilots, lakers, etc.[6]

- 27,392 were employed throughout the U.S. Great Lakes region (induced jobs) by providing goods and services to the 43,968 individuals who hold jobs created by port activity on the Great Lakes St. Lawrence Seaway System. Consequently, employment in this group is as directly dependent upon port activity as is the first group. These induced jobs include jobs involved with the production of consumer goods to supply the demand of those directly employed. Such jobs are in housing construction, retail trade, service industries, and wholesale trade.

- As the result of local purchases by the firms providing the direct services at the 16 U.S. ports, 26,757 indirect jobs were generated. These jobs are with suppliers of maintenance and repair services, suppliers of parts and equipment, business services providers, utilities, etc. in the eight-state region.

- Finally, 54,391 related jobs were with firms exporting international and shipping domestic cargo through the 16 U.S. ports. The majority of these jobs were with iron ore and coal mines, and the industries supporting the extraction of the ore and coal shipped on the Great Lakes St. Lawrence Seaway System. Related jobs were also created in the agricultural sector as the result of the production of export grain moving via the 16 U.S. ports.

[6] Based on the average number of hours worked annually in each category, the total person-hour impact for that category was converted into full-time equivalent jobs. For example, two workers who are involved with port activity only 50 percent of the year would be counted as only one full-time job.

2. DIRECT EMPLOYMENT IMPACTS

As a result of port activity in 2000, 43,968 full-time jobs were directly created. In this subsection the jobs are analyzed in terms of;

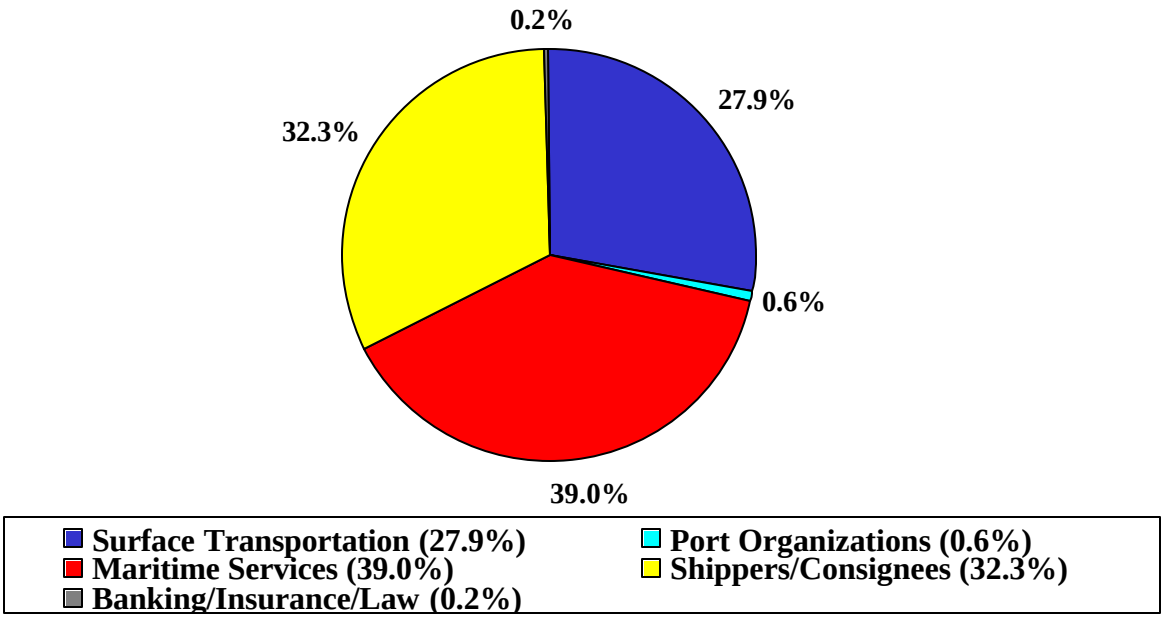
- Distribution by employer sector; and
- Distribution by commodity group.

