

Importance of Inland Waterways to U.S. Agriculture

Prepared For:



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Objective

Conduct a study of the importance of the inland waterways to U.S. agriculture and requirements for maintaining the competitive position of U.S. agriculture in world markets.



Acronyms

AM	Asset Management
AMS	Agricultural Marketing Service
BLS	Bureau of Labor Statistics
BTS	Bureau of Transportation Statistics
DDGS	Distiller's Dried Grains with Solubles
EIA	Energy Information Administration
GDP	Gross Domestic Product (which IMPLAN calls value added)
IMPLAN	Economic Impact Analysis for Planning Model which calculates value added GDP among other impacts
IWTF	Inland Waterways Trust Fund
NAICS	North American Industry Classification System
NESP	Navigation and Ecosystem Sustainability Program
O&M	Operations and Maintenance
PNW	Pacific Northwest
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
WRDA	Water Resources Development Act



I. EXECUTIVE SUMMARY

- U.S. farmers have enjoyed a competitive advantage accessing the global export market in larger part due to an effective, robust and resilient infrastructure and transportation network.
 - U.S. corn and soybean farmers produce abundant quantities of competitively priced crops.
 - The inland waterways system carries large volumes of bulk commodities and farm inputs, such as fertilizer, over long distances mainly for export or import, and is of vital importance to numerous industries. In 2017, 532.8 million tons of domestic barge traffic worth \$220 billion moved on the system.
 - The Mississippi River System is America's primary inland waterways system. It comprises the Mississippi, Arkansas, Illinois, Ohio, and Tennessee Rivers, and Gulf Intracoastal Waterway. This extensive waterway system feeds exports from grain elevators from Baton Rouge through New Orleans, to Myrtle Grove, LA. This region which handles 57 percent of U.S. corn exports in volume (valued at \$4.8 billion) and 59 percent of U.S. soybean exports (\$12.4 billion), as well as 55 percent of soybean meal exports and 72 percent of distiller's dried grains with solubles (DDGS) exports.
 - Due to its efficiencies and lower costs, the inland waterways system saves between \$7 billion and \$9 billion annually over the cost of shipping by other modes.
 - The infrastructure, however, is aging and needs major rehabilitation and construction to restore it to its full capability and forestall major disruptions, while providing opportunities for growth.
- The U.S. economy depends on farmers using the inland waterways system to maintain a competitive position in the global export marketplace, with agricultural exports providing a significant positive contribution to the U.S. balance of trade.
- In 2016, the total economic contribution of the waterways system resulted in employment of nearly 256,000 jobs and \$27.2 billion in Gross Domestic Product (GDP).
 - Every \$1 of output of waterways activity results in another \$1.89 in economic activity across the U.S.



- Historically, barge traffic has grown, but lagging infrastructure maintenance and improvement needs have resulted in more frequent delays, with the percentage of vessels delayed increasing from 35 percent in 2010 to 49 percent in 2017. Delays can cost up to \$739 per hour for an average tow, amounting to more than \$44 million per year.
 - The added costs associated with delays are ultimately borne by shippers, especially farmers, who will pay more (and in the case of farmers, get a lower price) for goods shipped on the inland waterways system. Higher costs also reduce the competitiveness of the river system.
 - Without consistent, predictable funding, the grain and soybean export draw area around the waterways system could shrink from an average of 150 miles, currently, to as little as 75 miles under a constrained scenario, as the cost to ship on the river increases. For corn, delays on the Mississippi River could have up to a \$0.24 per bushel impact. The impact to soybeans could be up to \$0.25 per bushel.

In 10 Years, by 2029 – Three Possible Scenarios

1) Status Quo Infrastructure Investment (no new construction or additional dredging)

- Delays on the system will continue at a higher pace, resulting in a diversion to rail or truck at an additional cost to shippers, most of which typically get passed back to the producer in terms of lower farmgate prices given the highly competitive global grain and oilseed market.
- The forecasted volume growth of farm products transiting the inland waterways system would be 25 percent, and the related economic impact would be over 312,000 jobs created and \$37.2 billion added to GDP.

2) Reduced Infrastructure Investment (no investment for construction and a reduced operations and maintenance (O&M) budget):

- Relative to the status quo scenario, employment will fall 7 percent to 290,000 jobs, and the contribution to GDP will decline 7 percent to \$34.7 billion.
- The forecasted volume growth of farm products transiting the inland waterways system would be 15 percent.

3) Increased Infrastructure Investment (full investment to meet all volume, maintenance, and upgrade needs would be \$6.3 billion over 10 years):



- Relative to the status quo scenario, employment will increase 11 percent to more than 346,000 jobs, and the contribution to GDP will expand 10 percent to \$41.0 billion.
- The forecasted volume growth of farm products transiting the inland waterways system would be 38 percent.

In 25 Years, by 2045 – 3 Possible Scenarios

■ 1) Status Quo Infrastructure Investment:

- Commodity volumes moved on the waterways system are forecast to increase to 618.8 million tons by 2045 (with farm products increasing 29 percent). Projected employment will increase to nearly 395,000 jobs, and the contribution to GDP will increase to \$54 billion.

■ 2) Reduced Infrastructure Investment (no investment for construction):

- Relative to the status quo scenario, employment will fall 18 percent to 323,000 jobs, and the contribution to GDP will fall 18 percent to \$44 billion.
- Commodity volumes moved on the waterways system are forecast to decrease to 520.4 million tons by 2045 (with farm products decreasing 20 percent).

■ 3) Increased Infrastructure Investment (full investment in the inland waterways infrastructure to meet the volume, maintenance, and upgrade needs would be \$0.4 billion per year after the initial investment through 2029):

- Relative to the status quo scenario, employment will increase 19 percent to 472,000 jobs, and the contribution to GDP will expand 20 percent to \$64.6 billion. This option will more than offset the cost of completing all proposed projects.
- Commodity volumes moved on the waterways system are forecast to increase to 744.3 million tons by 2045 (with farm products increasing 93 percent).
- Increased investment in the inland waterways will increase the market value of corn and soybeans by \$39 billion from the status quo investment level. Alternatively, reduced investment would result in a decline of \$58 billion.



Exhibit 1: Direct Economic Contributions

	Status Quo Investment Trend			Increased Investment			Reduce Investment		
	2016	2029	2045	2016	2029	2045	2016	2029	2045
Employment	60,285	65,734	70,850	60,285	74,810	84,233	60,285	60,062	58,513
Labor Income	\$5,232	\$7,261	\$10,534	\$5,232	\$8,023	\$12,462	\$5,232	\$6,740	\$8,852
GDP	\$8,263	\$11,372	\$16,508	\$8,263	\$12,504	\$19,554	\$8,263	\$10,594	\$13,888
Output	\$18,367	\$25,623	\$37,226	\$18,367	\$28,231	\$44,463	\$18,367	\$23,883	\$31,089

Note: \$ values in millions.

Note: Direct Economic Contributions stem from sales and operations from companies operating on the waterway. Total Economic Contributions stem from sales and operations from companies operating on the waterways as well as economic contributions from companies operating in the direct contributors supply chain as well as spent wages from individuals employed by those companies.

Exhibit 2: Total Economic Contributions

	Status Quo Investment Trend			Increased Investment			Reduce Investment		
	2016	2029	2045	2016	2029	2045	2016	2029	2045
Employment	255,782	312,121	394,993	255,782	346,129	472,287	255,782	289,916	322,753
Labor Income	\$16,606	\$22,796	\$33,121	\$16,606	\$25,122	\$39,515	\$16,606	\$21,242	\$27,163
GDP	\$27,188	\$37,226	\$54,095	\$27,188	\$40,977	\$64,563	\$27,188	\$34,716	\$44,416
Output	\$52,833	\$72,757	\$104,520	\$52,833	\$80,176	\$125,078	\$52,833	\$67,847	\$85,965

Note: \$ values in millions.



Infrastructure Investment Impacts to America's Agricultural Export Competitiveness

- The United States and Brazil compete directly for export business. Given the fungible nature of commodity supplies, the corn and soybean prices in the United States and Brazil are interrelated.
- Improvements in the U.S. infrastructure, such as a more efficient inland waterways system, would contribute to improved farm income.
 - Infrastructure problems in the United States will increase the price to the end user, lower prices paid to farmers, and make U.S. grains and soybeans less competitive in global markets. Similarly, improvement to Brazil's infrastructure will result in less expensive and more competitive grain and soybeans to the end user, and challenge demand for U.S. grain and soybeans.
- The United States is in direct competition with Brazil, therefore infrastructure investment in both countries can have a tremendous impact on a farmer's profitability.
 - Multinational corporations are making significant investments in the Brazilian grain and soybean transportation and handling system, including barge equipment, barge loading elevators, the rail network, and export elevators.
- The U.S. currently has an advantage of \$5.35 per metric ton over Brazil when shipping soybeans from Davenport, Iowa, to Shanghai, China, via the inland waterways system.
 - If the current navigation infrastructure spending trend is continued through 2045, the U.S. advantage declines to \$3.03 per metric ton before any additional improvements in Brazil's infrastructure are deployed.
- With increased infrastructure investment in the U.S. inland waterways system, barge rates decrease, and the landed cost of grain at destination markets improves the U.S. advantage to \$22.55 per metric ton over Brazil with all other items unchanged.
- Reduced investment in the U.S. inland waterways system results in an increase in barge costs resulting in shipments of soybeans from the United States increasing to \$3.89 per metric ton more than from Brazil. To be competitive, the U.S. soybean price would have to decline.



Implications for America's Overall Freight Transportation Infrastructure Network and Other Industries

- Shifting the equivalent volume of a typical 15-barge tow to surface transportation would require 216 rail cars or 1,050 trucks, leading to increased congestion of the rail and road systems.¹ In aggregate, this is the equivalent of an additional 49.1 million truck loads.
- Barge transportation is the most environmentally friendly mode, with an advantage in fuel efficiency and greenhouse gas emissions as well. Inland towing can move 647 ton-miles per gallon as opposed to 477 ton-miles for rail and only 145 ton-miles for truck. Inland towing CO₂ emissions are only 15.62 grams per ton-mile as compared to 21.19 for rail and 154.08 for truck.² This is an emissions reduction of 2.8 million grams per ton-mile.
- Water transport is safer. On a million-ton-mile basis, there are 21.9 rail fatalities and 79.3 truck fatalities for every 1 on the waterways system. A shift from water to truck is projected to increase fatalities by over 475 per year, an 11 percent increase. Injuries showed that for every 1 on the water, there were 80.9 on rail and 696.2 on truck.
- Other commodities also will benefit from improved investment in America's infrastructure, including petroleum with volume up 14 percent.

¹ Compare. Iowa Department of Transportation. February 25, 2019. <https://iowadot.gov/compare.pdf>, accessed February 2019.

² Texas Transportation Institute, "A Modal Comparison of Domestic Freight Transportation Effects on the General Public: 2001-2014," January 2017. <http://nationalwaterwaysfoundation.org/documents/Final%20TTI%20Report%202001-2014%20Approved.pdf>.



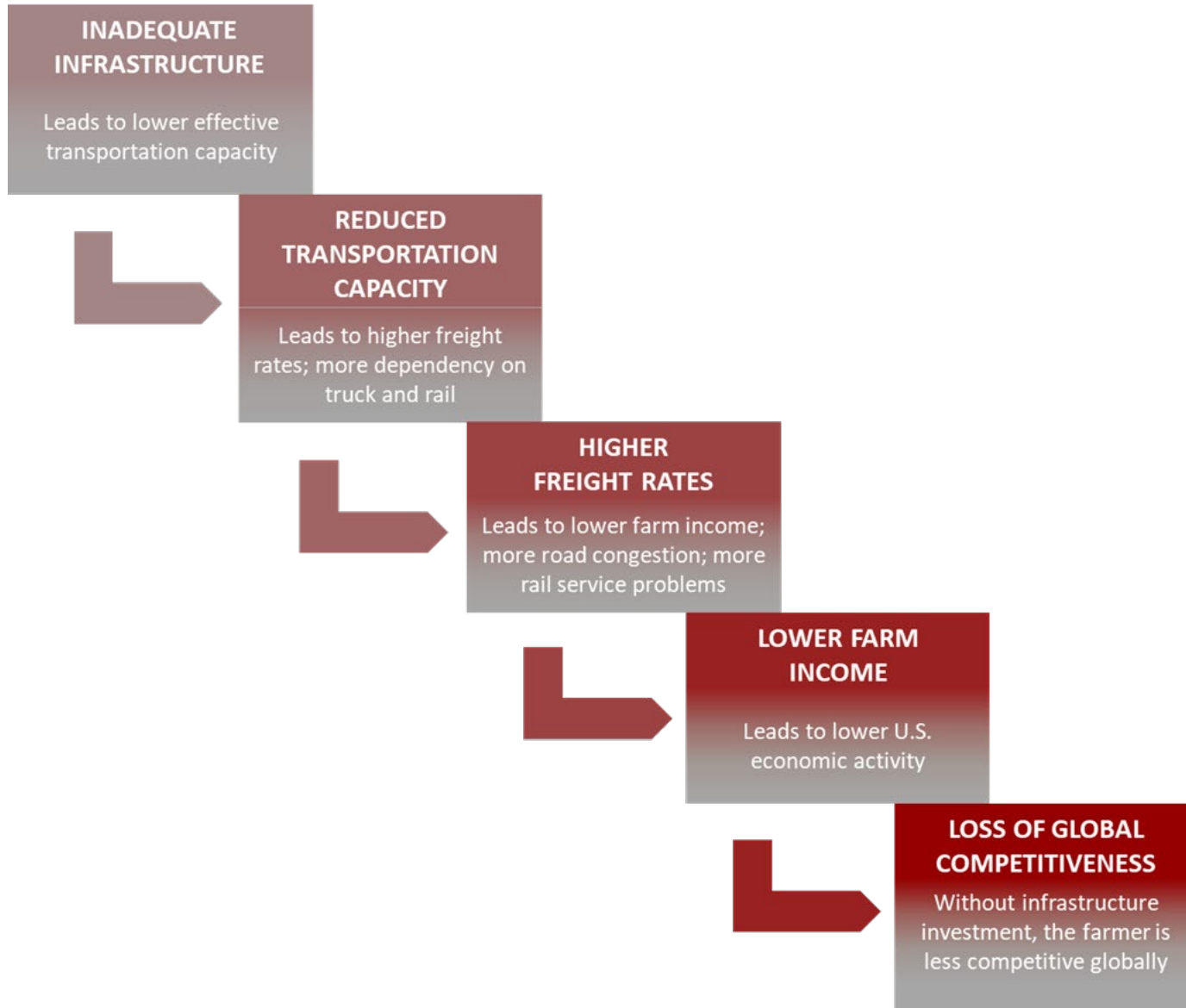
II. INTRODUCTION

The inland waterways system facilitates a strong U.S. economy, providing safe, cost-effective and environmentally friendly transportation of agricultural products and other goods, such as coal, petroleum and chemicals, for export and import and for domestic consumption. Informa's Agribusiness Consulting has been retained by the U.S. Department of Agriculture, Agricultural Marketing Service to document and quantify the importance of the waterways system to the U.S. economy, specifically to U.S. agriculture.

U.S. agriculture depends on an efficient and reliable infrastructure system to move grains, soybeans, and other products to the global market place. The United States has been the envy of the world with a robust and expansive transportation infrastructure. However, that infrastructure has aged over time. An aging and less reliable inland waterways infrastructure has resulted in lower effective transportation capacity. That lower capacity leads to higher freight rates for other modes. Those higher freight rates decrease farmer returns, leading to lower economic activity. Finally, without infrastructure investment, the farmer and the agribusiness sector are less competitive globally. Thus, to be competitive in the global marketplace, the U.S. farmer and U.S. agriculture need a reliable transportation infrastructure system, including a well-functioning inland waterways system.



Exhibit 3: Infrastructure Provides a Critical Framework for the Competitiveness of U.S. Farmers



- This study examines the economic value of the system if the U.S. Army Corps of Engineers' current budget was maintained by looking at the present value, the value in 10 years, and the value in 25 years. Similarly, the study looks at the value if all currently identified inland waterway improvement projects (USACE's 2016 Capital Investment Strategy) were completed and the value if no additional investment were made.
 - The analysis evaluated the impact on sectors specific to agriculture while taking into account the forecast volumes of other commodities and products moved on the inland navigation system.
- The inland waterways system for this study comprises the navigable areas of the upper and lower Mississippi River, McClellan-Kerr Arkansas River, Illinois and Ohio River Systems, Tennessee River, and Gulf Intracoastal Waterway.
 - Nearly 12,000 miles of inland and intracoastal shallow-draft waterways (9- to 14-foot draft) and 13,000 miles of greater than 14-foot deep coastal channels, for a total of 25,000 miles are operated and maintained for commerce.
 - The system is comprised of locks and dams along the upper reaches of the navigation system, north of St. Louis, Mo. and up the Ohio River from Cairo, Ill.
 - These locks and dams are important, allowing for the safe and efficient transit of the nation's commodities and products.
 - More than half of all barge trips traverse at least one lock.
- Commodity volumes moved on the internal inland waterways during 2017 totaled 532.8 million tons.³
 - Food and farm products represented 14 percent of these commodities, with further-processed products such as flour, animal feed, and fertilizer, accounting for an additional 5 percent.
- The inland waterways system has 193 lock sites and 239 lock chambers.⁴
 - The locks on the upper Mississippi River were mostly built during the 1930s with an average age of 75 years.

³ Waterborne Commerce of the United States 2017: Part 5 National Summary, U.S. Army Corps of Engineers

⁴ The U.S. Waterway System, 2017 Transportation Facts & Information, U.S. Army Corps of Engineers



- The 16 locks on the Mississippi River from the northern border of Iowa to the mouth of the Missouri River upriver from St. Louis have an average age of 77 years.⁵
- On the Illinois Waterway, the locks average nearly 80 years of age, while the locks on the Ohio River were built between 1921 and 2009 and average nearly 55 years of age.
- Most of the locks have exceeded their 50-year designed and engineered lifespan.

⁵ Upper Mississippi River Locks and Dams 2018. U.S. Army Corps of Engineers. Mississippi Valley Division. (Average age based on Lock and Dam 10 to Melvin Price Lock and Dam). <https://usace.contentdm.oclc.org/utis/getfile/collection/p16021coll11/id/3033>.



III. TRANSPORTATION BACKGROUND

A. Transportation Overview

- The transportation system moved 17.7 billion tons of goods valued at over \$18.1 trillion in 2016.⁶
 - Trucks carried 62.7 percent of the tonnage, 11.1 billion tons, and 61.9 percent of the value.
 - Rail moved 1.6 billion tons, 8.9 percent of goods, and water moved 0.8 billion tons, or 4.5 percent, in 2016. The remainder was carried by air, pipeline, or a combination of modes.
 - Goods valued at \$527 billion moved on all waterways of the United States.
- Transportation's total contribution to the U.S. GDP was \$1,066.9 billion in 2016 according to the U.S. Department of Transportation's Bureau of Transportation Statistics (BTS).⁷
 - For-hire transportation contributed \$562.4 billion or 2.97 percent to the U.S. GDP.
 - In-house transportation contributed another \$504.5 billion or 2.66 percent.
 - Inland water transportation contributed \$19.2 billion to U.S. GDP.
 - For-hire water transportation contributed \$16.5 billion and in-house contributed \$2.8 billion.⁸

⁶ Transportation Statistics Annual Report, 2018. U.S. Department of Transportation Bureau of Transportation Statistics

⁷ In-house transportation is business-related transportation. Business-related transportation includes privately owned and operated vehicles of all body types, used primarily on public rights of way, and the supportive services to store, maintain, and operate those vehicles. For-hire transportation consists of the services provided by transportation firms to industries and the public on a fee-basis. For more information, see: https://www.bts.gov/transportation_satellite_accounts.

⁸ This GDP contribution is for all water transportation in the United States and includes only the direct contribution from transportation. The inland waterways are not differentiated. Indirect and induced impacts are not included.



- The U.S. inland waterways system examined in this study comprises the navigable areas of:
 - The upper and lower Mississippi River,
 - Illinois River,
 - Missouri River,
 - McClellan-Kerr Arkansas River,
 - Ohio River System,
 - Tennessee River, and
 - Gulf Intracoastal Waterway.

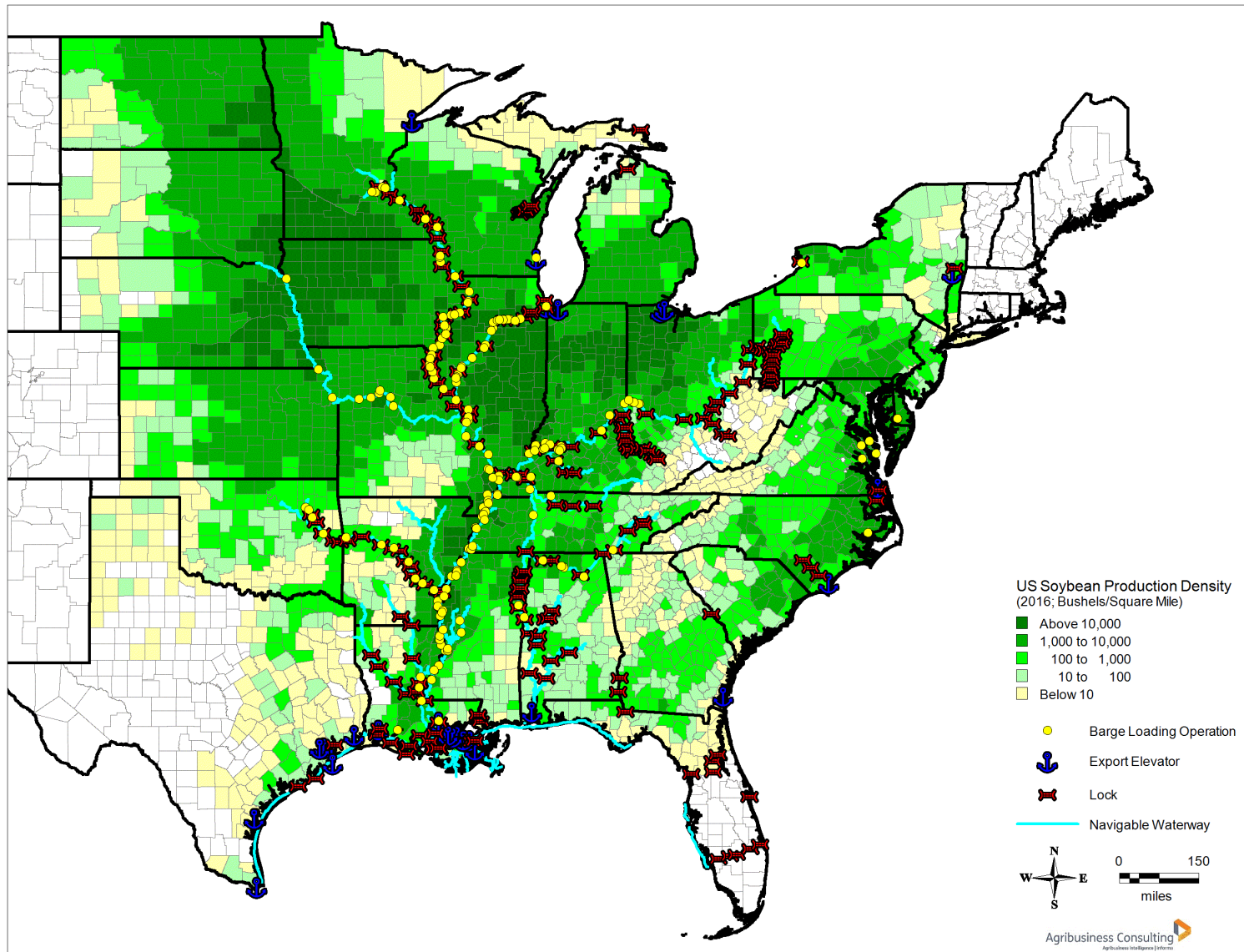
- The inland waterways system consists of nearly 12,000 miles of navigation channels with 193 lock sites and 239 locks.
 - More than half of all barge trips traverse at least one lock.
 - Locks and dams make it possible for safe and efficient transit of commodities and products.

- The 2018 fleet of barges totaled 22,801 of which 19,141 were dry cargo barges. This total includes 12,893 covered barges, which are used to move agricultural commodities, such as soybeans and corn.⁹

⁹ Agribusiness Intelligence, IEG Vantage, annual Barge Fleet Profile, and annual Barge Commodity Profile reports, www.bargefleet.com.

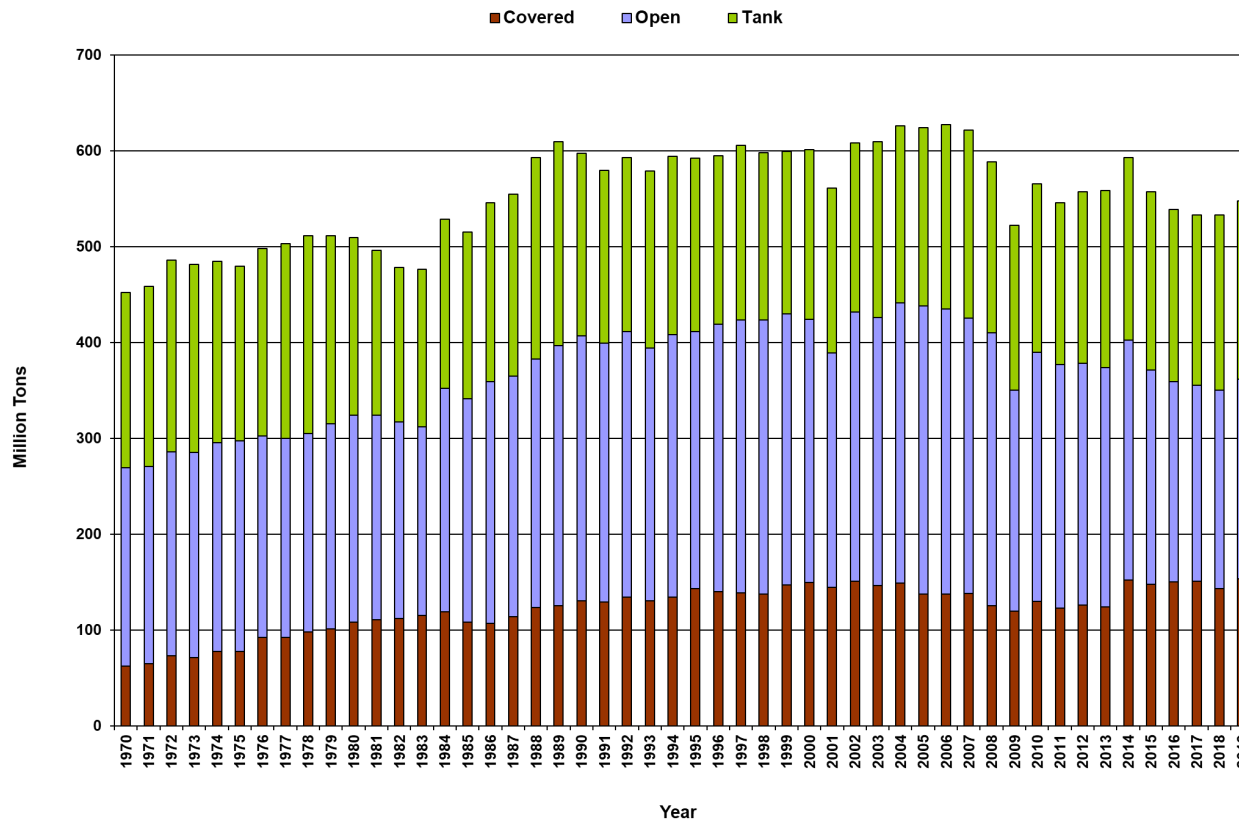


Exhibit 4: Inland Waterways Navigation System Overlaid with U.S. Soybean Production Density



- Commodity volumes moved on the inland waterways during 2017 totaled 532.8 million tons, as presented in Exhibit 5, and is forecasted to increase to 618.8 million by 2045 under current investment trends.
- Farm product movements on the inland waterways in 2017 were 94.8 million tons, slightly less than the record set in 2016 at 96.9 million tons. The volumes are estimated for 2018 and forecast for 2019.

Exhibit 5: Inland Waterways Traffic by Barge Type (2018 estimated and 2019 forecasted)

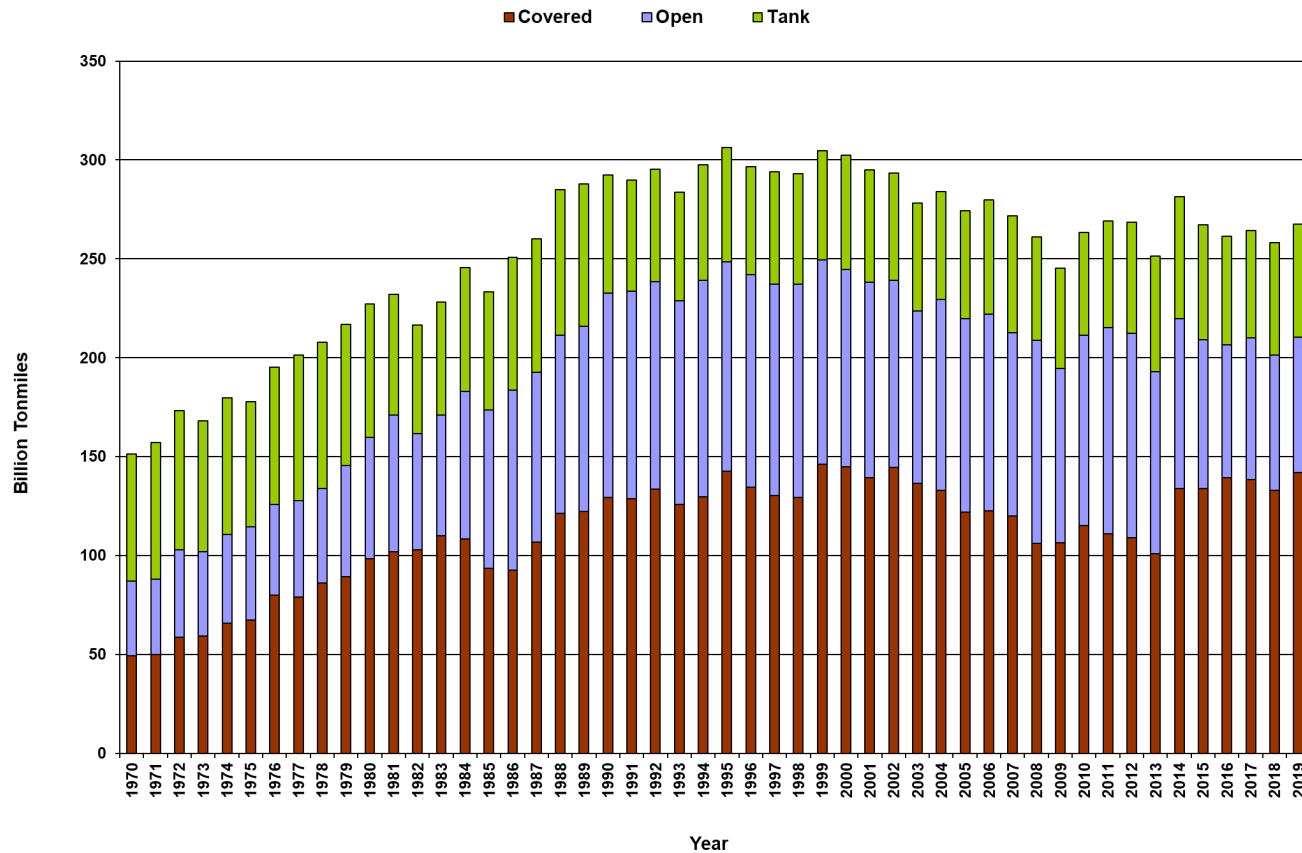


Source: U.S. Army Corps of Engineers (actual) and IEG Vantage (estimated and forecast)



- Ton-miles transported in 2017 totaled 264.2 billion, as seen in Exhibit 6.
- Commodities moved in tank and covered barges are expected to lead the projected increase in volumes through 2045, but declining coal movements will reduce open barge volumes and ton-miles.

Exhibit 6: Inland Waterways Traffic by Barge Type (2018 estimated 2019 forecasted)



Source: U.S. Army Corps of Engineers (actual) and IEG Vantage (estimated and forecasted)

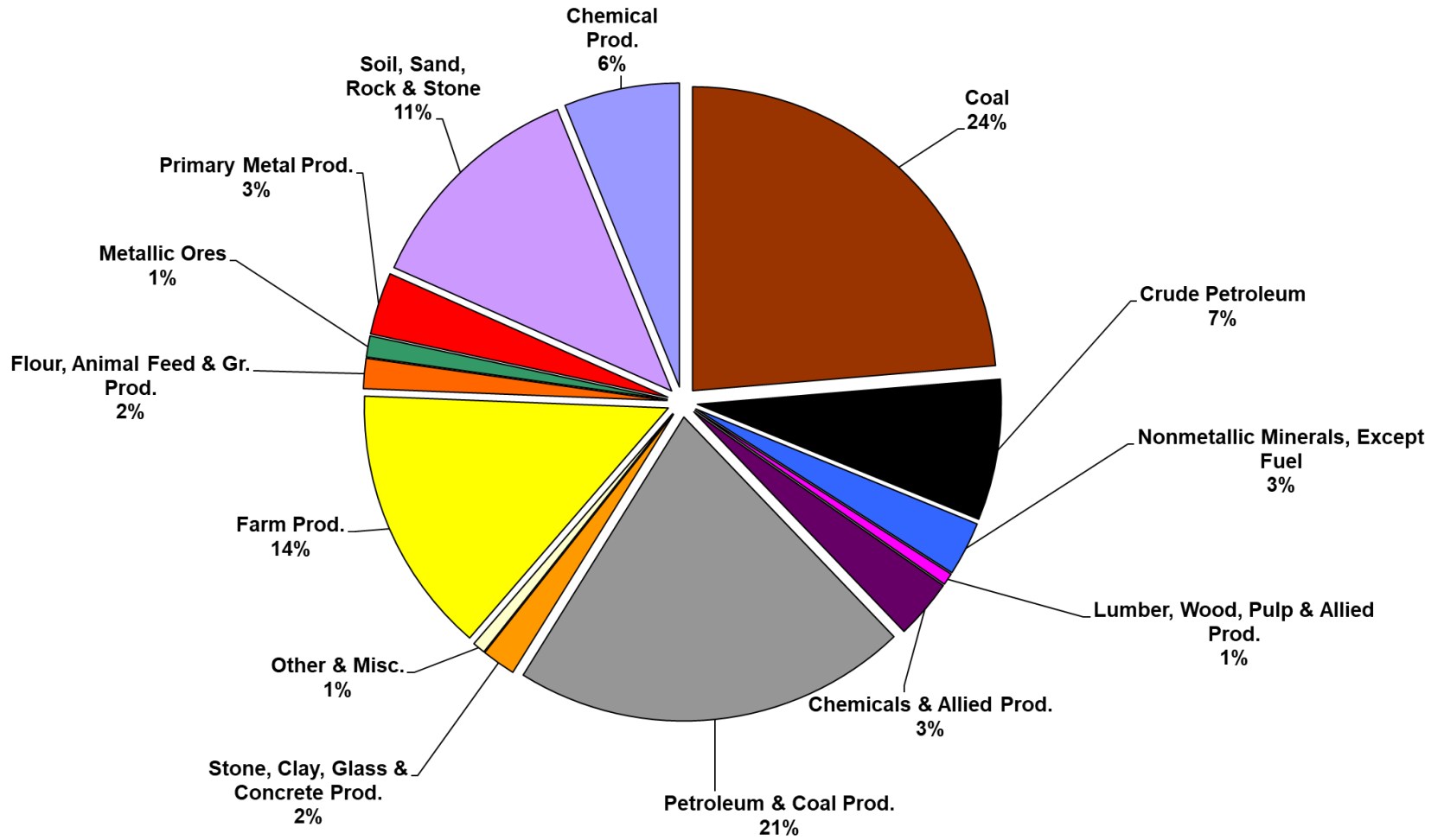


B. Commodity Movements on the Inland Waterways

- “Farm products” are 14 percent of the total. Further processed “flour, animal feed and milled grain products” and fertilizers (a subcategory of Chemical Products) add another 5 percent to agriculture related products.
- “Crude petroleum” and “petroleum & coal products” account for 28 percent of moves on the inland waterways making them the largest related commodity movements.
- “Coal” is the second largest commodity moved on the inland waterways with 24 percent of moves. However, coal declined 36 percent between 2013 and 2017.



