LOUISIANA WATERWAYS

STATE TRANSPORTATION PLAN

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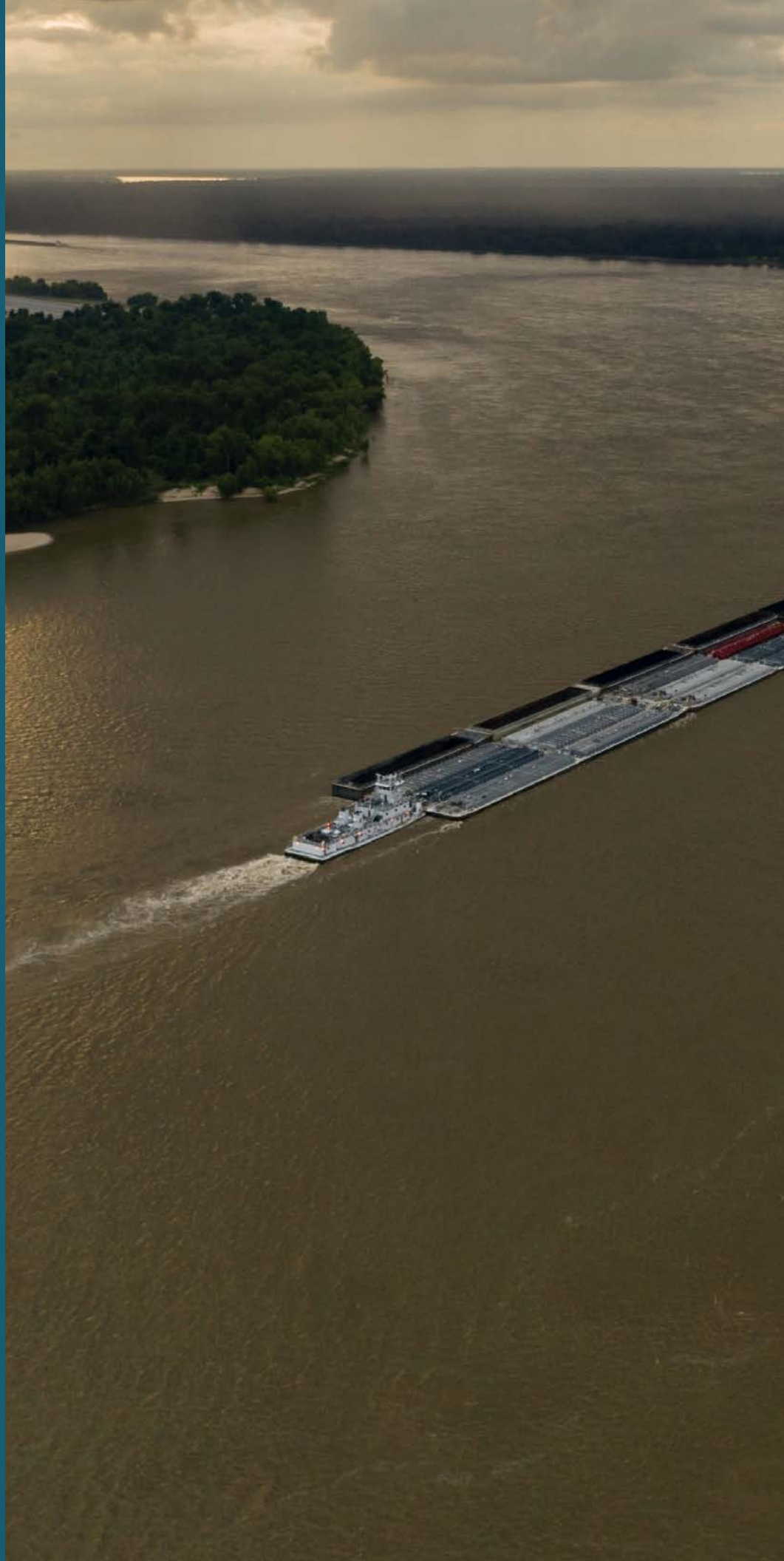

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GLOSSARY

Term	Description
AIS	Automatic Identification System
CAGR	Compound Annual Growth Rate
CBP	County Business Patterns
CPI	Consumer Price Index
CSC	Calcasieu Ship Channel
FAF	Freight Analysis Framework
FAK	Freight All Kinds
FCL	Full Container Load
ft	Feet
FY	Full Year
GDP	Gross Domestic Product
GFC	Global Financial Crisis
GT	Gross Tonnage
ha	Hectare (=10,000 m2)
KPI	Key Performance Indicator
LA WATERS	Louisiana Waterways Analysis Tool Evaluating Regional Systems
LCMA	Least cost market analysis
LCRM	Least cost route modeling
LCL	Less than container load
LOA	Length overall
LNG	Liquified natural gas
m	Meter
m^2	Square meters
mcyds/yr	Million cubic yards per year
mph	Moves per hour
P&L	Profit and loss account
p.a.	Per annum
pd	Per day
STS	Ship-to-Shore Crane (Quay Crane)
RH	Right Hand
RTG	Rubber-Tired Gantry
RS	Reach Stacker
QCEW	Quarterly Census of Employment and Wages
TEU	Twenty-Foot Equivalent Unit
TGS	TEU Ground Slots
THC	Terminal Handling Charge
Tonnes	Metric Tonnes
ULCS/s	Ultra Large Containership/s (10,000+TEU)
USD	United States Dollar(s)
USACE	US Army Corp of Engineers
YOY	Year on Year
YTD	Year to Date

EXECUTIVE SUMMARY

While waterborne transportation is an essential component of the State of Louisiana's transportation system, it is currently under-utilized in terms of ultimate potential and capacity.

Louisiana transported 238.7 million tons of freight in 2018 [3] on its inland waterway system, valued at $59 billion. Equivalent to six million 40-ton trucks if transported by road, this represents significant avoided congestion, emissions impacts and significantly reduced wear and tear of highway infrastructure. Moving commerce by water represents 25 percent of all goods movements within the State of Louisiana and is a critical component of the multi-modal transportation system within the State. Not only is waterborne commerce in Louisiana a critical component of the transportation system, with an estimated one in five jobs in the State being connected to the maritime industry, but it is also of fundamental importance to the region's economy.

Louisiana's intracoastal and inland waterway system is well established, with nearly 2,820 miles of navigable waterways, making it the second largest navigable waterway in the nation. Despite the extent of Louisiana's navigable inland waterways, Louisiana is still highly dependent upon trucks for the movement of three-quarters of its freight. While waterborne transportation is an essential component of the State of Louisiana's transportation system, it is currently under-utilized in terms of ultimate potential and capacity.

To be best positioned for future investments to promote increased commercial activities of the inland waterways of Louisiana, the Louisiana Department of Transportation and Development's (LADOTD) Office of Multimodal Commerce (OMC) developed a comprehensive, statewide waterways transportation system plan as a framework to guide this investment. The waterways plan is capable of both dovetailing into, and be a complement for, the Louisiana Statewide Transportation Plan.

By nesting the Louisiana Waterways State Transportation Plan within the over-all Louisiana Statewide Transportation Plan, the OMC is provided with the ability to identify potential chokepoints in the multimodal commerce network. The Louisiana Waterways Transportation Plan will assist in the development of strategies and capital investment programs to relieve these chokepoints through running "what-if" scenarios of the impacts of potential modal shifts on localized congestion. Assessing the potential for modal-shifts at nodal junctures will provide the ability to optimize the transport of commerce across all modes of the Louisiana Transportation System, and in particular to look for opportunities to fully capitalize on the connectivity of Louisiana's inland waterways and increase economic activity and throughput on the State's waterways.

The type and economic significance of waterborne commerce within Louisiana was identified to support planning and forecasting guidance. This focus enabled the identification and quantification of regional and national economic impact on the inland waterways network of Louisiana. The output provided an assessment of Louisiana's waterborne commerce by both commodity and industry, at a regional level. In addition, businesses, and port terminals (public and privately owned/operated) that depend on Louisiana's navigable waterway system are identified by industry type, company name, and product.

Because of the disparate nature of the type, source, and reporting structure of relevant data as it relates to all aspects of waterborne commerce and the infrastructure associated with it, the development of the Louisiana Waterways Analysis Tool Evaluating Regional Systems (LA WATERS) platform was a critical step in being able to collect, aggregate, process and analyze a multitude of data from a wide and diverse range of data sources into a first of its kind data management portal. LA WATERS enabled the compilation of historical data and trends, statistical analyses, infrastructure condition assessments, prevailing environmental and economic conditions, micro and macro market trigger events, along with an extensive library of available data into a "what-if" scenario planning tool for determining effective waterway infrastructure solutions to improve economic activity and throughput, evaluating projects

and strategies to alleviate multimodal bottlenecks and assisting in operational decision-making across a set of user defined geo-political boundaries.

While the COVID-19 pandemic is generally regarded as a once in a generation type economic shock, and there is significant uncertainty surrounding the impacts of climate change, it is evident that the region is expected to continue to experience an increasing trend to more frequent storms of higher magnitude. This Louisiana Waterways State Transportation Plan recognizes and emphasizes the need to mitigate against the risk to the waterways system resulting from these increased frequent extreme weather conditions and macro-economic shocks, as typified by the COVID-19 pandemic.

This program of study sponsored a dedicated port-specific customized survey designed to solicit waterways' user generated information that can best assist LADOTD in understanding Louisiana's waterborne commerce community conditions relative to the waterways and to generate perspectives on recommended future improvements to commerce and infrastructure.

FINDINGS

Louisiana has thirty-two active ports, including six deep water ports located on the Mississippi River. In 2018, 238.7 million tons of waterborne freight, valued at $59 billion, was transported on the Louisiana Inland Waterway system. This tonnage represents the equivalent of six million 40-ton trucks, which represents significant avoided congestion, emissions and additional wear and tear on the Louisiana highway infrastructure. FAF forecasts suggest that the total water tonnage will continue to increase at an annual growth of 0.7 percent per year through 2040, without any additional investment in the Inland Waterways System of Louisiana.

Despite the extent of Louisiana's navigable inland waterways, Louisiana is still highly dependent upon trucks for the movement of most of its freight. While waterborne transportation is an essential component of the State of Louisiana's transportation system, it is currently under-utilized in terms of unrealized potential and capacity. In order to be able to realize this untapped potential and fully leverage this competitive advantage of such an abundance of navigable waterways, Louisiana requires a paradigm shift in its approach to waterborne transportation, through the implementation of appropriate planning and management of investment in our navigable waterways.

The connectivity of the inland shallow draft network does provide a significant opportunity for trans-shipment to shallow draft for further distribution and deeper penetration into the Louisiana Inland Waterways system. However, stakeholder inputs characterized the Louisiana's intracoastal and inland waterways as not "a reliable means of transporting goods," a perspective that is supported by economic studies and data analysis. These analyses quantified the delta between actual utilization and potential capacity for waterborne commerce. As such, the waterways should at a minimum be predictably maintained at authorized depths, as they provide numerous economic and recreational opportunities to the local and regional economy.

The intracoastal and inland waterways are a significant source of economic activity, development, vitality, and growth for the parishes and areas that they serve. These waterways contribute socio-economic benefits that are measured in value by business activity, personal income, employment, recreational opportunities, environmental appreciation, and many other aspects important to the parishes and areas that these inland waterways serve. A major challenge will be how to appropriately monetize the socioeconomic benefits of intracoastal and inland waterways as part of Benefit Cost Analyses (BCA) conducted to secure funding for improvements and maintenance.

Direct waterborne commerce generates 52,400 direct jobs that are associated with $5.5 billion in labor income, $22.2 billion in value added to Louisiana's economy, and $83.2 billion in new output (or sales) across Louisiana. The 52,400 jobs directly related to Louisiana's waterborne commerce generate more than 207,000 additional jobs. This includes 96,300 jobs created through business-to-business transactions. While another 58,600 jobs are created by the increase in payroll from direct jobs and associated consumer spending. Furthermore, water-dependent industries generate a total of 525,000 jobs, or one in five jobs in the state. It is also estimated that waterborne freight through our ports and waterways in Louisiana, generate more than $182 billion in economic output.

Shallow-draft transportation is fundamentally a more efficient mode of goods movement that can reduce road congestion and fuel costs, which is significant, given the continued increase in fuel prices. Considering one barge is the equivalent of 15 rail cars and sixty 40-ton trucks, and one standard 15-barge tow moves the equivalent volume of 216 rail cars or 864 40-ton trucks, expanded shallow-draft operations, and improved integration with the Louisiana Statewide Transportation Plan, is a key strategic approach to reduce road/rail congestions, reduce carbon emissions, and reduce the burden on state highway transportation system.

The total economic impact of the waterborne commerce labor market is equivalent to more than $14.4 billion in labor income, $40.7 billion in value added, and $125.5 billion in output (or sales). However, significant opportunities exist to take even greater advantage of enhancing waterborne transportation than is currently being achieved, which in turn has cascading economic impacts on waterway transportation-related businesses, at both the regional and local levels.

The Ports of Baton Rouge and New Orleans (by far the largest economic driver of waterborne commerce in Louisiana) represent the key opportunities for trans-shipment of dry and liquid bulk commodities due the volumes of freight transiting through these Ports. This connection was especially important for port cities situated on the Upper Mississippi River Valley and its key tributaries, which are heavily engaged in the export of agricultural products.

Through a comprehensive analysis of port surveys, economic impact survey, key industry sector and AIS source data, a list of projects was identified that could potentially increase economic throughput of the waterways within their jurisdictions. These projects were evaluated and recorded within the LA WATERS platform and sensitivity analyses were performed to assess response to both micro and macro dynamic drivers.

RECOMMENDATIONS

Provide leadership and regularly update the Louisiana Waterways State Transportation Plan, at a minimum once every five years. The LADOTD OMC should continue to be the lead agency for monitoring waterway systems and serve as the lead agency in Waterborne Commerce related data management. This will help facilitate LADOTD in improving integration of the waterborne commerce system with the Louisiana Statewide Transportation Plan and the State's overall transportation system.

Establish a standardized data reporting protocol for goods, commerce, and economic reporting data. This will greatly improve the cost-effectiveness and timeliness of future updates and keep the database updated to the greatest extent possible. This will fundamentally establish the database as a state-of-the-art, industry leading framework for the analysis of waterborne commerce transportation systems.

Maintain an up-to-date database of Louisiana's intracoastal and inland waterway system. To maintain and manage Louisiana's waterways, an extensive record of all commercial waterways should be compiled in a

dedicated database. Tonnage should not be the only factor that determines a waterway's significance. More emphasis should be on the regional economic impact that a waterway contributes. The results and application of the Economic Impact and Importance of Waterborne Commerce study provides a baseline from which to establish data source and analysis guidelines.

Record and track inputs from stakeholders through the LA WATERS platform for establishing historical baseline data, benchmarks, and trend analysis.

Continue to develop the LA WATERS Platform. Complication of data sources and analysis methodologies through the LA WATERS platform should be on-going in assessing the ability of recommended operational strategies and individual projects in mitigating the dynamic challenges of the waterways.

Coordinate Louisiana Inland Waterway planning activities. Most of Louisiana's waterborne tonnage is reported through its individual ports. By increasing focus on the improved integration of systemwide solutions to waterway throughput efficiencies, it will be possible to develop strategies to mitigate waterway congestion throughout Louisiana's transportation network.

Partner with local waterway sponsors and stakeholders. LADOTD should partner with local waterway system administrators, such as the Red River Authority and the Gulf Intracoastal Canal Association, to keep an open dialogue regarding the issues concerning waterways. As witnessed by the recent severe and extreme weather events as well as the global COVID-19 pandemic, promoting active communications with waterway system stakeholders will keep LADOTD abreast of current conditions and will enable improved dynamic response to these micro and macro challenges to the overall transportation system.

Quantify the magnitude of economic impact of the waterway system not being optimized for improved efficiencies. LADOTD should perform high level economic impact studies to establish the return on investment in maintaining waterways at their authorized depths. This will also enable LADOTD to rapidly perform a Benefit Cost Analysis (BCA) and project specific Least Cost Market Analysis (LCMA) of system improvement impacts. Deeper draft is not always the answer to improved throughput, and LCMA sensitivity analyses can rapidly demonstrate the best most cost-effective efficiency improvements. Such a framework can also position the DOTD to rapidly and cost effectively respond to grant funding requests for information.

Provide higher level resolution economic impact analyses, and benefit cost analyses of proposed projects, evaluated both individually and as a portfolio of projects implemented together. Apply the LCMA framework to further define remedial actions and identify required resources when moving forward with programmed projects. Application of the LCMA can also be used to better target limited funding resources for these projects.

INTRODUCTION

1 INTRODUCTION

Louisiana moves 238.7 million tons of freight[1] per year on the Inland Waterways System of Louisiana. Valued at $59 billion, this tonnage represents the equivalent of six million 40-ton trucks and represents significant avoided congestion, air emissions and wear and tear of the highway infrastructure. Moving commerce by water in Louisiana is a critical component of the transportation system in Louisiana, representing 25% of all goods movement within the State. Furthermore, with an estimated one in five jobs in Louisiana connected to the maritime industry and waterborne commerce throughout Louisiana's of inland waterways, waterborne commerce is of fundamental importance to the region's economy.

Given the extent and the connectivity of the 2,820 miles of Louisiana's Inland Waterways System, the fact that only 25 percent of all freight movement occurs through waterborne transportation and with FAF forecasts suggesting this tonnage will increase at 0.7 percent per year through 2040 (without any additional investment), this presents a significant opportunity to shift additional freight movement onto the Louisiana Inland Waterways system and expand waterborne commerce within Louisiana, and along with it have a significant knock-on impact to the economy.

Positioning the State of Louisiana for the future investment required to develop this unmet potential, the Louisiana Department of Transportation and Development (LADOTD) Office of Multimodal Commerce (OMC) initiated the development of a comprehensive, Louisiana Waterways State Transportation Plan. This plan will provide the State of Louisiana with a planning framework that will enable planners and decision makers to proactively prepare for long term macro-economic shifts in transportation networks, as we respond to near-term switches in modal needs. The plan would be capable of dovetailing into, and be a complement for, the State of Louisiana Statewide Transportation Plan.

Layering these two inter-connected transportation plans will provide the ability to identify potential "chokepoints" in the Multimodal Commerce network and ultimately assist in the development of strategies and Capital Investment programs to relieve these chokepoints through running "what-if" scenarios of the impacts of potential modal shifts on localized congestion.

To be able to develop a plan capable of providing this level of planning and forecasting guidance, it is first necessary to provide a detailed understanding of the type and value of waterborne commerce, its impact to the State of Louisiana. its transportation system, and to identify the regional and national level of returns on investment in the network.

However, the vast amount of data pertaining to the waterborne commerce and the infrastructure that supports it is scattered across a highly disparate range of publicly available and subscription type databases, platforms, and reporting formats. A key deliverable of the Louisiana Waterways State Transportation Plan is the development of a centralized data management platform that is capable of compiling, synthesizing this historical and current data and trends, statistical analysis, infrastructure condition assessments, prevailing environmental and economic conditions, micro and macro market trigger events. The Louisiana Waterways Analysis Tool Evaluating Regional Systems (LA WATERS) technical support platform was a critical component of this data management, analysis, and story-boards presentation of information.

Industry, businesses, stakeholders, and other economic partners of the Inland waterways were consulted and surveyed as part of the evaluation and assessment of the opportunities and challenges of the Inland Waterways of Louisiana. These stakeholder and business economic surveys were combined with the analytical framework capabilities of the LA WATERS platform and data presentation protocols to facilitate the identification of opportunities and potential structural (projects)

1 2018 FAF

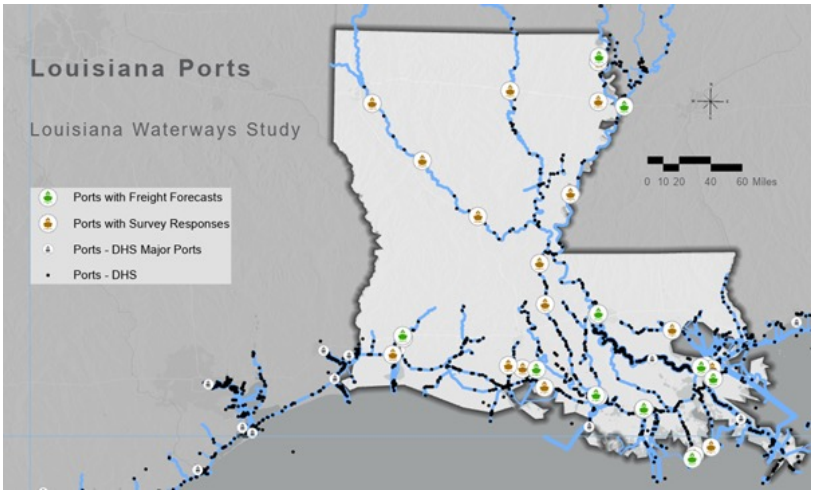
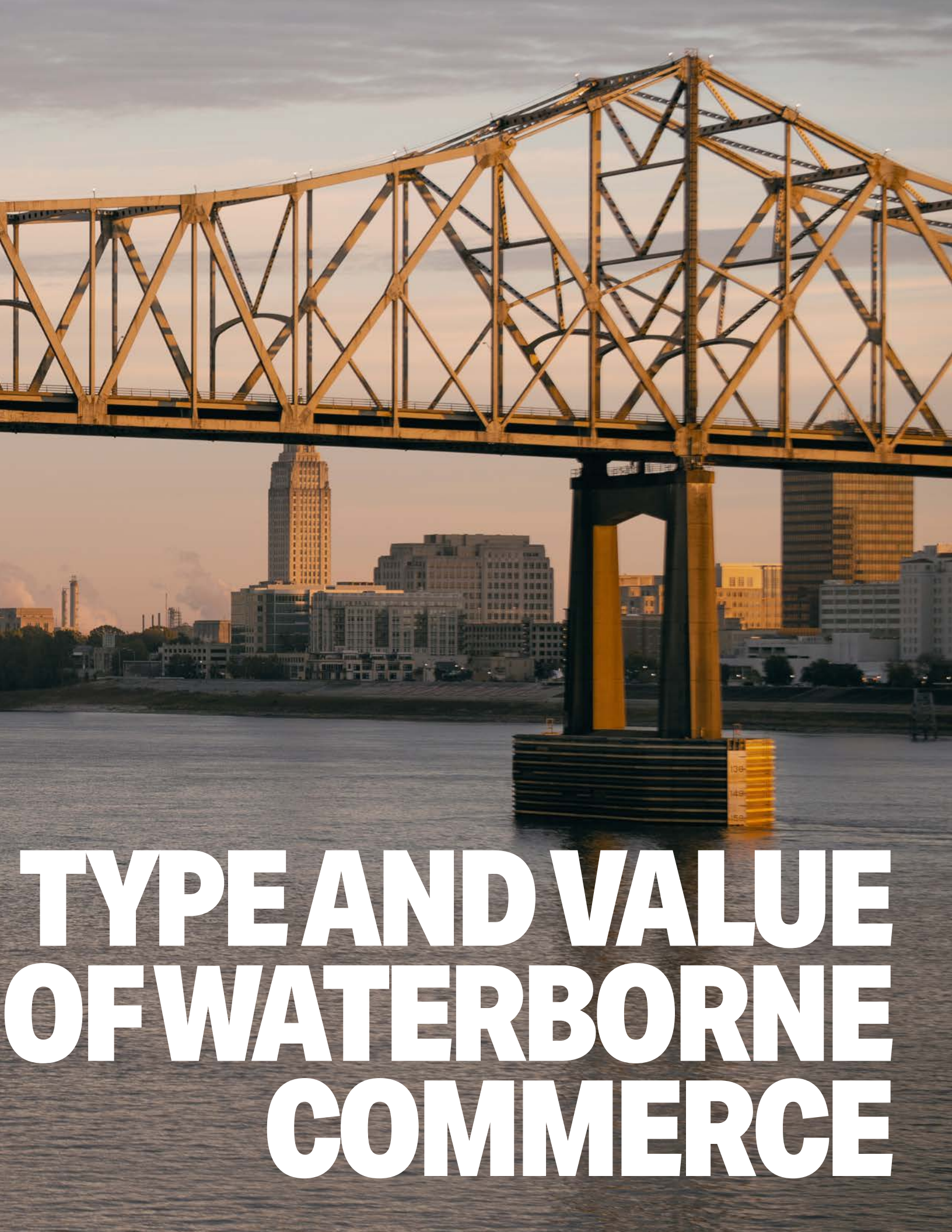


Figure 1: Louisiana Waterways study area

and non-structural (operational) solutions to alleviate multimodal bottlenecks and assess the impacts of potential modal shifts on localized chronic congestion as well as evaluating specific capital investment strategies for improving throughout and economic activity of the inland waterways of Louisiana. Additionally, because of the multi-faceted nature of the data and analysis, the LA WATERS platform provides the ability to apply the extensive library of available data to perform "what-if" scenario planning tool for determining effective waterway infrastructure solutions and assisting in operational decision-making.

The LA WATERS platform provided the OMC with a first of its kind management portal and tool for the analysis of waterborne commerce across varying degrees of user specified geo-political subdivisions. Furthermore, this platform serves as the basis for developing and applying systematic, transparent, and consistent protocols and processes in the assessment of the waterway systems and application of available data resources. This system is scalable and adaptable to accommodate increased database complexity and expanded availability as more data sources become available. It also provides the ability to post-process and represent the data at differing boundary geometries to reflect different political subdivisions that user defined economic queries could be run (parish, harbor terminal district, congressional etc.). The LA WATERS platform provides the ability for the framework analysis to dynamically respond to a continually evolving focus, micro and macro market influences, new data sources, modern modeling data needs, and other analytical and system requirements.

Finally, the compilation of research, analysis, findings, recommendations, and technical deliverables provides the basis for a draft Louisiana Waterways State Transportation Plan that can be layered into the Louisiana Statewide Transportation Plan. The Louisiana Waterways Transportation Plan provides a systemwide analysis and documentation of the impact and importance of waterborne commerce on the State of Louisiana, its transportation system, and the nation. The plan provides an update on the inventory and condition of the waterway system through an updated geographic representation of the system as a part of Louisiana's transportation intermodal system. Effective integration of the waterway system into the state's overall transportation system is critical, as it offers alternatives to the increasingly congested rail and highway networks and positions the state to best compete for available transportation system improvement grant funding requests. The plan is capable of dovetailing into, and be a complement for, the Louisiana Statewide Transportation Plan.



TYPE AND VALUE OF WATERBORNE COMMERCE

2 TYPE AND VALUE OF WATERBORNE COMMERCE

As a foundation for the development of any waterborne commerce transportation plan, it is first necessary to provide a detailed understanding of the type and value of waterborne commerce, its impact to the State of Louisiana, its transportation system, and to identify the regional and national level of returns on investment in the network.

The identification of the type (by commodity and industry sector) and value of waterborne commerce provides the ability to depict the current economic state of each commodity and industry sector in Louisiana. The output of this provides a detailed assessment of Louisiana's waterborne commerce by commodity and industry, reported at a parish level, and is also capable of being reported at user specified geo-political subdivisions. Similarly, this also identified businesses, port terminals and harbor districts that are dependent on Louisiana's navigable waterway system, also reported by industry type, company name, and product.

The type and value of waterborne commerce was documented using domestic freight flows of imports and exports from the U.S. Department of Transportation (US DOT) Freight Analysis Framework (FAF). This data captured trade flows between locations in the United States and four discrete trade zones within Louisiana. To refine the resolution of the reporting boundaries of this data to smaller geographies more aligned with each Louisiana port/waterway, industry and employment, data from the Quarterly Census of Employment and Wages (QCEW) and County Business Patterns (CBP) was proportionally disaggregated such that the trade zone data was more appropriately in line with project beneficial boundaries This process determined the distribution of activity based on the concentration of water transportation activities within each zone, paying particular attention to estimates of tonnage handled by individual Louisiana ports.

Table 1: FAF Zones in Louisiana

FAF Zone Name	Parishes
Baton Rouge FAF Zone	Ascension, East Baton Rouge, East Feliciana, Iberville, Livingston, Pointe Coupee, St. Helena, West Baton Rouge, West Feliciana
New Orleans FAF Zone	Jefferson, Orleans, Plaquemines, St. Bernard, St. Charles, St. James, St. John the Baptist, St. Tammany, Tangipahoa, Washington
Lake Charles-Jennings FAF Zone	Calcasieu, Cameron, Jefferson Davis
Louisiana (all other cities combined)	Balance of State

2.1 FREIGHT ANALYSIS FRAMEWORK ANALYSIS METHODOLOGY

The U.S. DOT Freight Analysis Framework from 2018 was examined to observe the economic impact that Louisiana's ports have on global trade. The FAF 2018 data set was the latest, most complete reporting year that was not compromised by the impacts of the COVID-19 global pandemic or hurricanes impacting the region during 2019/20 and is the data-set that was used as the source of the findings, analysis, charts, and tables in this section, unless otherwise noted. The dataset was filtered to include instances where a Louisiana port is either a domestic net importer or domestic net exporter. In cases where international trade stops over in a different coastal city, Louisiana was reclassified as both the domestic importer and domestic exporter. The analysis was limited by the Freight Analysis Framework, which groups together geographic data into FAF Zones, which are defined in Table 1. It is important to note that the two largest ports in Louisiana, the Port of South Louisiana, and the Port of New Orleans, are both captured in the New Orleans FAF Zone. The dataset was further refined so that transactions must represent one percent or more of a city's total imports/exports for a specific commodity. Finally, the charts only included Louisiana trading partners that incurred more than 2,000 tons in annual trade.

