

# Vital to Our Nation's Economy: GREAT LAKES JOBS

2011 REPORT



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# INTRODUCTION

An analysis of economic data shows that more than 1.5 million jobs are directly connected to the Great Lakes, generating \$62 billion in wages.

The Great Lakes have shaped the culture, history and economy of the eight states that border the freshwater seas. Historically, the lakes formed a water highway that promoted settlement, trade, resource mining and manufacturing that enabled the region to become the industrial heartland of the nation. The Great Lakes continue to provide a competitive advantage for businesses and support fantastic recreational opportunities that help attract talented workers to the region.

This analysis is based on 2009 employment data from the Bureau of Labor Statistics and represents a conservative estimate of direct employment related to the Great Lakes in the following sectors: manufacturing, tourism and recreation, shipping, agriculture, science and engineering, utilities, and mining.

## Objective

The goal of the report, *Jobs, Economy and the Great Lakes*, was to examine the economic impact of the Great Lakes by estimating the number of U.S. jobs and total payroll for industries that are connected to the Great Lakes. This analysis represents a conservative estimate of direct employment for those industries and jobs directly related to the Great Lakes. The authors define Great Lakes-related jobs as employment in industries that rely upon the Great Lakes for key inputs (e.g., water, fish) or economic viability (e.g., cheap transportation that provides an economic advantage), or are significantly influenced by the Lakes (e.g., by attracting visitors or climate moderation), both currently and for historic development of the industry. These industries would either not exist or not have developed to the extent that they have reached today without reliance upon the Great Lakes.

## Results

The calculations in this summary are based on the most recent annual estimates for county employment from the Bureau of Labor Statistics' Quarterly Census of Employment & Wages and Occupational Employment Statistics programs. For all states, except Michigan, only jobs in specific industries in the counties bordering the Great Lakes were included. In Michigan, jobs in Great Lake-connected industries within mining (except oil and gas), manufacturing, science and engineering were included from across the state. Michigan's access to the Great Lakes created a concentration of manufacturing infrastructure that continues to drive industry today and therefore most manufacturing jobs are connected to the lakes. **For more information on the source data, see the *Methods* section of this publication.**

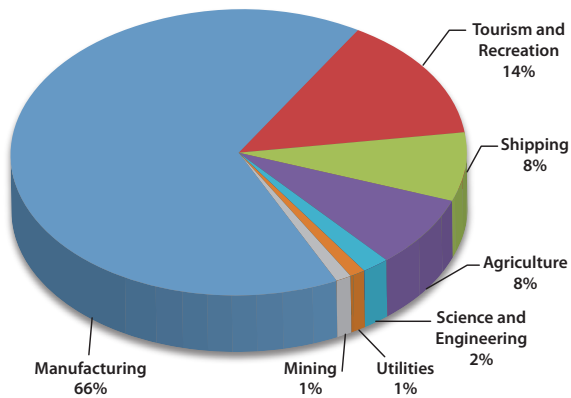


Figure 1. Percentage of Great Lakes jobs by industry (2009).

## MANUFACTURING: 994,879 Jobs

The Great Lakes provide efficient transportation, which sustains manufacturing and steel production, while the clean, abundant water attracts chemical and pharmaceutical companies to the region. Historically, access to the lakes resulted in a concentration of technical skill, transportation and manufacturing infrastructure. Today, it continues to drive manufacturing and innovation.

## TOURISM AND RECREATION: 217,635 Jobs

Great Lake beaches, resort communities and natural areas support a vibrant recreation and tourism industry and enhance the quality of life for residents. Over 4 million recreational vessels are registered in the region and people spend nearly \$16 billion annually on boating trips and equipment.<sup>1</sup> Many take advantage of the region's Great Lakes-dependent natural resources, including more than 9.2 million anglers, 4.6 million hunters and 23.2 million bird watchers each year.<sup>2</sup>

## SHIPPING, INCLUDING FREIGHT TRANSPORT

### AND WAREHOUSING: 118,550 Jobs

Great Lakes vessels transport an average of 163 million tons of cargo (e.g., iron ore, coal and grain) each year.<sup>3</sup> Lake vessels can ship goods three times more efficiently than rail and 10 times more efficiently than trucks,<sup>4</sup> which gives mining, manufacturing and agriculture in the region a competitive edge. Many of the transportation routes are multi-modal and involve transfers among lake-bound and international vessels, rail and trucks.