2.1 Employment Impact By Economic Sector

Exhibit II-1 presents the distribution of the 43,968 direct jobs among the following economic sectors:

- Maritime Services Sector
- Surface Transportation Sector
- Port Authorities
- Banking/Insurance/Law
- Direct Shippers/Consignees

Exhibit II-1
Distribution of Employment Impact
by Economic Sector



The exhibit indicates that 39 percent of the direct jobs are created with firms in the maritime services sector, the majority of which are with terminal operators. About one-third of the direct jobs are with shippers and consignees directly dependent upon the cargo moving via the 16 U.S. ports, while 28 percent of the direct jobs are with the surface transportation sector, of which the majority are jobs with trucking firms moving the cargo to and from the ports.

Exhibit II-2 shows the job impacts by detailed job category. As this exhibit shows, the largest job impacts, 14,208 are with the shippers/consignees directly dependent upon the Great Lakes for the shipment and receipt of cargo and raw materials. The majority of these jobs are dependent upon inter-lake movements of such commodities as iron ore, coal, stone and aggregates, salt and cement. The marine cargo activity supported 12,029 direct jobs with terminal operators, while 11,178 direct jobs are with trucking firms moving cargo to and from the ports, while 3,491 jobs are with the U.S. and Canadian laker fleets serving the 16 U.S. ports.

Exhibit II-2
Distribution of U.S. Employment Impacts
by Detailed Job Category

	Direct Jobs
SURFACE TRANSPORTATION	
RAIL	1,103
TRUCK	11,178
MARITIME SERVICES	
TERMINAL OPERATORS/SHIPPERS/CONSIGNEES	12,029
LONGSHOREMEN	420
PILOTS/TOWING	312
FORWARDERS/AGENTS/CHANDLERS/SURVEYORS	210
WAREHOUSE	154
GOV'T	381
SHIP REPAIR/MARINE CONSTRUCTION	149
LAKER	3,491
SHIPPER/CONSIGNEES	14,208
PORT ORGANIZATIONS	266
BANKING/INSURANCE/ADMIRALTY LAW	66
TOTALS	43,968

Totals may not add due to rounding

2.2 Employment Impact By Commodity

Most of the 43,968 jobs considered to be generated by port activity can be related to the handling of specific commodities or commodity groups. Certain employment sectors such as marine construction, federal and local government agencies, and the insurance and banking sectors are extremely difficult to assign to specific commodity groups, and if such an assignment is made, it is often done so arbitrarily. As a result, employment in these job categories and sectors was not allocated to commodity groups.

Exhibit II-3 presents the distribution of the direct employment impacts in terms of the key commodity groups handled by the 16 U.S. ports.

Exhibit II-3
Direct Job Impact by Commodity

COMMODITY	DIRECT JOBS
STEEL	5,422
GENERAL CARGO	342
GRAIN	1,467
ORE	19,034
COAL	6,393
CEMENT	1,136
STONE/AGGREGATES	4,645
PETROLEUM	1,373
OTHER DRY BULK	1,239
OTHER LIQUID BULK	317
SALT	782
NON ALLOCATED	1,818
TOTALS	**43,968**

Totals may not add due to rounding

This figure indicates that 43 percent of the direct jobs are generated by ore moving on the Great Lakes for use in the port dependent steel mills located on the Great Lakes. The shipment and receipt of coal creates 14.5 percent of the direct job impact, while the receipt of steel, mostly imported steel supported 12.3 percent of the direct jobs.

Exhibit II-4 presents the direct jobs created per 1,000 tons of each commodity handled at the 16 U.S. ports. Steel created the highest number of jobs per 1,000 tons, followed by general cargo (a large percentage is machinery and heavy lift cargo). The higher number of direct jobs created per 1,000 tons of steel and general cargo reflects the more labor intensive handling process associated with these cargoes and the higher incidence of the use of freight forwarders and warehousing. In contrast, bulk cargoes tend to create lower job impacts per 1,000 tons, reflecting the use of self-unloaders, as well as

a less reliance on the use of freight forwarders/customhouse brokers. Also, the rail is used to a greater extent for the movement of bulk cargoes to and from the ports, and rail transportation is less labor intensive than truck distribution, which is used for the majority of the inland distribution of steel and other general cargoes.