2.2 FINDINGS

2.2.1 BATON ROUGE FAF ZONE

The Baton Rouge FAF Zone connected around 40 million tons of international waterborne commerce in

Figure 2: Baton Rouge FAF Zone trading partners by total tons

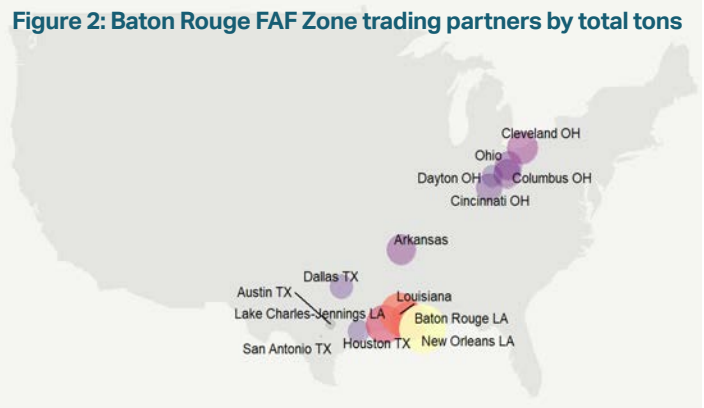


Figure 3: Baton Rouge FAF Zone trading partners by value

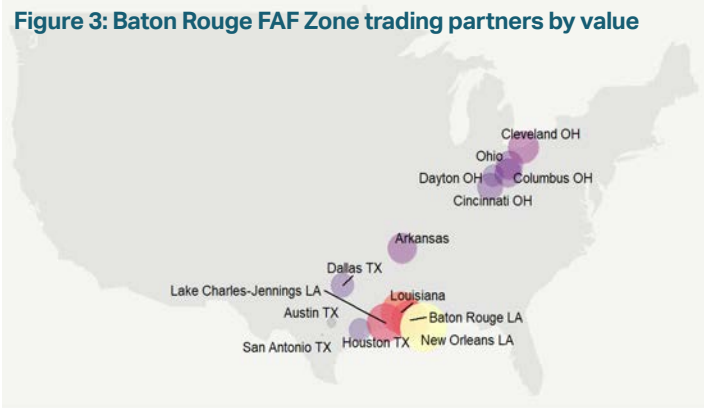


Table 2: Baton Rouge FAF Zone trading partners by FAF Zone, by total value

No.	Name	Tons	Dollars
1	New Orleans, LA	30,195,000	$6,507,000,000
2	Louisiana (all other cities combined)	3.865,000	$1,496,000,000
3	Baton Rouge, LA	2,224,000	$2,817,000,000
4	Lake Charles-Jennings, LA	1,787,000	$1,602,000,000
5	Cleveland, OH	475,000	$172,000,000
6	Arkansas (all cities combined)	334,000	$121,000,000
7	Columbus, OH	249,000	$90,000,000
8	Ohio (all other cities combined)	247,000	$90,000,000
9	Cincinnati, OH	193,000	$70,000,000
10	Dallas, TX	129,000	$62,000,000
11	Houston, TX	109,000	$53,000,000
12	Dayton, OH	90,000	$33,000,000
13	Austin, TX	30,000	$14,000,000
14	San Antonio, TX	25,000	$12,000,000

2018. These transactions were predominantly domestic transactions within Louisiana, and included cereal grains, other agricultural products, fuel oils, and coal. The Port was also responsible for international trade and served as the sole port of call as the port of origin or destination for a total of $2.8 billion in international trade and waterborne commerce. In total, the Port of Greater Baton Rouge was responsible for over $10 billion in annual economic activity and represents a key linkage for locations located in the Upper Mississippi Valley and Ohio River, that actively trade in agricultural products (Figure 2, Figure 3, and Table 2).

2.2.2 NEW ORLEANS FAF ZONE

The New Orleans FAF Zone had thirty-eight different trading partners resulting from international waterborne commerce in 2018. This amounted to 183 million tons of shipments. The twenty largest domestic connection cities have been highlighted.

Metallic ore is traded frequently between the New Orleans FAF Zone and the New York, Salt Lake City, and Florida FAF Zones. New Orleans is one of only a few cities that houses metals traded on the London Metal Exchange. The New Orleans FAF Zone also trades base metals with the New York FAF Zone. Metallic ore from the New Orleans FAF Zone represented 95 percent of Salt Lake City FAF Zone and 48 percent of Miami FAF Zone total ore imports.

Forty billion dollars of waterborne commerce was handled by the Port of New Orleans in 2018, making it by far the largest economic driver of waterborne commerce in Louisiana. The 20 largest domestic connection cities are highlighted in Table 2 and Table 3, with Iowa, Mississippi, (agri-bulk) West Virginia (coal), and Illinois (Chicago) base metals, and basic chemical trades dominating domestic inter-state trade.

Figure 4: New Orleans FAF Zone trading partners by total tons

Figure 5: New Orleans FAF Zone trading partners by total value

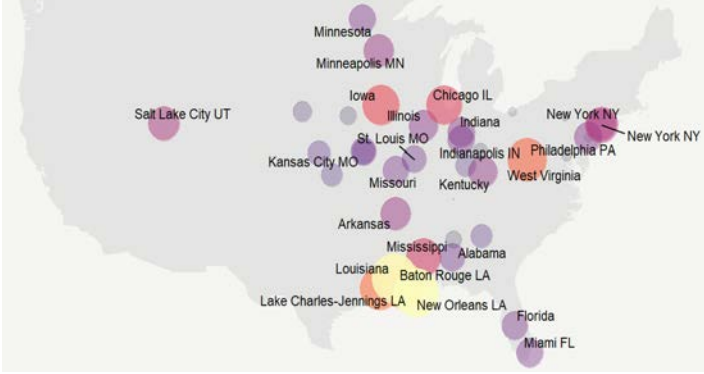


Table 3: Top 20 New Orleans FAF Zone trading partners by FAF Zone, by total tons

No.	Name	Tons	Dollars
1	New Orleans, LA	70,868,000	$17,275,000,000
2	Louisiana (all other cities combined)	63,185,000	$13,024,000,000
3	Baton Rouge, LA	30,195,000	$6,507,000,000
4	Lake Charles-Jennings, LA	6,611,000	$1,544,000,000
5	West Virginia (all cities combined)	4,690,000	$75,000,000
6	Iowa (all cities combined)	2,097,000	$342,000,000
7	Chicago, IL	1,552,000	$243,000,000
8	Mississippi (all cities combined)	1,126,000	$273,000,000
9	New York, NY	791,000	$209,000,000
10	Salt Lake City, UT	382,000	$27,000,000
11	Arkansas (all cities combined)	266,000	$68,000,000
12	Minneapolis, MN	252,000	$41,000,000
13	Kentucky (all cities combined)	188,000	$50,000,000
14	Illinois (all cities combined)	181,000	$38,000,000
15	Philadelphia, PA	150,000	$40,000,000
16	Indiana (all cities combined)	127,000	$9,000,000
17	Minnesota (all cities combined)	110,000	$18,000,000
18	Indianapolis, IN	110,000	$8,000,000
19	Miami, FL	102,000	$7,000,000
20	Missouri (all cities combined)	94,000	$18,000,000

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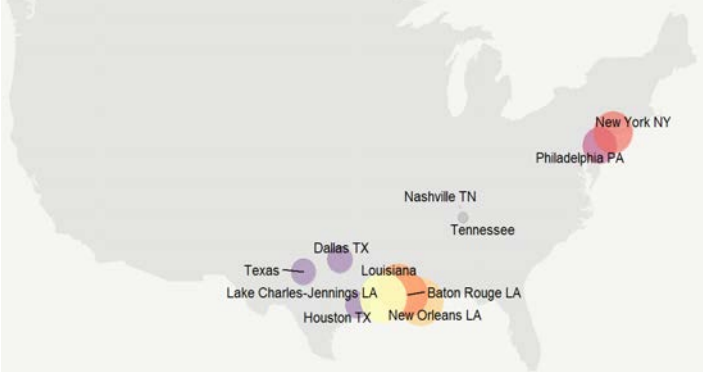
4	Lake Charles-Jennings, LA	6,611,000	$1,544,000,000
5	Iowa (all cities combined)	2,097,000	$342,000,000
6	Mississippi (all cities combined)	1,126,000	$273,000,000
7	Chicago, IL	1,552,000	$243,000,000
8	New York, NY	791,000	$209,000,000
9	West Virginia (all cities combined)	4,690,000	$75,000,000
10	Arkansas (all cities combined)	266,000	$68,000,000
11	Kentucky (all cities combined)	188,000	$50,000,000
12	Minneapolis, MN	252,000	$41,000,000
13	Alabama (all cities combined)	85,000	$40,000,000
14	Philadelphia, PA	150,000	$40,000,000
15	Illinois (all cities combined)	181,000	$38,000,000
16	Salt Lake City, UT	382,000	$27,000,000
17	Minnesota (all cities combined)	110,000	$18,000,000
18	Missouri (all cities combined)	94,000	$18,000,000
19	Kansas City, MO	76,000	$15,000,000
20	St. Louis, MO	62,000	$11,000,000

Figure 6: Lake Charles FAF Zone trading partners by total tons

Figure 7: Lake Charles FAF Zone trading partners by total value



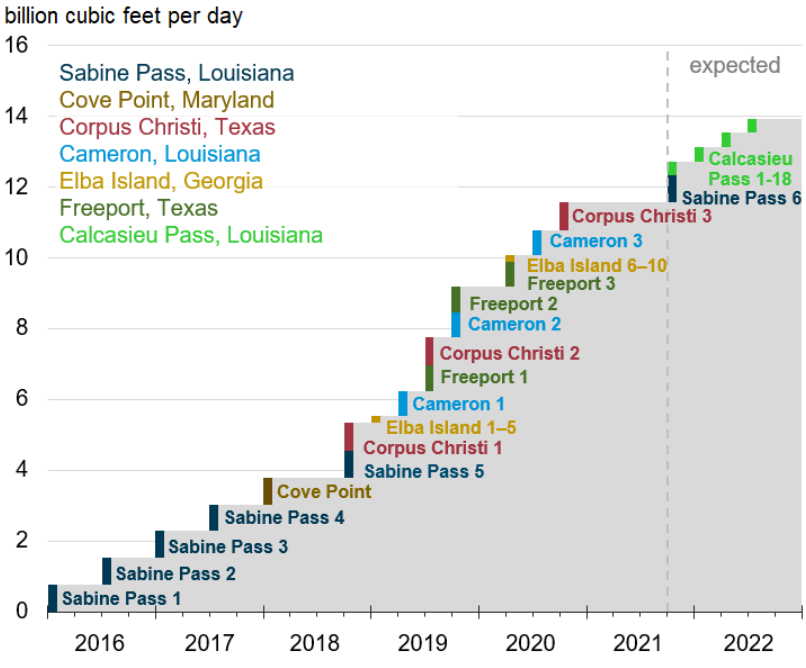
2.2.3 LAKE CHARLES FAF ZONE

The Lake Charles-Jennings FAF Zone was responsible for twenty-six million tons of international waterborne commerce in 2018. Most of these trade routes were with other Louisiana ports; however, Lake Charles-Jennings' proximity to Texas makes it a major hub on the Gulf.

Cities like Dallas, Houston, and other Texas metropolises frequently trade metallic ores with the Lake Charles-Jennings FAF Zone. While there is a large petroleum/oil trade between these hubs, it is only a small fraction of Texas' total annual output, and therefore did not pass this screening. Philadelphia and New York are also involved in the metallic ore trade with the Lake Charles-Jennings FAF Zone.

In recent years, the Lake Charles area has seen development of massive new liquified natural gas (LNG) export facilities, which have expanded exports

Figure 8: Lake Charles LNG export capacity (2016-2022) trading partners by total value



Source: US Energy Information Administration (EIA)

Table 5: Lake Charles FAF Zone- trading partners by FAF Zone, by total tons

No.	Name	Tons	Dollars
1	Lake Charles-Jennings, LA	13,472,000	$6,262,000,000
2	New Orleans, LA	6,611,000	$1,544,000,000
3	Louisiana (all other cities combined)	2,950,000	$3,119,000,000
4	Baton Rouge, LA	1,787,000	$1,602,000,000
5	New York, NY	956,000	$65,000,000
6	Philadelphia, PA	245,000	$17,000,000
7	Dallas, TX	31,000	$2,000,000
8	Houston, TX	28,000	$2,000,000
9	Texas (all other cities combined)	27,000	$2,000,000
10	Tennessee (all other cities combined)	4,000	$11,000,000
11	Nashville, TN	3,000	$9,000,000

Table 6: Lake Charles FAF Zone trading partners by FAF Zone, by total value

No.	Name	Tons	Dollars
1	Lake Charles-Jennings, LA	13,472,000	$6,262,000,000
2	Louisiana (all other cities combined)	2,950,000	$3,119,000,000
3	Baton Rouge, LA	1,787,000	$1,602,000,000
4	New Orleans, LA	6,611,000	$1,544,000,000
5	New York, NY	956,000	$65,000,000
6	Philadelphia, PA	245,000	$17,000,000
7	Tennessee (all other cities combined)	4,000	$1,000,000
8	Nashville, TN	3,000	$9,000,000
9	Dallas, TX	31,000	$2,000,000
10	Houston, TX	28,000	$2,000,000
11	Texas (all other cities combined)	27,000	$2,000,000

dramatically since 2018. While not yet reflected in regional Freight Analysis Framework data, LNG export estimates from the U.S. Energy Information Administration show that exports grew nationally from 2.97 billion cubic feet per day in 2018 to 10.85 billion cubic feet per day in 2022.

2.2.4 OTHER LOUISIANA TRADING PARTNERS

The Freight Analysis Framework also includes other Louisiana ports outside of the Baton Rouge, New Orleans, and Lake Charles FAF Zones. However, these ports trade entirely within Louisiana when it comes to international waterborne commerce. 63 million tons of commerce went transited between the New Orleans FAF Zone and these other Louisiana ports. Some of the largest trades includes cereal grains, fuel oils, coal, gasoline, other agricultural products, and metallic ore. This totaled over $20 billion in annual economic activity in 2018.

Table 7: Other Louisiana ports trading partners by FAF area, by total tons

No.	Name	Tons	Dollars
1	New Orleans, LA	63,185,000	$13,024,000,000
2	Baton Rouge, LA	3,862,000	$1,496,000,000
3	Lake Charles-Jennings, LA	2,950,000	$3,119,000,000
4	Louisiana (all other cities combined)	2,160,000	$4,049,000,000

Table 8: Other Louisiana ports trading partners by FAF area, by total tons

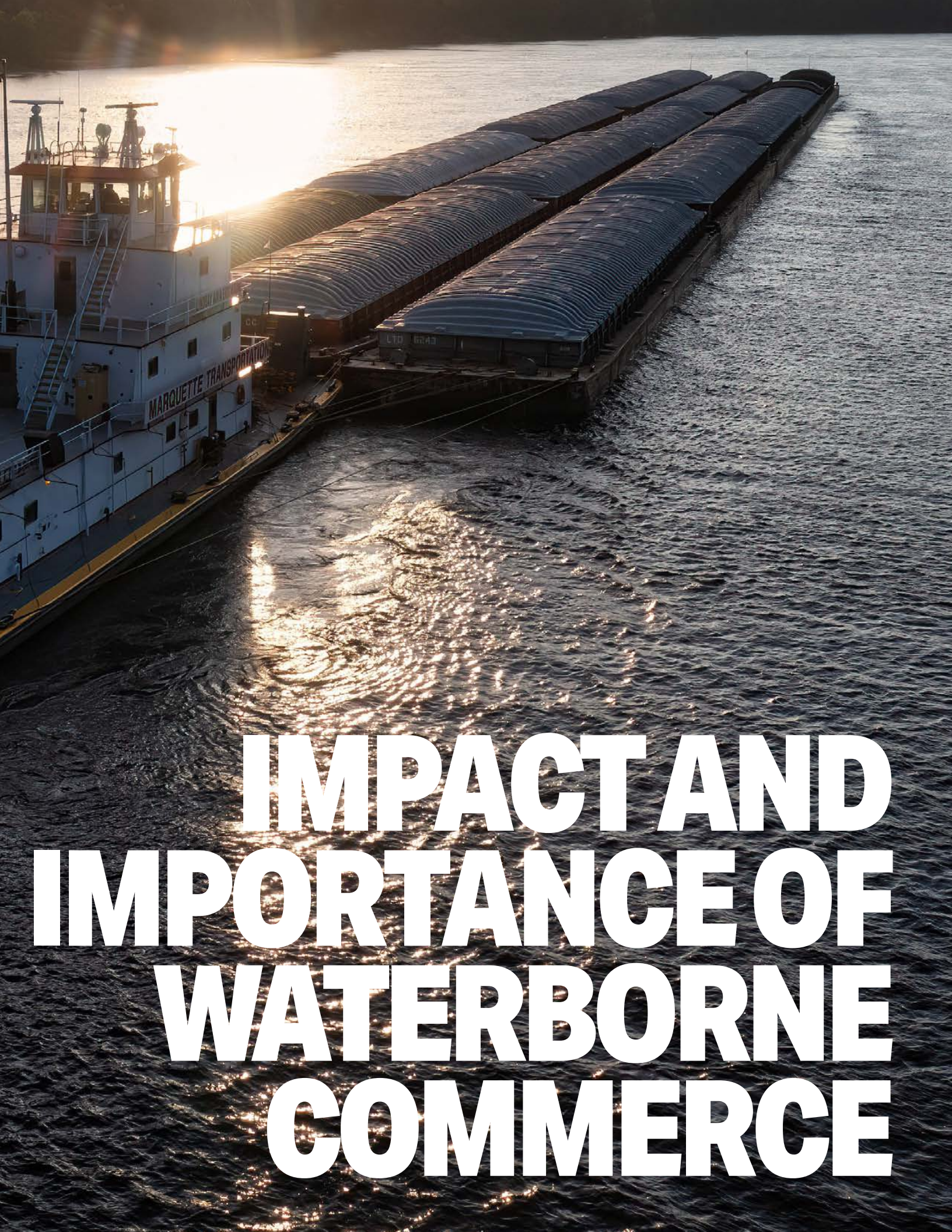
No.	Name	Tons	Dollars
1	New Orleans, LA	63,185,000	$13,024,000,000
2	Baton Rouge, LA	3,862,000	$1,496,000,000
3	Lake Charles-Jennings, LA	2,950,000	$3,119,000,000
4	Louisiana (all other cities combined)	2,160,000	$4,049,000,000

Figure 9: Other Louisiana trading partners by total tons

Figure 10: Other Louisiana ports trading partners by total value


PORT OF GREATER BATON ROUGE
INGRAM BARGE CO.


LINDSAY
ANN
ERICKSON
PORT OF
ST.LOUIS, MO



IMPACT AND IMPORTANCE OF WATERBORNE COMMERCE

3 IMPACT AND IMPORTANCE OF WATERBORNE COMMERCE

Not only is waterborne commerce in Louisiana a critical component of the transportation system, with an estimated one in five jobs within the State being connected to the maritime industry and movement of goods throughout Louisiana's 2,820 miles of inland waterways, but it is also of fundamental importance to the region's economy.

A detailed understanding of the type and value of waterborne commerce, enables the ability to quantify its impact to the State of Louisiana, its transportation system, and as such identify the regional and national level of returns on investment in the network. The economic impact assessment of waterborne commerce on the local, regional, and State economy, aims to capture the broader set of economic activities generated by an initial infusion of new dollars into an economy. When new economic activity occurs, businesses will purchase additional inputs and workers will have additional dollars for purchasing goods and services. These added purchases provide an additional boost to the economy, and the ripple effect continues. With each round of spending, some dollars may be spent outside of the area of focus or be captured (i.e., value added and final demand) and so the effect of subsequent rounds of spending is dampened. The total economic effect accounts for indirect spending by businesses and induced spending by workers benefiting from additional dollars.

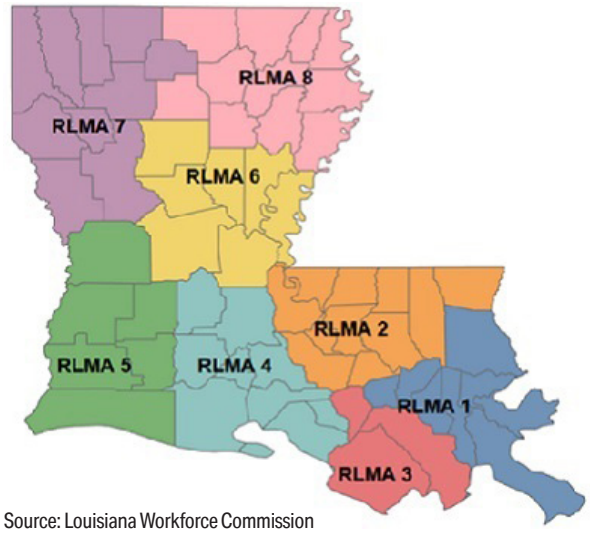
3.1 INDIRECT AND INDUCED ECONOMIC IMPACT METHODOLOGY

The quantification of the economic impact of waterborne commerce to State and regional economies was conducted with the following stepwise approach:

- Quantification of indirect and induced economic impacts.
- Statewide and national economic impacts estimated using standard regional economic models.

To refine the resolution of the reporting boundaries of this data to smaller geographies more aligned with each

Figure 11: Regional Labor Market Areas (RMLAs)



Source: Louisiana Workforce Commission

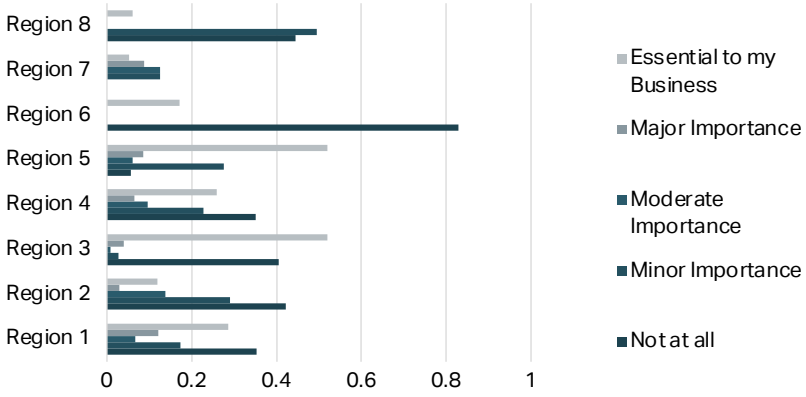


Figure 12: Importance of waterborne commerce by region

Louisiana port/waterway, industry and employment, data from the Quarterly Census of Employment and Wages (QCEW) and County Business Patterns (CBP) was proportionally disaggregated such that the economic impact data was more appropriately in line with project beneficial boundaries This process determined the distribution of impact based on the concentration of water transportation activities within each zone, paying particular attention to estimates of tonnage handled by individual Louisiana ports.

Economic impact assessments are based on the inter-industry linkages across the economy and commonly utilize the input-output method developed by Nobel prize winning economist Wassily Leontief [9]. Advances in data and analytical approaches have improved the method over time, but the same basic framework is still used today. The modeling tool IMPLAN was used in this analysis and is a widely used tool that uses region- and industry-specific multipliers to summarize the inter-industry relationships and overall economic impacts of an infusion of new dollars into the economy. These multipliers generate estimates of economic impact in terms of output, value added, employment, and earnings.

For this study, the economic impact was studied for two regions: the State of Louisiana and the United States. Statewide impacts were allocated to smaller geographic areas based on the QCEW in proportion to the direct jobs in each parish tied to industries used as the basis for the statewide analysis. This approach identifies the geographic area that serves to generate economic value for the state as opposed to a focus on the areas that receive those indirect and induced benefits.

Over 4,000 industry sector and business stakeholders were surveyed to establish metrics of how their respective economic activity is connected (directly or indirectly) to access to the inland waterways of Louisiana. Figure 12 shows how the importance of waterborne commerce varies by regional market areas of the state, as shown in Figure 11. In general, regions in coastal areas tended to respond that waterborne commerce was essential to the business, including Region 5 (Lake Charles: 52 percent), Region 3 (Houma: 52 percent), Region 1 (New Orleans: 29 percent), and Region 4 (Lafayette: 26 percent). However, even areas much further inland had some businesses for whom waterborne commerce was essential due to the connectivity of the inland waterways that stretch across much of the state, offering direct access to areas as far inland, such as Shreveport and Monroe, with inland waterways link to the Mississippi River via the Red River and the Atchafalaya River / Old River Control Structure Complex.

3.2 ECONOMIC IMPACT OF WATERBORNE COMMERCE SURVEY ANALYSIS

Baseline data from the QCEW and results from the individual economic surveys were used to determine jobs tied directly to waterborne commerce, which in turn served as the basis for the economic impact analysis. The data in Table 9 shows the level of employment in each major industry included in the survey scope, as well as the percent of businesses within each industry indicating each level of importance for waterborne commerce (with low and none excluded). While the most recent full year of data available were from 2020, the economic distortions caused by the COVID-19 pandemic make 2020 a poor base year for understanding longer-term trends; therefore, 2018 data were ultimately used as a basis for this analysis.

To translate the survey responses regarding the assessment of the importance of waterborne commerce to business operations into an estimate of direct jobs tied to waterborne commerce, the following additional assumptions for inclusion were used. Businesses indicating that 100 percent of their employment was tied to waterborne commerce were classified as "essential to operations". Businesses indicating that 50 percent of their employment was tied to waterborne commerce were classified as of "major importance to operations". Businesses indicating that 25 percent of their employment was tied to waterborne commerce were classified as of "moderate importance to operations". In total, this led to an estimate of just over 52,000 jobs tied directly to waterborne commerce, or approximately 27 percent of all jobs in the industries engaged in, or with strong ties to, waterborne commerce. In addition, businesses and port terminals that depend on Louisiana's navigable waterway system are identified by industry type, company name, and product.

Table 9: Waterway dependent jobs baseline data

NAICS	Industry Group	2019	2020	Essential	Major	Moderate	Total
483	Water Transportation	9,328	8,822	73.2%	10.6%	16.3%	100.0%
484	Truck Transportation	16,929	16,340	28.8%	8.7%	8.9%	46.4%
487	Scenic and Sightseeing Transportation	799	415	74.2%	0.0%	6.6%	80.7%
488	Support Activities for Transportation	20,192	18,572	45.4%	10.2%	7.1%	62.6%
493	Warehousing and Storage	8,097	7,763	14.3%	0.0%	0.0%	14.3%
31-33	Manufacturing	137,729	131,430	14.2%	5.9%	7.9%	28.0%

Table 10: Input data

NAICS	Industry Group	2019	Essential	Major	Moderate	Water Dependent Jobs
483	Water Transportation	9,328	73.2%	10.6%	16.3%	7,703
484	Truck Transportation	16,929	28.8%	8.7%	8.9%	5,989
487	Scenic and Sightseeing Transportation	799	74.2%	0.0%	6.6%	606
488	Support Activities for Transportation	20,192	45.4%	10.2%	7.1%	10,555
493	Warehousing and Storage	8,097	14.3%	0.0%	0.0%	1,158
31-33	Manufacturing	137,729	14.2%	5.9%	7.9%	26,341
Importance of Waterborne Commerce and Size of Impact					**TOTAL**	**52,351**

3.3 STATEWIDE ECONOMIC IMPACT

The results of the Statewide Economic Impact are presented in Table 11. The approximately 52,400 jobs with direct connection to waterborne commerce are associated with $5.5 billion in labor income, $22.2 billion in value added to the state economy, and $83.2 billion in new output (or sales) across Louisiana. The 52,400 jobs in Louisiana with a direct link to waterborne commerce, a knock-on effect and lead to a total of more than 207,000 additional jobs in Louisiana including a further 96,300 jobs created through business-to-business transactions. A further 58,600 additional jobs are created by the increase in payroll from direct jobs and associated consumer spending. Those total Statewide economic impacts in Louisiana are significant, with more than $14.4 billion in labor income, $40.7 billion in value added, and $125.5 billion in output (or sales) due to the economic activity associated with or created by waterborne commerce in Louisiana. The top industries, in terms of job creation, include a large cluster of jobs at ports or port tenants, including several key manufacturing and transportation-related industries. Additional jobs are created in transportation as well as several business service and consumer-oriented industries.

Figure 13: Statewide Impact of waterborne commerce by industry region

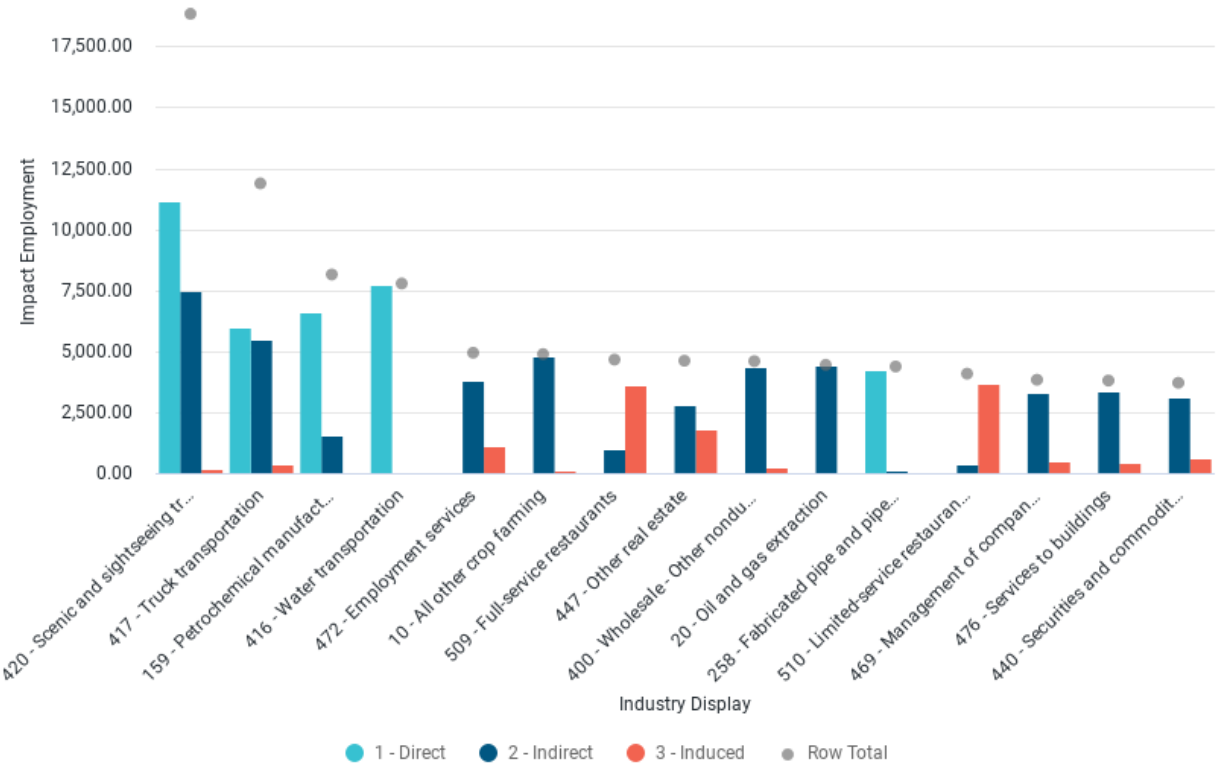


Table 11: Statewide economic impact

Impact	Employment	Labor Income	Value Added	Output
Direct	52,400	$5,549,000,000	$22,243,000,000	$83,240,000,000
Indirect	96,300	$6,278,000,000	$13,565,000,000	$33,625,000,000
Induced	58,600	$2,574,000,000	$4,849,000,000	$8,607,000,000
Total	**207,200**	**$14,401,000,000**	**$40,657,000,000**	**$125,473,000,000**

3.4 NATIONAL ECONOMIC IMPACT

The results of the National Economic Impact are presented in Table 12. The 52,400 jobs created in Louisiana with direct links to waterborne commerce, lead to a total of more than 512,000 jobs nationally, including an additional 238,800 jobs created nationally through business-to-business transactions. A further 221,200 jobs are created nationally by the increase in payroll from direct jobs and associated consumer spending. Those total National level economic impacts are highly significant, with more than $40.8 billion in labor income, $89.9 billion in value added, and $235.2 billion in output (or sales) due to the waterborne commerce generated in Louisiana

As with the Louisiana statewide impact analysis, top industries in terms of job creation at the national level also include a large cluster of jobs at ports or port tenants, including several key manufacturing and transportation-related industries. In addition, a significant number of jobs are created in oil and gas extraction, transportation as well as several business service and consumer-oriented industries.