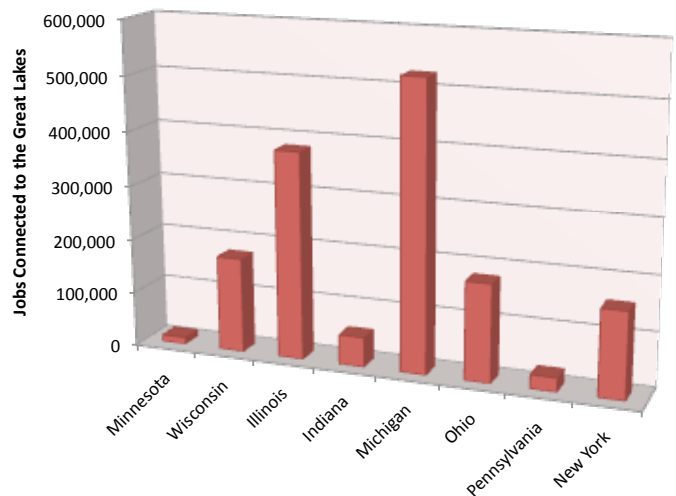


Figure 2. The number of jobs in each state that are connected to the Great Lakes (2009).

STATE	GREAT LAKES JOBS
Minnesota	11,877
Wisconsin	173,969
Illinois	380,786
Indiana	54,397
Michigan	525,886
Ohio	178,621
Pennsylvania	25,479
New York	157,547
<b>Total</b>	<b>1.51 Million</b>

INDUSTRY	GREAT LAKES JOBS
Manufacturing	994,879
Tourism and Recreation	217,635
Shipping	118,550
Agriculture	118,430
Science and Engineering	38,085
Utilities	10,980
Mining	10,003
<b>Total</b>	<b>1.51 Million</b>

**Table 1.** Number of jobs connected to the Great Lakes by state and industry. All data is for 2009.

### AGRICULTURE, FISHING AND FOOD PRODUCTION: 118,430 Jobs

The Great Lakes support a vibrant recreational and commercial fishery. The Lakes also moderate the climate of coastal areas, improving production and creating microclimates that are ideal for specialty crops such as cherries, asparagus and wine grapes. The high-value, specialty crops also provide spin-off industries such as culinary festivals and beverage production.

### SCIENCE AND ENGINEERING: 38,085 Jobs

Twenty science, engineering and conservation-oriented occupations are connected to the Great Lakes. That includes jobs that focus on the natural environment, such as an environmental scientist, and those tied to Great Lake industries, such as food scientists and nuclear engineers.

### UTILITIES: 10,980 Jobs

Power plants are the largest user of surface water in the region. Nuclear, coal and natural gas power plants are often located on a coast where they have ready access to water for facility cooling. The Great Lakes also enable lucrative hydro-electricity production in Sault Ste. Marie, Niagara Falls and the Upper St. Lawrence River.

### MINING: 10,003 Jobs

Mining operations flourish in the Great Lakes region because there are abundant natural resources, a regional market for the material, and access to inexpensive transportation.

### Ensuring a Vibrant Future

Water is huge draw for people — coastal trails, clean beaches and waterfront businesses add tremendous value to both metropolitan and semi-rural areas. In this new economic era, growth will be less linked to traditional manufacturing and more focused on quality of life and quality of the region's natural resources. Unless we protect and restore our best environmental asset — the Great Lakes — we will not be able to retain and attract strong new businesses and great human resources.

The Lakes are vital not only to the basin states, but are also an integral part of our nation's economic and environmental health. With 83 million people, the region produced 27% of the gross domestic product<sup>5</sup> and 24% of country's exports in 2009.<sup>6</sup> The Great Lakes basin is home to 38% of the Fortune 500 companies<sup>7</sup> and one of the largest concentrations of research universities in the world.<sup>8</sup> Great Lakes colleges and universities award 32% of the nation's advanced science and engineering degrees,<sup>9</sup> providing the human capital needed for innovation and entrepreneurship.