Exhibit 7: Inland Waterways Commodity Movements in Short Tons, 2013 – 2017



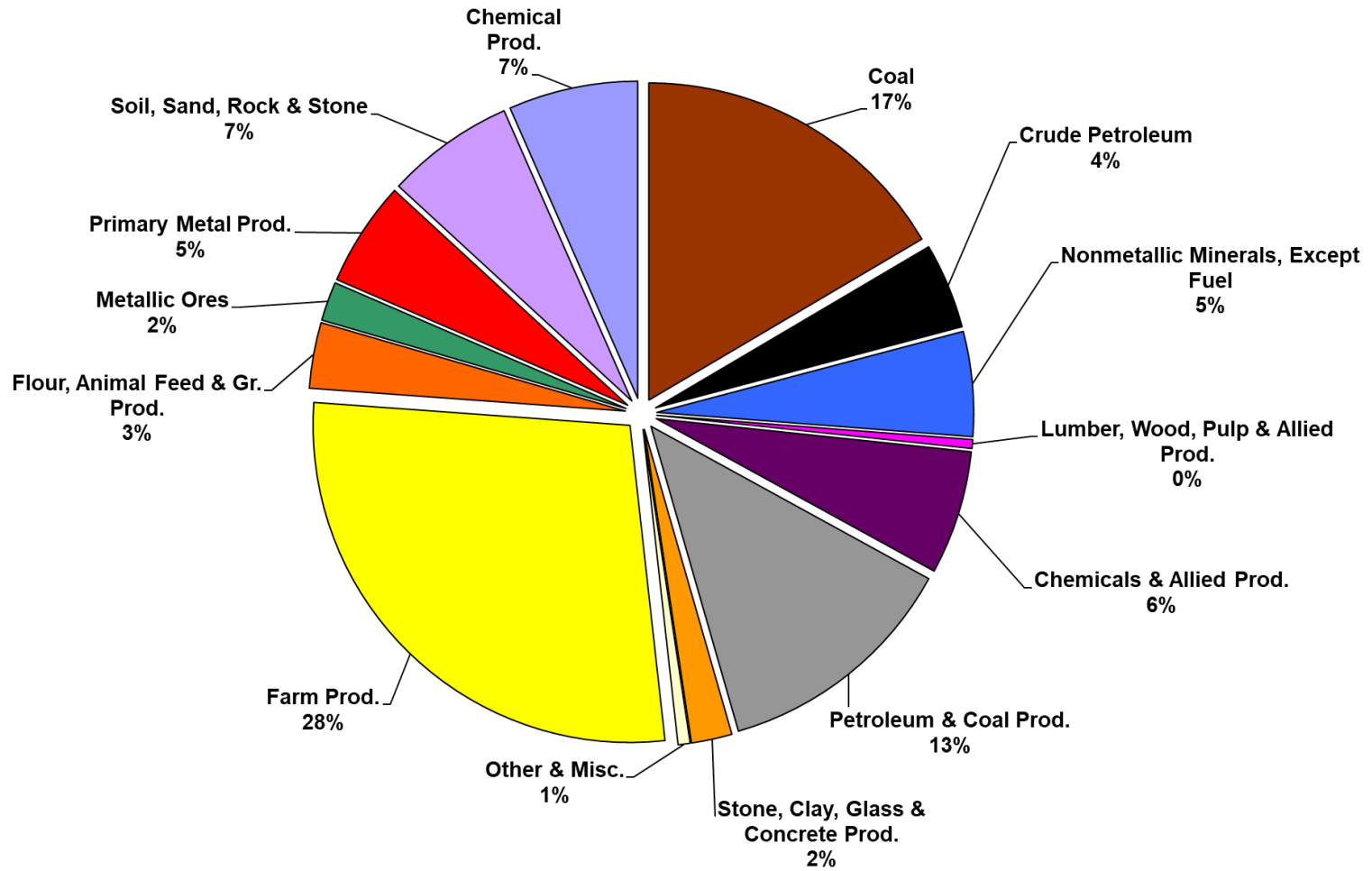
Source: U.S. Army Corps of Engineers



- “Farm products” jump from the third largest commodity to the leading commodity category — with 28 percent of the total — when barge traffic is measured in ton-miles.
 - “Flour, animal feed & grain products” and fertilizers (a subcategory of Chemical Products) together add another 10 percent to agriculture-related products.
 - Agricultural products are lower in total volume than coal and petroleum products, but they move greater distances.
- “Coal” and petroleum products (including “crude petroleum”) decline to 17 percent each when measured in ton-miles.



Exhibit 8: Inland Waterways Commodity Average Share in Ton-Miles, 2013-2017



Source: U.S. Army Corps of Engineers, IEG Vantage



- Covered barge movements are dominated by farm products, as seen in Exhibit 9 and Exhibit 10, which are in turn dominated by grains and oilseeds and related products, as seen in Exhibit 11.

Exhibit 9: Inland River Covered Barge Commodity in Short Tons, Average, 2013-2017

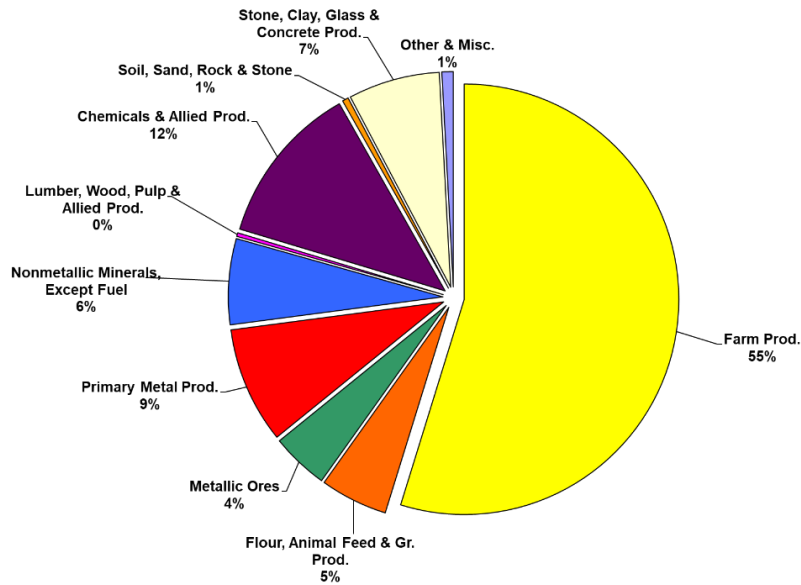
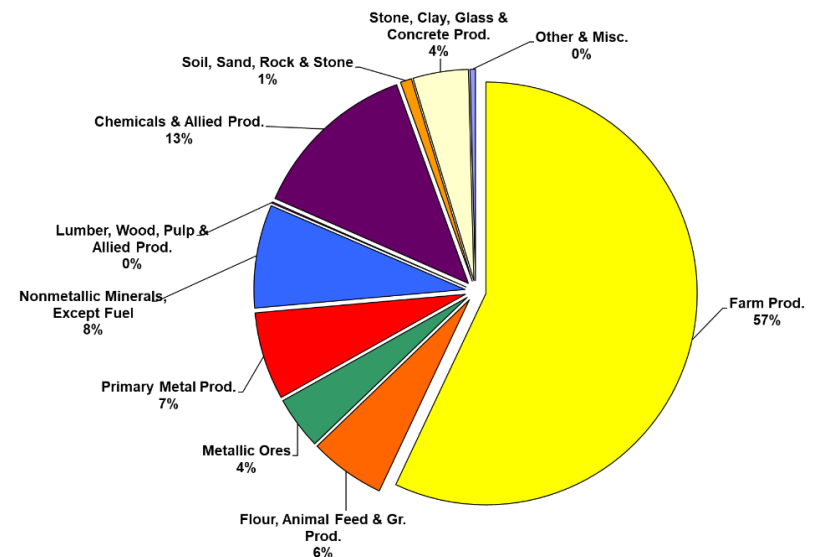


Exhibit 10: Inland River Covered Barge Commodity Average Share in Ton-Miles, 2013-2017



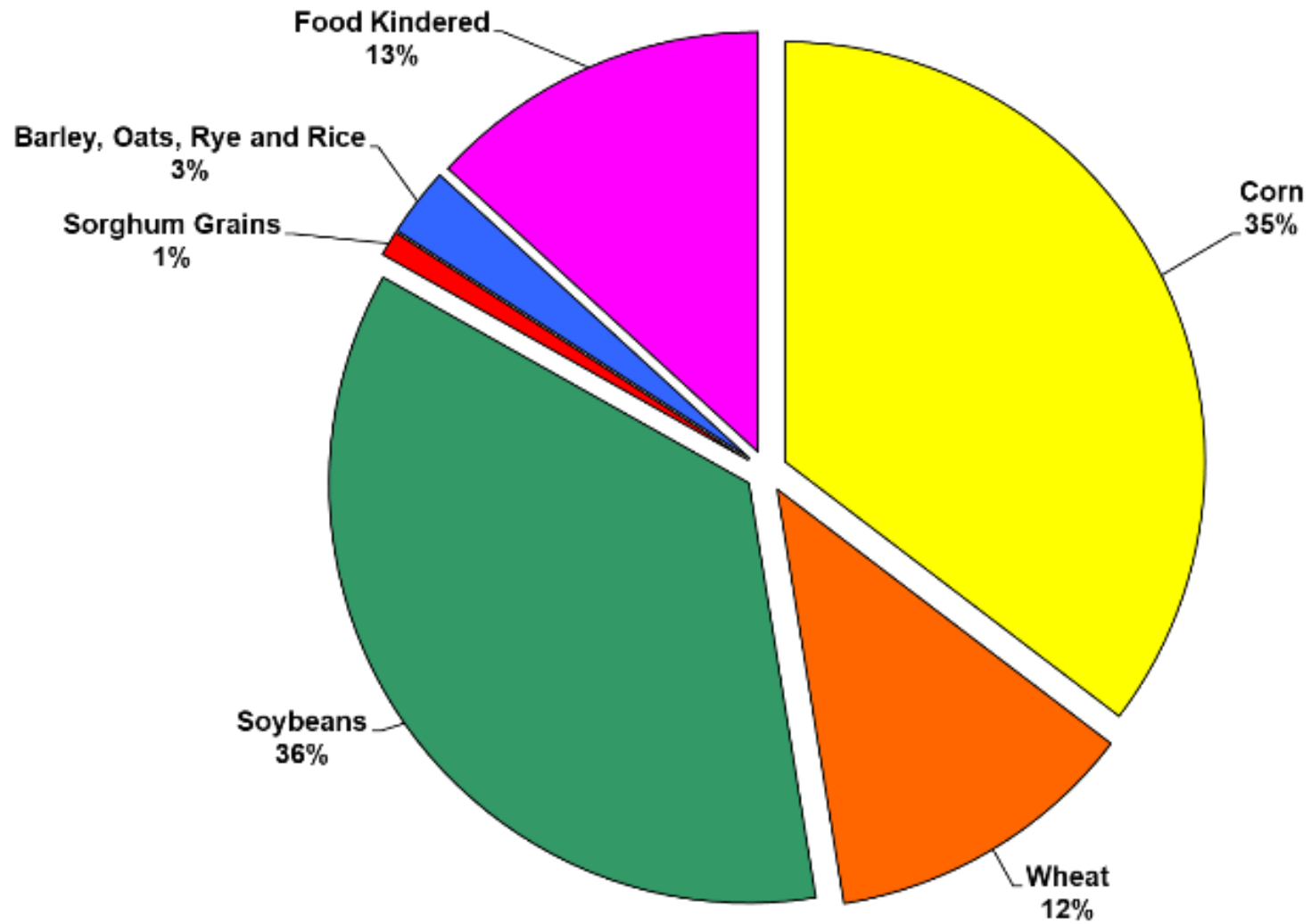
Source: U.S. Army Corps of Engineers, IEG Vantage



- Corn, soybeans, and wheat dominate the “farm products” volume and ton-miles with an 83 percent share.
- Corn is the highest volume agricultural commodity exported through the export grain complex of elevators from Baton Rouge through New Orleans to Myrtle Grove, LA on the Mississippi River in the Center Gulf, but the value of soybeans is higher.
 - At crop year 2018/19 prices, corn exports totaled \$4.8 billion versus \$12.4 billion for soybeans.
- Soybean exports through the export grain complex of elevators from Baton Rouge through New Orleans to Myrtle Grove, LA on the Mississippi River in the Center Gulf have been increasing faster than corn.
- With U.S. farmers producing record crop harvests and increasing wealth in Asia, increasing consumption for grain-based products, grain and oilseed barge movements are expected to continue to increase over the long term.
- With larger ending stocks, if a production problem does occur in another country, the United States is able to meet that demand.
 - For example, in 2016 Brazil had lower yields that ultimately shifted the source of Chinese imports to the United States, which resulted in a surge of barge movements.
 - Trade issues are currently impacting agricultural exports to China.



Exhibit 11: Covered Barge Traffic of Farm and Food, Average Share 2013-2017



Source: U.S. Army Corps of Engineers, IEG Vantage



C. Lock and Dam Infrastructure

- Lock and dam performance is declining under current investment trends.
- The average delay in minutes, and the percent of vessels delayed, has increased between 2000 and 2017.
 - The average delay in 2017 was 1.4 times the delay in 2000.
- Exhibit 12 shows performance metrics for the nine waterways for which the USACE has responsibility for maintaining the operation and condition of the locks. Exhibit 13 shows performance metrics for the Mississippi River alone.

Exhibit 12: Percent of Lockages and Vessel Delay, All Waterways

	Total Vessels	Total Lockages	Percent Commercial Lockages	Average Delay Minutes	Percent of Vessels Delayed
2000	1,140,428	797,137	73.1%	63.6	35.0%
2010	855,121	641,846	74.5%	79.8	36.0%
2017	746,095	584,563	78.8%	154.2	49.0%

Source: U.S. Army Corps of Engineers

Note: Lockage is the term used by the U.S. Army Corps of Engineers for the act of locking through or passing through a lock. Multiple vessels may pass through a lock in one lockage depending on their size.



Exhibit 13: Percent of Lockages and Vessel Delay, Mississippi River

	Total Vessels	Total Lockages	Percent Commercial Lockages	Average Delay Minutes	Percent of Vessels Delayed
2000	231,145	160,640	69.9%	90.0	20.0%
2010	139,768	109,205	68.2%	81.0	19.0%
2017	118,647	113,014	79.9%	121.8	53.0%

Source: U.S. Army Corps of Engineers

- Total vessels passing through locks declined by 35 percent while lockages declined by 27 percent between 2000 and 2017.
 - Commercial lockages declined from 582,707 to 460,636, or 21 percent over this period.
- Vessel delays on the Mississippi River increased from 20 percent in 2000 to 53 percent in 2017.
 - The average delay in 2017 of 121.8 minutes is 1.4 times the delay in 2000.
- Total vessels passing through locks on the Mississippi River declined by 49 percent while lockages declined by 30 percent between 2000 and 2017.
 - Commercial lockages on the Mississippi River declined from 112,287 to 90,298, or 20 percent, over this period.



D. Rail System

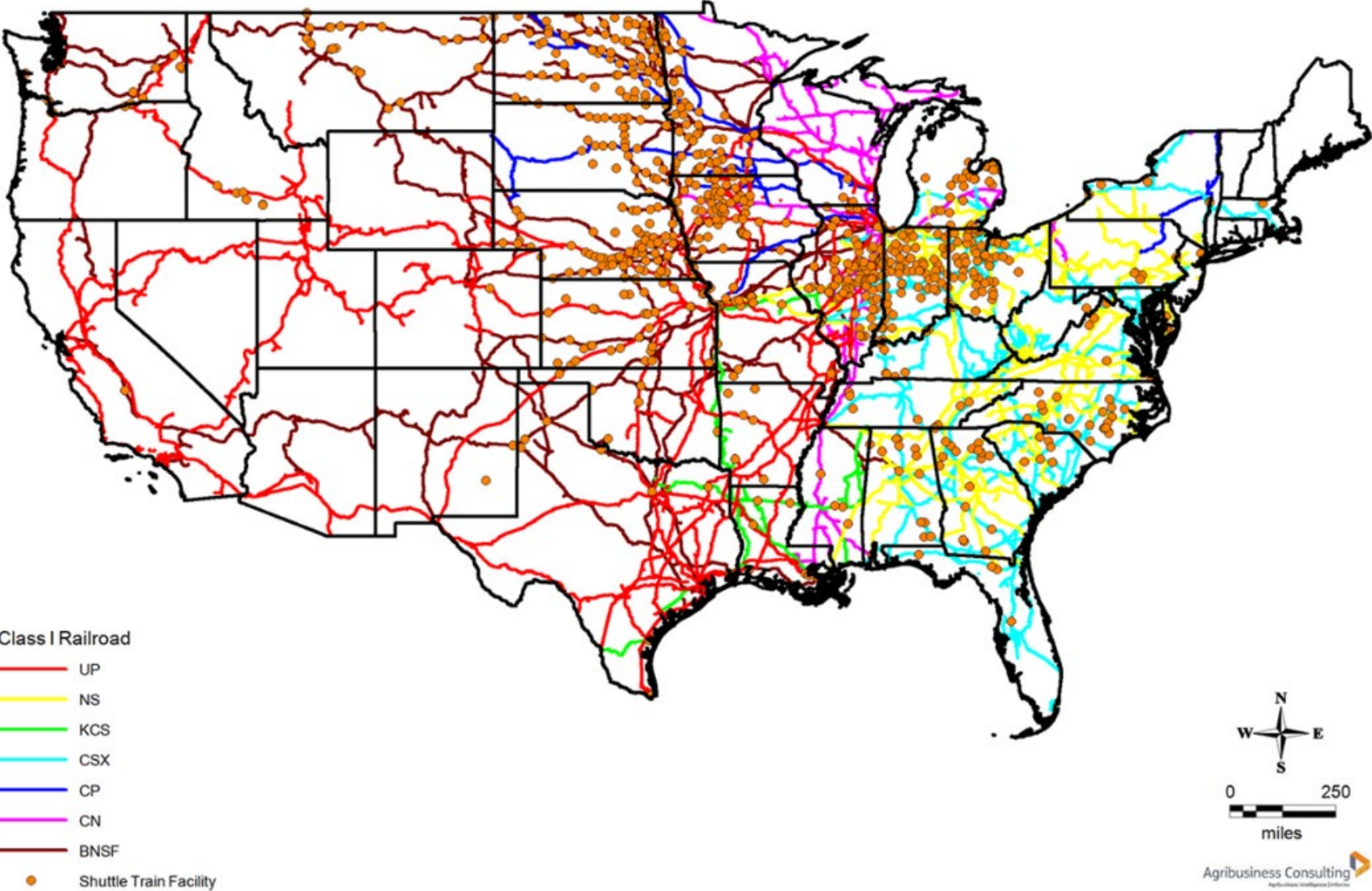
- The United States had about 138,500 railroad route-miles in 2017, including approximately 93,000 miles owned and operated by the seven Class I railroads.¹⁰
- About 570 local and regional railroads operated the remaining 45,500 miles.
- Over the past 50 years, Class I railroads and connecting facilities have developed increasingly efficient ways to carry and transfer cargo, allowing more cargo to be carried with fewer railcars. Average freight car capacity was about 93 tons in 2000 and reached 105 tons in 2016 due to construction of larger cars, particularly new hopper and tank cars.
- Freight rail ton-miles tripled to 1.8 trillion between 1960 and 2016 despite system mileage declining by half.
- Class I railroads had approximately 184,000 network route miles before the Railroad Revitalization and Regulatory Reform Act of 1976. The act led to the sale of rail lines to short-line railroads or the complete abandonment of rail-lines permanently reducing route-miles.
- The Staggers Rail Act of 1980 is a federal law that greatly deregulated the railroad industry.
 - The Staggers Act ended restrictions on rate setting and allowed rail carriers to set market rates and abandon unprofitable lines.
 - Since passage of the Staggers Act, the modal share of grains, oilseeds, and grain products hauled by rail has declined from 50 percent in 1980 to about 25 percent in 2016.¹¹

¹⁰ Association of American Railroads, Railroad Facts, Statistical Highlights (Washington, DC: Annual Issues), available at <https://www.aar.org/> as of August 2018.

¹¹ Chang, Kuo-Liang “Matt”, Peter Caffarelli, Jesse Gastelle, and Adam Sparger. Transportation of U.S. Grains: A Modal Share Analysis, April 2019. U.S. Dept. of Agriculture, Agricultural Marketing Service. Web. https://www.ams.usda.gov/sites/default/files/media/TransportationofUSGrainsModalShare1978_2016.pdf.



Exhibit 14: Rail Grain Shuttle Loading Facilities and Class I Railroad Network



IV. METHODOLOGY

A. Scenario Assumptions

- Three scenarios were used for this study.
 - The status quo scenario continued current spending trends in the President's budget requests.
 - The second scenario had increased investment on the Inland Waterways System and the completion of all approved projects and rehabilitation projects required to increase reliability, resulting in reduced delay time, lower barge freight rates, higher farmer returns, increased export competitiveness, and more jobs.
 - The last scenario examined the impact of reduced investment with no new construction or rehabilitation, resulting in rapidly increasing delay times, higher barge rates, and lower farmer returns.
 - Each scenario considered the current value of the inland waterways system, its value in 10 years (in 2029), and its value in 2045.
 - Each scenario then was evaluated using Economic Impact Analysis for Planning (IMPLAN).
 - Based on a literature review, there were numerous transportation savings resulting from using the inland waterways. These were used in addition to the IMPLAN analysis in calculating the economic impact.
- The status quo scenario continued current investment trends under the following assumptions:
 - The annual construction program for new construction and rehabilitation will remain around \$215 million based on the current funding trend in the President's Budget, and operations and maintenance (O&M) will remain at \$665 million.¹²
 - USACE will continue its asset management (AM) program targeting repair funding to fix critical failures and the highest-risk items.

¹² It should be noted that annual appropriations and/or continuing resolutions passed by Congress and signed into law determine the annual construction program and not the President's budget request. The 2016 President's budget was used as a proxy.



- The cost to transport commodities on the inland waterways is roughly half the cost to ship by rail — this assumption was maintained throughout the study period.
- Estimates of transportation cost savings published by the USACE and the U.S. Chamber of Commerce range from \$7 billion to \$9 billion annually. These values are based on all goods currently being moved on water compared to the same volume moved by rail.^{13 14 15}

¹³ Waterways Work for America. U.S. Chamber of Commerce

https://www.uschamber.com/sites/default/files/legacy/USChamb_Waterway_MainFactSheet_090613a.pdf.

¹⁴ https://www.iwr.usace.army.mil/Portals/70/docs/VTN/VTNCivilWorksBro_lores.pdf.

¹⁵ Based on barge transportation costs of \$15.60 per ton from the Midwest to the Gulf and rail transportation costs of \$31.60 per ton from the Midwest to the Pacific Northwest, the cost savings for transporting 532.8 million tons would be \$8.5 billion.



B. Economic Impact Analysis for Planning (IMPLAN)

- To estimate the “ripple effects”¹⁶ that the U.S. inland waterways system’s output has on the entire U.S. economy, the IMPLAN economic input-output software was used. Results from the models provide insight into the number of jobs, labor income, Gross Domestic Product (GDP) (which IMPLAN calls Value Added), and output (industry sales) created by three different impact categories—Direct, Indirect, and Induced.
 - Employment is the total number of jobs supported by the economic activity.
 - Labor Income is the total value of all employment income, including employee compensation and proprietor income.
 - GDP is the total value added by each step in the supply chain. The GDP can be thought of as the summation of labor income, profit, taxes, and indirect business taxes.
 - Output can be defined as the summation of the business revenues that are associated with activities on the inland waterway.
- The different impacts estimated by IMPLAN are defined as follows:
 - Direct impacts reflect the economic activity that occurs in the industries in which investments are made or changes occur. In the status quo case, the direct impacts are those that occur at organizations operating on and along the U.S. inland waterways system.
 - Indirect impacts are the additional economic impacts that occur to industries upstream (or through “backward linkages”) to the industry that was directly impacted as it purchases inputs and services in order to produce or provide its own product or service.
 - Induced impacts are those impacts created by changes in the spending of labor income and profits generated by the direct and indirect impacts. Wages for the jobs directly supported by the industry are spent on housing, medical treatments, groceries, etc. The spending in these industries creates induced (and positive) impacts for the housing, medical, and grocery store industries, along with other such industries.

¹⁶ The indirect and induced impacts.



- To estimate the economic impact of the U.S. inland waterways system on the U.S. economy, three key pieces of information associated with activities along the waterways were utilized:
 - Economic Output
 - Employment
 - Employee Compensation
- This data was derived from several sources¹⁷ through taking shares of NAICS codes associated with economic activity on the waterways, as well as freight movement along the waterways.
- The NAICS codes most closely associated with the inland waterways system and used in this study were:
 - 483113 “Coastal and Great Lakes Freight Transportation”
 - 483211 “Inland Water Freight Transportation”
 - 488310 “Port and Harbor Operations”
 - 488320 “Marine Cargo Handling”
 - 488330 “Navigational services to shipping”
 - 488390 “Other Support Activities for Water Transportation”
- Shares of these NAICS codes to be attributed to the waterways were developed from:
 - 2012 Economic Census
 - 2016 Waterborne Commerce Statistics
 - 2016 Service Annual Survey

¹⁷ Bureau of Labor Statistics, Waterborne Commerce Statistics, Service Annual Survey, IMPLAN, Economic Census and PwC.



- Related 2017 PWC study on the tugboat, towboat and barge industry¹⁸
- Once the inland waterways shares were developed for each NAICS code, estimates for 2016 were established using the derived shares from:
 - Bureau of Labor Statistics (BLS)
 - Service Annual Survey
- The President's Budget for the inland waterways provides for investment and maintenance of the inland waterway infrastructure. This expenditure provides a positive economic impact and supports activities on the waterways. In 2016, The President's Budget allocated:
 - \$665 million for operations and maintenance
 - \$215 million for construction
- This level of investment was inflated by two percent each year through 2029 and 2045. This federal investment and activities along the inland waterways were used to estimate direct, indirect, and induced impacts on the inland waterways system using IMPLAN.
- Three scenarios were run analyzing the economic importance of the inland waterways system:
 - Status Quo Investment Scenario is the inland waterway's contribution to the U.S. economy under a continuation of current allocated funds for construction and operations and maintenance, and the impact such investment would have on the inland waterways system as well as the U.S. economy.
 - Increased Investment Operations Scenario is the inland waterway's contribution to the U.S. economy under full funding for all construction projects proposed by the USACE, along with continued allocated funds for investment and operations and maintenance and the impact such investment would have on the inland waterways, as well as the U.S. economy.

¹⁸ <http://www.americanwaterways.com/sites/default/files/Econ%20Impact%20of%20US%20Tugboat%20Towboat%20and%20Barge%20Industry%20Ih%206-22-17.pdf>.



- Reduced Investment Scenario is the inland waterways system's contribution to the U.S. economy under gradually decreasing funding and purchasing power for construction and operations and maintenance, and the impact such investment would have on the inland waterways system as well as the U.S. economy.

C. Baseline—Current Economic Contributions of the Inland Waterways

To forecast future contributions of the inland waterways under each of the three scenarios, a baseline for the present valuation of the inland waterways was conducted resulting in the below direct and total economic contributions of the waterways to the U.S. economy:

- Direct Economic Contributions are stem from sales and operations from companies operating on the waterway.
 - In 2016, the U.S. inland waterways system directly contributed:
 - \$17.5 billion in Economic Output
 - 55,200 Jobs
 - \$7.7 billion in GDP
 - Government investment to the inland waterways via the President's Budget in 2016 was roughly:
 - \$665 million for Operations and Maintenance
 - \$215 million for Construction
 - According to the USACE, about 55 percent of these funds were spent through federal channels while the remaining 45 percent was spent through private sector contracting. This investment resulted in a direct contribution of:
 - \$880 million in Economic Output
 - 5,100 Jobs
 - \$570 million in GDP



Exhibit 15: Direct Economic Contributions of the Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Inland Waterways	55,231	\$4,818	\$7,693	\$17,487
Construction and O&M	5,054	\$414	\$570	\$880
Government	2,390	\$258	\$364	\$484
Private	2,664	\$156	\$206	\$396
Total	60,285	\$5,232	\$8,263	\$18,367

Source: IMPLAN, Agribusiness Intelligence

- Total Economic Contributions stem from sales and operations from companies operating on the waterways, from companies operating in the supply chain of direct contributors and spent wages from individuals employed by those companies. Total Economic Contributions include direct, indirect, and induced contributions.
 - In 2016, the U.S. inland waterways system in total contributed:
 - \$50.6 billion in Economic Output
 - 242,900 Jobs
 - \$25.9 billion in GDP
 - According to the USACE, approximately 55 percent of these budget funds were spent through federal channels while the remaining 45 percent was spent through private sector contracting.¹⁹ This investment resulted in a total contribution of:
 - \$2.2 billion in Economic Output
 - 12,900 Jobs
 - \$1.3 billion in GDP

¹⁹ This represents who is doing the work, for example the USACE would perform certain maintenance and construction activity, while private sector is contracted outside of government to perform necessary work.



Exhibit 16: Total Economic Contributions of the Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Inland Waterways	242,880	\$15,764	\$25,877	\$50,588
Construction and O&M	12,902	\$842	\$1,311	\$2,245
Government	6,291	\$468	\$729	\$1,140
Private	6,611	\$373	\$582	\$1,105
Total	255,782	\$16,606	\$27,188	\$52,833

Source: IMPLAN, Agribusiness Intelligence



- Exhibit 17 and Exhibit 18 show the top 10 (ranked by employment and GDP gains) IMPLAN industries that benefit from activities and investment along the U.S. inland waterways.
- As expected, water transportation and support activities for water transportation rank at the top of the list for jobs supported by activities and investment on the U.S. inland waterways system.

- Water Transportation
 - **Employment:** 26,100
 - **GDP:** \$4.4 Billion
- Support Activities
 - **Employment:** 38,600
 - **GDP:** \$4.1 Billion

Exhibit 17: Top 10 Industries Affected by the Inland Waterways by GDP

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
410	Water transportation	26,088	\$2,217	\$4,417	\$11,156
414	Support activities for water transportation	38,617	\$3,258	\$4,110	\$7,960
440	Real estate	8,675	\$219	\$1,326	\$1,826
395	Wholesale trade	7,265	\$610	\$1,182	\$1,768
441	Owner-occupied dwellings	0	\$0	\$964	\$1,485
433	Monetary authorities and depository credit Intermediation	2,121	\$185	\$508	\$703
415	Couriers and messengers	8,114	\$326	\$492	\$899
437	Insurance carriers	1,625	\$174	\$461	\$792
156	Petroleum refineries	272	\$70	\$415	\$1,455
461	Management of companies and enterprises	2,707	\$332	\$411	\$667

Source: IMPLAN, Agribusiness Intelligence

Exhibit 18: Top 10 Industries Affected by the Inland Waterways by Employment

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
414	Support activities for water transportation	38,617	\$3,258	\$4,110	\$7,960
410	Water transportation	26,088	\$2,217	\$4,417	\$11,156
440	Real estate	8,675	\$219	\$1,326	\$1,826
415	Couriers and messengers	8,114	\$326	\$492	\$899
395	Wholesale trade	7,265	\$610	\$1,182	\$1,768
501	Full-service restaurants	5,508	\$136	\$152	\$281
464	Employment services	5,114	\$209	\$310	\$409
502	Limited-service restaurants	4,961	\$101	\$246	\$425
518	Postal service	4,632	\$398	\$408	\$467
482	Hospitals	4,472	\$355	\$409	\$708

Source: IMPLAN, Agribusiness Intelligence



V. ECONOMIC IMPORTANCE UNDER STATUS QUO INVESTMENT

A. Scenario Description

- Three scenarios were used for this study.
 - The status quo scenario continued current trends in the President's budget.
 - The second scenario had increased investment on the Inland Waterway System and the completion of all approved projects and rehabilitation projects required to increase reliability resulting in reduced delay time, lower barge rates, higher farmer returns, increased export competitiveness and more jobs.
 - The last scenario was the impact of reduced investment with no new construction or rehabilitation resulting in rapidly increasing delay times, higher barge rates and lower farmer returns.
 - Each scenario considered the current value of the inland waterway system, its value in 10 years and its value in 2045.
 - Each scenario was then evaluated using IMPLAN.
 - Based on a literature review, there were numerous transportation savings using the inland waterway. These were used in addition to the IMPLAN analysis which calculates the economic impact.
- The status quo scenario continued current investment trends.
 - The current funding trend in the President's Budget (PBud) had the annual construction program for new construction and rehabilitation to remain around \$215 million, and O&M will remain at \$665 million.²⁰
 - USACE will continue its asset management (AM) program targeting repair funding to fix critical failures and the highest risk items.