Figure 14: National Impact of waterborne commerce by industry region

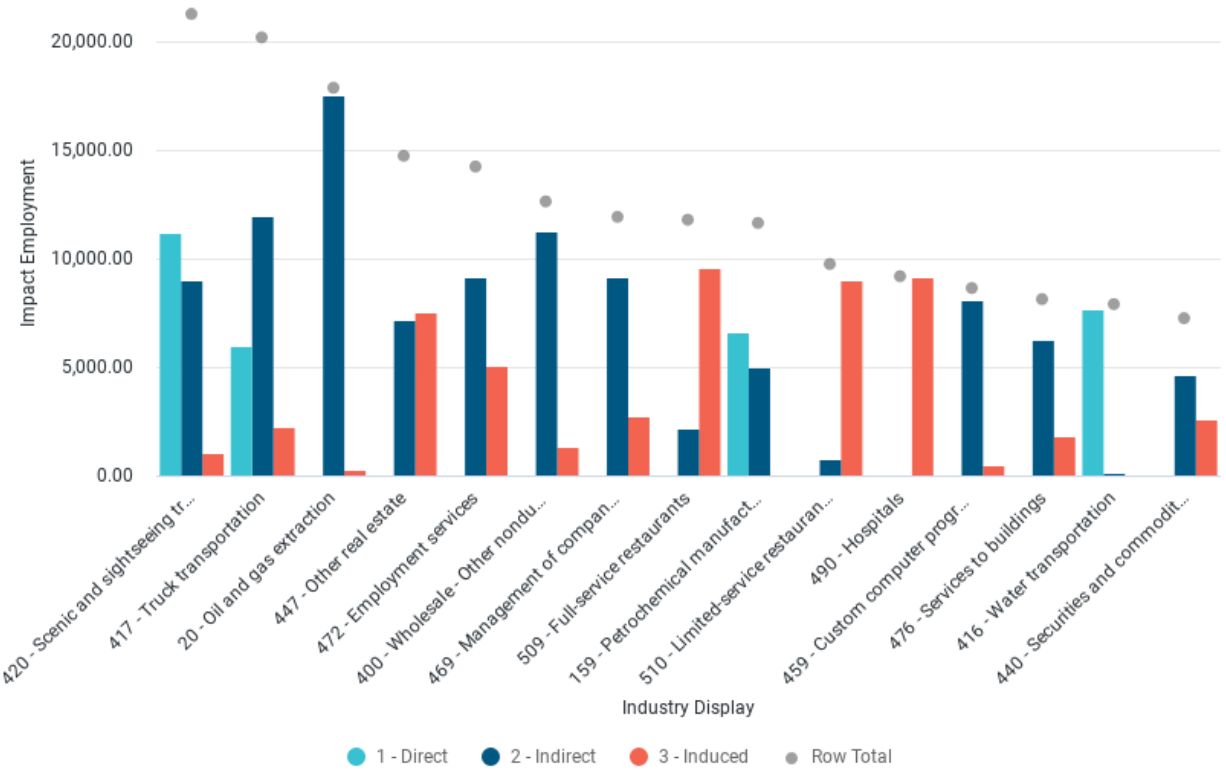


Table 12: United States economic impact

Impact	Employment	Labor Income	Value Added	Output
Direct	52,400	$5,549,000,000	$22,243,000,000	$83,240,000,000
Indirect	238,800	$22,266,000,000	$44,615,000,000	$110,843,000,000
Induced	221,200	$12,998,000,000	$23,056,000,000	$41,129,000,000
Total	**512,300**	**$40,813,000,000**	**$89,914,000,000**	**$235,212,000,000**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PORTUNITIES AND
LLENGES FOR THE
ATERWAY SYSTEM

4 OPPORTUNITIES AND CHALLENGES FOR THE WATERWAY SYSTEM

Despite the more than 2,820 miles of inland waterways that crisscross throughout the state, the majority of the movement of freight throughout Louisiana is still predominantly dependent upon trucks. This represents a significant missed opportunity to capitalize on the potential for increased freight movement on the inland waterways and enhanced transshipment of deep draft commerce to the connectivity of shallow draft navigation through the State of Louisiana. 238.7 million tons of freight[1], per year that are moved on the Inland Waterways System of Louisiana. Valued at $59 billion, this tonnage represents the equivalent of six million 40-ton trucks and represents significant avoided congestion, air emissions and wear and tear of the highway infrastructure.

With only 25% of all freight movement in Louisiana being transported by water, and with an Inland Waterways network that ranks second in the nation in terms of navigable miles, significant potential exists to increase waterborne freight movement on the inland waterway system. Waterborne commerce stakeholders have established a position that the Inland Waterways of Louisiana is "not a reliable means for waterborne freight movement." This is a perspective that is substantiated by economic data analysis, economic impact analysis and confirms that there is unmet potential in increased waterborne commerce, throughput, and economic activity on the Inland Waterways of Louisiana.

The Mississippi River was originally authorized in 1985 to a depth of 55-ft from Southwest Pass, through New Orleans to Baton Rouge. However, USACE Mississippi River Maintenance Dredging Operations and Maintenance (O&M) budgetary constraints have historically limited the effective maintained deep draft navigation depth to a -45-ft draft. In 2020, the deepening of the Mississippi River from 45-ft to 50-ft was authorized, with the LADOTD, as the non-federal sponsor, providing $81 million towards the approximately $250 million project. Increasing deep draft capabilities along this waterway corridor is strategic economic advantage to the nation, as it has been estimated that every foot of additional depth provided allows an extra $1 million in additional cargo to enter the Mississippi River, its inland tributaries and ultimately the inland waterways of Louisiana. However, the depth of other inland waterways supporting shallow draft cargo is insufficient to support deep-draft navigation's (in excess of 20-ft draft) ability to exploit the connectivity of the inland waterways system. Notwithstanding this, because of the extent and connectivity of the state's inland waterway network, there does exist significant opportunity for transshipment to shallow draft for further distribution and deeper penetration into Louisiana's inland waterway system and ultimately providing a level of greater economic activity on the system. As such, the inland waterways should, at a minimum, be maintained at authorized depths as they provide many local and regional economic and recreational opportunities.

The LA WATERS platform and data presentation protocols facilitate the identification of opportunities and potential structural (projects) and non-structural (operational) improvements of the waterways. A key focus was the identification of multi-modal bottlenecks and developing solutions to alleviate them. The LA WATERS platform provides the ability to rapidly screen these potential solutions and assess the impacts of potential modal shifts on localized chronic congestion, as well as evaluating specific capital investment strategies for improving throughout and economic activity of the inland waterways of Louisiana. Additionally, because of the multi-faceted nature of the data and analysis, the LA WATERS platform provides the ability to apply the extensive library of available data to perform "what-if" scenario planning

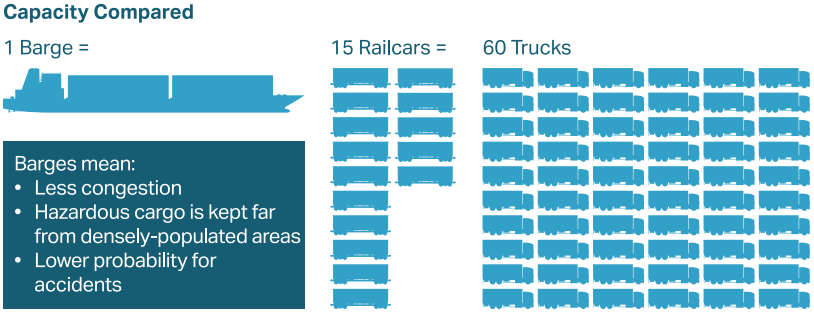
1 2018 FAF

tool for determining effective waterway infrastructure solutions and assisting in operational decision-making.

Assessing system improvements that could potentially improve greater utilization of the waterways was achieved by posing conceptual "what-if" planning scenarios on a range of temporal and spatial scales of resolution. The framework also established the ability to quantify the response of the Louisiana waterborne transportation network response to micro changes, and macro trends or market shocks. This would also help identify early project priorities for more detailed investigation and analysis.

Macro market influences can be regarded as external shifts at the global or regional level, represented as gradual trends evolving over time or sudden market shocks. Micro market shifts can be regarded as much more local and represent changes in the Louisiana economy. Both have significant impacts on the waterborne economies. However, it is the micro-market influences that are of greater concern to this program, as it is these that the Louisiana Waterways State Transportation Plan can have greatest consequence over and provide greater insight into "what-if" scenario planning. This approach provides the greatest level of accuracy and precision in not only establishing a Louisiana Waterways State Transportation Plan that can react to future market shifts, but also one that is fundamentally based on an analytical information systems platform capable of supporting future decision-making processes.

Figure 15: Cargo capacity comparisons by mode



4.1 POTENTIAL IMPROVEMENTS NEEDED TO ACHIEVE GREATER UTILIZATION OF WATERWAYS

Significant opportunities exist for the State of Louisiana to take much greater advantage of enhancing waterborne transportation than is currently being achieved. These opportunities include increasing the efficiency of waterborne transportation and augmenting the economic impacts of waterway transportation-related businesses at both the regional and local levels. Expanded shallow-draft operations, on a statewide level, is one approach to reduce landside congestion. Shallow-draft transportation is looked at as a more efficient mode of goods movement that can reduce road congestion and fuel costs, which is significant, given the continued increase in fuel prices, considering that one barge is the equivalent of 15 rail cars and 60 trucks, and one standard 15-barge tow moves the equivalent volume of 216 rail cars or 864 trucks (Figure 15).

Identifying and assessing the potential impact of each individual project or strategy in terms of alleviating chronic chokepoints in the system was conducted based on the cost of the engineering / strategic solution and potential impact on Louisiana's economy. A cost/time methodology was used to show the door-to-door (i.e., freight analysis framework, region to parish) economies of transportation for a multimodal system (i.e., truck, rail, and waterways) along with a modal choice model to explain the current and potential future modal shifts of cargo in Louisiana.

Proposed improvements were "applied" to the multimodal network to estimate their impact on transportation cost/time, and ultimately impacts to the modal choice model. The new modal split, combined with new transportation costs, can be used to measure the impact on of economic output, jobs, salaries, and tax revenues. Potential improvement projects were then ranked based on high level Benefit Cost Analyses (BCA). Delays and complications created by inefficient transfers

in multi, and intermodal transportation can provide targeted opportunities to increase the overall efficiency and competitiveness of transportation on Louisiana's waterways. The general location and types of multimodal waterway transfers were identified based on the Freight Analysis Framework and data followed by investigation of specific multimodal hubs, including outreach to port and associated hub operators. This baseline understanding of bottlenecks was layered with estimated trade elasticities to assess the competitive improvement and potential increases in commerce that can be expected from alleviating existing bottlenecks.

The development of opportunities and documenting challenges for the waterway system was organized as follows:

- Identify the improvements needed to achieve greater utilization of the Louisiana waterways.
- Identifying opportunities for relieving multimodal bottlenecks to waterways.

4.2 STAKEHOLDER CONSULTATION SURVEYS

To support the successful development of the Louisiana Waterways State Transportation Plan, a Louisiana waterway stakeholder survey was conducted to initiate conversations with the senior executives of the primary users of the Louisiana waterways system, such as ports, harbor and terminal districts, their tenants, logistics operators and carriers (Figure 16).

Attention was paid to specific impacts of severe weather conditions at individual ports (ice storm, tropical storms, and hurricanes) combined with the COVID-19 pandemic-related economic challenges of 2020 that impacted Louisiana's waterway community as part of the assessment of potential environmental impacts to the economic activity of the waterways system.

These surveys were constructed in a two-tier format. The first 17 questions were standard across all the

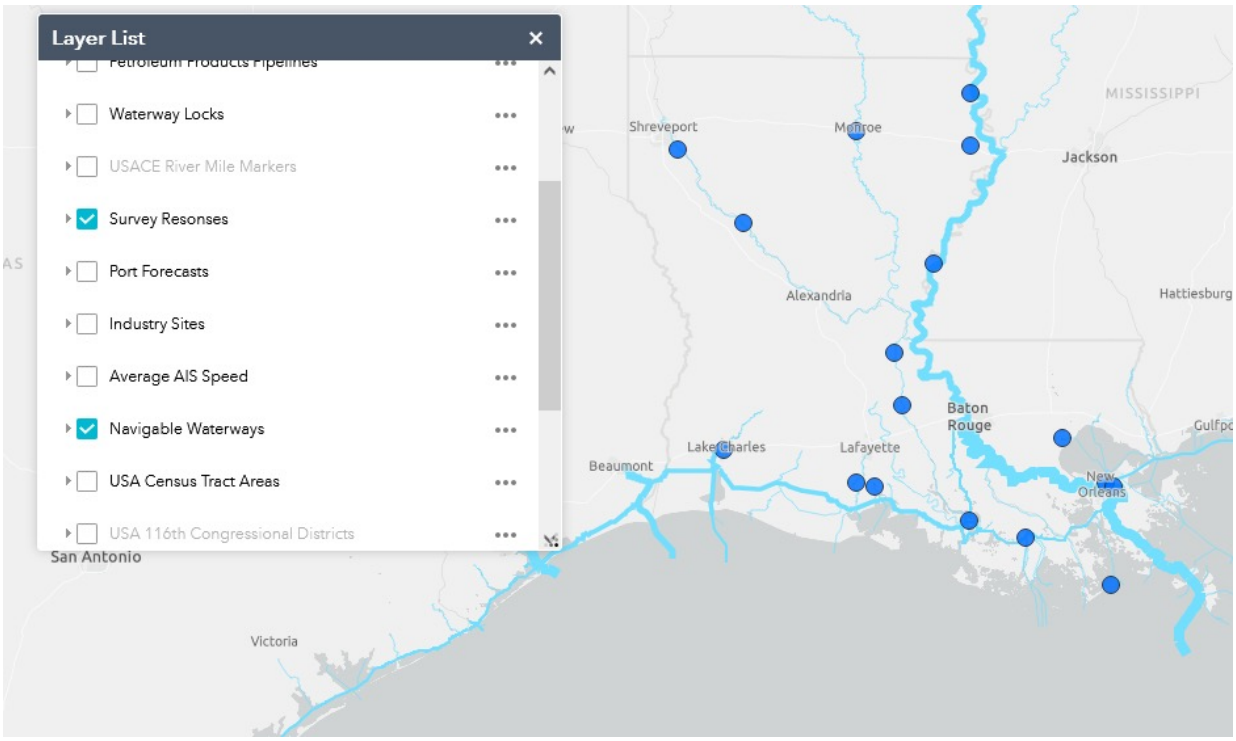


Figure 16: Georeferenced listing of participating ports

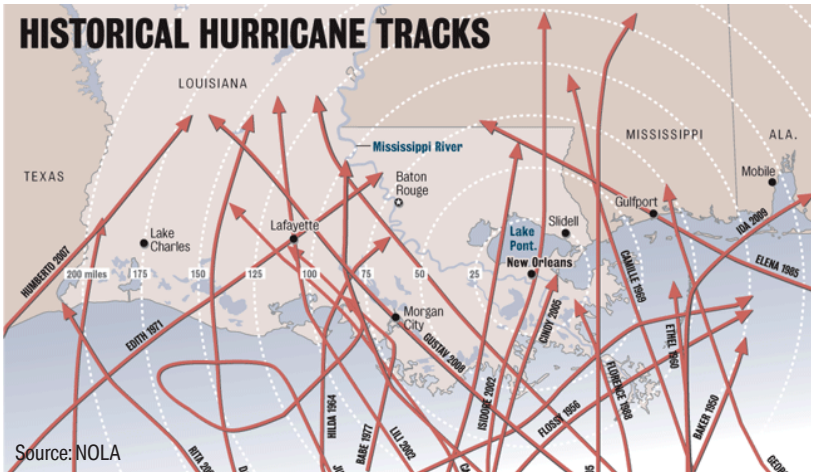


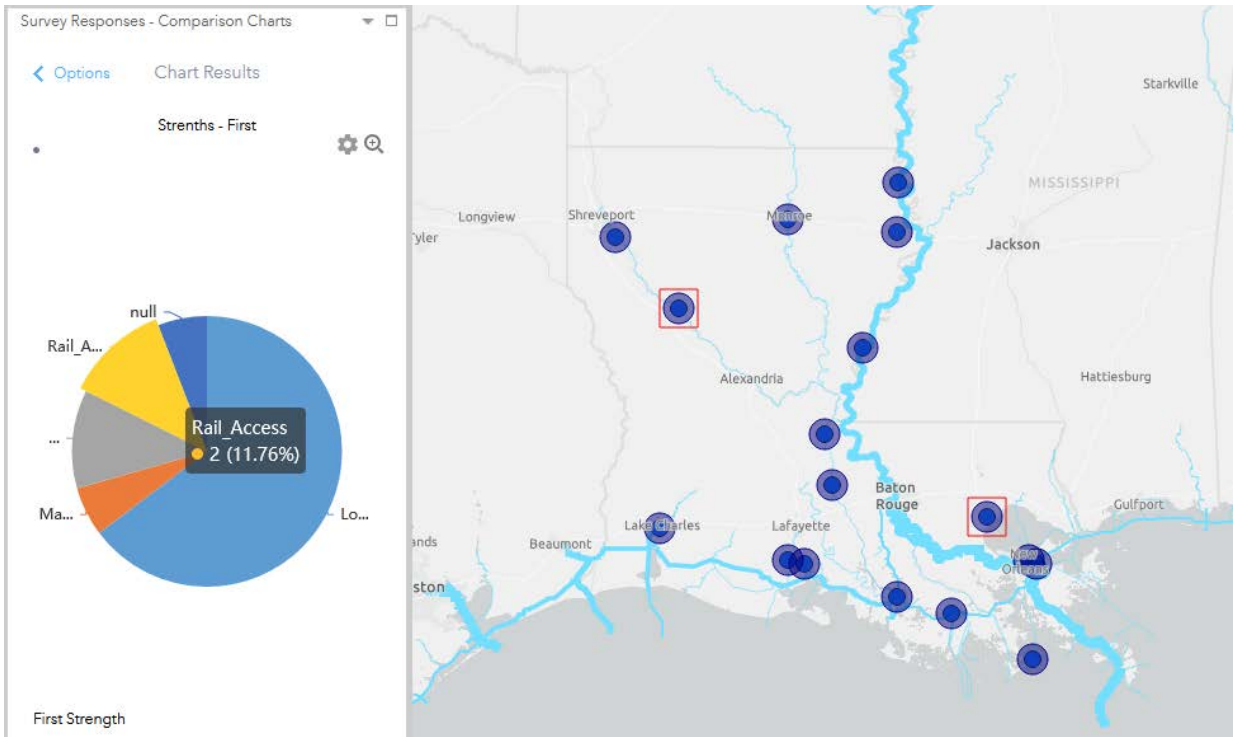
Figure 17: Map of historical hurricane tracks path

surveys submitted to the appropriate point of contact at the individual ports. Discussions with stakeholders provided user specific input in characterizing the needs to support future growth. As part of the process, a detailed preliminary analysis of currently available data was performed, as it relates to waterborne commerce operations. In performing this initial analysis, specific trends were identified, highlighted, and incorporated in the port survey, as part of the second set of questions, tailored to each port, to provide a more specific line of questioning in order to explain some initial economic trend analysis based on preliminary volume data analysis (via USACE and US Census Bureau data) and basic internet searches.

Upon receipt of the completed surveys, a follow up telephone conversation was conducted to provide a more detailed understanding of the responses and implications to this study. Initial survey input was included as part of an overall summary of stakeholder consultation, opinions, and input. Specific attention was made in order to maintain individual comments as anonymous and confidential.

This waterways' user generated information that can best assist LADOTD in understanding Louisiana's port community conditions relative to the waterways and

Figure 18: Example of available survey results georeferenced by participants



The platform enables the user to assess the response of the Inland Waterways system's response to known and hypothetical external triggers under a range of rapidly assessed "what-if" scenarios.

to generate perspectives on recommended future improvements to commerce and infrastructure.

Feedback from the port-by-port stakeholder surveys combined with the economic surveys, confirmed existing hypotheses posed by the industry and further confirmed by data analysis, that the Louisiana Inland Waterways are underutilized, when bench-marked against potential capacity for waterborne commerce and as such, are not optimized as a means of transporting goods. Port-specific stakeholder surveys, economic impact analysis surveys and data analysis of the Louisiana's intracoastal and inland waterways revealed a general stakeholder determined consensus, in that they are not optimized to be a "reliable means of transporting goods." Through the development of the LA WATERS platform, the ability to perform this analysis, as afforded by the application of the LA WATERS tool enables the waterborne transportation plan to identify the cause-and-effect relationship of these preliminary, anecdotal, but data supported, conclusions.

The details of the individual Port Surveys and preliminary freight volumes analysis are included in Appendix D.

This information is managed within the LA WATERS platform serves as a baseline for evaluating impacts of environmental impacts (hurricanes, flooding, etc.) as well as economic impacts, such as those experienced through the COVID-19 pandemic. Overall review of relevant information through the multitude of available data sources compiled as part of this plan is available through the LA WATERS tool and can be used in future analysis of waterway focus areas.

4.3 POTENTIAL WATERWAY AND INTERMODAL RELATED PROJECTS

This Waterways Plan developed a comprehensive analysis of potential projects as identified through the analysis of a port survey, an economic impact survey, source data, and through the analysis of AIS data in identification of waterway congestion points. These identified projects were evaluated and recorded within the LA WATERS platform as a means of applying current information when evaluating their potential to mitigate against extreme weather and additional micro and macro-economic conditions. The story board function provides historic insight into the analysis based on current information at the time of the evaluations. The initial analysis was based on project type, magnitude, river/waterway, project description, economic background, statement of need, how project addresses need, project scope, project cost, and additional studies-data bearing on project evaluation. (The port survey results and evaluations are detailed in the LA WATERS, and the project summary may be found in the project storyboard). Example project summaries have been included in Appendix E.

In order to be able to perform and replicate these analyses and comparative assessments, in response to prevailing and extreme conditions, as well as in response to micro and macro market shocks, it is critical to be able to follow the progression of applied protocol and processes in potential project evaluation, selection, and prioritization, in a consistent fashion when applying the application of such information to address waterway conditions. Furthermore, the platform enables the user to assess the response of the Inland Waterways system's response to known and hypothetical external triggers under a range of rapidly assessed "what-if" scenarios.

Data developed during the Economic Impact Survey is represented through the LA WATERS platform and can be post-processed under an array of user defined criteria. By using these tools, basic analysis and superimposing of diverse data, reports, analysis, and additional information can be visually represented and further analyzed. The details of these responses are included in Appendix A. As an example, the collation of economic impact data is shown in Figure 19.

In addition to the specific industry code that identifies the main activity of the business, the survey asked

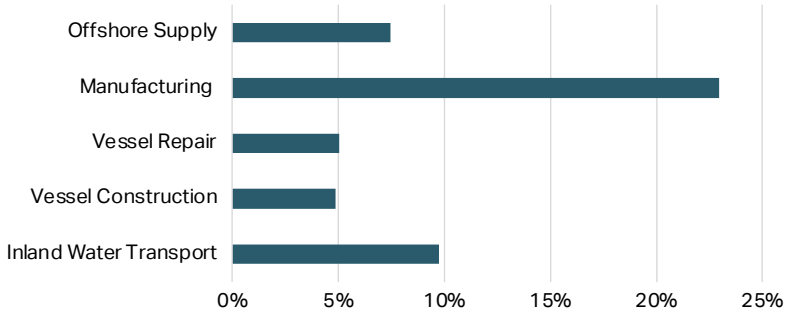


Figure 19: Business industries geo-referenced to waterway via Freight Analysis Framework analysis of segments

businesses to report their business type as it relates to waterborne commerce. Among surveyed businesses, nearly 90 percent reported as being headquartered in Louisiana. Furthermore, among survey respondents, more than 70 percent indicated that "a majority" of the company's business was in the state of Louisiana. The survey was also used to capture the strength of business ties to Louisiana and waterborne commerce. Another way that the survey assessed the strength of business connections to waterborne commerce was a question about relocation. Among firms indicating a strong connection to waterborne commerce, 45 percent indicated they would relocate if the current port were not available. Businesses indicating a strong connection to waterborne commerce in Region 3 (Houma) and Region 1 (New Orleans) were far more likely to say yes, the business would relocate if the port were not available.

The survey was designed with broad scope to help assess the full extent of connections to waterborne commerce within Louisiana. Among survey respondents, 27 percent indicated that waterborne commerce was "essential" to the success of the business, 9 percent said it was of "major" importance, and 9 percent said it was of "moderate" importance.

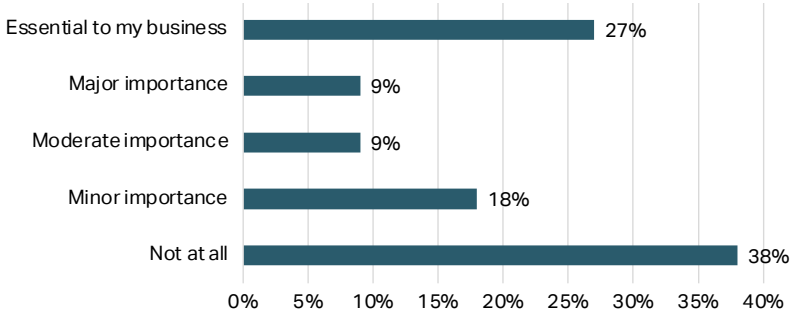


Figure 20: Survey response to importance of waterborne commerce to the surveyed businesses

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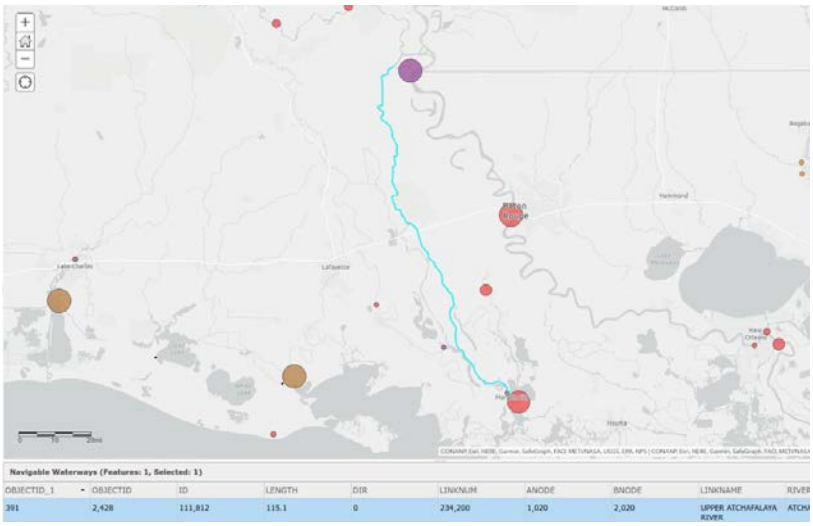
5 ALLEVIATING POTENTIAL BOTTLENECKS IN THE WATERWAY SYSTEM

Port-specific stakeholder consultation surveys facilitated the development of candidate projects to potentially alleviate congestion and chokepoints on the inland waterways system.

By analyzing Automatic Identification System (AIS) data it was possible to identify cumulative vessel movement signatures in freight movement that suggest congestion and chokepoints in freight movement in the Inland Waterways System of Louisiana. These "heat" maps were used to focus on such zones, investigate multi-modal issues and potential modal shift opportunities at the freight nodal points.

Figure 21: Georeferenced analysis of Atchafalaya River



5.1 AUTOMATIC IDENTIFICATION SYSTEM (AIS) DATA ANALYSIS TO IDENTIFY POTENTIAL CHOKEPOINTS

By analyzing available Automatic Identification System (AIS) data, it was possible to screen vessel movement signatures as they transit the Louisiana Inland Waterways System. By post-processing this data for known anchorage points, it is possible to identify areas of congestion and potential chokepoints.

Raw AIS data was transformed into a temporal spatial data set of vessels and their movements. The Commercially Navigable Waterway V5 data set published by the U.S. Department of Transportation and the Pipeline and Hazardous Materials Safety Administration is a network suitable for network analysis of the navigable waterways. Bounding geometries were created to represent the water's surface which could be used to capture vessels that entered a segment. Vessel movements were analyzed and grouped into segment traversal events. Each event detailed the duration within the segment, the average speed, direction (upstream/downstream/incomplete) and status flags indicating whether the vessel used its anchor or became moored.

By aggregating the events, average transit times

Table 13: Sample of raw AIS data produced spatially in GIS Tool for spatial analysis

OID	MMSI	Traversal duration	Entry time	Year	Depart time	Travel distance	Section length	Segmented
1	4372	00:06:25.02	2017-01-08 16:58:56.817011+00	2017	2017-01-08 17:05:22+00	920.7152531	185231.0459	111812
2	4372	00:04:33.01	2017-01-23 14:59:49.881046+00	2017	2017-01-23 15:04:23+00	742.7182051	185231.0459	111812
3	205437000	00:02:41.03	2017-01-28 15:18:38.677105+00	2017	2017-01-28 15:21:20+00	770.3259817	901.7492785	128868
4	209004000	00:00:52.10	2017-01-12 19:25:26.022354+00	2017	2017-01-12 19:26:19+00	298.4778765	901.7492785	128868
5	209088000	00:01:17.01	2017-01-27 11:51:44.920456+00	2017	2017-01-27 11:53:02+00	492.9260952	901.7492785	128868

Figure 22: Visual comparison of AIS data

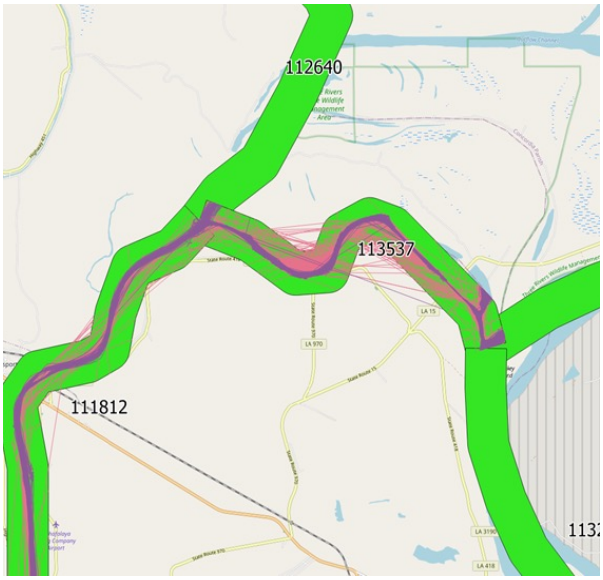


Figure 24: (Far right) Sample River segments showing the varying size of segments

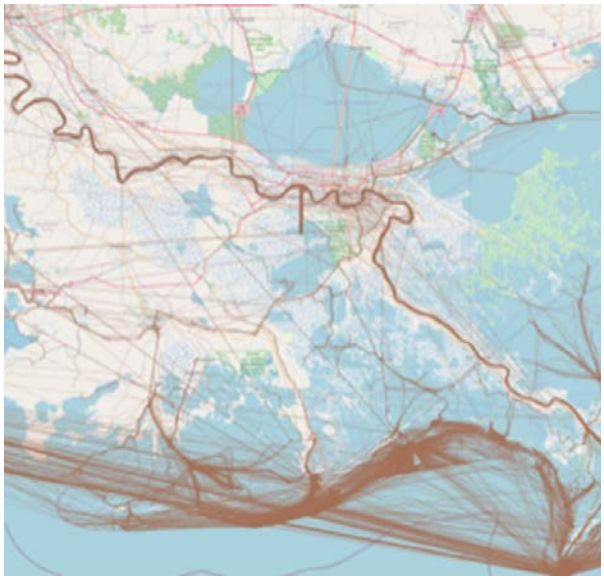


Figure 23: Raw AIS trips plotted on a map

was derived for each river segment, using the status effects to filter out vessels that did not just pass through a segment. These averages are displayed in Table 13. Each segment has the average traversal duration (shown in days) in the upstream and downstream direction for January 2009 and 2017. Several of the segments show a very clear increase in transit times, while a few show a small decrease.