Exhibit II-4
Jobs per 1,000 Tons

COMMODITY	JOBS/ 1,000 TONS
STEEL	1.07
GENERAL CARGO	0.33
GRAIN	0.22
ORE	0.22
COAL	0.15
CEMENT	0.21
STONE/AGGREGATES	0.20
PETROLEUM	0.30
OTHER DRY BULK	0.11
OTHER LIQUID BULK	0.51
SALT	0.20

3. INDUCED JOBS

The regional purchases by the 43,968 direct jobholders with the direct income earned from port activity creates additional jobs throughout the U.S. Great Lakes region. In 2000, $1.6 billion was received by those 43,968 directly employed as a result of activity at the 16 U.S. Great Lakes ports. As the result of the re-spending of a portion of this income for purchases in the 8-state region, an additional 27,392 induced jobs were generated throughout the region.

These induced jobs are estimated based on the current expenditure profile of residents in the metropolitan areas in which each port is located, as estimated by the U.S. Bureau of Labor Statistics, "Consumer Expenditure Survey". This survey indicates the distribution of consumer expenditures over key consumption categories for residents of each key metropolitan area in the U.S. The consumption categories are:

- Housing
- Food
- Entertainment

- Health Care
- Apparel
- Transportation Equipment and Services

The estimated consumption expenditure generated as a result of the respending 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 each relevant metropolitan area in which the port is located, 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 in the 8-state region. Further levels of induced jobs are not estimated since it is not possible to defensibly identify geographically where the subsequent rounds of purchasing occur.

4. INDIRECT JOBS

The firms directly dependent upon the vessel and cargo activity at the private and public marine terminals at the 16 U.S. Great Lakes ports made $1.3 billion of regional purchases from suppliers of parts and equipment, business services, maintenance and repair services, communications and utilities, office equipment, and fuel. These purchases supported 26,757 indirect jobs in the 8-state region. If maritime activity on the Great Lakes St. Lawrence Seaway System were to cease, these indirect jobs would also be lost. To estimate these indirect jobs, actual expenditures by port-dependent firms were collected from the telephone surveys. To estimate the indirect jobs, the expenditures were used as inputs into a regional input-output model developed for the 8-state region by the U.S. Bureau of Economic Analysis, Regional Input-Output Modeling System (RIMSII).

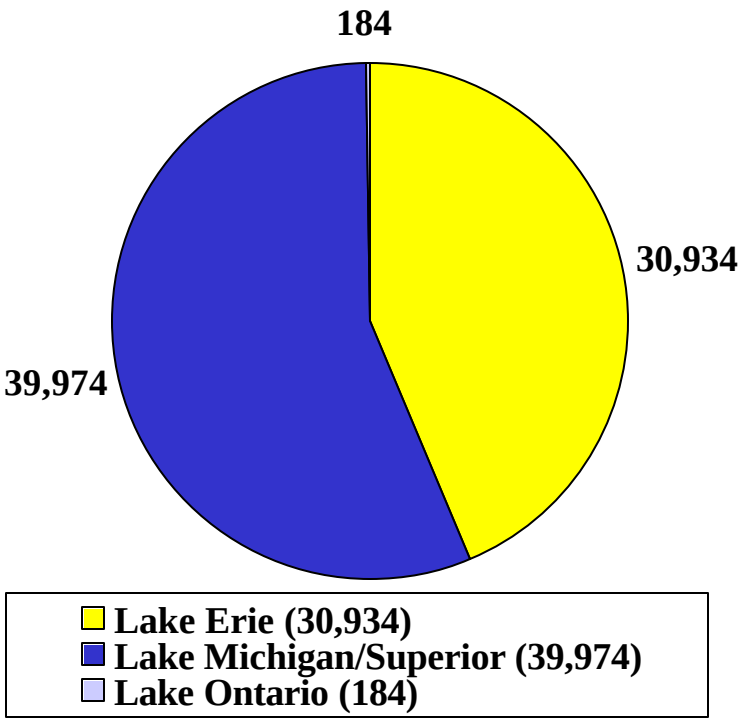
5. RELATED JOBS

During the 2000 shipping season, 54,391 jobs were related to the 192 million tons of cargo moving on the Great Lakes St. Lawrence Seaway System. The majority of these jobs are related to iron ore shipped on the Great Lakes and the firms supporting the mining activity. Related jobs are also created by the shipment of coal, grain, cement and stone and aggregates. It is to be emphasized that these jobs are related to the shipment of cargo on the Great Lakes, not directly dependent on the ports. If the Great Lakes St. Lawrence Seaway System were not available, the firms employing the related jobs would most likely use other modes to move the cargoes to end markets, albeit at a higher transportation cost. This increased transportation cost could in fact result in a loss of employment or shutdown of the production or mining operations.