²⁰ It should be noted that annual appropriations and/or continuing resolutions passed by Congress and signed into law determine the annual construction program and not the President's budget request. The 2016 President's budget was used as a proxy.



- The cost to transport commodities on the inland waterway is approximately half the cost to ship by rail with barge costs of \$0.01 per ton-mile and rail costs of \$0.02 per ton-mile. Estimates of transportation cost savings published by the USACE and the U.S. Chamber of Commerce range from \$7 billion to \$9 billion annually. These values are based on all goods currently being moved on water compared to the same volume moved by rail.^{21 22 23}

²¹ https://www.uschamber.com/sites/default/files/legacy/USChamb_Waterway_MainFactSheet_090613a.pdf.

²² https://www.iwr.usace.army.mil/Portals/70/docs/VTN/VTNCivilWorksBro_lores.pdf.

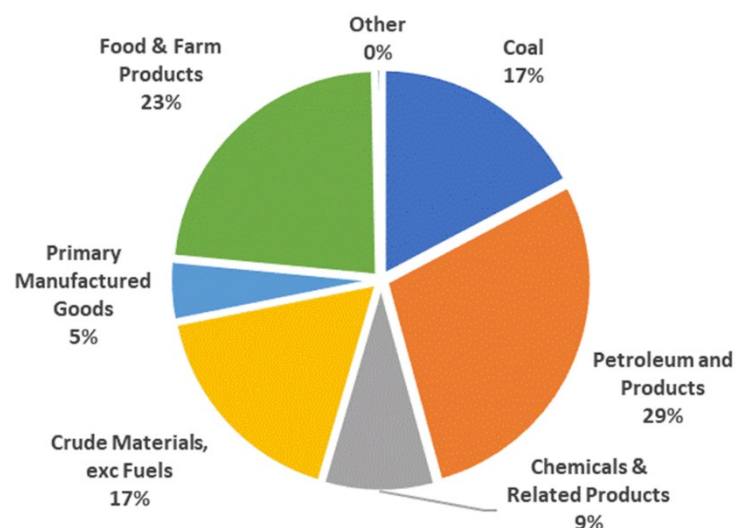
²³ Based on barge transportation costs of \$15.60 per ton from the Midwest to the Gulf and rail transportation costs of \$31.60 per ton from the Midwest to the Pacific Northwest, the cost savings for transporting 532.8 million tons would be \$8.5 billion.



1. Status Quo by 2029

- Food and farm products grow to 23 percent from 17 percent of goods moved on the inland waterway, totaling 135.1 million tons.
 - In the forecast, corn movements increase 92 percent to 65.2 million tons.
 - Soybean movements increase 25 percent to 42.3 million tons.
 - Wheat movements increase 41 percent to 11.7 million tons.
 - Animal feed movements, mainly DDGS, increases 5 percent to 5.6 million tons as the growth in corn-based ethanol is assumed to grow minimally.
- Total commodity flows on the inland waterway system are forecasted to reach 583.2 million tons by 2029, which is an annual growth of 0.7 percent.
 - Coal and petroleum related volumes are based upon EIA Long-Term Energy forecasts.
 - Food and food related movements along with fertilizer flows are based upon IEG Vantage long-term crop forecasts.
 - Crude materials, manufactured goods and other items are based upon projected population growth and trends.
- Petroleum and related products remain at 29 percent of commodity flows. Coal declines from 109.8 million tons to 100.8 million tons in 2029.

Exhibit 19: Forecast Inland Waterway Commodity Share, Status Quo Investment, 2029



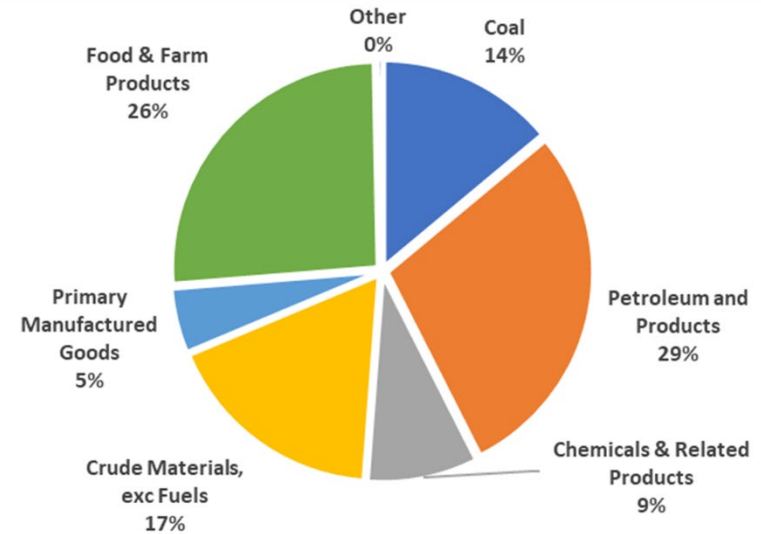
Source: IEG Vantage



2. Status Quo by 2045

- IEG Vantage forecasted commodity flows on the inland waterways out to 2045.
- Total commodity flows are forecasted to reach 618.8 million tons by 2045, a 0.5 percent annual growth rate.
- Petroleum and related products remain at 29 percent of commodity flows.
- Food and farm products constitute 26 percent of goods moved on the inland waterway, totaling 160.8 million tons.
 - In the forecast, corn movements increase to 78.9 million tons.
 - Soybean movements increase to 51.6 million tons.
 - Wheat movements increase to 12.7 million tons.
 - Animal feed movements increase to 6.1 million tons.
- Coal declines from 109.8 million tons in 2016 to 86.2 million tons in 2045.

Exhibit 20: Forecast Inland Waterway Commodity Share, Status Quo Investment, 2045



Source: IEG Vantage



B. IMPLAN Analysis

3. Projected Economic Contributions of the Inland Waterways through 2029

Looking forward 10 years to 2029 under the Status Quo Operations Scenario, direct and total economic contributions of the waterways to the U.S. economy were derived and are shown below:

- Direct Economic Contributions:
 - In 2029, the U.S. inland waterways are estimated to directly contribute:
 - \$24.5 billion in Economic Output
 - 59,800 Jobs
 - \$10.6 billion in GDP
 - Government investment via the President's Budget in 2029, in real terms, was estimated at:
 - \$860 million for Operations and Maintenance
 - \$278 million for Construction
 - The USACE share of spending was held constant at approximately 55 percent spent through federal channels while 45 percent was spent through private sector contracting.²⁴ This investment resulted in a direct contribution of:
 - \$1.1 billion in Economic Output
 - 6,000 Jobs
 - \$732 million in GDP

²⁴ The percentage represents the portion of spending handled internally by the USACE compared to the portion contracted out to the private sector. With a higher budget, a larger portion is contracted out to private contractors; with a constrained budget, more work is performed by the USACE, which reduces the portion of the budget contracted out. Higher investment allows up to 70 percent of the budget to be contracted out; whereas, reduced investment only allows for 20 percent to be contracted.



Exhibit 21: Direct Economic Contributions by the Inland Waterways, 2029 Status Quo

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Inland Waterways	59,780	\$6,729	\$10,640	\$24,485
Construction and O&M	5,954	\$532	\$732	\$1,138
Government	2,858	\$336	\$473	\$626
Private	3,096	\$196	\$260	\$512
Total	65,734	\$7,261	\$11,372	\$25,623

Source: IMPLAN, Agribusiness Intelligence

■ Total Economic Contributions:

○ In 2029, the U.S. inland waterways system, in total, will contribute:

- \$69.9 billion in Economic Output
- 296,900 Jobs
- \$35.5 billion in GDP

○ The USACE share of spending was held constant at approximately 55 percent spent through federal channels while 45 percent was spent through private sector contracting. This investment resulted in a direct contribution of:

- \$2.9 billion in Economic Output
- 15,200 Jobs
- \$1.7 billion in GDP



Exhibit 22: Total Economic Contributions by the Inland Waterways, 2029 Status Quo

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Inland Waterways	296,898	\$21,716	\$35,545	\$69,882
Construction and O&M	15,223	\$1,079	\$1,681	\$2,875
Government	7,541	\$609	\$948	\$1,472
Private	7,682	\$471	\$733	\$1,403
Total	312,121	\$22,796	\$37,226	\$72,757

Source: IMPLAN, Agribusiness Intelligence



- Exhibit 23 and Exhibit 24 show the top 10 (ranked by employment and GDP gains) IMPLAN industries that benefit from activities and investment along the U.S. inland waterways system.
- As expected, water transportation and support activities for water transportation rank at the top of the list for jobs supported by activities and investment on the U.S. inland waterways system.

○ Water Transportation

- **Employment:** 28,200
- **GDP:** \$6.1 Billion

○ Support Activities

- **Employment:** 43,400
- **GDP:** \$5.7 Billion

Exhibit 23: Top 10 Industries Affected by the Inland Waterways by GDP, 2029 Status Quo

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
410	Water transportation	28,244	\$3,101	\$6,089	\$15,621
414	Support activities for water transportation	43,439	\$4,524	\$5,688	\$11,137
440	Real estate	10,926	\$299	\$1,812	\$2,537
395	Wholesale trade	9,134	\$832	\$1,612	\$2,343
441	Owner-occupied dwellings	0	\$0	\$1,322	\$2,041
433	Monetary authorities and depository credit intermediation	2,673	\$252	\$694	\$918
415	Couriers and messengers	10,210	\$445	\$671	\$1,261
437	Insurance carriers	2,047	\$238	\$630	\$1,109
156	Petroleum refineries	341	\$95	\$565	\$2,222
461	Management of companies and enterprises	3,408	\$453	\$561	\$915

Source: IMPLAN, Agribusiness Intelligence

Exhibit 24: Top 10 Industries Affected by the Inland Waterways by Employment, 2029 Status Quo

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
414	Support activities for water transportation	43,439	\$4,524	\$5,688	\$11,137
410	Water transportation	28,244	\$3,101	\$6,089	\$15,621
440	Real estate	10,926	\$299	\$1,812	\$2,537
415	Couriers and messengers	10,210	\$445	\$671	\$1,261
395	Wholesale trade	9,134	\$832	\$1,612	\$2,343
501	Full-service restaurants	6,960	\$186	\$209	\$389
464	Employment services	6,436	\$286	\$423	\$557
502	Limited-service restaurants	6,271	\$138	\$337	\$588
518	Postal service	5,829	\$544	\$557	\$652
482	Hospitals	5,659	\$488	\$561	\$920

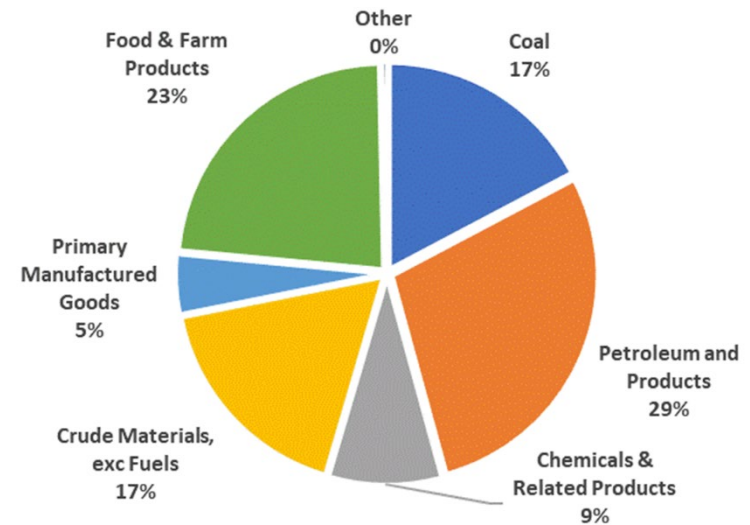
Source: IMPLAN, Agribusiness Intelligence



4. Summary Results by 2029

- Total commodity flows on the inland waterways system are forecasted to reach 583.2 million tons by 2029, which is an annual growth of 0.7 percent.
- Food and farm products grow to 23 percent from 17 percent of goods moved on the inland waterways, totaling 135.1 million tons.
 - In the forecast, corn movements increase 92 percent to 65.2 million tons.
 - Soybean movements increase 25 percent to 42.3 million tons.
 - Wheat movements increase 41 percent to 11.7 million tons.
 - Animal feed movements, mainly DDGS, increases 5 percent to 5.6 million tons as the growth in corn-based ethanol is assumed to grow minimally.
- Petroleum and related products remain at 29 percent of commodity flows.
- Coal declines from 109.8 million tons to 100.8 million tons in 2029.

Exhibit 25: Forecast Inland Waterways Commodity Share, Status Quo Investment, 2029



Source: IEG Vantage



5. Projected Economic Contributions of the Inland Waterways in 2045

Looking forward 25 years to 2045 under the Status Quo Investment Scenario, direct and total economic contributions of the inland waterways to the U.S. economy were derived and are shown below:

- Direct Economic Contributions:
 - In 2045, the U.S. inland waterways system is estimated to directly contribute:
 - \$35.7 billion in Economic Output
 - 63,400 Jobs
 - \$15.5 billion in GDP
 - Government investment via the President's Budget in 2045 in real terms was estimated at:
 - \$1.2 billion for Operations and Maintenance
 - \$382 million for Construction
 - The USACE share of spending was held constant at approximately 55 percent spent through federal channels while 45 percent was spent through private sector contracting. This investment resulted in a direct contribution of:
 - \$1.6 billion in Economic Output
 - 7,400 Jobs
 - \$1 billion in GDP



Exhibit 26: Direct Economic Contributions by the Inland Waterways, 2045 Status Quo

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Inland Waterways	63,428	\$9,801	\$15,498	\$35,664
Construction and O&M	7,422	\$733	\$1,010	\$1,563
Government	3,576	\$464	\$654	\$860
Private	3,846	\$269	\$356	\$703
Total	70,850	\$10,534	\$16,508	\$37,226

Source: IMPLAN, Agribusiness Intelligence

■ Total Economic Contributions:

○ In 2045, the U.S. inland waterways system, in total, will contribute:

- \$101.6 billion in Economic Output
- 376,000 Jobs
- \$51.8 billion in GDP

○ The USACE share of spending was held constant at approximately 55 percent spent through federal channels while 45 percent was spent through private sector contracting. This investment resulted in a direct contribution of:

- \$3.9 billion in Economic Output
- 19,000 Jobs
- \$2.3 billion in GDP



Exhibit 27: Total Economic Contributions by the Inland Waterways, 2045 Status Quo

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Inland Waterways	375,985	\$31,631	\$51,774	\$100,609
Construction and O&M	19,008	\$1,490	\$2,321	\$3,911
Government	9,464	\$844	\$1,314	\$2,010
Private	9,544	\$646	\$1,007	\$1,901
Total	394,993	\$33,121	\$54,095	\$104,520

Source: IMPLAN, Agribusiness Intelligence



- The impact of activities and investment on the U.S. inland waterways system does not benefit all industries to the same degree.
- The charts to the right show the top ten (ranked by employment and GDP gains) IMPLAN industries that benefit from activities and investment along the U.S. inland waterways system.
- As expected, water transportation and support activities for water transportation rank at the top of the list for jobs supported by activities and investment on the U.S. inland waterways system.

○ Water Transportation

- **Employment:** 30,000
- **GDP:** \$8.9 Billion

○ Support Activities

- **Employment:** 49,100
- **GDP:** \$8.3 Billion

Exhibit 28: Top 10 Industries Affected by the Inland Waterways by GDP, 2045 Status Quo

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
410	Water transportation	29,979	\$4,516	\$8,868	\$22,753
414	Support activities for water transportation	49,136	\$6,589	\$8,285	\$16,221
440	Real estate	14,369	\$434	\$2,633	\$3,686
395	Wholesale trade	12,014	\$1,210	\$2,343	\$3,289
441	Owner-occupied dwellings	0	\$0	\$1,921	\$2,966
433	Monetary authorities and depository credit intermediation	3,517	\$367	\$1,009	\$1,262
415	Couriers and messengers	13,456	\$647	\$977	\$1,836
437	Insurance carriers	2,693	\$347	\$915	\$1,612
156	Petroleum refineries	449	\$138	\$822	\$3,234
461	Management of companies and enterprises	4,484	\$659	\$816	\$1,330

Source: IMPLAN, Agribusiness Intelligence

Exhibit 29: Top 10 Industries Affected by the Inland Waterways by Employment, 2045 Status Quo

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
414	Support activities for water transportation	49,136	\$6,589	\$8,285	\$16,221
410	Water transportation	29,979	\$4,516	\$8,868	\$22,753
440	Real estate	14,369	\$434	\$2,633	\$3,686
415	Couriers and messengers	13,456	\$647	\$977	\$1,836
395	Wholesale trade	12,014	\$1,210	\$2,343	\$3,289
501	Full-service restaurants	9,151	\$271	\$303	\$565
464	Employment services	8,468	\$415	\$616	\$809
502	Limited-service restaurants	8,246	\$200	\$490	\$854
518	Postal service	7,681	\$792	\$811	\$949
482	Hospitals	7,441	\$709	\$815	\$1,249

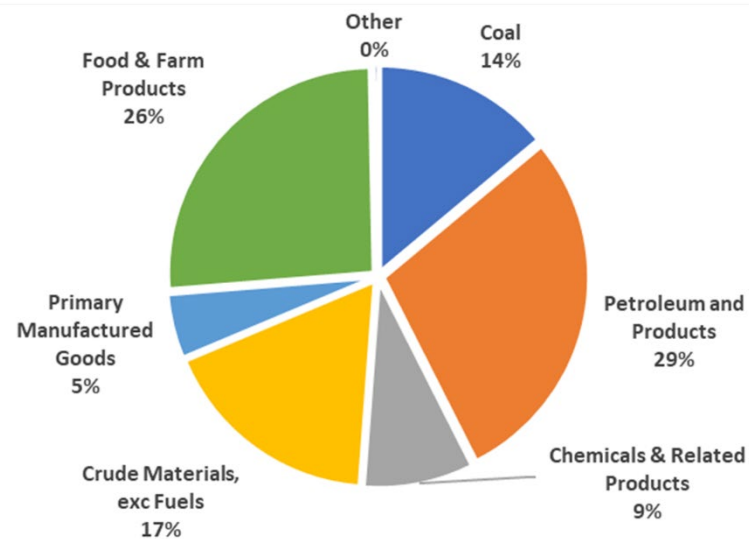
Source: IMPLAN, Agribusiness Intelligence



6. Summary Results by 2045

- Total commodity flows are forecasted to reach 618.8 million tons by 2045, a 0.5 percent annual growth rate.
- Food and farm products constitute 26 percent of goods moved on the inland waterways, totaling 160.8 million tons.
 - In the forecast, corn movements increase to 78.9 million tons.
 - Soybean movements increase to 51.6 million tons.
 - Wheat movements increase to 12.7 million tons.
 - Animal feed movements increase to 6.1 million tons.
- Petroleum and related products remain at 29 percent of commodity flows.
- Coal declines from 109.8 million tons in 2016 to 86.2 million tons in 2045.

Exhibit 30: Forecast Inland Waterways Commodity Share, Status Quo Investment, 2045



Source: IEG Vantage



Exhibit 31: Summary of Economic Contribution of Inland Waterways System with the Status Quo Investment Trend

	Direct			Total		
	2016	2029	2045	2016	2029	2045
Employment	60,285	65,734	70,850	255,782	312,121	394,993
Labor Income	\$5,232	\$7,261	\$10,534	\$16,606	\$22,796	\$33,121
GDP	\$8,263	\$11,372	\$16,508	\$27,188	\$37,226	\$54,095
Output	\$18,367	\$25,623	\$37,226	\$52,833	\$72,757	\$104,520

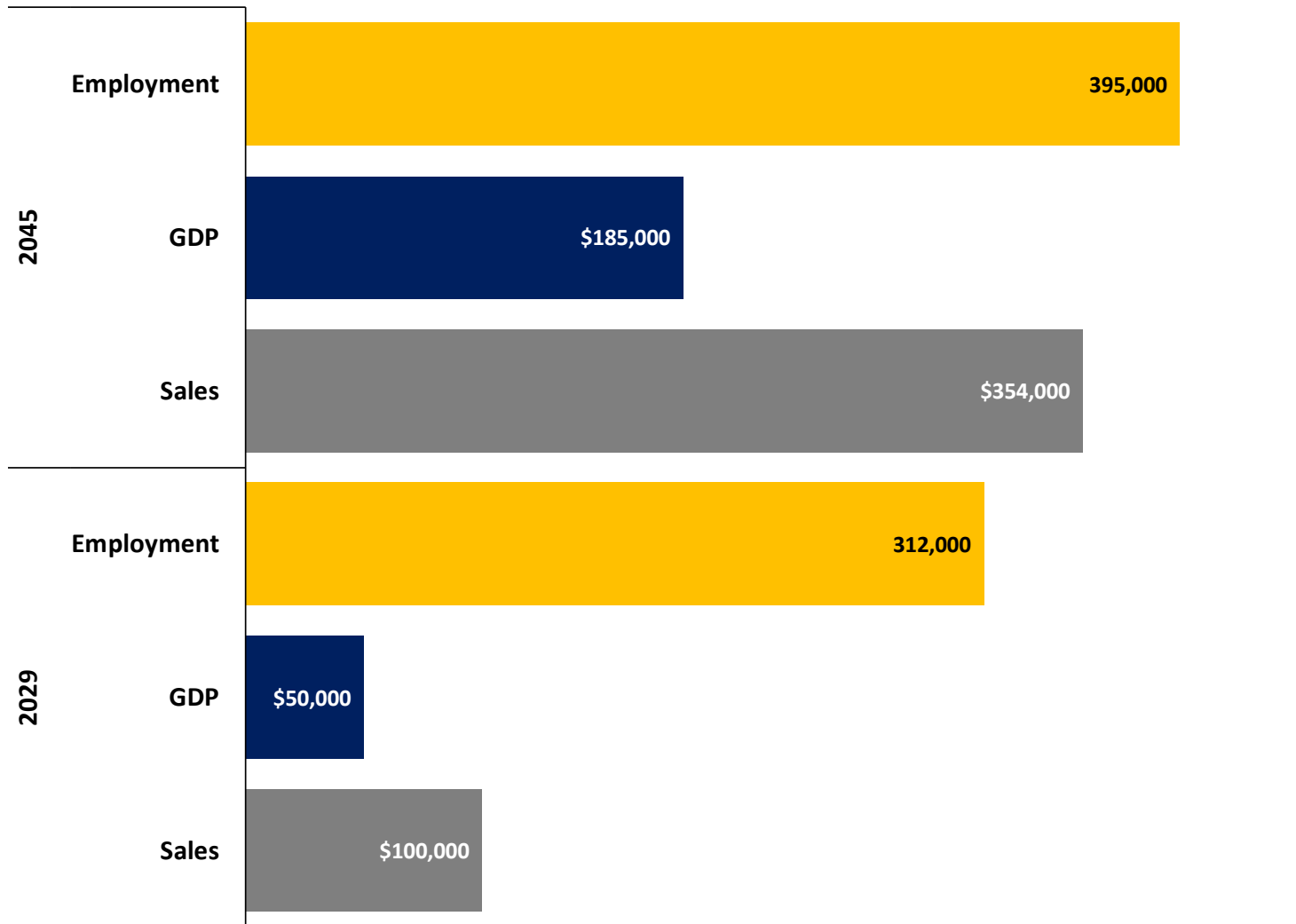
Note: \$ values in millions.

7. Total Cumulative Economic Impacts with Status Quo Investment, 2029 and 2045

- The cumulative economic impacts for GDP and output (sales) were calculated as the average between time periods (2016 to 2029, and 2029 to 2045) multiplied by the number of years between those time periods. Employment reflects a job added by the respective year, 2029 and 2045.
- The employment count, cumulative GDP, and output (sales) to 2029 and 2045 for the status quo investment scenario are summarized in Exhibit 32.



Exhibit 32: Total Cumulative Economic Impact with Status Quo Inland Waterways System Investment to 2029 and 2045 (Employment Actual Count, GDP and Sales in Millions of Dollars)



VI. ECONOMIC IMPORTANCE WITH INCREASED INVESTMENT

A. Scenario Description

- Under the second scenario with increased investment:
 - All authorized new construction projects would be completed, existing lock and dam sites would be rehabilitated, and proactive/advance maintenance would be performed to ensure the highest possible reliability.
 - Seven locks (five Upper Mississippi River and two Illinois Waterway) would be expanded to 1,200 feet and dual chambers under the Navigation and Ecosystem Sustainability Program (NESP).
 - Dredging of the lower Mississippi River to 50 feet from Baton Rouge, LA, to the Southwest Pass would be included.
- The Olmsted Locks and Dam was formally dedicated on August 30, 2018. The new facility replaces Locks and Dams 52 and 53 on the Ohio River.
 - The project had a cost of \$2.7 billion dollars with an estimated annual net benefit of \$640 million. It should be noted that the projects had an original estimated cost of \$775 million and completion date of 1998. Escalating costs, unpredictable funding and building in the “wet” contributed to the delay and cost increase.
 - Average delays in 2016 for Lock 52 were 3.71 hours and at Lock 53 were 3.28 hours. Delays of 20 or more hours were for over 800 tows reported in 2018 with locking times of 1 to 2 hours at Lock 52.²⁵
 - Transit times for the 2 locks could take up to 6 hours. Olmsted upon completion should have a processing time of 45 minutes to one hour, resulting in a time savings of up to four hours.
- Twenty-one additional projects that are either awaiting construction or major rehabilitation with a combined cost of almost \$6.3 billion will be completed.
 - It has been assumed for the purposes of this analysis that the projects would be completed over a 10-year period beginning in 2019 with completion by 2029.
 - Investments are spread evenly over this time period.

²⁵ <https://www.waterwaysjournal.net/2018/08/30/olmsted-locks-and-dam-formally-and-finally-dedicated/>



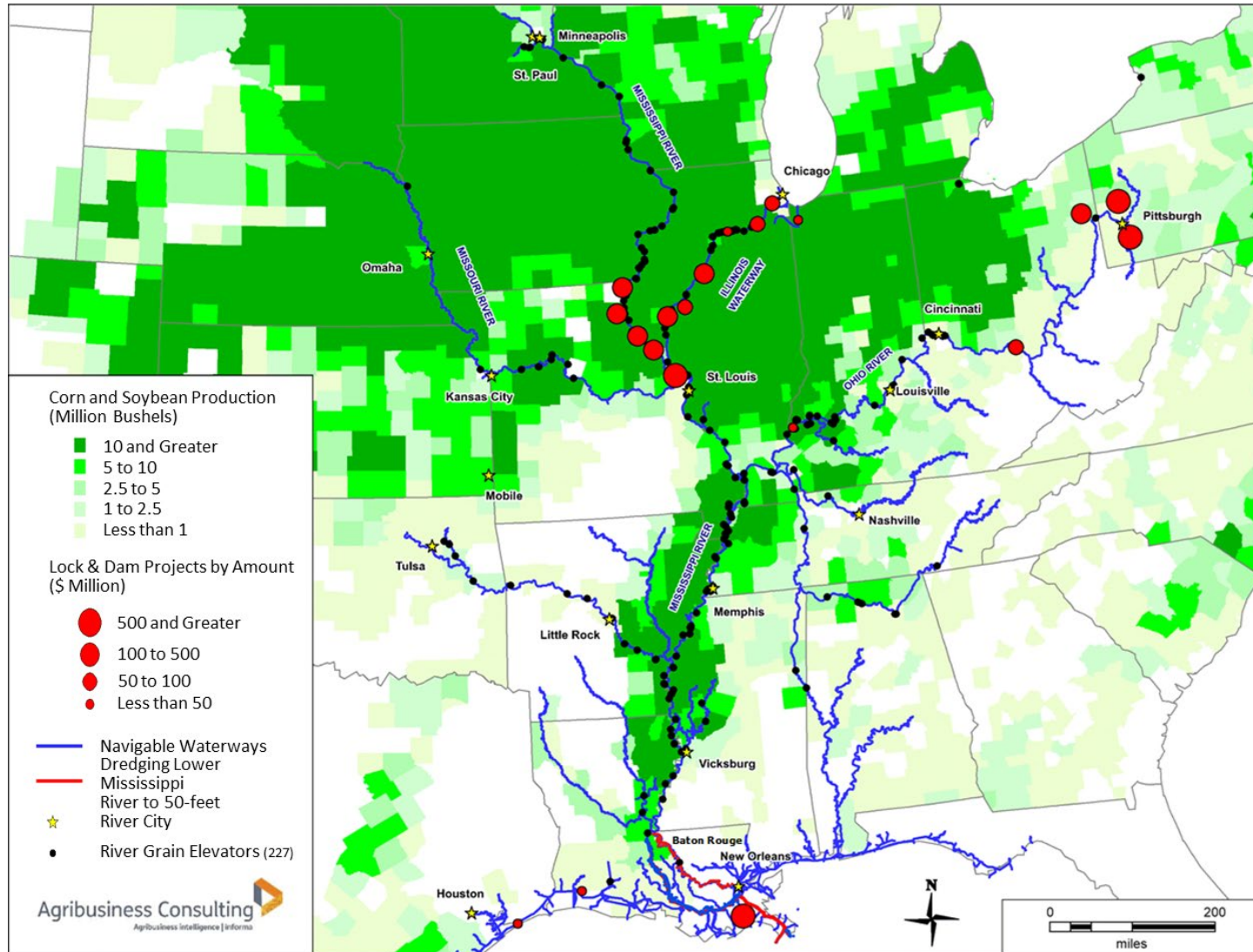
Exhibit 33: Projects Awaiting Construction and Rehabilitation

Potential Investments	River State	River Mile	Amount (\$Million)
NAVIGATION & ECOSYSTEM SUSTAINABILITY PROGRAM (NESP) PROJECTS - AWAITING CONSTRUCTION			
LaGrange Lock	Illinois River/IL	80	\$361.30
Peoria Lock	Illinois River/IL	158	\$362.50
Upper Mississippi River Lock and Dam 20	Mississippi River/MO	343	\$326.30
Upper Mississippi River Lock and Dam 21	Mississippi River/MO	325	\$454.20
Upper Mississippi River Lock and Dam 22	Mississippi River/MO	301	\$376.60
Upper Mississippi River Lock and Dam 24	Mississippi River/MO	273	\$438.30
Upper Mississippi River Lock and Dam 25	Mississippi River/MO	241	\$548.50
PROJECTS AWAITING CONSTRUCTION			
Brazos High Island	Gulf Intracoastal Waterway/TX		\$17.60
Brazos River to Port O'Connor	Gulf Intracoastal Waterway/TX		\$22.20
Calcasieu Lock	Gulf Intracoastal Waterway/TX	63	\$16.90
Dashields Lock	Ohio River/PA	13	\$808.70
Dredging Lower-Mississippi River to 50ft	Mississippi River/LA		\$159.10
Emsworth Lock	Ohio River/PA	6	\$744.40
Inner Harbor Navigation Canal Lock	Mississippi River/LA	63	\$1,009.90
Montgomery Lock	Ohio River/PA	32	\$362.50
MAJOR REHABILITATION PROJECTS			
Brandon Road Lock	Illinois River/IL	286	\$69.20
Dresden Island	Illinois River/IL	271.5	\$50.50
Greenup Lock	Ohio River/OH & KY	341	\$55.00
J.T. Myers Lock	Ohio River/IN & KY	846	\$45.20
Starved Rock	Illinois River/IL	231	\$30.30
TJ O'Brien	Illinois River/IL	327	\$47.00
TOTAL			\$6,306

Source: National Waterways Foundation and INLAND WATERWAYS USERS BOARD 30th ANNUAL REPORT, December 2017



Exhibit 34: Potential Navigation Investments, and Corn and Soybean Production Density



Source: U.S. Army Corps of Engineers, USDA and IEG Vantage



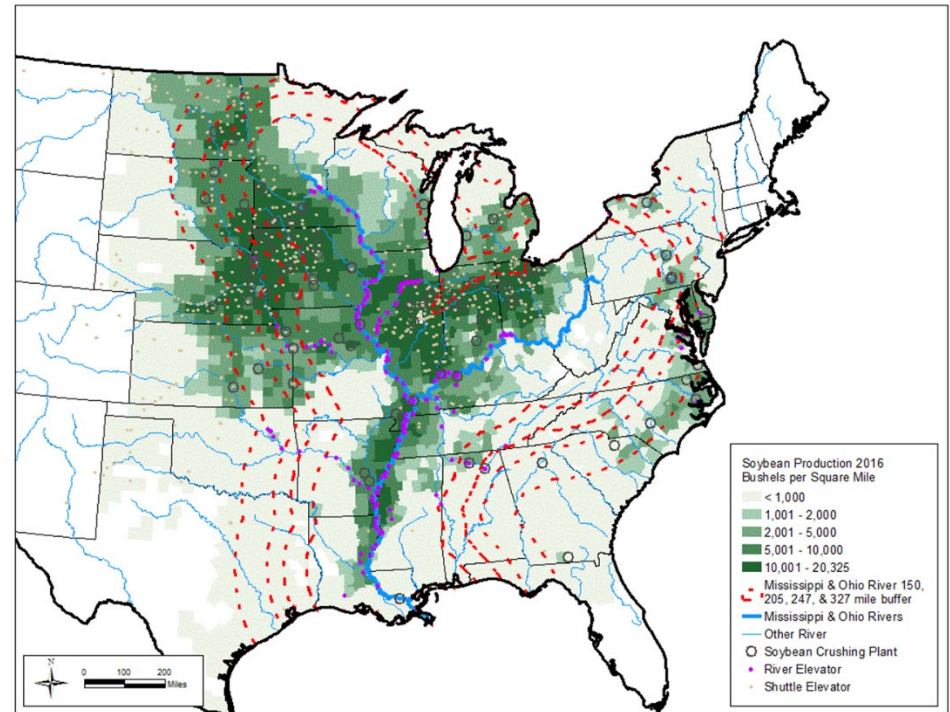
- Construction of a second 1,200-foot lock at Locks 20, 21, 22, 24, and 25 (above St. Louis) on the Mississippi River, and at LaGrange and Peoria on the Illinois Waterway is particularly important to agricultural shippers and barge operators. This project is referred to as the Navigation and Ecosystem Sustainability Program (NESP).
 - Corn and soybeans, and to a lesser extent wheat, are the dominant commodities in terms of tonnage shipped through these locks.
 - These products typically are bound for the lower Mississippi River region to be transloaded to an export elevator and oceangoing ships for export.
 - Fertilizer, moving northbound by barge, is also a significant commodity being shipped through these locks.
 - All seven of these locks are currently 600 feet in length and 110 feet in width, which means that the 15-barge tows typically found on the river moving grain for export must be split into two sections to pass through. By constructing a new 1,200 foot lock, a 15-barge tow could pass through the lock in one lockage.
 - Congress authorized expansions of the seven NESP locks in WRDA 2007 (P.L. 110-114, Title VIII). No appropriations have been provided for construction, and limited funding for preliminary work (referred to as preconstruction engineering and design) has been provided.²⁶
 - An increase in lock size would result in cutting in half the time it takes for a 15-barge tow to transit each lock.