Based on Freight Analysis Framework data, studies, and datasets available from the USACE Institute for Water Resources and Economic Impact Study, a detailed analysis of current and projected freight flows was integrated with employment and economic impact analysis. As an example, by using AIS data, tanker

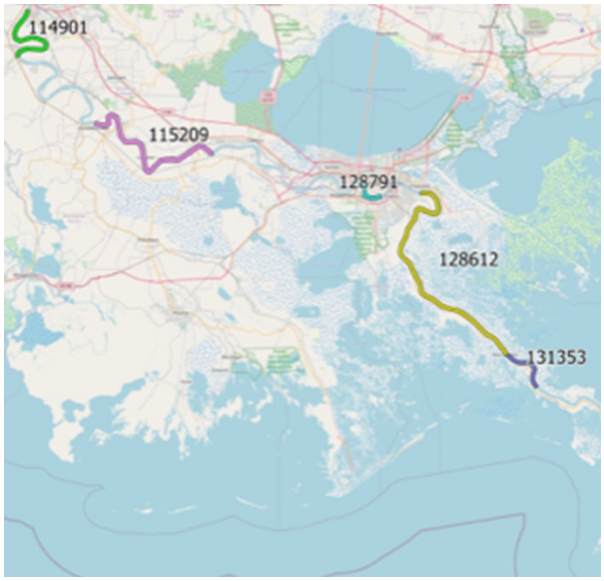
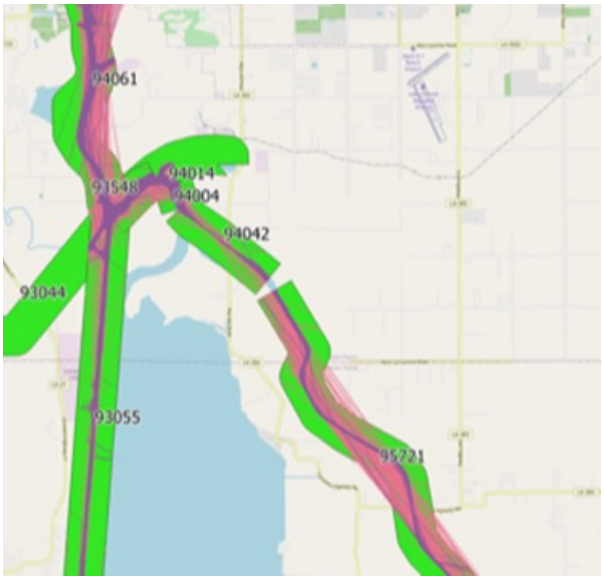


Figure 25: (Far right) Identifying waterway bottleneck challenges of segments



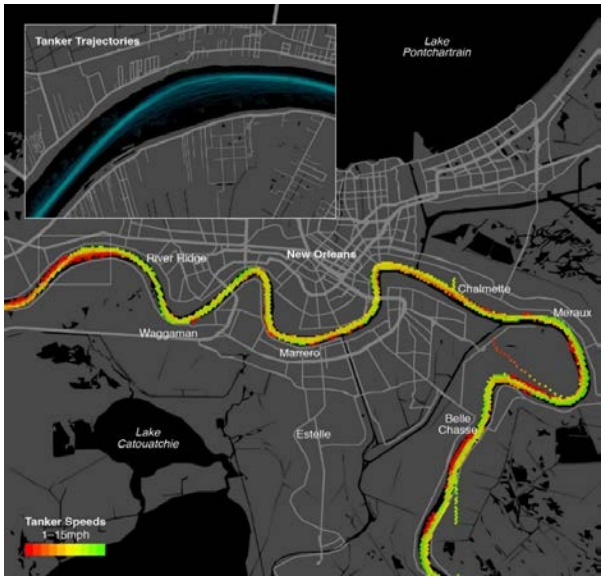


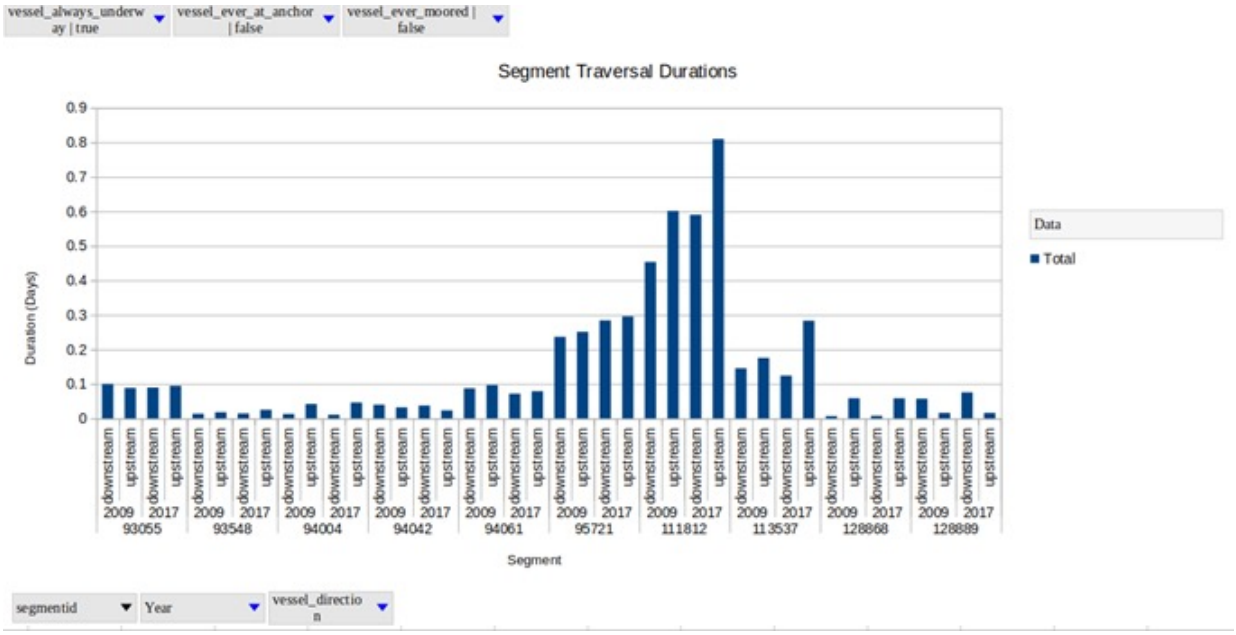
Figure 26: Tanker Trajectories and speeds captured and illustrated through web-based data system

path density is shown over one month for a stretch of river in New Orleans. From this data mooring locations can be determined and demonstrating the ability to use AIS data to create paths. The analysis can also discriminate for cargo, vessel characteristics, and time ranges. The estimates of future commodity flows are built up from historic data and trends by industry, by trade lane, and by commodity. This analysis produces the potential geographic areas of focus based on the delay of commerce, commodity, and tie-in to economic impact.

Figure 24 is a sample of the output of the AIS data collected. This graphic depicts tanker path density over one month for a stretch of river in New Orleans. From this data mooring locations can be determined, demonstrating the use of AIS data to create paths. The analysis can also discriminate for cargo, vessel characteristics and time ranges.

Figure 25 demonstrates how AIS data is used in recognizing delay anomalies along the segmented river. Note the segment 111812, (Old River Lock) the Traversal Durations spike demonstrating a bottleneck of traffic. By comparing multiple years (2009 -2017) distinctive trends can be readily identified and used to complement and reinforce evaluations and project identification. This information can also be represented geographically through the LA WATERS tools.

Figure 27: Example of Segment Traversal Durations



5.2 IMPACT OF LIQUEFIED NATURAL GAS ON WATERWAYS

St. James, Calcasieu, and Cameron parishes are at the center of significant expansion of industrial facilities in Louisiana. Projects by Yuhang Chemical, Formosa, Wanhua Chemical, South Louisiana Methanol, and others coalesce in St. James Parish, with construction costs in the order of billions of dollars. In southwest Louisiana, liquefied natural gas plant development dominates the industrial expansion, including Driftwood LNG, Lake Charles LNG, Sabine Pass LNG, and Calcasieu LNG [11] [12].

The Calcasieu Ship Channel (CSC) is a 68-mile long, deep-draft commercial waterway located in southwest Louisiana, from Lake Charles into the Gulf of Mexico. Beginning in the 1920s, the CSC was channelized by straightening, widening, and deepening the Calcasieu River to its current dimensions of 400 ft wide by 40 ft deep.

For the LNG and other industries along the waterway, draft of -40/ -42-ft is preferred to handle Panamax vessels fully laden, reducing cost per delivered ton and therefore more competitive in relative markets [14].

Table 14: Cameron LNG Output in Tons

Commodity	2019	2020	2021
LNG	1,679,567	7,752,711	10,165,792

Figure 28: The Calcasieu Ship Channel

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6 LA WATERS: DEVELOPMENT OF DATA MANAGEMENT AND ANALYSIS TOOLS

6.1 KEY FINDINGS

The following presents a list of findings resulting from the analysis of Louisiana's intracoastal and inland waterway system.

Because of the disparate nature of the type, source, and reporting structure of relevant data as it relates to all aspects of waterborne commerce and the infrastructure associated with it, the development of the LA WATERS platform was a critical step in being able to collect, aggregate, process and analyze a multitude of data from a wide and diverse range of data sources into a first of its kind data management portal. LA WATERS enabled the compilation of historical data and trends, statistical analysis, infrastructure condition assessments, prevailing environmental and economic conditions, micro and macro market trigger events, along with an extensive library of available data into "what-if" scenario planning tool for determining effective waterway infrastructure solutions and assisting in operational decision-making. Furthermore, this platform serves as the basis for developing and applying systematic, transparent, and consistent protocols and processes in the assessment of the waterway systems and application of available resources. While the COVID-19 pandemic is generally regarded as a once in a generation type economic shock, and there is significant uncertainty surrounding the impacts of climate change, it is evident that the region is expected to continue to experience an increasing trend to more frequent storms of higher magnitude. This Louisiana Waterways State Transportation Plan recognizes and emphasizes the need to mitigate against the risk to the waterways system resulting from these increased frequent extreme weather conditions and macro-economic shocks, as typified by the COVID-19 pandemic.

In order to be able to perform and replicate these analyses and comparative assessments, both in response to prevailing conditions and under extreme conditions, it is critical to be able to follow the progression of applied protocol and processes in potential project evaluation, selection, and prioritization, in a consistent fashion when applying the application of such information when addressing prevailing and future waterway conditions.

The objective in developing the LA WATERS platform was to be able create a picture of the current state of waterborne transportation in Louisiana based on a multitude of both publicly available and subscription base data and historical information. The output provided an ability to report on a detailed assessment of Louisiana's waterborne commerce, broken down by commodity and industry and reported at a user defined level of geo-political resolution.

Storyboard mapping presentations are used to support information presentation, transfer, and collaboration for multiple aspects of the project. Internally, online story board mapping allows project engineers to access information from across a multitude of databases previously housed in individual separate, often incompatible disparate sources in a geographical context. The application of Geographical Information Systems demonstrates the spatial relationships between the different potential projects (when evaluated individually and cumulatively) and the various components of the state's waterway transportation system.

Through the collection of information, historical precedent, statistics, conditions, assessments, and extensive data available, this study included the development of a LA WATERS platform required for applying relative information in determining effective waterway infrastructure solutions and assist in operational decisions.

This emphasis in the Atchafalaya Bay Channel is recognized as an attempt to mitigate the dynamic nature of the opportunities and challenges as evidenced in preceding years as a result of extreme weather conditions and the COVID-19 pandemic. The ability to follow the protocol progression and processes in existing project evaluation, selection, and prioritization, allows the

The data management tool is designed to allow LADOTD to update layers and supporting data in a timely manner whenever needed.

timely application of relevant information in addressing waterway conditions.

To provide LADOTD staff easy and intuitive access to the information, findings, recommendations, and conclusions of this plan, the LA WATERS platform provides context for the stand-alone "dynamic analysis tool" in serving the following:

- **Study Results and Report Conclusions:** Present project recommendations in an interactive map format that allows users to explore report findings and recommendations, and the data and analysis that support the findings, and related data that allows users to understand project findings with historical and geographic context.
- **Context:** Provide LADOTD users access to geographic data that drives the day-to-day work of DOT waterway planners and managers. By placing existing datasets in one location, analysist and planners can collect and share a range of data related waterway operations that currently reside across several internal and external systems.
- **Analysis:** The dynamic analysis tool provides the user with standard GIS tools for comparing and analyzing study results in the context of existing GIS data. Users can query all layers by location and by attributes and use selection tools to find the details of individual records. Basic GIS tools like location lookup, point and area measurement tools allow users full access to the data that supports the report. Information and status are available for datasets such as river gauges, waterway locks, and inland and coastal digital navigation layers are available, as well as study-generated data such as freight history and projections for a variety of years and commodity types. The dynamic analysis tool allows the users to juxtapose these datasets with study project recommendations and use this information to drive decision processes.

Dynamic analysis tools give the user the ability to query port surveys, freight trends and forecasts for waterway segments and ports and display dynamic informational graphs. Interactive selection tools allow the user to limit queries to selected waterways or ports to keep results relevant to the areas impacted by a single or group of potential projects.

LADOTD staff often respond to requests from lawmakers, coworkers, and the general public to provide information about and related to Louisiana waterway systems. The dynamic analysis tool brings together data that is needed to respond to these requests. The tool contains census boundaries, parish boundaries, state, and national legislative districts and LADOTD divisions, providing context to staff and allowing them to identify affected populations and responsible authorities quickly and accurately, at multiple different scales or geo-political boundaries.

The data management tool is designed to allow LADOTD to update layers and supporting data in a timely manner whenever needed. The development of the tool is handled by off-the-shelf ESRI ArcGIS Online tools that require no custom programming or development. As much as possible, links to reference and context data are provided through linking to external mapping layers from authoritative sources, such as NOAA and the USACE. This means that updates to the supporting data happens automatically as the hosting agency updates the layer. Since these links are external, there is no data storage requirement for this data, which reduces the cost of hosting and maintaining the tool and makes managing updates simpler.

By implementing the Louisiana Waterways Analysis Tool Evaluating Regional Systems (LA WATERS), technical support platform, developed as a component feature of this Louisiana Waterways State Transportation Plan, OMC is provided the framework for the identification and analysis of opportunities to alleviate multimodal bottlenecks and improving throughout and economic activity of the inland waterways of Louisiana.


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FINDINGS AND OMMENDATIONS

7 FINDINGS AND RECOMMENDATIONS

7.1 FINDINGS

The following presents a list of findings resulting from the analysis of Louisiana's intracoastal and inland waterway system:

Louisiana has thirty-two active ports, including six deep water ports located on the Mississippi River. 238.7 million tons of waterborne freight, valued at $59 billion, was transported on the Louisiana Inland Waterway system. This tonnage represents the equivalent of six million 40-ton trucks, which represents significant avoided congestion, emissions and additional wear and tear on the Louisiana highway infrastructure. FAF forecasts suggest that the total water tonnage will continue to increase at an annual growth of 0.7 percent per year through 2040, without any additional investment in the Inland Waterways System of Louisiana.

Despite the extent of Louisiana's navigable inland waterways, Louisiana is still highly dependent upon trucks for the movement of most of its freight. While waterborne transportation is an essential component of the State of Louisiana's transportation system, it is currently under-utilized in terms of unrealized potential and capacity. In order to be able to realize this untapped potential and fully leverage this competitive advantage of such an abundance of navigable waterways, Louisiana requires a paradigm shift in its approach to waterborne transportation, through the implementation of appropriate planning and management of investment in our navigable waterways.

The connectivity of the inland shallow draft network does provide a significant opportunity for trans-shipment to shallow draft for further distribution and deeper penetration into the Louisiana Inland Waterways system. However, stakeholder inputs characterized the Louisiana's intracoastal and inland waterways as not optimized "as a reliable means of transporting goods," a perspective that is supported by economic studies and data analysis. These analyses quantified the delta between actual utilization and potential capacity for waterborne commerce. As such, the waterways should at a minimum be predictably maintained at as authorized depths levels as they provide numerous economic and recreational opportunities to the local and regional economy.

The intracoastal and inland waterways are a significant source of economic activity, development, vitality, and growth for the parishes and areas that they serve. These waterways contribute socio-economic benefits that are measured in value by business activity, personal income, employment, recreational opportunities, environmental appreciation, and many other aspects important to the parishes and areas that these inland waterways serve. A major challenge will be how to appropriately monetize the socioeconomic benefits of intracoastal and inland waterways as part of Benefit Cost Analyses (BCA) conducted to secure funding for improvements and maintenance.

Direct waterborne commerce generates 52,400 direct jobs that are associated with $5.5 billion in labor income, $22.2 billion in value added to Louisiana's economy, and $83.2 billion in new output (or sales) across Louisiana. The 52,400 jobs directly related to Louisiana's waterborne commerce generate more than 207,000 additional jobs. This includes 96,300 jobs created through business-to-business transactions. While another 58,600 jobs are created by the increase in payroll from direct jobs and associated consumer spending. Furthermore, water-dependent industries generate a total of 525,000 jobs, or one in five jobs in the state. It is also estimated that waterborne freight through our ports and waterways in Louisiana, generate more than $182 billion in economic output.

Shallow-draft transportation is fundamentally a more efficient mode of goods movement that can reduce road congestion and fuel costs, which is significant, given the continued increase in fuel prices. Considering one barge is the equivalent of 15 rail cars and sixty 40-

The total economic impact of the waterborne commerce labor market is equivalent to more than $14.4 billion in labor income, $40.7 billion in value added, and $125.5 billion in output (or sales).

ton trucks and one standard 15-barge tow moves the equivalent volume of 216 rail cars or 864 40-ton trucks, expanded shallow-draft operations, and improved integration with the Louisiana Statewide Transportation Plan, is a key strategic approach to reduce road/rail congestions, reduce carbon emissions, and reduce the burden on state highway transportation system.

The total economic impact of the waterborne commerce labor market is equivalent to more than $14.4 billion in labor income, $40.7 billion in value added, and $125.5 billion in output (or sales). However, significant opportunities exist to take even greater advantage of enhancing waterborne transportation than is currently being achieved, which in turn has cascading economic impacts on waterway transportation-related businesses, at both the regional and local levels.

The Ports of the Baton Rouge FAF Zone and New Orleans FAF Zone (by far the largest economic driver of waterborne commerce in Louisiana) represent the key opportunities for trans-shipment of dry and liquid bulk commodities due the volumes of freight transiting through these Ports. This connection was especially important for port cities situated on the Upper Mississippi River Valley and its key tributaries, heavily engaged in the export of agricultural products.

Louisiana waterways have seen an overall growth based on port volumes according to data collected from the FAF, USACE, and US Census data from 2003 to 2019. This growth was not seen in all ports but was focused on larger ports that were able to improve infrastructure and adapt to market changes. The largest increase in volume, according to the Link Ton data, was found along the coast and specifically in the Lake Charles section of the Calcasieu River. The waterways with the greatest decline in volumes were in smaller coastal channels and waterways. This would suggest that cargo volumes are becoming more concentrated in larger ports and smaller ports are losing market share.

In the past decade, major ports in Louisiana have been able to grow their cargo volumes, recovering from declines caused by the global financial crisis in 2008. Ports such as New Orleans, Lake Charles, and the Port of Plaquemines all experienced volume growth or consistent volumes between 2010 and 2018. These ports have had the advantage of consistent improvement projects, established new infrastructure, and allowed for different types of cargo to be brought into the port. A key difference between ports like larger ports and smaller regional ports is a diversity of cargo being moved through them.

Using information collected through the survey responses, there appears to be a general need for dredging and waterway maintenance at smaller ports along the coast and in the interior of Louisiana. Many ports responded to the survey, saying that the greatest weakness or threat to the port is channel depth and stabilizing their banks against erosion. Similar problems were not reported by larger ports, with the exception of Lake Charles Harbor and Terminal District, which has a constant need to maintain its navigational channel connecting it to the Gulf. Many of the ports that reported a need for dredging are situated in waterways that are offshoot channels, or tributaries connecting to major waterways. For example, the Abbeville Harbor and Terminal District sits on the Vermillion River which connects to the nearby Intercoastal Waterway. On the interior of the state, the ports of Caddo-Bossier and Natchitoches Parish both reported that the 9 ft. draft of the Red River was a limiting factor the economic growth of the ports.

A comprehensive analysis of port surveys, economic impact survey, key industry sector and AIS source data, identified a list of projects that could potentially increase economic throughput of the waterways within their jurisdictions. These projects were evaluated and recorded within the LA WATERS platform and sensitivity analyses were performed to assess response to both micro and macro dynamic drivers.

7.2 RECOMMENDATIONS

The following recommendations should be considered in the effective improved management of Louisiana's waterway systems to best position the Louisiana inland waterways system to capitalize on its competitive market advantages of highly interconnectivity and opportunity for intermodal shifts.

- **Provide leadership and regularly update the Louisiana Waterways State Transportation Plan, at a minimum once every five years.** The LADOTD OMC should continue to be the lead agency for monitoring waterway systems and serve as the lead agency in Waterborne Commerce related data management. This will help facilitate LADOTD in improving integration of the waterborne commerce system with the Louisiana Statewide Transportation Plan and the State's overall transportation system.
- **Establish a standardized data reporting protocol for goods, commerce, and economic reporting data.** This will greatly improve the cost-effectiveness and timeliness of future updates and keep the database updated to the greatest extent possible. This will fundamentally establish the database as a state-of-the-art, industry leading framework for the analysis of waterborne commerce transportation systems.
- **Maintain an up-to-date database of Louisiana's intracoastal and inland waterway system.** To maintain and manage Louisiana's waterways, an extensive record of all commercial waterways should be compiled in a dedicated database. Tonnage should not be the only factor that determines a waterway's significance. More emphasis should be on the regional economic impact that a waterway contributes. The results and application of the Economic Impact and Importance of Waterborne Commerce study provides a baseline from which to establish data source and analysis guidelines.
- **Record and track inputs from stakeholders through the LA WATERS platform for establishing historical baseline data, benchmarks, and trend analysis.**
- **Continue to develop the LA WATERS Platform.** Consolidation of data sources and analysis methodologies through the LA WATERS platform should be on-going in assessing the ability of recommended operational strategies and individual projects in mitigating the dynamic challenges of the waterways.
- **Coordinate Louisiana Inland Waterway planning activities.** Most of Louisiana's waterborne tonnage is reported through its individual ports. By increasing focus on the improved integration of systemwide solutions to waterway throughput efficiencies, it will be possible to develop strategies to mitigate waterway congestion throughout Louisiana's transportation network.
- **Partner with local waterway sponsors and stakeholders.** LADOTD should partner with local waterway system administrators, such as the Red River Authority and the Gulf Intracoastal Canal Association, to keep an open dialogue regarding the issues concerning waterways. As witnessed by the recent severe and extreme weather events as well as the global COVID-19 pandemic, promoting active communications with waterway system stakeholders will keep LADOTD abreast of current conditions and will enable improved dynamic response to these micro and macro challenges to the overall transportation system.
- **Quantify the magnitude of economic impact of the waterway system not being optimized for improved efficiencies.** LADOTD should perform high level economic impact studies to establish the return on investment in maintaining waterways at their authorized depths. This will also enable LADOTD to rapidly perform a Benefit Cost Analysis and project-specific Least Cost Market Analysis (LCMA) of system improvement impacts. Deeper draft is not always the answer to improved throughput, and LCMA

sensitivity analyses can rapidly demonstrate the best most cost-effective efficiency improvements. Such a framework can also position LADOTD to rapidly and cost effectively respond to grant funding requests for information.

- **Provide higher level resolution economic impact analyses, and benefit cost analyses of proposed projects, evaluated both individually and as a portfolio of projects implemented together.** Apply the LCMA framework to further define remedial actions and identify required resources when moving forward with programmed projects. Application of the LCMA can also be used to better target limited funding resources for these projects.
- **Recommend comprehensive training in the implementation of the LA WATERS platform and analysis tools.** The wide spectrum of economic, engineering, and planning information available for the management of the waterway systems requires training in the application of these tools and developing both user and manager skill levels to fully realize the benefit of this centralized data repository. The platform is dynamic in its evolution and will require continued regular maintenance and updates in order to keep up with the ability to quantify micro and macro-economic impacts to the Louisiana waterways system.


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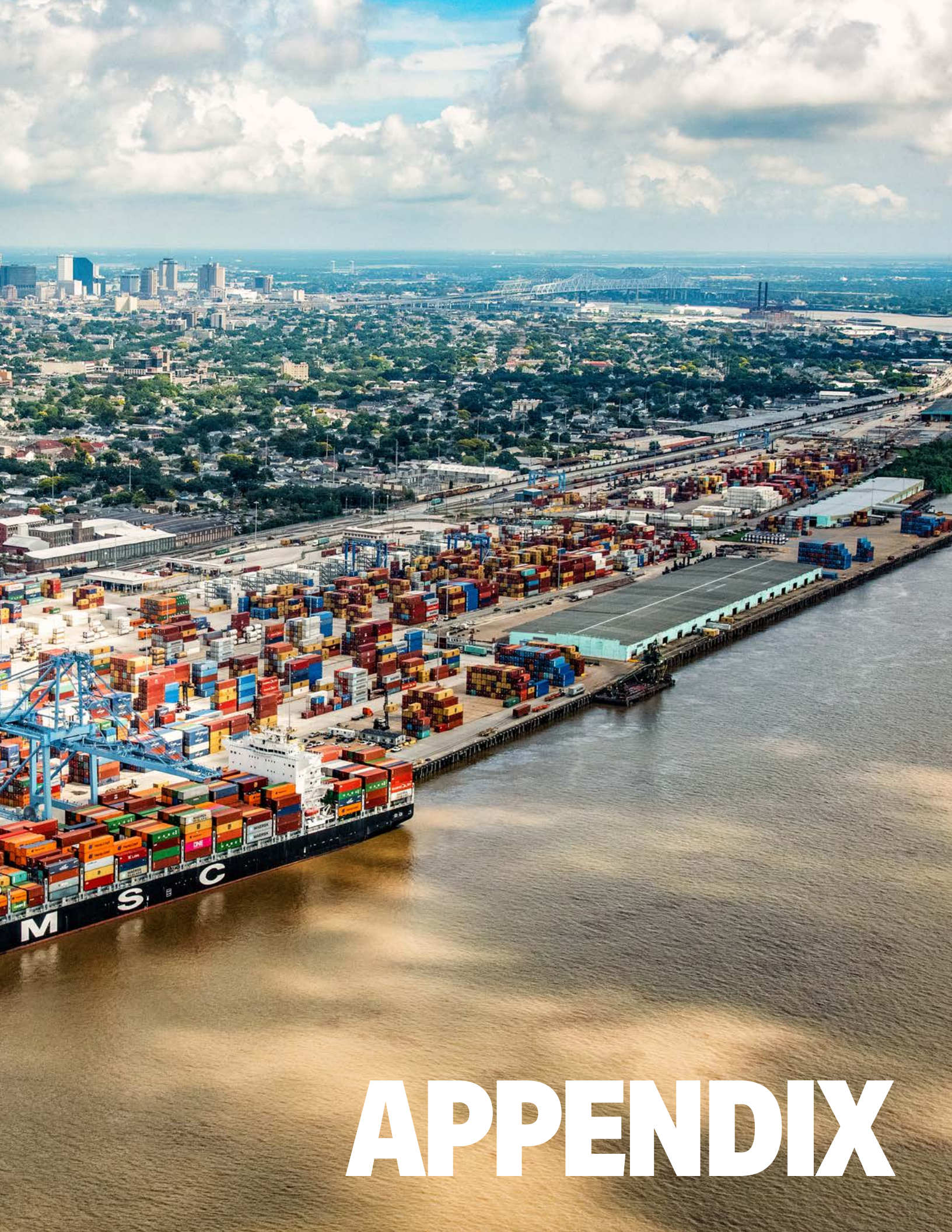


APPENDIX

APPENDIX A: ECONOMIC IMPACT SURVEY – ADDITIONAL INFORMATION

A.1 SURVEY RESPONSES WEIGHTED BY INDUSTRY

The survey responses were weighted based on the industry, region of state, and firm size to ensure that the final analysis was representative of all businesses in Louisiana within the scope of the survey.

Appendix Table 1 shows the percent of survey respondents from each industry before and after assigning survey weights as well as a comparison to Census data on the distribution of firms across industries. Given the large size of the sample, the unweighted data follow a similar pattern to the overall population of firms in the Census data, but that distribution matches after assigning sample weights to make the survey respondents more representative of the full population of firms.

