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

Phase II

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A University of Wisconsin - Superior and University of Minnesota Duluth Consortium

Project Goals

• Make use of economic impact analysis to estimate the economic value of the Great Lakes and St. Lawrence Seaway (GLSLS) system to different regions of interest

– individual port communities
– states
– GLSLS region
– the nation

• Report results in terms useful to a range of stakeholders, including port authorities, government agencies, policy makers, and the general public

– industry contributions to **employment**, **incomes**, **value added** (contribution to GDP or GSP), and **tax revenues**

• Provide ability to update economic impact on a regular basis

Input-Output (IO) Modeling

Use **input-output (IO) modeling**, which depends on **inter-sectoral linkages** that exist across a region's economy.

- Typically based on hundreds of industrial sectors.
- Requires underlying data to be representative of the region of analysis.
- Results include impact on employment and output in each sector, as well as taxes, value added, etc.

Input-Output (IO) Modeling

The overall impact of any economic activity can be broken down into **three stages** that comprise a **ripple effect**:

1. The **direct effect** is the actual economic activity of interest that we wish to assess the **overall** impact of.
    - Changes in activity influence the industry of interest's production decisions, and therefore its **employment** and **demand for inputs** from other firms.

2. The **indirect effect** accounts for additional impacts due to changes in demand on other industries that provide inputs to the directly impacted sectors.
    - This causes additional effects on their suppliers as well.

3. The **induced effect** accounts for the above resulting changes in employment and incomes causing additional changes in demand for consumer goods and services.
    - This affects additional industries, such as those in the retail, grocery, and leisure and hospitality sectors.

Input-Output (IO) Modeling

Summing over the direct, indirect, and induced effects gives the total impact on a region's economy that results from the economic activity of interest.

Direct Effects Needed

- Want to track **economic activity directly associated with port activities and the movement of cargo** through the GLSLS

- IO models typically need related industry **output** and/or **employment** figures as **direct effects** to input into the model

Direct Effects Needed

- In our case this includes:
  - Firms that provide cargo handling and vessel services
    - Stevedoring firms, terminal and dock operators, warehouse operators
    - Freight forwarder/customshouse brokers, vessel agents, pilots and tug operators, chandlers, bunkering firms, marine surveyors, etc.
  - Firms handling inland movement into and out of the ports
    - Rail and trucking companies
    - Barge operators
    - Pipelines
  - Port administration and related governmental operations
    - Port authorities
    - Coast Guard, U.S. Army Corps of Engineers, etc.
  - Any other firms performing port related economic activity

Current Study

Phase I involved:

- Model assessment and selection
- Defining region of interest to be modeled
- Determination of data needs

Alternative Models Considered

After careful consideration of many alternatives, came down to choice between MARAD Port Kit and IMPLAN.

- **MARAD Port Kit** provides **port specific interface** that generates direct effects from data on shipments and inland movements
  - **Minimal survey requirements**
  - Updated version now available
    - Unfortunately the MARAD funded update is only national
    - **Need to order regionally customized versions from Rutgers** (Expensive!)
    - Underlying industry linkages based on national averages for port related costs

- **IMPLAN** is just a **general IO model** with **no port specific interface**
  - Relatively inexpensive and updated annually
  - Need to input employment or output data from **all port related industries** as direct effect

Initially decided on pilot study using MARAD model.
Problems have become apparent, so now also including IMPLAN.

Selected Region

- Initial pilot study on Twin Ports of Duluth/Superior
  - Green Bay also added on!
- Expand to include 16 ports in the 8 states
  - Define separate port regions by counties they lie in
- Potential further expansion to include additional ports and docks

Port	County
Buffalo, NY	Erie
Oswego, NY	Oswego
Ogdensburg, NY	St. Lawrence
Milwaukee, WI	Milwaukee
Green Bay, WI	Brown
Duluth, MN/Superior, WI	Douglas, WI
Duluth, MN/Superior, WI	St. Louis, MN
Gary, IN - USSteel?	Lake
Burns Harbor, IN	Porter
Erie, PA	Erie
Detroit, MI	Wayne
Toledo, OH	Lucas
Lorain, OH	Lorain
Conneaut, OH	Ashtabula
Cleveland, OH	Cuyahoga
Ashtabula, OH	Ashtabula
Chicago, IL	Cook

Rather than order model for all regions right off the bat, decided on pilot study to assess implementation procedures and outcomes.