²⁶ USACE, Rock Island District, NESP Program Status; <http://www.mvr.usace.army.mil/Missions/Navigation/NESP/Program-Status/>.



- The deepening of the lower Mississippi River will attract more grain and soybean volumes flowing to the river for export positioning on the lower Mississippi River.
 - Improving the draft of the lower Mississippi River from 45 feet to 50 feet would increase reliability of river navigation and reduce the impact of low-water events.
 - With the lower Mississippi River dredged to 50 feet, the effective draw area around the waterways system would be increased from 205 miles to 247 miles.
 - The impact of the deeper draft on the lower Mississippi River will save \$5 per metric ton in ocean freight as the average weight loaded onto ocean going vessels increases from 66,000 metric tons to 78,000 metric tons.
 - From a basis standpoint, the basis will improve 13 cents per bushel for 205 miles from the river and decline steadily until reaching zero at 247 miles. An increase in basis (price) received by farmers leads to an increase in land values.

Exhibit 35: Extended Soybean Draw Area on the Inland Waterways with Dredging Lower Mississippi River to 50-Feet



Source: Agribusiness Consulting and IEG Vantage



B. IMPLAN Analysis

1. Projected Economic Contributions of the Inland Waterways through 2029

Looking forward 10 years to 2029 under the Increased Investment Scenario, direct and total economic contributions of the waterways to the U.S. economy were derived and are presented below:

■ Direct Economic Contributions:

○ In 2029, the U.S. inland waterways system is estimated to directly contribute:

- \$26.4 billion in Economic Output
- 64,400 Jobs
- \$11.5 billion in GDP

○ Government investment via the President's Budget in 2029 in real terms is estimated at:

- \$860 million for Operations and Maintenance
- \$1 billion for Construction

○ According to USACE, it is estimated that approximately 30 percent of funds would be spent through federal channels while the remaining 70 percent would be spent through private sector contracting.²⁷ This investment resulted in a direct contribution of:

- \$1.9 billion in Economic Output
- 10,500 Jobs
- \$1.1 billion in GDP

²⁷ Increased investment will require that a greater percentage of the investment be allocated to private sector contractors than under status quo investment.



Exhibit 36: Direct Economic Contributions by the Inland Waterways, 2029 Increased Investment

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Inland Waterways	64,350	\$7,243	\$11,453	\$26,356
Construction and O&M	10,460	\$780	\$1,050	\$1,875
Government	2,262	\$260	\$366	\$562
Private	8,198	\$519	\$685	\$1,312
Total	74,810	\$8,023	\$12,504	\$28,231

Source: IMPLAN, Agribusiness Intelligence

■ Total Economic Contributions:

○ In 2029, the U.S. inland waterways system in total contributes:

- \$75.2 billion in Economic Output
- 319,600 Jobs
- \$38.3 billion in GDP

○ According to the USACE, it is estimated that roughly 30 percent of funds would be spent through federal channels while the remaining 70 percent would be spent through contracting private sector entities. This investment resulted in a direct contribution of:

- \$5 billion in Economic Output
- 26,500,200 Jobs
- \$2.7 billion in GDP



Exhibit 37: Total Economic Contributions by the Inland Waterways, 2029 Increased Investment

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Inland Waterways	319,592	\$23,376	\$38,262	\$75,223
Construction and O&M	26,537	\$1,746	\$2,714	\$4,953
Government	6,784	\$531	\$831	\$1,389
Private	19,753	\$1,215	\$1,884	\$3,564
Total	346,129	\$25,122	\$40,977	\$80,176

Source: IMPLAN, Agribusiness Intelligence



- Exhibit 38 and Exhibit 39 show the top 10 (ranked by employment and GDP gains) IMPLAN industries that benefit from activities and investment along the U.S. inland waterways system.
- As expected, water transportation and support activities for water transportation rank at the top of the list for jobs supported by activities and investment on the U.S. inland waterways system.

○ Water Transportation

- **Employment:** 30,400
- **GDP:** \$6.6 Billion

○ Support Activities

- **Employment:** 46,800
- **GDP:** \$6.1 Billion

Exhibit 38: Top 10 Industries Affected by the Inland Waterways, GDP, 2029 Increased Investment

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
410	Water transportation	30,404	\$3,338	\$6,554	\$16,816
414	Support activities for water transportation	46,789	\$4,871	\$6,126	\$11,993
440	Real estate	11,989	\$328	\$1,988	\$2,783
395	Wholesale trade	10,151	\$925	\$1,791	\$2,604
441	Owner-occupied dwellings	-	-	\$1,457	\$2,249
433	Monetary authorities and depository credit intermediation	2,942	\$278	\$764	\$1,010
415	Couriers and messengers	11,023	\$480	\$724	\$1,361
437	Insurance carriers	2,233	\$260	\$687	\$1,209
461	Management of companies and enterprises	3,762	\$500	\$620	\$1,010
482	Hospitals	6,233	\$537	\$617	\$1,013

Source: IMPLAN, Agribusiness Intelligence

Exhibit 39: Top 10 Industries Affected by the Inland Waterways, Employment, 2029 Increased Investment

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
414	Support activities for water transportation	46,789	\$4,871	\$6,126	\$11,993
410	Water transportation	30,404	\$3,338	\$6,554	\$16,816
440	Real estate	11,989	\$328	\$1,988	\$2,783
415	Couriers and messengers	11,023	\$480	\$724	\$1,361
395	Wholesale trade	10,151	\$925	\$1,791	\$2,604
501	Full-service restaurants	7,675	\$205	\$230	\$429
464	Employment services	7,076	\$314	\$466	\$613
502	Limited-service restaurants	6,910	\$152	\$372	\$647
62	Maintenance and repair construction of nonresidential structures	6,905	\$438	\$581	\$1,175
518	Postal service	6,297	\$587	\$602	\$704

Source: IMPLAN, Agribusiness Intelligence



2. Projected Economic Contributions of the Inland Waterways through 2045

Looking forward 25 years to 2045 under the Increased Investment Scenario, direct and total economic contributions of the waterways to the U.S. economy were derived and are shown below:

■ Direct Economic Contributions:

○ In 2045, the U.S. inland waterways system is estimated to directly contribute:

- \$42.9 billion in Economic Output
- 76,300 Jobs
- \$18.6 billion in GDP

○ Government investment via the President's Budget in 2045 is estimated at:

- \$1.2 billion for Operations and Maintenance
- \$382 million for Construction

○ The USACE share of spending was held constant at approximately 30 percent spent through federal channels while 70 percent spent through private sector contracting. This investment resulted in a direct contribution of:

- \$1.6 billion in Economic Output
- 7,900 Jobs
- \$900 million in GDP



Exhibit 40: Direct Economic Contributions by the Inland Waterways, 2045 Increased Investment

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Inland Waterways	76,299	\$11,790	\$18,643	\$42,900
Construction and O&M	7,934	\$672	\$911	\$1,563
Government	1,950	\$253	\$357	\$469
Private	5,983	\$419	\$554	\$1,094
Total	84,233	\$12,462	\$19,554	\$44,463

Source: IMPLAN, Agribusiness Intelligence

■ **Total Economic Contributions:**

○ In 2045, the U.S. inland waterways system in total contributes:

- \$121 billion in Economic Output
- 452,300 Jobs
- \$62.3 billion in GDP

○ The USACE share of spending was held constant at approximately 30 percent spent through federal channels with 70 percent spent through private sector contracting. This investment resulted in a direct contribution of:

- \$4 billion in Economic Output
- 20,000 Jobs
- \$2.3 billion in GDP



Exhibit 41: Total Economic Contributions by the Inland Waterways, 2045 Increased Investment

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Inland Waterways	452,278	\$38,050	\$62,280	\$121,024
Construction and O&M	20,008	\$1,465	\$2,283	\$4,054
Government	5,162	\$460	\$717	\$1,096
Private	14,846	\$1,005	\$1,566	\$2,958
Total	472,287	\$39,515	\$64,563	\$125,078

Source: IMPLAN, Agribusiness Intelligence



- Exhibit 42 and Exhibit 43 show the top 10 (ranked by employment and GDP gains) IMPLAN industries that benefit from activities and investment along the U.S. inland waterways system.
- As expected, water transportation and support activities for water transportation rank at the top of the list for jobs supported by activities and investment on the U.S. inland waterways system.

○ Water Transportation

- **Employment:** 36,000
- **GDP:** \$10.7 Billion

○ Support Activities

- **Employment:** 59,100
- **GDP:** \$10.0 Billion

Exhibit 42: Top 10 Industries Affected by the Inland Waterways, GDP, 2045 Increased Investment

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
410	Water transportation	36,062	\$5,433	\$10,668	\$27,369
414	Support activities for water transportation	59,097	\$7,925	\$9,965	\$19,510
440	Real estate	17,112	\$517	\$3,136	\$4,390
395	Wholesale trade	14,404	\$1,450	\$2,809	\$3,944
441	Owner-occupied dwellings	-	-	\$2,293	\$3,539
433	Monetary authorities and depository credit intermediation	4,205	\$439	\$1,206	\$1,509
415	Couriers and messengers	16,178	\$779	\$1,175	\$2,208
437	Insurance carriers	3,211	\$413	\$1,091	\$1,922
156	Petroleum refineries	540	\$166	\$988	\$3,889
461	Management of companies and enterprises	5,365	\$788	\$977	\$1,592

Source: IMPLAN, Agribusiness Intelligence

Exhibit 43: Top 10 Industries Affected the Inland Waterways, Employment, 2045 Increased Investment

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
414	Support activities for water transportation	59,097	\$7,925	\$9,965	\$19,510
410	Water transportation	36,062	\$5,433	\$10,668	\$27,369
440	Real estate	17,112	\$517	\$3,136	\$4,390
415	Couriers and messengers	16,178	\$779	\$1,175	\$2,208
395	Wholesale trade	14,404	\$1,450	\$2,809	\$3,944
501	Full-service restaurants	10,920	\$323	\$362	\$674
464	Employment services	10,103	\$496	\$735	\$965
502	Limited-service restaurants	9,838	\$239	\$585	\$1,018
62	Maintenance and repair construction of nonresidential structures	9,265	\$649	\$861	\$1,742
518	Postal service	9,230	\$951	\$975	\$1,140

Source: IMPLAN, Agribusiness Intelligence



Exhibit 44: Summary of Economic Contribution of Inland Waterways System with Increased Investment

	Direct			Total		
	2016	2029	2045	2016	2029	2045
Employment	60,285	74,810	84,233	255,782	346,129	472,287
Labor Income	\$5,232	\$8,023	\$12,462	\$16,606	\$25,122	\$39,515
GDP	\$8,263	\$12,504	\$19,554	\$27,188	\$40,977	\$64,563
Output	\$18,367	\$28,231	\$44,463	\$52,833	\$80,176	\$125,078

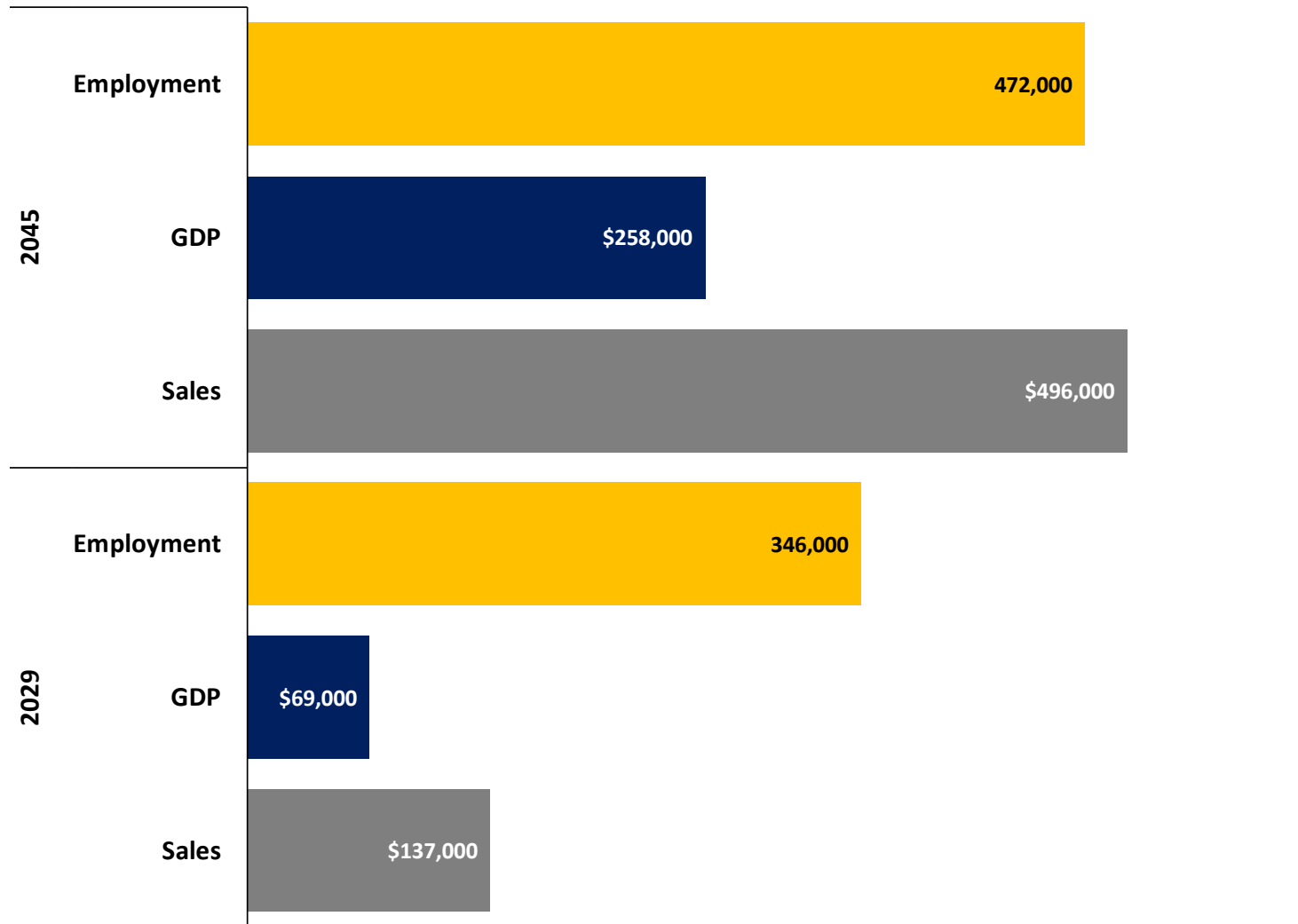
Note: \$ values in millions.

3. Total Cumulative Economic Impacts with Increased Investment, 2029 and 2045

- The cumulative economic impacts for GDP and output (sales) were calculated as the average between time periods (2016 to 2029, and 2029 to 2045) multiplied by the number of years between those time periods. Employment reflects a job added by the respective year, 2029 and 2045.
- The employment count, cumulative GDP, and output (sales) to 2029 and 2045 for the increased investment scenario are summarized in Exhibit 45.



Exhibit 45: Total Cumulative Economic Impact with Increased Inland Waterways System Investment to 2029 and 2045 (Employment Actual Count, GDP and Sales in Millions of Dollars)



VII. ECONOMIC IMPORTANCE WITH REDUCED INVESTMENT

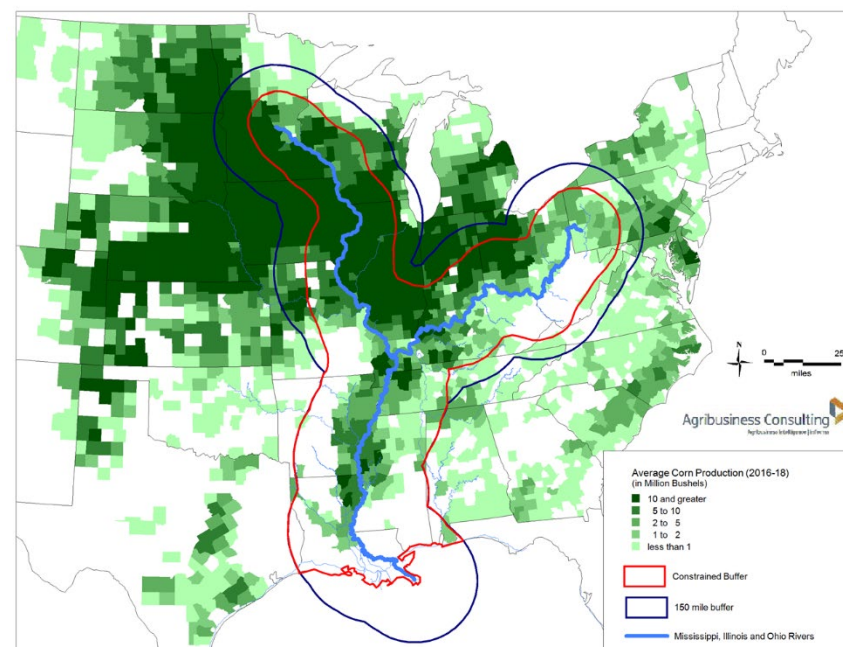
C. Scenario Description

- Under the third scenario, with reduced investment and no new construction or additional dredging of the inland waterways system:
 - USACE O&M funds are to be decreased one percent every year. A reduction combined with increasing costs due to inflation will progressively lead to increased delays as the system falls behind in repairs.
 - Locks and dams would continue to be operated with minimal maintenance performed.
 - Repairs would be made only after operational failure of a lock, with no proactive maintenance or repairs (a “fix-as-fails” approach).
- Such a scenario is expected to result in more frequent short-term closures for repairs required to keep the affected lock operating and increased delay times as barge traffic increased.
 - The cost of increasing delays also is expected to result in the diversion of waterborne commodity traffic to rail and truck.
 - Agriculture-related movements diverted to rail would either ship to the Pacific Northwest, to Canada for export or to below the last lock on the Mississippi River for export through the Gulf. Rail capacity issues in St. Louis are to be expected if that mode and route are chosen; only five trains per day currently serve the greater St. Louis area grain barge loading facilities.
 - It is more likely that shipments will be by truck to below the locking portion of the inland waterways.



- The average lock delay is forecast to increase over time as maintenance is curtailed. The more locks a shipment must pass through, the greater is the delay per shipment.
 - A tow passing through only Lock 27 on the Mississippi River is projected to have an increase of just under \$0.01 per bushel while a tow beginning at Lock 1 just below Minneapolis would have an increase of roughly \$0.24 per corn bushel and \$0.25 per soybean bushel.
 - Similarly on the Illinois Waterway, the per-bushel impact would increase from just over \$0.01 at LaGrange to more than \$0.08 per bushel at Lockport.
- Assuming an average draw area of 150 miles from the waterways system, the increased barge transportation cost must be offset by a decrease in truck transportation. The draw area would progressively decline until it reached only 77 miles near Minneapolis.
 - The decline on the Illinois River will be 25 miles due to fewer locks.
- The increase in waterways costs and a declining draw area would shift agriculture exports to the rail system. The IMPLAN analysis assumes that rail shipments would increase to 20 trains per day to the PNW, five trains per day to St. Louis, and four trains per day to Canada for export out of Vancouver.

Exhibit 46: Reduced Corn Draw Area with Increased Barge Locking Delays on the Inland Waterways

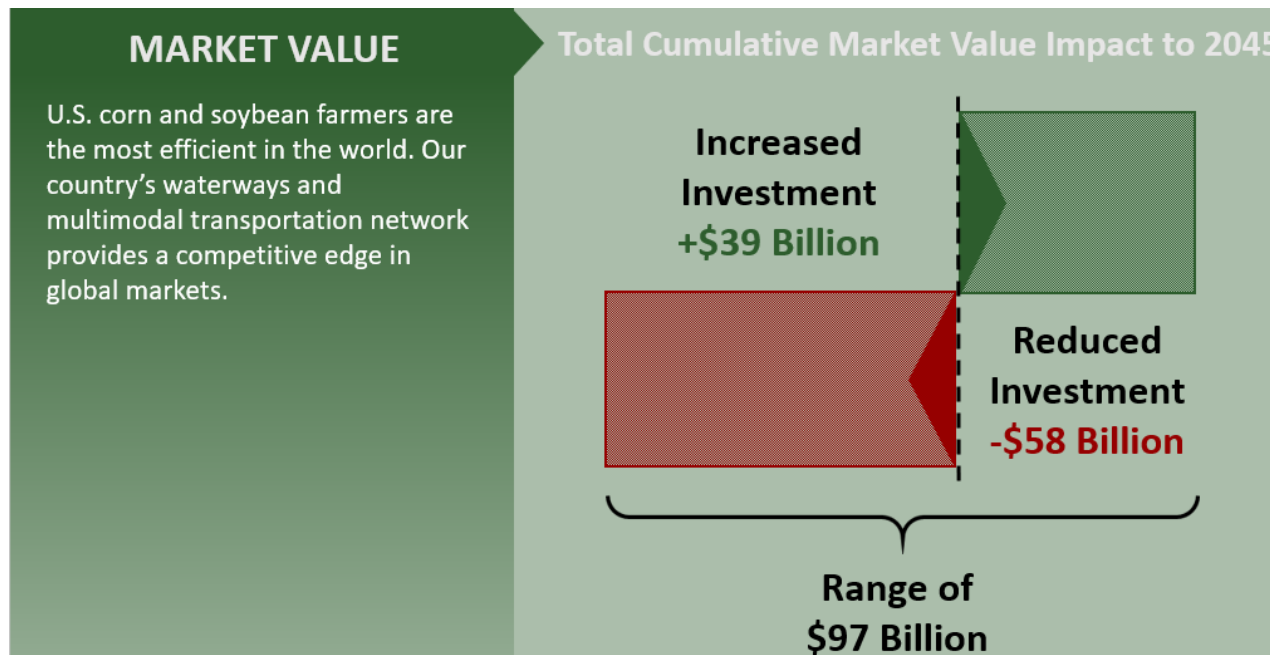


Source: Agribusiness Intelligence



- Farmers potentially can shift their crop mix to a limited degree, but it is more likely that some acres, particularly marginal land, will be taken out of production, thereby potentially reducing production and the resulting economic multiplier benefits ag production brings to rural areas and the U.S. economy.
- Increased transportation costs are forecast to be borne by producers and could reduce farmgate prices by up to \$0.24 per corn bushel and \$0.25 per soybean bushel.
- When the impact of the reduced investment in the inland waterways system is compared to the impact of status quo investment, there is a \$58 billion decline in the market value of corn and soybeans. When compared to the market value of increased investment in the inland waterways system, the difference reaches \$97 billion in 2045.

Exhibit 47: Comparison of Impact of Increased Investment vs. Reduced Investment in the Inland Waterways System



- The reduction in agricultural commodity prices is forecast to have additional impacts:
 - Reduced soybean and corn prices could lead to increased domestic crushing and grind.
 - There is potential for livestock herds and flocks expansion, though not substantially, as a result of reduced feed costs.



D. IMPLAN Analysis

1. Projected Economic Contributions of the Inland Waterways through 2029

Looking forward 10 years to 2029 under the Reduced Investment Scenario, direct and total economic contributions of the waterways to the U.S. economy were derived and are shown below:

- Direct Economic Contributions:
 - In 2029, the U.S. inland waterways system is estimated to directly contribute:
 - \$23.2 billion in Economic Output
 - 56,800 Jobs
 - \$10.1 billion in GDP
 - Government investment via the President's Budget in 2029 in real terms is estimated at:
 - \$638 million for Operations and Maintenance
 - \$0 million for Construction
 - According to the USACE, it is estimated that roughly 80 percent of funds would be spent through federal channels while the remaining 20 percent would be spent through private sector contracting. This investment resulted in a direct contribution of:
 - \$638 million in Economic Output
 - 3,300 Jobs
 - \$493 million in GDP



Exhibit 48: Direct Economic Contributions by the Inland Waterways, 2029 Reduced Investment

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Inland Waterways	56,753	\$6,388	\$10,101	\$23,245
Construction and O&M	3,309	\$352	\$493	\$638
Government	2,559	\$304	\$430	\$511
Private	750	\$48	\$63	\$128
Total	60,062	\$6,740	\$10,594	\$23,883

Source: IMPLAN, Agribusiness Intelligence

■ Total Economic Contributions:

○ In 2029, the U.S. inland waterways system in total will contribute:

- \$66.3 billion in Economic Output
- 281,900 Jobs
- \$33.7 billion in GDP

○ According to USACE, it is estimated that roughly 80 percent of funds would be spent through federal channels while the remaining 20 percent would be spent through private sector contracting. This investment resulted in a direct contribution of:

- \$1.5 billion in Economic Output
- 8,100 Jobs
- \$971 million in GDP



Exhibit 49: Total Economic Contributions by the Inland Waterways, 2029 Reduced Investment

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Inland Waterways	281,866	\$20,617	\$33,746	\$66,344
Construction and O&M	8,050	\$625	\$971	\$1,503
Government	6,142	\$508	\$788	\$1,151
Private	1,908	\$117	\$182	\$352
Total	289,916	\$21,242	\$34,716	\$67,847

Source: IMPLAN, Agribusiness Intelligence



- Exhibit 50 and Exhibit 51 show the top 10 (ranked by employment and GDP gains) IMPLAN industries that benefit from activities and investment along the U.S. inland waterways system.
- As expected, water transportation and support activities for water transportation rank at the top of the list for jobs supported by activities and investment on the U.S. inland waterways system.

○ Water Transportation

- **Employment:** 26,800
- **GDP:** \$5.8 Billion

○ Support Activities

- **Employment:** 41,200
- **GDP:** \$5.4 Billion

Exhibit 50: Top 10 Industries Affected the Inland Waterways by GDP, 2029 Reduced Investment

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
410	Water transportation	26,812	\$2,943	\$5,780	\$14,829
414	Support activities for water transportation	41,221	\$4,293	\$5,398	\$10,569
440	Real estate	10,191	\$279	\$1,690	\$2,366
395	Wholesale trade	8,477	\$772	\$1,496	\$2,175
441	Owner-occupied dwellings	0	\$0	\$1,232	\$1,903
433	Monetary authorities and depository credit intermediation	2,494	\$235	\$647	\$856
415	Couriers and messengers	9,672	\$421	\$636	\$1,194
437	Insurance carriers	1,920	\$224	\$591	\$1,040
156	Petroleum refineries	321	\$89	\$532	\$2,094
518	Postal service	5,518	\$515	\$528	\$617

Source: IMPLAN, Agribusiness Intelligence

Exhibit 51: Top 10 Industries Affected by the Inland Waterways by Employment, 2029 Reduced Investment

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
414	Support activities for water transportation	41,221	\$4,293	\$5,398	\$10,569
410	Water transportation	26,812	\$2,943	\$5,780	\$14,829
440	Real estate	10,191	\$279	\$1,690	\$2,366
415	Couriers and messengers	9,672	\$421	\$636	\$1,194
395	Wholesale trade	8,477	\$772	\$1,496	\$2,175
501	Full-service restaurants	6,480	\$174	\$194	\$362
464	Employment services	5,998	\$266	\$395	\$519
502	Limited-service restaurants	5,843	\$128	\$314	\$547
518	Postal service	5,518	\$515	\$528	\$617
482	Hospitals	5,275	\$455	\$523	\$857

Source: IMPLAN, Agribusiness Intelligence



2. Projected Economic Contributions of the Inland Waterways through 2045

Looking forward 25 years to 2045 under the Reduced Investment Scenario, direct and total economic contributions of the waterways to the U.S. economy were derived and are shown below:

- Direct Economic Contributions:
 - In 2045, the U.S. inland waterways system is estimated to directly contribute:
 - \$30.6 billion in Economic Output
 - 56,000 Jobs
 - \$13.5 billion in GDP
 - Government investment via the President's Budget in 2045 in real terms is estimated at:
 - \$543 million for Operations and Maintenance
 - \$0 million for Construction
 - The USACE share of spending was held constant at roughly 80 percent spent through federal channels while 20 percent spent through private sector contracting. This investment resulted in a direct contribution of:
 - \$543 million in Economic Output
 - 2,600 Jobs
 - \$421 million in GDP



Exhibit 52: Direct Economic Contributions by the Inland Waterways, 2045 Reduced Investment

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Inland Waterways	55,956	\$8,551	\$13,468	\$30,546
Construction and O&M	2,558	\$300	\$421	\$543
Government	1,980	\$260	\$367	\$435
Private	578	\$41	\$54	\$109
Total	58,513	\$8,852	\$13,888	\$31,089

Source: IMPLAN, Agribusiness Intelligence

■ Total Economic Contributions:

○ In 2045, the U.S. inland waterways system in total will contribute:

- \$84.7 billion in Output
- 316,500 Jobs
- \$43.6 billion in GDP

○ The USACE share of spending was held constant at roughly 80 percent spent through federal channels while 20 percent spent through private sector contracting. This investment resulted in a direct contribution of:

- \$1.3 billion in Output
- 6,200 Jobs
- \$830 million in GDP



Exhibit 53: Total Economic Contributions by the Inland Waterways, 2045 Reduced Investment

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Inland Waterways	316,526	\$26,629	\$43,587	\$84,698
Construction and O&M	6,227	\$534	\$830	\$1,267
Government	4,757	\$435	\$674	\$971
Private	1,470	\$99	\$155	\$296
Total	322,753	\$27,163	\$44,416	\$85,965

Source: IMPLAN, Agribusiness Intelligence



- Exhibit 54 and Exhibit 55 show the top 10 (ranked by employment and GDP gains) IMPLAN industries that benefit from activities and investment along the U.S. inland waterways system.
- As expected, water transportation and support activities for water transportation rank at the top of the list for jobs supported by activities and investment on the U.S. inland waterways system.

○ Water Transportation

- **Employment:** 25,200
- **GDP:** \$6.2 Billion

○ Support Activities

- **Employment:** 41,300
- **GDP:** \$5.8 Billion

Exhibit 54: Top 10 Industries Affected by the Inland Waterways by GDP, 2045 Reduced Investment

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
410	Water transportation	25,236	\$3,172	\$6,229	\$15,502
414	Support activities for water transportation	41,338	\$4,626	\$5,817	\$11,127
440	Real estate	11,799	\$298	\$1,804	\$2,484
395	Wholesale trade	9,838	\$827	\$1,601	\$2,394
441	Owner-occupied dwellings	0	-	\$1,315	\$2,027
433	Monetary authorities and depository credit intermediation	2,893	\$252	\$692	\$959
415	Couriers and messengers	11,297	\$454	\$685	\$1,252
437	Insurance carriers	2,224	\$239	\$631	\$1,085
156	Petroleum refineries	374	\$96	\$572	\$2,004
518	Postal service	6,442	\$554	\$568	\$650

Source: IMPLAN, Agribusiness Intelligence

Exhibit 55: Top 10 Industries Affected by the Inland Waterways by Employment, 2045 Reduced Investment

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
414	Support activities for water transportation	41,338	\$4,626	\$5,817	\$11,127
410	Water transportation	25,236	\$3,172	\$6,229	\$15,502
440	Real estate	11,799	\$298	\$1,804	\$2,484
415	Couriers and messengers	11,297	\$454	\$685	\$1,252
395	Wholesale trade	9,838	\$827	\$1,601	\$2,394
501	Full-service restaurants	7,501	\$185	\$207	\$383
464	Employment services	6,966	\$285	\$423	\$557
502	Limited-service restaurants	6,762	\$137	\$336	\$579
518	Postal service	6,442	\$554	\$568	\$650
482	Hospitals	6,104	\$485	\$558	\$967

Source: IMPLAN, Agribusiness Intelligence



Exhibit 56: Summary of Economic Contribution of Inland Waterways System with Reduced Investment

	Direct			Total		
	2016	2029	2045	2016	2029	2045
Employment	60,285	60,062	58,513	255,782	289,916	322,753
Labor Income	\$5,232	\$6,740	\$8,852	\$16,606	\$21,242	\$27,163
GDP	\$8,263	\$10,594	\$13,888	\$27,188	\$34,716	\$44,416
Output	\$18,367	\$23,883	\$31,089	\$52,833	\$67,847	\$85,965

Note: \$ values in millions.

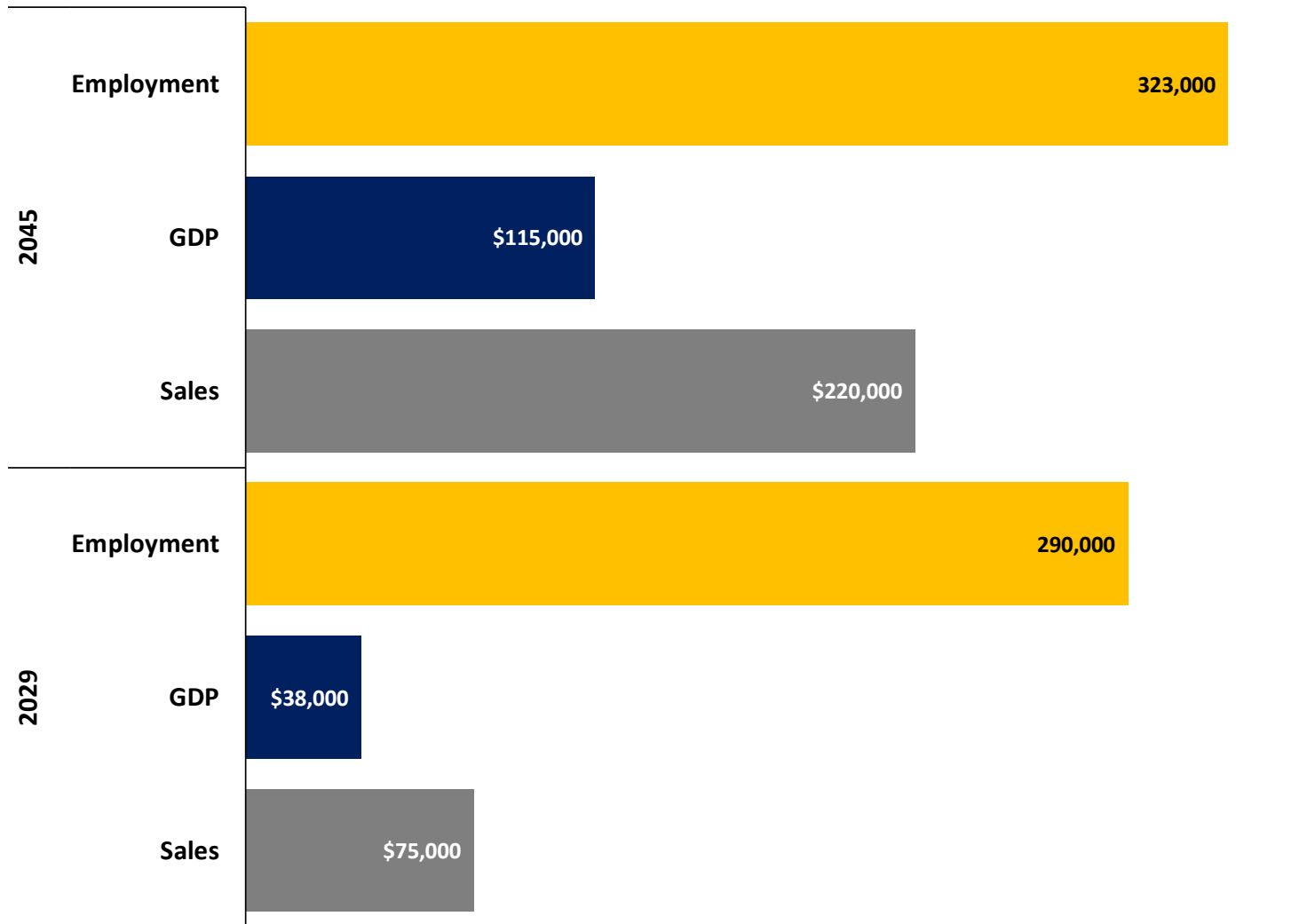
Source: IMPLAN, Agribusiness Intelligence

3. Total Cumulative Economic Impacts with Reduced Investment, 2029 and 2045

- The cumulative economic impacts for GDP and output (sales) were calculated as the average between time periods (2016 to 2029, and 2029 to 2045) multiplied by the number of years between those time periods. Employment reflects a job added by the respective year, 2029 and 2045.
- The employment count, cumulative GDP, and output (sales) to 2029 and 2045 for the reduced investment scenario are summarized in Exhibit 57.