Appendix Table 1: Survey responses weighted by industry by NAICS code

Industry	Unweighted	Weighted	Census
NAICS 311 Food manufacturing	6.4%	5.6%	5.6%
NAICS 312 Beverage and tobacco product manufacturing	0.2%	0.9%	0.9%
NAICS 314 Textile product mills	0.6%	1.1%	1.1%
NAICS 315 Apparel manufacturing	0.4%	0.5%	0.5%
NAICS 321 Wood product manufacturing	1.2%	2.3%	2.3%
NAICS 322 Paper manufacturing	0.4%	0.8%	0.8%
NAICS 323 Printing and related support activities	7.2%	4.4%	4.4%
NAICS 324 Petroleum and coal products manufacturing	0.4%	1.1%	1.1%
NAICS 325 Chemical manufacturing	3.0%	5.3%	5.3%
NAICS 326 Plastics and rubber products manufacturing	1.0%	1.3%	1.3%
NAICS 327 Nonmetallic mineral product manufacturing	2.2%	3.3%	3.3%
NAICS 331 Primary metal manufacturing	2.2%	0.7%	0.7%
NAICS 332 Fabricated metal product manufacturing	16.9%	11.4%	11.4%
NAICS 333 Machinery manufacturing	7.0%	5.3%	5.3%
NAICS 334 Computer and electronic product manufacturing	1.6%	1.4%	1.4%
NAICS 335 Electrical equipment and appliance mfg.	1.8%	0.9%	0.9%
NAICS 336 Transportation equipment manufacturing	2.6%	2.5%	2.5%
NAICS 337 Furniture and related product manufacturing	3.8%	2.4%	2.4%
NAICS 339 Miscellaneous manufacturing	8.2%	4.5%	4.5%
NAICS 483 Water transportation	2.4%	3.3%	3.3%
NAICS 484 Truck transportation	13.1%	24.5%	24.5%
NAICS 487 Scenic and sightseeing transportation	2.4%	0.9%	0.9%
NAICS 488 Support activities for transportation	12.5%	12.0%	12.0%
NAICS 493 Warehousing and storage	2.2%	3.6%	3.6%

Appendix Table 2 shows the percent of survey respondents from each Regional Labor Market Area before and after assigning survey weights as well as a comparison to U.S. Census data (2019) on the distribution of firms across regions. Given the large size of the sample, the unweighted data follow a similar pattern to the overall population of firms in the census data, but that distribution matches the census after assigning sample weights to make the survey respondents more representative of the full population of firms.

Appendix Table 2: Statistics by Regional Labor Market Area

Regional Labor Market Area	Unweighted	Weighted	Census
1-New Orleans	26%	26%	26%
2-Baton Rouge	20%	20%	20%
3-Houma	8%	7%	7%
4-Lafayette	23%	17%	17%
5-Lake Charles-Jennings	7%	7%	7%
6-Alexandria	2%	5%	5%
7-Shreveport	10%	12%	12%
8-Monroe	5%	6%	6%

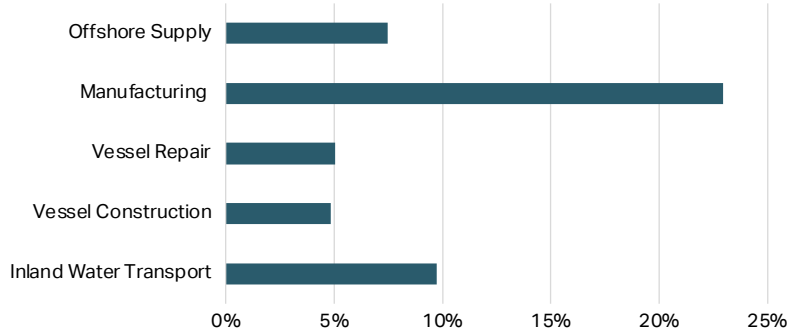
Appendix Table 3 shows the percent of survey respondents from each size category before and after assigning survey weights as well as a comparison to census data on the distribution of firms across size category. Aside from the smallest firms, the unweighted data follow a similar pattern to the overall population of firms in the census data given the relatively large size of the sample of firms. The distribution matches the census after assigning sample weights to make the survey respondents more representative of the full population of firms.

Appendix Table 3: Sample statistics by firm size

Firm Size Category	Unweighted	Weighted	Census
Fewer than 5 employees per establishment	25%	49%	49%
5 to 9 employees per establishment	20%	15%	15%
10 to 19 employees per establishment	19%	13%	13%
20 to 49 employees per establishment	17%	12%	12%
50 to 99 employees per establishment	11%	5%	5%
100 to 249 employees per establishment	5%	3%	3%
250 or more employees per establishment	4%	1%	1%

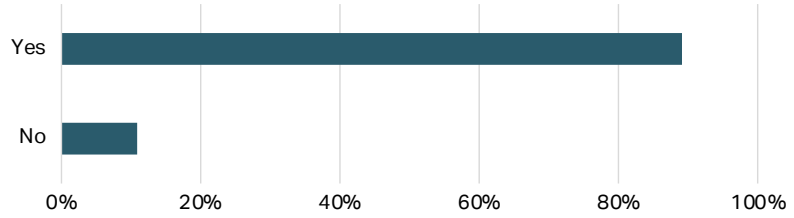
A.2 BUSINESS INDUSTRIES

Appendix Figure 1: Reported business type



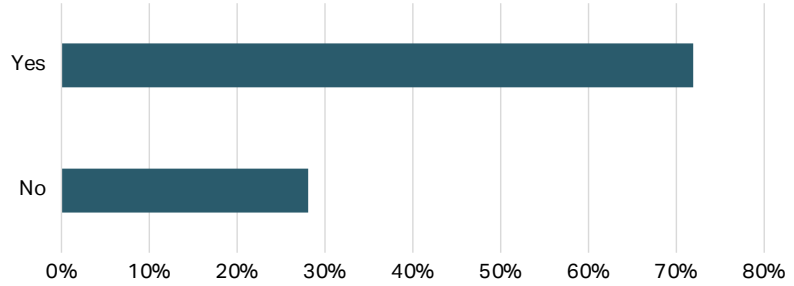
In addition to the specific industry code that identifies the main business activity, the survey asked businesses to report their business type as it relates to waterborne commerce.

Appendix Figure 2: Businesses headquartered in Louisiana



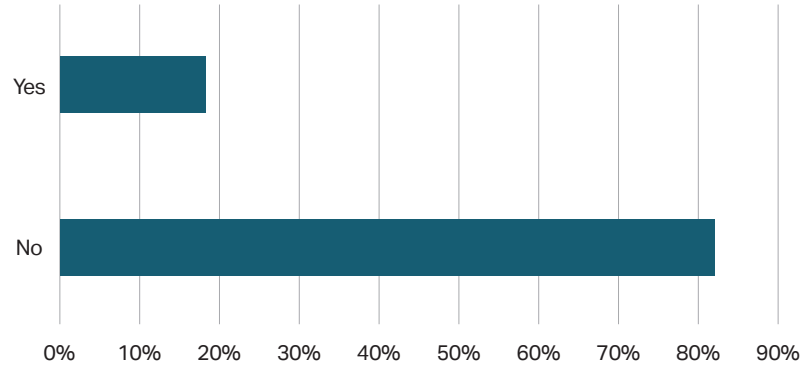
Among surveyed businesses, nearly 90 percent were headquartered in Louisiana.

Appendix Figure 3: Business conducted in Louisiana



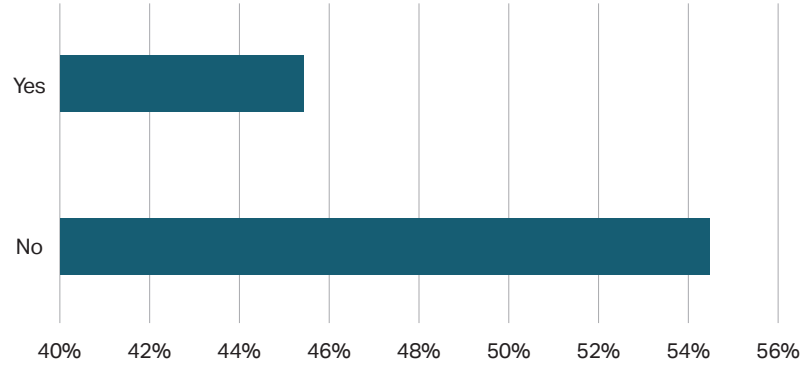
Among survey respondents, more than 70 percent indicated that a majority of the company's business was in the state of Louisiana.

Appendix Figure 4: Businesses that consider relocating



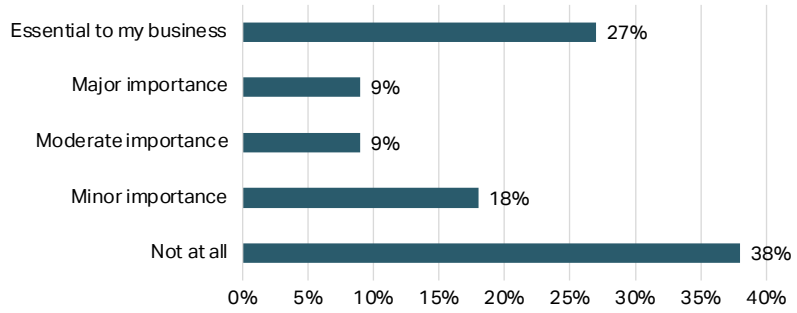
The survey was also used to capture the strength of business ties to Louisiana and waterborne commerce. Among businesses currently headquartered in Louisiana, only a small portion (18 percent) indicated they had considered relocating.

Appendix Figure 5: Businesses that would relocate if current port not available



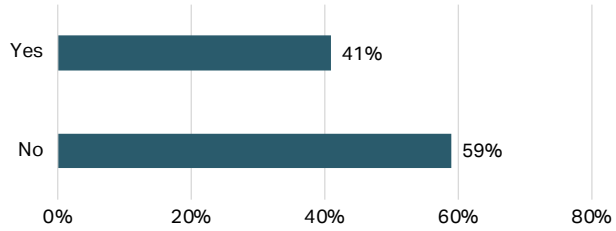
Another way that the survey assessed the strength of business connections to waterborne commerce was a question about relocation. Among firms indicating a strong connection to waterborne commerce, 45 percent indicated they would relocate if the current port were not available.

Appendix Figure 6: Importance of waterborne commerce to business



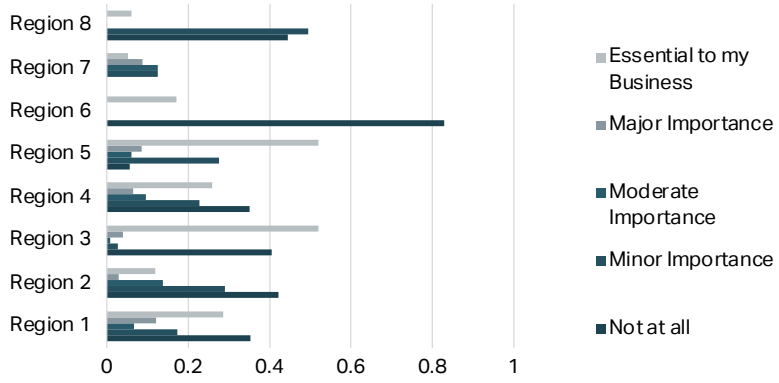
The survey was designed with broad scope to help assess the full extent of connections to waterborne commerce within Louisiana. Among survey respondents, 27 percent indicated that waterborne commerce was essential to the success of the business, 9 percent said it was of major importance, and 9 percent said it was of moderate importance.

Appendix Figure 7: Would you relocate if port not available?



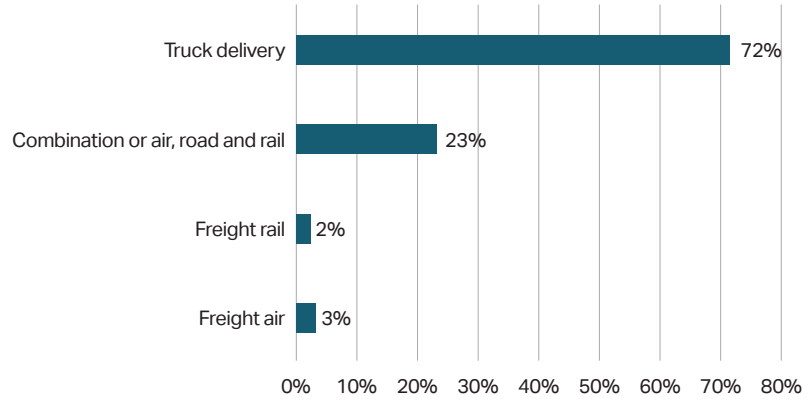
Another way that the survey assessed the strength of business connections to waterborne commerce was a question about relocation. Among firms indicating a strong connection to waterborne commerce, 41percent indicated they would relocate if the current port were not available.

Appendix Figure 8: Would you relocate if port not available (by region)?



Appendix Figure 8 shows response by region when asked if the business would relocate if the port currently used was not available. Businesses indicating a strong connection to waterborne commerce in Region 3 (Houma) and Region 1 (New Orleans) were far more likely to respond yes, the business would relocate if the port were not available.

Appendix Figure 9: Transportation modes ranked 1 or 2 that are relied on



The survey also asked about common modes of transport for those businesses who said they did not have a strong connection to waterborne commerce. Among that group, by far the most common was truck (72 percent) or a combination of air, rail, and road (23 percent).

APPENDIX B: ADDITIONAL FREIGHT ANALYSIS FRAMEWORK INFORMATION

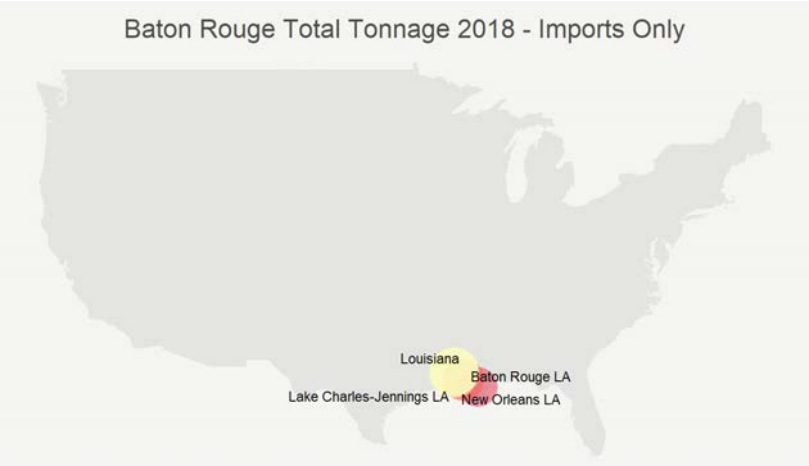
B.1 ADDITIONAL FREIGHT ANALYSIS FRAMEWORK INFORMATION

Appendix B examines total tonnage and trade value where a Louisiana port is the direct importer or exporter of foreign trade. This will result in a further refinement of the Freight Analysis Framework. In the main report, for example, New Orleans would be included in foreign waterborne commerce if it were the domestic destination after a stopover from a domestic origin. Now, a foreign import must go directly to a Louisiana port and vice-versa for exports.

Baton Rouge and New Orleans experienced much more economic activity as a foreign exporter rather than importer, while Lake Charles-Jennings saw more revenue from importing globally. International trade into Louisiana's other ports were often the only American port used in trade flow.

Baton Rouge imported fuel oils, fertilizers, nonmetallic minerals, and metallic ore. It exported fuel oils, other agricultural products, and basic chemicals. New Orleans imported crude petroleum, fuel oils, base metals, and fertilizers from abroad. Its main exports were fuel oils, agricultural products, crude petroleum, and gasoline. The Port of Lake Charles' predominant imports were crude petroleum and fuel oils, while its predominant exports were gasoline, fuel oils, and coal. Louisiana's other ports were a collection of other agricultural products, fuel oils, and fertilizers.

Appendix Figure 10: Baton Rouge FAF Zone trading partners by total tons, imports only

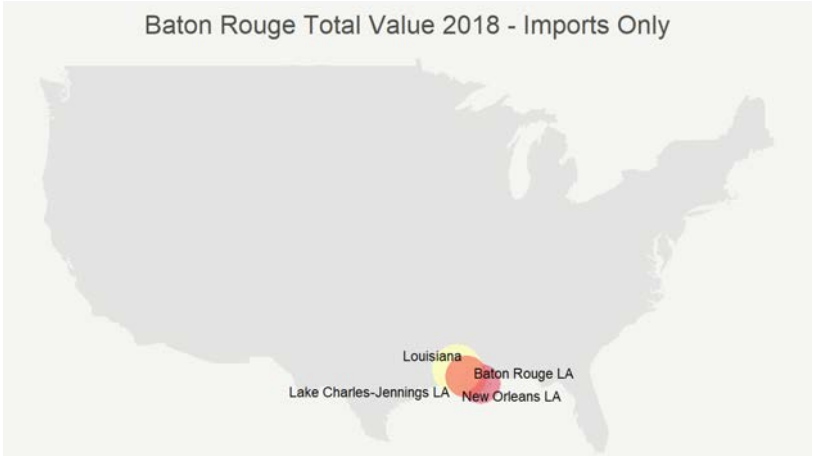


Source: Freight Analysis Framework, 2018

Appendix Table 4: Baton Rouge FAF Zone trading partners by FAF Zone, by total tons, imports only

	Name	Tons	Dollars
1	Louisiana (all other cities combined)	1,597,000	$383,000,000
2	Baton Rouge LA	539,000	$759,000,000
3	New Orleans LA	418,000	$29,000,000
4	Lake Charles-Jennings LA	51,000	$4,000,000

Appendix Figure 11: Baton Rouge FAF Zone trading partners by total value, imports only



Source: Freight Analysis Framework, 2018

Appendix Table 5: Baton Rouge FAF Zone trading partners by FAF Zone, by total value, imports only

	Name	Tons	Dollars
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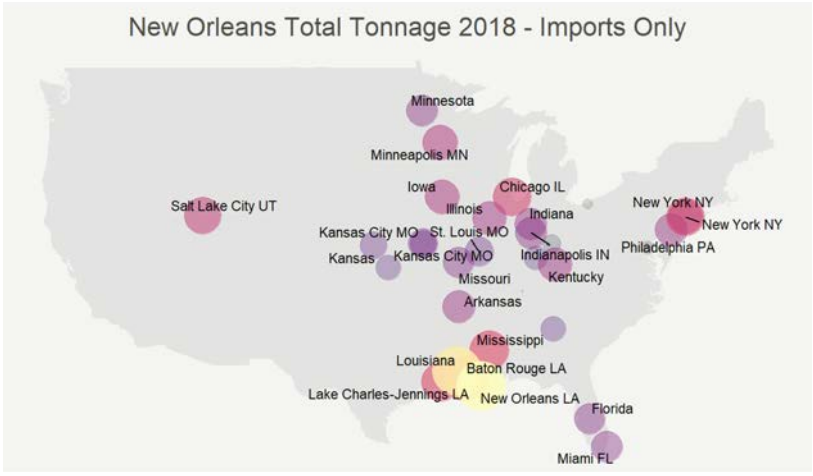
2	Louisiana (all other cities combined)	1,597,000	$383,000,000
3	New Orleans LA	418,000	$29,000,000
4	Lake Charles-Jennings LA	51,000	$4,000,000

Appendix Figure 12: Top 20 New Orleans FAF Zone trading partners by total tons, imports only



Source: Freight Analysis Framework, 2018

Appendix Table 6: Top 20 New Orleans FAF Zone trading partners by FAF Zone, by total tons, imports only

	Name	Tons	Dollars
1	New Orleans LA	22,231,000	$7,923,000,000
2	Louisiana (all other cities combined)	16,107,000	$2,594,000,000
3	Baton Rouge LA	4,761,000	$728,000,000
4	New York NY	791,000	$209,000,000
5	Mississippi (all cities combined)	726,000	$118,000,000
6	Lake Charles-Jennings LA	691,000	$98,000,000
7	Chicago IL	515,000	$106,000,000
8	Salt Lake City UT	382,000	$27,000,000
9	Minneapolis MN	252,000	$41,000,000
10	Iowa (all cities combined)	232,000	$37,000,000
11	Kentucky (all cities combined)	188,000	$50,000,000
12	Illinois (all cities combined)	181,000	$38,000,000
13	Arkansas (all cities combined)	151,000	$29,000,000
14	Philadelphia PA	150,000	$40,000,000
15	Indiana (all other cities combined)	127,000	$9,000,000
16	Minnesota (all cities combined)	110,000	$18,000,000
17	Indianapolis IN	110,000	$8,000,000
18	Miami FL	102,000	$7,000,000
19	Missouri (all cities combined)	94,000	$18,000,000
20	Florida (all cities combined)	93,000	$6,000,000

Appendix Figure 13: Top 20 New Orleans FAF Zone trading partners by total value, imports only

Source: Freight Analysis Framework, 2018

Appendix Table 7: Top 20 New Orleans FAF Zone trading partners by FAF Zone, by total value, imports only

	Name	Tons	Dollars
1	New Orleans LA	22,231,000	$7,923,000,000
2	Louisiana (all other cities combined)	16,107,000	$2,594,000,000
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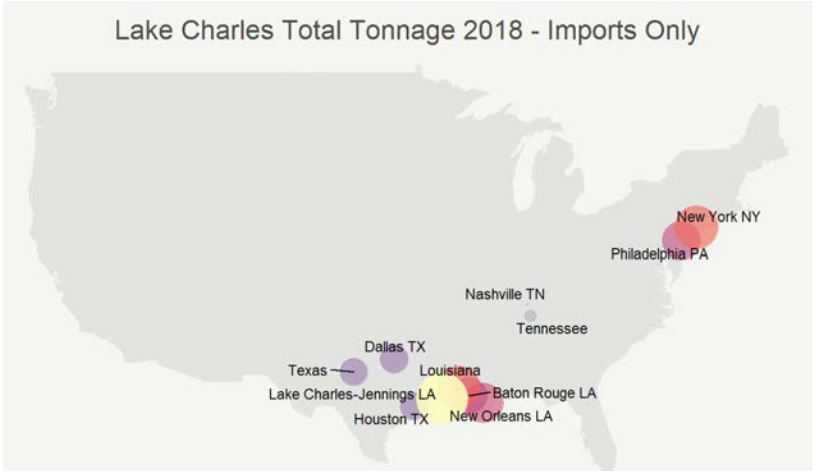
7	Lake Charles-Jennings LA	691,000	$98,000,000
8	Kentucky (all cities combined)	188,000	$50,000,000
9	Minneapolis MN	252,000	$41,000,000
10	Philadelphia PA	15,000	$40,000,000
11	Illinois (all other cities combined)	181,000	$38,000,000
12	Iowa (all cities combined)	232,000	$37,000,000
13	Arkansas (all cities combined)	151,000	$29,000,000
14	Salt Lake City UT	382,000	$27,000,000
15	Minnesota (all other cities combined)	110,000	$18,000,000
16	Missouri (all other cities combined)	94,000	$18,000,000
17	Kansas City MO	76,000	$15,000,000
18	St. Louis MO	62,000	$11,000,000
19	Indiana (all cities combined)	127,000	$9,000,000
20	Kansas City MO	41,000	$9,000,000

Appendix Figure 14: Lake Charles-Jennings Zone trading partners by total tons, imports only

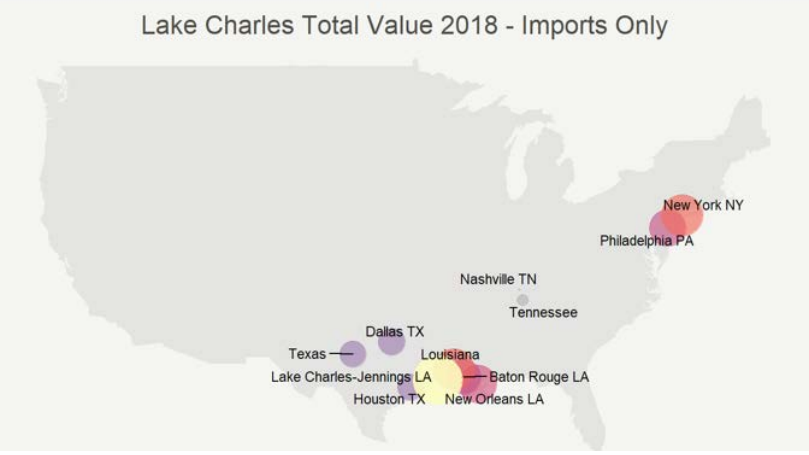


Source: Freight Analysis Framework, 2018

Appendix Table 8: Lake Charles-Jennings Zone trading partners by FAF Zone, by total tons, imports only

	Name	Tons	Dollars
1	Lake Charles-Jennings LA	13,124,000	$5,660,000,000
2	New York NY	956,000	$65,000,000
3	Louisiana (all other cities combined)	879,000	$821,000,000
4	New Orleans LA	342,000	$22,000,000
5	Philadelphia PA	245,000	$17,000,000
6	Baton Rouge LA	160,000	$11,000,000
7	Dallas TX	31,000	$2,000,000
8	Houston TX	28,000	$2,000,000
9	Texas (all other cities combined)	27,000	$2,000,000
10	Tennessee (all other cities combined)	4,000	$11,000,000
11	Nashville TN	3,000	$9,000,000

Appendix Figure 15: Lake Charles-Jennings FAF Zone trading partners by total value, imports only

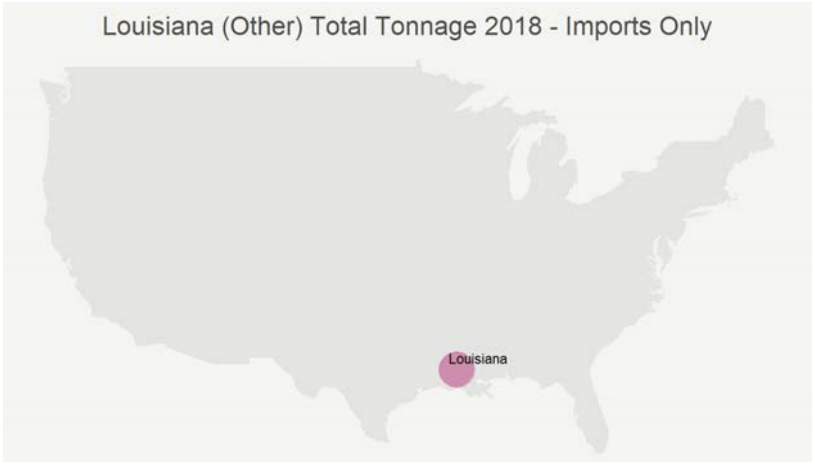


Source: Freight Analysis Framework, 2018

Appendix Table 9: Lake Charles-Jennings trading partners by FAF Zone, by total value, imports only

	Name	Tons	Dollars
1	Lake Charles-Jennings LA	13,124,000	$5,660,000,000
2	Louisiana (all other cities combined)	879,000	$821,000,000
3	New York NY	956,000	$65,000,000
4	New Orleans LA	342,000	$22,000,000
5	Philadelphia PA	245,000	$17,000,000
6	Baton Rouge LA	160,000	$11,000,000
7	Tennessee (all other cities combined)	4,000	$11,000,000
8	Nashville TN	3,000	$9,000,000
9	Dallas TX	31,000	$2,000,000
10	Houston TX	28,000	$2,000,000
11	Texas (all other cities combined)	27,000	$2,000,000

Appendix Figure 16: Other Louisiana ports, trading partners by total tons, imports only

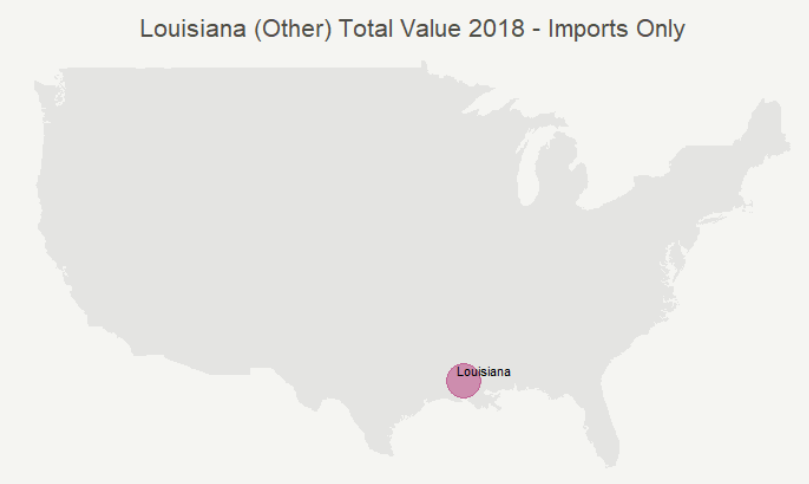


Source: Freight Analysis Framework, 2018

Appendix Table 10: Other Louisiana ports, trading partners by FAF Zone, by total tons, imports only

	Name	Tons	Dollars
1	Louisiana (all cities combined)	846,000	$2,229,000,000

Appendix Figure 17: Other Louisiana ports trading partners by total value, imports only

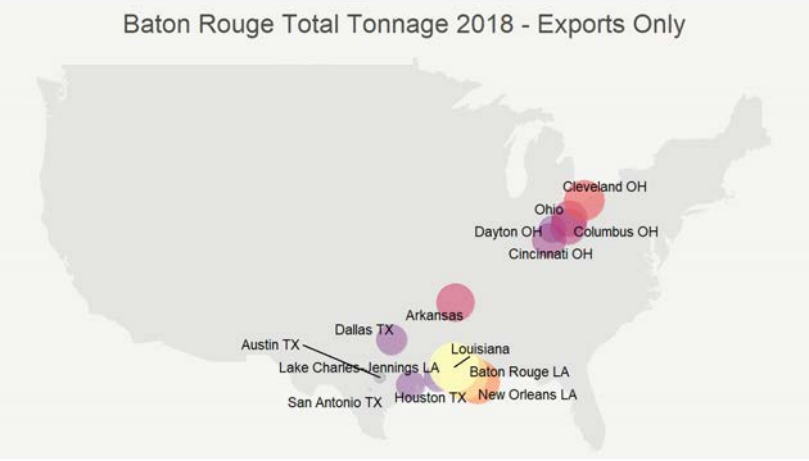


Source: Freight Analysis Framework, 2018

Appendix Table 11: Other Louisiana ports, trading partners by FAF Zone, by total value, imports only

	Name	Tons	Dollars
1	Louisiana (all other cities combined)	846,000	$2,229,000,000

Appendix Figure 18: Baton Rouge FAF Zone trading partners by total tons, exports only

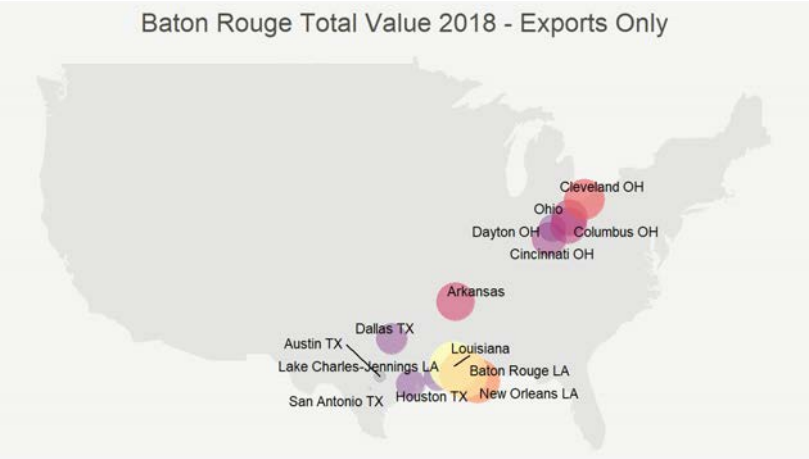


Source: Freight Analysis Framework, 2018

Appendix Table 12: Baton Rouge trading partners by FAF Zone, by total tons, exports only