<sup>1</sup> Great Lakes Commission. 2008. Great Lakes Recreational Boating's Economic Punch. Ann Arbor, MI.

<sup>2</sup> U.S. Department of the Interior, Fish and Wildlife Service. 2008. 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. Washington, DC: U.S. Census Bureau.

<sup>3</sup> Lake Carriers' Association. 2009. Statistical Annual Report of Lake Carriers' Association. Rocky River, OH: Author. Retrieved February 11, 2011, from <http://www.lcaships.com/SR09-Dry-Bulk%20Commerce%20-%20Text.pdf>

<sup>4</sup> U.S. Army Corp of Engineers. 2009. Great Lakes Navigation System: Economic Strength to the Nation

<sup>5</sup> Bureau of Economic Analysis. 2009. Gross Domestic Product by State. Retrieved February 10, 2011 from: <http://www.bea.gov/regional/index.htm#gsp>

<sup>6</sup> International Trade Administration. 2009. State export statistics. Retrieved February 10, 2011 from: <http://tse.export.gov/TSE/TSEhome.aspx>

<sup>7</sup> Fortune Magazine. April 2010. Find Top Companies by State. Retrieved February 10, 2011 from: <http://money.cnn.com/magazines/fortune/fortune500/>

<sup>8</sup> Affolter-Caine, B. and J.C. Austin. 2006. The Vital Center: A Federal State Compact to Renew the Great Lakes Region. Washington, DC: Brookings Institution.

<sup>9</sup> National Science Foundation. 2010. Science and Engineering Indicators: 2010.

### Data Sources

1. Quarterly Census of Employment and Wages: [www.bls.gov/cew](http://www.bls.gov/cew)
2. Occupational Employment Statistics: [www.bls.gov/oes](http://www.bls.gov/oes)

## METHODS USED TO CALCULATE THE NUMBER OF GREAT LAKES-RELATED JOBS

In 2009, Michigan Sea Grant undertook an analysis of economic data to determine the number of Michigan jobs directly related to the Great Lakes. The results were reported in the publication, *Michigan's Great Lakes Jobs* (2009, Michigan Sea Grant) and included the number of jobs in the state of Michigan that were related to the Great Lakes based upon data accessed from the U.S. Bureau of Economic Analysis.

This new report, resulting in the publication *Jobs, Economy and the Great Lakes* (2011, Michigan Sea Grant) was developed to estimate the number of Great Lakes-related jobs for all eight Great Lakes states. During the course of the current analysis, the authors refined their methods and used a different source of employment data than used in 2009.

### Revised Analytical Methods

Unlike Michigan, the other Great Lakes states—Minnesota, Wisconsin, Illinois, Indiana, Ohio, Pennsylvania and New York—are only partially within the Great Lakes basin and have access to other major waterways, including the Atlantic, the Ohio River and the Mississippi River. For the current, region-wide analysis, data from programs within the U.S. Bureau of Labor Statistics (BLS) was used. This approach was modified from the methodology applied in 2009, and the number of Great Lakes-related jobs in all eight states was recalculated. The BLS data was used to refine the current analysis and remove some job categories that are not specifically Great Lakes-related, such as oil and natural gas delivery and animal production. As a result, it is difficult to directly compare the research methods used in this current report, *Jobs, Economy and the Great Lakes*, with those used in 2009 for the *Michigan's Great Lakes Jobs* report.

### Data Sources

Data for this study was drawn from two programs within the U.S. Bureau of Labor Statistics:

**1) Quarterly Census of Employment and Wages (QCEW)** program publishes a quarterly count of employment and wages reported by employers. Data are available at the county or state level within detailed industry categories. The categories were developed for the North American Industry Classification System (NAICS), a standard used by federal statistical agencies in classifying businesses for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy. These data include all part-time and full-time workers covered by state unemployment insurance laws and federal workers covered by the Unemployment Compensation for Federal Employees program. Annual employment data are released approximately 10 months after the end of the year.