MARAD Port Kit

- Began process of obtaining the updated model shortly after last year's GLMRI meeting
- After several bureaucratic hurdles and installation problems, finally got a working version **(or so I thought!)** in late April
- Added Green Bay component to the model in July

MARAD Port Kit

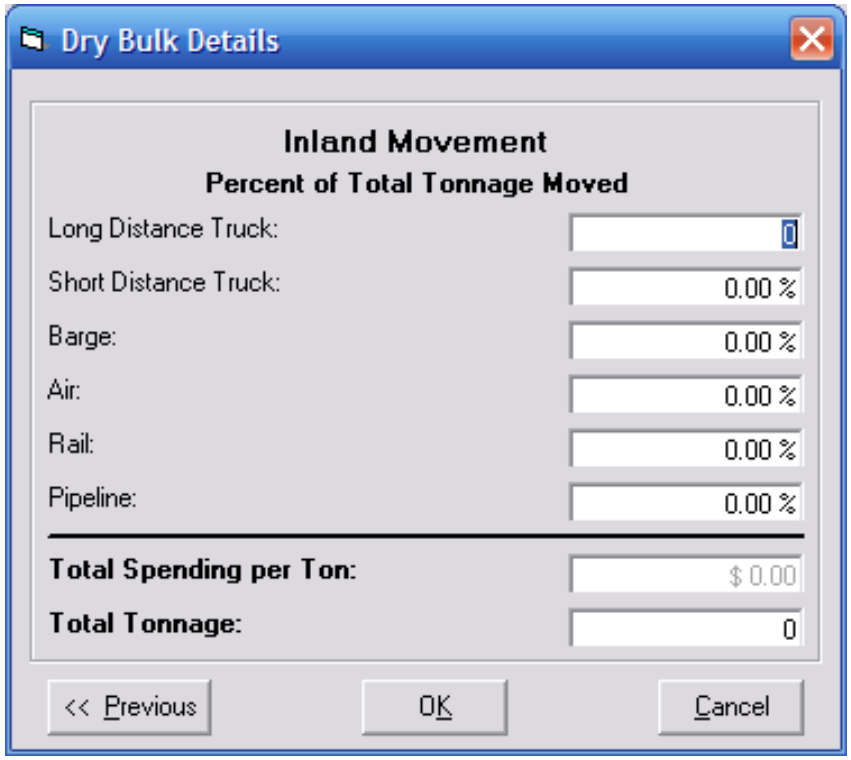
- Began **survey design** in May
  - Involved meeting with representatives from port related industries to determine best sources for required data and other components
    - Lake Superior Warehousing
    - Great Lakes Fleet/Key Lakes
    - Midwest Energy Resources
- Rather than put together separate surveys, decided on a single survey with separate sections

MARAD Port Kit

MARAD Port Kit Required Data

Minimum:

- Shipments by cargo type
  - Containerized cargo
  - Breakbulk – cargo in individual pieces or on pallets, such as forest products, paper, and steel
  - Liquid bulk – such as petroleum and petrochemicals
  - Dry bulk – such as grain or coal
  - Autos and other vehicles
  - Project cargo – such as wind turbine components



- Inland mode of transportation

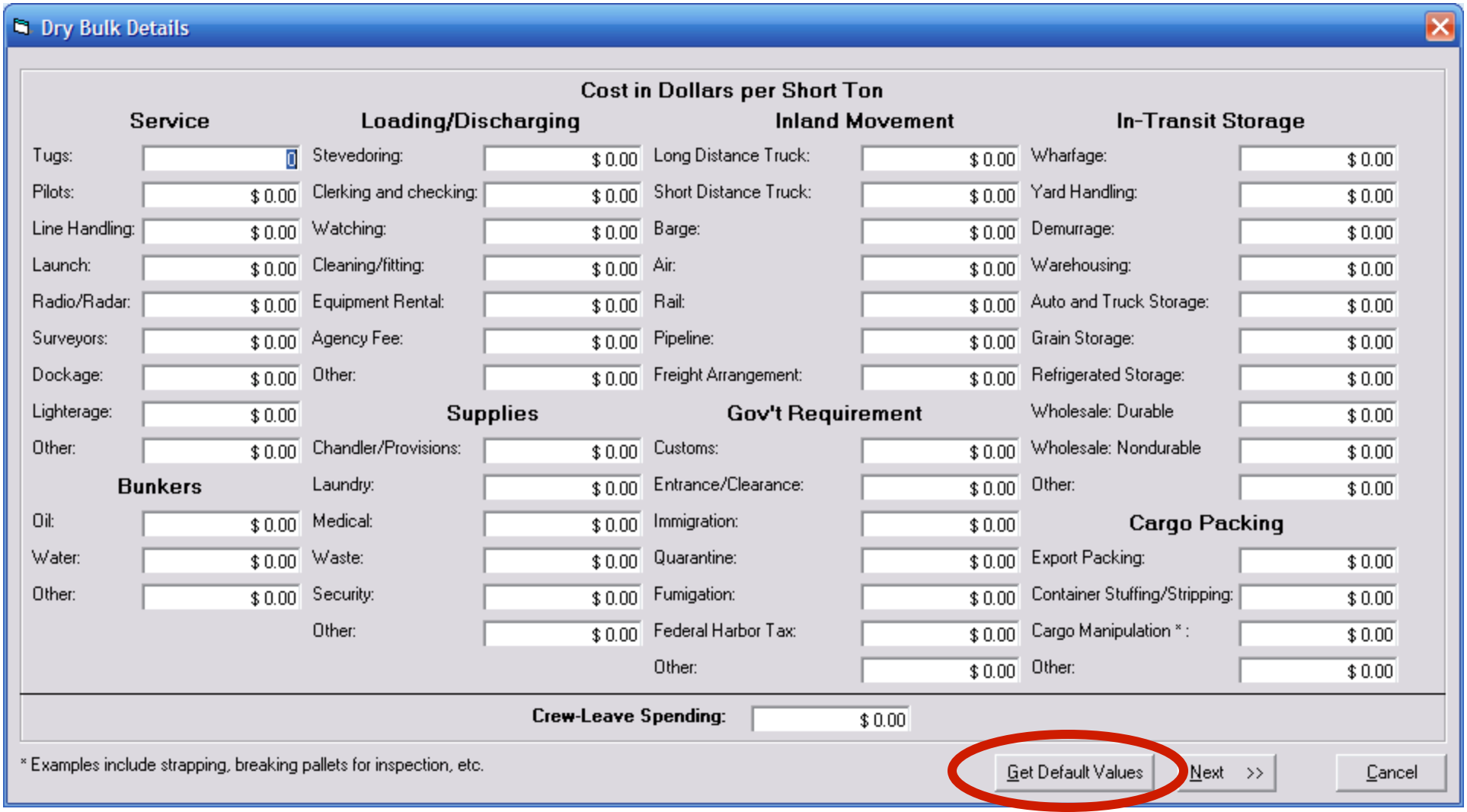
Shipments	2009	Cargo Type				
		Breakbulk (Short Tons)	Dry Bulk (Short Tons)	Liquid Bulk (Short Tons)	Project Cargo (Short Tons)	Containerized Cargo (# Containers in TEUs)
	Loaded					
	Unloaded					

