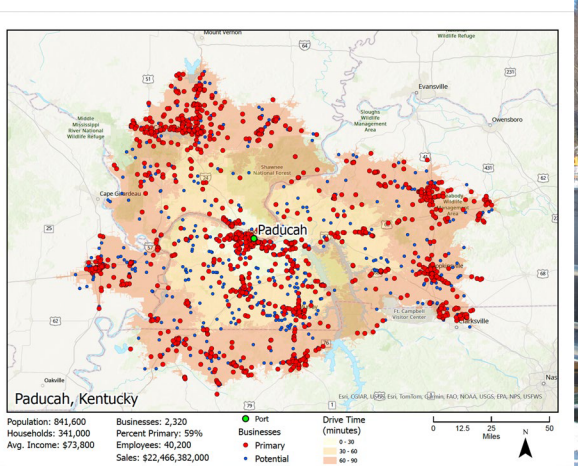
Marine Freight Development in the MAASTO Region



Market Identification, Valuation, and Employment Using Geospatial Analysis

MID-AMERICA FREIGHT COALITION

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About the Mid-America Freight Coalition (MAFC)

The industries and farms of the Mid-America region can compete in the marketplace only if their products can move reliably, safely and at reasonable cost to market.

State Departments of Transportation play an important role in providing the infrastructure that facilitates movement of the growing amount of freight. The Mid-America Freight Coalition was created to support the ten states of the Mid America Association of State Transportation Officials (MAASTO) region in their freight planning, freight research needs and in support of multi-state collaboration across the region.

www.midamericafreight.org

Technical Report Documentation

1. Report No. MAFC 31	2. Government Accession No.	3. Recipient's Catalog No. CFDA 20.701	
4. Title and Subtitle Marine Freight Development in the MAASTO Region: Market Identification, Valuation, and Employment Using Geospatial Analysis.		5. Report Date August 2024 6. Performing Organization Code	
7. Author/s Ernest Perry, Glenn Vorhes, Anupam Srivastava, and Soyoung Ahn.		8. Performing Organization Report No. MAFC 31	
9. Performing Organization Name and Address Mid-America Freight Coalition University of Wisconsin–Madison 1415 Engineering Drive, 2205 EH Madison, WI 53706		10. Work Unit No. (TRAIS) 11. Contract or Grant No. TPF-5(509) PO# 395-0097-243-95	
12. Sponsoring Organization Name and Address Wisconsin Department of Transportation Division of Transportation Investment Management PO Box 7913 Madison, WI 53707		13. Type of Report and Period Covered Final Report 08/01/2022 – 03/31/2024 14. Sponsoring Agency Code TPF-5(509) PO# 395-0097-243-95	
15. Supplementary Notes This project provides a strategic approach to potential market and port development based on a sample of 30 ports and terminals across the MAASTO region. To support the strategic approach, the MAFC Port and Terminal Buffer Tool was developed that creates a 90-minute drive time buffer for U.S. Army Corps of Engineers (USACE) defined public ports and private terminals located along the commercial waterways in the MAASTO region. The buffer tool allows users to explore the business and industry surrounding the port or terminal. The literature review provides an understanding of constraints and opportunities to port development. Interviews with industry leadership provide the shipping, policy, economic, and environmental context for marine freight movement. This triangulation of methods provides a strategic approach to organization and development of the ports and terminals. There is both history and current rationale that support port and marine freight development in the region.			
17. Key Words Marine Planning, Port Development, Great Lakes, Inland Waterways, Marine Highways, MARAD, Planning Best Practices, Multistate Collaboration.	18. Distribution Statement No restrictions. This report is available to the public through the National Transportation Library Digital Repository.		
19. Security Classification (of this report) Unclassified	20. Security Classification (of this page) Unclassified	21. No. of Pages 82	22. Price -0-

Form DOT F 1700.7 (8-72) Reproduction of form and completed page is authorized.

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ACRONYMS

AAR	Association of American Railroads
AASHTO	American Association of State Highway and Transportation Officials
AGLPA	American Great Lakes Ports Association
ATRI	American Transportation Research Institute
BTS	Bureau of Transportation Statistics
CAV	Connected and Autonomous Vehicles
CFS	Commodity Flow Survey
CG	Coast Guard
DOT	U.S. Department of Transportation
DNR	Department of Natural Resources
FAC	Freight Advisory Committee
FAF	Freight Analysis Framework
FAHP	Federal-Aid Highway Program
FAST Act	Fixing America's Surface Transportation Act
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
GDP	Gross Domestic Product
GLNS	Great Lakes Navigation System
GLRTOC	Great Lakes Regional Transportation Operations Coalition
ICE	Infrastructure Condition Evaluation
IIJA	Infrastructure Investment and Jobs Act
IRPT	Inland River Ports & Terminals
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITS	Intelligent Transportation Systems
ITTS	Institute for Trade and Transportation Studies
IWS	Inland Waterways System
LATTS	Latin America Trade and Transportation Study
LMIGA	Lake Michigan Interstate Gateway Alliance
LRTP	Long Range Transportation Plan

LSC	Logistics and Supply Chain Collaboration
MAASTO	Mid America Association of State Transportation Officials
MAFC	Mid-America Freight Coalition
MAP-21	Moving Ahead for Progress in the 21st Century Act
MCC	Motor Carriers Committee
MH	Marine Highway
MPO	Metropolitan Planning Organizations
MRS	Mississippi River System
NCHRP	National Cooperative Highway Research Program
NFSP	National Freight Strategic Plan
NHFN	National Highway Freight Network
NHFP	National Highway Freight Program
NHS	National Highway System
NPMRDS	National Performance Management Research Data Set
OSOW	Oversize and Overweight
PHFS	Primary Highway Freight System
SAFETEA-LU	Safe, Accountable, Flexible, Efficiency Transportation Equity Act: A Legacy for Users
SCOHT	Standing Committee on Highway Transport
STB	Surface Transportation Board
STIC	Strategic Transportation Issues Committee
TEA-21	Transportation Equity Act for the 21st Century
TETC	The Eastern Transportation Coalition
TIGER	Transportation Investment Generating Economic Recovery
TPIMS	Truck Parking Information and Management System
TREDIS	Transportation Economic Development Impact System
TSMO	Transportation System Management and Operation
UMRBA	Upper Mississippi River Basin Association
USACE	U.S. Army Corps of Engineers
VIUS	Vehicle Inventory and Use Survey

1. INTRODUCTION

This project focuses on understanding and supporting port and terminal development across the MAASTO region's waterways. The project provides a tool to identify and examine primary and potential freight markets within a 90-minute drive time buffer for U.S. Army Corps of Engineers (USACE) defined public ports and private terminals. Hereinafter, the use of the term "ports" simply refers to a combination of both public and private terminals. Through the identification of businesses and industries in market proximity to the ports, combined with a review of past development research and interviews with port and marine leadership, the project lays out a strategic development approach in support of port growth. There is both history and current rationale that support port and marine freight development in the region.

This marine freight focused project is one of five (5) marine projects out of a total of 25 multimodal projects identified and prioritized by the state technical representatives of MAFC over the last 12 years. This focus on marine freight reflects the abundance of water resources in the region, as well as a desire to utilize the economically viable, efficient, and environmentally favorable freight capabilities of the waterways. The previous marine freight project, "*Maximizing State Marine Freight Planning*" (MAFC-29) [1], focused on the state DOT planning efforts to support the industry. This current project looks at waterway freight development from the port perspective. These two projects combined provide a comprehensive strategic understanding of port development in the MAASTO region.

Historically, major cities in the MAASTO region, as well as the world, were established based on waterway transportation access. The role of early port cities as transportation hubs continues today. St. Louis, Kansas City, Cincinnati, Cleveland, Chicago, and Duluth-Superior remain as major freight crossroads. Many smaller ports serve rural agriculture and extractive industries, providing exchange points from extraction/production to manufacturing, consumption, and export. Both urban and non-urban ports are critically important to the MAASTO region as well as the national economy. Importantly for the MAASTO region, most of the nation's inland waterways fall within or adjacent to the MAASTO States. The encompassing Mississippi, Missouri, and Ohio systems, as well as the Great Lakes, provide waterway service for the 10 MAASTO states.

The 2023 MAFC-29 [1] report identified a range of benefits related to increased support and advocacy for waterway freight transportation. Environmental benefits, economic efficiencies, relief of truck mode congestion, community development, and the safety of waterways are all identified as benefits of the marine freight mode.

The cargo capacity benefits are demonstrated below in Figure 2-1. As shown in the Iowa DOT graphic, the carrying capacity of barges is unparalleled by truck or rail. One barge can carry the equivalent of 70 trucks or 16 rail cars. With barge tows comprised of multiple barges, a single 15 barge tow could handle the same volume of freight as more than 200 rail cars or more than 1,000 large semis/tractor-trailers.

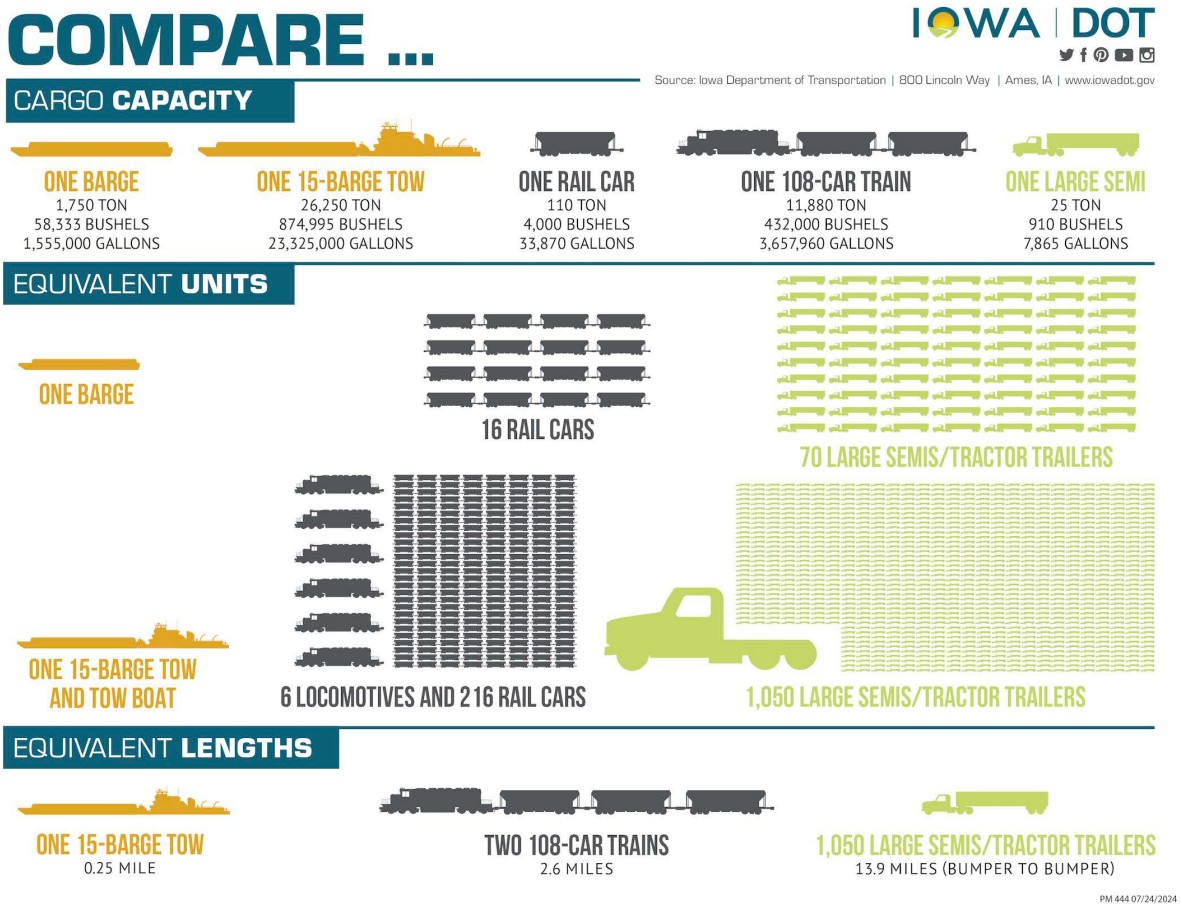


Figure 2-1. Compare …, Iowa DOT [2]

For the Great Lakes shipping, freighters are the operational vessels. According to Great Lakes analysis [2], one 1,000-foot freighter carrying 62,000 tons equates to 564 rail cars, or 2,340 tucks to carry the same load.

Waterways investments that result in shifting truck traffic from the highways to the waterways could provide a tremendous reprieve to pavement damage caused by trucks. One smaller four-barge tow could remove 280 trucks from a rural highway. A forty-barge tow, such as found with major downstream grain movements on the Mississippi River would shift 2,800 truckloads from the road. The 2,300+ truck capacity on a Great Lakes freighter may provide even greater relief to pavements. Based on MAFC research, the wear from one class 8 truck is equivalent to approximately 6,000 cars on rigid pavements and 4,000 cars on flexible pavements [3]. Based on these ratios, one freighter could eliminate the equivalent pavement impact associated with 14,040,000 cars. A single barge removes the impact of 420,000 cars. Shifting truck traffic from highways would also provide some degree of relief for traffic congestion.