6. EMPLOYMENT IMPACT BY REGION

Exhibit II-5 shows the direct and induced employment impacts by region, excluding the impacts of the Saint Lawrence Seaway Development Corporation. As this exhibit shows, 56 percent of the direct and induced jobs are created by activity on Lake Michigan and Lake Superior.[7] U.S. port activity on Lake Erie created 43.5 percent of the direct and induced jobs, while U.S. port activity on Lake Ontario created the balance of the direct and induced jobs.

Exhibit II-5
Distribution of Direct Jobs by U.S Great Lake Region



In the next chapter, business revenue, income and tax impacts are presented.

[7] The ports on Lake Michigan and Lake Superior are combined since only one port on Lake Superior (Duluth/Superior) was included in the analysis.

III. REVENUE IMPACTS

The movement of cargo via the public and private facilities at each of the 16 U.S. ports in the Great Lakes St. Lawrence Seaway System generates revenue for firms in each of the economic sectors. For example, revenue is received by transportation firms (railroads and truck operations) as a result of moving outbound cargo to the ports and distributing the in-bound commodities to inland destinations. The firms in the maritime service sector receive revenue from arranging for transportation services, cargo handling, providing services to vessels in port and repairs to vessels calling the ports. The banking, insurance and admiralty law sector receives revenue from financial and legal services provided to users of the transportation system. The local port authorities receive revenue from terminal and equipment leases at the various ports, as well as from terminal charges and port charges. In addition, revenue is received by shippers/consignees from the sales of cargo shipped or received via the ports and from the sales of products made with raw materials received through the port system. Since this chapter 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 the port system) will be excluded from the remaining discussion.

As described in Chapter I, the revenue generated by port activity is used by firms to pay salaries, for retained earnings and the payment of dividends, to purchase equipment and maintenance services, and to pay taxes. Of these various uses of revenue, only three can be isolated as remaining in the 8-state region with any degree of accuracy. This is the personal income component of revenue, which can be traced to geographic locations based on the residence of those receiving the income; the state and local taxes paid, which are a portion of revenue remaining in the region; and purchases made in the 8-state region by the firms providing the direct services at the ports.

1. REVENUE IMPACT

As a result of activity at the 16 U.S. ports on the Great Lakes St. Lawrence Seaway System, $3.4 billion of business revenue was received by firms supplying cargo handling and vessel services and inland transportation services. Exhibit III-1 shows the distribution of this revenue by commodity. The movement of iron ore creates the greatest revenue impact overall, reflecting the volume of ore moving on the Great Lakes St. Lawrence Seaway System. Iron and steel products moving on the Great Lakes St. Lawrence Seaway System creates the second largest revenue impact, followed by coal, and stone and aggregates.

Exhibit III-1
Revenue Impacts by Commodity
(1000 Dollars)

COMMODITY	REVENUE $1,000
STEEL	$786,004
GENERAL CARGO	$74,852
GRAIN	$125,588
ORE	$982,561
COAL	$635,534
CEMENT	$87,335
STONE/AGGREGATES	$321,381
PETROLEUM	$74,129
OTHER DRY BULK	$157,552
OTHER LIQUID BULK	$30,507
SALT	$60,612
NON ALLOCATED	$49,187
TOTALS	**$3,385,243**

Totals may not add due to rounding

Exhibit III-2 shows that iron and steel products moving on the Great Lakes St. Lawrence Seaway System creates the greatest revenue per ton impact, followed by the movement of other general cargo commodities.