Exhibit 57: Total Cumulative Economic Impact with Reduced Inland Waterways System Investment to 2029 and 2045 (Employment Actual Count, GDP and Sales in Millions of Dollars)



E. Impact of a Lock Failure

The possibility of an extended lock failure could be one of the outcomes of a “No Investment” approach. Although not specifically part of this study, research has been performed in the past on the consequences of such a failure.

- Lock and Dam 25 on the Mississippi River is an older structure, has not been approved for a major rehabilitation as of 2019 and has been the subject of previous studies. Lock and Dam 25 links the Upper Mississippi River with the remainder of the inland waterways system.
 - A failure here would impact over 7.5 million tons of corn and almost 6 million tons of soybeans headed to export at the Gulf, based upon 2017 commodity flows.
 - In addition, more than 3 million tons of fertilizer shipped up-bound would be impacted.

Exhibit 58: Lock 25 Annual Tonnage by Commodity Grouping

	CY2010	CY2011	CY2012	CY2013	CY2014	CY2015	CY2016	CY2017
00 - All Units (Ferried Autos, Passengers, Railway Cars)	-	-	-	-	-	-	-	-
10 - All Coal, Lignite, and Coal Coke	2,068,539	1,528,178	928,588	731,700	752,600	435,200	298,949	311,373
20 - All Petroleum and Petroleum Products	370,009	245,230	184,300	376,600	348,740	295,000	244,557	254,279
30 - All Chemicals and Related Products	3,019,716	3,582,237	3,444,506	3,900,426	4,393,941	4,222,345	4,701,027	4,296,964
40 - All Crude Materials, Inedible, Except Fuels	2,296,529	2,611,946	1,975,340	2,303,676	3,106,028	2,347,780	1,958,472	1,915,251
50 - All Primary Manufactured Goods	1,017,574	1,329,147	1,543,665	1,458,020	1,724,156	1,475,263	1,859,864	1,859,270
60 - All Food and Farm Products	15,274,530	13,643,310	13,927,272	8,457,467	11,292,154	16,066,195	22,509,356	22,686,412
70 - All Manufactured Equipment & Machinery	32,393	75,480	139,897	78,860	46,895	71,910	176,210	176,154
80 - All Waste Material			3,100		2,605	4,800		-
90 - All Unknown or Not Elsewhere Classified - 90	37,809	17,531	16,600	9,200	6,400	1,600	8,200	8,197
Total	24,117,099	23,033,059	22,163,268	17,315,949	21,673,519	24,920,093	31,756,635	31,507,900
Total Loaded Barges	15,455	14,742	14,505	11,131	13,886	16,100	20,264	20,244
Empty	7,018	5,711	6,579	3,741	4,839	7,084	11,434	8,552
Total Barges	22,473	20,453	21,084	14,872	18,725	23,184	31,698	28,796
Barge Load Weight	1,560	1,562	1,528	1,556	1,561	1,548	1,567	1,556
Empty/Total Barges	45%	39%	45%	34%	35%	44%	56%	42%

Source: U.S. Army Corps of Engineers



- A 2011 study (Kruse) identified Locks and Dams 20 and 25 as the two most critical structures on the Upper Mississippi, based on their age, need for maintenance, and the economic consequences of their failure.²⁸
- A Mid-America Freight Coalition study from 2017 reports that, “Under the extreme closure of the entire system north of lock 25, and with 100 percent of the tonnage going to trucks, there would be an additional 12,337,400 tons of goods moved on 489,496 truckloads.”
 - Pavement damage costs are estimated at \$28,841,353 and additional costs to the trucking industry would be approximately \$283,072,536.
 - Further, “there would be an additional 212,464 tons of CO₂ with an approximate social cost of \$7,720,704.”²⁹ The study assumes that all agricultural products would be trucked to St. Louis.
- A study prepared for the National Waterways Foundation and the U.S. Maritime Administration estimated the cost of an unplanned closure of Lock 25 would be \$1.57 billion.³⁰
 - A closure of Lock 25 would impact 132 counties in 17 States, affect the primary path for corn and soybean exports, test the nation’s railroads, and discourage 80 percent of users from returning to the waterways.

²⁸ Kruse, James, Zafarbek Ahmedov, Bruce McCarl, Ximing Wu, and James Mjelde. America’s Locks & Dams: “A Ticking Time Bomb for Agriculture?” College Station, Texas. Texas Transportation Institute, December 2011. https://unitedsoybean.org/wp-content/uploads/Americas_Locks_And_Dams.pdf.

²⁹ Mid-America Freight Coalition, “Modal Investment Comparison: The Impact of Upper Mississippi River Lock and Dam Shutdowns on State Highway Infrastructure, October 2017.

³⁰ Center for Transportation Research, University of Tennessee and Vanderbilt Engineering Center for Transportation and Operational Resiliency, Vanderbilt University, “The Impacts of Unscheduled Lock Outages”, October 2017.

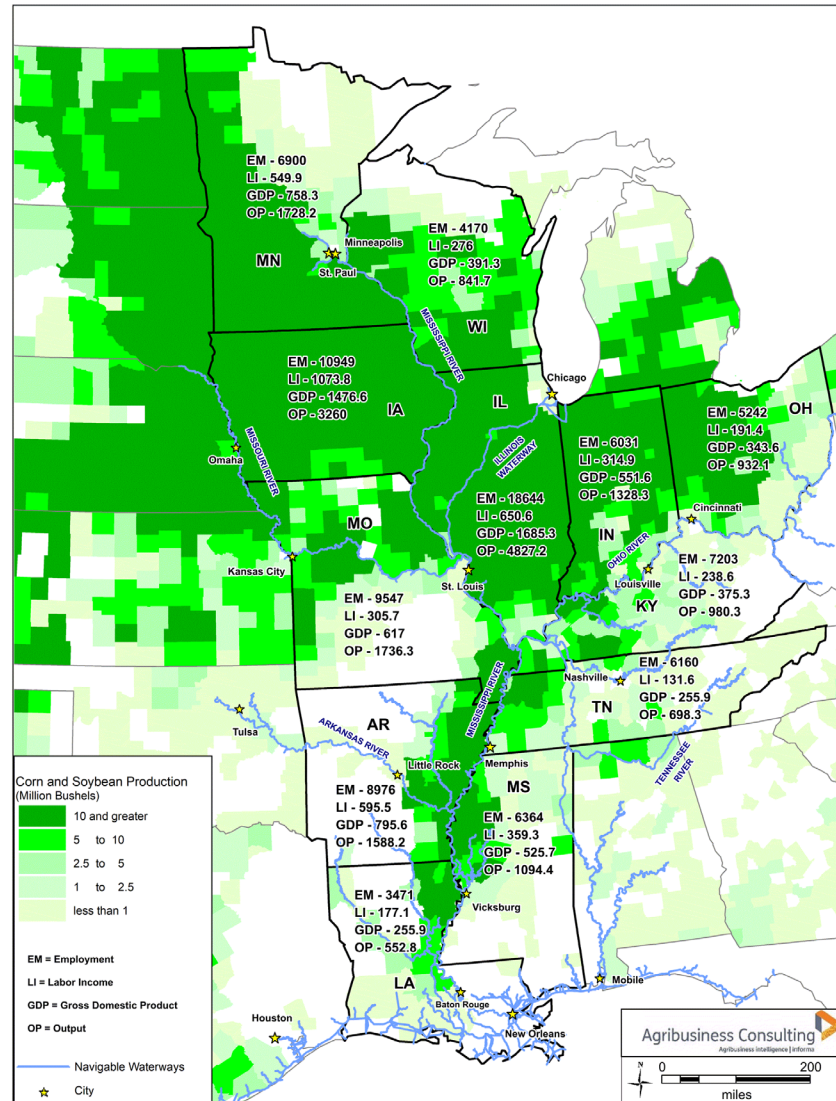


VIII. CURRENT ECONOMIC CONTRIBUTIONS OF CORN AND SOYBEAN EXPORTS MOVED ALONG THE INLAND WATERWAYS BY STATE

The inland waterways support a significant portion of corn and soybean exports moving from States adjacent to the navigable waterways of the Mississippi River down through to the Gulf of Mexico. This section summarizes analysis of the present economic contribution to State economies from the production of corn and soybeans that are estimated to be transported via the inland waterways by barge and destined for export through the export grain complex of elevators from Baton Rouge through New Orleans to Myrtle Grove, LA on the Mississippi River in the Center Gulf. Corn and soybean production do not impact every industry in each State to the same degree. Presented for each State are the direct contributions, total contributions, and the top 10 industries affected and ranked in terms of GDP and employment. Exhibit 60 shows a summary of the results by State.



Exhibit 59: Economic Impact of Corn and Soybean Exports via Inland Waterways by Select States, 2016



Source: Agribusiness Intelligence



**Exhibit 60: Total Contributions from State Commodity Production for Exports via
Inland Waterways, 2016**

State	Commodity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Arkansas	Corn	1,171	\$32.9	\$49.1	\$154.8
	Soybean	7,805	\$562.7	\$746.4	\$1,433.4
	Total	8,976	\$595.5	\$795.6	\$1,588.2
Illinois	Corn	8,684	\$279.4	\$622.5	\$1,880.5
	Soybean	9,960	\$371.2	\$1,062.8	\$2,946.7
	Total	18,644	\$650.6	\$1,685.3	\$4,827.2
Indiana	Corn	1,654	\$55.0	\$96.8	\$291.6
	Soybean	4,377	\$259.9	\$454.8	\$1,036.7
	Total	6,031	\$314.9	\$551.6	\$1,328.3
Iowa	Corn	812	\$37.7	\$68.5	\$221.8
	Soybean	10,137	\$1,036.2	\$1,408.0	\$3,038.2
	Total	10,949	\$1,073.8	\$1,476.6	\$3,260.0
Kentucky	Corn	2,599	\$48.7	\$80.8	\$271.7
	Soybean	4,604	\$190.0	\$294.5	\$708.7
	Total	7,203	\$238.6	\$375.3	\$980.3
Louisiana	Corn	0	\$0.0	\$0.0	\$0.0
	Soybean	3,471	\$177.1	\$255.9	\$552.8
	Total	3,471	\$177.1	\$255.9	\$552.8
Minnesota	Corn	1,317	\$55.3	\$90.4	\$281.9
	Soybean	5,583	\$494.7	\$667.9	\$1,446.4
	Total	6,900	\$549.9	\$758.3	\$1,728.2
Mississippi	Corn	1,129	\$28.8	\$47.7	\$148.1
	Soybean	5,234	\$330.5	\$478.0	\$946.3
	Total	6,364	\$359.3	\$525.7	\$1,094.4
Missouri	Corn	1,267	\$27.0	\$50.4	\$171.3
	Soybean	8,280	\$278.7	\$566.6	\$1,564.9
	Total	9,547	\$305.7	\$617.0	\$1,736.3
Ohio	Corn	381	\$8.6	\$16.5	\$49.9
	Soybean	4,861	\$182.8	\$327.2	\$882.2
	Total	5,242	\$191.4	\$343.6	\$932.1
Tennessee	Corn	1,284	\$17.8	\$34.9	\$102.5
	Soybean	4,876	\$113.8	\$221.1	\$595.7
	Total	6,160	\$131.6	\$255.9	\$698.3
Wisconsin	Corn	72	\$2.2	\$3.7	\$11.0
	Soybean	4,097	\$273.8	\$387.7	\$830.8
	Total	4,170	\$276.0	\$391.3	\$841.7

Source: IMPLAN, Agribusiness Intelligence

A. Arkansas Economic Contribution of Corn and Soybean Exports Moved Along Inland Waterways

1. Arkansas Corn Produced for Exports via Inland Waterways

- Direct Economic Contributions stem from the production of corn for exports via inland waterways.

- In 2016, Arkansas corn produced for exports via inland waterways directly contributed:

- \$85 Million in Economic Output
- 597 Jobs
- \$9.2 Million in GDP

Exhibit 61: Direct Economic Contributions from Arkansas Corn to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Corn Exports	597	\$9.6	\$9.2	\$85.0

Source: IMPLAN, Agribusiness Intelligence

- Total Economic Contributions stem from the production of corn for exports via inland waterways, from companies operating in the supply chain of direct contributors and spent wages from individuals employed by those companies. Total Economic Contributions include direct, indirect, and induced contributions.

- In 2016, Arkansas corn produced for exports via inland waterways in total contributed:

- \$155 Million in Output
- 1,171 Jobs
- \$49 Million in GDP

Exhibit 62: Total Economic Contributions from Arkansas Corn to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Corn Exports	1,171	\$32.9	\$49.1	\$154.8

Source: IMPLAN, Agribusiness Intelligence



■ Exhibit 63 and Exhibit 64 show the top 10 (ranked by employment and GDP gains) IMPLAN industries that benefit from Arkansas corn produced for exports via inland waterways.

■ As expected, grain farming and support activities for grain farming rank near the top of the list for jobs supported by Arkansas corn production for exports via inland waterways.

- Grain Farming
 - **Employment:** 597
 - **GDP:** \$9.2 Million
- Support Activities
 - **Employment:** 227
 - **GDP:** \$9.3 Million

Exhibit 63: Top 10 Industries Affected by Arkansas Corn to Exports via Inland Waterways by GDP

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
19	Support activities for agriculture and forestry	227	\$6,396	\$9,322	\$12,118
2	Grain farming	597	\$1,372	\$9,217	\$85,000
440	Real estate	39	\$324	\$5,207	\$7,537
395	Wholesale trade	25	\$1,732	\$4,114	\$6,139
441	Owner-occupied dwellings	0	\$0	\$1,751	\$2,703
433	Monetary authorities and depository credit intermediation	10	\$597	\$1,278	\$2,173
437	Insurance carriers	5	\$455	\$1,245	\$2,376
411	Truck transportation	9	\$444	\$660	\$1,522
62	Maintenance and repair construction of nonresidential structures	11	\$333	\$631	\$1,495
526	Other local government enterprises	4	\$287	\$624	\$1,460

Source: IMPLAN, Agribusiness Intelligence

Exhibit 64: Top 10 Industries Affected by Arkansas Corn to Exports via Inland Waterways by Employment

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
2	Grain farming	597	\$1,372	\$9,217	\$85,000
19	Support activities for agriculture and forestry	227	\$6,396	\$9,322	\$12,118
440	Real estate	39	\$324	\$5,207	\$7,537
395	Wholesale trade	25	\$1,732	\$4,114	\$6,139
62	Maintenance and repair construction of nonresidential structures	11	\$333	\$631	\$1,495
502	Limited-service restaurants	11	\$175	\$422	\$824
433	Monetary authorities and depository credit intermediation	10	\$597	\$1,278	\$2,173
411	Truck transportation	9	\$444	\$660	\$1,522
501	Full-service restaurants	9	\$173	\$206	\$428
438	Insurance agencies, brokerages, and related activities	9	\$328	\$562	\$1,419

Source: IMPLAN, Agribusiness Intelligence



2. Arkansas Soybeans Produced for Exports via Inland Waterways

- Direct Economic Contributions stem from the production of soybeans for exports via inland waterways.
 - In 2016, Arkansas soybeans produced for exports via inland waterways directly contributed:
 - \$826 Million in Economic Output
 - 2,934 Jobs
 - \$403 Million in GDP

Exhibit 65: Direct Economic Contributions from Arkansas Soybeans to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Soybean Exports	2,934	\$371.1	\$403.1	\$826.0

Source: IMPLAN, Agribusiness Intelligence

- Total Economic Contributions stem from the production of soybeans for exports via inland waterways, from companies operating in the supply chain of direct contributors and spent wages from individuals employed by those companies. Total Economic Contributions include direct, indirect, and induced contributions.
 - In 2016, Arkansas soybeans produced for exports via inland waterways in total contributed:
 - \$ 1.4 Billion in Output
 - 7,805 Jobs
 - \$746 Million in GDP

Exhibit 66: Total Economic Contributions from Arkansas Soybeans to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Soybean Exports	7,805	\$562.7	\$746.4	\$1,433.4

Source: IMPLAN, Agribusiness Intelligence



- Exhibit 67 and Exhibit 68 show the top 10 (ranked by employment and GDP gains) IMPLAN industries that benefit from Arkansas soybean produced for exports via inland waterways.

- As expected, oilseed farming and support activities for grain farming rank near the top of the list for jobs supported by Arkansas soybean production for exports via inland waterways.

- Oilseed Farming
 - ❑ **Employment:** 2,934
 - ❑ **GDP:** \$403 Million
- Support Activities
 - ❑ **Employment:** 1,063
 - ❑ **GDP:** \$44 Million

Exhibit 67: Top 10 Industries Affected by Arkansas Soybeans to Exports via Inland Waterways by GDP

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
1	Oilseed farming	2,934	\$3,856	\$403,075	\$826,000
19	Support activities for agriculture and forestry	1,063	\$29,983	\$43,695	\$56,800
440	Real estate	265	\$2,187	\$35,170	\$50,902
395	Wholesale trade	195	\$13,618	\$32,351	\$48,275
441	Owner-occupied dwellings	0	\$0	\$30,925	\$47,742
433	Monetary authorities and depository credit intermediation	81	\$5,041	\$10,789	\$18,341
482	Hospitals	138	\$8,108	\$9,935	\$19,202
475	Offices of physicians	89	\$8,062	\$8,210	\$12,559
437	Insurance carriers	34	\$2,861	\$7,833	\$14,953
502	Limited-service restaurants	175	\$2,807	\$6,753	\$13,181

Source: IMPLAN, Agribusiness Intelligence

Exhibit 68: Top 10 Industries Affected by Arkansas Soybeans to Exports via Inland Waterways by Employment

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
1	Oilseed farming	2,934	\$3,856	\$403,075	\$826,000
19	Support activities for agriculture and forestry	1,063	\$29,983	\$43,695	\$56,800
440	Real estate	265	\$2,187	\$35,170	\$50,902
395	Wholesale trade	195	\$13,618	\$32,351	\$48,275
502	Limited-service restaurants	175	\$2,807	\$6,753	\$13,181
501	Full-service restaurants	145	\$2,700	\$3,208	\$6,670
482	Hospitals	138	\$8,108	\$9,935	\$19,202
62	Maintenance and repair construction of nonresidential structures	107	\$3,204	\$6,062	\$14,375
405	Retail - General merchandise stores	91	\$2,446	\$4,394	\$6,749
411	Truck transportation	90	\$4,259	\$6,331	\$14,595

Source: IMPLAN, Agribusiness Intelligence



B. Illinois Economic Contribution of Corn and Soybean Exports Moved Along Inland Waterways

1. Illinois Corn Produced for Exports via Inland Waterways

- Direct Economic Contributions stem from the production of corn for exports via inland waterways.
 - In 2016, Illinois corn produced for exports via inland waterways directly contributed:
 - \$1.1 Billion in Economic Output
 - 4,222 Jobs
 - \$135 Million in GDP

Exhibit 69: Direct Economic Contributions from Illinois Corn to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Corn Exports	4,222	\$22.9	\$135.0	\$1,069.0

Source: IMPLAN, Agribusiness Intelligence

- Total Economic Contributions stem from the production of corn for exports via inland waterways, from companies operating in the supply chain of direct contributors and spent wages from individuals employed by those companies. Total Economic Contributions include direct, indirect, and induced contributions.
 - In 2016, Illinois corn produced for exports via inland waterways in total contributed:
 - \$1.9 Billion in Output
 - 8,684 Jobs
 - \$623 Million in GDP

Exhibit 70: Total Economic Contributions from Illinois Corn to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Corn Exports	8,684	\$279.4	\$622.5	\$1,880.5

Source: IMPLAN, Agribusiness Intelligence



- Exhibit 71 and Exhibit 72 show the top 10 (ranked by employment and GDP gains) IMPLAN industries that benefit from Illinois corn produced for exports via inland waterways.

- As expected, grain farming and support activities for grain farming rank near the top of the list for jobs supported by Illinois corn production for exports via inland waterways.

- Grain Farming
 - **Employment:** 4,222
 - **GDP:** \$135 Million
- Support Activities
 - **Employment:** 956
 - **GDP:** \$38 Million

Exhibit 71: Top 10 Industries Affected by Illinois Corn to Exports via Inland Waterways by GDP

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
2	Grain farming	4,222	\$26,336	\$134,973	\$1,069,000
440	Real estate	476	\$7,995	\$87,413	\$115,636
395	Wholesale trade	318	\$27,809	\$58,489	\$84,424
19	Support activities for agriculture and forestry	956	\$19,685	\$37,735	\$49,525
437	Insurance carriers	78	\$9,499	\$31,933	\$48,290
433	Monetary authorities and depository credit intermediation	92	\$8,934	\$20,994	\$29,581
441	Owner-occupied dwellings	-	-	\$14,785	\$22,826
156	Petroleum refineries	6	\$1,164	\$11,989	\$34,711
62	Maintenance and repair construction of nonresidential structures	116	\$5,877	\$10,539	\$19,540
438	Insurance agencies, brokerages, and related activities	71	\$4,567	\$9,272	\$15,961

Source: IMPLAN, Agribusiness Intelligence

Exhibit 72: Top 10 Industries Affected by Illinois Corn to Exports via Inland Waterways by Employment

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
2	Grain farming	4,222	\$26,336	\$134,973	\$1,069,000
19	Support activities for agriculture and forestry	956	\$19,685	\$37,735	\$49,525
440	Real estate	476	\$7,995	\$87,413	\$115,636
395	Wholesale trade	318	\$27,809	\$58,489	\$84,424
62	Maintenance and repair construction of nonresidential structures	116	\$5,877	\$10,539	\$19,540
411	Truck transportation	101	\$4,397	\$7,576	\$16,915
464	Employment services	93	\$3,590	\$5,296	\$7,113
433	Monetary authorities and depository credit intermediation	92	\$8,934	\$20,994	\$29,581
468	Services to buildings	85	\$1,479	\$2,303	\$3,649
501	Full-service restaurants	82	\$2,014	\$2,414	\$4,375

Source: IMPLAN, Agribusiness Intelligence



2. Illinois Soybeans Produced for Exports via Inland Waterways

- Direct Economic Contributions stem from the production of soybeans for exports via inland waterways.
 - In 2016, Illinois soybeans produced for exports via inland waterways directly contributed:
 - \$1.8 Billion in Economic Output
 - 3,525 Jobs
 - \$368 Million in GDP

Exhibit 73: Direct Economic Contributions from Illinois Soybeans to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Soybean Exports	3,525	\$3.1	\$367.5	\$1,785.0

Source: IMPLAN, Agribusiness Intelligence

- Total Economic Contributions stem from the production of soybeans for exports via inland waterways, from companies operating in the supply chain of direct contributors and spent wages from individuals employed by those companies. Total Economic Contributions include direct, indirect, and induced contributions.
 - In 2016, Illinois soybeans produced for exports via inland waterways in total contributed:
 - \$2.9 Billion in Output
 - 9,960 Jobs
 - \$1.1 Billion in GDP

Exhibit 74: Total Economic Contributions from Illinois Soybeans to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Soybean Exports	9,960	\$371.2	\$1,062.8	\$2,946.7

Source: IMPLAN, Agribusiness Intelligence



- Exhibit 75 and Exhibit 76 show the top 10 (ranked by employment and GDP gains) IMPLAN industries that benefit from Illinois soybean produced for exports via inland waterways.

- As expected, oilseed farming and support activities for grain farming rank near the top of the list for jobs supported by Illinois soybean production for exports via inland waterways.

- Oilseed Farming
 - **Employment:** 3,525
 - **GDP:** \$367 Million
- Support Activities
 - **Employment:** 1,216
 - **GDP:** \$48 Million

Exhibit 75: Top 10 Industries Affected by Illinois Soybeans to Exports via Inland Waterways by GDP

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
1	Oilseed farming	3,525	\$12,719	\$367,481	\$1,785,000
440	Real estate	608	\$10,220	\$111,747	\$147,827
395	Wholesale trade	537	\$46,993	\$98,839	\$142,665
19	Support activities for agriculture and forestry	1,216	\$25,024	\$47,970	\$62,958
437	Insurance carriers	83	\$10,066	\$33,839	\$51,172
433	Monetary authorities and depository credit intermediation	129	\$12,508	\$29,392	\$41,415
62	Maintenance and repair construction of nonresidential structures	287	\$14,523	\$26,042	\$48,284
441	Owner-occupied dwellings	-	-	\$19,607	\$30,270
156	Petroleum refineries	8	\$1,620	\$16,682	\$48,295
416	Warehousing and storage	242	\$12,774	\$16,667	\$26,248

Source: IMPLAN, Agribusiness Intelligence

Exhibit 76: Top 10 Industries Affected by Illinois Soybeans to Exports via Inland Waterways by Employment

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
1	Oilseed farming	3,525	\$12,719	\$367,481	\$1,785,000
19	Support activities for agriculture and forestry	1,216	\$25,024	\$47,970	\$62,958
440	Real estate	608	\$10,220	\$111,747	\$147,827
395	Wholesale trade	537	\$46,993	\$98,839	\$142,665
62	Maintenance and repair construction of nonresidential structures	287	\$14,523	\$26,042	\$48,284
416	Warehousing and storage	242	\$12,774	\$16,667	\$26,248
411	Truck transportation	216	\$9,370	\$16,145	\$36,049
464	Employment services	132	\$5,125	\$7,559	\$10,152
433	Monetary authorities and depository credit intermediation	129	\$12,508	\$29,392	\$41,415
502	Limited-service restaurants	111	\$2,182	\$6,067	\$10,163

Source: IMPLAN, Agribusiness Intelligence



C. Indiana Economic Contribution of Corn, Soybean Exports Moved Along Inland Waterways

1. Indiana Corn Produced for Exports via Inland Waterways

- Direct Economic Contributions stem from the production of corn for exports via inland waterways.
 - In 2016, Indiana corn produced for exports via inland waterways directly contributed:
 - \$164 Million in Economic Output
 - 840 Jobs
 - \$21 Million in GDP

Exhibit 77: Direct Economic Contributions from Indiana Corn to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Corn Exports	840	\$9.9	\$20.9	\$164.0

Source: IMPLAN, Agribusiness Intelligence

- Total Economic Contributions stem from the production of corn for exports via inland waterways, from companies operating in the supply chain of direct contributors and spent wages from individuals employed by those companies. Total Economic Contributions include direct, indirect, and induced contributions.
 - In 2016, Indiana corn produced for exports via inland waterways in total contributed:
 - \$292 Million in Output
 - 1,654 Jobs
 - \$97 Million in GDP

Exhibit 78: Total Economic Contributions from Indiana Corn to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Corn Exports	1,654	\$55.0	\$96.8	\$291.6

Source: IMPLAN, Agribusiness Intelligence



■ Exhibit 79 and Exhibit 80 show the top 10 (ranked by employment and GDP gains) IMPLAN industries that benefit from Indiana corn produced for exports via inland waterways.

■ As expected, grain farming and support activities for grain farming rank near the top of the list for jobs supported by Indiana corn production for exports via inland waterways.

- Grain Farming
 - ❑ **Employment:** 840
 - ❑ **GDP:** \$21 Million

- Support Activities
 - ❑ **Employment:** 223
 - ❑ **GDP:** \$14 Million

Exhibit 79: Top 10 Industries Affected by Indiana Corn to Exports via Inland Waterways by GDP

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
2	Grain farming	840	\$3,490	\$20,901	\$164,000
19	Support activities for agriculture and forestry	223	\$4,272	\$13,674	\$16,430
440	Real estate	76	\$780	\$11,831	\$16,317
395	Wholesale trade	42	\$3,004	\$6,182	\$9,619
172	Pesticide and other agricultural chemical manufacturing	5	\$717	\$5,486	\$10,774
437	Insurance carriers	11	\$1,047	\$4,036	\$6,335
441	Owner-occupied dwellings	-	-	\$2,994	\$4,622
62	Maintenance and repair construction of nonresidential structures	20	\$844	\$1,429	\$3,015
438	Insurance agencies, brokerages, and related activities	12	\$570	\$1,286	\$2,445
433	Monetary authorities and depository credit intermediation	13	\$806	\$1,252	\$2,479

Source: IMPLAN, Agribusiness Intelligence

Exhibit 80: Top 10 Industries Affected by Indiana Corn to Exports via Inland Waterways by Employment

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
2	Grain farming	840	\$3,490	\$20,901	\$164,000
19	Support activities for agriculture and forestry	223	\$4,272	\$13,674	\$16,430
440	Real estate	76	\$780	\$11,831	\$16,317
395	Wholesale trade	42	\$3,004	\$6,182	\$9,619
62	Maintenance and repair construction of nonresidential structures	20	\$844	\$1,429	\$3,015
502	Limited-service restaurants	18	\$299	\$737	\$1,415
501	Full-service restaurants	18	\$344	\$394	\$815
411	Truck transportation	16	\$811	\$1,251	\$2,749
464	Employment services	16	\$532	\$769	\$1,081
482	Hospitals	15	\$994	\$1,197	\$2,201

Source: IMPLAN, Agribusiness Intelligence



2. Indiana Soybeans Produced for Exports via Inland Waterways

- Direct Economic Contributions stem from the production of soybeans for exports via inland waterways.
 - In 2016, Indiana soybeans produced for exports via inland waterways directly contributed:
 - \$618 Million in Economic Output
 - 1,600 Jobs
 - \$210 Million in GDP

Exhibit 81: Direct Economic Contributions from Indiana Soybeans to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Soybean Exports	1,600	\$114.8	\$210.1	\$618.0

Source: IMPLAN, Agribusiness Intelligence

- Total Economic Contributions stem from the production of soybeans for exports via inland waterways, from companies operating in the supply chain of direct contributors and spent wages from individuals employed by those companies. Total Economic Contributions include direct, indirect, and induced contributions.
 - In 2016, Indiana soybeans produced for exports via inland waterways in total contributed:
 - \$1 Billion in Output
 - 4,377 Jobs
 - \$455 Million in GDP

Exhibit 82: Total Economic Contributions from Indiana Soybeans to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Soybean Exports	4,377	\$259.9	\$454.8	\$1,036.7

Source: IMPLAN, Agribusiness Intelligence



- Exhibit 83 and Exhibit 84 show the top 10 (ranked by employment and GDP gains) IMPLAN industries that benefit from Indiana soybean produced for exports via inland waterways.

- As expected, oilseed farming and support activities for grain farming rank near the top of the list for jobs supported by Indiana soybean production for exports via inland waterways.

- Oilseed Farming
 - **Employment:** 1,600
 - **GDP:** \$210 Million
- Support Activities
 - **Employment:** 534
 - **GDP:** \$33 Million

Exhibit 83: Top 10 Industries Affected by Indiana Soybeans to Exports via Inland Waterways by GDP

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
1	Oilseed farming	1,600	\$3,804	\$210,074	\$618,000
19	Support activities for agriculture and forestry	534	\$10,211	\$32,682	\$39,268
440	Real estate	207	\$2,136	\$32,401	\$44,686
395	Wholesale trade	145	\$10,357	\$21,314	\$33,161
441	Owner-occupied dwellings	-	-	\$14,366	\$22,178
172	Pesticide and other agricultural chemical manufacturing	14	\$1,816	\$13,884	\$27,268
437	Insurance carriers	26	\$2,512	\$9,681	\$15,194
62	Maintenance and repair construction of nonresidential structures	96	\$3,968	\$6,718	\$14,171
482	Hospitals	70	\$4,674	\$5,626	\$10,346
411	Truck transportation	70	\$3,488	\$5,380	\$11,821

Source: IMPLAN, Agribusiness Intelligence

Exhibit 84: Top 10 Industries Affected by Indiana Soybeans to Exports via Inland Waterways by Employment

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
1	Oilseed farming	1,600	\$3,804	\$210,074	\$618,000
19	Support activities for agriculture and forestry	534	\$10,211	\$32,682	\$39,268
440	Real estate	207	\$2,136	\$32,401	\$44,686
395	Wholesale trade	145	\$10,357	\$21,314	\$33,161
62	Maintenance and repair construction of nonresidential structures	96	\$3,968	\$6,718	\$14,171
502	Limited-service restaurants	84	\$1,372	\$3,382	\$6,488
501	Full-service restaurants	78	\$1,527	\$1,749	\$3,620
416	Warehousing and storage	72	\$3,258	\$4,511	\$7,377
482	Hospitals	70	\$4,674	\$5,626	\$10,346
411	Truck transportation	70	\$3,488	\$5,380	\$11,821

Source: IMPLAN, Agribusiness Intelligence



D. Iowa Economic Contribution of Corn and Soybean Exports Moved Along Inland Waterways

1. Iowa Corn Produced for Exports via Inland Waterways

- Direct Economic Contributions stem from the production of corn for exports via inland waterways.
 - In 2016, Iowa corn produced for exports via inland waterways directly contributed:
 - \$133 Million in Economic Output
 - 261 Jobs
 - \$18 Million in GDP

Exhibit 85: Direct Economic Contributions from Iowa Corn to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Corn Exports	261	\$12.5	\$17.7	\$133.0

Source: IMPLAN, Agribusiness Intelligence

- Total Economic Contributions stem from the production of corn for exports via inland waterways, from companies operating in the supply chain of direct contributors and spent wages from individuals employed by those companies. Total Economic Contributions include direct, indirect, and induced contributions.
 - In 2016, Iowa corn produced for exports via inland waterways in total contributed:
 - \$222 Million in Output
 - 812 Jobs
 - \$69 Million in GDP

Exhibit 86: Total Economic Contributions from Iowa Corn to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Corn Exports	812	\$37.7	\$68.5	\$221.8

Source: IMPLAN, Agribusiness Intelligence



- Exhibit 87 and Exhibit 88 show the top 10 (ranked by employment and GDP gains) IMPLAN industries that benefit from Iowa corn produced for exports via inland waterways.