Advocacy materials from The Waterways Council [4] (Figure 2-2) show that the environmental benefits of barge transportation also favor the waterways by a large measure. Based on CO_2 per million-ton miles, the truck mode would generate 832% more pollution than the same move by barge.

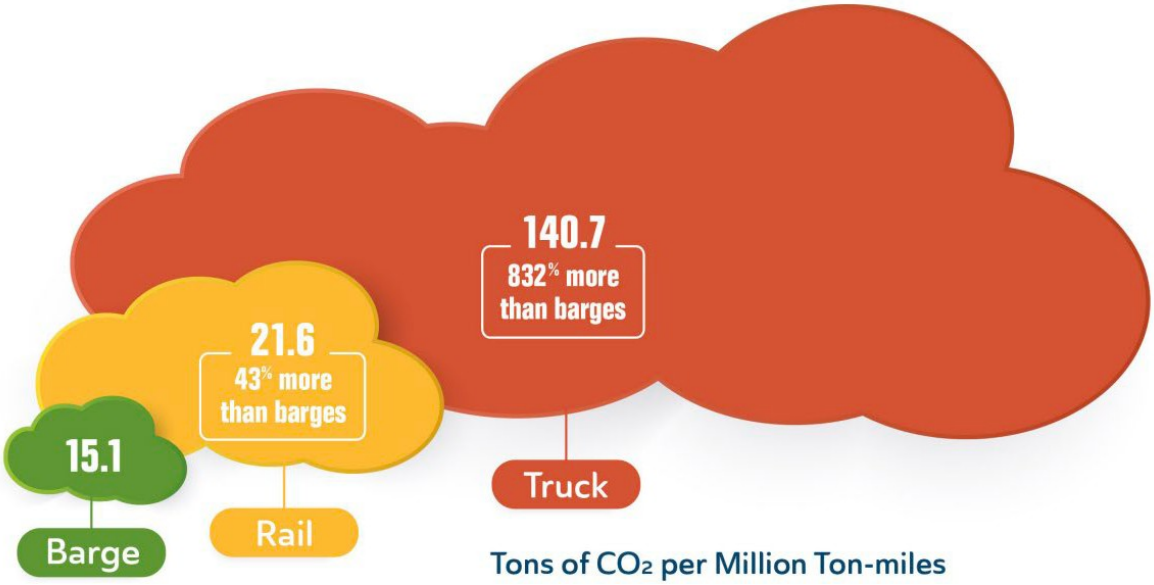


Figure 2-2. Tons of CO2 per Million Ton-Miles. The Waterways Council. [5]

This Waterway Council literature also reports that in terms of safety, for every one accident in the barge industry, there are 96 injuries in the rail industry, and 1,145 truck related injuries.

Given the benefits expected with increased levels of marine freight, and the current supporting national policy, Infrastructure Investment and Jobs Act, (IIJA Public Law 117-58), this project examines freight markets for USACE- defined public ports and private terminals located along the commercial waterways in the MAASTO region. A 90-minute drive time buffer analysis of businesses and industries located near each port was created for this assessment. This provides a tool for both states and ports to identify and classify businesses and industries in their area.

The project also provides a literature review of marine freight markets and development to understand the opportunities and constraints to increased waterway freight movement.

Additionally, interviews with port officials from each of the selected ports and marine related state DOT Freight Advisory Committee (FAC) members add a grounded understanding of the context for the buffer and business analysis. Combined, these tasks provide a strategic understanding and direction for ports as well as state DOTs in the development of the port and marine resources.

The waterway systems included in the study are the Great Lakes, the Mississippi River, and the Ohio River. The navigable tributaries to the Mississippi and Ohio (Illinois, Missouri, and Kaskaskia Rivers) are also included in the scope of the study. The project includes a sample of three ports and/or terminals per state that have been selected in partnership with the MAFC technical representative for each state. This results in a total of 30 distinct geoeconomic port market assessments.

Marine freight transportation on the Great Lakes and Inland River systems provide a viable and efficient mode of transportation. While the system is often considered slow, seasonal, and limited to bulk cargos, there is capacity to capture additional traditional or primary cargos, as well as to expand into new or potential markets and commodities. According to the Great Lakes Strategic planning efforts, only 50% of the capacity at most Great Lakes ports is being utilized, leaving significant room for expansion [5].

Chapter 2 provides a literature review of port markets and port development. This includes a review of market catchment areas, a review of traditional port markets, and a review of strategic planning for port and marine sector development. This chapter also provides the rationale for strategic port market development.

Chapter 3 provides the geoeconomics assessment of businesses and industries within the drive time buffer surrounding the selected ports. Based on the 30 ports selected by the MAFC technical representatives, a 90-minute drive time buffer was established. Businesses and industries falling within the buffer can be geographically located in drive-time zones of 30-, 60- and 90-minutes. The businesses or industries can then be evaluated as a business partner or logistics customer.

Chapter 4 documents the information collected through interviews with port officials and marine leadership. This chapter provides an overview of each port's growth expectations and opportunities, perceived limits to growth in infrastructure and the marine system, and potential policy opportunities in support of market and port growth in the marine sector.

Chapter 5 provides a summary of the interviews and the buffer analysis, with a focus on strategic development of ports and port markets. This chapter also incorporates feedback from a project review teleconference with 37 stakeholders. The economic buffer assessments and interview findings provide direction and insight for the subject ports and other ports across the region. Additionally, information from this report, combined with findings from previous MAFC strategic reports, provides a focused perspective on port development, marine freight planning, policy, operations, and additional research needs.

2. REVIEW OF PORT MARKETS AND DEVELOPMENT

This project examines the potential local cargo markets available to a sample of ports across the MAASTO region. For this study, the localized market is defined as traditional cargo producing or receiving businesses, industries, and shipping entities, as well as potential marine commodity producing or consuming facilities located within a 90-minute drive time from the port or terminal. For a commodity or business type to be included in the assessment as a primary cargo source, they must handle traditional or primarily marine cargos for the Inland Rivers and Great Lakes. Additional potential cargos were included in the assessment, based on industry trends and stakeholder input. Examples of potential cargos include containerized shipments, project cargos for alternate fuel installations, vehicles and automotive parts, and non-perishable retail goods.

The 90-minute drive time buffer around each port or group of terminals was selected by the MAFC technical representatives from two sets of alternatives. The decision was based on past research, and an evaluation of the port catchment areas for a sample of ports at 30-, 60-, and 90-minute drive times, compared with 30-, 60-, and 90-direct miles. The selected drive-time approach considers the actual travel time to the port from a given location, rather than a concentric ring approach representing a straight-line distance. The 90-minute drive time also falls in line with the catchment areas defined in previous port market research. In a 2002 New York Inland Port Study, it was generally agreed the catchment area of the Central New York Inland Port (CNYIP) facility would be 75 – 100 miles, but that it is directionally dependent [6]. A catchment area is defined as;

> the area from which a location, such as a city, service, or institution, attracts a population that uses its services and economic opportunities. Catchment areas may be defined based on from where people are naturally drawn to a location (for example, labor catchment area) or as established by governments or organizations for the provision of services.

For the purposes of this project, a 90-minute drive time buffer or catchment area (further defined in Chapter 4) represents the potential market area for increasing traditional maritime business as well as identifying potential new markets. The project recognizes that for larger ports, such as Duluth-Superior and Milwaukee, the catchment area can be much larger, especially for cargos bound for export. Several of the region's ports utilize rail or truck services to bring shipments of grain, iron ore, and other bulk commodities from longer distances. These are critical shipments and worthy of evaluation; however, they are not the focus of this project and the buffer tool.

Assessment of the potential freight markets for a port are often based on disaggregation of commodity flow data, or on custom databases created to track specific commodities and cargos. A 2020 feasibility study of containerized freight operations at Brunswick, Missouri provides an example of a data-driven analysis [7]. Similarly, a Florida DOT analysis provides a step-by-step approach in using disaggregated FAF data to understand freight movements in smaller geographies [8]. By comparison, this project focuses on business and industry access to ports, the context of and potential for port development, and input from affiliated industries to develop a strategic approach to potential markets.

The existing inland port system has historic constraints on current and potential future markets and cargos. Inland dockside and waterside facilities are typically comprised of equipment and structures designed to accommodate large and bulky cargos. This historic design and focus influences cargos carried on the waterways today. According to the *Great Lakes Shipping Study* by Homeland Security [9];

> The GLSLS system has evolved over time to accommodate dry-bulk cargos. As previously mentioned, many of the U.S.-flag lakers are self-offloading, and most ports depend on this capability to receive bulk cargos. While containerized cargo dominates ocean transport, the GLSLS sees very little of this type of traffic.

This is confirmed by the American Great Lakes Ports Association's list of primary cargo on the Great Lakes [10] that includes iron ore, coal, limestone, farm products, and steel."

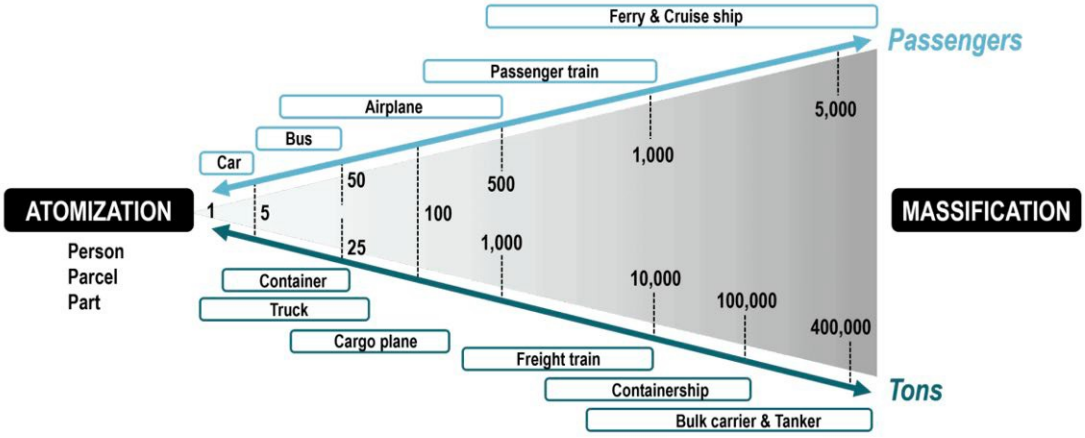
The Inland River system has also been dominated by large and bulky cargos. Based on a 2019 Bureau of Transportation Statistics report, the top five cargos on the length of the Mississippi River include soybeans, distillate fuel oil, corn, crude petroleum, coal, and lignite [11]. According to the 2021 Freight Plan for OKI (the Cincinnati/Northern Kentucky MPO), the top cargos moving through the Ohio River lock system in 2017 included [12]:

- Coal, Lignite, and Coal Coke,
- Petroleum and Petroleum Products,
- Chemicals and Related Products,
- Crude Materials, Inedible, Except Fuels,
- Primary Manufactured Goods,
- Food and Farm Products,
- Manufactured Equipment & Machinery, and
- Waste Material.

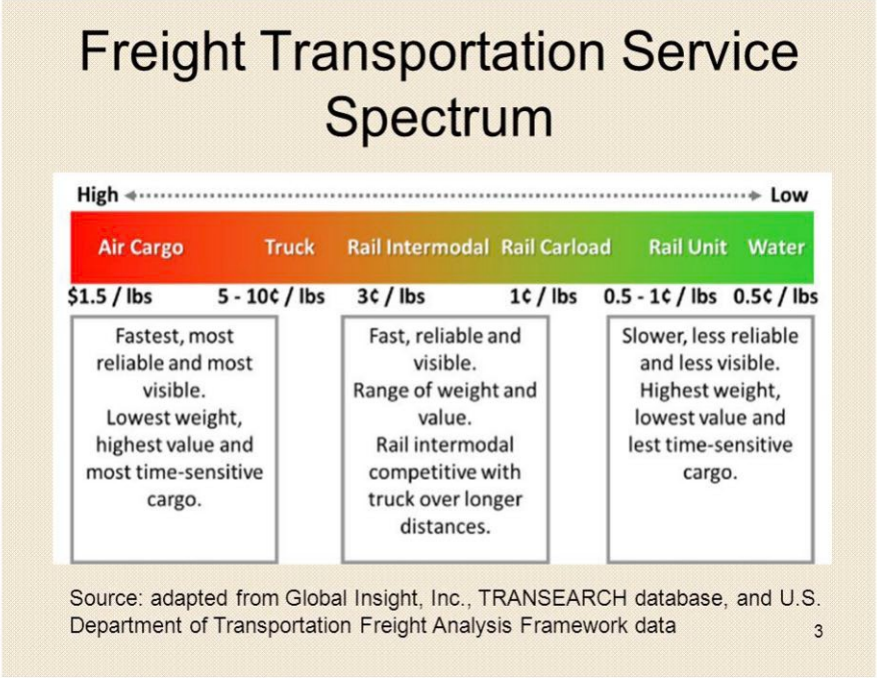
A 2023 Bureau of Transportation Statistics (BTS) publication [13] stated the top commodities moved on the waterways in the U.S. are natural gas and fossil products, crude petroleum, fuel oils, grains, other ag products, and sand. The cargos are summarized by the Eno Center, "The inland waterway system rarely moves high-value goods or containerized freight, partially due to the need for fast shipping times, something inland waterways cannot offer due to the need for inland transloading." [14]

The census of primary businesses and industries in the geoeconomic buffer analysis discussed in Chapter 3 focuses on the top commodities from each waterways system.