	Name	Tons	Dollars
1	Louisiana (all other cities combined)	2,265,000	$1,113,000,000
2	Baton Rouge, LA	1,685,000	$2,058,000,000
3	New Orleans, LA	864,000	$375,000,000
4	Cleveland, OH	475,000	$172,000,000
5	Arkansas (all cities combined)	334,000	$121,000,000
6	Columbus, OH	249,000	$90,000,000
7	Ohio (all other cities combined)	247,000	$90,000,000
8	Cincinnati, OH	193,000	$70,000,000
9	Dallas, TX	129,000	$62,000,000
10	Houston, TX	109,000	$53,000,000
11	Lake Charles-Jennings, LA	95,000	$50,000,000
12	Dayton, OH	90,000	$33,000,000
13	Austin, TX	30,000	$14,000,000
14	San Antonio, TX	25,000	$12,000,000

Appendix Figure 19: Baton Rouge FAF Zone trading partners by total value, exports only



Source: Freight Analysis Framework, 2018

Appendix Table 13: Baton Rouge FAF Zone trading partners by FAF Zone, by total value, exports only

	Name	Tons	Dollars
1	Baton Rouge, LA	1,685,000	$2,058,000,000
2	Louisiana (all other cities combined)	2,265,000	$1,113,000,000
3	New Orleans, LA	864,000	$375,000,000
4	Cleveland, OH	475,000	$172,000,000
5	Arkansas (all cities combined)	334,000	$121,000,000
6	Columbus, OH	249,000	$90,000,000
7	Ohio (all other cities combined)	247,000	$90,000,000
8	Cincinnati, OH	193,000	$70,000,000
9	Dallas, TX	129,000	$62,000,000
10	Houston, TX	109,000	$53,000,000
11	Lake Charles-Jennings, LA	95,000	$50,000,000
12	Dayton, OH	90,000	$33,000,000
13	Austin, TX	30,000	$14,000,000
14	San Antonio, TX	25,000	$12,000,000

Appendix Figure 20: New Orleans FAF Zone trading partners by total tons, exports only

Source: Freight Analysis Framework, 2018

Appendix Table 14: New Orleans trading partners by FAF Area, by total tons, exports only

	Name	Tons	Dollars
1	New Orleans LA	48,637,000	$9,352,000,000
2	Louisiana (all other cities combined)	47,078,000	$10,430,000,000
3	Baton Rouge LA	24,152,000	$5,375,000,000
4	Lake Charles-Jennings LA	5,489,000	$1,403,000,000
5	West Virginia (all cities combined)	4,690,000	$75,000,000
6	Iowa (all cities combined)	1,865,000	$305,000,000
7	Chicago IL	1,037,000	$137,000,000
8	Mississippi (all cities combined)	400,000	$155,000,000
9	Arkansas (all cities combined)	115,000	$39,000,000
10	Alabama (all other cities combined)	85,000	$40,000,000
11	Nebraska (all other cities combined)	20,000	$9,000,000
12	Omaha NE	14,000	$7,000,000
13	Birmingham AL	12,000	$5,000,000
14	Philadelphia PA	5,000	$2,000,000
15	Pennsylvania	5,000	$2,000,000

Appendix Figure 21: New Orleans FAF Zone trading partners by total value, exports only

Source: Freight Analysis Framework, 2018

Appendix Table 15: New Orleans FAF Zone trading partners by FAF Zone, by total value, exports only

	Name	Tons	Dollars
1	Louisiana (all other cities combined)	47,078,000	$10,430,000,000
2	New Orleans, LA	48,637,000	$9,352,000,000
3	Baton Rouge, LA	24,152,000	$5,375,000,000
4	Lake Charles-Jennings, LA	5,489,000	$1,403,000,000
5	Iowa (all cities combined)	1,865,000	$305,000,000
6	Mississippi (all cities combined)	400,000	$155,000,000
7	Chicago, IL	1,037,000	$137,000,000
8	West Virginia (all cities combined)	4,690,000	$75,000,000
9	Alabama (all other cities combined)	85,000	$40,000,000
10	Arkansas (all cities combined)	115,000	$39,000,000
11	Nebraska (all other cities combined)	20,000	$9,000,000
12	Omaha, NE	14,000	$7,000,000
13	Birmingham, AL	12,000	$5,000,000
14	Philadelphia, PA	5,000	$2,000,000
15	Pennsylvania (all other cities combined)	5,000	$2,000,000

Appendix Figure 22: Lake Charles-Jennings FAF Zone trading partners by total tons, exports only

Source: Freight Analysis Framework, 2018

Appendix Table 16: Lake Charles FAF Zone trading partners by FAF Zone, by total tons, exports only

	Name	Tons	Dollars
1	Louisiana (all other cities combined)	2,071,000	$2,298,000,000
2	Baton Rouge, LA	1,481,000	$1,537,000,000
3	Lake Charles-Jennings, LA	348,000	$602,000,000
4	New Orleans, LA	89,000	$21,000,000

Appendix Figure 23: Lake Charles-Jennings FAF Zone trading partners by total value, exports only

Source: Freight Analysis Framework, 2018

Appendix Table 17: Lake Charles-Jennings FAF Zone trading partners by FAF Zone, by total value, exports only

	Name	Tons	Dollars
1	Louisiana (all other cities combined)	2,071,000	$2,298,000,000
2	Baton Rouge, LA	1,481,000	$1,537,000,000
3	Lake Charles-Jennings, LA	348,000	$602,000,000
4	New Orleans, LA	89,000	$21,000,000

Appendix Figure 24: Other Louisiana ports, trading partners by total value, exports only

Source: Freight Analysis Framework, 2018

Appendix Table 18: Other Louisiana ports, trading partners by FAF Zone, by total tons, exports only

	Name	Tons	Dollars
1	Louisiana (all cities combined)	1,314,000	$1,820,000,000

Appendix Figure 25: Other Louisiana ports, trading partners by total value, exports only

Source: Freight Analysis Framework, 2018

Appendix Table 19: Other Louisiana ports, trading partners by FAF Zone, by total value, exports only

	Name	Tons	Dollars
1	Louisiana (all cities combined)	1,314,000	$1,820,000,000

APPENDIX C: STAKEHOLDER OUTREACH SURVEY

C.1 STAKEHOLDER OUTREACH SURVEY (MASTER)

The following script was used to perform the stakeholder outreach survey discussions:

To best plan for future development and investment, the Louisiana Department of Transportation & Development's Office of Multimodal Commerce is developing a comprehensive, statewide waterways transportation system plan. To develop this plan, it is imperative there are productive conversations with the main users of Louisiana Waterways. Discussion with stakeholders, such as yourself, are the best way to understanding what is needed going forward. Your knowledge, opinions, and experiences are critical to the success and the future of the port.

The Louisiana Department of Transportation has engaged our firm, Moffatt & Nichol, in helping them develop such a plan. While we have reviewed the data, there is only so much information that can be extracted from doing so. Therefore, we are reaching out in hopes that you could provide us with responses to the questions below.

Additionally, we will be reaching out to set up a time to chat over the phone or via teleconference at a time that is convenient for you and your team.

Please note that your input will be included as part of an overall "Stakeholder Opinions and Input Summary;" therefore, individual comments will remain anonymous.

If you have any questions, please call Ric Cruz, at Moffatt & Nichol: XXX-XXX-XXXX.

Please complete the survey listed below at the following link XXXXXXX.

1. What do you believe are your port's greatest strengths?
2. What do you believe are your port's greatest weaknesses?
3. What do you believe are the greatest future operational, growth and/or developmental opportunities for the port?
4. What do you believe are the greatest threats to the future success of the port?
5. In what areas should the port focus its efforts to improve? Please prioritize the top 5 areas from the list below and provide suggestions for port improvement
6. Port operations
7. Throughput growth
8. Acquisition of new property for port operations
9. Development or redevelopment of existing port properties
10. Environmental sustainability
11. Existing port infrastructure improvements
12. Port access (highway, rail, waterway)
13. Customer service
14. Stakeholder coordination (i.e., with government, industry, community)
15. Other? _____
16. What is the port's top three revenue streams?
17. Do you expect there to be any changes to the top sources of revenue in the medium-to-long term?
18. What is your anticipated growth in the near-term?
19. Who do you view as the port's biggest competitors and why?
20. How can the Louisiana Department of Transportation best help you meet your development and growth goals to

move your cargo in the most efficient, cost-effective, and environmentally sustainably way?

21. What forms of transportation do you currently use and anticipate using in the future to move your cargo?
22. If the port had only one opportunity to implement, where should the Louisiana Department of Transportation focus its efforts and resources for improvement and growth?
    - a. IMMEDIATE: In the next 3 – 5 years? (one single answer for each)
    - b. SHORT-TERM: In the next 6 – 10 years?
    - c. LONG-TERM: In the next 11 – 20 years?

APPENDIX D: PORT SURVEY SUMMARIES AND FREIGHT VOLUME FORECAST

D.1 ABBEVILLE HARBOR AND TERMINAL DISTRICT

Documents provided:

Survey Response

The Abbeville Harbor and Terminal District survey responses were sparse. However, they did provide insights into the strengths and weaknesses of their port. Stable tenants and access to the Gulf of Mexico and Intracoastal Waterway as well as diversity are strengths of the port. Navigation depth and lack of dredging as well substandard port access on the landside hold the port back. Future investments in these areas are key to the port's success, including the need to improve LA Highway 690.

- The Port's main tenants include:
- Clean Gulf Associates Service
- Grand Isle Shipyard, Inc.
- Gulf Coast Marine Fabricators
- Industrial Scrap Metals, LLC
- Stallion Offshore Quarters, Inc.
- United States Coast Guard
- Wet Tech Energy, Inc.

The port has one ongoing project: Emergency access road (Alternate Route) to Port of Vermilion. The port believes that LADOTD can best support them by improving access road infrastructure.

D.2 AVOYELLES PARISH PORT COMMISSION

Documents provided:

Survey Response

The Avoyelles Parish Port Commission survey responses were sparse. They do mention their lack of local economies and economically depressed area are major areas of concern for the port. In addition, larger economic regions are the biggest threat to the port in the future.

The port handles mainly aggregate and liquid fertilizer products. The Port's main tenants include:

- Helena Farm Chemical – Fertilizer
- Local Construction Company

The port believes that LADOTD can best support them by allowing for easier access to port funds for basic port improvements.

D.3 CENTRAL LOUISIANA REGIONAL PORT

Documents provided:

Survey Response

The port provided in-depth answers to the questions in the port survey. The ports strengths all lie in its location, with proximity to highways, rail, an airport, and a growing agricultural industry. The weaknesses that the port identified were its lack of available land and lack of coordination between the port and regional economic development organizations. The port also has several promising opportunities including the incoming Avant Organics which will develop a facility at the port. They also see the implementation of new infrastructure such as liquid fertilizer tanks, manufacturing and warehouse space, and rail developments as opportunities.

The ports revenue comes from three main commodities: steel, fertilizer, and fuel. With the addition of the Avant Organics facility, specialty chemicals will soon make up a share of the port's revenue. The port noted that its two largest sources of revenue are coming from one company, so any issues that the company faces will also negatively affect the port. They fully acknowledged the problem that this could cause and are actively trying to alleviate the situation.

The ports current tenants include:

- Dis-Tran Package Substations
- Helm Fertilizer
- Alexandria Terminal Company

The port had a unique response to the question of how LADOTD could best support them. The port asked the state to provide logistical expertise to local businesses to enable them to better utilize the transportation and production options available at the port.

D.4 PORT OF CADDO-BOSSIER

Documents provided:

Survey Response

The Port of Caddo-Bossier responded to almost all the survey questions and provided enough detail to get a firm understanding of the port. The port listed several strengths, but a notable theme was the stability of their operations. The port noted that its board of directors, long term planning, flexibility, and community and governmental support were all primary strengths. The weaknesses of the port are a lack of government funding for river maintenance and the limitations of being served by only a single class 1 railroad. The port believes that if there was funding to maintain a 12 ft draft in the river, it would have the opportunity to bring in a higher volume of cargo.

The port outlined specific revenue sources and development opportunities that they believe will improve operations at the port. The primary revenue sources at the port are steel, petroleum products, and aggregate materials, and while the port does not expect any new sources of revenue to become primary revenue sources, they do expect continued volume growth. To further improve the opportunities at the port, expanding the land of the port is a priority in the short term. The goal of expanding land is to entice new tenants and expand facilities at the port. In the medium and long term, the goal of the port is to continually improve the infrastructure at the port.

The port's tenants include:

- Calamut Packaging
- Genesis Energy
- Oakley Louisiana, Inc
- Omni Industries
- Pratt Industries
- Ternium
- Ronpak
- West Louisiana Aggregates

The port has multiple projects that have recently been completed or are currently being worked on. They include multiple warehouse expansions, dock improvements, and a satellite rail yard. The ports responses show that improving rail is a key focus of the port's future development. The port wrote that the best way that LADOTD could assist the port is through a class 1 railroad right of way acquisition that currently falls outside the port's jurisdiction.

D.5 GRAND ISLE PORT COMMISSION

Documents provided:

Survey Response

5-year CAPEX plan

The Grand Isle Port Commission did a good job of filling out the survey and provided a 5-year capex plan as well. From the responses, it appears that the port's strengths are associated to the surrounding fishing and oil/gas activities while its weaknesses are associated to its small local economy and shallow waters. The port adds channel dredging as a priority.

The port's main sources of revenue include support for offshore facilities, large vessel docking area, commercial fishing and tourism and recreational fishing.

The Port's main tenants include:

- Local commercial fishing vessels
- Louisiana Wildlife and Fisheries
- Louisiana State University Sea Grant Program

Grand Isle Port is a unique port facility that is not competing with other port facilities since the goal of the port is to provide the support for local offshore vessels and commercial fishing vessels.

Grand Isle Port can utilize the LADOTD assistance in funding for port development.

The 5-year CAPEX plan shows a total of more than $8 million in projects as follows:

- Installing a new bulkhead for the area next to LA Wildlife and Fisheries building ($500,000)
- New Port office building ($250,000)
- Deepening of the Barataria Bar Channel ($3,000,000)
- Pile clusters north of Fifi Island ($300,000)
- Extension of Bayou Rigaud ($4,000,000)

D.6 PORT OF GREATER BATON ROUGE

Documents provided:

Survey Response

The Port of Greater Baton Rouge provided answers sufficient to establish a general overview of the port. The port did not go into its weaknesses or competitors but did explain its operations and strengths. In the response, the port stated that its location and existing infrastructure were its greatest strengths. The port has recently completed multiple projects that have added new capabilities to the port, including a container storage expansion, a rail car chambering yard, and a floating crane. These improvements to the infrastructure of the port will also allow them to capture the growth of cargo movements in the area, which they listed as their most important opportunity. They also echoed this by listing their priority for their short-, medium-, and long-term development opportunities as actions necessary to increase cargo volume growth.

The port indicated that its main revenue comes from throughput and dockage fees, as well as land leases. They do not expect any changes to their top sources of revenue but did identify an opportunity to add renewable fuel commodities into port operations. In a profile released by the port, the executive director of the port stated that the port and their tenants were able to handle the difficulties of COVID-19 without much disruption.

The port outlined its main tenants and supplied a link to their full directory on their website. The port's main tenants include:

- Drax Biomass International, Inc.
- Louis Dreyfus Commodities (LDC)
- Genesis Energy
- BWC Terminals
- Continental Cement & Company
- Dow Chemical Company
- Louisiana Sugar Cane Products, Inc.
- Pine Bluff Sand & Gravel
- Shell Catalyst & Technologies

The port wrote that the best way they could be supported by LADOTD is by continuing the Port Construction and Development Priority Program.

Historical Volumes

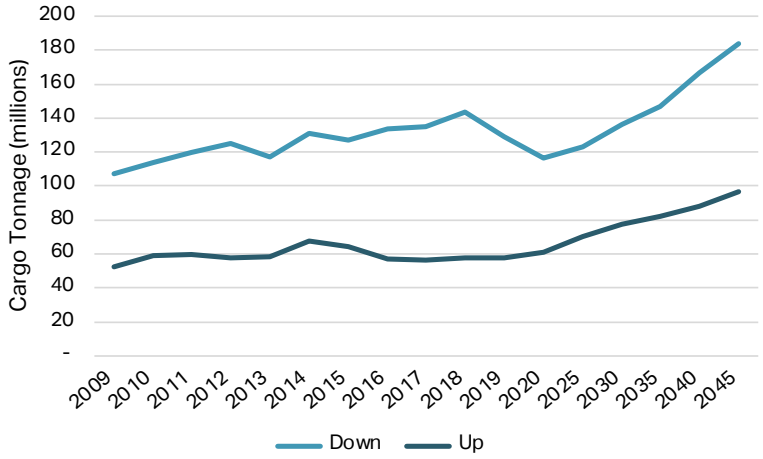
The Port of Greater Baton Rouge has experienced significant growth in cargo volumes over the past decade. Total port volumes increased by about 20 million tons in that time frame, according to publicly available sources at the USACE. The most significant growth of cargo was seen in agricultural and coal products. The largest commodities by tonnage have remained the same from 2010 to 2019. Chemical products and petroleum products have consistently made up about half of the port's volumes over the observed timeframe. These volumes do match the what the port described in its survey response. The port does not expect revenue changes in the near future and has stated their main goal is to complete any project to help increase cargo volumes. With the focus on volume growth, and the economic growth of the surrounding area, it is likely that volumes will continue to increase.

Appendix Table 20: Cargo volumes at Greater Baton Rouge

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
CHEM	15,751,536	16,960,587	16,223,098	16,970,088	17,042,781	17,085,169	19,606,197	20,265,628	18,523,383	18,697,397
COAL	1,515,168	2,442,020	2,315,629	5,398,618	2,411,991	2,431,380	3,325,293	6,468,504	9,039,115	6,768,110
CRMAT	4,297,904	5,963,049	6,975,080	5,171,917	5,859,601	5,396,028	5,145,263	4,101,435	5,553,037	5,694,834
FARM	6,173,735	3,569,740	4,512,633	5,625,999	12,429,014	14,371,150	18,980,956	20,573,329	20,628,477	14,440,492
MACH	28,240	43,250	105,164	22,899	93,341	85,158	24,175	15,731	31,426	53,398
MANU	2,540,100	3,756,217	4,006,694	3,778,936	3,506,141	2,170,446	705,330	1,172,939	896,645	2,057,138
PETROL	25,209,009	25,114,570	25,830,267	26,779,049	27,483,815	27,010,194	25,017,841	24,218,455	27,372,197	25,547,182
UNKWN	18,495	23,937	16,846	127,935	359,194	232,449	193,506	197,021	190,531	141,553
WASTE	2,800		7,407							
Total	**55,536,987**	**57,873,370**	**59,992,818**	**63,875,441**	**69,185,878**	**68,781,974**	**72,998,561**	**77,013,042**	**82,234,811**	**73,400,104**

Volumes along the Mississippi River in the Baton Rouge area are expected to experience continued growth in the next 25 years. Historically, the volumes on the waterway have increased at a similar rate that the volumes at the port of Baton Rouge have experienced. The port waterway will continue to grow in volume in the future which gives the port an opportunity to capture more market share. The Port of Baton Rouge is already investing heavily in projects that would bring in new cargo, and the addition of these new capabilities will help the port as the entire region grows.

Appendix Figure 26: River volume forecast at Baton Rouge



D.7 GREATER KROTZ SPRINGS PORT COMMISSION

Documents provided:

Survey Response

The Greater Krotz Springs Port Commission responded to the survey with in-depth answers, providing a snapshot of the port's current situation. The port has identified its community, board of directors, economic development plan as its main strengths, showing that they believe the support from their workforce and community are their strongest attributes. The port commission identified a lack of infrastructure as their main weaknesses, most notably a need for storage capabilities, additional dock space, and security systems. The primary weakness that the port wrote was that the banks of the waterway are not stabilized, but unlike many other ports, Greater Krotz Springs wrote that they had no issue with the depth of their waterway, the Atchafalaya River. The port has begun work on a new blending and storage plant, which they see as a major opportunity for the port and for the economic improvement of the surrounding area.

The port listed its revenue sources as leases and throughput resources. They emphasized that they expect the incoming blending facility to become a top source of revenue in the near future. They also expect additional tenants to move into the port that would provide support services for the blending facility. Construction is expected to begin in 2021. While the port is expecting this opportunity to move forward, there is a significant need for infrastructure improvements to support the incoming tenants. Building additional roads to dock and plant sites would increase the space available for tenants and adding truck turnarounds would speed outgoing cargo by truck. The port identified that these projects, along with assistance in stabilizing the banks, would be the best way for LADOTD to help the port.

The port's primary tenants include:

- Dupre Trucking
- Ron Wolfe Engineering
- Whitetales Catering
- Union Pacific R/R
- Local Sand and Dirt Contractors
- Campground Operators for Temp Jobs

D.8 GREATER LAFOURCHE PORT COMMISSION

Documents provided:

Survey Response

The Greater Lafourche Port Commission provided answers to some of the questions posed in the survey. The port's strengths seem to come from the location, workforce at the port, and the ability to expand. The weaknesses of the port stem from environmental issues like coastal land loss and channel depth funding. The port notes its primary weakness is that it is undiversified. An effort to diversify the revenue sources would strengthen the port. The port is a landlord port, so revenue is reliant on land leases and facility improvements. The port did not answer questions regarding the anticipated growth at the port, port competitors, and how LADOTD could support them.

In the opportunities section of the survey, the port listed multiple promising opportunities that could positively impact the port going forward. A theme of the ports opportunities was the renewable energy sector. The port listed solar power, offshore wind, and the decommissioning of offshore oil and gas facilities as major opportunities for the port. Environmental improvements were also prevalent with the port writing that channel deepening is their greatest opportunity and mentioning coastal restoration as an opportunity.

The port's tenants include:

- Edison Chouest Offshore
- Bollinger Shipyard
- Hornbeck Offshore
- Harvey Gulf International Marine
- Halliburton
- Schlumberger
- Louisiana Offshore Oil Port

The port did not identify any ongoing projects but wrote that there are multiple major projects in the early planning phases. The port stated that its development goal in the medium term would include developing a site at Fourchon Island. The port also plans to develop an additional slip at the port and establish industrial facilities at the nearby airport as their long-term development goals.

Historical Volumes

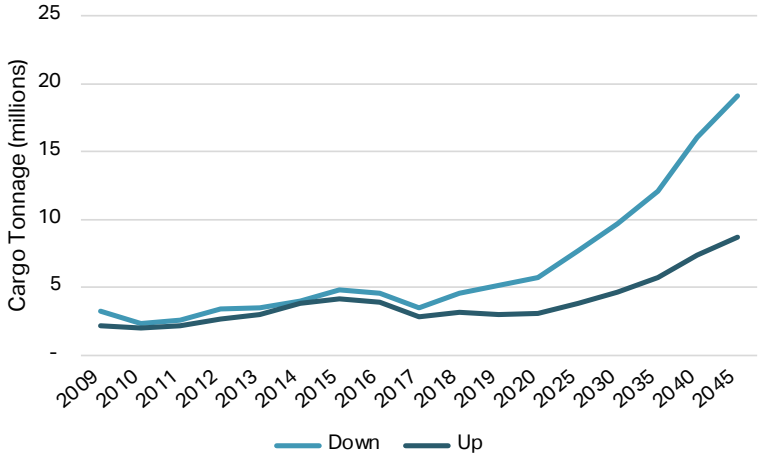
Volumes at the port have had positive growth from 2012 to 2019. Volumes at the port fell in 2017, most likely due to disruptions caused by hurricanes and have not fully recovered to the levels of tonnage seen in 2015 and 2016. Historically, the port has served as an offshore energy port, supporting operations in the gulf, and the volumes reflect that. The largest commodity type moved through the port is machinery, which includes the tools and equipment that would be used on offshore drilling facilities. Other major commodities are petroleum products and aggregate materials. The port did note in its survey that their main weakness was that they were did not have a diverse range of cargo and would work to expand the commodities that are handled in the port. The port offered several possible opportunities, with most focused on the green energy sector.

Appendix Table 21: Historical volumes at Greater Lafourche Port

	2012	2013	2014	2015	2016	2017	2018	2019
CHEM	174,260	162,154	165,989	167,019	119,898	53,317	252,207	339,011
COAL			648	579				
CRMAT	1,033,152	1,323,935	1,661,316	1,396,043	1,143,115	797,126	703,693	740,572
FARM	262,570	198,253	232,653	190,276	263,983	32,705	1,478	65,214
MACH	3,030,306	2,827,083	3,682,238	4,963,622	5,049,183	4,285,943	5,495,396	5,325,100
MANU	43,110	35,570	80,540	84,955	65,184	52,859	22,296	28,332
PETROL	1,748,460	1,721,460	2,015,648	2,090,085	1,603,471	955,458	1,047,768	1,151,010
UNKWN	283	100	5,928	2,750	5,733	7,731	1,250	7,927
WASTE	263,399	357,685	356,908	426,731	288,606	309,846	312,506	118,502
Total	**6,555,540**	**6,626,240**	**8,201,868**	**9,322,060**	**8,539,173**	**6,494,985**	**7,836,594**	**7,775,668**

Volumes along the Bayou Lafourche are expected to increase significantly over the next few decades. A large portion of this would come from the category of machinery and could come from the addition of green energy infrastructure to the region. The volume trends forecasted using the Freight Analysis Framework, predict that volumes moving down the waterway will increase at a much greater rate than volumes moving up. This could lead to more diverse cargo moving through the port, as more agricultural products or aggregate materials are moved through the waterway.

Appendix Figure 27: Waterway volume near Lafourche Port



D.9 GREATER OUACHITA PORT COMMISSION

Documents provided:

Survey Response

The port commission provided some answers to the questions posed in the survey and enough to give a general overview of the port. The port's strength is in its location and its proximity to a good workforce, but the port suffers due to a lack of manufacturing in the region. The port noted an opportunity in the match back of outgoing containers.

The ports revenue mostly comes from the containers that move through the port and the rail services that are offered. They are looking to increase the throughput of containers to raise their revenue. They also get cargo revenue from aggregate stone products. The port commission also reported that there were no tenants at the port.

D.10 LAKE CHARLES HARBOR AND TERMINAL DISTRICT

Documents provided:

Survey Response

Contact list of port tenants and related entities

The Lake Charles Harbor and Terminal District operates the Port of Lake Charles. The group responded to the survey and provided a detailed list of tenants and other associations that are linked to the port. The contact list and responses all demonstrate the importance of the harbor and terminal district to the regional economy. The port noted that its strengths are in its ability to move cargo in and out of the port. The deep channel, class 1 railroad, and interstate access were all primary strengths, along with existing infrastructure at the port. The limitations of the mentioned transportation options do pose problems for the port. The length of the channel to the gulf, and the restriction of 40ft drafts hinder the size of vessels that can access the port. There is also only one class 1 railroad which limits the options of transporting cargo by rail.

The port does see an opportunity in the expansion of the cargo types handled by the port, most notably liquified natural gas. The port knows that an export facility could add significant value to the port. The port has adequate space for industrial development as well. At the time of their survey response, the largest sources of revenue fame from pet coke, barite, and calcine coke, but the port does expect liquified natural gas to become one of their top sources of revenue sometime in the next decade. The port also expects growth in the handling of wood products, steel, and project cargo for wind energy.

Notable tenants at the port include:

- Biehl & Co.
- Citgo
- Dupre Logistics Transport, Inc.
- Halliburton
- IFG Port Holdings LLC
- Industrial Fumigant Co.
- LNG Terminal Services, Inc.
- Norton Lilly

There have been a several projects completed in recent years at the port, as well as a number of ongoing projects. These include hurricane repair projects, mooring and berth upgrades, and other facility improvements. The port provided a list of 18 projects that were recently completed or ongoing. In the short term, the port wanted to focus on hurricane recovery and resiliency projects. The port would also like to construct a high-capacity modern cargo berth as well as a multi-modal container terminal as long-term development goal.

The port wrote that the best way for LADOTD could support them would be to continue and increase funding for infrastructure and the Calcasieu Ship Channel. Specifically, this support is needed for channel maintenance dredging.

Historical Volumes

The volumes at the Port of Lake Charles have remained relatively consistent from 2010 to 2019 with a slight upward

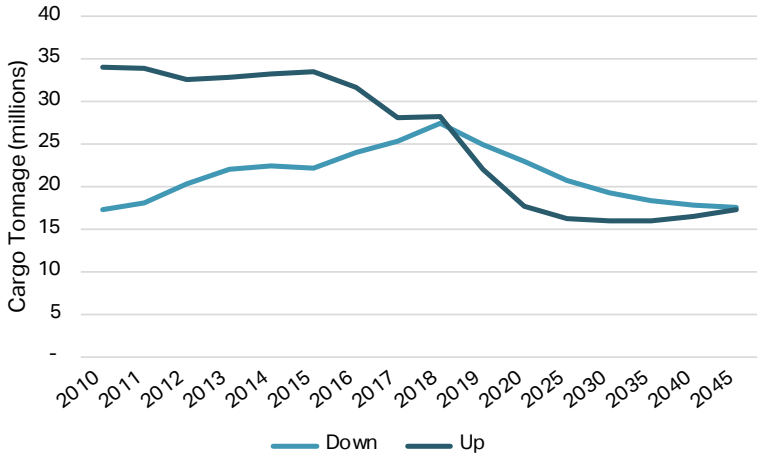
Appendix Table 22: Historical Volumes at Lake Charles

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
CHEM	2,954,875	3,168,857	3,047,507	3,066,661	2,908,272	2,500,787	3,057,914	362,003	3,730,851	4,754,634
COAL	64,053	98,116	94,657	47,448	158,420	69,443	61,483	182,828	159,258	284,998
CRMAT	2,307,183	2,225,762	2,070,093	2,178,994	1,923,663	3,113,615	3,954,094	251,056	2,516,848	3,253,974
FARM	629,838	426,760	392,530	399,974	221,817	299,864	485,410	215,367	406,253	385,876
MACH	914,469	861,037	442,181	664,693	358,032	277,575	276,046	58,363	273,694	77,979
MANU	582,445	475,217	477,560	644,720	532,211	576,314	516,626	243,998	303,177	423,456
PETROL	47,132,735	46,958,527	47,733,962	49,477,100	50,644,372	49,794,521	47,658,621	645,754	49,434,868	48,719,263
UNKWN	11,853	9,903	75,212	62,410	18,030	43,564	9,023	14,182	77,118	133,388
WASTE	17,444	22,664	48,629	35,328	36,637	16,759	26,621	11,442	6,277	4,745
TOTAL	**54,614,895**	**54,246,843**	**54,382,331**	**56,577,328**	**56,801,454**	**56,692,442**	**56,045,838**	**1,984,993**	**56,908,344**	**58,038,313**

trend. The port did experience significant losses in volume during 2017, but this is seen in most Louisiana ports due to multiple severe hurricanes that damaged the region that year. The port's main commodity is petroleum products which makes up about 80 percent of the port's total volumes. The volume of other commodity groups has also risen in recent years. Chemical products and aggregate materials have both grown from 2010 to 2019. Other commodity categories have seen a decline in volumes over that same period. Agricultural products and manufactured products have both had declining volumes in recent years, but these decreases have been made up by the growth of chemical products and aggregates. In the port's response to the survey, it was made clear that the port will continue to focus on the energy generating commodities, with a move towards liquified natural gas.