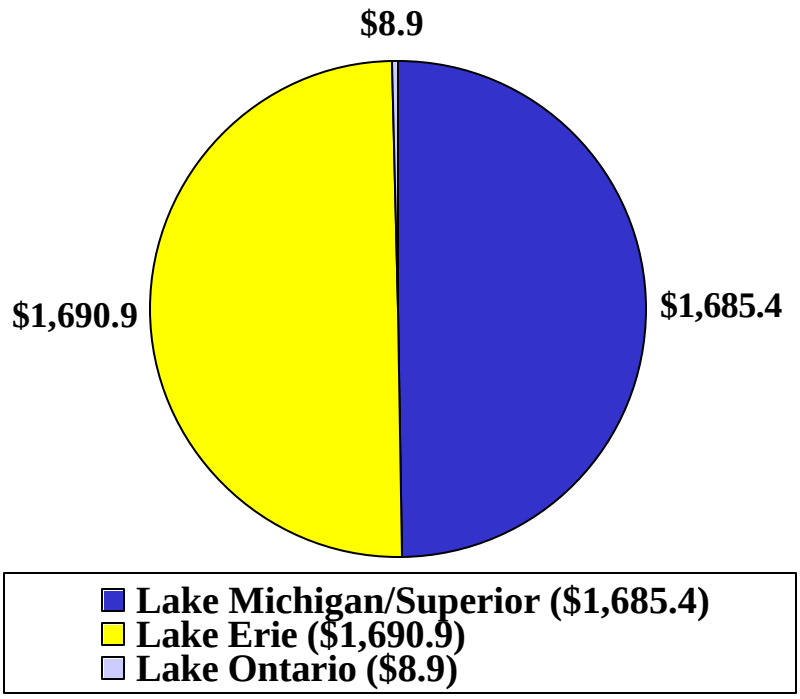
Exhibit III-2
Revenue Per Ton

COMMODITY	REVENUE $1,000
STEEL	$156
GENERAL CARGO	$73
GRAIN	$18
ORE	$11
COAL	$15
CEMENT	$16
STONE/AGGREGATES	$14
PETROLEUM	$16
OTHER DRY BULK	$14
OTHER LIQUID BULK	$49
SALT	$15

This reflects the greater labor intensity of terminal operations associated with iron and steel products, as well as the truck revenue and freight forwarding/brokerage revenue associated with these non-bulk cargoes. In contrast, a large percentage of bulk cargoes use self-unloaders to move the bulk cargoes, and, as a result, terminal charges are less than for the steel and other general cargoes.

Exhibit III-3 shows the distribution of the $3.4 billion of revenue by U.S. Great Lake region.

Exhibit III-3
Distribution of Revenue Impact
by U.S. Great Lake Region
(1,000 Dollars)



As indicated, the cargo activity at the Lake Erie ports and the Lake Michigan/Superior ports create nearly identical levels of revenue, while the ports on Lake Ontario create significantly less revenue. This reflects the volume of cargo moving via these ports compared to the ports on the other Lakes.

2. PURCHASES

During the 2000 shipping season, firms directly dependent on the cargo and vessel activity on the Great Lakes made $1.3 billion of purchases for parts, supplies, utilities, fuel, maintenance and repair services, retail supplies, and business services. These $1.3 billion of purchases supported the 26,757 indirect jobs in the 8-state region.

3. PERSONAL INCOME IMPACTS

The income impact is estimated by multiplying the average annual earnings of each port participant (i.e., railroad employees, truckers, longshoremen, dependent shippers/consignees, agents, freight forwarders, etc.) by the corresponding direct number of full-time equivalent jobs in each participant category. This procedure was followed at each of the 16 U.S. ports on the Great Lakes St. Lawrence Seaway System. In 2000, the activity on the Great Lakes St. Lawrence Seaway System created $1.6 billion of direct personal wage and salary income. This represents an average salary of nearly $37,000 per direct job.

As described in the methodology section of Chapter 1, the personal income multiplier for the 8-state Great Lakes region was developed from data supplied by Bureau of Economic Analysis, Regional Input-Output Modeling System. This income multiplier reflects the amount of purchases made by directly employed individuals within the region. The direct wage and salary income is multiplied by the 8-state regional income multiplier to estimate direct and induced income and consumption impact of $3.5 billion dollars.

In addition, those holding the indirect jobs received $820.7 million of indirect wages and salaries.

Combining the direct, induced and indirect income impacts, the cargo and vessel activity on the Great Lakes St. Lawrence Seaway System created a total personal income and consumption impact of $4.3 billion.

4. TAX IMPACT

The tax impact is estimated using the per capita tax burdens for federal, state and local taxes, as developed by state, by the Tax Foundation. The taxes include revenue from all sources, both personal and corporate. These tax burdens are multiplied by the direct and induced income created at each of the 16 U.S. ports.

Using this methodology, it is estimated that $1.3 billion of federal, state and local tax revenues were created during the 2000 shipping season at the 16 U.S. ports of the Great Lakes St. Lawrence Seaway System.