Inland Movement			Cargo Type				
			Breakbulk	Dry Bulk	Liquid Bulk	Project Cargo	Containerized Cargo
	Inbound to port						
	% of above tonnage moved by:	Long Distance Truck					
		Short Distance Truck					
		Rail					
		Barge					
		Air					
		Pipeline					
	Outbound from port						
	% of above tonnage moved by:	Long Distance Truck					
		Short Distance Truck					
		Rail					
		Barge					
		Air					
		Pipeline					

Can adjust model to reflect **local conditions** by accounting for the following costs in relation to each cargo type:

- Costs of Waterside Services
  - Tugs, pilots, line hauling and launch fees, dockage fees
- Government Requirements
  - Customs, entrance/clearance fees, immigration, quarantine
- Loading/Discharging
  - Stevedoring, clerking, security, cleaning/fitting, equipment rental
- Suppliers
  - Chandlers/provisions, laundry, medical, waste handling charges
- Bunkers
  - Oil, water
- In-Transit Storage
  - Wharfage fees, yard handling, demurrage, warehousing and other storage
- Cargo Packing
  - Export packing, container stuffing/stripping, cargo movement and adjustment
- Inland Movement
  - Long- and short-distance Trucking, barge, rail, pipeline

Data Input Requirements - Example



Based on national averages!

		Cargo Type									
		Breakbulk (Cost per Short Ton)		Dry Bulk (Cost per Short Ton)		Liquid Bulk (Cost per Short Ton)		Project Cargo (Cost per Short Ton)		Containerized Cargo (Cost per Container)	
		National Average	Local Cost	National Average	Local Cost	National Average	Local Cost	National Average	Local Cost	National Average	Local Cost
Loading/Discharging	Stevedoring	$9.00	$	$0.34	$	$0.00	$	$20.00	$	$93.68	$
	Clerking and checking	$0.40	$	$0.00	$	$0.00	$	$0.04	$	$0.88	$
	Watching	$0.00	$	$0.00	$	$0.00	$	$0.00	$	$0.11	$
	Cleaning/fitting	$0.00	$	$0.00	$	$0.00	$	$0.30	$	$0.00	$
	Equipment Rental	$0.00	$	$0.00	$	$0.00	$	$0.00	$	$1.10	$
	Agency Fee	$0.03	$	$0.03	$	$0.03	$	$0.03	$	$0.26	$
	Other (Please Specify)	$0.00	$	$0.00	$	$0.00	$	$0.00	$	$0.00	$
In-Transit Storage	Wharfage	$2.05	$	$0.00	$	$0.12	$	$3.00	$	$17.00	$
	Yard Handling	$0.00	$	$0.00	$	$0.00	$	$20.00	$	$0.77	$
	Demurrage	$0.85	$	$0.00	$	$0.00	$	$0.00	$	$0.07	$
	Warehousing	$0.50	$	$0.00	$	$0.00	$	$0.00	$	$0.02	$
	Auto & Truck Storage	$0.00	$	$0.00	$	$0.00	$	$0.00	$	$0.00	$
	Grain Storage	$0.00	$	$0.00	$	$0.00	$	$0.00	$	$0.00	$
	Refrigerated Storage	$0.00	$	$0.00	$	$0.00	$	$0.00	$	$0.04	$
	Other (Please Specify)	$0.00	$	$0.00	$	$0.00	$	$0.00	$	$0.00	$
Cargo Packing	Export Packing	$0.02	$	$0.00	$	$0.00	$	$0.00	$	$0.13	$
	Container Stuffing/Stripping	$0.00	$	$0.00	$	$0.00	$	$0.00	$	$5.32	$
	Cargo Manipulation*	$0.00	$	$0.00	$	$0.00	$	$0.00	$	$0.15	$
	Other (Please Specify)	$0.00	$	$0.00	$	$0.00	$	$0.00	$	$0.00	$