The relationship between cargo types, cargo values, and mode selection has historically shaped freight operations in the region. Great Lakes and Inland River ports specialized in the equipment and facilities to support the commodities moved and as a result defined their roles as system for bulk, heavy, and dry goods. As shown in Figure 3-1 below, there is a clear pattern between mode selection, cargo value, and velocity. The Great Lakes are geared for moving dry bulk commodities and the Inland River ports are settled in their markets with dry bulk, grain, and fuels dominating the loads.



(a)



(b)

Figure 3-1. (a) Atomization versus Massification in Transportation Modes; (b) Freight Service Spectrum. Available at: https://transportgeography.org/contents/chapter1/what-is-transport-geography/atomization-massification-modes/

In addition to the historic factors that shaped port development, previous research and development efforts have identified other conducive circumstances and contexts. A Great Lakes study [15] identified the following strategic considerations:

- Sales and/or freight volume.
- Demand points or markets to be served.
- Product sourcing.
- Number of end (or source) points to be serviced by the facility.

- Freight pricing (including variability by mode).
- Facility ownership or leasing plan.
- Proximity or access to key markets.
- Transportation network requirements.
- Access to key transportation corridors.
- Ability to balance modes.
- Labor and workforce needs and costs.
- Tax and regulatory requirements.
- Utility requirements, including information technology considerations.
- Real estate and facility requirements (including specific building design and engineering requirements).
- Overall costs to establish and operate the facility or network Incentives or other public sector assistance.

Additional strategic considerations factor into the use of the waterways. Based on the Wisconsin Port Development Initiative [17], additional factors affecting port development include seasonality of the waterways, service reliability, speed to market, extra cargo handling, and a lack of awareness of the availability and value of the waterways.

Any of the factors listed above can be a screening criterion for market and port development. For warehousing and logistics development, favorable criteria must be in place for a location or community to even be placed on the candidate list. Likewise, a well-prepared port facility is more likely to secure additional cargos based on the ability to serve the needs of customers and the products.

These primary commodities and their related businesses and industries are the predominant focus of the geoeconomics analysis presented in Chapter 3. Other potential commodities included in the analysis were identified in literature and through project interviews. Warehousing, containers and container repositioning, alternative fuels, and several other manufacturing industries are included in the buffer analysis to capture these potential market opportunities.

In Chapter 3, the geoeconomics buffer analysis is detailed and presented. The buffer analysis involved three major components: the selection of the ports to include in the project; the buffer design; and identification of the business/industries and commodities to be evaluated. These steps are defined in the following chapter. The geoeconomics buffers are delineated for each of the 30 ports.

3. GEOECONOMIC BUFFER ANALYSIS OF PORTS

To understand the potential for expanded maritime freight opportunities within the ports' catchment or market areas, each of the MAFC technical representatives was asked to identify three ports in their state for inclusion in the project. Both public ports and private terminals were eligible for inclusion. Selections were based on the state practitioners' experiences working with public and private ports. Respondents noted the absence of private terminals in the previous tonnage data, planning efforts, and programs.

The state representatives collaborated on port selection to avoid overlap of market areas and to provide the broadest coverage of their facilities. Factors cited by the representatives in the selection of the ports included new investments, relationships to newly defined marine highways, and interest in connectivity with other modes.

3.1. Ports Included in the Project

The following ports, listed by state, were selected for the project. Each entry includes the web address and a brief marketing narrative from the port's website. The degree of detail in these summaries ranges from minimal representation on a local Chamber of Commerce website (Atchison, KS) to a dedicated website with promotional material, booking information, real estate descriptions, links to important related information, news releases, and performance reports (America's Central Port at https://www.americascentralport.com/). There is a broad range of information and advertisements in the web-presence of the ports selected for this project.

Following the presentation of the website marketing material, a table of basic data about each port is provided. Again, the degree of detail in the reporting reflects the information presented by the port entity on their website.

NOTE: Website errors have not been corrected; out-of-date Class 1 railroad names, abbreviations, and tonnages are also not corrected and indicate a time lag in web updates on many of these sites.

3.1.1. Illinois

America's Central Port (Public Port Authority)
Granite City, IL (across from St. Louis)

https://www.americascentralport.com/

Website text: Home to two public multi-modal Mississippi River harbors. The Granite City Harbor is a year-round 24-hour slack water operation, handling 2,500 barges and 3 million tons of product each year, including goods such as grain, fertilizer, steel, chemicals, and other bulk freight. The newly opened Madison Harbor is just south of Lock 27, providing open river barge navigation straight through to the Gulf of Mexico. Located at the heart of the U.S. transportation network, with access to six Class-I railroads, two multi-modal harbors, four interstate highways, and home to over 75 manufacturers and freight intensive operators, America's Central Port is one of the largest freight hubs in the Midwest.

America's Central Port					
Acres	Top Commodities	Total Tonnage	Interstate Connections	Rail Connections	Notes
1,200 acres 2 Harbors.	Grain, fertilizer, steel, petroleum.	3 million Tons.	I-70, I-44, I-64, I-44, I-55.	BNSF, NS, CSX, UP, CN, KCS.	

Illinois International Port District (Public Port Authority)
Chicago, IL

https://www.iipd.com/

Website text: The Illinois International Port District (IIPD) is an Illinois municipal corporation created to promote the shipment of cargos and commerce through its facilities. The IIPD is the owner and master landlord controlling two land areas in South Chicago: the Iroquois Landing Terminal is an open paved terminal with 3,000 linear feet of ship and barge berthing space located at the mouth of the Calumet River in the southwest corner of Lake Michigan, and Senator Dan Dougherty Harbor (Lake Calumet Terminal) which encompasses approximately 1,600 acres of land and currently is home to various harbor operations and terminals located at the junction of the Grand Calumet and Little Calumet Rivers, situated six miles inland from Lake Michigan. The IIPD's harbor facilities are served by rail facilities and are adjacent to three interstate highways and feature an abundance of warehouse facilities.

Illinois International Port District					
Acres	Top Commodities	Total Tonnage	Interstate Connections	Rail Connections	Notes
1,600 acres.	Sand and Gravel, Petroleum products, metal products.	16 million Tons.	I-55, I-57, I-90, I-94, I-290.	BNSF, UP, CN, NS, CSX, CP.	

Kaskaskia Regional Port District.
RedBud, Il.

https://www.kaskaskiaport.com/
Website text:

- **14th Largest Inland Port by tonnage and 71st in the country**
- **MARAD US Marine Highway approves grant for 8 rail cars**
- **Tonnage exceeds 2.3 million tons on Kaskaskia River**
- **EDA Approves grant for Second Entrance & Laydown Yard at KRPD #2**
- KWA Summit March 4, 2024 Mariners' Village Convention Center, Carlyle Lake,IL

Kaskaskia Regional Port District					
Acres	Top Commodities	Total Tonnage	Interstate Connections	Rail Connections	Notes
1,600 acres.	Sand and Gravel, Petroleum products, metal products.	2.3 million tons.	I-55, I-57, I-90, I-94, I-290.	BNSF, UP, CN, NS, CSX, CP.	

3.1.2. Indiana

The Ports of Indiana

https://www.portsofindiana.com/ (All Indiana public port websites located here)

Website text: Find your perfect location with shovel-ready land leases in each port. Featuring strategic locations, multimodal connections and modern infrastructure, our tenants experience growth with like-minded partners

Burns Harbor (Public Port Authority)
Burns Harbor, IN

Website text: A major hub of international trade located in the Steel Capital of North America.

Ports of Indiana, Burns Harbor					
Acres	Top Commodities	Total Tonnage	Interstate Connections	Rail Connections	Notes
75 acres.	Steel, steel products, agriculture products, construction.	3.45 million tons.	I-80, I-90, I-94, I-65, I-57.	BNSF, UP, CN, NS, CSX, CP.	Major steel processing and manufacturing.

Jeffersonville (Public Port Authority)
Jeffersonville, IN

Website text: Strategically located in a top logistics market, cargo-handling capacity was recently doubled.

Ports of Indiana, Jeffersonville.					
Acres	Top Commodities	Total Tonnage	Interstate Connections	Rail Connections	Notes
1,057 acres.	Corn, heavy lift, wire rod, fertilizer, salt, soybeans, steel, pig Iron, liquid asphalt.	Over 2 million tons.	I-64, I-65, I-71, I-265.	CSX, NS.	

Mount Vernon (Public Port Authority)
Mount Vernon, IN

Website text: One of the largest inland ports in the U.S., features a 544-acre mega site available for development.

Ports of Indiana, Mount Vernon.					
Acres	Top Commodities	Total Tonnage	Interstate Connections	Rail Connections	Notes
680 acres.	Corn, wheat, coal, ethanol, fertilizer, limestone, pig iron, steel coils, salt, soybean products.	5.02 million tons.	I-64, I-69.	BNSF, UP, CN, NS, CSX, CP.	

3.1.3. Iowa

Dubuque East Central Intergovernmental Association (Public Port Authority)
Dubuque, IA

https://www.ecia.org/

Website text: Six private terminals that specialize in rail car storage, steel, liquid and dry bulk, project cargo.

Dubuque East Central Intergovernmental Association					
Acres	Top Commodities	Total Tonnage	Interstate Connections	Rail Connections	Notes
121 acres.	Rail car storage, steel, liquid and dry bulk, project cargo.	2.8 million tons.	U.S. highways 20, 151 and 61.	BNSF, CP, Soo.	

Quad Cities Port Area (Public Port Authority)
Davenport and Bettendorf, IA

https://quadcitieschamber.com/locate-grow-business/economic-development/transportation/
Website text:

- Established October 2020
- 15-county geographic area (7 Illinois counties and 8 Iowa counties)
- Approximately 222 river miles from Dubuque, Iowa to Keokuk, Iowa
- Ranked a Top 100 Port on the U.S. Ports List
- Over 150 existing facilities, including 70 barge terminals.

This area is also designated as a segment of Marine Highway M-35 by the United States Department of Transportation's Marine Administration (MARAD). Also affiliated with Tri-State Corn Belt Ports, and Northern Grain Belt Ports.

Quad Cities Port Area					
Acres	Top Commodities	Total Tonnage	Interstate Connections	Rail Connections	Notes
222 miles of riverfront, 150 facilities, 70 terminals.	Agricultural products, petroleum, coal, sand, stone, cement.	700 million tons.	I-74, I-80, I-88 & I-280.	BNSF, CP, UP.	Included in M-3 and 2 Port Statistical Areas.

Blencoe – (Private Terminal)
Blencoe, IA

https://www.newcoop.com/

Website text: Specializing in fertilizer, county rock, DDG's, soybeans, corn, and soybean meal.

Port of Blencoe, New Cooperative, INC.					
Acres	Top Commodities	Total Tonnage	Interstate Connections	Rail Connections	Notes
38 acres.	Fertilizer, county rock, DDG's, soybeans, corn, and soybean meal.	7.7 million tons.	I-29.	UP.	8,000 member owners.

3.1.4. Kansas

Port Authority of the City of Atchison (Public Port Authority)
Atchison, KS

https://cityofatchison.com/

Port Authority of the City of Atchison					
Acres	Top Commodities	Total Tonnage	Interstate Connections	Rail Connections	Notes
NA.	None.	0.0	U.S. and State routes only.	BNSF, UP.	Public river access.

Port KC (Public Port Authority)
Kansas City, MO

https://portkc.com/

Website text: Growing the economy of Kansas City's Port District through transportation, global commerce, and development.

Port KC					
Acres	Top Commodities	Total Tonnage	Interstate Connections	Rail Connections	Notes
424.5 acres, 2,000 feet of riverfront.	Fertilizers, Rebar, mill scale, and scrap steel.	87,793 Tons.	I-29, I-35, I-435, I-49, I-70.	BNSF, UP, CP, NS, CX.	Recently added 415 acres for warehousing and industrial development.

Port Authority of St. Joseph (Public Port Authority)
St. Joseph, MO

https://missouriports.org/missouris-ports/st-joseph/

Website text: The mission of the authority is to promote the general welfare of the community by increasing the volume of commerce through encouraging private capital investment by fostering the creation of industrial facilities and industrial parks, enhancing economic development, and job creation and developing the intermodal potential of the Missouri River for the commercial benefit of the region.

Port Authority at St Joe					
Acres	Top Commodities	Total Tonnage	Interstate Connections	Rail Connections	Notes
213 acres.	Steel coils, fertilizer, agricultural products, DDGs, biodiesel.	NA.	I-29, I-229.	UP, BNSF.	

3.1.5. Kentucky

Ports of Cincinnati and Northern Kentucky (Port Statistical Area)
Cincinnati, OH

https://centralohioriverbusinessassociation.com/

Website text: Located along the waterways of Ohio River and Licking River, the ports of Cincinnati and Northern Kentucky measure over 225 miles. It supports more than 70 active terminals and moves and estimated 48 million tons of cargo annually.