- As expected, grain farming and support activities for grain farming rank near the top of the list for jobs supported by Iowa corn production for exports via inland waterways.

- Grain Farming
 - **Employment:** 261
 - **GDP:** \$18 Million

- Support Activities
 - **Employment:** 132
 - **GDP:** \$4.7 Million

Exhibit 87: Top 10 Industries Affected by Iowa Corn to Exports via Inland Waterways by GDP

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
2	Grain farming	261	\$1,773	\$17,748	\$133,000
440	Real estate	55	\$481	\$7,979	\$11,243
395	Wholesale trade	34	\$2,315	\$4,743	\$7,534
19	Support activities for agriculture and forestry	132	\$2,621	\$4,739	\$6,361
172	Pesticide and other agricultural chemical manufacturing	4	\$417	\$4,365	\$8,293
437	Insurance carriers	8	\$880	\$3,844	\$5,560
433	Monetary authorities and depository credit intermediation	17	\$1,254	\$2,072	\$3,679
441	Owner-occupied dwellings	-	-	\$2,038	\$3,146
62	Maintenance and repair construction of nonresidential structures	16	\$717	\$1,199	\$2,473
169	Nitrogenous fertilizer manufacturing	1	\$178	\$975	\$2,616

Source: IMPLAN, Agribusiness Intelligence

Exhibit 88: Top 10 Industries Affected by Iowa Corn to Exports via Inland Waterways by Employment

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
2	Grain farming	261	\$1,773	\$17,748	\$133,000
19	Support activities for agriculture and forestry	132	\$2,621	\$4,739	\$6,361
440	Real estate	55	\$481	\$7,979	\$11,243
395	Wholesale trade	34	\$2,315	\$4,743	\$7,534
433	Monetary authorities and depository credit intermediation	17	\$1,254	\$2,072	\$3,679
62	Maintenance and repair construction of nonresidential structures	16	\$717	\$1,199	\$2,473
411	Truck transportation	12	\$560	\$886	\$2,023
502	Limited-service restaurants	11	\$173	\$415	\$806
501	Full-service restaurants	10	\$186	\$219	\$467
468	Services to buildings	9	\$152	\$240	\$380

Source: IMPLAN, Agribusiness Intelligence



2. Iowa Soybeans Produced for Exports via Inland Waterways

- Direct Economic Contributions stem from the production of soybeans for exports via inland waterways.
 - In 2016, Iowa soybeans produced for exports via inland waterways directly contributed:
 - \$1.8 Billion in Economic Output
 - 1,767 Jobs
 - \$713 Million in GDP

Exhibit 89: Direct Economic Contributions from Iowa Soybeans to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Soybean Exports	1,767	\$674.7	\$713.0	\$1,811.0

Source: IMPLAN, Agribusiness Intelligence

- Total Economic Contributions stem from the production of soybeans for exports via inland waterways, from companies operating in the supply chain of direct contributors and spent wages from individuals employed by those companies. Total Economic Contributions include direct, indirect, and induced contributions.
 - In 2016, Iowa soybeans produced for exports via inland waterways in total contributed:
 - \$3 Billion in Output
 - 10,137 Jobs
 - \$1.4 Billion in GDP

Exhibit 90: Total Economic Contributions from Iowa Soybeans to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Soybean Exports	10,137	\$1,036.2	\$1,408.0	\$3,038.2

Source: IMPLAN, Agribusiness Intelligence



- Exhibit 91 and Exhibit 92 show the top 10 (ranked by employment and GDP gains) IMPLAN industries that benefit from Iowa soybean produced for exports via inland waterways.

- As expected, oilseed farming and support activities for grain farming rank near the top of the list for jobs supported by Iowa soybean production for exports via inland waterways.

- Oilseed Farming
 - **Employment:** 1,767
 - **GDP:** \$713 Million

- Support Activities
 - **Employment:** 1,053
 - **GDP:** \$38 Million

Exhibit 91: Top 10 Industries Affected by Iowa Soybeans to Exports via Inland Waterways by GDP

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
1	Oilseed farming	1,767	\$6,982	\$713,002	\$1,811,000
440	Real estate	577	\$5,039	\$83,652	\$117,875
395	Wholesale trade	436	\$29,484	\$60,394	\$95,937
441	Owner-occupied dwellings	-	-	\$57,322	\$88,496
19	Support activities for agriculture and forestry	1,053	\$20,981	\$37,940	\$50,924
172	Pesticide and other agricultural chemical manufacturing	35	\$3,541	\$37,076	\$70,433
437	Insurance carriers	78	\$8,357	\$36,510	\$52,808
433	Monetary authorities and depository credit intermediation	225	\$16,348	\$27,012	\$47,966
62	Maintenance and repair construction of nonresidential structures	271	\$11,830	\$19,794	\$40,827
482	Hospitals	207	\$13,501	\$18,921	\$32,884

Source: IMPLAN, Agribusiness Intelligence

Exhibit 92: Top 10 Industries Affected by Iowa Soybeans to Exports via Inland Waterways by Employment

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
1	Oilseed farming	1,767	\$6,982	\$713,002	\$1,811,000
19	Support activities for agriculture and forestry	1,053	\$20,981	\$37,940	\$50,924
440	Real estate	577	\$5,039	\$83,652	\$117,875
395	Wholesale trade	436	\$29,484	\$60,394	\$95,937
62	Maintenance and repair construction of nonresidential structures	271	\$11,830	\$19,794	\$40,827
502	Limited-service restaurants	266	\$4,343	\$10,425	\$20,227
501	Full-service restaurants	252	\$4,528	\$5,315	\$11,346
433	Monetary authorities and depository credit intermediation	225	\$16,348	\$27,012	\$47,966
416	Warehousing and storage	225	\$10,573	\$13,096	\$21,988
482	Hospitals	207	\$13,501	\$18,921	\$32,884

Source: IMPLAN, Agribusiness Intelligence



E. Kentucky Economic Contribution of Corn and Soybean Exports Moved Along Inland Waterways

1. Kentucky Corn Produced for Exports via Inland Waterways

- Direct Economic Contributions stem from the production of corn for exports via inland waterways.

- In 2016, Kentucky corn produced for exports via inland waterways directly contributed:

- \$162 Million in Economic Output
- 1,605 Jobs
- \$18 Million in GDP

Exhibit 93: Direct Economic Contributions from Kentucky Corn to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Corn Exports	1,605	\$11.1	\$17.6	\$162.0

Source: IMPLAN, Agribusiness Intelligence

- Total Economic Contributions stem from the production of corn for exports via inland waterways, from companies operating in the supply chain of direct contributors and spent wages from individuals employed by those companies. Total Economic Contributions include direct, indirect, and induced contributions.

- In 2016, Kentucky corn produced for exports via inland waterways in total contributed:

- \$272 Million in Output
- 2,599 Jobs
- \$81 Million in GDP

Exhibit 94: Total Economic Contributions from Kentucky Corn to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Corn Exports	2,599	\$48.7	\$80.8	\$271.7

Source: IMPLAN, Agribusiness Intelligence



- Exhibit 95 and Exhibit 96 show the top 10 (ranked by employment and GDP gains) IMPLAN industries that benefit from Kentucky corn produced for exports via inland waterways.

- As expected, grain farming and support activities for grain farming rank near the top of the list for jobs supported by Kentucky corn production for exports via inland waterways.

- Grain Farming
 - **Employment:** 1,605
 - **GDP:** \$18 Million
- Support Activities
 - **Employment:** 366
 - **GDP:** \$13 Million

Exhibit 95: Top 10 Industries Affected by Kentucky Corn to Exports via Inland Waterways by GDP

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
2	Grain farming	1,605	\$3,348	\$17,553	\$162,000
19	Support activities for agriculture and forestry	366	\$10,079	\$12,649	\$17,164
440	Real estate	70	\$564	\$9,806	\$13,961
395	Wholesale trade	42	\$2,797	\$6,526	\$9,918
437	Insurance carriers	13	\$1,362	\$2,858	\$5,541
441	Owner-occupied dwellings	-	-	\$2,529	\$3,905
433	Monetary authorities and depository credit intermediation	17	\$1,067	\$1,760	\$3,316
526	Other local government enterprises	9	\$870	\$1,508	\$3,192
62	Maintenance and repair construction of nonresidential structures	19	\$695	\$1,323	\$2,829
482	Hospitals	13	\$885	\$1,033	\$1,909

Source: IMPLAN, Agribusiness Intelligence

Exhibit 96: Top 10 Industries Affected by Kentucky Corn to Exports via Inland Waterways by Employment

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
2	Grain farming	1,605	\$3,348	\$17,553	\$162,000
19	Support activities for agriculture and forestry	366	\$10,079	\$12,649	\$17,164
440	Real estate	70	\$564	\$9,806	\$13,961
10	All other crop farming	65	\$300	\$510	\$1,014
395	Wholesale trade	42	\$2,797	\$6,526	\$9,918
62	Maintenance and repair construction of nonresidential structures	19	\$695	\$1,323	\$2,829
433	Monetary authorities and depository credit intermediation	17	\$1,067	\$1,760	\$3,316
502	Limited-service restaurants	16	\$279	\$658	\$1,241
464	Employment services	16	\$513	\$755	\$1,060
411	Truck transportation	15	\$655	\$1,022	\$2,432

Source: IMPLAN, Agribusiness Intelligence



2. Kentucky Soybeans Produced for Exports via Inland Waterways

- Direct Economic Contributions stem from the production of soybeans for exports via inland waterways.
 - In 2016, Kentucky soybeans produced for exports via inland waterways directly contributed:
 - \$432 Million in Economic Output
 - 2,152 Jobs
 - \$137 Million in GDP

Exhibit 97: Direct Economic Contributions from Kentucky Soybeans to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Soybean Exports	2,152	\$97.0	\$137.1	\$432.0

Source: IMPLAN, Agribusiness Intelligence

- Total Economic Contributions stem from the production of soybeans for exports via inland waterways, from companies operating in the supply chain of direct contributors and spent wages from individuals employed by those companies. Total Economic Contributions include direct, indirect, and induced contributions.
 - In 2016, Kentucky soybeans produced for exports via inland waterways in total contributed:
 - \$709 Million in Output
 - 4,604 Jobs
 - \$295 Million in GDP

Exhibit 98: Total Economic Contributions from Kentucky Soybeans to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Soybean Exports	4,604	\$190.0	\$294.5	\$708.7

Source: IMPLAN, Agribusiness Intelligence



- Exhibit 99 and Exhibit 100 show the top 10 (ranked by employment and GDP gains) IMPLAN industries that benefit from Kentucky soybean produced for exports via inland waterways.

- As expected, oilseed farming and support activities for grain farming rank near the top of the list for jobs supported by Kentucky soybean production for exports via inland waterways.

- Oilseed Farming
 - **Employment:** 2,152
 - **GDP:** \$137 Million
- Support Activities
 - **Employment:** 629
 - **GDP:** \$22 Million

Exhibit 99: Top 10 Industries Affected by Kentucky Soybeans to Exports via Inland Waterways by GDP

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
1	Oilseed farming	2,152	\$2,582	\$137,068	\$432,000
19	Support activities for agriculture and forestry	629	\$17,301	\$21,714	\$29,464
440	Real estate	141	\$1,132	\$19,689	\$28,033
395	Wholesale trade	105	\$7,067	\$16,487	\$25,056
441	Owner-occupied dwellings	-	-	\$10,346	\$15,972
437	Insurance carriers	23	\$2,408	\$5,051	\$9,793
62	Maintenance and repair construction of nonresidential structures	65	\$2,328	\$4,429	\$9,471
433	Monetary authorities and depository credit intermediation	40	\$2,522	\$4,162	\$7,839
482	Hospitals	51	\$3,486	\$4,067	\$7,518
416	Warehousing and storage	61	\$2,887	\$3,418	\$5,815

Source: IMPLAN, Agribusiness Intelligence

Exhibit 100: Top 10 Industries Affected by Kentucky Soybeans to Exports via Inland Waterways by Employment

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
1	Oilseed farming	2,152	\$2,582	\$137,068	\$432,000
19	Support activities for agriculture and forestry	629	\$17,301	\$21,714	\$29,464
10	All other crop farming	215	\$990	\$1,684	\$3,346
440	Real estate	141	\$1,132	\$19,689	\$28,033
395	Wholesale trade	105	\$7,067	\$16,487	\$25,056
62	Maintenance and repair construction of nonresidential structures	65	\$2,328	\$4,429	\$9,471
416	Warehousing and storage	61	\$2,887	\$3,418	\$5,815
502	Limited-service restaurants	60	\$1,054	\$2,491	\$4,695
501	Full-service restaurants	54	\$1,050	\$1,292	\$2,571
482	Hospitals	51	\$3,486	\$4,067	\$7,518

Source: IMPLAN, Agribusiness Intelligence



F. Louisiana Economic Contribution Soybean Exports Moved Along Inland Waterways

1. Louisiana Soybeans Produced for Exports via Inland Waterways

- Direct Economic Contributions stem from the production of soybeans for exports via inland waterways.
 - In 2016, Louisiana soybeans produced for exports via inland waterways directly contributed:
 - \$304 Million in Economic Output
 - 1,477 Jobs
 - \$117 Million in GDP

Exhibit 101: Direct Economic Contributions from Louisiana Soybeans to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Soybean Exports	1,477	\$99.5	\$116.5	\$304.0

Source: IMPLAN, Agribusiness Intelligence

- Total Economic Contributions stem from the production of soybeans for exports via inland waterways, from companies operating in the supply chain of direct contributors and spent wages from individuals employed by those companies. Total Economic Contributions include direct, indirect, and induced contributions.
 - In 2016, Louisiana soybeans produced for exports via inland waterways in total contributed:
 - \$553 Million in Output
 - 3,471 Jobs
 - \$256 Million in GDP

Exhibit 102: Total Economic Contributions from Louisiana Soybeans to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Soybean Exports	3,471	\$177.1	\$255.9	\$552.8

Source: IMPLAN, Agribusiness Intelligence



- Exhibit 103 and Exhibit 104 show the top 10 (ranked by employment and GDP gains) IMPLAN industries that benefit from Louisiana soybean produced for exports via inland waterways.

- As expected, oilseed farming and support activities for grain farming rank near the top of the list for jobs supported by Louisiana soybean production for exports via inland waterways.

- Oilseed Farming
 - **Employment:** 1,477
 - **GDP:** \$116 Million
- Support Activities
 - **Employment:** 584
 - **GDP:** \$17 Million

Exhibit 103: Top 10 Industries Affected by Louisiana Soybeans to Exports via Inland Waterways by GDP

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
1	Oilseed farming	1,477	\$1,966	\$116,473	\$304,000
19	Support activities for agriculture and forestry	584	\$14,074	\$16,877	\$24,077
440	Real estate	119	\$857	\$13,558	\$20,631
395	Wholesale trade	82	\$5,381	\$12,146	\$18,834
441	Owner-occupied dwellings	-	-	\$9,856	\$15,216
172	Pesticide and other agricultural chemical manufacturing	7	\$915	\$6,465	\$12,815
482	Hospitals	46	\$3,063	\$3,597	\$6,706
62	Maintenance and repair construction of nonresidential structures	49	\$2,355	\$3,459	\$7,253
156	Petroleum refineries	2	\$371	\$3,346	\$10,265
416	Warehousing and storage	21	\$1,189	\$2,719	\$3,558

Source: IMPLAN, Agribusiness Intelligence

Exhibit 104: Top 10 Industries Affected by Louisiana Soybeans to Exports via Inland Waterways by Employment

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
1	Oilseed farming	1,477	\$1,966	\$116,473	\$304,000
19	Support activities for agriculture and forestry	584	\$14,074	\$16,877	\$24,077
440	Real estate	119	\$857	\$13,558	\$20,631
395	Wholesale trade	82	\$5,381	\$12,146	\$18,834
502	Limited-service restaurants	53	\$886	\$2,314	\$4,283
501	Full-service restaurants	50	\$1,053	\$1,213	\$2,400
62	Maintenance and repair construction of nonresidential structures	49	\$2,355	\$3,459	\$7,253
482	Hospitals	46	\$3,063	\$3,597	\$6,706
411	Truck transportation	32	\$1,233	\$1,964	\$4,875
475	Offices of physicians	30	\$2,286	\$2,486	\$3,978

Source: IMPLAN, Agribusiness Intelligence



G. Minnesota Economic Contribution of Corn and Soybean Exports Moved Along Inland Waterways

1. Minnesota Corn Produced for Exports via Inland Waterways

- Direct Economic Contributions stem from the production of corn for exports via inland waterways.
 - In 2016, Minnesota corn produced for exports via inland waterways directly contributed:
 - \$160 Million in Economic Output
 - 522 Jobs
 - \$23 Million in GDP

Exhibit 105: Direct Economic Contributions from Minnesota Corn to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Corn Exports	522	\$14.6	\$22.6	\$160.0

Source: IMPLAN, Agribusiness Intelligence

- Total Economic Contributions stem from the production of corn for exports via inland waterways, from companies operating in the supply chain of direct contributors and spent wages from individuals employed by those companies. Total Economic Contributions include direct, indirect, and induced contributions.
 - In 2016, Minnesota corn produced for exports via inland waterways in total contributed:
 - \$282 Million in Output
 - 1,317 Jobs
 - \$90 Million in GDP

Exhibit 106: Total Economic Contributions from Minnesota Corn Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Corn Exports	1,317	\$55.3	\$90.4	\$281.9

Source: IMPLAN, Agribusiness Intelligence



- Exhibit 107 and Exhibit 108 show the top 10 (ranked by employment and GDP gains) IMPLAN industries that benefit from Minnesota corn produced for exports via inland waterways.

- As expected, grain farming and support activities for grain farming rank near the top of the list for jobs supported by Minnesota corn production for exports via inland waterways.

- Grain Farming
 - **Employment:** 522
 - **GDP:** \$23 Million
- Support Activities
 - **Employment:** 168
 - **GDP:** \$5.2 Million

Exhibit 107: Top 10 Industries Affected by Minnesota Corn to Exports via Inland Waterways by GDP

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
2	Grain farming	522	\$2,593	\$22,649	\$160,000
440	Real estate	83	\$985	\$8,690	\$13,589
395	Wholesale trade	56	\$4,756	\$8,547	\$13,085
19	Support activities for agriculture and forestry	168	\$3,342	\$5,183	\$7,254
437	Insurance carriers	17	\$2,279	\$4,209	\$7,879
433	Monetary authorities and depository credit intermediation	18	\$1,782	\$3,253	\$4,966
441	Owner-occupied dwellings	-	-	\$3,005	\$4,639
156	Petroleum refineries	1	\$215	\$1,757	\$6,092
62	Maintenance and repair construction of nonresidential structures	19	\$893	\$1,557	\$3,028
482	Hospitals	14	\$1,076	\$1,290	\$2,206

Source: IMPLAN, Agribusiness Intelligence

Exhibit 108: Top 10 Industries Affected by Minnesota Corn to Exports via Inland Waterways by Employment

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
2	Grain farming	522	\$2,593	\$22,649	\$160,000
19	Support activities for agriculture and forestry	168	\$3,342	\$5,183	\$7,254
440	Real estate	83	\$985	\$8,690	\$13,589
395	Wholesale trade	56	\$4,756	\$8,547	\$13,085
62	Maintenance and repair construction of nonresidential structures	19	\$893	\$1,557	\$3,028
433	Monetary authorities and depository credit intermediation	18	\$1,782	\$3,253	\$4,966
437	Insurance carriers	17	\$2,279	\$4,209	\$7,879
501	Full-service restaurants	15	\$350	\$420	\$784
438	Insurance agencies, brokerages, and related activities	15	\$896	\$1,280	\$2,707
411	Truck transportation	15	\$610	\$1,080	\$2,433

Source: IMPLAN, Agribusiness Intelligence



2. Minnesota Soybeans Produced for Exports via Inland Waterways

- Direct Economic Contributions stem from the production of soybeans for exports via inland waterways.
 - In 2016, Minnesota soybeans produced for exports via inland waterways directly contributed:
 - \$807 Million in Economic Output
 - 1,324 Jobs
 - \$310 Million in GDP

Exhibit 109: Direct Economic Contributions from Minnesota Soybeans to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Soybean Exports	1,324	\$279.5	\$309.5	\$807.0

Source: IMPLAN, Agribusiness Intelligence

- Total Economic Contributions stem from the production of soybeans for exports via inland waterways, from companies operating in the supply chain of direct contributors and spent wages from individuals employed by those companies. Total Economic Contributions include direct, indirect, and induced contributions.
 - In 2016, Minnesota soybeans produced for exports via inland waterways in total contributed:
 - \$1.4 Billion in Output
 - 5,583 Jobs
 - \$668 Million in GDP

Exhibit 110: Total Economic Contributions from Minnesota Soybeans to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Soybean Exports	5,583	\$494.7	\$667.9	\$1,446.4

Source: IMPLAN, Agribusiness Intelligence



- Exhibit 111 and Exhibit 112 show the top 10 (ranked by employment and GDP gains) IMPLAN industries that benefit from Minnesota soybean produced for exports via inland waterways.

- As expected, oilseed farming and support activities for grain farming rank near the top of the list for jobs supported by Minnesota soybean production for exports via inland waterways.

- Oilseed Farming
 - **Employment:** 1,324
 - **GDP:** \$310 Million

- Support Activities
 - **Employment:** 511
 - **GDP:** \$16 Million

Exhibit 111: Top 10 Industries Affected by Minnesota Soybeans to Exports via Inland Waterways by GDP

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
1	Oilseed farming	1,324	\$3,782	\$309,501	\$807,000
395	Wholesale trade	268	\$22,924	\$41,197	\$63,067
440	Real estate	320	\$3,818	\$33,681	\$52,666
441	Owner-occupied dwellings	-	-	\$27,389	\$42,283
19	Support activities for agriculture and forestry	511	\$10,171	\$15,776	\$22,078
433	Monetary authorities and depository credit intermediation	88	\$8,469	\$15,461	\$23,607
437	Insurance carriers	62	\$8,133	\$15,018	\$28,114
482	Hospitals	119	\$9,427	\$11,295	\$19,320
62	Maintenance and repair construction of nonresidential structures	113	\$5,330	\$9,292	\$18,077
475	Offices of physicians	65	\$7,448	\$7,412	\$10,610

Source: IMPLAN, Agribusiness Intelligence

Exhibit 112: Top 10 Industries Affected by Minnesota Soybeans to Exports via Inland Waterways by Employment

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
1	Oilseed farming	1,324	\$3,782	\$309,501	\$807,000
19	Support activities for agriculture and forestry	511	\$10,171	\$15,776	\$22,078
440	Real estate	320	\$3,818	\$33,681	\$52,666
395	Wholesale trade	268	\$22,924	\$41,197	\$63,067
501	Full-service restaurants	122	\$2,793	\$3,352	\$6,263
482	Hospitals	119	\$9,427	\$11,295	\$19,320
502	Limited-service restaurants	114	\$2,117	\$5,643	\$9,842
62	Maintenance and repair construction of nonresidential structures	113	\$5,330	\$9,292	\$18,077
433	Monetary authorities and depository credit intermediation	88	\$8,469	\$15,461	\$23,607
411	Truck transportation	87	\$3,630	\$6,429	\$14,478

Source: IMPLAN, Agribusiness Intelligence



H. Mississippi Economic Contribution of Corn and Soybean Exports Moved Along Inland Waterways

1. Mississippi Corn Produced for Exports via Inland Waterways

- Direct Economic Contributions stem from the production of corn for exports via inland waterways.
 - In 2016, Mississippi corn produced for exports via inland waterways directly contributed:
 - \$82 Million in Economic Output
 - 564 Jobs
 - \$13 Million in GDP

Exhibit 113: Direct Economic Contributions from Mississippi Corn to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Corn Exports	564	\$7.8	\$12.5	\$82.0

Source: IMPLAN, Agribusiness Intelligence

- Total Economic Contributions stem from the production of corn for exports via inland waterways, from companies operating in the supply chain of direct contributors and spent wages from individuals employed by those companies. Total Economic Contributions include direct, indirect, and induced contributions.
 - In 2016, Mississippi corn produced for exports via inland waterways in total contributed:
 - \$148 Million in Output
 - 1,129 Jobs
 - \$48 Million in GDP

Exhibit 114: Total Economic Contributions from Mississippi Corn to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Corn Exports	1,129	\$28.8	\$47.7	\$148.1

Source: IMPLAN, Agribusiness Intelligence



- Exhibit 115 and Exhibit 116 show the top 10 (ranked by employment and GDP gains) IMPLAN industries that benefit from Mississippi corn produced for exports via inland waterways.

- As expected, grain farming and support activities for grain farming rank near the top of the list for jobs supported by Mississippi corn production for exports via inland waterways.

- Grain Farming
 - ❑ **Employment:** 564
 - ❑ **GDP:** \$12 Million
- Support Activities
 - ❑ **Employment:** 234
 - ❑ **GDP:** \$9.2 Million

Exhibit 115: Top 10 Industries Affected by Mississippi Corn to Exports via Inland Waterways by GDP

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
2	Grain farming	564	\$1,058	\$12,472	\$82,000
19	Support activities for agriculture and forestry	234	\$6,346	\$9,154	\$12,040
440	Real estate	34	\$233	\$4,055	\$6,042
395	Wholesale trade	21	\$1,151	\$2,760	\$4,443
441	Owner-occupied dwellings	-	-	\$1,568	\$2,420
172	Pesticide and other agricultural chemical manufacturing	3	\$257	\$1,083	\$4,227
433	Monetary authorities and depository credit intermediation	8	\$533	\$1,064	\$1,853
437	Insurance carriers	3	\$251	\$908	\$1,499
445	Commercial and industrial machinery and equipment rental and leasing	2	\$104	\$572	\$782
62	Maintenance and repair construction of nonresidential structures	10	\$292	\$566	\$1,339

Source: IMPLAN, Agribusiness Intelligence

Exhibit 116: Top 10 Industries Affected by Mississippi Corn to Exports via Inland Waterways by Employment

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
2	Grain farming	564	\$1,058	\$12,472	\$82,000
19	Support activities for agriculture and forestry	234	\$6,346	\$9,154	\$12,040
440	Real estate	34	\$233	\$4,055	\$6,042
10	All other crop farming	22	\$88	\$214	\$477
395	Wholesale trade	21	\$1,151	\$2,760	\$4,443
502	Limited-service restaurants	10	\$153	\$367	\$748
62	Maintenance and repair construction of nonresidential structures	10	\$292	\$566	\$1,339
468	Services to buildings	10	\$79	\$144	\$296
411	Truck transportation	10	\$376	\$536	\$1,417
433	Monetary authorities and depository credit intermediation	8	\$533	\$1,064	\$1,853

Source: IMPLAN, Agribusiness Intelligence



2. Mississippi Soybeans Produced for Exports via Inland Waterways

- Direct Economic Contributions stem from the production of soybeans for exports via inland waterways.
 - In 2016, Mississippi soybeans produced for exports via inland waterways directly contributed:
 - \$559 Million in Economic Output
 - 1,948 Jobs
 - \$271 Million in GDP

Exhibit 117: Direct Economic Contributions from Mississippi Soybeans to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Soybean Exports	1,948	\$213.5	\$270.9	\$559.0

Source: IMPLAN, Agribusiness Intelligence

- Total Economic Contributions stem from the production of soybeans for exports via inland waterways, from companies operating in the supply chain of direct contributors and spent wages from individuals employed by those companies. Total Economic Contributions include direct, indirect, and induced contributions.
 - In 2016, Mississippi soybeans produced for exports via inland waterways in total contributed:
 - \$946 Million in Output
 - 5,234 Jobs
 - \$478 Million in GDP

Exhibit 118: Total Economic Contributions from Mississippi Soybeans to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Soybean Exports	5,234	\$330.5	\$478.0	\$946.3

Source: IMPLAN, Agribusiness Intelligence



- Exhibit 119 and Exhibit 120 show the top 10 (ranked by employment and GDP gains) IMPLAN industries that benefit from Mississippi soybean produced for exports via inland waterways.

- As expected, oilseed farming and support activities for grain farming rank near the top of the list for jobs supported by Mississippi soybean production for exports via inland waterways.

- Oilseed Farming
 - **Employment:** 1,948
 - **GDP:** \$271 Million

- Support Activities
 - **Employment:** 816
 - **GDP:** \$32 Million

Exhibit 119: Top 10 Industries Affected by Mississippi Soybeans to Exports via Inland Waterways by GDP

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
1	Oilseed farming	1,948	\$2,086	\$270,934	\$559,000
19	Support activities for agriculture and forestry	816	\$22,114	\$31,901	\$41,960
440	Real estate	160	\$1,114	\$19,424	\$28,940
441	Owner-occupied dwellings	-	-	\$18,697	\$28,865
395	Wholesale trade	115	\$6,410	\$15,373	\$24,749
433	Monetary authorities and depository credit intermediation	50	\$3,145	\$6,278	\$10,930
482	Hospitals	64	\$3,730	\$4,688	\$9,032
475	Offices of physicians	53	\$4,273	\$4,542	\$7,150
172	Pesticide and other agricultural chemical manufacturing	12	\$947	\$3,991	\$15,581
437	Insurance carriers	12	\$1,100	\$3,986	\$6,580

Source: IMPLAN, Agribusiness Intelligence

Exhibit 120: Top 10 Industries Affected by Mississippi Soybeans to Exports via Inland Waterways by Employment

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
1	Oilseed farming	1,948	\$2,086	\$270,934	\$559,000
19	Support activities for agriculture and forestry	816	\$22,114	\$31,901	\$41,960
440	Real estate	160	\$1,114	\$19,424	\$28,940
10	All other crop farming	144	\$590	\$1,430	\$3,194
395	Wholesale trade	115	\$6,410	\$15,373	\$24,749
502	Limited-service restaurants	112	\$1,659	\$3,972	\$8,103
501	Full-service restaurants	82	\$1,452	\$1,736	\$3,688
62	Maintenance and repair construction of nonresidential structures	69	\$2,027	\$3,923	\$9,276
482	Hospitals	64	\$3,730	\$4,688	\$9,032
411	Truck transportation	64	\$2,531	\$3,605	\$9,539

Source: IMPLAN, Agribusiness Intelligence



I. Missouri Economic Contribution of Corn and Soybean Exports Moved Along Inland Waterways

1. Missouri Corn Produced for Exports via Inland Waterways

- Direct Economic Contributions stem from the production of corn for exports via inland waterways.
 - In 2016, Missouri corn produced for exports via inland waterways directly contributed:
 - \$95 Million in Economic Output
 - 703 Jobs
 - \$7 Million in GDP

Exhibit 121: Direct Economic Contributions from Missouri Corn to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Corn Exports	703	\$3.2	\$6.9	\$95.0

Source: IMPLAN, Agribusiness Intelligence

- Total Economic Contributions stem from the production of corn for exports via inland waterways, from companies operating in the supply chain of direct contributors and spent wages from individuals employed by those companies. Total Economic Contributions include direct, indirect, and induced contributions.
 - In 2016, Missouri corn produced for exports via inland waterways in total contributed:
 - \$171 Million in Output
 - 1,267 Jobs
 - \$50 Million in GDP

Exhibit 122: Total Economic Contributions from Missouri Corn to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Corn Exports	1,267	\$27.0	\$50.4	\$171.3

Source: IMPLAN, Agribusiness Intelligence



- Exhibit 123 and Exhibit 124 show the top 10 (ranked by employment and GDP gains) IMPLAN industries that benefit from Missouri corn produced for exports via inland waterways.

- As expected, grain farming and support activities for grain farming rank near the top of the list for jobs supported by Missouri corn production for exports via inland waterways.

- Grain Farming
 - ❑ **Employment:** 703
 - ❑ **GDP:** \$7 Million

- Support Activities
 - ❑ **Employment:** 177
 - ❑ **GDP:** \$5.3 Million

Exhibit 123: Top 10 Industries Affected by Missouri Corn to Exports via Inland Waterways by GDP

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
2	Grain farming	703	\$1,555	\$6,934	\$95,000
440	Real estate	52	\$522	\$5,899	\$8,980
19	Support activities for agriculture and forestry	177	\$3,528	\$5,330	\$7,511
395	Wholesale trade	32	\$2,271	\$4,774	\$7,375
172	Pesticide and other agricultural chemical manufacturing	3	\$342	\$2,261	\$5,553
433	Monetary authorities and depository credit intermediation	10	\$720	\$2,111	\$3,002
437	Insurance carriers	8	\$738	\$1,864	\$3,564
441	Owner-occupied dwellings	-	-	\$1,392	\$2,148
438	Insurance agencies, brokerages, and related activities	9	\$570	\$960	\$1,841
445	Commercial and industrial machinery and equipment rental and leasing	3	\$88	\$870	\$1,097

Source: IMPLAN, Agribusiness Intelligence

Exhibit 124: Top 10 Industries Affected by Missouri Corn to Exports via Inland Waterways by Employment

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
2	Grain farming	703	\$1,555	\$6,934	\$95,000
19	Support activities for agriculture and forestry	177	\$3,528	\$5,330	\$7,511
440	Real estate	52	\$522	\$5,899	\$8,980
395	Wholesale trade	32	\$2,271	\$4,774	\$7,375
10	All other crop farming	20	\$94	\$146	\$403
62	Maintenance and repair construction of nonresidential structures	14	\$549	\$844	\$1,912
433	Monetary authorities and depository credit intermediation	10	\$720	\$2,111	\$3,002
411	Truck transportation	9	\$417	\$715	\$1,580
438	Insurance agencies, brokerages, and related activities	9	\$570	\$960	\$1,841
501	Full-service restaurants	9	\$184	\$208	\$422

Source: IMPLAN, Agribusiness Intelligence



2. Missouri Soybeans Produced for Exports via Inland Waterways

- Direct Economic Contributions stem from the production of soybeans for exports via inland waterways.
 - In 2016, Missouri soybeans produced for exports via inland waterways directly contributed:
 - \$922 Million in Economic Output
 - 3,474 Jobs
 - \$202 Million in GDP

Exhibit 125: Direct Economic Contributions from Missouri Soybeans to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Soybean Exports	3,474	\$76.1	\$201.6	\$922.0

Source: IMPLAN, Agribusiness Intelligence

- Total Economic Contributions stem from the production of soybeans for exports via inland waterways, from companies operating in the supply chain of direct contributors and spent wages from individuals employed by those companies. Total Economic Contributions include direct, indirect, and induced contributions.
 - In 2016, Missouri soybeans produced for exports via inland waterways in total contributed:
 - \$1.6 Billion in Output
 - 8,280 Jobs
 - \$567 Million in GDP

Exhibit 126: Total Economic Contributions from Missouri Soybeans to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Soybean Exports	8,280	\$278.7	\$566.6	\$1,564.9

Source: IMPLAN, Agribusiness Intelligence



- Exhibit 127 and Exhibit 128 show the top 10 (ranked by employment and GDP gains) IMPLAN industries that benefit from Missouri soybean produced for exports via inland waterways.