IV. COMPARISON OF ECONOMIC IMPACTS 1991-2000

This chapter compares the economic impacts generated by port activity at the 16 U.S. ports on the Great Lakes St. Lawrence Seaway System. The methodology used by Martin Associates to estimate the economic impacts generated by the marine cargo and vessel activity on the Great Lakes St. Lawrence Seaway System in 1991 is, for the most part, the same as the methodology used to measure the current 2000 economic impacts.[8] However, there are some key differences, which are addressed in the following section.

1. CHANGES IN IMPACT METHODOLOGY

The methodology used to estimate the current economic impacts differs from that used in the 1992 study in several key areas. First, in the present study, Martin Associates has developed a more rigorous method to collect local purchases, which are used to estimate the indirect impacts. The U.S. Bureau of Economic Analysis prepared a detailed input-output model of the 8-state Great Lakes region, which was then used with the local purchase data to estimate indirect jobs. In the 1992 economic impact study, no indirect jobs were estimated.

The tax impact is now based on state and local tax burdens against income. In the 1992 study, the federal, state and local taxes were based on per employee, rather than income burdens, and only included taxes paid by individuals. The new methodology accounts for differences in income levels between jobs. Also, total income generated is used as the base to drive the tax impacts, including direct and induced income. Therefore, comparison with the 1991 tax impacts cannot be made.

Related jobs with users of the Great Lakes St. Lawrence Seaway System were not estimated in the earlier study, but are included in this analysis.

The focus on the comparisons should, therefore, be on the direct job impacts, since the same methodology to measure the direct impacts was used both in estimating the impacts in 1991 and in this current study.

2. COMPARISON OF TONNAGE

Tonnage handled by the 16 U.S. ports on the Great Lakes St. Lawrence Seaway System grew from 123.8 million short tons in 1991 to 192.0 million tons in 2000. Exhibit IV-1 compares the tonnage

[8] "The Economic Impacts of the Great Lakes St. Lawrence Seaway System", 1992, prepared by Martin Associates for the Saint Lawrence Seaway Development Corporation. The 1992 study is based on 1991 cargo and vessel activity. An interim update of the 1992 study was prepared using 1994 data, but detailed surveys were not conducted for this update, Therefore, comparisons will be made with the 1992 study which is based on a comprehensive survey of the maritime community serving the Great Lakes ports similar to the surveys conducted in this current study.

levels in the two study years.

Exhibit IV-1
Comparison of Tonnage

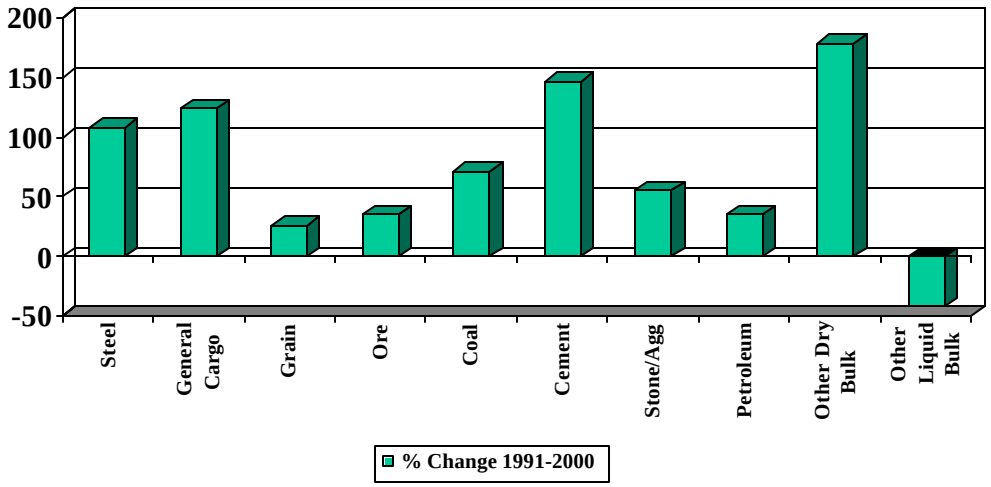
COMMODITY	2000	1991	CHANGE
STEEL	5,047	2,424	2,624
GENERAL CARGO	1,025	458	567
GRAIN	6,814	5,399	1,415
ORE	87,796	65,132	22,665
COAL	42,245	24,677	17,568
CEMENT	5,372	2,187	3,185
STONE/AGGREGATES	23,187	14,931	8,257
PETROLEUM	4,653	3,437	1,216
OTHER DRY BULK	11,255	4,054	7,201
OTHER LIQUID BULK	621	1,079	(458)
SALT*	3,953		
TOTALS	191,969	123,776	68,193