The QCEW data set excludes members of the armed forces, the self-employed, proprietors, domestic workers, unpaid family workers and railroad workers covered by the railroad unemployment insurance system. The program provides employment data within detailed industry categories; however, data are suppressed for any industry classification when necessary to protect the identity of

cooperating employers. For example, data for rural counties are often suppressed because there may be only one or two employers within a given industry, making them easy to identify. The QCEW data set provides a conservative estimate regarding employment in rural counties, and in fields with a larger percentage of self-employed or informal workers, such as anglers, wildlife guides and farmers.

**2) Occupational Employment Statistics (OES)** are based on a semi-annual mail survey that covers all full-time and part-time wage and salary workers in nonfarm industries. The OES data set provides detailed information about 800 occupations for states or metropolitan statistical areas (MSAs), but not counties. The survey does not cover the self-employed, owners and partners in unincorporated firms, household workers or unpaid family workers. This data set was used only to identify specific technical jobs in industries that are not intuitively connected to the lakes, such as fisheries biologists working for an engineering firm or a university. Data are issued approximately one year after the reference period.

### Assumptions and Methods

Both QCEW and OES programs release annual employment data approximately 10-12 months after the end of the year. Therefore, 2009 data were used for the *Jobs, Economy and the Great Lakes* report. The entire data set was downloaded as text files to a Microsoft Access database and filtered based on geographic and industry criteria. Below, is a description of the specific industries and occupations that were considered connected to the Great Lakes; specific titles and codes are listed in Table 2, *Bureau of Labor Statistic Industries and Occupations that are Considered Connected to the Great Lakes, by Sector*.

### Jobs in Mining and Manufacturing

**Explanation:** The Great Lakes provide efficient transportation for iron ore, coal and finished goods, which sustains steel production and manufacturing. The region's clean and abundant water attract chemical and pharmaceutical companies. Historically, access to the Lakes resulted in a concentration of educational, transportation and manufacturing infrastructure and technical skill, which continues to drive manufacturing and innovation in the region.

**Method:** Job estimates are based on data from the QCEW program. All manufacturing industries were considered directly related to the Lakes, except printing and petroleum product manufacturing. All mining jobs, except those related to oil and gas extraction, were also considered directly connected. For Michigan, jobs that met these criteria from all counties were included. For all other states in the region, only these jobs in coastal counties were considered Great Lakes-related.

### Jobs in Science and Engineering

**Explanation:** Lake-influenced technical jobs include scientific and engineering occupations connected directly to the natural environment, such as nautical engineers or environmental scientists, and occupations tied directly to an industry influenced by the Lakes, such as food scientists (agriculture, food processing) and nuclear engineers (utilities). This limited sub-set of technical professions represents less than five percent of all engineering and scientific jobs in the Great Lakes region.

**Method:** The OES was used to select 18 specific science and engineering professions (Table 2, *Bureau of Labor Statistic Industries and Occupations that are Considered Connected to the Great Lakes, by Sector*). For Michigan, jobs in these occupations in all counties were included. For all other states, jobs from the following coastal Metropolitan Statistical Areas were included: Duluth, MN; Green Bay, WI; Milwaukee, WI; Chicago, IL; Gary, IN; Cleveland, OH; Erie, PA; Buffalo, NY; Rochester, NY; and Syracuse, NY.

Two other industries from the QCEW data set were included in this sector: conservation organizations and administration of environmental programs. For Michigan, jobs from all counties were included, but for the other states in the region jobs only from coastal counties were included.

### Jobs in Agriculture, Tourism, Transportation and Utilities

**Method:** Jobs in these four sectors were estimated based on QCEW data. For all states, including Michigan, jobs that met specific industry criteria, outlined below, were included if they were located within a coastal county.

**Agriculture, Fishing and Food Production:** Over geologic time, the Great Lakes created unique soil conditions and produced topography along the coast, such as muck soils and sandy hills where fruit, vegetable and ornamental plants flourish. The Great Lakes moderate the climate of coastal areas, improving production and creating microclimates that are ideal for specialty crops. All crop production in coastal counties was considered influenced by the Lakes, however, animal production was excluded. Food and beverage production (including seafood processing and fermentation) and fishing and hunting were also included in this category. Because the QCEW program excludes self-employed people and proprietors, very few hunting and fishing jobs were counted.