- As expected, oilseed farming and support activities for grain farming rank near the top of the list for jobs supported by Missouri soybean production for exports via inland waterways.

- Oilseed Farming
 - ❑ **Employment:** 3,474
 - ❑ **GDP:** \$202 Million

- Support Activities
 - ❑ **Employment:** 1,215
 - ❑ **GDP:** \$37 Million

Exhibit 127: Top 10 Industries Affected by Missouri Soybeans to Exports via Inland Waterways by GDP

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
1	Oilseed farming	3,474	\$4,365	\$201,632	\$922,000
395	Wholesale trade	300	\$21,355	\$44,890	\$69,348
440	Real estate	378	\$3,801	\$42,942	\$65,367
19	Support activities for agriculture and forestry	1,215	\$24,227	\$36,600	\$51,576
433	Monetary authorities and depository credit intermediation	78	\$5,889	\$17,265	\$24,552
172	Pesticide and other agricultural chemical manufacturing	25	\$2,483	\$16,408	\$40,298
441	Owner-occupied dwellings	-	-	\$14,710	\$22,710
437	Insurance carriers	50	\$4,569	\$11,539	\$22,063
62	Maintenance and repair construction of nonresidential structures	178	\$7,084	\$10,884	\$24,658
411	Truck transportation	111	\$4,927	\$8,450	\$18,663

Source: IMPLAN, Agribusiness Intelligence

Exhibit 128: Top 10 Industries Affected by Missouri Soybeans to Exports via Inland Waterways by Employment

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
1	Oilseed farming	3,474	\$4,365	\$201,632	\$922,000
19	Support activities for agriculture and forestry	1,215	\$24,227	\$36,600	\$51,576
440	Real estate	378	\$3,801	\$42,942	\$65,367
395	Wholesale trade	300	\$21,355	\$44,890	\$69,348
10	All other crop farming	258	\$1,240	\$1,918	\$5,292
62	Maintenance and repair construction of nonresidential structures	178	\$7,084	\$10,884	\$24,658
411	Truck transportation	111	\$4,927	\$8,450	\$18,663
416	Warehousing and storage	105	\$5,074	\$7,486	\$11,628
502	Limited-service restaurants	91	\$1,574	\$3,917	\$7,279
501	Full-service restaurants	88	\$1,813	\$2,055	\$4,163

Source: IMPLAN, Agribusiness Intelligence



J. Ohio Economic Contribution of Corn and Soybean Exports Moved Along Inland Waterways

1. Ohio Corn Produced for Exports via Inland Waterways

- Direct Economic Contributions stem from the production of corn for exports via inland waterways.
 - In 2016, Ohio corn produced for exports via inland waterways directly contributed:
 - \$27 Million in Economic Output
 - 212 Jobs
 - \$3.4 Million in GDP

Exhibit 129: Direct Economic Contributions from Ohio Corn to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Corn Exports	212	\$1.5	\$3.4	\$27.0

Source: IMPLAN, Agribusiness Intelligence

- Total Economic Contributions stem from the production of corn for exports via inland waterways, from companies operating in the supply chain of direct contributors and spent wages from individuals employed by those companies. Total Economic Contributions include direct, indirect, and induced contributions.
 - In 2016, Ohio corn produced for exports via inland waterways in total contributed:
 - \$50 Million in Output
 - 381 Jobs
 - \$17 Million in GDP

Exhibit 130: Total Economic Contributions from Ohio Corn to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Corn Exports	381	\$8.6	\$16.5	\$49.9

Source: IMPLAN, Agribusiness Intelligence



- Exhibit 131 and Exhibit 132 show the top 10 (ranked by employment and GDP gains) IMPLAN industries that benefit from Ohio corn produced for exports via inland waterways.

- As expected, grain farming and support activities for grain farming rank near the top of the list for jobs supported by Ohio corn production for exports via inland waterways.

- Grain Farming
 - **Employment:** 212
 - **GDP:** \$3.4 Million
- Support Activities
 - **Employment:** 58
 - **GDP:** \$1.5 Million

Exhibit 131: Top 10 Industries Affected by Ohio Corn to Exports via Inland Waterways by GDP

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
2	Grain farming	212	\$838	\$3,358	\$27,000
440	Real estate	14	\$145	\$1,919	\$2,720
19	Support activities for agriculture and forestry	58	\$1,102	\$1,518	\$2,237
395	Wholesale trade	9	\$670	\$1,326	\$2,072
437	Insurance carriers	3	\$269	\$764	\$1,330
433	Monetary authorities and depository credit intermediation	2	\$134	\$666	\$835
441	Owner-occupied dwellings	-	-	\$471	\$727
156	Petroleum refineries	0	\$25	\$329	\$848
169	Nitrogenous fertilizer manufacturing	1	\$97	\$262	\$849
62	Maintenance and repair construction of nonresidential structures	3	\$139	\$251	\$520

Source: IMPLAN, Agribusiness Intelligence

Exhibit 132: Top 10 Industries Affected by Ohio Corn to Exports via Inland Waterways by Employment

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
2	Grain farming	212	\$838	\$3,358	\$27,000
19	Support activities for agriculture and forestry	58	\$1,102	\$1,518	\$2,237
440	Real estate	14	\$145	\$1,919	\$2,720
395	Wholesale trade	9	\$670	\$1,326	\$2,072
62	Maintenance and repair construction of nonresidential structures	3	\$139	\$251	\$520
502	Limited-service restaurants	3	\$49	\$121	\$228
411	Truck transportation	3	\$132	\$214	\$478
501	Full-service restaurants	3	\$57	\$65	\$133
464	Employment services	3	\$96	\$155	\$210
437	Insurance carriers	3	\$269	\$764	\$1,330

Source: IMPLAN, Agribusiness Intelligence



2. Ohio Soybeans Produced for Exports via Inland Waterways

- Direct Economic Contributions stem from the production of soybeans for exports via inland waterways.
 - In 2016, Ohio soybeans produced for exports via inland waterways directly contributed:
 - \$498 Million in Economic Output
 - 1,975 Jobs
 - \$105 Million in GDP

Exhibit 133: Direct Economic Contributions from Ohio Soybeans to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Soybean Exports	1,975	\$60.7	\$105.1	\$498.0

Source: IMPLAN, Agribusiness Intelligence

- Total Economic Contributions stem from the production of soybeans for exports via inland waterways, from companies operating in the supply chain of direct contributors and spent wages from individuals employed by those companies. Total Economic Contributions include direct, indirect, and induced contributions.
 - In 2016, Ohio soybeans produced for exports via inland waterways in total contributed:
 - \$882 Million in Output
 - 4,861 Jobs
 - \$327 Million in GDP

Exhibit 134: Total Economic Contributions from Ohio Soybeans to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Soybean Exports	4,861	\$182.8	\$327.2	\$882.2

Source: IMPLAN, Agribusiness Intelligence



- Exhibit 135 and Exhibit 136 show the top 10 (ranked by employment and GDP gains) IMPLAN industries that benefit from Ohio soybean produced for exports via inland waterways.

- As expected, oilseed farming and support activities for grain farming rank near the top of the list for jobs supported by Ohio soybean production for exports via inland waterways.

- Oilseed Farming
 - **Employment:** 1,975
 - **GDP:** \$105 Million
- Support Activities
 - **Employment:** 811
 - **GDP:** \$21 Million

Exhibit 135: Top 10 Industries Affected by Ohio Soybeans to Exports via Inland Waterways by GDP

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
1	Oilseed farming	1,975	\$4,470	\$105,098	\$498,000
440	Real estate	202	\$2,170	\$28,684	\$40,669
395	Wholesale trade	173	\$12,687	\$25,099	\$39,209
19	Support activities for agriculture and forestry	811	\$15,322	\$21,113	\$31,117
433	Monetary authorities and depository credit intermediation	30	\$2,228	\$11,118	\$13,936
441	Owner-occupied dwellings	-	-	\$10,154	\$15,676
437	Insurance carriers	35	\$3,452	\$9,796	\$17,052
62	Maintenance and repair construction of nonresidential structures	91	\$3,645	\$6,576	\$13,639
411	Truck transportation	67	\$3,079	\$4,967	\$11,105
156	Petroleum refineries	2	\$384	\$4,948	\$12,767

Source: IMPLAN, Agribusiness Intelligence

Exhibit 136: Top 10 Industries Affected by Ohio Soybeans to Exports via Inland Waterways by Employment

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
1	Oilseed farming	1,975	\$4,470	\$105,098	\$498,000
19	Support activities for agriculture and forestry	811	\$15,322	\$21,113	\$31,117
440	Real estate	202	\$2,170	\$28,684	\$40,669
395	Wholesale trade	173	\$12,687	\$25,099	\$39,209
62	Maintenance and repair construction of nonresidential structures	91	\$3,645	\$6,576	\$13,639
416	Warehousing and storage	76	\$3,641	\$4,580	\$7,587
10	All other crop farming	70	\$606	\$838	\$1,364
411	Truck transportation	67	\$3,079	\$4,967	\$11,105
502	Limited-service restaurants	61	\$1,030	\$2,555	\$4,808
501	Full-service restaurants	57	\$1,160	\$1,323	\$2,687

Source: IMPLAN, Agribusiness Intelligence



K. Tennessee Economic Contribution of Corn and Soybean Exports Moved Along Inland Waterways

1. Tennessee Corn Produced for Exports via Inland Waterways

- Direct Economic Contributions stem from the production of corn for exports via inland waterways.
 - In 2016, Tennessee corn produced for exports via inland waterways directly contributed:
 - \$56 Million in Economic Output
 - 892 Jobs
 - \$7.7 Million in GDP

Exhibit 137: Direct Economic Contributions from Tennessee Corn to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Corn Exports	892	\$1.7	\$7.7	\$56.0

Source: IMPLAN, Agribusiness Intelligence

- Total Economic Contributions stem from the production of corn for exports via inland waterways, from companies operating in the supply chain of direct contributors and spent wages from individuals employed by those companies. Total Economic Contributions include direct, indirect, and induced contributions.
 - In 2016, Tennessee corn produced for exports via inland waterways in total contributed:
 - \$103 Million in Output
 - 1,284 Jobs
 - \$35 Million in GDP

Exhibit 138: Total Economic Contributions from Tennessee Corn to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Corn Exports	1,284	\$17.8	\$34.9	\$102.5

Source: IMPLAN, Agribusiness Intelligence



- Exhibit 139 and Exhibit 140 show the top 10 (ranked by employment and GDP gains) IMPLAN industries that benefit from Tennessee corn produced for exports via inland waterways.

- As expected, grain farming and support activities for grain farming rank near the top of the list for jobs supported by Tennessee corn production for exports via inland waterways.

- Grain Farming
 - ❑ **Employment:** 892
 - ❑ **GDP:** \$7.7 Million

- Support Activities
 - ❑ **Employment:** 166
 - ❑ **GDP:** \$5.1 Million

Exhibit 139: Top 10 Industries Affected by Tennessee Corn to Exports via Inland Waterways by GDP

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
2	Grain farming	892	\$881	\$7,699	\$56,000
19	Support activities for agriculture and forestry	166	\$3,345	\$5,113	\$7,160
440	Real estate	25	\$307	\$3,858	\$5,347
395	Wholesale trade	17	\$1,251	\$2,829	\$4,214
172	Pesticide and other agricultural chemical manufacturing	2	\$308	\$1,555	\$3,364
441	Owner-occupied dwellings	-	-	\$930	\$1,435
437	Insurance carriers	3	\$332	\$915	\$1,639
433	Monetary authorities and depository credit intermediation	5	\$395	\$599	\$1,061
62	Maintenance and repair construction of nonresidential structures	8	\$269	\$493	\$1,096
482	Hospitals	4	\$286	\$464	\$738

Source: IMPLAN, Agribusiness Intelligence

Exhibit 140: Top 10 Industries Affected by Tennessee Corn to Exports via Inland Waterways by Employment

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
2	Grain farming	892	\$881	\$7,699	\$56,000
19	Support activities for agriculture and forestry	166	\$3,345	\$5,113	\$7,160
440	Real estate	25	\$307	\$3,858	\$5,347
395	Wholesale trade	17	\$1,251	\$2,829	\$4,214
62	Maintenance and repair construction of nonresidential structures	8	\$269	\$493	\$1,096
11	Beef cattle ranching and farming, including feedlots and dual-purpose ranching and farming	7	\$3	\$52	\$171
10	All other crop farming	7	\$15	\$31	\$65
464	Employment services	6	\$183	\$287	\$404
501	Full-service restaurants	6	\$127	\$153	\$292
411	Truck transportation	6	\$286	\$415	\$941

Source: IMPLAN, Agribusiness Intelligence



2. Tennessee Soybeans Produced for Exports via Inland Waterways

- Direct Economic Contributions stem from the production of soybeans for exports via inland waterways.
 - In 2016, Tennessee soybeans produced for exports via inland waterways directly contributed:
 - \$338 Million in Economic Output
 - 2,754 Jobs
 - \$72 Million in GDP

Exhibit 141: Direct Economic Contributions from Tennessee Soybeans to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Soybean Exports	2,754	\$23.9	\$71.7	\$338.0

Source: IMPLAN, Agribusiness Intelligence

- Total Economic Contributions stem from the production of soybeans for exports via inland waterways, from companies operating in the supply chain of direct contributors and spent wages from individuals employed by those companies. Total Economic Contributions include direct, indirect, and induced contributions.
 - In 2016, Tennessee soybeans produced for exports via inland waterways in total contributed:
 - \$596 Million in Output
 - 4,876 Jobs
 - \$221 Million in GDP

Exhibit 142: Total Economic Contributions from Tennessee Soybeans to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Soybean Exports	4,876	\$113.8	\$221.1	\$595.7

Source: IMPLAN, Agribusiness Intelligence



- Exhibit 143 and Exhibit 144 show the top 10 (ranked by employment and GDP gains) IMPLAN industries that benefit from Tennessee soybean produced for exports via inland waterways.

- As expected, oilseed farming and support activities for grain farming rank near the top of the list for jobs supported by Tennessee soybean production for exports via inland waterways.

- Oilseed Farming
 - **Employment:** 2,754
 - **GDP:** \$72 Million

- Support Activities
 - **Employment:** 766
 - **GDP:** \$24 Million

Exhibit 143: Top 10 Industries Affected by Tennessee Soybeans to Exports via Inland Waterways by GDP

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
1	Oilseed farming	2,754	\$1,538	\$71,670	\$338,000
19	Support activities for agriculture and forestry	766	\$15,436	\$23,597	\$33,041
440	Real estate	122	\$1,495	\$18,805	\$26,060
395	Wholesale trade	106	\$7,796	\$17,624	\$26,252
172	Pesticide and other agricultural chemical manufacturing	9	\$1,499	\$7,574	\$16,390
441	Owner-occupied dwellings	-	-	\$5,992	\$9,251
62	Maintenance and repair construction of nonresidential structures	67	\$2,317	\$4,248	\$9,446
437	Insurance carriers	14	\$1,373	\$3,781	\$6,772
433	Monetary authorities and depository credit intermediation	27	\$2,139	\$3,247	\$5,753
411	Truck transportation	45	\$2,232	\$3,238	\$7,345

Source: IMPLAN, Agribusiness Intelligence

Exhibit 144: Top 10 Industries Affected by Tennessee Soybeans to Exports via Inland Waterways by Employment

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
1	Oilseed farming	2,754	\$1,538	\$71,670	\$338,000
19	Support activities for agriculture and forestry	766	\$15,436	\$23,597	\$33,041
440	Real estate	122	\$1,495	\$18,805	\$26,060
395	Wholesale trade	106	\$7,796	\$17,624	\$26,252
62	Maintenance and repair construction of nonresidential structures	67	\$2,317	\$4,248	\$9,446
10	All other crop farming	60	\$129	\$270	\$572
416	Warehousing and storage	54	\$2,426	\$3,028	\$5,161
411	Truck transportation	45	\$2,232	\$3,238	\$7,345
502	Limited-service restaurants	37	\$618	\$1,586	\$2,940
501	Full-service restaurants	36	\$787	\$948	\$1,802

Source: IMPLAN, Agribusiness Intelligence



L. Wisconsin Economic Contribution of Corn and Soybean Exports Moved Along Inland Waterways

1. Wisconsin Corn Produced for Exports via Inland Waterways

- Direct Economic Contributions stem from the production of corn for exports via inland waterways.
 - In 2016, Wisconsin corn produced for exports via inland waterways directly contributed:
 - \$6 Million in Economic Output
 - 36 Jobs
 - \$1 Million in GDP

Exhibit 145: Direct Economic Contributions from Wisconsin Corn to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Corn Exports	36	\$0.6	\$0.8	\$6.0

Source: IMPLAN, Agribusiness Intelligence

- Total Economic Contributions stem from the production of corn for exports via inland waterways, from companies operating in the supply chain of direct contributors and spent wages from individuals employed by those companies. Total Economic Contributions include direct, indirect, and induced contributions.
 - In 2016, Wisconsin corn produced for exports via inland waterways in total contributed:
 - \$11 Million in Output
 - 72 Jobs
 - \$4 Million in GDP

Exhibit 146: Total Economic Contributions from Wisconsin Corn to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Corn Exports	72	\$2.2	\$3.7	\$11.0

Source: IMPLAN, Agribusiness Intelligence



- Exhibit 147 and Exhibit 148 show the top 10 (ranked by employment and GDP gains) IMPLAN industries that benefit from Wisconsin corn produced for exports via inland waterways.

- As expected, grain farming and support activities for grain farming rank near the top of the list for jobs supported by Wisconsin corn production for exports via inland waterways.

- Grain Farming
 - ❑ **Employment:** 36
 - ❑ **GDP:** \$1 Million
- Support Activities
 - ❑ **Employment:** 12
 - ❑ **GDP:** \$425,000

Exhibit 147: Top 10 Industries Affected by Wisconsin Corn to Exports via Inland Waterways by GDP

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
2	Grain farming	36	\$154	\$815	\$6,000
440	Real estate	3	\$23	\$475	\$646
19	Support activities for agriculture and forestry	12	\$288	\$425	\$573
395	Wholesale trade	2	\$138	\$268	\$429
437	Insurance carriers	1	\$54	\$174	\$290
441	Owner-occupied dwellings	-	-	\$120	\$186
433	Monetary authorities and depository credit intermediation	1	\$47	\$83	\$147
172	Pesticide and other agricultural chemical manufacturing	0	\$17	\$71	\$290
62	Maintenance and repair construction of nonresidential structures	1	\$32	\$57	\$114
461	Management of companies and enterprises	0	\$44	\$54	\$91

Source: IMPLAN, Agribusiness Intelligence

Exhibit 148: Top 10 Industries Affected by Wisconsin Corn to Exports via Inland Waterways by Employment

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
2	Grain farming	36	\$154	\$815	\$6,000
19	Support activities for agriculture and forestry	12	\$288	\$425	\$573
440	Real estate	3	\$23	\$475	\$646
395	Wholesale trade	2	\$138	\$268	\$429
62	Maintenance and repair construction of nonresidential structures	1	\$32	\$57	\$114
433	Monetary authorities and depository credit intermediation	1	\$47	\$83	\$147
501	Full-service restaurants	1	\$12	\$14	\$30
411	Truck transportation	1	\$30	\$48	\$104
482	Hospitals	1	\$42	\$51	\$92
10	All other crop farming	1	\$6	\$9	\$15

Source: IMPLAN, Agribusiness Intelligence



2. Wisconsin Soybeans Produced for Exports via Inland Waterways

- Direct Economic Contributions stem from the production of soybeans for exports via inland waterways.
 - In 2016, Wisconsin soybeans produced for exports via inland waterways directly contributed:
 - \$463 Million in Economic Output
 - 1,397 Jobs
 - \$179 Million in GDP

Exhibit 149: Direct Economic Contributions from Wisconsin Soybeans to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Soybean Exports	1,397	\$155.5	\$178.8	\$463.0

Source: IMPLAN, Agribusiness Intelligence

- Total Economic Contributions stem from the production of soybeans for exports via inland waterways, from companies operating in the supply chain of direct contributors and spent wages from individuals employed by those companies. Total Economic Contributions include direct, indirect, and induced contributions.
 - In 2016, Wisconsin soybeans produced for exports via inland waterways in total contributed:
 - \$831 Million in Output
 - 4,097 Jobs
 - \$388 Million in GDP

Exhibit 150: Total Economic Contributions from Wisconsin Soybeans to Exports via Inland Waterways, 2016

Activity	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
Soybean Exports	4,097	\$273.8	\$387.7	\$830.8

Source: IMPLAN, Agribusiness Intelligence



- Exhibit 151 and Exhibit 152 show the top 10 (ranked by employment and GDP gains) IMPLAN industries that benefit from Wisconsin soybean produced for exports via inland waterways.

- As expected, oilseed farming and support activities for grain farming rank near the top of the list for jobs supported by Wisconsin soybean production for exports via inland waterways.

- Oilseed Farming
 - **Employment:** 1,397
 - **GDP:** \$179 Million
- Support Activities
 - **Employment:** 553
 - **GDP:** \$20 Million

Exhibit 151: Top 10 Industries Affected by Wisconsin Soybeans to Exports via Inland Waterways by GDP

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
1	Oilseed farming	1,397	\$3,431	\$178,826	\$463,000
440	Real estate	169	\$1,358	\$27,807	\$37,835
19	Support activities for agriculture and forestry	553	\$13,279	\$19,582	\$26,402
395	Wholesale trade	140	\$9,782	\$18,940	\$30,380
441	Owner-occupied dwellings	-	-	\$15,350	\$23,698
437	Insurance carriers	29	\$2,899	\$9,282	\$15,444
482	Hospitals	74	\$5,142	\$6,286	\$11,300
433	Monetary authorities and depository credit intermediation	49	\$3,335	\$5,906	\$10,431
62	Maintenance and repair construction of nonresidential structures	68	\$2,909	\$5,200	\$10,449
475	Offices of physicians	36	\$4,284	\$4,335	\$6,096

Source: IMPLAN, Agribusiness Intelligence

Exhibit 152: Top 10 Industries Affected by Wisconsin Soybeans to Exports via Inland Waterways by Employment

IMPLAN Sector	Description	Employment	Labor Income (\$ Million)	GDP (\$ Million)	Output (\$ Million)
1	Oilseed farming	1,397	\$3,431	\$178,826	\$463,000
19	Support activities for agriculture and forestry	553	\$13,279	\$19,582	\$26,402
440	Real estate	169	\$1,358	\$27,807	\$37,835
395	Wholesale trade	140	\$9,782	\$18,940	\$30,380
501	Full-service restaurants	76	\$1,339	\$1,571	\$3,379
482	Hospitals	74	\$5,142	\$6,286	\$11,300
62	Maintenance and repair construction of nonresidential structures	68	\$2,909	\$5,200	\$10,449
502	Limited-service restaurants	68	\$1,129	\$2,975	\$5,468
411	Truck transportation	53	\$2,596	\$4,180	\$9,064
10	All other crop farming	51	\$480	\$747	\$1,309

Source: IMPLAN, Agribusiness Intelligence



IX. OTHER ECONOMIC IMPACTS OF THE INLAND WATERWAYS SYSTEM

- Without adequate waterways capacity, congestion on roadways and the rail network will increase.
 - Barge traffic is capable of moving large volumes of cargo over long distances. One barge can transport 1,750 tons or 58,333 bushels or 1,555,000 gallons. It would take 16 rail cars or 70 large semis/tractor trailers to move that same amount of cargo.³¹ A typical 15-barge tow can therefore haul approximately 26,250 tons of cargo. It would take 216 rail cars or 1,050 trucks to move the equivalent volume.
- Water transportation has a less negative environmental impact than other modes of transportation.
 - A study by the Texas Transportation Institute released in January 2017 compared the fuel efficiency and greenhouse gas emissions of Inland Towing, Railroads and Truck movements.³² The inland waterways have a distinct advantage over railroads and trucks in terms of fuel efficiency and greenhouse gas emissions, with the lowest carbon footprint.
- The Texas Transportation Institute study also performed a safety assessment of fatalities and injuries for each mode of transportation.
 - On a million ton-mile basis, there are 21.9 rail fatalities and 79.3 truck fatalities for every 1 fatality on the waterways system associated with the transportation of goods.
 - Similarly, for every injury per million ton-mile on the waterways, there are 80.9 injuries on rail and 696.2 injuries on truck.³³

³¹ <https://iowadot.gov/compare.pdf>, accessed February 2019.

³² Texas Transportation Institute, "A Modal Comparison of Domestic Freight Transportation Effects on the General Public: 2001-2014," January 2017.

³³ Texas Transportation Institute, Average from 2001 to 2014.



Exhibit 153: Modal Comparison of Fuel Efficiency and Greenhouse Gas Emissions

Mode	Ton-Miles per Gallon	CO ₂ Emissions (Grams per Ton-Mile)
Inland Towing	647	15.62
Railroads	477	21.19
Truck	145	154.08

Source: Mid-America Freight Coalition

- Diversion of waterways freight would result in increased traffic and deterioration of road surfaces requiring additional maintenance and surfacing. Passenger cars inflict minimal damage on roadways, whereas roadways must be designed to handle the heavier loads carried by truck. An increase in truck volume will speed the deterioration of the road surface if not designed to carry these heavier loads.
- The U.S. interstates, State highways, and county roads are used by 80,000-pound trucks. Exceptions and permits for higher truck weights are available on small segments of the interstate system. Most States provide weight limit exemptions for various types of vehicles and commodities, including agriculture on State and local roads. Some exemptions or higher weights are allowed through specific permits, including segments of the interstate.³⁴

A priority of the agricultural community is an infrastructure that can handle heavier trucks with an additional sixth axle. This requires additional study and funding.³⁵

³⁴ Compilation of Existing State Truck Size and Weight Limit Laws. May 2015. https://ops.fhwa.dot.gov/freight/policy/rpt_congress/truck_sw_laws/index.htm.

³⁵ Research to Support Evaluation of Truck Size and Weight Regulations. Transportation Research Board Special Report 328. June 2019. <http://www.trb.org/Main/Blurbs/178439.aspx>.



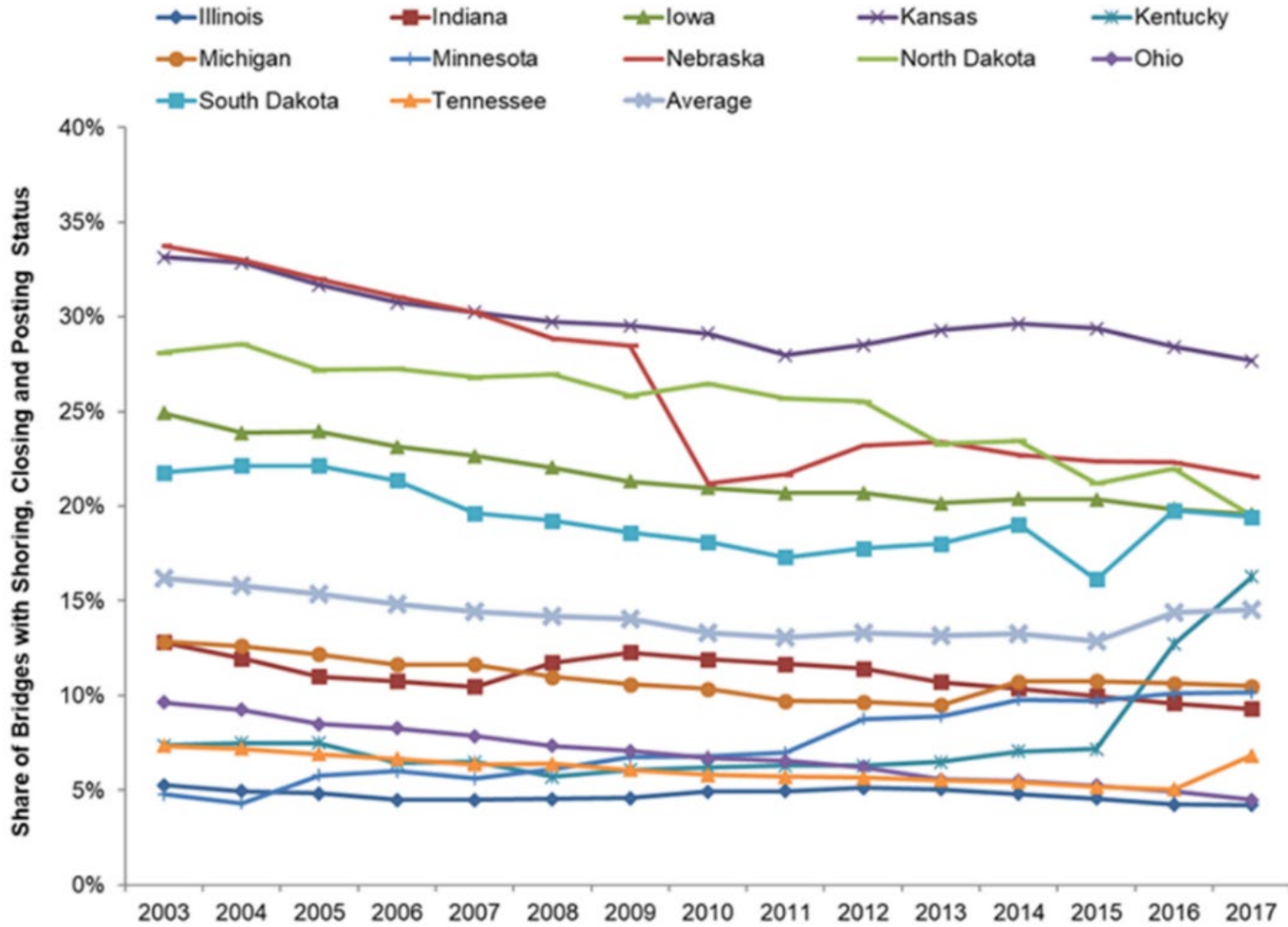
- A study completed by the Mid-America Freight Coalition in 2014 states that the wear-and-tear of one average five-axle truck on flexible pavement equates to approximately 4,000 cars. For rigid pavements, this ratio increases to approximately 6,200 cars for one truck.³⁶
- Meanwhile, from 2003 through 2017, the share of bridges that either require shoring, closing or posting declined from 16.2 percent to 14.5 percent. Improvements have been slow, but steady. Additional freight on roadways, due to inadequate waterways capacity, has the potential to reverse this trend.³⁷

³⁶ Understanding Freight Vehicle Pavement Impacts: How do Passenger Vehicles and Trucks Compare? Mid-America Freight Coalition. National Center for Freight & Infrastructure Research & Education. University of Wisconsin-Madison <http://midamericafreight.org/wp-content/uploads/2018/10/ESALs.pdf>.

³⁷ Shoring is the process of temporarily supporting a structure when in danger of collapse or during repairs or alterations. Posting of bridges is the means of enforcing weight limits when a bridge is no longer capable of supporting designed load limits. Closing a bridge is to close that bridge to all traffic.



Exhibit 154: State Comparison Share of Bridges with Shoring, Closing and Posting Status



Note: The share amount is the annual average for the selected soybean producing States.

Source: Agribusiness Consulting



X. U.S. AGRICULTURAL COMPETITIVENESS WITH BRAZIL

- The United States and Brazil compete directly for export corn and soybean business. Given the fungible nature of commodity supplies, the corn and soybean prices in the United States and Brazil are interrelated.
 - Improvements to Brazil's infrastructure will result in less expensive and more competitive grain and soybeans to the end user, and on the margin, more demand for Brazilian corn and soybeans, and less demand for U.S. corn and soybeans.
- Infrastructure problems in the United States will increase the total commodity price to the end user and make U.S. grains and soybeans less competitive in global markets.
 - The method used to recapture the demand lost is to lower the representative corn or soybean basis, which reduces the farmer's income from the marketplace.
 - Likewise, improvements in the U.S. infrastructure, such as a more efficient inland waterways system, will contribute to improved farm income.
- Major grain exporting companies examine where to deploy capital on a global basis. The United States is in direct competition with Brazil, therefore infrastructure investment can have a tremendous impact on a farmer's profitability in both countries.
 - The first step in building any agriculture facility is to determine the ability of the facility to source inputs and sell outputs. A company will want to have as many transportation options as possible at the proposed site and confidence the options will be maintained over the life of the facility.
 - A lack of U.S. infrastructure investment, combined with infrastructure investment in Brazil, ultimately reduces the competitiveness of U.S. agricultural products compared to Brazil and lowers the prices paid to farmers. A company would be expected to have more confidence building a facility on a river segment that has new locks versus the promise of new locks.
- The U.S. infrastructure advantage over other countries is disappearing.



- Multinational corporations are investing heavily in the Brazilian grain and soybean transportation and handling system including barge equipment, barge loading elevators, the rail network, and export elevators.
 - Across northern Brazil, the result is a recorded export increase from 1.6 million metric tons of soybeans in 2002 to 15.4 million metric tons, with the potential capacity to exceed 60 million metric tons.
 - Meanwhile in southern Brazil at the ports of Paranagua and Santos, infrastructure investments continue to improve export capabilities.

- Any improvement to ocean freight rates from the United States versus ocean rates from Brazil will translate into a more competitive price. Dredging the Mississippi River to 50 feet will make U.S. ocean freight rates more competitive.