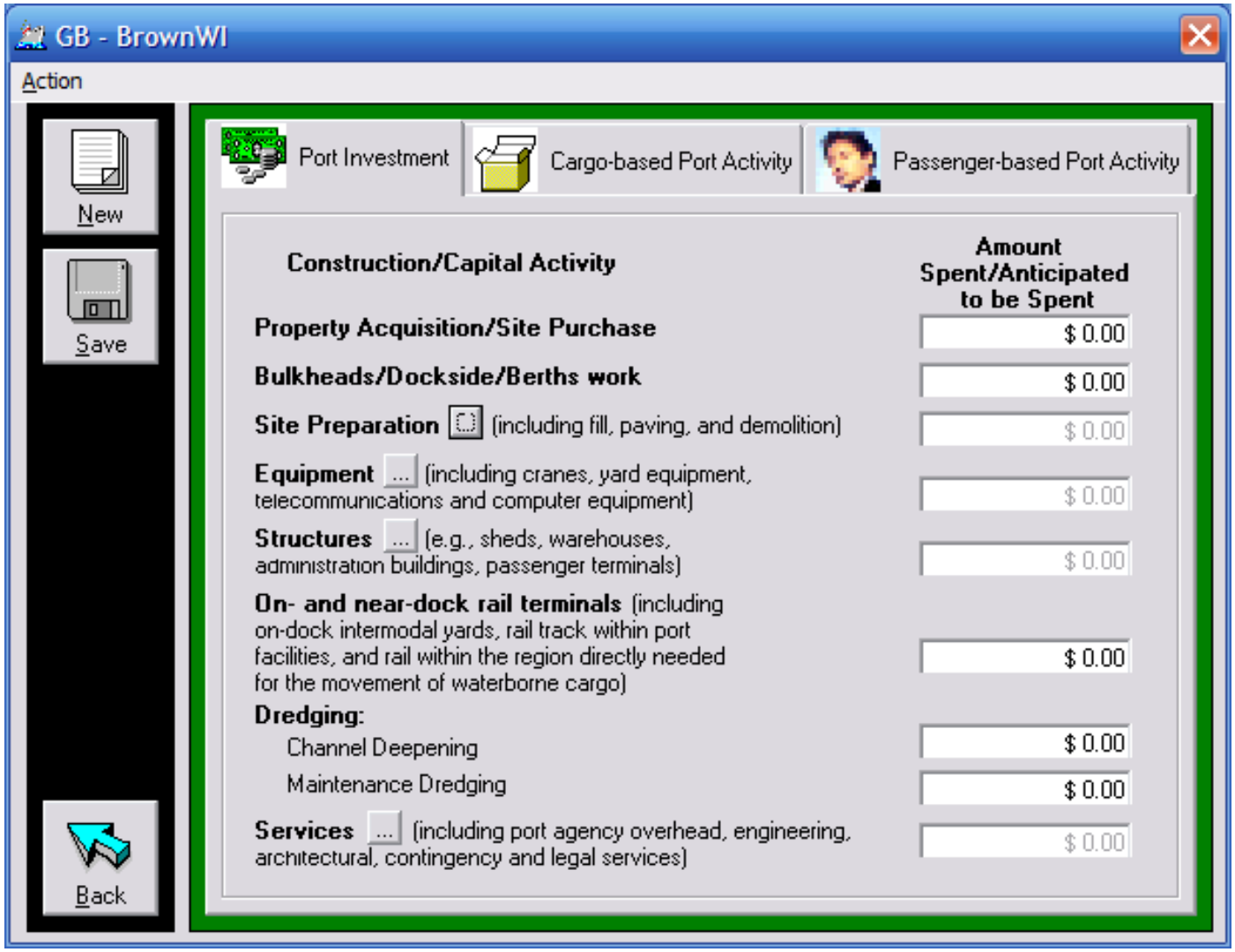
* For example: strapping, breaking pallets for inspection, etc.