The volumes for the Calcasieu Ship Channel are expected to decline in the next few decades. This also comes with a shift in the way that goods are moved through the port. The volume coming down the channel has been increasing, while the volume moving away from the channel has fallen. This shows that less cargo will be reaching the port and more cargo will be leaving from it. A change in the balance of importing and exporting at the port, could be an opportunity for growth, as the port can invest in facilities that would entice businesses to move their goods through Lake Charles. The overall slowdown seen in the ship channel volumes could be related to the expected decline of petroleum and coal products, as the United States begins to invest further in green energy. The port noted that it is considering the movement of wind equipment in the future, which would help alleviate the burden of decreased petroleum and coal products.

Appendix Figure 28: Calcasieu Ship Channel Volumes



D.11 LAKE PROVIDENCE PORT COMMISSION

Documents provided:

Survey Response

Master Plan (1984)

Lake Providence Port Commission did a good job of filling out the survey and did provide additional documents although they are outdated. The Port is currently in the final stages of securing a replacement for Myriant, one their primary customers, a Bio refinery. As one their weaknesses, they stated the "debt related to Myriant development" – which is something worth following up on. While debt related to the Myriant development is a threat, restarting the Myriant plant with a new operator is thought to be an opportunity.

Like many river ports, the port has channel width and depth issues – of which half falls under Mississippi jurisdiction. The port also struggles with poor rail operators. However, MSR access and a short line rail with access to two mainlines (KCS & UP) are considered some of its strengths. The port also mentions demand for material handling and stakeholder support as its strengths.

The port mentioned rehabilitation of rail (new operators), restarting cottonseed operations, and collaboration with NE Delta ports and SE Arkansas as opportunities. For threats, the port mentions uncertain federal appropriations for annual dredging, current rail operators, high capex for development (and fierce funding competition at the Federal Level) and solving the Mississippi ownership of ½ the channel.

The port's main tenants include:

- Myriant – Bio refinery
- Bunge
- CHS
- EPIC
- Helena
- Nutrien
- Terral River Service
- CEA Agreements with Tensas Port & Vidalia Port for Management

The port's primary commodities include export of grain via GOM elevators and import fertilizers through GOM facilities.

In the near-term and upon completion of the rail rehab project, the port will likely be able to recondition our cottonseed houses and begin shipping whole cottonseed again. They were at one time the largest single source of cottonseed as feed in the US.

The port considers Madison Parish Port, LA and Yellow Bend Port, AR its main competitors due to proximity. Both Ports handle same commodities as Lake Providence, but long term the port believers they will have more opportunities to collaborate than compete due to the rail rehabilitation.

The port is looking for assistance from LADOTD to maintain and increase funding through the Port Priority Fund and provide funding for the DOTC Rail Program.

It is clear through the surveys that rehabilitation of the rail system to the port is a priority. Access to the channel and

Appendix Table 23: Historical Volumes at Lake Providence Port

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
CHEM	159,425	148,291	176,327	172,364	135,030	133,011	144,954	111,321	154,075	160,928
CRMAT	326,938	86,397	81,398	442,606	253,235	117,311	123,137	124,392	108,336	170,304
FARM	824,282	618,634	446,103	962,940	825,179	882,143	659,609	817,841	884,843	763,959
MACH	9,410	7,644	9,747	3,078						
MANU	28,648	34,910	19,232	14,354	29,333	26,050	16,397	32,550		1,591
TOTAL	**1,348,703**	**895,876**	**732,807**	**1,595,342**	**1,242,777**	**1,158,515**	**944,097**	**1,086,104**	**1,147,254**	**1,096,782**

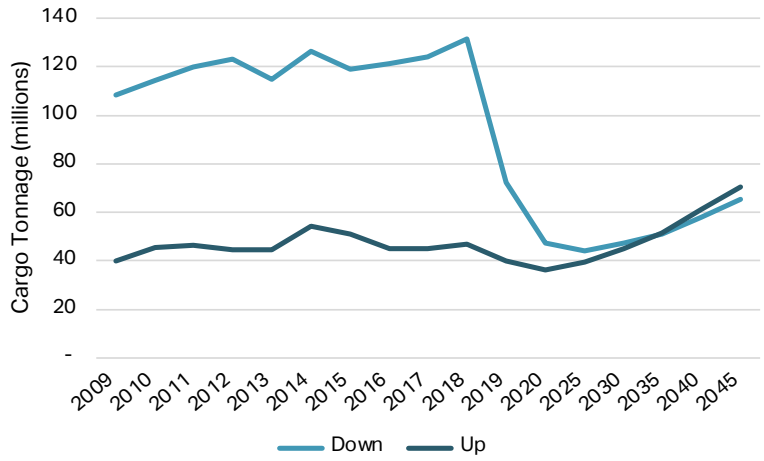
width and depth issues also a concern.

Historical Volumes

The Lake Providence Port has seen consistent volumes between 2010 and 2019. There have been periods where volumes have increased and decreased, but the overall trend of cargo is consistent. The ports main commodities include agricultural products, aggregate materials, and chemical products. The port has a higher dependence on agricultural products than other ports examined but is also in a region with more agricultural productivity. Examining the decline of volume in 2017, almost all the losses in volume came from the agricultural category. The ports reliance on one major type of commodity does make it more susceptible to large dips in volume. The port stated in their survey that the shallow depth of its channel limits the number of vessels that can reach the port, which could be a possible explanation for the consistent volumes and limited growth.

Volumes along the Mississippi River where the Port of Lake Providence is located has seen growing volumes since 2009. With consistent volumes at the port and growing volumes along the waterway, there seems to be other factors limiting the growth of the port. This could be due to the depth and width of the channel, or the decline of cottonseed operations that the port noted in its survey response.

Appendix Figure 29: Mississippi River Volume at Lake Providence Port



D.12 MADISON PORT COMMISSION

Documents provided:

Survey Response

Madison Port Commission did a good job of filling out the survey but did not provide any additional studies or documents. The Port's strengths lie in its location directly on the main part of the river, 24/7 operations, and land availability for expansion. Rare high water restricting operations is the Port's main weakness.

With land available, new, and expanding tenants provides an opportunity as well as new 8-inch natural gas pipeline and grant submittal for entrance road upgrades. A small sand bar developing out in the river that needs action from USACE is the main threat to the port.

The port's main sources of revenue stem from the Chemical Plant, grain, and incoming and outgoing rail service and it is expected that revenue will increase significantly in the medium-to-long term. New leases with Rail Vehicle Services, LLC are expected to lead that increase. However, the port is also working on a container on barge project that could significantly increase revenue and activity.

The port considers Port of Vicksburg its biggest competitor although they are 2-miles from the river.

The port is looking for assistance from LADOTD from the Port Priority Program and staff support from Baton Rouge.

The port's main tenants include:

- Simplot
- Terral River Service
- Complex Chemical
- Delta Southern Railroad
- Helena Agri-Enterprises
- Bunge
- CHS
- Lansing Trade Group_
- Rail Vehicle Services
- New Break
- Maximum Access
- The port does not currently handle any international cargo.
- Historical Volume

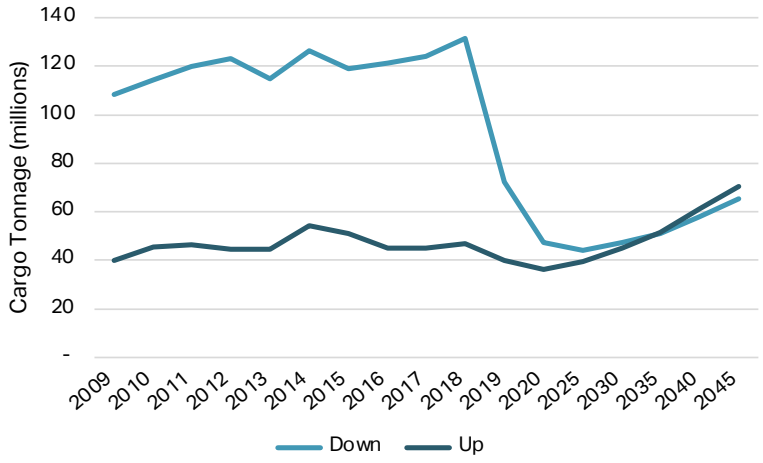
Madison Parish has experienced a slow decline of cargo tonnage between 2010 and 2019. While the decline has not been linear, the overall trend has been negative, with volumes never reaching the level they hit in 2010 or 2011. According to the USACE data, the port's largest source of tonnage was the movement of aggregate materials, under the 'CRMAT' category. Aggregate materials have been in decline since 2010, which has had an amplified effect on the ports overall volume. The port only recorded cargo from four of the categories used to classify commodities, meaning that the products which were moved through the port were not diverse. When aggregate volumes were reduced it had a greater effect due to the lack of diversity of the port's cargo.

Appendix Table 24: Historical Volumes at Madison Parish Port

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
CHEM	62,499	77,933	79,297	104,429	56,818	21,400	61,081	59,093	31,441	31,979
CRMAT	475,751	292,603	131,351	139,171	150,861	158,205	175,878	167,397	121,128	131,751
FARM	174,105	167,714	193,986	177,492	183,246	104,072	135,402	157,270	248,729	190,399
MANU	22,202	22,530	28,624	24,525	16,096	22,107	20,474	29,825		
Total	**734,557**	**560,780**	**433,258**	**445,617**	**407,021**	**305,784**	**392,835**	**413,585**	**401,298**	**354,129**

While the port has seen a decline in overall tonnage over the past decade, volume moving along the Mississippi River has maintained a stable growth rate. While most trends of the cargo moving along the Mississippi would not affect volumes at Madison Parish, the trend does suggest that cargo that would once be moved through Madison Parish Port is now being moved through another port.

Appendix Figure 30: Mississippi River Volume at Madison Parish Port



D.13 MORGAN CITY HARBOR AND TERMINAL DISTRICT

Documents provided:

Survey Response

Morgan City White Paper (2015; M&N)

Richardson Economic Report (2016)

Morgan City Harbor and Terminal District completed the survey and provided detailed answers to the questions asked. In addition to the survey responses, Morgan City also provided a 2016 economic report, and a 2015 whitepaper outlining an import/export investment case (M&N). The Port's main strength is its location. It is located at the intersection of the Atchafalaya River and the Gulf Intracoastal Waterway, providing convenient access to both the inland water system and the gulf coast. The port also is well connected to for land-based transportation, with rail access on-site and is close to I-49 and a commercial airport. The main weakness of the port is insufficient funding to maintain the nearby waterways which are being affected by shoaling and excessive flooding.

Multiple opportunities exist for the port. The port identified that resuming import/export activity is the greatest opportunity that the port currently has. The expansion of rail services and the introduction of container-on-barge services were also opportunities that the port could work towards. The Port also outlined multiple threats including Competition for dredging funding, oil and gas industry slowdowns, and the future operation of river control structures.

The port's main revenue comes from cargo movements on rail, specifically incoming steel, and oil and gas products. The port is expecting revenue to increase in the future from new leases, bringing back import/export activity, and increasing the number of products moved by rail. The survey does note that these increases are dependent on market conditions and the ability of the port to dredge the surrounding water.

The port sees the other large ports of Louisiana as it is competition, including New Orleans, Baton Rouge, and Lake Charles.

The port is looking for LADOTD support for more cost-effective dredging options, and continued funding for property purchases, updating equipment, and infrastructure improvements.

The port's tenants include:

- Coast Guard
- St. Mary Levee District
- U. S. Customs
- Intermoor
- Ecoserve
- Halliburton
- Baker Hughes
- Conrad Industries (4 facilities)
- Oceaneering
- New Industries
- Swiftships

Appendix Table 25: Historical Volumes at Morgan City (Tons)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
CHEM	19,293	16,958	12,690	26,963	33,966	25,950	1,400		915	4,679
COAL	1,715									
CRMAT	1,109,689	1,029,159	1,152,828	1,072,257	885,931	911,591	386,180	247,608	300,441	331,083
FARM	20,421	757	5,004	2,266	9,753	12,698	1,539	2,436	8,100	14,400
MACH	173,421	49,211	64,578	39,591	25,996	24,587	28,066	41,057	59,419	89,341
MANU	50,177	34,524	14,363	17,250	41,478	4,549	78	40,255	10,570	6,390
PETROL	201,962	135,293	309,913	429,837	135,851	186,082	281,727	273,759	584,355	44,149
UNKWN	74,209	39,736	94,747			220				
WASTE	335,357	252,462	99,232	110,463	128,295	34,629	14,700	7,011	27,800	5,146
Total	**1,986,244**	**1,558,100**	**1,753,355**	**1,698,627**	**1,261,270**	**1,200,306**	**713,690**	**612,126**	**991,600**	**495,188**

- Bollinger
- Halimar shipyards

Morgan City Harbor and Terminal District continued to emphasize in their response the need for continued dredging support. They also provided an alternative which would involve developing a way to divert sediment before it gets to the Atchafalaya Basin, where it accumulates and causes issues.

Historical Volume

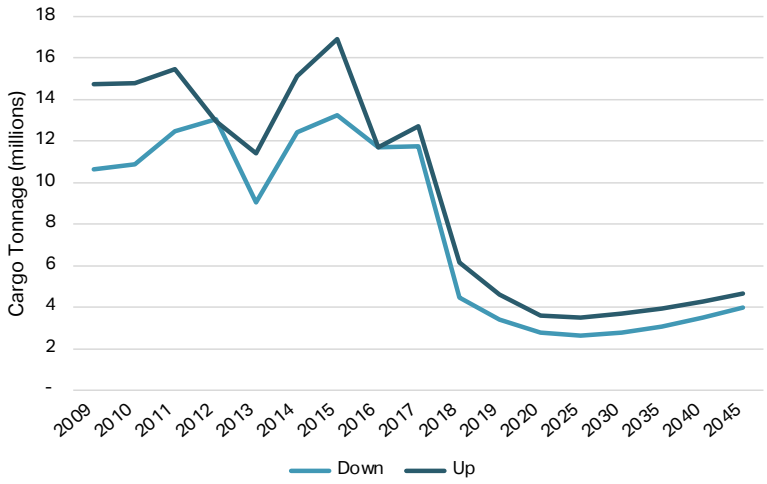
Morgan City has experienced declining port volumes starting around 2005. There are multiple economic factors that are contributing to the decline in volumes. According to the port, their biggest weakness is the excessive maintenance that is needed to maintain the channel that the port sits on. The port also noted that importing and exporting activities have slowed in recent years and restarting those is a potential opportunity to regain former levels of volume. Other possible factors could be the shifting economic landscape of the state, changes to the types of cargo being brought into the port, and the growth of larger ports.

The volumes above were collected by the US Army Corps of Engineers. The table shows a downward trend of cargo volumes at the port of Morgan City. The category 'CRMAT,' which includes bulk aggregates like sand, gravel, and building stone made up most of the volumes at the port in 2011 through to 2015. The loss of aggregate volume severely impacted the total tonnage at Morgan City. There were some categories of cargo that increased, such as 'MACH' which includes manufactured equipment, machinery, and products. Farm and agricultural products also rose over the observed time frame but did not offset losses to aggregate materials. Other commodities such as petroleum products, manufactured goods, and farm products all experienced sporadic growth and declines in volume over the same period.

Examining the Link Ton data, shows that the decline is also being felt along the waterway that the Port of Morgan City sits on. With port volumes declining, and the volume of cargo moving through the region also falling, there is a possibility that the decreases are related to the waterway itself. With less volume moving along Bayou Shaffer, the body of water that connects the Atchafalaya River to the Louisiana Intercoastal Waterway, the port has less of a

chance to capture new business as there is less incentive for shipping companies to call Morgan City if they are not already traveling on that waterway.

Appendix Figure 31: Total Volume on Bayou Shaffer



D.14 NATCHITOCHES PARISH PORT COMMISSION

Documents provided:

Survey Response

Natchitoches Parish Port Commission responded with in-depth answers to most of the questions posed in the survey. The ports identified strengths all stem from the port's location and accessibility by rail and barge. The strength of their location on the Red River is limited by the 9ft channel depth restriction as well as dilapidated infrastructure at the port. Like many other ports, Natchitoches believes a deepening of the red river to 12ft could be the best opportunity the port has to grow. The port also notes it plans to continue to develop warehouse space and develop the unused land within the property. The port noted that they are not near larger industrial areas and must continually improve to remain competitive. Because of the port's location, it sees coastal area ports as its top competitors but also believes that some business might be moving to other states for better incentives.

The port's top three sources of revenue are rail, property rental, and tonnage fees. These three forms of revenue are tied to specific cargo. The top three cargo sources are carbon, wood chips, and aggregate materials. While the port does not have immediate plans to diversify, it does see over reliance on specific cargo types as a possible threat and hopes to bring in a new industry.

The port listed their main tenants as:

- ADA Carbon Solutions
- Madden Contracting
- Kisatchie Chips
- Terral River Service
- Custom Commodities & Logistics

The port wrote that its priorities in the short term will be building new warehouse space. They also plan to build a barge unloading dock and additional rail infrastructure in the future. They also said that the best way LADOTD could support them is to provide additional support for improving and updating older equipment and infrastructure. They specified that they need support for larger projects including access road maintenance, dock improvements, and rail infrastructure.

D.15 PORT OF NEW ORLEANS

Documents provided:

Survey Response

New Orleans Lessee List

Project List

Port Master Plan

The Port of New Orleans provided detailed and insightful answers to each of the questions in the survey. The port gave a good idea of the current operations at the port and a look into the future plans of the port. Due to the size of the port, many of the challenges that the port faces are less straight forward than the challenges smaller ports reported in the survey. The port identified its top strengths as its internationally known brand, its existing rail infrastructure, and access to the inland waterway system. The weaknesses of the port, like many other regardless of size, are based on a lack of funding for capital needs, competition from competing ports, and lack of an aligned port strategy. New Orleans does have a unique challenge because it is responsible for the maintenance of major non-port infrastructure like roads and bridges, which do not generate revenue.

The port does have multiple opportunities that it wants to capitalize on in order to maintain levels of growth. Its primary opportunity is to accommodate larger vessels to bring in more fuel-efficient ships and more containerized cargo. The port also identified distribution centers, auto fabrication, and logistic parks as possible avenues of expansion. The port has several opportunities identified that focus on logistics and expanding services.

While New Orleans does have many opportunities, there are also significant threats to the economic state of the port. The most notable that was described by the port, are other states offering incentives to businesses and drawing business away from Louisiana. The port also wrote that economic development in the surrounding states could pose problems as more states begin to develop new industries which would shift cargo away from New Orleans.

The port listed multiple revenue sources with the top three being containers, breakbulk cargo, and cruise operations. The port acknowledged that cruise revenues in 2020 were a small fraction of previous years but believes that operations will pick up once it is considered safe to do so. The port anticipates a growth in the cargo that is moved in containers and wants to increase their opportunities by establishing cold storage facilities and rail infrastructure.

The port has many tenants in a wide range of industries. The port provided a full list of its lessees.

The port has dozens of projects that are currently ongoing. The port provided a full project list consisting of 123 projects that are being planned, constructed, or were recently completed. Of those projects there were several categories, but the largest category was improvements to the wharves at the port which consisted of forty-nine projects. There were also twenty-nine projects that focused on bridges, and sixteen projects focused on cranes at the port. The master project list included the cost of each project, which showed that about 68 percent of the recent project funding was going towards the wharf projects.

The port stated the best way for LADOTD to support them would be to provide incentives to move cargo by rail or barge, which would alleviate traffic on the highway infrastructure in the state. The port currently offers these services but has not been able to change the behavior of outside logistics companies. The port also wrote that LADOTD should

Appendix Table 26: Historical Volumes at the Port of New Orleans

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
CHEM	7,390,076	7,719,833	7,518,940	7,448,791	8,056,844	10,274,132	12,058,906	12,014,432	11,478,133	13,232,536
COAL	3,303,472	5,389,991	8,968,944	5,883,831	1,727,262	1,437,625	1,382,160	2,078,907	1,602,487	2,017,366
CRMAT	7,444,360	9,485,236	9,074,140	9,769,747	9,032,521	8,128,694	7,521,990	7,997,731	8,801,623	9,728,220
FARM	18,675,733	18,622,204	17,339,797	19,513,338	24,935,498	26,456,173	27,467,391	29,626,663	27,000,692	25,245,313
MACH	672,089	758,083	1,012,432	821,076	1,064,961	1,156,304	1,048,596	1,230,754	1,372,400	1,287,145
MANU	6,056,412	7,196,881	7,609,699	7,468,416	10,982,786	10,468,810	8,979,385	9,457,034	7,942,738	7,046,364
PETROL	28,697,660	27,899,175	27,596,413	25,761,702	27,679,976	29,191,890	31,189,750	32,912,046	34,121,466	32,804,219
UNKWN	170,928	103,309	142,951	491,618	985,204	696,226	622,681	1,024,009	1,013,004	847,397
WASTE			84,685							
Total	**72,410,730**	**77,174,712**	**79,348,001**	**77,158,519**	**84,465,052**	**87,809,854**	**90,270,859**	**96,341,576**	**93,332,543**	**92,208,560**

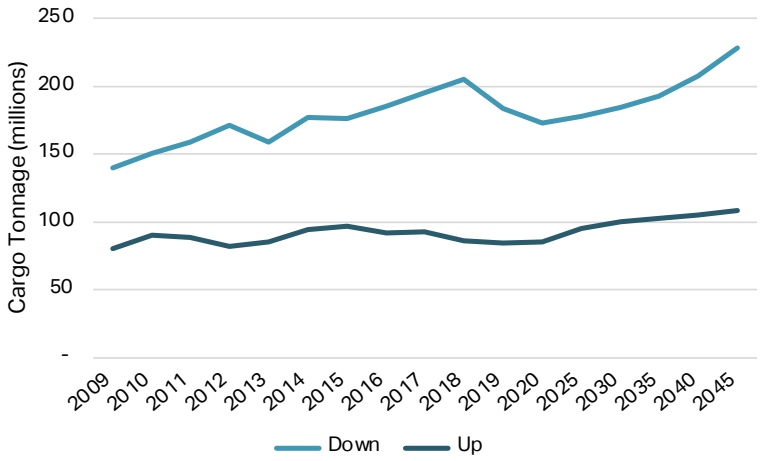
continue to fund the Port Priority Program so that ports can quickly respond to opportunities.

Historical Volumes

The Port of New Orleans has seen increasing volumes over the past decade. Volumes at the port rose by about twenty million tons between 2010 and 2019. Volumes peaked in 2017, which could have been caused by cargo being diverted away from smaller ports that were more severely affected by hurricanes. The port's primary commodities are petroleum products and agricultural products, which make up more than half of the ports overall volume. Other commodities have seen growth over the past decade, including aggregate materials, chemical products, and the manufactured products. Volumes in these categories have grown but are not primary sources of tonnage for the port. The only commodity that declined from 2010 to 2019 was coal, which fell from a peak of 8.9 million tons in 2012 to 2 million tons in 2019. Multiple ports responded to the survey saying that emission heavy fuel sources are declining state-wide, and the volumes at the Port of New Orleans reflect that.

The total tonnage of cargo moving along the Mississippi River near the Port of New Orleans is expected to increase from 2020 to 2045. With the volume of cargo increasing, it is likely that the port will be able to continually increase the tonnage at the port. There will be competition for this added volume, as local competing ports will be adding facilities and new capacity to capture cargo moving down the Mississippi.

Appendix Figure 32: Mississippi River volumes at the Port of New Orleans



D.16 PLAQUEMINES PORT HARBOR AND TERMINAL DISTRICT

Documents provided:

Survey Response

The Plaquemines Port Harbor and Terminal District responded with descriptive answers and gave insight to the ports plans and current operations. Many of the port's responses were focused on facilities that will be developed at the port in the near future. The facilities are an LNG facility and a 1,000-acre container terminal that is in the planning phase. Both projects plan to capitalize on the strengths of the port, specifically the natural depth of the berths and the width of the Mississippi at the port. The port noted that the local economy is relatively small, but the port has access to all forms of transportation and would serve as a transshipment point and logistics center for incoming international cargo. The port wrote that its top sources of revenue are from leases, throughput fees, and grants.

The port is developing the container terminal and LNG facility due to the demand they see for imports to major midwestern markets. The port believes a major opportunity exists to develop alternative routes for foreign cargo to travel from the coast to inland markets. They specified that it hopes the expansion of the Panama Canal would entice imports from Asia to pass through Plaquemines instead of the port of Los Angeles and Long Beach. Plaquemines believes that this demand necessitates the development of the new container terminal at the port.

The port reported its main tenants as:

- Chevron Oronite
- Phillip66
- CHS, Inc.
- Venice Port Complex
- C&C Marine

The port has multiple projects that are ongoing, in addition to the previously mentioned ones. The port is upgrading the surrounding parish's water infrastructure, as well as relocating existing businesses to make way for the LNG facilities that will be developed soon. The port said that the best way LADOTD could support them would be to provide support and funding for auxiliary projects that would support the larger projects that are going on at the port.

Historical Volume

The Port at Plaquemines Parish has seen high volumes of cargo moving through for nearly the entire past decade. The port has seen consistent volumes with limited growth over that period. While the overall tonnage of the port has not changed significantly, the commodities that are being moved through the port have. The movement of Coal products, which was once the largest commodity, has fallen by nearly 60 percent between 2010 and 2019. The volumes lost were made up by growth of petroleum products, and increases to chemical, manufactured, and aggregate products. The port was severely affected by hurricanes and environmental challenges seen in 2017 and the volumes that year reflect those issues.

The section of the Mississippi River that flows near the Port of Plaquemines has experience growth in cargo moving up and down the river. Cargo moving down has grown rapidly between 2009 and 2018, and cargo moving up has increased slightly. Due to the location of the port, Plaquemines serves as one of the final major ports before the Mississippi meets the Gulf of Mexico, giving it an advantage to capture cargo moving up the river. The port is currently

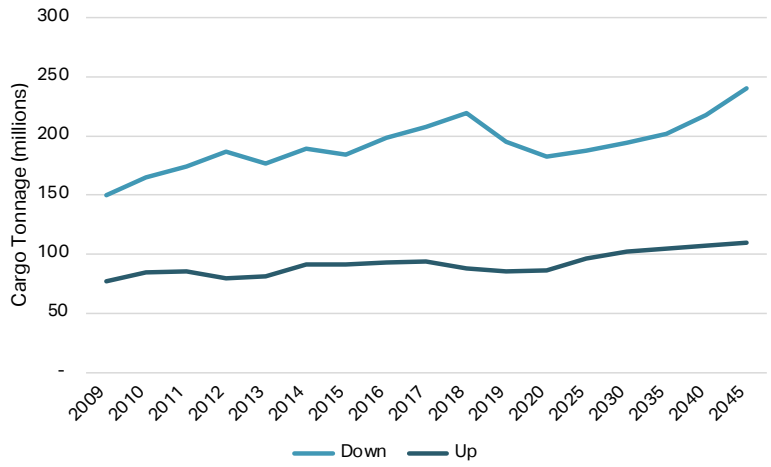
Appendix Table 27: Historical Volumes at Plaquemines

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
CHEM	1,949,085	2,245,529	1,932,352	2,246,391	1,465,105	2,157,369	2,623,130	3,087,297	3,789,964	3,857,667
COAL	22,034,985	21,540,860	23,269,372	18,799,404	15,890,053	12,355,515	8,360,061	8,565,504	8,871,949	8,625,706
CRMAT	1,153,871	890,923	761,161	1,020,657	775,698	791,679	1,086,748	2,029,337	2,573,087	2,194,951
FARM	18,274,632	16,916,132	18,089,265	17,548,608	18,498,480	17,429,909	19,322,498	18,223,569	17,204,114	13,507,500
MACH	26,542	12,618	5,798	1,663	18,309	10,179	18,379	13,551	281,997	385,635
MANU	189,991	194,402	281,435	212,372	236,941	2,458,646	2,607,608	3,031,005	2,797,730	2,704,790
PETROL	12,206,284	12,288,236	14,049,935	16,789,957	18,305,674	18,208,344	22,535,528	19,175,668	20,963,184	21,353,104
UNKWN	1,297	4,306	3,931	256,696	304,732	94,807	226,680	339,976	368,112	123,631
WASTE			92,092							
Total	**55,836,687**	**54,093,006**	**58,485,341**	**56,875,748**	**55,494,992**	**53,506,448**	**56,780,632**	**54,465,907**	**56,850,137**	**52,752,984**

undergoing projects to capture more market share. Specifically, the ports container terminal and LNG facility, which are under construction, would significantly improve the port's ability to bring in new cargo.

Using figures from the Freight Analysis Framework, growth rates were generated to forecast the change in volume of the waterway through to 2045. The forecasts have volume moving down the Mississippi dip in 2018 and 2019 which is reflected in the commodity volume data. After that decline, the growth of volume is positive for cargo moving up and down the river. Growing volumes along the Mississippi would have a beneficial impact on Plaquemines as more volume added to the waterway, would give the port more opportunity to capture market share. The possibility of an increase in cargo would also mean the ports investments in a container terminal and LNG facility would have great return on investment, as the new facilities would capture some of the growing cargo.

Appendix Figure 33: Mississippi River Cargo Volumes near Plaquemines Parish



D.17 TERREBONNE PORT COMMISSION

Documents provided:

Survey Response

The Terrebone Port Commission (TPC) provided in-depth responses to selection of the questions on the survey. The questions that were not answered were mostly about cargo, and the port states that they are not involved in the handling of the small amount of cargo because they are primarily a fabrication and coastal energy port.