- The U.S. currently has an advantage of \$5.35 per metric ton over North Mato Grosso, Brazil, when shipping soybeans from Davenport, Iowa, to Shanghai, China, via the inland waterways system as seen in Exhibit 155. The U.S. total soybean landed cost in Shanghai is \$397.45 per metric ton compared to \$402.80 per metric ton from Brazil.
 - The farm value of soybeans in the fourth quarter of 2018 is used as a starting point for the comparison. Transportation costs to port are added, followed by the cost of ocean freight.
 - Combined transportation charges for truck and barge movement from Davenport, Iowa to the export location on the inland waterways system is \$36.38 per metric ton compared to \$79.37 per metric ton for the truck movement in Brazil.
 - The high inland transportation charge in Brazil is offset partially by an ocean freight rate of \$30.00 per metric ton from Brazil as opposed to \$47.52 per metric ton from the U.S.

- If the current spending trend is continued through 2045, the landed cost from the U.S. increases to nearly \$400.00 per metric ton with all other costs except barge costs remaining constant. The U.S. advantage declines to \$3.03 per metric ton before any improvements in Brazil infrastructure are considered.

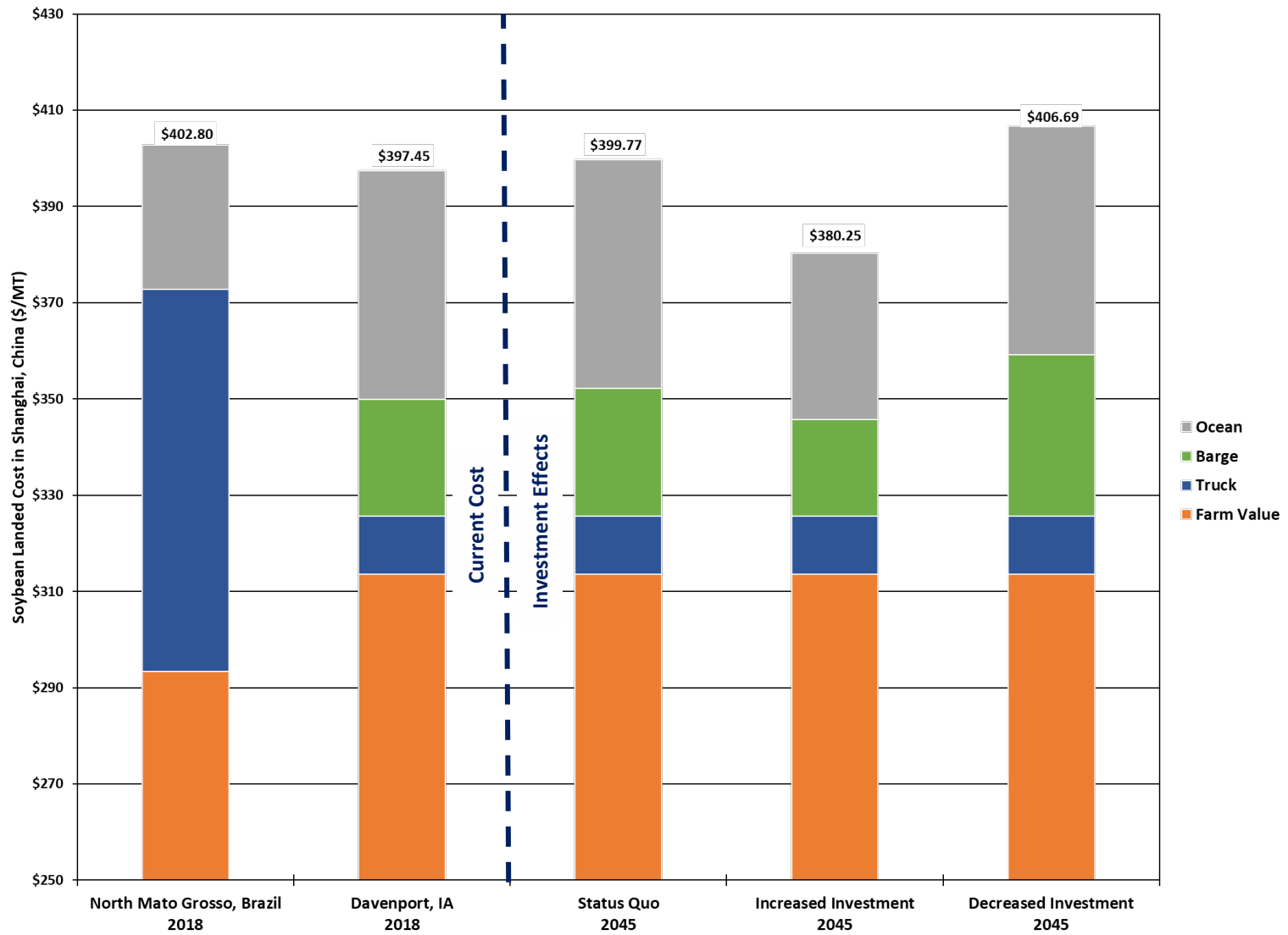
- With increased spending, U.S. barge costs decline by \$4.18 per metric ton of soybeans compared to the current status quo cost. Ocean freight benefits from deeper drafts, resulting in a \$13.02 per metric ton savings. The total cost reduction is \$17.20 per metric ton compared to the status quo.



- Increased investment in the waterways system results in a \$22.55 per metric ton U.S. advantage over Brazil with all other items unchanged.
- Reduced investment increases barge costs to \$33.52 per metric ton for a total landed cost in Shanghai of \$406.69 per metric ton.
 - Shipments of soybeans from the United States would be \$3.89 per metric ton higher than from Brazil. To remain competitive, the U.S. price would have to decline.



Exhibit 155: Comparison of Landed Costs of Soybeans Shipped to Shanghai, China



Source: USDA-AMS, IEG Vantage, Agribusiness Consulting



- Soybean transportation costs to China from Brazil are decreasing at a faster rate than those from the U.S. as seen in Exhibit 156, and demonstrate that if U.S. transportation costs increase, the competitiveness of U.S. agriculture is in jeopardy.
- China's investment in Brazil hit a seven-year high in 2017.³⁸
 - China invested \$20.9 billion in Brazil in 2017, the most since 2010 as a recession helped push down asset prices and attracted investors.
 - A bilateral fund launched in 2017 to direct \$20 billion in financing from state-owned Chinese and Brazilian banks. The fund focuses on railways and infrastructure to help bring grain to ports as China is the dominant buyer of Brazilian soybeans, but also considers manufacturing, technology, and agricultural projects.
- Brazil wants Chinese investment in infrastructure projects if investors create local jobs and play by Brazilian rules.³⁹
- It was reported in 2015 that China was investing \$50 billion in Brazil.⁴⁰
 - The investment would be used to build a railway link from Brazil's Atlantic coast to the Pacific coast of Peru to reduce the cost of exports to China.
- Higher and consistent inland waterway funding is needed to ensure the long-term prosperity of U.S. agriculture.
- Project engineering and design (PED) funding is urgently needed for NESP to start design on new locks, which are essential for the competitiveness of the heartland corridor.

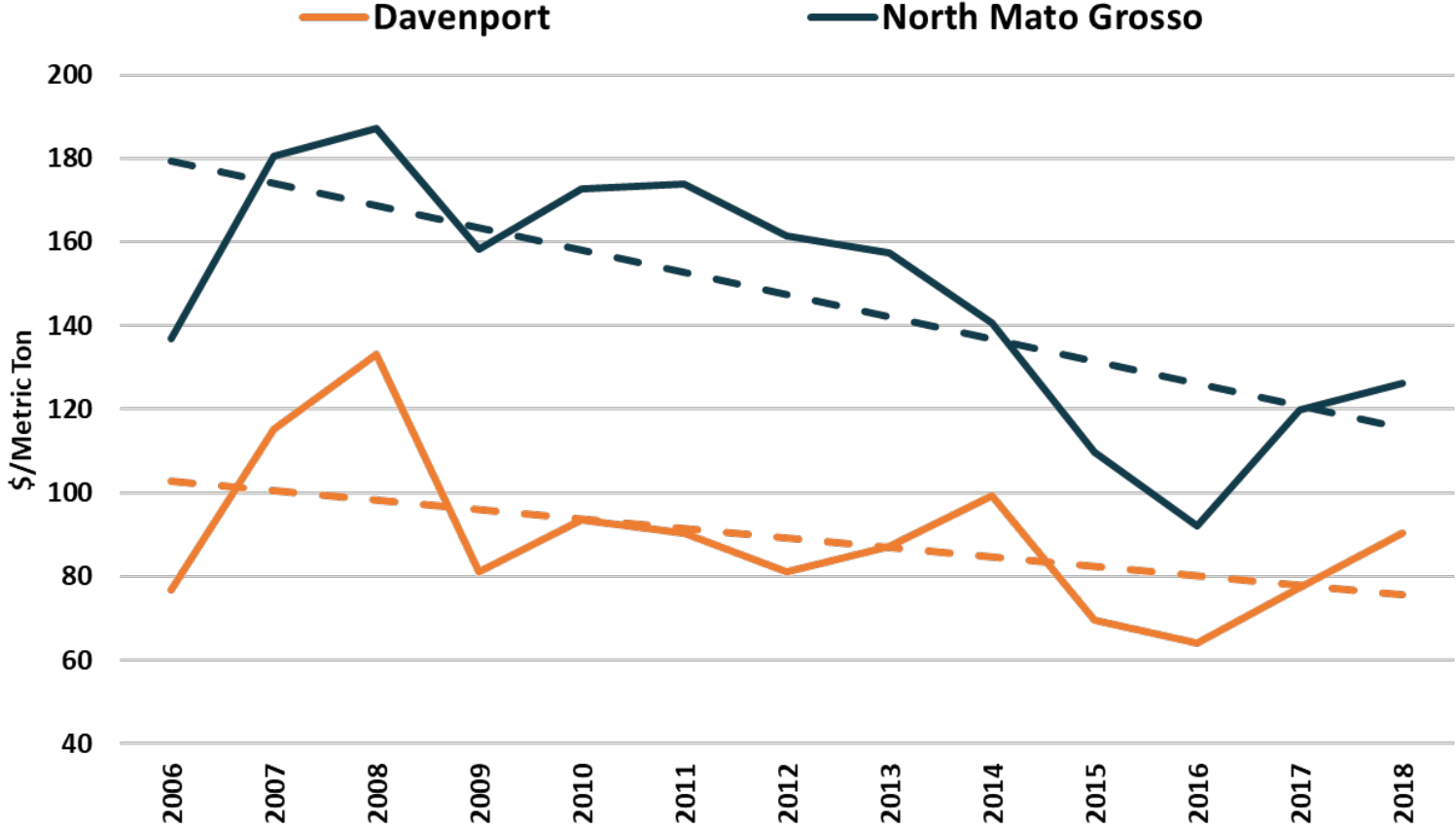
³⁸ <https://www.reuters.com/article/us-brazil-china-investment/china-investment-in-brazil-hit-seven-year-high-in-2017-idUSKBN1F7387>

³⁹ <https://finance.yahoo.com/news/brazil-wants-china-invest-infrastructure-194842132.html>

⁴⁰ <https://www.bbc.com/news/business-32747454>



Exhibit 156: Soybean Transportation Costs to China: United States vs. Brazil



Source: USDA-AMS, IEG Vantage, Agribusiness Consulting



XI. CONCLUSIONS

- The inland waterways system carries large volumes of bulk commodities over long distances mainly for export or import.
- The inland waterways system is of vital importance to numerous industries, with 532.8 million tons moved on the system in 2017. That volume is forecast to increase to 618.8 million tons by 2045.
 - America's primary inland waterways system feeds to the export grain complex of elevators from Baton Rouge through New Orleans to Myrtle Grove, LA on the Mississippi River in the Center Gulf, which handles 57 percent of U.S. corn exports by volume (valued at \$4.8 billion) and 59 percent of U.S. soybean exports (\$12.4 billion), and 55 percent of soybean meal exports and 72 percent of DDGS exports.
 - Due to its efficiency and lower costs, the inland waterways system saves between \$7 billion and \$9 billion annually over the cost of by other modes.
 - The waterways infrastructure, however, is aging and needs major rehabilitation and construction to restore it to its full capability, while accommodating opportunities for growth.
 - The U.S. economy depends on farmers using that infrastructure to maintain their competitive position in the global export market place.
- The rail system is near capacity with limited ability to expand. Diversion from the waterways system would shift traffic to the rail and truck networks, which results in higher freight rates for shippers.
- Historically, barge traffic has grown, but lagging infrastructure maintenance and improvement needs have resulted in more frequent delays, with the percentage of vessels delayed increasing from 35 percent in 2010 to 49 percent in 2017. Delays can cost up to \$739 per hour for an average tow, or more than \$44 million per year.
- Using IMPLAN analysis of the U.S. inland waterways system demonstrates that in 2016 the system had direct output of \$17.5 billion with over 55,200 jobs and a GDP impact of \$7.7 billion. Construction and O&M activity increases those figures to \$18.4 billion of direct output, almost 60,300 jobs, and a GDP impact of almost \$8.3 billion.



- The total economic contribution of the inland waterways system, after considering indirect impacts, amounts to almost 256,000 jobs and \$27.2 billion in GDP.
- Every \$1 of output from waterways activity results in an additional \$1.89 in economic activity across the United States.
- The forecasted growth is over 312,000 jobs by 2029 and \$37.2 billion for the GDP impact.
- By 2045, the impact grows to almost 395,000 jobs and more than \$54 billion in GDP.
- Increased investment in the inland waterways system would allow for the transportation of increased volumes of commodities with farm products growing from 14 percent of commodity volumes on the system in 2016 to 25 percent by 2029 and 29 percent by 2045.
 - With the completion of the Olmsted Locks-and-Dam project, projects identified and approved by Congress would be completed over the next 10 years, NESP construction funding could be approved and dredging to 50-foot depths would begin.
 - Dredging alone would result in a 12-13 cent per bushel improvement in the basis (price) of corn and soybeans received by producers, all things being equal. An improvement in basis could result in an increase in land value in the draw area for the inland waterways system.
 - Completion of approved projects would allow for reduced delays, decreased locking times, and heavier loads.
- Under the increased investment scenario, the economic impact of the inland waterways system would increase from 312,000 jobs and a GDP impact of \$37.2 billion in 2029 for the status quo scenario to more than 346,000 jobs and a GDP impact of \$41.0 billion.
 - In 2045, the employment impact would exceed 472,000 jobs as opposed to 395,000 jobs if current spending continues, with a GDP impact of \$64.6 billion as opposed to \$54 billion.
 - The increase in employment and GDP would more than offset the cost of completing all of the proposed projects.
- A reduced investment scenario with no new builds or additional dredging would have a negative effect on the inland waterways system.



- Delays on the system would occur at an even higher rate than have previously occurred, resulting in a diversion of traffic to rail or truck at an additional cost to shippers and their farmer-customers.
 - The draw area around the inland waterways system would tighten as the cost to ship on the river increased.
 - An increase in crushing of soybeans or use of corn for ethanol would occur because of the increased shipping cost. Both would result in a shift in feeding patterns for poultry and livestock.
 - Ultimately, the price received by farmers would see a decline, up to \$0.24 per bushel for corn, due to the increase in shipping costs.
- Under the reduced investment scenario, the economic impact of the waterways system would decrease from 312,000 jobs and a GDP impact of \$37.2 billion in 2029 for the status quo scenario to 290,000 jobs and a GDP impact of \$34.7 billion.
 - In 2045, the employment impact of reduced investment would be 323,000 jobs, as opposed to 395,000 jobs under the status quo. The GDP impact of the reduced investment would be \$44 billion as opposed to \$54 billion under status quo.
- Reduced investment in the inland waterways results in a decline of the market value of corn and soybeans of \$58 billion from status quo investment levels. However, increased investment results in a \$39 billion increase in market value from the status quo. The two scenarios therefore have a range of \$97 billion.
- The United States and Brazil compete directly for export business. As a result, the corn and soybean prices in the United States and Brazil are intertwined.
 - Any investments in U.S. transportation infrastructure, such as a more efficient inland waterways system, will contribute to improved farm income.
 - A lack of infrastructure investment in the United States will increase the price of U.S. grains and soybeans to the end-user and lower demand for U.S. grains and soybeans, thereby depressing farm income.
 - Similarly, improvement to Brazil's infrastructure will result in less expensive and more competitive grain and soybeans to the end user, and could result in less demand for U.S. grains and soybeans.



- Multinational corporations have invested heavily in grain and soybean collection infrastructure, including barge equipment, barge loading elevators, the rail network, and export elevators.
- The United States currently has an advantage of \$5.35 per metric ton over Brazil when shipping soybeans from Davenport, Iowa, to Shanghai, China, via the inland waterways system.
 - If the current U.S. investment trend continues through 2045, the U.S. advantage declines to \$3.03 per metric ton before any improvements in Brazilian infrastructure are factored in.
- With increased U.S. investment in the inland waterways system, the U.S. advantage increases to \$22.55 per metric ton over Brazil with all other items unchanged.
- Reduced U.S. investment results in an increase in shipping costs, \$3.89 per metric ton higher than from Brazil. To be competitive, the U.S. soybean price would have to decline.
- The inland waterways system has other economic impacts that were not included in this study.
 - It would require 216 rail cars or 1,050 trucks to move the equivalent volume of a standard 15-barge tow leading to increased congestion of the rail and road systems. In aggregate, this is the equivalent of an additional 21.4 million trucks.
 - The inland waterways have an environmental advantage in fuel efficiency and greenhouse gas emissions, as well. Inland towing can move 647 ton-miles per gallon as opposed to 477 ton-miles for rail and only 145 ton-miles for truck. Inland towing CO2 emissions are only 15.62 grams/ton-mile compared to 21.19 for rail and 154.2 for truck. This is an emissions reduction of 2.8 million grams/ton-mile.
 - Water transport is safer. On a million ton-mile basis there are 21.9 rail fatalities and 79.3 truck fatalities for every 1 on the water. A shift from water to truck would increase fatalities by more than 475 per year, an 11 percent increase. Injury data show that for every 1 on the water, there were 80.9 on rail and 696.2 on truck.
- Increased investment of \$6.3 billion in the inland waterways system over the 10 years ending in 2029, would result in \$1.2 billion increase in GDP in 2029 and would increase to \$3.0 billion per year by 2045 on a direct basis. The cumulative economic contribution would be an additional \$3.75 billion by 2029, growing to an additional \$10.47 billion by 2045.



- Reduced investment would result in almost 12,337 fewer jobs in 2045 and a GDP that will be over \$2.6 billion lower than is estimated for the current investment trend. When total economic contributions are considered, 72,240 fewer jobs will be created and GDP will be nearly \$9.7 billion lower.

Exhibit 157: Direct Economic Contributions by Investment Scenario and Timeframe

	Status Quo Investment Trend			Increased Investment			Reduce Investment		
	2016	2029	2045	2016	2029	2045	2016	2029	2045
Employment	60,285	65,734	70,850	60,285	74,810	84,233	60,285	60,062	58,513
Labor Income	\$5,232	\$7,261	\$10,534	\$5,232	\$8,023	\$12,462	\$5,232	\$6,740	\$8,852
GDP	\$8,263	\$11,372	\$16,508	\$8,263	\$12,504	\$19,554	\$8,263	\$10,594	\$13,888
Output	\$18,367	\$25,623	\$37,226	\$18,367	\$28,231	\$44,463	\$18,367	\$23,883	\$31,089

Note: Values in million dollars

Exhibit 158: Total Economic Contributions by Investment Scenario and Timeframe

	Status Quo Investment Trend			Increased Investment			Reduce Investment		
	2016	2029	2045	2016	2029	2045	2016	2029	2045
Employment	255,782	312,121	394,993	255,782	346,129	472,287	255,782	289,916	322,753
Labor Income	\$16,606	\$22,796	\$33,121	\$16,606	\$25,122	\$39,515	\$16,606	\$21,242	\$27,163
GDP	\$27,188	\$37,226	\$54,095	\$27,188	\$40,977	\$64,563	\$27,188	\$34,716	\$44,416
Output	\$52,833	\$72,757	\$104,520	\$52,833	\$80,176	\$125,078	\$52,833	\$67,847	\$85,965

Note: Values in million dollars



XII. APPENDIX A: ECONOMIC CONTRIBUTION ANALYSES DETAIL

M. Status Quo Scenario Analysis Results, 2016

Exhibit 159: 2016 Economic Contribution – All Activities

Impact Type	Employment	Labor Income	Total Value Added	Output
Direct Effect	60,285	\$5,232,019,088	\$8,263,069,499	\$18,339,206,051
Indirect Effect	82,010	\$5,594,090,984	\$8,657,506,747	\$16,075,880,336
Induced Effect	113,486	\$5,779,907,326	\$10,267,425,916	\$18,390,443,631
Total Effect	255,781	\$16,606,017,398	\$27,188,002,162	\$52,805,530,019

Exhibit 160: 2016 Economic Contribution – Water Transportation Activities, Status Quo

Impact Type	Employment	Labor Income	Total Value Added	Output
Direct Effect	55,231	\$4,817,833,046	\$7,692,831,237	\$17,486,953,433
Indirect Effect	79,862	\$5,456,908,041	\$8,432,641,363	\$15,634,667,542
Induced Effect	107,786	\$5,489,587,516	\$9,751,706,196	\$17,466,689,503
Total Effect	242,880	\$15,764,328,604	\$25,877,178,795	\$50,588,310,479

Exhibit 161: 2016 Economic Contribution – Construction and O&M Activities, Status Quo

Impact Type	Employment	Labor Income	Total Value Added	Output
Direct Effect	5,054	\$414,186,042	\$570,238,263	\$852,252,618
Indirect Effect	2,148	\$137,182,943	\$224,865,384	\$441,212,794
Induced Effect	5,700	\$290,319,810	\$515,719,720	\$923,754,128
Total Effect	12,901	\$841,688,795	\$1,310,823,366	\$2,217,219,539



N. Status Quo Operations Scenario Analysis Results, 2029

Exhibit 162: 2029 Economic Contribution – All Activities, Status Quo

Impact Type	Employment	Labor Income	Total Value Added	Output
Direct Effect	65,734	\$7,260,572,413	\$11,372,393,580	\$25,586,891,594
Indirect Effect	102,813	\$7,604,801,999	\$11,766,501,586	\$22,198,377,786
Induced Effect	143,574	\$7,930,382,239	\$14,087,513,324	\$24,935,455,360
Total Effect	312,121	\$22,795,756,651	\$37,226,408,490	\$72,720,724,740

Exhibit 163: 2029 Economic Contribution – Water Transportation Activities, Status Quo

Impact Type	Employment	Labor Income	Total Value Added	Output
Direct Effect	59,780	\$6,728,726,785	\$10,640,012,569	\$24,484,549,330
Indirect Effect	100,284	\$7,429,526,804	\$11,479,242,640	\$21,632,480,219
Induced Effect	136,833	\$7,558,018,911	\$13,426,053,265	\$23,764,617,637
Total Effect	296,898	\$21,716,272,501	\$35,545,308,473	\$69,881,647,186

Exhibit 164: 2029 Economic Contribution – Construction and O&M Activities, Status Quo

Impact Type	Employment	Labor Income	Total Value Added	Output
Direct Effect	5,954	\$531,845,627	\$732,381,011	\$1,102,342,264
Indirect Effect	2,529	\$175,275,194	\$287,258,946	\$565,897,567
Induced Effect	6,741	\$372,363,328	\$661,460,059	\$1,170,837,724
Total Effect	15,223	\$1,079,484,150	\$1,681,100,016	\$2,839,077,554



O. Status Quo Operations Scenario Analysis Results, 2045

Exhibit 165: 2045 Economic Contribution – All Activities, Status Quo

Impact Type	Employment	Labor Income	Total Value Added	Output
Direct Effect	70,850	\$10,534,081,768	\$16,507,897,674	\$37,176,551,664
Indirect Effect	135,356	\$11,064,376,363	\$17,118,155,381	\$31,922,657,186
Induced Effect	188,787	\$11,522,757,144	\$20,469,000,386	\$35,371,126,917
Total Effect	394,993	\$33,121,215,274	\$54,095,053,441	\$104,470,335,766

Exhibit 166: 2045 Economic Contribution – Water Transportation Activities, Status Quo

Impact Type	Employment	Labor Income	Total Value Added	Output
Direct Effect	63,428	\$9,800,875,232	\$15,497,944,573	\$35,663,508,517
Indirect Effect	132,190	\$10,821,640,590	\$16,720,343,243	\$31,151,833,398
Induced Effect	180,367	\$11,008,798,756	\$19,556,013,318	\$33,793,422,593
Total Effect	375,985	\$31,631,314,578	\$51,774,301,134	\$100,608,764,508

Exhibit 167: 2045 Economic Contribution – Construction and O&M Activities, Status Quo

Impact Type	Employment	Labor Income	Total Value Added	Output
Direct Effect	7,422	\$733,206,536	\$1,009,953,101	\$1,513,043,147
Indirect Effect	3,166	\$242,735,773	\$397,812,137	\$770,823,788
Induced Effect	8,420	\$513,958,388	\$912,987,068	\$1,577,704,324
Total Effect	19,008	\$1,489,900,697	\$2,320,752,307	\$3,861,571,259



P. Increased Investment Scenario Analysis Results, 2029

Exhibit 168: 2029 Economic Contribution – All Activities, Increased Investment

Impact Type	Employment	Labor Income	Total Value Added	Output
Direct Effect	74,810	\$8,022,827,949	\$12,503,771,096	\$28,192,399,118
Indirect Effect	113,153	\$8,362,667,005	\$12,953,833,906	\$24,475,777,688
Induced Effect	158,166	\$8,736,267,488	\$15,519,108,450	\$27,469,313,928
Total Effect	346,129	\$25,121,762,442	\$40,976,713,453	\$80,137,490,734

Exhibit 169: 2029 Economic Contribution – Water Transportation Activities, Increased Investment

Impact Type	Employment	Labor Income	Total Value Added	Output
Direct Effect	64,350	\$7,243,052,603	\$11,453,306,574	\$26,356,082,571
Indirect Effect	107,950	\$7,997,419,894	\$12,356,685,140	\$23,286,008,951
Induced Effect	147,292	\$8,135,733,592	\$14,452,304,744	\$25,581,121,231
Total Effect	319,592	\$23,376,206,089	\$38,262,296,458	\$75,223,212,753

Exhibit 170: 2029 Economic Contribution – Construction and O&M Activities, Increased Investment

Impact Type	Employment	Labor Income	Total Value Added	Output
Direct Effect	10,460	\$779,775,347	\$1,050,464,522	\$1,836,316,547
Indirect Effect	5,203	\$365,247,111	\$597,148,767	\$1,189,768,737
Induced Effect	10,874	\$600,533,895	\$1,066,803,706	\$1,888,192,697
Total Effect	26,537	\$1,745,556,353	\$2,714,416,995	\$4,914,277,980



Q. Increased Investment Scenario Analysis Results, 2045

Exhibit 171: 2045 Economic Contribution – All Activities, Increased Investment

Impact Type	Employment	Labor Income	Total Value Added	Output
Direct Effect	84,233	\$12,461,763,777	\$19,553,550,642	\$44,435,825,287
Indirect Effect	162,823	\$13,306,347,811	\$20,588,925,606	\$38,415,905,862
Induced Effect	225,231	\$13,747,047,367	\$24,420,247,588	\$42,198,912,001
Total Effect	472,287	\$39,515,158,955	\$64,562,723,835	\$125,050,643,151

Exhibit 172: 2045 Economic Contribution – Water Transportation Activities, Increased Investment

Impact Type	Employment	Labor Income	Total Value Added	Output
Direct Effect	76,299	\$11,789,625,818	\$18,642,719,464	\$42,900,191,134
Indirect Effect	159,013	\$13,017,520,401	\$20,113,161,907	\$37,473,026,702
Induced Effect	216,966	\$13,242,655,881	\$23,524,233,708	\$40,650,635,584
Total Effect	452,278	\$38,049,802,100	\$62,280,115,079	\$121,023,853,420

Exhibit 173: 2045 Economic Contribution – Construction and O&M Activities, Increased Investment

Impact Type	Employment	Labor Income	Total Value Added	Output
Direct Effect	7,934	\$672,137,959	\$910,831,177	\$1,535,634,153
Indirect Effect	3,810	\$288,827,410	\$475,763,699	\$942,879,160
Induced Effect	8,265	\$504,391,486	\$896,013,880	\$1,548,276,417
Total Effect	20,008	\$1,465,356,855	\$2,282,608,756	\$4,026,789,731



R. Reduced Investment Scenario Analysis Results, 2029

Exhibit 174: 2029 Economic Contribution – All Activities, Reduced Investment

Impact Type	Employment	Labor Income	Total Value Added	Output
Direct Effect	60,062	\$6,739,989,940	\$10,594,097,418	\$23,858,219,437
Indirect Effect	96,038	\$7,110,313,182	\$10,992,192,836	\$20,722,490,933
Induced Effect	133,816	\$7,391,440,352	\$13,130,129,342	\$23,240,895,905
Total Effect	289,916	\$21,241,743,474	\$34,716,419,596	\$67,821,606,274

Exhibit 175: 2029 Economic Contribution – Water Transportation Activities, Reduced Investment

Impact Type	Employment	Labor Income	Total Value Added	Output
Direct Effect	56,753	\$6,388,064,787	\$10,101,329,983	\$23,244,945,498
Indirect Effect	95,207	\$7,053,384,701	\$10,898,071,511	\$20,537,270,950
Induced Effect	129,906	\$7,175,371,508	\$12,746,319,003	\$22,561,462,509
Total Effect	281,866	\$20,616,820,996	\$33,745,720,497	\$66,343,678,957

Exhibit 176: 2029 Economic Contribution – Construction and O&M Activities, Reduced Investment

Impact Type	Employment	Labor Income	Total Value Added	Output
Direct Effect	3,309	\$351,925,153	\$492,767,435	\$613,273,938
Indirect Effect	831	\$56,928,482	\$94,121,325	\$185,219,983
Induced Effect	3,910	\$216,068,844	\$383,810,339	\$679,433,396
Total Effect	8,050	\$624,922,479	\$970,699,100	\$1,477,927,317



S. Reduced Investment Scenario Analysis Results, 2045

Exhibit 177: 2045 Economic Contribution – All Activities, Reduced Investment

Impact Type	Employment	Labor Income	Total Value Added	Output
Direct Effect	55,956	\$8,551,428,381	\$13,467,769,851	\$30,545,709,545
Indirect Effect	111,930	\$9,159,157,879	\$14,156,975,019	\$26,381,990,253
Induced Effect	154,867	\$9,452,468,567	\$16,791,338,766	\$29,016,029,418
Total Effect	322,753	\$27,163,054,827	\$44,416,083,636	\$85,943,729,215

Exhibit 178: 2045 Economic Contribution – Water Transportation Activities, Reduced Investment

Impact Type	Employment	Labor Income	Total Value Added	Output
Direct Effect	53,398	\$8,250,934,557	\$13,047,051,759	\$30,023,571,147
Indirect Effect	111,285	\$9,110,272,928	\$14,076,136,528	\$26,225,386,263
Induced Effect	151,843	\$9,267,833,324	\$16,463,364,981	\$28,449,226,387
Total Effect	316,526	\$26,629,040,810	\$43,586,553,268	\$84,698,183,797

Exhibit 179: 2045 Economic Contribution – Construction and O&M Activities, Reduced Investment

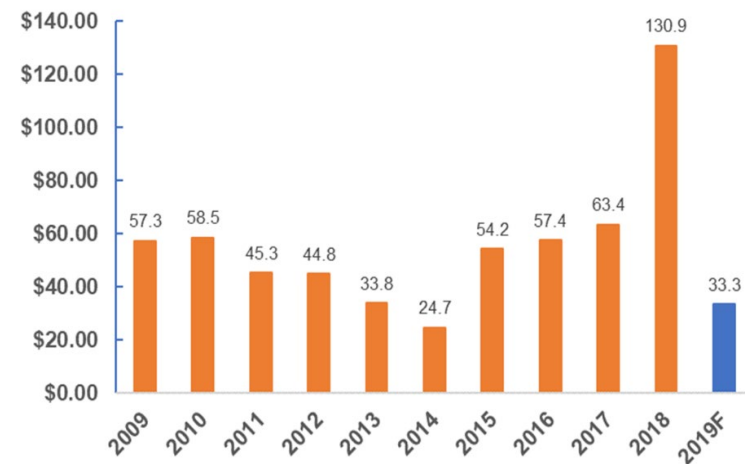
Impact Type	Employment	Labor Income	Total Value Added	Output
Direct Effect	2,558	\$300,493,823	\$420,718,092	\$522,138,398
Indirect Effect	646	\$48,884,951	\$80,838,490	\$156,603,989
Induced Effect	3,024	\$184,635,242	\$327,973,785	\$566,803,031
Total Effect	6,227	\$534,014,017	\$829,530,367	\$1,245,545,419



XIII. APPENDIX B: INLAND WATERWAYS TRUST FUND

- The Inland Waterways Trust Fund (IWTF) was created as part of the Inland Waterways Revenue Act of 1978.
- The IWTF was established to finance construction and major rehabilitation on the nation’s inland waterways.
- IWTF earned \$114.4 million in FY 2017.⁴¹
- The inland marine towing industry paid \$113.73 million into the fund.
- Interest earned on the fund was \$0.675 million.
- Barge operators on the waterway network pay a \$0.29 per gallon federal fuel tax that covers half the cost of new construction and major rehabilitation projects (lock repairs over \$20 million) through the IWTF.
- The other half is covered by general funds.
- The annual transfer from the IWTF to the Corps was \$108.0 million in 2016 and \$108.4 million in 2017.
- The transfer in 2018 from IWTF to the Corps was only \$49.3 million due to delays in appropriations.
- FY2018 funding for IWTF lock and dam modernization projects will be \$399 million, enough for the four User Board’s ongoing construction projects and the LaGrange Lock and Dam rehabilitation.⁴²

Exhibit 180: Inland Waterways Trust Fund End-of-Year Balance



Note: “According to the Corps, the current IWTF Fund balance build-up is temporary and largely due to lack of final FY 2018 appropriations amounts until the Consolidated Appropriations Act (P.L. 115-141), which was signed March 23, leaving too little time before the end of FY 2018 to allocate and spend the newly-appropriated funding.”

Source: INLAND WATERWAYS USERS BOARD 31st ANNUAL REPORT, December 2018

⁴¹ US Army Corps of Engineers, The U.S. Waterway System: 2016 Transportation Facts & Information

⁴² The Inland Waterways Users Board makes recommendations while OMB makes the spending amounts – More than 50 percent of the IWTF projects comes from higher Federal shares- as Olmsted was finished with 85 percent Fed and only 15 percent IWTF.



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