		Cargo Type									
		Breakbulk (Cost per Short Ton)		Dry Bulk (Cost per Short Ton)		Liquid Bulk (Cost per Short Ton)		Project Cargo (Cost per Short Ton)		Containerized Cargo (Cost per Container)	
		National Average	Local Cost	National Average	Local Cost	National Average	Local Cost	National Average	Local Cost	National Average	Local Cost
Navigational Service	Tugs	$0.45	$	$0.29	$	$0.29	$	$0.45	$	$2.85	$
	Pilots	$0.40	$	$0.38	$	$0.31	$	$0.40	$	$3.74	$
	Line Handling	$0.60	$	$0.02	$	$0.01	$	$0.26	$	$1.47	$
	Launch	$0.24	$	$0.03	$	$0.02	$	$0.24	$	$0.64	$
	Radio/Radar	$0.05	$	$0.05	$	$0.00	$	$0.05	$	$0.04	$
	Surveyors	$0.04	$	$0.06	$	$0.01	$	$0.04	$	$0.13	$
	Dockage	$0.16	$	$0.75	$	$0.01	$	$0.16	$	$2.46	$
	Lighterage	$0.00	$	$0.00	$	$0.01	$	$0.00	$	$0.00	$
	Other (Please Specify)	$0.00	$	$0.00	$	$0.00	$	$0.00	$	$0.00	$
Gov't Requirement	Customs	$0.60	$	$0.27	$	$0.10	$	$0.60	$	$1.10	$
	Entrance/Clearance	$0.25	$	$0.39	$	$0.00	$	$0.25	$	$0.50	$
	Immigration	$0.30	$	$0.00	$	$0.00	$	$0.03	$	$0.08	$
	Quarantine	$0.40	$	$0.00	$	$0.00	$	$0.04	$	$0.04	$
	Fumigation	$0.10	$	$0.00	$	$0.00	$	$0.00	$	$0.14	$
	Federal Harbor Tax	$0.00	$	$0.00	$	$0.00	$	$0.00	$	$0.00	$
	Other (Please Specify)	$0.00	$	$0.00	$	$0.00	$	$0.00	$	$0.00	$

		Cargo Type									
		Breakbulk (Cost per Short Ton)		Dry Bulk (Cost per Short Ton)		Liquid Bulk (Cost per Short Ton)		Project Cargo (Cost per Short Ton)		Containerized Cargo (Cost per Container)	
		National Average	Local Cost	National Average	Local Cost	National Average	Local Cost	National Average	Local Cost	National Average	Local Cost
Supplies	Chandler/Provisions	$0.06	$	$0.03	$	$0.04	$	$0.06	$	$0.92	$
	Laundry	$0.00	$	$0.00	$	$0.00	$	$0.00	$	$0.04	$
	Medical	$0.03	$	$0.01	$	$0.00	$	$0.03	$	$0.24	$
	Waste	$0.08	$	$0.00	$	$0.00	$	$0.08	$	$0.02	$
	Security	$6.00	$	$0.00	$	$0.00	$	$6.00	$	$0.00	$
	Dunnage	$0.00	$	$0.00	$	$0.00	$	$0.00	$	$0.00	$
	Oil	$0.00	$	$0.00	$	$0.00	$	$0.00	$	$0.00	$
	Water	$0.00	$	$0.00	$	$0.00	$	$0.00	$	$0.00	$
	Other (Please Specify)	$0.00	$	$0.00	$	$0.00	$	$0.00	$	$0.00	$

MARAD Port Kit

Port Investment and Capital Expenditures Impact



Construction/Capital Activity		Expenditures		
		2007	2008	2009
Equipment	Dockside:			
	Cranes			
	Gangways			
	Conveyors			
	Inland:			
	Switch/yard locomotives			
	Chassis			
	Gate Equipment:			
	Gates			
	Booths			
	Signaling			
	Variable Signs			
	Security Systems			
	Yard Equipment:			
	Fork Lifts			
	Straddle Loaders			
	Side Loaders			
	Yard Hostelers			
	Overhead Cranes			
	Conveyors			
	Switching Engines			
	Container Racking Systems			
	Bulldozers			
	Spiralveyors			
	Concrete Pods/Curb Strips			
	Telecommunications and Computer Equipment:			
	Fiber			
	Cable			
	Computers			
	Radio Frequency Equipment			
	Telecommunications Equipment			
	Electronic Tags			
	Lighting/Electrical:			
	Yard and Gate Lighting			
	Plugs/outlets for "Reefer" containers and trailers			
	Waterborne:			
	Ferries, Tugs, and other marine vehicles			

Construction/Capital Activity		Expenditures		
		2007	2008	2009
Property Acquisition/Site Purchase				
Bulkheads/Dockside/Berths work				
Site Preparation	Fill			
	Paving			
	Demolition			
Structures	Administration Buildings			
	Sheds and Warehouses			
	Passenger Terminals			
On- and near-dock rail terminals (including intermodal yards, track within port facilities, and regional rail directly related to movement of waterborne cargo)				
Dredging	Channel deepening			
	Maintenance dredging			
Services	Port Agency Overhead			
	Engineering, Architectural, and Contingency			
	Legal Services			

MARAD Port Kit

- Initial survey went out to 24 Twin Ports dock/terminal operators and shipping agents on August 12th
- Have received only 7 responses to date
  - And little info on these for adjusting national averages
- Conducted follow-up telephone calls on September 2nd
  - No additional responses since

- Survey went out to 14 Green Bay terminals on September 1
- 5 responses so far
  - Again little info for adjusting national averages

Can still run model, as shipments by cargo type is available through each Port Authority. However, must rely on national average costs!