**Transportation and Warehousing:** Great Lake vessels transport an average of 163 million tons of cargo each year. Lake vessels can ship goods three times more efficiently than rail and 10 times more efficiently than trucks, giving mining, manufacturing and agriculture a competitive edge. Many of the region's transportation routes are multi-modal and involve transfers among lake-bound and international vessels, rail and trucks. Thus, jobs in water, rail and truck transport were included. However, air transport and passenger ground transport were excluded. Sightseeing transport was not included in this category, but was included in tourism.

**Utilities:** Power plants are the largest user of surface water in the region. Nuclear, coal and natural gas power plants are often located along the coast, where they have ready access to water for facility cooling. The Great Lakes also enable lucrative hydro-electricity production in Sault Ste. Marie, Niagara Falls and the Upper St. Lawrence River. Natural gas distribution was excluded, but water and sewerage systems were included.

**Tourism and Recreation:** Great Lake beaches, resort communities and natural areas support a vibrant recreation and tourism industry that includes boating, bird watching, fishing and camping. Thus the 12 industry categories that best captured these disparate businesses were selected (Table 2, *Bureau of Labor Statistic Industries*

*and Occupations that are Considered Connected to the Great Lakes, by Sector*). These jobs were included in the estimates of Great Lakes-related jobs for the report *Jobs, Economy and the Great Lakes*, only if the jobs were located in a county adjacent to a Great Lake.

### Additional Considerations

The data sources and methodology used to estimate the number of Great Lakes jobs likely lead to an overestimation of employment in some industries and an underestimation of other types of employment. The following factors were identified through discussions with natural resource economists and a written peer review.

#### Factors leading to an *overestimation* of employment connected to the Great Lakes:

For Michigan, jobs in specific industries within mining, manufacturing and science and engineering were included from all counties. The lakes are responsible for the development of these industries within the Great Lakes basin, but it is hard to quantify the advantages provided by the Lakes today.

All crop production in coastal counties is considered connected to the Great Lakes. The Lakes make the coastal area more productive and better suited for high-value crops (e.g., fruit, greenhouse operations); however, some types of agriculture would occur without the presence of the Lakes. The source data for this analysis counts part-time and full-time employment as equivalent.

#### Factors leading to an *underestimation* of employment connected to the Great Lakes:

This analysis only examines direct employment in industries connected to the Great Lakes and does not include indirect and induced employment. Total economic impact is often measured as the sum of all three types of employment (direct, indirect and induced). For example, we included the jobs of people working in maritime transportation such as longshoreman (direct employment), but not jobs in industries that supply maritime transport companies (indirect employment), or the jobs created when maritime transport employees spend their salaries on groceries, auto fuel or clothing (induced employment).

The source data from BLS does not cover certain types of employment, including the self-employed, proprietors, railroad workers and members of the military. This likely leads to an underestimation of employment in some Great Lakes-dependent industries, such as fishing, outdoor guiding and shipping, as well as jobs within the U.S. Army Corps of Engineers and the Coast Guard.

The BLS is required to withhold any data that could be connected to a specific business when there are only one or two establishments in a particular industry and county. As a result, employment data in narrow industry categories, such as aquaculture or boat dealers, or from rural counties, are underestimated in this analysis.

Some important industries, such as food service and gas stations, are excluded from estimates of tourism and recreation jobs because it is very difficult to isolate employment related to leisure travel. Food consumption typically accounts for about 20-30% of total tourism expenditures.



**Table 2.** Bureau of Labor Statistic Industries and Occupations that are Considered Connected to the Great Lakes, by Sector