* Included with Dry Bulk in 1991

Totals may not add due to rounding

The table shows that tonnage increased by 68.2 million tons since 1991, with the greatest growth recorded for iron, coal and stone and aggregates. In fact, the only cargo recording a decline was liquid bulk. In addition, Exhibit IV-2 shows the percentage change in tonnage from 1991-2000.

Exhibit IV-2
Percentage Change in Tonnage 1991-2000



These changes in tonnage levels will have direct impacts on the level jobs, personal income, business revenue and taxes generated by the cargo activity at the 16 U.S. Great Lakes ports.

3. COMPARISON OF ECONOMIC IMPACTS

Exhibit IV-3 compares the impacts generated by the cargo and vessel activity at the 16 U.S. Great Lakes ports between 1991 and 2000.

Exhibit IV-3
Comparison of Economic Impacts

IMPACTS				
JOBS	**2000**	**1991**	**CHANGE**	**PERCENT CHANGE**
DIRECT	43,968	33,716	10,252	30.41%
INDUCED	27,392	10,912	16,480	151.03%
SUB TOTAL	71,360	44,628	26,732	59.90%
INDIRECT	26,757	NA	NA	
TOTAL JOBS	**98,117**	**44,628**	**26,732**	
RELATED SHIPPER JOBS	**54,391**	NA	NA	
	ALL DOLLAR VALUES IN 1,000 DOLLARS			
PERSONAL INCOME (1000)				
DIRECT	$1,623,014	$1,050,128	$572,886	54.55%
INDUCED	$1,889,837	$854,180	$1,856,393	121.25%
INDIRECT	$820,736	NA	NA	
TOTAL INCOME IMPACT	**$4,333,586**	**$1,904,308**	**$2,429,278**	
REVENUE (1000)	**$3,385,243**	**$1,724,883**	**$1,660,360**	96.26%
FEDERAL, STATE, LOCAL TAXES (1000)	**$1,336,290**	**NA**	**NA**	

Totals may not add due to rounding

As a result of the growth in tonnage, direct jobs increased by more than 10,000 jobs, while induced jobs grew by nearly 16,500 jobs, reflecting higher earnings per direct job, as well as a greater consumption multiplier effect. Direct personal income grew by 54.5 percent over the period, while induced income and consumption expenditures grew by 121.3 percent over the 1991- 2000 period, far outstripping the rate of inflation for this period, which increased by 27.1 percent. Similarly, the revenue received by the businesses providing the transportation services as well as the cargo handling services nearly doubled, growing by 96.3 percent over the 1991-2000 period, compared to the 27.1 percent increase in inflation over the same time period.

In 1991, indirect jobs and related jobs were not measured, and the tax impacts only included taxes paid by individuals. In this current study, the tax impact includes taxes generated from all sources at the federal, state and local levels. Therefore, comparisons of these tax impacts and indirect and related jobs cannot be made with the earlier study.

4. COMPARISON OF DIRECT JOB IMPACTS BY COMMODITY

Exhibit IV-4 compares the direct jobs generated by commodity in 1991 and 2000.