MARAD Port Kit Output - Example

	Economic Component			
	Output (000 $)	Employment (jobs)	Income (000$)	Gross State Product (000$)
I. TOTAL EFFECTS (Direct and Indirect/Induced)*				
Private				
1. Agriculture	0.0	0	0.0	0.0
2. Agri. Serv., Forestry, & Fish	164.0	3	76.5	126.3
3. Mining	749.1	0	233.3	326.7
4. Construction	6,623.5	21	912.1	2,021.7
5. Manufacturing	84,653.9	199	6,923.9	20,807.4
6. Transport. & Public Utilities	363,798.0	3,479	125,895.1	255,001.2
7. Wholesale	7,453.0	56	3,030.8	2,854.1
8. Retail Trade	29,526.2	758	10,859.0	16,234.5
9. Finance, Ins., & Real Estate	42,510.1	368	16,941.2	29,502.0
10. Services	36,261.3	658	15,189.1	17,110.1
Private Subtotal	571,739.0	5,542	180,060.9	343,984.2
Public				
11. Government	10,638.1	63	3,567.2	6,825.1
Total Effects (Private and Public)	582,377.1	5,605	183,628.1	350,809.3
II. DISTRIBUTION OF EFFECTS/MULTIPLIER				
1. Direct Effects	408,985.2	3,409	126,312.7	258,025.7
2. Indirect and Induced Effects	173,391.8	2,195	57,315.4	92,783.6
3. Total Effects	582,377.1	5,605	183,628.1	350,809.3
4. Multipliers (3/1)	1.424	1.644	1.454	1.360

III. COMPOSITION OF GROSS STATE PRODUCT

1. Wages--Net of Taxes	-39,907.6
2. Taxes	243,223.6
a. Local	130,813.8
b. State	84,929.0
c. Federal	27,480.7
General	7,792.9
Social Security	19,687.8
3. Profits, dividends, rents, and other	147,493.4
4. Total Gross State Product (1+2+3)	350,809.3

Big Problem!!

IV. TAX ACCOUNTS

	Business	Household	Total
1. Income --Net of Taxes	-39,907.6	174,446.7	-------
2. Taxes	243,223.6	39,204.6	282,428.2
a. Local	130,813.8	3,906.4	134,720.2
b. State	84,929.0	6,995.8	91,924.8
c. Federal	27,480.7	28,302.4	55,783.2
General	7,792.9	28,302.4	36,095.4
Social Security	19,687.8	0.0	19,687.8

EFFECTS PER MILLION DOLLARS OF INITIAL EXPENDITURE

Employment (Jobs)	13.7
Income	447,847
State Taxes	224,193
Local Taxes	328,566
Gross State Product	855,581

INITIAL EXPENDITURE IN DOLLARS

410,024,552

Note: Detail may not sum to totals due to rounding.

*Terms:
Direct Effects --the proportion of direct spending on goods and services produced in the specified region

Indirect Effects--the value of goods and services needed to support the provision of those direct economic effects.

Induced Effects--the value of goods and sevices needed by households that provide the direct and indirect labor.

For IMPLAN

Included request on initial survey to collect employment data for input into IMPLAN

- went out to 24 Twin Ports dock/terminal operators and shipping agents

Employment – Please enter the number of people employed by your company at this port in each of the following shipping seasons:

2007: Full-time:_____ Part-time:_____

2008: Full-time:_____ Part-time:_____

2009: Full-time:_____ Part-time:_____

Please provide the following information for your operations at this port (optional):

2007: Gross revenues: $_____ Total Payroll: $_____

2008: Gross revenues: $_____ Total Payroll: $_____

2009: Gross revenues: $_____ Total Payroll: $_____

For IMPLAN

- Developed survey for additional firms and other organizations that are in any way port related
  - Primarily compiled from list obtained from Port Authority
- Sent out to 80 firms and other establishments on September 15
  - Including the 17 nonrespondents to the initial survey
- Have so far received 16 back
  - Will be conducting follow-up calls over the next few weeks
  - Need response rate as close to 100% as possible to generate good impact analysis!

Employment:

While it is understood that for some firms being surveyed port related activities only account for a portion of their overall operations, it is important that the researchers get as accurate a view of port related employment as possible. Please provide the following information on your organization.

Please enter the overall number of people employed by your company's operations in Douglas County, WI, and/or St. Louis County, MN, in each year. In addition, indicate the percent of this total employment that is due to port related activities conducted by your firm.

(Alternatively, if there are no jobs within your organization that are exclusively due to port related activities, please estimate the cumulative number of hours per year that are spent on port related activities by employees at your firm.)

2007: Full-time:_____ Part-time:_____ Percent port-related:_____

Alternative – cumulative number of employee hours spent on port related activities over the year:_____

2008: Full-time:_____ Part-time:_____ Percent port-related:_____

Alternative – cumulative number of employee hours spent on port related activities over the year:_____

2009: Full-time:_____ Part-time:_____ Percent port-related:_____

Alternative – cumulative number of employee hours spent on port related activities over the year:_____

Additional Information (optional):

Please provide the following information for your operations in Douglas County, WI, and/or St. Louis County, MN:

2007: Gross revenues: $_____ Total Payroll: $_____

Percent due to port-related activities:_____

2008: Gross revenues: $_____ Total Payroll: $_____

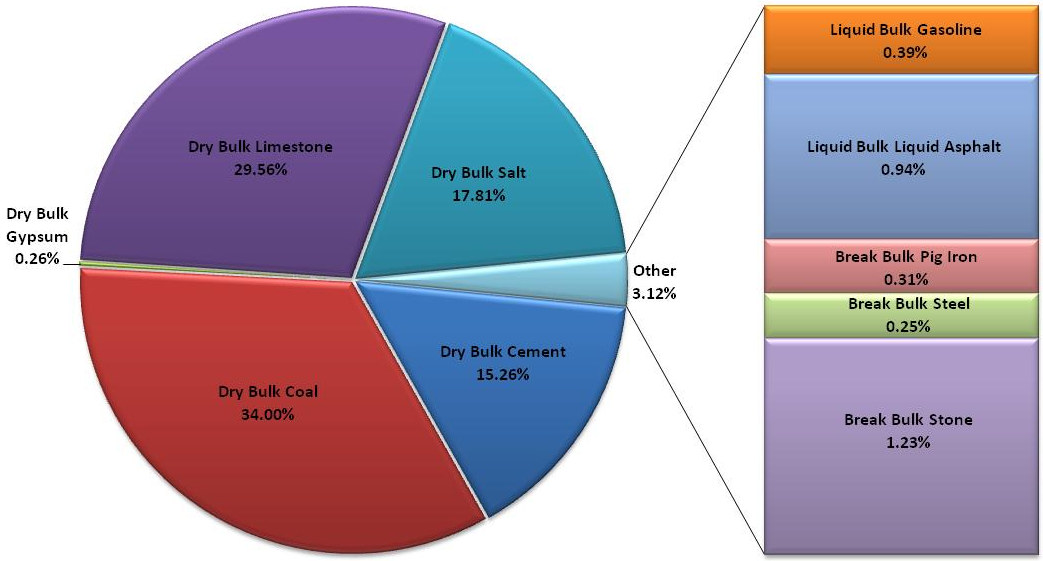
Percent due to port-related activities:_____

2009: Gross revenues: $_____ Total Payroll: $_____

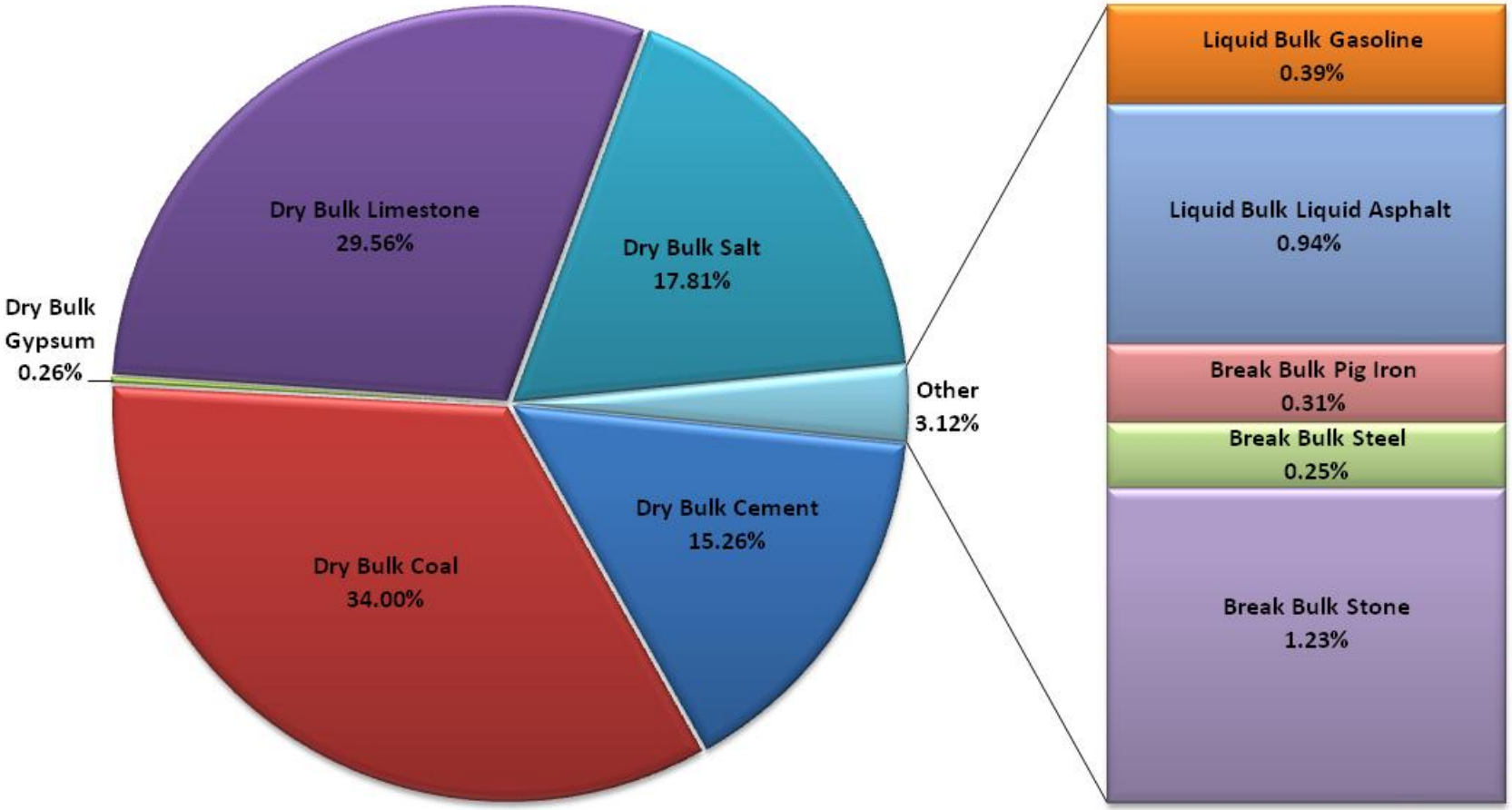
Percent due to port-related activities:_____