Ports of Cincinnati and Northern Kentucky					
Acres	Top Commodities	Total Tonnage	Interstate Connections	Rail Connections	Notes
226 miles of waterfront with over 70 terminals. Covers 15 counties.	Coal, limestone, sand and gravel, gypsum, petroleum and petroleum products, grain, steel, cement, and fertilizer.	48 million tons.	I-71, I-75.	CSX, NS.	Port Statistical Area.

Owensboro River Port (Public Port Authority)
Owensboro, KY

https://owensbororiverport.com/

Website text: The Owensboro Riverport sits on approximately 340 acres at Ohio River Mile 759 with the CSX main rail line.

The Owensboro Riverport is defined as Foreign Trade Zone #29 (FTZ #29 Site 8). Approximately 181 acres of the port's 340-acre site is Foreign-Trade Zone activated, allowing customers to utilize the advantages of a foreign trade zone. In addition, the riverport is a U.S. Customs Port of Entry and Homeland Security Facility, with 24/7 on-site security.

The Owensboro Riverport is a designated goods delivery site for both the London Market Exchange (LME) and the Chicago Mercantile Exchange.

Owensboro River Port					
Acres	Top Commodities	Total Tonnage	Interstate Connections	Rail Connections	Notes
340 acres.	Metals, grains, chemicals, paper products.	1.2 million tons.	I-64, I-65, I-69.	CSX.	FTZ.

Paducah-McCracken Riverport Authority (Public Port Authority)
Paducah, KY

https://paducahriverport.org/

Website text: Western Kentucky has the largest concentration of navigable rivers in the world. In Downtown Paducah, the Tennessee River joins the Ohio River just outside the city's flood wall, and the Cumberland enters the Ohio just upstream at Smithland. Forty miles downstream, the Ohio enters the Mississippi at Cairo, IL. The strategic geographic location has enabled the City of Paducah and surrounding region to become the major hub for inland river activity. Twenty-three barge companies have operating or corporate headquarters here. There are five major inland shipyards in the region that service most of our nation's inland river towboats and barge fleets.

Paducah-McCracken Riverport Authority					
Acres	Top Commodities	Total Tonnage	Interstate Connections	Rail Connections	Notes
48 acres and 2,300 ft of river frontage.	Aggregates, aluminum products, agricultural products, bagged products. building products. dry bulk commodities.	660,000.	US 60 to I-24.	CN.	FTZ.

3.1.6. Michigan

Michigan Great Lakes Ports

https://www.greatlakesports.org/wp-content/uploads/2021/01/Michigan-2021-Update.pdf

Bay City (Private Terminal)
Bay City, MI

https://www.portfisher.com/about-port-fisher-terminals

Website text: Port Fisher Terminals is a multi-modal port site, offering convenient vessel, rail, and highway transportation access. Located in Bay City, Michigan – centrally located on the East Coast of Michigan – the port is protected by the Saginaw Bay and supported by the Saginaw River.

Port Fisher Terminals					
Acres	Top Commodities	Total Tonnage	Interstate Connections	Rail Connections	Notes
80 acres Storage.	Bulk and break bulk, large components, dry commodities.		I-75.	CSX, CN.	

Detroit (Public Port Authority)
Detroit, MI.

https://portdetroit.com/

Website text: The Port of Detroit is located along the west side of the Detroit River and is the largest inland port in the state of Michigan. The port is overseen by the Detroit/Wayne County Port Authority, a five-member board of directors appointed by the State of Michigan, Wayne County, and the City of Detroit.

Port Detroit					
Acres	Top Commodities	Total Tonnage	Interstate Connections	Rail Connections	Notes
80 acres.	Steel, stone, coal, cement.	17 million tons.	I-75, I-94, I-96.	CS, CSX, NS.	Largest steel port in U.S.. Cruise docks.

Monroe (Public Port Authority)
Monroe, MI

https://portofmonroe.com/

Website text: The Port of Monroe is Michigan's only port on Lake Erie and serves as the gateway to the State of Michigan's far reaching multimodal transportation network. Located on the deep-draft frontage of the river basin, with direct rail Class 1 rail access, and immediately adjacent to I-75, the Port of Monroe represents the closest convergence of major freight assets anywhere in the region. This accessibility coupled with efficient cargo handling, economic freight rates and a highly accommodating Port management team have earned us the reputation of being the
"Mariner's Port" to our customers and "The Biggest Little Port" on the Great Lakes.

Port of Monroe					
Acres	Top Commodities	Total Tonnage	Interstate Connections	Rail Connections	Notes
300 acres.	Coal, limestone, synthetic gypsum, liquid asphalt, project, and break-bulk cargos.	2.8 million tons.	I-75.	CS, NS.	

3.1.7. Minnesota

Port of Duluth-Superior (Public Port Authority) Duluth, MN.

https://duluthport.com/

Website text: Located at the westernmost tip of Lake Superior, the Port of Duluth-Superior is North America's farthest-inland freshwater seaport. A remarkable 9-mile natural breakwater shelters the port's 49 miles of harbor frontage. Twenty privately owned bulk cargo docks and award-winning general cargo terminal populate the working waterfront, along with a marine fueling depot, a shipyard with dry docks, multiple tug, and barge services, plus an intermodal cargo terminal.

Duluth-Superior is a diversified multimodal shipping hub, offering global cargo transport through the Great Lakes-St. Lawrence Seaway, free-flowing major highways, and direct Class I rail service to the East, West and Gulf Coast

Twenty privately owned bulk cargo docks and an award-winning general cargo terminal populate the working waterfront, along with a marine fueling depot, a shipyard with dry docks, multiple tug and barge services, plus an intermodal cargo terminal.

Port of Duluth					
Acres	Top Commodities	Total Tonnage	Interstate Connections	Rail Connections	Notes
120-acre marine terminal.	Iron ore, coal, limestone, grain.	35 million tons.	I-35, I-535.	BNSF, CN, CP, UP.	Reporting includes both port of Duluth and Superior.

Port of Saint Paul (Public Port Authority) Saint Paul, MN.

https://sppa.com/

Website text: Saint Paul is home to the northernmost river terminals on the Mississippi River. The Saint Paul Port Authority manages four ports within Saint Paul city limits.

In 2019, 5.5 million tons shipped into the Saint Paul Harbor. Top imports included fertilizer, petroleum products, aggregate, cement, and salt. From an outbound perspective 3.4 million tons shipped out of Saint Paul. In this case, top exports included soybeans, corn, grain, and wheat.

Port of Saint Paul					
Acres	Top Commodities	Total Tonnage	Interstate Connections	Rail Connections	Notes
272 acres.	Fertilizer, petroleum, aggregates, soybean, corn, grains.	8.9 million tons	I-35E, I-94.	BNSF, CN, CP, UP.	

Winona (Public Port Authority)
Winona, MN.

https://www.cityofwinona.com/661/Commerical-Harbor

Website text: The Port Authority of Winona is the economic development arm of the City of Winona. The Authority works to expand and diversify the tax base, and to create new opportunities for the growth of businesses, workforce, and housing in Winona. The Port Authority has a variety of financing tools, including a revolving loan fund, to create new economic development opportunities. In addition, the Port Authority promotes waterborne transportation.

The operators of the Commercial Harbor transported over 1.5 million tons of commodities in 2019, and on average 1100 barges enter the Commercial Harbor each shipping season.

Port of Winona					
Acres	Top Commodities	Total Tonnage	Interstate Connections	Rail Connections	Notes
	Soybean, corn, grain.	1.5 million tons.	I-35E, I-94.	BNSF, CN, CP, UP.	

3.1.8. Missouri

https://missouriports.org/ (Missouri Ports Association)

AGRIServices of New Brunswick (private)
New Brunswick, MO.

https://agriservices.com/

Website text: AGRIServices of Brunswick operates the largest port on the Missouri River – the Brunswick River Terminal. Its 236-acre footprint provides build-to-suit sites for any commodity, or manufacturing for any industry.

More than just agriculture, we also specialize in transporting commodities by barge, rail and truck. Our central location has strategic access to any port on the inland waterways.

Brunswick River Terminal					
Acres	Top Commodities	Total Tonnage	Interstate Connections	Rail Connections	Notes
236 acres.	Grain, fertilizer, sand, coal slag, DDGs, steel.	500,000 tons.	US 24 to I-70.	NS.	

Pemiscot County Port (Public Port Authority)
Hayti, MO.

http://www.pemiscotport.com/

Website text: Designated Enterprise Zone, Slack water ice free harbor with 300 ft. turning basin. Includes general cargo dock and fleeting operator.

Three miles from I-55 and access to Northern-Sante Fe Railroad.

Pemiscot County Port					
Acres	Top Commodities	Total Tonnage	Interstate Connections	Rail Connections	Notes
253 acres.	Crude petroleum, ag products, dry bulk, barge covers.		I-55.	BNSF via 5-mile rail spur.	

Southeast Missouri Port Authority (Semo Port) (Public Port Authority)
Scott City, MO.

https://www.semoport.com/

Website text: Semo Port has ready access to all five modes of transportation: river, rail, highway, pipeline, air. Interstate highways 55, 57, and 24 are located nearby. Enterprise Products pipelines for petroleum products and natural gas are one mile away. The regional airport is four miles by direct highway.

Land is available for lease to port-related industries, terminals, and distribution facilities. Team tracks are available for rail-truck transfer of cargo. Several companies operate terminals and provide cargo transfer between barge, rail, and truck. This web site is designed to provide information to those interested in Semo Port's facilities and services.

Southeast Missouri Port Authority Port					
Acres	Top Commodities	Total Tonnage	Interstate Connections	Rail Connections	Notes
500 acres.	General cargo, dry bulk, project cargo.	Exceeds 1 million tons.	I-55, I-57, I-24, I-64.	BNSF, UP.	Rail, water, truck transfer available.

3.1.9. Ohio

Cleveland (Public Port Authority)
Cleveland, OH.

https://www.portofcleveland.com/

Website text: The Port of Cleveland is one of the largest ports on the Great Lakes. Over 22,000 jobs and $4.7 billion in annual economic activity are tied to the roughly 13 million tons of cargo that move through Cleveland Harbor each year.

Port of Cleveland					
Acres	Top Commodities	Total Tonnage	Interstate Connections	Rail Connections	Notes
154 acres.	Iron ore, limestone, cement, salt.	Exceeds 13 million tons.	I-90.	CSX, NS.	Great Lakes Container port. Warehousing available.

Toledo/Lucas County Port Authority (Public Port Authority)
Toledo, OH.

https://www.toledoport.org/port-of-toledo

Website text: The Port of Toledo's general cargo terminal is operated by Midwest Terminals.

Toledo/Lucas County Port Authority					
Acres	Top Commodities	Total Tonnage	Interstate Connections	Rail Connections	Notes
4,100 ft. dock length. sq.	Oils, petroleum products, asphalt, aluminum, cereals.	11.7 million tons.	I-75, I-80/I-90.	CN, CSX, NS.	

The Mid-Ohio Valley Port Statistical Area. (Port Statistical Area)
Lisbon, OH.

https://www.seohioport.com/why-the-mov/

Mid-Ohio Port Statistical Area					
Acres	Top Commodities	Total Tonnage	Interstate Connections	Rail Connections	Notes
220 miles of riverfront on both sides of river.	Food and farm products, petroleum products, asphalt,	47.8million tons.			

3.1.10. Wisconsin

Port Milwaukee (Public Port Authority)
Milwaukee, WI.

https://portmilwaukee.com/

Website text: Port Milwaukee serves as a regional transportation and distribution center with a primary market including the State of Wisconsin, northern and western Illinois (including the City of Chicago) and eastern Minnesota including Minneapolis and St. Paul. Port Milwaukee is also capable of cost effectively reaching Iowa, North Dakota, South Dakota, Nebraska, Missouri and Indiana, and the western Canadian Provinces of Alberta, Saskatchewan, and Manitoba.

Port Milwaukee has sixteen (16) berths, each capable of handling vessels with a Seaway maximum draft of 26' 06" (8.08 meters) at normal water conditions, with a length of 1,000' (304.8 meters). The Port also has two dedicated barge berths with drafts in excess of 18' (5.5 meters).

Port Milwaukee					
Acres	Top Commodities	Total Tonnage	Interstate Connections	Rail Connections	Notes
467 acres.	Salt, steel, limestone, general cargo, over dimensional loads, grain, fertilizer.	2.3 million tons.	I-94, I-794, I-43.	UP, CPKC.	Ferry and cruise ship dock.

Green Bay (Public Port Authority)
Green Bay, WI.

https://www.portofgreenbay.com/

Website text: There are 14 port businesses located along three miles of the Fox River. These businesses move more than two million tons of cargo on more than 200 ships each year. Port businesses handle dry bulk commodities such as coal, limestone and salt, bulk liquids like petroleum products, liquid asphalt and tallow, and break-bulk commodities including wood pulp and forest products in addition to oversized cargo like machinery and wind components.

The Port has 14 terminal operators along the Fox River.

Port of Green Bay					
Acres	Top Commodities	Total Tonnage	Interstate Connections	Rail Connections	Notes
3 miles of Fox River front with 14 businesses.	Salt, steel, limestone, general cargo, over dimensional loads, grain, fertilizer.	2 million tons plus.	I-43.	CN.	