TPC identified its strength as its existing skillset of fabrication and repair which is used for various sectors like fishing and government vessels, the wind energy sector, and the oil and gas industry. Its primary weakness as a port is the lack of depth and maintenance of the Houma Navigation Canal (HCN), which the port says is deficient for 50 percent of the year, drastically reducing the fabrication utilization capacity of the port. While this is the Port's weakness, it also serves as an opportunity. The port believes it would greatly increase its fabrication utilization capacity if the HCN was operational year-round. The solution that the port provides would be some type of rock jetty structure that could block the sediment migration from the east of Terrebone Bay. The port recommends a millage tax placed on the parish to raise extra funds to combat these issues.

TPC wrote in their response that they have no revenue related to commodities and that they expect an increase in revenue based on the deepening of the HCN. The port also reported that they are not currently worried about competition from other ports but do see other large landowners developing large industrial sites as a possible threat to their tenant base.

Terrebone Port Commission is looking for continued support from LADOTD for complete and deliver a deepening study to lawmakers in Washington, DC.

The port's primary tenants are:

- Thomasea Marine Constructors – Marine Fabrication and Repair
- LaShip LLC – Marine Fabrication and Repair
- Gulf Island – Marine Fabrication and Repair
- Eagle Drydock – Marine Fabrication and Repair
- Morrison Energy – Oil and Gas Construction, Fabrication and Installation, Pipeline
- Caterpillar Engine – Marine Engine Supplier
- Double R – Marine Vessel Operator (Crew Boats)
- US Customs & Border Patrol
- Immigration & Customs Enforcement

Historical Volume

Terrebone has seen port volumes increase from 2011 to 2014 but has experienced a downward trend since 2015. The port experienced significantly lower volumes in 2017, but this was most likely due to damage caused by hurricanes during that year. The port had to undergo an emergency project after hurricane Harvey to dredge the Houma Navigational Canal. During normal operation, the ports main types of commodities are petroleum products and aggregate materials. Both categories of cargo have fallen since peaks in in the early 2010's. Other categories of cargo have remained relatively low over the course of the observed time. Agricultural products, machinery, and manufactured

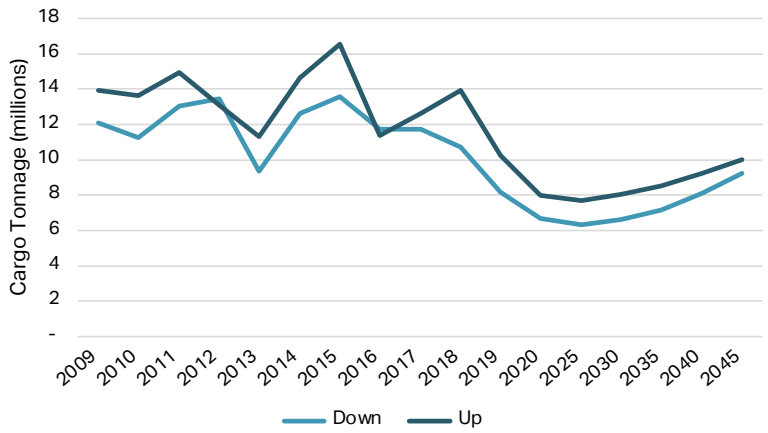
goods have all remained relatively low in volume, fluctuating year to year. Other categories such as chemical products, waste, and unknown material have all had sporadic periods of movement followed by years of no volume.

Appendix Table 28: Historical Volumes at Terrebone Port

	2011	2012	2013	2014	2015	2016	2017	2018	2019
CHEM	1,424	407	5,339					829	6,591
COAL		1,724							
CRMAT	924,367	1,041,449	878,688	944,841	702,724	685,188	589,928	551,799	380,400
FARM	2,420	10,530	1,053	5,860	1,526	3,440			10,500
MACH	13,133	15,739	18,885	14,771	17,565	18,991	33,653	70,234	42,469
MANU	24,003	60,422	19,859	79,398	49,887	31,785	23,156	2,640	4,951
PETROL	1,958,421	1,415,707	2,501,779	3,339,115	3,093,116	2,455,358	1,976,732	1,496,814	1,694,341
UNKWN	602	1,079							
WASTE			1		16				
Total	**2,924,370**	**2,547,057**	**3,425,604**	**4,383,985**	**3,864,834**	**3,194,762**	**2,623,469**	**2,122,316**	**2,139,252**

Volumes along the Houma Navigation Canal have remained relatively consistent, with a slight positive trend in recent years. The volume moving up the canal increased from 2016 to 2018 while the volumes at the port did not see a similar increase. This could indicate that cargo is being brought in at other ports further along the intercoastal waterway or being moved further inland towards larger population centers. While the port is primarily a fabrication port, it still relies on cargo coming into the port through its various berths and overall operations could be impacted by the reduction of cargo.

Appendix Figure 34: Cargo Volumes on Houma Navigation Canal



D.18 SOUTH TANGIPAHOA PARISH PORT COMMISSION

Documents provided:

Survey Response

The port commission responded to survey with some brief answers and some with more depth. It listed its only strength as its proximity to the CN railroad and I-55. The weaknesses of the port were the limitations of the shallow waterway and the lack of funding for additional infrastructure and upgrades to existing structures.

The port states that its primary revenue came from lease payments from tenants, followed by fees from rail, barge, and truck movements. The port does want to expand into containerized freight and develop a trans-loading storage facility for containers. In the long term, the port also wants market towards new polymer and resin manufacturing industries in order to grow.

The reported tenants are:

- Premier Chemicals & Services
- Balchem Industries
- Cornerstone Chemical
- Darling Industries

The port, like many, needs additional support with funding for major projects such as infrastructure upgrades and continued dredging efforts.

D.19 ST. BERNARD PORT

Documents Provided:

Survey Response

St. Bernard Port, Harbor and Terminal District 2020 Report

Tenant Business Directory

St. Bernard Port responded to most of the questions in the survey and provided enough information to give an overview of port operations. In addition to the survey response, the port sent a 2020 report as well as a list of tenant businesses. From the supplied documents the port has outlined that their strength lies in a fast-moving operational practice. The port reported that their primary strength is their ability to make decisions quickly. They also noted that they are not entirely dependent on marine operations for revenue and can therefore still succeed if there are problems with their waterway. They did note that they are dependent on two tenants who generate 50% of the ports revenue and are working to diversify. To avoid a problem from this dependence, the port wants to expand project cargo opportunities, add additional transit shed space, and acquire new space for an industrial park. The port sees these as possible ways to attract new tenants and diversify.

The ports main revenue comes from metallic ores, fertilizer, coke, and coal. The port expects that these products will remain as the port's primary revenue generators for the next decade. The port does expect lease revenue to increase about 20 percent from the addition of new transit sheds. While the port does not expect revenue to decline in the next few years, they do acknowledge that there is competition with other ports. The Port of Houston and the Port of Mobile are both close to St. Bernard Port and manage similar types of cargo.

- Some of the port's main tenants include:
- Associated Terminals
- Grady Crawford Construction
- Gulf Container, Inc.
- Hamilton Enterprises
- Rain CII Carbon, LLC
- Southern Chem Industries, LLC
- Valero Energy Corp.

The port identified one ongoing project which is a $32 million rehabilitation of a slip at their Arabi Terminal. While no other ongoing projects were identified by the port, they have stated that they plan to construct the transit shed in the short term. Once the sheds are built, the port wants to focus on land acquisition and the addition of a dock. With these projects in mind, the port said the best way for LADOTD to support them would be to continue and increase funding for the Port Priority Program.

D.20 TWIN PARISH PORT COMMISSION

Documents provided:

Survey Response

Port Strategic Plan: Twin Parch Port District – Parish of Iberia and Vermillion (2018)

Twin Parish Port Commission provided answers to most of the questions posed in the survey. The port wrote that its greatest strengths were in its location giving it access to the inland waterway system as well as the Gulf. Road access was also a port strength given its proximity to Hwy 14 and US 90. The port's location was also considered a weakness due to the limited construction potential of being in a coastal zone. The port reported its primary weakness as the threat of environmental factors such as sea level rise, storm surges, and coastal erosion.

The port did identify multiple opportunities for improvement including capturing overflow fabrication work from the Texas oilfields, developing a marine shipyard for vessel maintenance, developing the seafood industry further, and growing the tourism section of the region.

Currently, the ports only commodity is seafood, and therefore it is the only revenue source that the port has. The port does want to expand and grow its industrial and fabrication industries, as well as continue to support the growth of its seafood operations. With seafood being the sole commodity handled, the port sees foreign imports of seafood as the main competitor., as a greater supply would lower the price and slow the port's growth.

The Twin Parish Port Commission recently finished a major maintenance project on a fabrication building and has Port Priority funding to expand other fabrication facilities. The port noted that the best way LADOTD could support its growth would be to ease the Port Priority criteria for return on investment.

The port reported a single tenant:

- Bagwell Energy Services

The Twin Parish Port is a small port but has a large impact on the surrounding communities and in the general region.

D.21 VIDALIA PORT COMMISSION

Documents provided:

Survey Response

Vidalia Port thoroughly answered each of the questions in the survey, giving good insights into the general operation of the port. The responses were somewhat restricted by the fact that Vidalia was not operational at the time it submitted the responses. The port is set to begin operations in 2021. It identified multiple strengths, including its access to the Mississippi River, highway access, available land for expansion, market demand, and political support. The primary weakness of the port is that it will require significant capex to provide flood free sites. Other weaknesses are a lack of direct rail access and competition from Natches-Adams Port and other emerging ports. Natches-Adams Port sits directly across the Mississippi River from Vidalia port.

The port identified the growth of agricultural products as a major opportunity to grow. Most of the strengths of the port are also seen as opportunities. The port also wrote that it considers collaboration with local NE Delta ports like Natches-Adams to be a possible opportunity. While the port does have opportunities to grow in the region, there are also environmental threatens that will challenge that growth. The fluctuation of the Mississippi River is seen as the primary threat facing the port. The permitting and mitigation efforts are also seen as challenges that the port needs to address.

The port wrote that the best way LADOTD could support it is by continuing the Port Priority Program and adding funding for rail programs.

Vidalia's current tenants are:

- Bunge – Vidalia
- Two J Ranch/ Vidalia Dock & Storage

The port has multiple major projects that are ongoing at the time of their survey response. These projects include a bulk loading facility at the port, the purchase of 265 additional acres for future development, and the development of a slack water slip.

D.22 WEST CALCASIEU PORT, HARBOR AND TERMINAL DISTRICT

Documents provided:

Survey Response

The West Calcasieu Port, Harbor and Terminal District (WCPHTD) responded to the survey and gave a good overview of their strengths and the challenges that they face. The strengths of the port are its location and its ability to serve it niche industry of shallow-water transportation and fleeting services. The port also wrote they have very low overhead expenses and good relationships in the maritime industry and at various government levels. The weaknesses of the port include the shallow depth of the waterway, lack of possible expansion space, lack of amenities at the port, and the general need for capex projects. The port does see an opportunity in developing its waterfront and expanding its total waterfront property. The WCPHTD reported that its main threat is succession planning to replace its older senior staff. The port also emphasized the importance of dredging in order to remain competitive.

The port's only reported revenue is the service based marine operations. They expect this revenue will increase in the future but acknowledge that it is entirely dependent on the economic development in the surrounding region. It also is based on the competing private barge-servicing facilities that are being developed in the area.

The ports main tenants include:

- Devall Southern Towing
- River Barge Works
- CGBM, subsidiary of Accutrans
- General Equipment

The WCPHTD did not identify how LADOTD could best support its operations, but it did emphasize the threat of tropical storms and hurricanes to the port's operations. It noted that it was collaborating closely with tenants and the US Coast Guard to prepare for future storms.

D.23 PORT OF ST. MARY

Documents provided:

Survey Response

The Port of St. Mary responded to the survey with thorough responses. The port identified its main cargo is iron and agricultural products. They highlighted their primary strengths being their location and the existing infrastructure at the port. They also noted the importance of their Beneficial Use/Dredging material management plan as a strength of the port. Somewhat paradoxically, they reported that their location was also their greatest weakness, mostly stemming from the depth of the intercoastal waterway, substandard rail facility, lack of an additional water well at the port, and numerous pipelines. The weaknesses of the port also come from the local economy and weather.

The port identified a wide range of potential opportunities moving forward. They have received interest from Oil and Gas companies as well as home manufacturing companies in the port. They are also planning to decommission the older O&G pipelines at the port. Other opportunities include education, community involvement, real estate promotion and port access.

The port stated that their revenue sources include leases, tax revenue, and the sales from the port water plant. They do not expect any major changes to these revenue streams outside of some growth in 2021 but did mention that they are expecting sugar products to become a more central cargo at the port. There is competition that the port faces from private industries and local landowners. The port needs better road access and hopes to get support from LADOTD for that project.

The ports main tenants are:

- Carbon Black
- Salt Mine
- Various Fisheries

Waterway Volumes

Data: The data used in the analysis of Louisiana waterway volumes comes from a variety of sources, published by various government entities. The main source of information is the United States Army Corp of Engineers, which collects cargo data through its Waterborne Commerce Statistics Center. The volumes are published in multiple forms, showing specific characteristics of waterway volumes. The Link Tons data that is supplied by the USACE shows the overall tonnage of cargo moving through certain sections of U.S. waterways. The sections, called links in the documentation, vary greatly in size, and do not show the destinations or origins of the cargo, but only show the total tonnage that has passed through that link. Two other USACE sources of data were used in this analysis, the first focuses on total volumes at individual ports. This data provides only the total tonnage at the port and the year that the tonnage was recorded. The final source provides detailed cargo data for specific waterways and ports. This data set, referred to as the USACE commodity data set, was the basis for the historical port volumes used in this analysis. These USACE databases were used in conjunction with data from the U.S. Census through U.S. Trade Online, an online portal that gives access to U.S. commerce data. The Census data provides information on imports and exports from certain ports, allowing these volumes to be compared to the total port volumes provided by the USACE. When combined, the databases provide a comprehensive view of the type and quantity of cargo moving throughout the U.S. waterways.

In addition to cargo trade data, information from the Freight Analysis Framework (FAF) was used in this analysis. The Freight analysis framework is a Department of Transportation managed database of freight movement and estimated forecasts. The FAF data was used to estimate future cargo volumes as well as establish historical trends that could be validated through the USACE volume data. Because the FAF data is collected for all modes of transportation, only inbound and outbound waterborne cargo was considered from the overall dataset.

APPENDIX E: EXAMPLE PROJECTS TO INCREASE ECONOMIC ACTIVITY

Below are three example candidate modal specific projects that met initial engineering screening criteria for further evaluation.

WATERWAY

OID 10-12 Atchafalaya Navigation Channel Improvements

Initial Project Description: Maintenance of a 20-foot federally authorized depth of Lower Atchafalaya River Navigation Channel

Statement of Need: Maintaining the depth of the Atchafalaya Bar Navigation Channel and Atchafalaya Bay Navigation Channel at 20 ft as mandated by Congress would not only help the Port of Morgan City keep the business it has developed with great effort but could increase that business. Perhaps, more important is the opportunity for smaller vessels that call at larger Louisiana ports to start calling at the Port of Morgan City. These vessels are more efficient in serving the smaller north-south trade lanes. Larger ports could focus on larger vessels to continue growing exports in the large east-west trade lanes. Given that Louisiana producers and its ports have been losing a share of U.S. agricultural exports, investing in the Port of Morgan City should be a priority for the state. Despite the channel averaging a depth of 14 ft, the Port of Morgan City was selected by a shipper operating in the U.S. Midwest/Gulf Coast to Central America/Caribbean market. However, the inability to fully load vessels requiring a 20 ft channel depth challenges the sustainability of this activity. Each ship call at Morgan City generates about $100,000 to the local and state economy and positively impacts the local economies along the Mississippi waterway. With a depth of 20 ft, each call would contribute significantly more ($162,500 at a 14 ft draft versus $296,500 at a 20 ft draft [2015 USD]). Insufficient channel depth maintenance has put the Port of Morgan City at a competitive disadvantage, which has a negative economic and potentially environmental impact.

Ports with deeper water depth that serve deeper draft vessels would be able to serve them better if vessels requiring less draft could be served at the Port of Morgan City.

Project Scope: The maintenance dredging issues have historically focused on:

Atchafalaya Bar Channel: Need for maintaining a reliable 20 ft draft (the Atchafalaya Bar Navigation Channel Bar Channel depth is currently 12 to 14 ft, authorized up to 20 ft)

Atchafalaya Bay Channel: Project to focus on the sandy shoals in the bay channel, the location of which is moving increasingly further south. This is more in line with routine maintenance dredging/or the location of sediment traps in the Atchafalaya River.

Historically the vast majority of the operations budget dedicated to the management of fluid mud in the Atchafalaya Bar Channel (10 million cubic yards/year). Previous dredging strategies maintained the advertised depth for two to three weeks per year.

Project Costs: Agitation dredging of the Atchafalaya Bay Channel at a cost $8 million/year for 20 ft deep channel 365 days a year (versus an historical ~$20 million/year), reimbursed by the USACE New Orleans District out of its operations budget. The operations budget could then be spread over greater areas of focus.

PORT

OID 18_Lake Providence Stack Chute Diversion Structure

Initial Project Description: Plug and divert the Stack Chute back into the Mississippi River Channel to minimize port entrance shoal development.

Statement of Need: Without structural modifications (closure) to Stack Chute and/or event specific dredging events (typically associated with Mississippi River discharges > 1.5-million cubic feet per sec (mcfs), agri-product export is significantly impacted at the time of greatest need (e.g., during harvest and export). Because of the shoaling, barges must lighten their load, with increased export costs, and/or divert to rail, with additional costs. It may be worth considering if rail export to a more cost-effective export location is a viable option, where economies of scale could justify structural investment. The Freight Analysis Framework data and product flows would reveal potential of this option.

Project Scope: A sand bar develops annually at the mouth of the entrance to the port access channel. By developing a closure structure at the Stack Chute and diverting the flow back into the Mississippi River, it is anticipated to prevent the shoal from forming under operational conditions. However, the entire Stack Chute spit is inundated when the Mississippi River discharge exceeds 1.5 mcfs, after which event specific dredging would be required. This event has occurred eight times in the past 13 years and would result in dedicated dredging contracts nearly every other year, even under a diverted Stack Chute scenario.

By inspecting USACE dredging records it is possible to separate out the dredging events that would potentially not be required if the structural modifications to the Stack Chute are made. A Mississippi River discharge analysis will determine the event specific dredging requirements (volume and cost) and can be compared on a cost benefit analysis to that of the structural approach.

Project Costs - Structural Modification:

- Develop Stack Chute closure/bypass structure:
- Channel excavation: ~18,000 cubic yards
- Closure fill: ~18,000 cubic yards
- Graded stone “C”:
- Stone pad: 3 ft thick x 200 ft wide x 230 ft long = ~6,670 tons
- Closure fill cap: 3 ft thick = ~8,530 tons
- Preliminary diversion plan cost = $1.1 million USD

RAIL

OID 6 – Morgan City Harbor and Terminal District

Initial Project Description: Additional rail improvements and the purchase of new equipment will improve current capabilities to move product.

Statement of Need: Morgan City Harbor and Terminal District has the opportunity to increase the shipment of agricultural products to Caribbean and Central American customers, to increase capacity for shipbuilding and maintenance/repair, and to increase service for offshore oil and gas facilities. Morgan City is well located to serve the smaller bulk product ships serving Caribbean and Central American destinations for agricultural products and for serving the oil/gas and shipbuilding/repair industries.

Rail capacity and offload facility improvements will increase the port's ability to increase the shipment from rail to/from waterway traffic. Additional railcar load/unload capacity provides a substantial increase in opportunities to provide handling and storage of unit trains for the export of agricultural products to Caribbean and Central American customers. Additional rail capacity would provide benefits for handling materials for shipbuilding/repair and the oil/gas industry.

Agricultural products for export to Caribbean and Central American destinations originates domestically for rice in parishes in and near Morgan City, and for corn, throughout the southern and central United States.

Project Scope: Construct up to 2,000 -ft of additional rail storage/unloading track; construct bulk agricultural product storage and loading facilities.

Project Costs: Rail and switches: $1 million; bulk storage and loading facilities: $6 million.

Notes: There is a white paper and an economic report available that expands on the specific drivers for expansion of the existing capabilities of the Morgan City Harbor and Terminal District facilities. The primary issue is maintenance of the Atchafalaya River channel at the authorized 20-foot depth. The issue involving significant port improvements involves the opportunity to increase use of the port facility for shipping agricultural products to Caribbean and Central American customers, as the products for these customers typically ship in smaller vessels that are well suited for the Morgan City terminal. Noted in the reports, improved rail capacity and storage/unloading capabilities will expand the port's ability to service its agricultural, oil/gas, and shipbuilding/repair clients

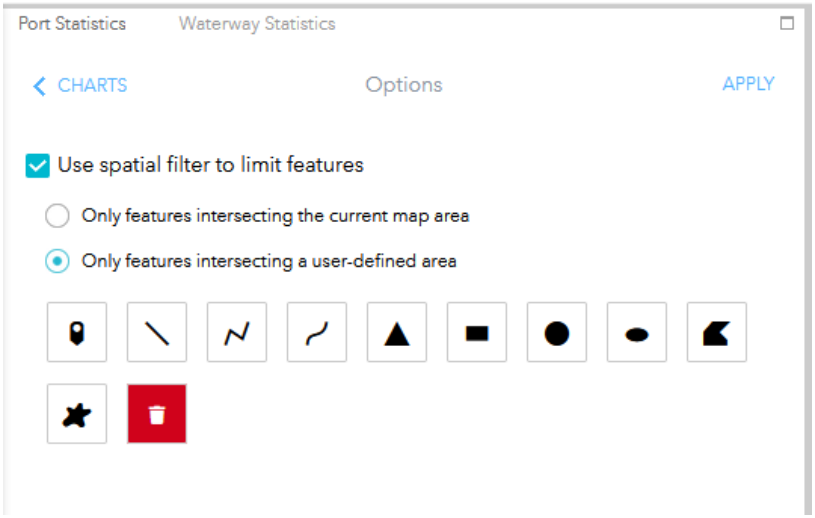
APPENDIX F: LA WATERS GIS

F.1 GIS DYNAMIC ANALYSIS TOOLS

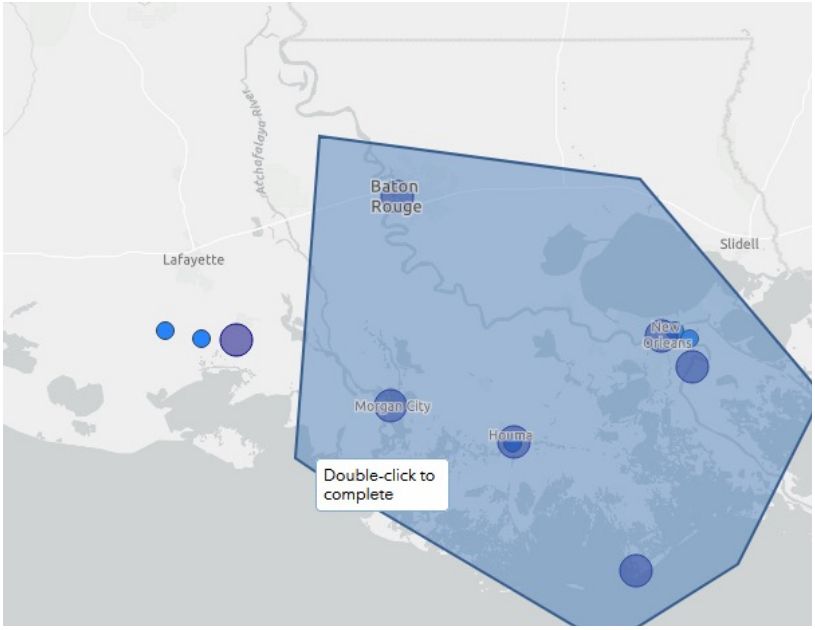
Port and Waterway Volume Infographics

Port and waterway volume infographics tools are interactive and are used to communicate historical commodity trends by waterway and port. The user sets the extent or uses interactive selection tool to select ports or waterway segments. Pie charts and histograms update in real time to display summaries for the user's selection.

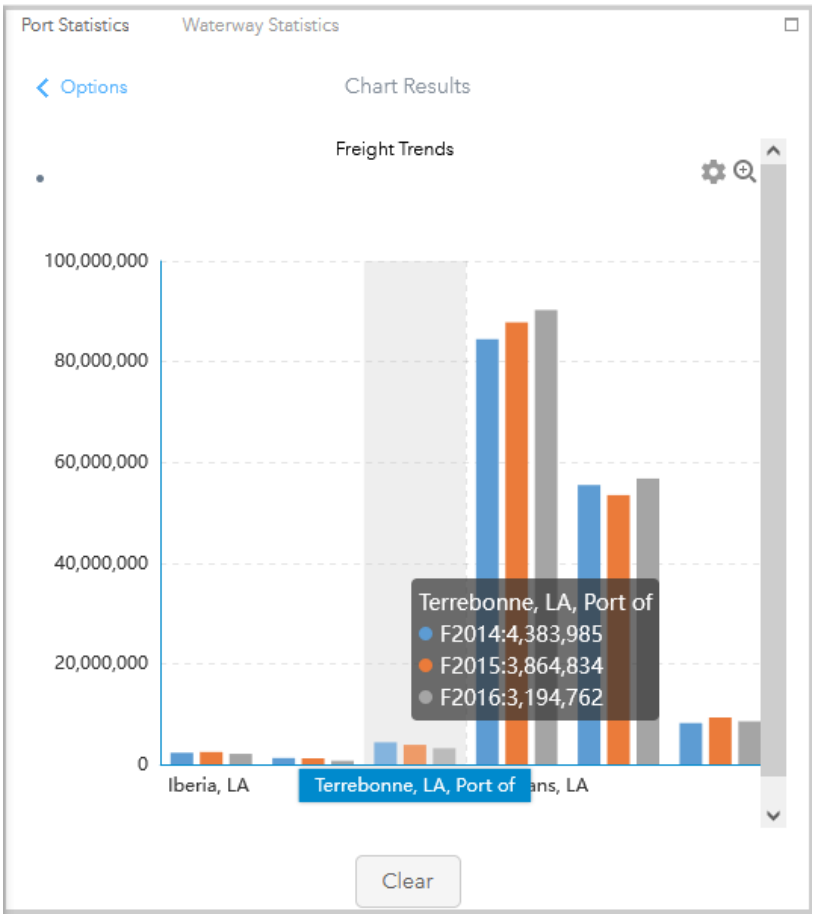
Appendix Figure 35: Port and waterway infographics



Appendix Figure 36: Port and waterway infographic



Appendix Figure 37: Analysis by selected area/region



- Economic Impact Statewide Infographic (same as above for economic impact data)
- Selected Project Infographics (same as above for recommended projects)

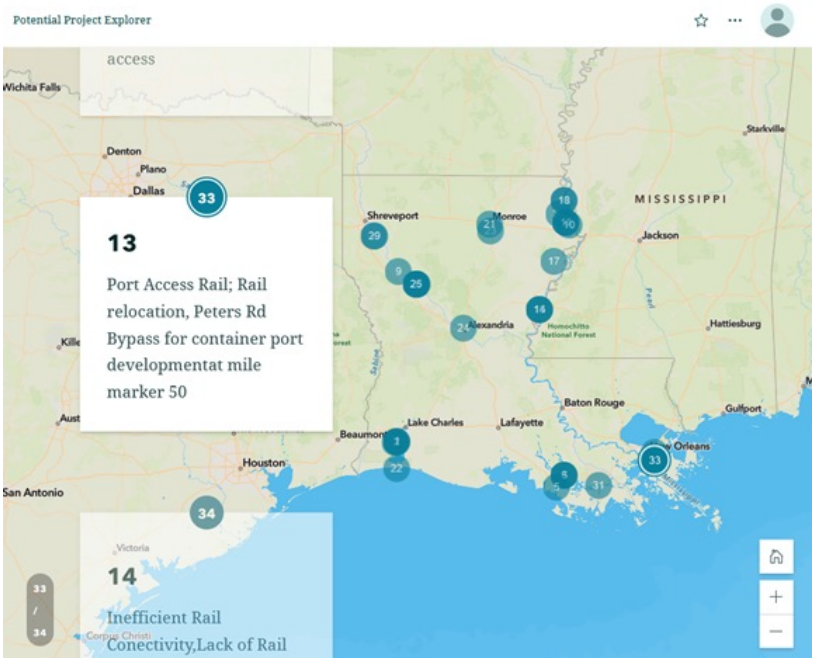
F.2 LAYERS

- Crude Oil Trunk Pipelines – Energy Information Administration
- Petroleum Product Terminals – Energy Information Administration
- Petroleum Products Pipelines – Energy Information Administration
- Waterway Locks – USACE
- USACE River Mile Markers – USACE
- Survey Responses by Port – Moffatt & Nichol, with metadata
- Port Forecasts by – Moffatt & Nichol, with metadata
- Economic historical summary – tonnage by waterway and port
- Tonnage projections – tonnage by waterway and port
- Industry Sites – Kathleen Babineaux Blanco Public Policy Center, University of Louisiana Lafayette
- AIS Analysis (Moffatt & Nichol) – identifying choke points and locations with significant slowdown
- LCRM (Moffatt & Nichol) – Least Cost Route Modeling
- Bathymetry – NOAA
- Navigable Waterways – USACE/NOAA
- USA Block Groups – U.S. Census/ESRI
- USA Census Tracts – U.S. Census/ESRI
- USA 116th Congressional Districts – U.S. Census/ESRI
- Louisiana State Legislative Boundaries – Louisiana State GIS
- Parish Boundaries – U.S. Census/ESRI
- North American Rail Lines – FRA
- LADTOD Roads – DOTD
- U.S. Highways and Major Roads – ESRI
- Economic impact by region/parish – Kathleen Babineaux Blanco Public Policy Center, University of Louisiana Lafayette
- Cadastral (Data.gov)
- City
- Parish
- Legislative districts
- U.S. Congress
- State Congress
- State Senate
- External links

F.3 REPORT STORY MAP

- The context and conclusions of the report are fundamentally geographic in nature and maps are the most intuitive and efficient way to convey the analysis and conclusions. In addition to providing the report in standard document form, Moffatt & Nichol has provided the report in Story Map form.
- Story Maps are interactive presentation web pages created using ESRI ArcGIS Online tools. The interactive format allows for text, static graphics, charts, and figures, interspersed with special-focus interactive maps that allow the user limited web mapping input to explore the geographic and attribute content of the subject being presented.
- All the elements of the document report are reproduced in the Story Map, with additional mapping content to enhance the contextual understanding of discussion and conclusions.
- The Story Map, in contrast to the Dynamic Analysis Tool is intended to convey the ideas and content of the final report, and not as a living tool to be updated on a continuing basis. The data and the Story Map are hosted on LADOTD's ArcGIS Portal.

Appendix Figure 38: Example of Story Map with georeferenced potential projects with summary information



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