Economic Impact Results for the Port of Green Bay, 2009

Type	Commodity	Short Tons
Dry Bulk	Cement	304,489.43
	Coal	678,431.48
	Gypsum	5,149.95
	Limestone	589,798.84
	Salt	355,423.41
	Subtotal	1,933,293
Liquid Bulk	Gasoline	7,841.76
	Liquid Asphalt	18,700.52
	Subtotal	26,542
Break Bulk	Pig Iron	6,119.97
	Steel	5,056.25
	Stone	24,494.21
	Subtotal	35,670
Total Shipments		**1,995,506**



Short Tons


Dry Bulk Limestone
29.56%
Dry Bulk Salt
17.81%
Dry Bulk
Gypsum
0.26%
Other
3.12%
Dry Bulk Cement
15.26%
Dry Bulk Coal
34.00%
Liquid Bulk Gasoline
0.39%
Liquid Bulk Liquid Asphalt
0.94%
Break Bulk Pig Iron
0.31%
Break Bulk Steel
0.25%
Break Bulk Stone
1.23%

PRELIMINARY ESTIMATES!

Port of Green Bay, 2009

Division Level Report for Impacts on BrownWI for Green Bay 9_19 Single-Regional Analysis.

Wages, salaries, and proprietor's income (excluding benefits)

Essentially Gross Revenues

	Economic Component			
	Output (000 $)	Employment (jobs)	Income (000$)	Gross State Product (000$)
I. TOTAL EFFECTS (Direct and Indirect/Induced)*				
Private				
1. Agriculture	62.5	0		29.5
2. Agri. Serv., Forestry, & Fish	14.4	0		11.6
3. Mining	499.7	0		
4. Construction	740.3	2		
5. Manufacturing	5,325.4	7		
6. Transport. & Public Utilities	59,438.4	444		
7. Wholesale	2,230.5	20		
8. Retail Trade	4,120.9	101		
9. Finance, Ins., & Real Estate	4,683.6	50		
10. Services	5,043.7	90		
Private Subtotal	82,159.6	714		
Public				
11. Government	895.0	5	292.6	535.3
Total Effects (Private and Public)	83,054.6	719	26,935.0	40,433.8
II. DISTRIBUTION OF EFFECTS/MULTIPLIER				
1. Direct Effects	57,437.1	403	18,263.0	26,867.1
2. Indirect and Induced Effects	25,617.6	316	8,672.0	13,566.7
3. Total Effects	83,054.6	719	26,935.0	40,433.8
4. Multipliers (3/1)	1.446	1.785	1.475	1.505

Value Added

More detail by industry also produced!

Includes:
- **Wages**
- **Taxes**
- **Non-wage compensation**
- **Profit**
- **Net interest**
- **Depreciation**

PRELIMINARY ESTIMATES!

Port of Green Bay, 2009

III. COMPOSITION OF GROSS STATE PRODUCT

1. Wages--Net of Taxes	23,906.2
2. Taxes	5,916.7
a. Local	961.6
b. State	842.6
c. Federal	4,112.5
General	1,224.6
Social Security	2,887.9
3. Profits, dividends, rents, and other	10,610.9
4. Total Gross State Product (1+2+3)	40,433.8

IV. TAX ACCOUNTS

	Business	Household	Total
1. Income --Net of Taxes	23,906.2	26,935.0	-------
2. Taxes	5,916.7	5,889.8	11,806.5
a. Local	961.6	713.1	1,674.7
b. State	842.6	1,025.3	1,867.9
c. Federal	4,112.5	4,151.5	8,263.9
General	1,224.6	4,151.5	5,376.1
Social Security	2,887.9	0.0	2,887.9

EFFECTS PER MILLION DOLLARS OF INITIAL EXPENDITURE

Employment (Jobs)	12.5
Income	468,354
State Taxes	32,479
Local Taxes	29,120
Gross State Product	703,074

INITIAL EXPENDITURE IN DOLLARS 57,510,031

Conclusions so far…

- Updated MARAD model not a good choice
  - Ordering difficulties
  - Too many bugs
  - **Still using old version's national average cost data**
- Likely to use IMPLAN as move forward
- Survey process in either case more involved than expected
  - Limited survey response a particular problem for use of IMPLAN
  - Much follow-up needed

Next steps:

- Continue current data collection to complete pilot study
  - Get fixed version of MARAD model for Twin Ports
  - Do IMPLAN analysis
  - Compare results

- Move forward with surveys of additional ports to assess 2010 economic impact for whole GLSLS

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