La Crosse (Public Port Authority)
La Crosse, WI.

https://www.cityoflacrosse.org/your-government/departments/parks-recreation-forestry/boating-information/la-crosse-municipal-harbor

Website text: The Port of La Crosse handles nearly one million tons of commodities annually including liquids, cement, grain, and general bulk products. Strategically located near major roads and rail yards. The port also supports an active excursion boat trade, hosting the Delta Queen on 20 stops per year.

La Crosse Public Port					
Acres	Top Commodities	Total Tonnage	Interstate Connections	Rail Connections	Notes
Approximately 450 acres.	Grain, cement, salt, pig iron, cottonseed, DDGs.	700,000 to 1 million tons per year.	I-90	CPKC	Port Statistical Area, Northern Grain Belt Port.

3.1.11 General Website Observations

There is tremendous diversity in the marketing materials, information and web presence across the ports included in this study. Providing uniform and complete information about each port's

capabilities in equipment, warehousing, storage, and access are critical factors in selection of business locations and to the extent they are available should be publicized. Ports should work to provide uniform information about their capabilities and potential. State port associations, state DOTs, and advocacy groups can also support information dissemination about current port capabilities through research, advocacy, and information sharing.

3.2. Selection of the Geoeconomic Buffer

To determine the types of businesses and industrial activity in proximity to the ports, the MAFC technical representatives were asked to evaluate two scenarios to frame the buffer analysis. The first scenario represented catchment areas of 30, 60, and 90 direct miles from the port or port area centroid. The second scenario included catchment areas of 30-, 60- and 90-minutes' drive time rather than direct miles. The 90-minute drive time catchment area was selected by the technical representatives to capture a more realistic market shed based on the transportation network.

The presence of cargos originating or terminating beyond 90 miles / 90-minute drive time for any of the ports or terminals is a given. However, as a planning and development tool focused on marine freight corridors, this project focuses on the 90-minute drive time buffer to manage large amounts of business and industry data and to provide an immediately useable product. This localized, 90-minute market buffer analysis does not capture dispersed and distant facilities that ship items such as coal, grain, and ores from longer distances.

The Environmental Systems Research Institute's (ESRI's) Streets travel network was used to generate the catchment area using a 30-, 60-, and 90-minute threshold agreed upon by the participants. The drive time polygons were generated assuming non-congested conditions with travel speeds equal to posted speeds for the respective roads. The graphic below of the Dubuque, IA port provides an example of the three catchment areas A buffer map was created for each of the 30 ports; these can be found at the MAFC Port and Terminal Buffer Tool and in Appendix B.

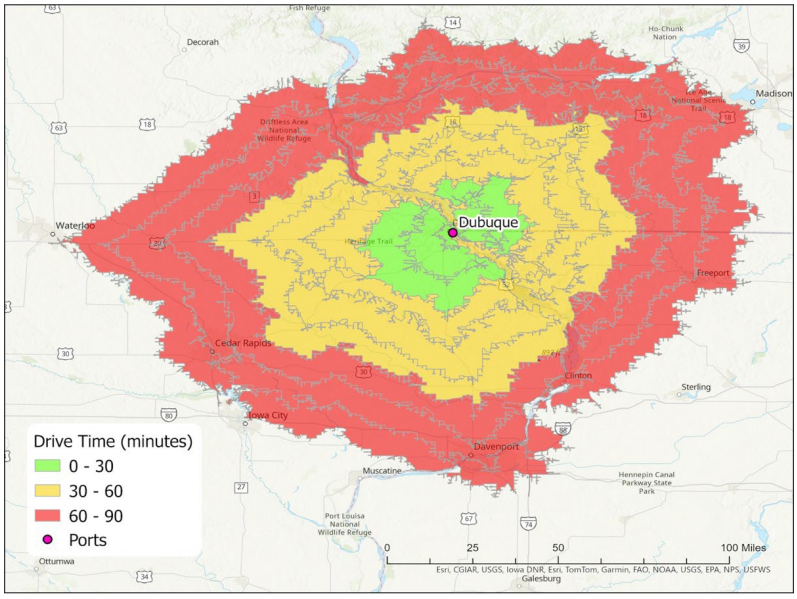


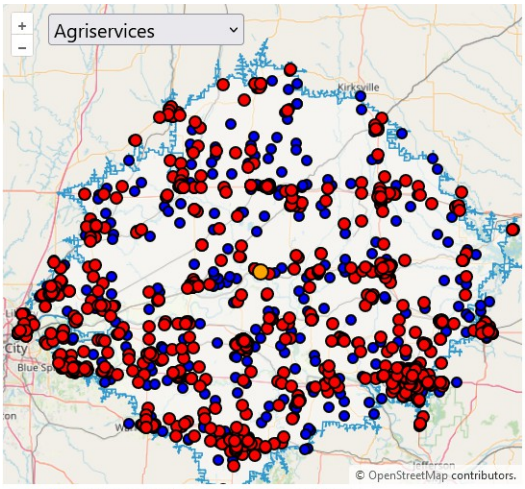
Figure 4-1. Drive Time Buffer representation of Dubuque, IA port area.

Each of the 30 ports have similar catchment areas generated around each port. Drive time (Figure 4-1) is symbolized by colored, 30-minute thresholds out to the maximum of 90 minute

To populate the buffer zones, business geopoint information was gathered using the Business Analyst dataset available from ESRI. The dataset is comprised of point data, geolocated by addresses; this data is compiled by Data Axle (https://www.data-axle.com). Businesses are categorized by Standardized Industrial Classification (SIC) codes in the dataset. The category tree (main categories and subcategories) of SIC codes was reduced to a subset based on potential interest to stakeholders and was further refined through meetings. The business identification for each port was done using a combination of a spatial filter on the drive time derived catchment area with a 90-minute threshold and applying the SIC codes of interest. North American Industry Classification System (NAICS) codes were preferred for presentation of results due to the greater level of detail and higher perceived familiarity with the classifications. A lookup table from the 2022 version was used to translate the SIC codes into the corresponding NAICS codes with business grouped by category hierarchy. A web application was developed to present the results.

The application allows users to select port and business categories at two- and three-digit NAICS levels for review and analysis. Businesses are displayed as points on the map. A distinction is made between primary and potential businesses. Primary cargos and businesses/industries are those that are currently using these inland ports. Primary cargos include common shipments such as grains, aggregates, fuels, and project cargo. Potential cargos include such freight as container shipments, automobiles, and retail seasonal items. Potential cargos were identified through discussions with state technical representatives, through the literature review, and in conducting port interviews.

Summary information is provided for each port/terminal in the study. This information includes the number of businesses within the buffer, differentiating the primary from potential businesses. Each category also includes the number of employees and total sales for the businesses. A complete list of the businesses and business categories for each selected port is provided in a table, which includes each business name, address, number of employees, annual sales, driving time to the port, and NAICS code. A screen capture of the web application is shown in Figure 4-2 for the AGRIServices port facility in Brunswick, MO.



Total Count	1,439
Total Employees	21,142
Total Sales	$9,912,730,000
Primary Business Count	761
Primary Business Employees	13,385
Primary Business Sales	$6,917,087,000
Potential Business Count	678
Potential Business Employees	7,757
Potential Business Sales	$2,995,643,000

- Agriculture, Forestry, Fishing and Hunting
- Mining, Quarrying, and Oil and Gas Extraction
- Construction
  - Heavy and Civil Engineering Construction
  - Specialty Trade Contractors
- Manufacturing
  - Food Manufacturing
  - Wood Product Manufacturing
  - Paper Manufacturing
  - Petroleum and Coal Products Manufacturing
  - Chemical Manufacturing
  - Plastics and Rubber Products Manufacturing
  - Primary Metal Manufacturing
  - Fabricated Metal Product Manufacturing
  - Machinery Manufacturing

Name	Address	Employees	Sales	Minutes	NAICS
MO Energy Propane Gas Of Purdin Inc	Highway 5 Purdin, MO 64674	2	6,238,000	50	425120
MFA Petroleum Co	Old 63 S Columbia, MO 65201	5	71,344,000	80	324110
Hahn & Phillips Grease Co Inc	N Odell Ave Marshall, MO 65340	3	24,932,000	40	425120
Elliotts Orchard & Berry Patch	Bosworth, MO 64623	3	90,000	30	111339
Gingerichs Durable Foundation	Linneus, MO 64653	4	324,000	50	238140

Figure 4-2. MAFC Port and Terminal Buffer Tool. Results for AGRIServices of Brunswick, MO.

3.3. Using the Buffer Tool Features

In the screen shot below, the port at AGRIServices has been selected from the drop-down box in the upper left-hand corner of the MAFC Port and Terminal Buffer Tool. For other facilities, users can scroll down the list to select the port or terminal of interest. In the check box section below the map, the industry categories are listed and may be selected/deselected to focus on specific business/industry groups.

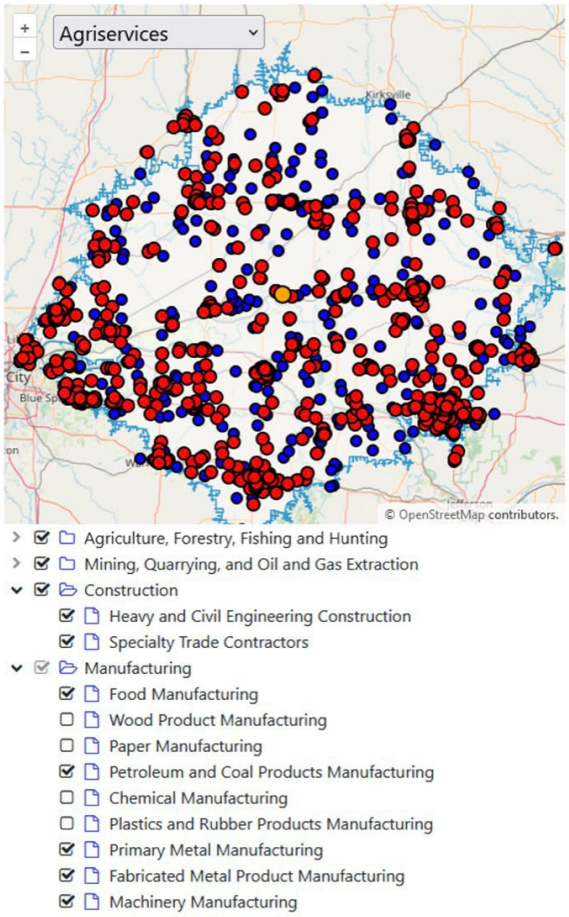


Figure 4-3. MAFC Port and Terminal Buffer Tool. Port and Business/Industry Selection example. Results for AGRIServices of Brunswick, MO

Below, two charts are presented showing the summary statistics of the query based on primary and potential cargos. This is a snapshot of the business characteristics within 90-minute drive time of the port selected. The buffer tool provides a summary and a business list dependent on the selected port and business categories. This information includes the size and scope of the business and geographic information.

Total Count	1,439
Total Employees	21,142
Total Sales	$9,912,730,000
Primary Business Count	761
Primary Business Employees	13,385
Primary Business Sales	$6,917,087,000
Potential Business Count	678
Potential Business Employees	7,757
Potential Business Sales	$2,995,643,000

Name	Address	Employees	Sales	Minutes	NAICS
MO Energy Propane Gas Of Purdin Inc	Highway 5 Purdin, MO 64674	2	6,238,000	50	425120
MFA Petroleum Co	Old 63 S Columbia, MO 65201	5	71,344,000	80	324110
Hahn & Phillips Grease Co Inc	N Odell Ave Marshall, MO 65340	3	24,932,000	40	425120
Elliotts Orchard & Berry Patch	Bosworth, MO 64623	3	90,000	30	111339
Gingerichs Durable Foundation	Linneus, MO 64653	4	324,000	50	238140

Figure 4-4. Examples for MAFC Port and Terminal Buffer Tool. Port Specific Business Information. Results for AGRIServices of Brunswick, MO

The buffer tool provides this information for each of the 30 ports or terminals. During project interviews and a teleconferences, port representatives responded positively towards the MAFC Port and Terminal Buffer Tool. The data for each port buffer is downable for data manipulation and analysis. The port respondents indicated the tool will assist with planning and may provide a better understanding of the nearby markets. State technical representatives also responded favorably and planned to use the buffer tool to verify planning studies and explore the business context around the ports.

In summary, the MAFC Port and Terminal Buffer Tool provides a snapshot of the businesses and industries within a 90-minute drive time of the ports included in this project. For this project, the buffer tool can be used to identify potential business development activities. The literature review provides a background on previous development opportunities and constraints at ports, and the interviews with port stakeholders provide context and actions perceived as necessary to move the system forward.

The following chapter presents an overview of the discussions with port leadership. Chapter 4 addresses port operations and the development environment, perceptions of stakeholders' towards future growth and cargos, and limitations and opportunities to grow their facility as well as the overall maritime system.

4. PORT CONTEXT, CARGOS, AND FACTORS IMPACTING PORT DEVELOPMENT

The market capabilities at a port or terminal are governed by a complex array of conditions and factors internal and external to the port. These include but are not limited to the historic context of marine cargos and the ports, the economic context of the surrounding area, the support of a network of industry peers, awareness of the benefits of marine shipping, state and federal support, the condition of the overall economy, and climate and hydrology related events.