Exhibit IV-4
Comparison of Direct Job Impacts by Commodity

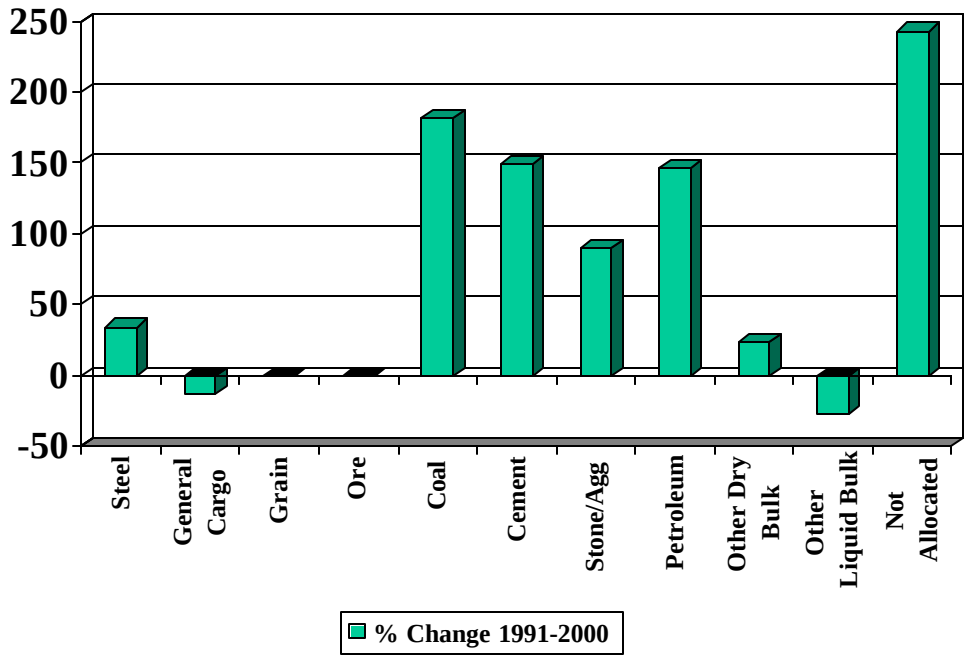
COMMODITY	2000	1991	CHANGE
STEEL	5,422	4,055	1,367
GENERAL CARGO	342	394	(52)
GRAIN	1,467	1,617	(150)
ORE	19,034	19,950	(916)
COAL	6,393	2,272	4,121
CEMENT	1,136	456	680
STONE/AGGREGATES	4,645	2,441	2,204
PETROLEUM	1,373	559	814
OTHER DRY BULK	1,239	1,004	235
OTHER LIQUID BULK	317	438	(121)
SALT*	782		
NON ALLOCATED	1,818	530	1,288
TOTALS	43,968	33,716	10,252

* Included with Dry Bulk in 1991

Totals may not add due to rounding

With respect to job growth by commodity, the largest growth was with jobs created by the movement of coal, 4,121 job increase, followed by growth in jobs created by stone and aggregates (2,204 direct job increase) and growth in jobs created by iron and steel products (1,367 direct job increase). Exhibit IV-5, on the following page, shows the percentage change in direct jobs by commodity between 1991-2000.

Exhibit IV-5
Percentage Change in Direct Jobs by Commodity
1991-2000



5. COMPARISON OF DIRECT JOBS BY CATEGORY

Exhibit IV-6, on the following page, shows the direct jobs generated by job category between 1991 and 2000. The greatest growth in jobs was with truckers serving the Great Lakes St. Lawrence Seaway System (4,490 jobs), followed by a 4,188 increase with terminal operators and dependent shippers/consignees.

Exhibit IV-6
Employment Impacts by Job Category

	2000	1991	CHANGE
SURFACE TRANSPORTATION			
RAIL	1,103	878	225
TRUCK	11,178	6,688	4,490
MARITIME SERVICES			
TERMINAL OPERATORS/SHIPPERS/CONSIGNEES	26,237	22,049	4,188
LONGSHOREMEN	420	150	270
PILOTS/TOWING	312	64	248
FORWARDERS/AGENTS/CHANDLERS/SURVEYORS	210	141	69
WAREHOUSE	154	225	(71)
GOV'T	381	123	258
SHIP REPAIR/MARINE CONSTRUCTION	149	160	(11)
LAKER	3,491	2,932	559
PORT ORGANIZATIONS	266	302	(36)
BANKING/INSURANCE/ADMIRALTY LAW	66	4	62
TOTALS	***43,968***	***33,716***	***10,252***

Totals may not add due to rounding

6. CONCLUSION

The comparisons made in this chapter between the economic impacts generated by cargo and vessel activity at the 16 U.S. Great Lakes ports underscore the continued growth in the economic contribution of the Great Lakes St. Lawrence Seaway System. The system has grown in importance as a key transportation system for bulk cargoes such as iron ore, coal, and stone and aggregates that are used by our nation's industrial sector. Continued support by federal, state and local governments will be critical in future years in order to maintain and grow the economic contribution of these 16 U.S. Great Lakes ports.