Sector	Code	Industry or Occupation Designation
<b>AGRICULTURE, FISHING AND FOOD PRODUCTION</b> <i>Data Source: QCEW</i> <i>Geographic Range: Coastal counties</i> <i>Exclusions: Animal production, forestry</i>	111	Crop production
	1125	Aquaculture
	114	Fishing, hunting and trapping
	1151	Support activities for crop production
	311	Food manufacturing
	312	Beverage and tobacco product manufacturing
<b>MANUFACTURING</b> <i>Data Source: QCEW</i> <i>Geographic Range: All Michigan counties, coastal counties in other states</i> <i>Exclusions: Printing, petroleum products manufacturing</i>	313	Textile mills
	314	Textile product mills
	315	Apparel manufacturing
	316	Leather and allied product manufacturing
	321	Wood product manufacturing
	322	Paper manufacturing
	325	Chemical manufacturing
	326	Plastics and rubber products manufacturing
	327	Nonmetallic mineral product manufacturing
	331	Primary metal manufacturing
	332	Fabricated metal product manufacturing
	333	Machinery manufacturing
	334	Computer and electronic product manufacturing
	335	Electrical equipment and appliance mfg.
	336	Transportation equipment manufacturing
	337	Furniture and related product manufacturing
	339	Miscellaneous manufacturing
<b>SCIENCE AND ENGINEERING</b> <i>Data Source: OES</i> <i>Geographic Range: All Michigan counties, coastal Metropolitan Statistical Areas in other states</i> <i>Exclusions: Most general engineering and science occupations</i>	17-2081	Environmental engineers
	17-2121	Marine engineers and naval architects
	17-2151	Mining and geological engineers, including mining safety engineers
	17-2161	Nuclear engineers
	17-3025	Environmental engineering technicians
	19-1012	Food scientists and technologists
	19-1013	Soil and plant scientists
	19-1023	Zoologists and wildlife biologists
	19-1031	Conservation scientists
	19-2021	Atmospheric and space scientists
	19-2041	Environmental scientists and specialists, including health
	19-2043	Hydrologists
	19-4011	Agricultural and food science technicians
	19-4041	Geological and petroleum technicians
	19-4051	Nuclear technicians
	19-4091	Environmental science and protection technicians, including health
	19-4093	Forest and conservation technicians
<i>Data Source: QCEW</i> <i>Geographic Range: All Michigan counties, coastal counties in other states</i> <i>Exclusions: All other public administration and services</i>	813312	Environment and conservation organizations
	924	Administration of environmental programs

TABLE CONTINUED ON NEXT PAGE

Sector	Code	Industry or Occupation Designation
<b>MINING</b> <i>Data Source: QCEW</i> <i>Geographic Range: All Michigan counties, coastal counties in other states</i> <i>Exclusions: Oil and gas extraction</i>	212	Mining, except oil and gas
	213113	Support activities for coal mining
	213114	Support activities for metal mining
	213115	Support activities for nonmetallic minerals
<b>TOURISM AND RECREATION</b> <i>Data Source: QCEW</i> <i>Geographic Range: Coastal counties</i> <i>Exclusions: Food service, gas stations, air transport</i>	441222	Boat dealers
	45111	Sporting goods stores
	4853	Taxi and limousine service
	4855	Charter bus industry
	487	Scenic and sightseeing transportation
	532111	Passenger car rental
	5615	Travel arrangement and reservation services
	712	Museums, historical sites, zoos, and parks
	713	Amusements, gambling, and recreation
	71393	Marinas
	7211	Traveler accommodation
	7212	RV parks and recreational camps
<b>TRANSPORTATION AND WAREHOUSING</b> <i>Data Source: QCEW</i> <i>Geographic Range: Coastal counties</i> <i>Exclusions: Air transport, transit and ground passenger transport, pipeline transport, sightseeing transport</i>	482	Rail transportation
	483	Water transportation
	484	Truck transportation
	4882	Support activities for rail transportation
	4883	Support activities for water transportation
	4884	Support activities for road transportation
	493	Warehousing and storage
<b>UTILITIES</b> <i>Data Source: QCEW</i> <i>Geographic Range: Coastal counties</i> <i>Exclusions: Natural gas distribution</i>	2211	Power generation and supply
	2213	Water, sewerage and other systems

## ABOUT MICHIGAN SEA GRANT



Michigan Sea Grant helps foster economic growth and protects Michigan's coastal/Great Lakes resources through education, research and outreach. A collaborative effort of the University of Michigan and Michigan State University, Michigan Sea Grant is part of the NOAA-National Sea Grant network of 32 university-based programs. See: Michigan Sea Grant, [www.miseagrant.umich.edu](http://www.miseagrant.umich.edu)

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