To understand the port contexts across the MAASTO region, interviews were conducted via teleconference with port leadership and with maritime-related membership on state freight advisory committees (FACs). Overall, 35 interviews were conducted. These guided discussions addressed current cargos, future growth expectations, potential new cargos, operating conditions on the water, dock and terminal access areas, policies and programs, state DOT support, and other conditions the participants felt impacted opportunities for development.

While the interviews focused on the maritime sector, all the functions and conditions at the ports occur within a larger framework of logistics and economic patterns. Expanding the markets and mode share into this larger multimodal logistics sector requires innovation in the marine systems to provide reliable and timely service for potential cargos.

The geoeconomics buffer analysis and the interviews combine to provide an understanding of the proximate port market conditions, and the factors that ports, state and federal governments, and marine advocates can influence to expand port development opportunities.

4.1. Strategic Areas of Concern and Opportunity

Based on the results of the discussions with port leadership and advocates, the responses are organized into five overlapping categories of understanding and action. The categories defined below include market development, organizational development, infrastructure condition, awareness of the marine cargo opportunities and benefits, and how the demonstrated environmental benefits can support further advancement of the marine and port system.

4.1.1. Market Development Strategic Area

This group of responses details the constraints facing port facilities and proposed actions that could support market development and increased cargo loads at the ports. In the discussions with respondents, the following issues were highlighted as most important to support market development at their port. The interview responses are listed in *Italics* and the rationale provided by the respondent for the statement is in regular text.

- ✓ *Include commerce and or economic development arms of state government in developing programs, funding, market development, and customer identification at the DOT.*

  Many states currently include these groups in their FACs and freight development efforts. These partnerships provide insight and opportunities and should be amplified to include aggressive market identification, consultation, and funding on the part of these agencies.

- ✓ *Include commerce and or economic development agencies in state DOT FACs.*

These agencies can bring additional insight, support and awareness, and potential funding for transportation related economic development.

- ✓ *For private terminals and smaller ports, create a representative body to act as voice and facilitator in support of navigation for marine corridors. Examples include a port statistical area, a river commission, or navigation position within an existing organization such as UMRBA*.

  Respondents from smaller and mid-size operations, especially private terminals, lack the representation and support of larger or coastal ports. A voice is needed to represent their interests and needs.

- ✓ *Work with other advocacy groups to establish focus areas and understand each of the entity's goals and abilities*.

  Many of the concerns and proposed solutions have been issues since the 1980s, and active advocacy groups exist. Partnering in advocacy efforts may provide greater benefits and prevent redundancy.

- ✓ *Prepare for containers and present ports as a container network.*

  The ports should be prepared for container cargo, thereby increasing opportunities to become part of the larger, container-dependent logistics network.

- ✓ *Pursue the opportunity for alternate fuel processing, storage, and use.*

  Ports with adequate space could host alternate fuel processing and storage facilities. This provides diversity of income at the port and moves towards decarbonization.

- ✓ *Increase awareness of the business case for marine shipping with DOTs, industries, and the logistics sector.*

  The maritime sector needs to demonstrate that it can be an efficient, reliable, and cost-effective logistics partner. Developing a business case for important supply chain scenarios and cargos that could use the waterways allows for comparison to traditional cargo moves without a waterway segment.

- ✓ *Create programs specifically for smaller, growing ports.*

  Initial infrastructure and equipment costs are high and returns for port development may take many years to emerge. Assistance in planning and administration, market development, infrastructure, and operations would increase the likelihood of creating sustainable and viable port facilities.

- ✓ *Create programs that include private terminals.*

  Private terminals vastly outnumber public ports and move the majority of the freight on the Inland Waterways. If the emphasis is on moving more freight via the waterways and creating a greener freight system, support for private terminals would increase the likelihood of modal diversion to maritime.

- ✓ *DOTs should provide reasonable, stable funding for public and private ports every year.*

  Stable, impactful, and consistent transportation funding is provided for other freight modes and port advocates argue that similar formula funds should be available for ports. Stable funding provides the time and resources required for long-term strategic planning, and reasonable funding would allow for sustainable growth at the ports.

- ✓ *Development of container and liner services, creating more efficient equipment and logistics, accelerating ship building, port maintenance and dredging, and general port development should be considered as formula-based program areas, as well as areas in need of research and development*.

  Respondents cited lack of innovation and the need for the development of a modern system. One respondent reflected that they operate and tie barges together the same way they did it 100 years ago and added that certainly there is something better and safer!

- ✓ *Use and elevate green freight programs such as Marine Highways and EPA's Smartway program.*

  The industry needs to increase awareness of its green shipping abilities as a means of "branding" the waterways positively. Establishing a presence in these programs may lead to more impactful programs and funding.

4.1.2. Organizational Development Strategic Area

These responses reflect the organizational settings and orientations of the state DOTs, federal agencies, ports, and associations that may limit networking and development, as well as those that support greater industry networking and port development. The responses are categorized to reflect actions/issues at the state DOT, those at the port or terminal, and actions that require partnerships.

<u>DOT Organizational Development Activities:</u>

- ✓ *State DOTs should employ dedicated navigation and marine freight professionals.*

  DOTs should be staffed with marine freight professionals to support awareness of ports within the agency and with relevant partners, and to develop and manage marine programs.

- ✓ *Ensure waterway freight representation on the FAC.*

  For states with FACs and navigable waterways, waterway freight representation should be included in their FAC committee membership to provide industry insights and updates, professional network development and familiarity with agency staff, and advocate for freight waterway issues.

  The presence of multiple waterways systems within some states in the MAASTO region may require representatives for each of the systems. For example, industry experiences and input from the Great Lakes ports is likely to be different than input from a Mississippi River port or terminal. Where possible and applicable, additional marine members should be included in the FAC to capture these relevant differences.

- ✓ *Identify reliable and reasonable formula funding for capital investments and operational funding for ports.*

  Port operators feel both capital and operating funds are needed to succeed, and the funding should be consistent and reliable like programs for other modes.

  Current state funding for ports has not been reliable or sufficient for most ports. Federal competitive grant programs also present issues for smaller ports with limited resources for grant applications. Several of the ports interviewed relayed stories of stockpiling rail and dock components over several funding cycles to acquire the needed materials.

- ✓ *Develop formula-based marine development programs that address a range of capital and operational needs.*

  The emphasis with this action is formula-based programs. Competitive grant funding is appreciated but for many ports, especially smaller ports, the demands of creating the grant applications are either too costly or too specialized for staff.

- ✓ *Conduct inventory and condition reports for public and private ports and docks.*

  Interviewees suggested that the first step in planning for development is completing an inventory of dock and port conditions. This allows for planning and prioritizing of needed projects, and greater understanding of the scope of the issues.

- ✓ *Partner with state and regional commerce and economic development agencies to support market identification and development*.

  These agencies can bring additional insight, support, and awareness, and identify potential funding sources for transportation-related economic development.

- ✓ *Support creation of a river or marine corridor commission, or some form of representation.*

  Respondents from smaller and mid-size operations, especially private terminals, lack the representation, programs, and funding support in comparison to public or coastal ports. A voice is needed to represent their interests and needs.

<u>Port Organizational Development Activities:</u>

- ✓ *Provide for consistent, long-term management and planning for public ports.*

  Respondents indicated that port planning and project execution are multiyear efforts and organizational stability is critical. Without organizational stability and the associated leadership continuity, management, planning, and development become difficult. In one case, public port management moves from city oversight to the county oversight every three years. This rotation of responsibilities likely hinders planning and development efforts and the overall growth of the port.

- ✓ *Public and private entities should create and/or participate in a state port association*.

  These organizations are critical for professional networks, port representation and awareness, and developing a collective approach of support for the ports.

  These associations have varying degrees of activity with more advanced groups conducting studies, advocating at the capital and DOT, and even hiring lobbyists to advocate for funding.

- ✓ *Hire a professional lobbyist.*

  Port associations, and private terminals have demonstrated success employing lobbyists to advocate for port funding and favorable policies.

- ✓ *Consider developing a port statistical area to provide a regional voice for smaller ports and to collectively tabulate tonnage for program applications.*

  Port statistical areas aggregate the ports to form a representative area. A statistical area can provide greater visibility, increased reportable freight tonnages, marketing opportunities, and potential for program eligibility.

- ✓ *Develop an executive-level river or marine corridor commission, and/or establish dedicated freight navigation staff within existing groups to represent and support the ports.*

  A commission or other executive position should be focused on increasing the awareness and representation of ports and terminals in policy and funding discussions.

- ✓ *Increase emphasis on workforce development.*

  Like other areas of transportation, there are concerns that enough qualified maritime personnel will be available in the future. Historically, the barge industry was a family business, with most new employees coming from families in the industry. This has been changing and the industry needs to find new ways to attract and train employees.

- ✓ Prepare inland ports to serve as a potential container network.

  Most respondents were hesitant to include containers as a potential new cargo at this time. They still recognize the importance of containers in shipping and most feel that the network should be built, and ports should be prepared to handle containers.

- ✓ *Develop a business case for marketing marine freight and short sea shipping.*

  The industry needs to demonstrate that they can be an efficient, reliable, and cost-effective logistics partner. Development of business cases for supply chain scenarios that include the waterways should include estimates for the costs and delivery times in comparison to traditional cargo moves.

- ✓ *Work together as a network instead of competing*.

  Ports cite "friendly competition" and call for a systems perspective that requires the nodes and modes to work together for an efficient, beneficial freight system. State programs should encourage collaboration between ports and a system-based approach to managing the waterways.

- ✓ *Consider alternative approaches to diversification – including fuel production/storage, solar installation, recreation, rail storage, general storage, cold storage, and processing.*

  Diversification of cargo and activities was cited by several ports as critical for them to endure economic or cargo-related downturns. These other uses of the property may provide income during times of seasonal or climate-related closings at the port.

- ✓ *Participate in the FAC.*

  When available, port and marine representatives should pursue positions on state FACs. This allows for greater networking with DOT and industry representatives and provides awareness of the various freight systems.

<u>Partnership Organizational Development Activities</u>

- ✓ *For system development, states and the maritime sector should utilize Marine Highway (MH) designations at a multistate level to initiate system modernization and create a viable alternate to Interstates.*

  <u>A multistate Marine Highway should provide</u>:
  - Consistent and reliable channel depth.
  - Barge fleeting and support services.
  - Focused incentives for shipping on MH corridors.
  - Multistate agreements to support freight navigation along these corridors.

- Multistate and Federal agreements to support investment, maintenance, and operation of the maritime system.
- Creation of Marine Highway groups, commissions, or resources at agencies to represent and advocate for terminals and ports.

Potential Partnership Areas:

- ✓ *Ship and barge building.*
  New vessels could provide efficiency and better service but are costly and difficult to finance due to slower returns on investments in marine equipment and facilities. Program support and incentives should be provided to encourage innovation in this area.
- ✓ *Workforce development.*
  Awareness, interest, and attraction to the maritime sector are critical factors for building an educated and trained workforce – from agency professionals to barge captains. Agencies and the sector should work collaboratively to advance a training-driven agenda.
- ✓ *Clean fuels.*
  In several locations, there are opportunities to locate alternative and clean fuel production facilities on port property. Some facilities have ample space for handling and storage of crops and biofuels. Such facilities can also operate on alternative energy sources such as wind and solar, and port and waterway vehicles could be fueled by energy manufactured on site.
- ✓ *Recognize the last mile(s) to the ports/terminals as critical freight corridors.*
  Ports should advocate for, and government agencies should recognize, port landside access roads and rail lines as critical to freight movement and the economy of their regions. Designating these routes as critical freight corridors can expand program eligibility for the facilities, provide for greater awareness of the functionally of these routes, and act as a marketing strategy to showcase the port.
- ✓ *Program funding should be available for private terminals*.
  To support the move of freight from the highways to waterways, private terminals should be included in program eligibility, state port cargo data collection, and FAC membership. As one interviewee stated, "There are just a couple public ports along the river, and a hundred private terminals moving 90% of what's moved. How do we recognize this and support private terminals?"

  Including private terminals provides for a better accounting of state waterway tonnages, leverages success for private sector businesses, and promotes a system of ports on maritime corridors.

One of the more poignant points made concerning port development was provided by a public port representative when he stated: "*This is a long process; people look at our port and want to start at this level. This has taken 40 years to build, and we are still building*."

4.1.3 Infrastructure Strategic Area

This area of comments represents perceived infrastructure conditions that limit maritime freight movement and actions that support greater freight movement and port development.

- ✓ *Modernize the system. Tows, locks, equipment, marketing, and service. All of it*!
  If the industry wants to advance, it needs to change. Investment and research in equipment, hydrology, logistics, climate, and marketing are needed to revitalize the system.

- ✓ *Move towards electric equipment on the dock.*
  Respondents cite aging and polluting equipment as part of the drive for electric equipment. The other benefit is public awareness, and potential program eligibility from going green with port equipment.
- ✓ *Explore cargo specific equipment for greater efficiency and containers.*
  When asked about new cargos and the need for equipment, the responses were couched in terms of the type of new cargos. Any new cargos would require new equipment unless it was similar to current cargos. Respondents cited larger equipment, electric equipment, and container handling equipment as potential needs.
- ✓ *USACE is doing good job keeping channels open.*
  Every year there are notable shutdowns of river or lake freight movements due to low water, high water, or a need for dredging. Still, interviewees resoundingly approved of the USACE management of water levels. They cite improvements in management of the resource and solid relationships with stakeholders as evidence of a positive working environment.
- ✓ *USACE is doing a good job managing storage.*
  In the case of the Missouri River, a nine-foot channel depth is created and managed by a series of six upstream lakes and channelization devices throughout the system. Storage in the lakes is largely dependent on snow melt. A balance between water releases for navigation, downstream users, and lake users must be found every navigation season.
- ✓ *Consider creating a large lake for additional storage for low water on the Missouri River.*
  Create a large lake in Northwestern Missouri to maintain flows in the Missouri River during periods of low water. The lake would be derived from feeder streams and provide backup flow to the Missouri River for summer and winter lows. While the environmental clearance for such a task would be substantial, the Missouri River provides approximately 60% of the flow in the Mississippi River at St. Louis. This makes the Missouri River contribution critical to the Mississippi system and reflects the need for a systems-level approach in understanding the inland waterways.
- ✓ *Consider public-private partnerships (PPP) for waterway investments.*
  The mix of private and public users and their interests in development aligns with PPP investments. Private investment could help modernize system components and generate benefits for both the private and public sectors.
- ✓ *Landside port access is generally good.*
  There were only a few issues raised with road access to the port or terminals mentioned during the interviews. Respondents did state that the roads and bridges servicing ports should be designed for freight loads greater than typical rural pavement designs, and that bridge and tunnel heights should be adequate for OSOW loads.
- ✓ *Call for an inventory of docks and dock conditions.*

The call for an inventory is based on a strategic development perspective. Public port advocates reflected that the industry is not aware of the scope and the condition of these facilities. An inventory is needed to provide a baseline for the planning process.

- ✓ *Call for inventory and upgrade of last-mile access.*

  Rough roads, difficult traffic, and restrictive intersection geometries should be identified and fixed to allow critical ports to function as heavy-weight capable freight facilities.

- ✓ *Call for DOTs to add the last mile(s) to ports as critical freight corridors.*

  In addition to an inventory of the last mile access routes, state DOTs should identify these access routes as critical freight corridors in their freight corridor inventory. Inclusion recognizes the role and importance of ports to state economies and reflects the need for road design and geometrics to accommodate freight movement.

- ✓ *Provide dredging and channel maintenance to maintain draft.*

  Port leadership frequently cited the need for continued maintenance of river channels and harbors to maintain maximum loads and economic efficiency at their facilities. They also pointed to the need for dredging in other parts of the system to ensure through traffic to its destination. There is an awareness and recognition across port leadership that the lakes and rivers are a system, and that downstream and upstream issues are everyone's issues.

- ✓ *Identify applications for reuse of dredged materials.*

  This issue is related to the continued need for dredging across most of the system. There is a need for standards and specifications for the dredged materials to allow for their reuse under contract specifications within the construction industry.

- ✓ *Buy America preferences present real limitations to the purchase of material handlers at ports.*

  Respondents consistently mentioned that Buy America provisions are problematic in the port world, as most (if not all) material handlers used at ports contain foreign components. Additionally, waivers for the program are in question and may be withdrawn according to proposed legislation [16].

  The Buy America program and the lack of American made material handlers has halted MARAD Port Infrastructure Development Program (PDIP) grants at some ports and is of concern for those seeking funding for improvements that require material handlers.

4.1.4 Awareness Strategic Area

Among the longstanding critical needs for maritime development are improving awareness of waterways as shipping options and ensuring that the economic and environmental benefits of moving cargo on the region's lakes and rivers are understood by decision makers, policy makers, and the public. For example, the number of trucks diverted from highways with barge tows (~70) and Great Lakes freighters (~2,300) is a statistically sound and may demonstrate the importance of maritime freight to state DOT leadership circles.

- ✓ *Within the state DOTs, make sure the executive leadership, engineering staff, and communications personnel are aware of waterway advantages for pavements and traffic.*

  Marine freight remains a niche topic in most DOTs. Advocates should ensure that the core department areas, especially highway engineers, are aware of the benefits of waterway freight movement. Within the agency, using districts, teams, and unit meetings can help present the information. Special presentations by DOT leadership should be arranged with Commissions and State leadership that govern DOTs. Further, informal professional networks can be an effective means of communicating the importance of waterways within the agency.

- ✓ *Within the FAC, create a marine modal emphasis day.*

  Most of the FACs in the MAASTO region have waterway representation of some kind. This often includes a federal or state agency representative, or a representative of the ports, state port association, and/or marine services in the state. Marine freight FAC members perceive that the marine freight awareness of general FAC members is limited. It is recommended that a marine freight session be included as a focus of a FAC meeting, or a marine freight-based tour with a session should be conducted.

- ✓ *Within state legislative body – create and/or attend a Port Day.*

  With many of the region's ports partially dependent upon legislatively or governor allocated funding, it is imperative that legislators, lobbyists, and the public are aware of the importance and benefits of marine freight. Personal visits can provide an opportunity to showcase ports and the system.

- ✓ *DOTs should work more with groups like The Great Lakes St. Lawrence Governors & Premiers (GSGP) to leverage existing goodwill and marketing.*

  Existing advocacy and representative groups such as the GSGP, Upper Mississippi River Basin Association (UMRBA), Inland Rivers Ports and Terminals (IRPT), and others are effective in their work and should be included as advocates when the various agendas of the groups align. This broadens the messaging to more stakeholders and demonstrates a collective voice across the industry.

- ✓ *Industry, commerce/economic development, and DOTs should establish a similar group for inland rivers.*

  Similar to the GSGP, an Inland Rivers group championed and managed by State Governors would elevate attention to infrastructure needs along the region's rivers. The group could provide strategic program direction, feature the voices of high-level champions, and provide the organization and representation needed to impact policy and funding.

- ✓ *Participate in USACE, Fish and Wildlife Service, Coast Guard meetings, and all other agency events related to the waterways.*

Providing marine freight stakeholder input for federal and state policy changes and actions is critical. Conservationists, flood plain groups, communities, and other agencies all participate in these open houses and hearings. Industry and waterway advocates should attend and ensure their perspectives are recorded.

- ✓ *Market the industry as green.*

  The environmental benefits of waterway freight movement should be marketed to the public, within transportation agencies, and across the political spectrum of decision makers.

- ✓ *Where equipment is visible to the public, clean it up, paint it, even better - use it as advertising*.

  The industry is often referred as silent or invisible; however, with increased recreational and cruise activity on the region's waterways, the marine freight sector should work to modernize and reflect an environmentally favorable, clean, and efficient industry.

- ✓ *Attend and participate in supply chain, chamber, and local business group meetings.*

  Port leadership indicated they were interested but not aggressive in their pursuit of new, nontraditional marine cargos. The move to handling untested cargos is a challenge for waterways, but there are potential opportunities. Attending supply chain and business-related professional meetings may broaden connections, increase awareness of innovative logistics trends, provide insight, and potentially generate new business.

- ✓ *Work with local and social media to promote events*.

  Local media, social media, and tourism offices (state and local) should be provided materials to promote the ports and waterways. Events to increase familiarity with the waterfront include the celebration of historic anniversaries of marine events, ribbon cuttings, and ship/tug/barge launches.

- ✓ *Work with DOT to create and establish the warrant and specifications for a Maritime Highway (MH) bridge crossing sign, and Marine Highway Port access sign.*

  Marine Highway bridge crossing signs have been used in Mississippi and should be posted across the MAASTO region to recognize national marine corridors and identify port access routes to the Marine Highways.

- ✓ *Provide marine history and marine supply chain educational materials to educators for kindergarten through high school students.*

  Advocates should partner with existing marine education campaigns within MARAD and NOAA Coastal Management programs to keep marine awareness in school curricula, at summer camps, and through other educational opportunities.

- ✓ *Initiate meetings with maritime advocacy groups to understand the roles of each group and how they might work together.*

  Respondents called for greater representation and a voice in policy, program, and funding decisions. Many groups currently exist to advocate for specific issues. For example, the American Waterway Operator (https://americanwaterways.com/) represents the barge industry and works to address issues of concern to barge operations. For lock and dam and infrastructure issues, the Waterways Council is the primary advocate (https://waterwayscouncil.org/).

- ✓ *Create stronger marine professional and business networks.*

There are several potential partners in the maritime sector. The sector and its advocates should leverage relationships with groups representing other waterway corridors, marine-oriented associations, and other groups that can build a larger voice and avoid redundancy in advocacy.

4.1.5 Environmental Strategic Areas

These characteristics of and proposed actions for, marine freight development provide green incentives to incorporate waterways into supply chains, create goodwill with the public and agencies, and provide efficiencies in shipping.

- ✓ *Create more interest in industry sponsored river cleanups.*

  Work with industry and advocacy groups on river cleanups and create awareness of the events. These efforts create community goodwill and support for ports and the waterfronts.

- ✓ *Consider tours and recreational operations as part of a diversification plan.*

  Environmental and recreational activities can coexist with port activities. All activities can be incorporated into the port or terminal business model to provide for diversification.

- ✓ *Market the industry as green.*

  Respondents indicated the industry is currently unable to leverage the advantages of environmental benefits under current Federal programs, but they anticipate recognition of these benefit in future programs.

- ✓ *Promote environmental pricing in program formulas and reward low carbon moves.*

  To leverage the environmental and efficiency benefits of waterways, the maritime sector should promote adoption of green factors in program formulas that would incentivize shippers to use waterways. This should be promoted to the DOTs through FACs and through the legislative process with lobbying by state associations.

- ✓ *Participate in USACE, Fish and Wildlife Service, Coast Guard meetings, and all other events related to navigable waterways.*

  Shipping and navigation interests should be represented at all relevant meetings regarding the environmental management of navigable rivers and lakes.

- ✓ "*Green does not pay… currently, so to move containers or real freight off the highways, incentives will be needed".*

  Respondents mentioned interest in moving freight from highways to a greener Marine Highway system. For containers, the industry could initiate a container design and build initiative, along with a brokerage firm to manage container inventories for ports. This would entail development of container manufacturing and distribution complex for inland waters at a port.

  The maritime freight sector should also work with state commerce and economic development agencies to attract appropriate operations to existing harbor and port facilities, including the reuse and remediation of brownfield sites. This would encourage the movement of raw materials and finished products through the waterfront, reducing long-distance truck moves.

Lastly, the maritime freight sector and DOTs should develop business cases and supply chain models for relevant cargos, to demonstrate that waterways are part of an efficient, green, and multimodal logistics system. This information can then be used for advocacy with policy makers, marketing, customer attraction, and building goodwill with the public.

4.1.6 General Observations

The interviews with port leadership and marine advocates revealed a range of port scenarios that could impact the types and volumes of cargo moving across the docks. The respondents also identified proposed changes and innovations that would positively affect market development. These factors have been categorized into five strategic areas of understanding and action to support agency and maritime freight sector efforts in waterway development.

Understanding these five strategic areas, combined with the port buffer tool at MAFC Port and Terminal Buffer Tool, provides an understanding of development opportunities for ports in the MAASTO region. In the following chapter, this collection of strategic planning products is summarized and organized for implementation.

5. SUPPORTING COLLABORATIVE PORT DEVELOPMENT

5.1. Introduction

This project provides an understanding of the port market development context though the MAFC Port and Terminal Buffer Tool. The buffer tool maps the business locations and provides information on relevant businesses and industries within a 90-minute drive time of the port or port area center point. The project also incorporates discussions with 35 port professionals and 30 ports and terminals across the MAASTO region, outlines previous research findings, and summarizes a teleconference reviewing the findings with the stakeholders. These components of the project provide an understanding of how state DOTs and ports can support market and waterway system development.

In summary of the discussion with port advocates, attracting new cargos and advancing the marine system requires a broad range of actions. The maritime freight sector must demonstrate it can provide a reliable, viable, and cost-effective shipping strategy in the larger multimodal system in order to attract potential cargos beyond the traditional, primary cargos moved on the waterways. In addition, advancing the role of waterways within the U.S. logistics system will require efforts in serval areas including innovative tow operations and practices, state and federal agency leadership for port development, reliable formula funding for port development, improvements in management of hydrology and marine systems, better lock and dam technology, and environmental conservation.

All respondents agreed that it will be difficult to overcome seasonality and climate/weather issues that close the system and/or delay shipments. However, having a more benign environmental footprint is a major advantage of using ports and the associated waterways. Still, at this time, neither the market nor transportation programs support or reward mode use based on a reduced environmental footprint.

Port leadership called for dedicated state agency maritime staffing like that currently available for the rail and trucking industries. They also called for reliable formula-based funding, and a need for increased awareness of the benefits of waterways within state agencies and government leadership. Similarly, the larger logistics sector and the public are perceived to lack an awareness of inland marine freight systems. Without awareness of the service, along with its benefits and constraints, the industry will continue to operate with limited exposure to potential markets.

The respondents also expressed that transportation and economic development at the ports should be a shared responsibility among the terminal operators, local agencies, and state transportation agencies. Efforts should also include relevant non-transportation agencies such as economic development, commerce, and natural resources. A combined focus on waterway freight development by these agencies increases the constituencies, expands potential program applicability, and extends overall awareness of the benefits of moving freight on the waterways.

5.2. Implementation of Strategic Agenda

Interviews with stakeholders identified a broad range of strategies and opportunities, as well as constraints to increased market development. To verify the information summarized from the interviews and literature, and to ensure the functionality of the MAFC Port and Terminal Buffer Tool, a working session was held with study participants and MAFC state representatives. The

teleconference was conducted on Microsoft TEAMS and provided the 37 attendees the opportunity to ask questions, make additional comments, and provide additional information.

The information from the interviews was presented at the teleconference as a strategic application of five focus areas that include actions, market contexts, and constraints in the areas of: 1) port market development; 2) organizational development at the ports/terminals and DOTs; 3) infrastructure issues and opportunities; 4) awareness of the system, its benefits and how it works; and 5) the environmental footprint of marine shipping. The components of each of these areas was reviewed with the participants and the group agreed on the findings.

When asked to prioritize the strategic areas for action, all the areas and factors reviewed were cited as critical to creating the system needed for today's markets. When pushed for a more distinct response, one port director responded that the importance of each of these strategic criteria would depend on the stage of development of the port or terminal. Smaller ports may need more support in startup planning and administrative funding, while larger ports may see market development and awareness as the most important efforts. At the conclusion of the prioritization process, market development activities and infrastructure maintenance and improvements were identified as the two most important strategic areas. The top proposed actions to complement the five strategic categories and lay a foundation for development are described in Chapter 3.

The MAFC Port and Terminal Buffer Tool was also reviewed during this session. The marine industry representatives and state DOT participants responded positively to the tool. One DOT participant responded the tool will be useful in their marine planning and in verifying their current work on market development. Port representatives can use the tool to identify and understand the business structure and climate around their facility, as well as find information on the business size and contact information.

A request was made to make the files from the tool downloadable. Project staff have incorporated this functionality into the application.

Overall, the discussions during the teleconference confirmed the importance of the five components of the strategic approach and the buffer tool. Comments made during the session were incorporated into this report.

A broad range of strategies and opportunities, as well as constraints, were identified by the port leadership.

5.3. A Need for Research, Innovation, and Action in Marine Freight Systems

In developing the strategic approach for maritime freight, several actions and constraints were identified as options or issues across two or more of the five strategic categories. These strategic actions also received strong support from the participants and were rated as being of special importance to the planning and development process. While each of the actions in the comprehensive list could prove beneficial to port and waterway freight development, the following actions were highlighted by study participants as the most important in support of increased freight loads on the waterways and associated port development.

The Market Development and Infrastructure categories were prioritized by the industry representative during the working teleconference session and are presented first.

Priority action items under the category of Market Development include the following:

- ✓ Create a business case model for key cargos and potential cargos. This project would provide a comparison of the costs, shipping times, and environmental benefits of cargo movement on rail or highways versus a logistics strategy that includes the waterways.
- ✓ State and port leadership should use the buffer tool to become familiar with the business structure and climate in the port or terminal area. The tool also provides business contact information.
- ✓ Create programs that reward green shipping on Marine Highways.
- ✓ Utilize Marine Highway designations to leverage funding and development.
- ✓ Port leadership should consider attending local supply chain meetings to explore potential cargos and develop the needed networks to establish business.

Priority actions considered under the Infrastructure category include the following:

- ✓ DOTs should conduct a dock and facility inventory for public ports. DOTs should work with associations and individual terminals to include private sector information. Including the private sector port inventories captures the true scope of maritime freight and a more accurate portrayal of the total tonnages.
- ✓ Work with DOTs to list port access roads as critical freight corridors.
- ✓ Include private terminals in programs, data collection, and FACs.
- ✓ Inventory port equipment needs.
- ✓ Find alternative funding for dredging and the use of dredged materials. Ports repeatedly mentioned falling off the USACE dredge list due to decreased freight volumes across their docks. This threatens continuation of dredging and ultimately the operability of ports and of the overall system.
- ✓ Dredging and channel maintenance should be provided as needed across the entire system for ports that have sufficient active and sustainable operations. The entirety of navigable rivers and lakes should be considered as an interconnected system.
- ✓ Define the ports, terminals, multimodal connections, and waterways as a system of freight corridors. Any cargo changes, closures, or expansions in one area of the system impacts other areas.

Priority actions under the Organizational Development category include the following:

- ✓ Where feasible, state DOTs should provide dedicated marine staff to complete planning, and support operations and development at ports.
- ✓ State DOTs should include waterway representation on their FACs. More than one representative may be necessary to reflect the breadth of the industry.
- ✓ Ports, terminals, the State DOTs, and regional MARAD representatives should participate and support the state port association. If an association does not exist, the industry should consider creating one.
- ✓ Port leadership should participate in the FACs when possible.

- ✓ Ports, terminals, and state DOTs should attend meetings held by USACE, Departments of Natural Resources, and the Coast Guard regarding waterway management.
- ✓ Consider creating a river commission like GSGP to represent interests of the users, provide system level planning, and advocate for waterway development.
- ✓ Create multistate and federal agreements to fund and improve the waterways freight system.

Priority actions under the Awareness category include the following:

- ✓ Create a port/terminal/waterways day at FAC to familiarize the state DOTs and other industry representatives on the roles, benefits, and possibilities with waterway freight movement.
- ✓ Create a Port/Terminal/Waterways Day during the state legislative session to present the roles, benefits, and possibilities with waterway freight movement.
- ✓ Create business case models for primary and potential marine cargos to compare the costs, environmental impacts, and time to delivery with waterways moves as compared to a logistics strategy that does not include the waterways.
- ✓ State DOT maritime planners and port representatives should attend supply chain, chamber of commerce, and other business association meetings to represent the waterways.
- ✓ Create and install Marine Highway signs at Marine Highway bridge crossings and along access roads to ports serving Marine Highways.
- ✓ Ports, terminals, and state DOTs should attend meetings held by USACE, state DNRs, USCG, and other related agencies regarding waterway management.

Priority actions under the Environmental category include the following:

- ✓ Create business case models for primary and potential marine cargos to compare the costs, environmental impacts, and time to delivery with waterways moves as compared to a logistics strategy that does not include the waterways.
- ✓ Promote environmental pricing/costs of carbon in program formulas and reward low carbon moves.
- ✓ Participate in meetings with USACE, Fish and Wildlife Service, U.S. Coast Guard, and all other agencies related to the resource.
- ✓ Promote the industry as green. Create ways to use social media to educate and advocate.
- ✓ With increases in cruise ships and recreational activities on the waterways, ensure safety through boater education.
- ✓ With increases in cruise ships and recreational activities on the waterways, the industry should display docks, equipment, and facility entrances as clean, painted, and advertise for the industry.

The categories and actions listed above should be prioritized at the port, local, agency, and regional levels. State DOTs, in partnership with state port associations and individual facilities, should work to implement and support the actions.

5.4. Summary and a Collaborative Model for the Future

The partnering abilities of MAASTO states combined with the navigable freight corridors across the region provide the perfect testing ground to revolutionize the waterway system. MAASTO has long been an established leader in developing and implementing multistate solutions to transportation issues and the Marine Highway freight corridors provide an administrative and functional setting to launch a regional marine freight corridor development agenda.

Based on work on this project and the findings in MAFC 29, three coordinated actions could set the stage for innovation that reframes the industry as a modern, efficient, and critical part of the larger freight logistics system. Initiating these tasks requires partnerships that provide for the creation of an effective network of practitioners and decision-makers that can facilitate planning and research. The tasks include:

1. the utilization of the Marine Highways as an organizing tool;
2. creating business case models for primary and potential waterway cargos; and
3. completing dock and facilities inventories.

When completed, these actions should create opportunities for expansion. These actions are briefly described below.

First, MAFC 29 highlights the potential for Marine Highways acting as an organizing and coordinating entity for multistate marine freight corridors. The Marine Highway designation provides a venue to implement many of the strategic actions identified in this report, as well as those in MAFC 29.

State DOTs and the maritime freight sector could establish a commission or organizing body for multistate Marine Highway segments. Such a commission or group would advocate for policies that promote the preservation and development of the Marine Highway freight corridors, including consistent channel depth, expanded marine services, and modal connections across the entire corridor.

Second, research and industry partnerships are needed to develop and demonstrate the business case for waterway freight movement. This approach would be used to compare cargo shipments that include waterways verses those that do not include a marine component. The business case would provide justification for marine shipping based on a comparison of total cost, delivery time, and environmental impacts. Business case models could be created for a variety of cargos and be used to demonstrate the value of waterways to new customers and policy makers.

The third component for immediate consideration is an inventory of the port docks and facilities. This effort should also extend to private terminals. If the private terminals are amenable, adding their facilities increases the system's reported tonnages, adds additional voices to the effort, and builds a network of ports able to work together to create a more robust and viable waterway system.

Within the larger framework of the five action areas identified in this report, this prioritized three-tiered approach provides the structure and organization to build a foundation of innovation and

connectivity across the marine freight system. The designate Marine Highways provide a structure for coordination and organization, the business cases provide the justification, and the dock and infrastructure inventory provide a baseline for states to begin the planning and development process to incorporate more of the five action areas.

With the continued increase in freight volumes, the ever-increasing freight-related highway congestion, and the importance of environmental considerations in transportation, working to move more freight through the ports across the MAASTO region demonstrates multimodal and multistate leadership. MAASTO's committee structure and its multistate problem-solving abilities can take the industry lead in addressing current and future marine freight-related transportation opportunities and issues.

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APPENDIX A – PORTS BY STATE AND OWNERSHIP

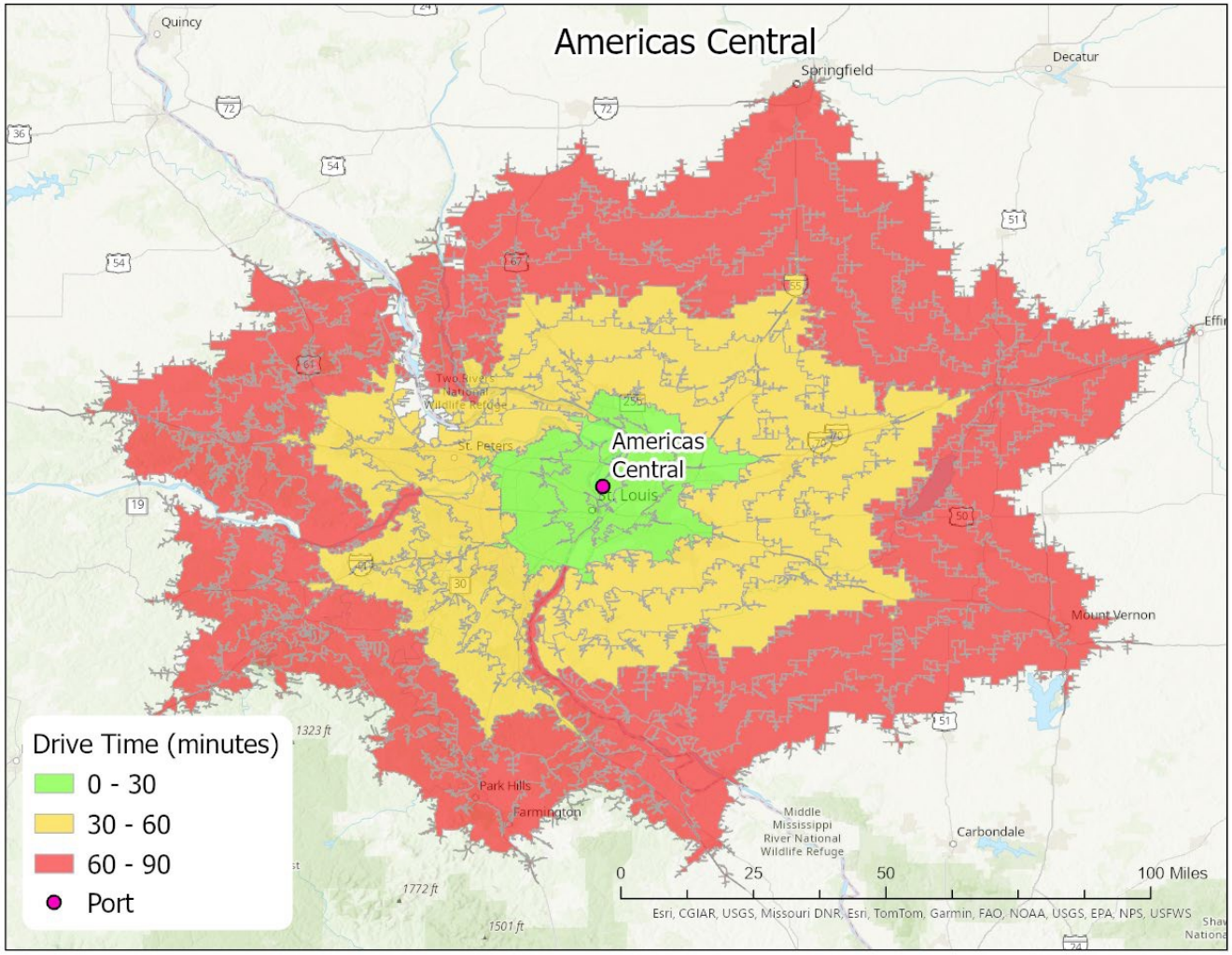
Public and Private Ports by State

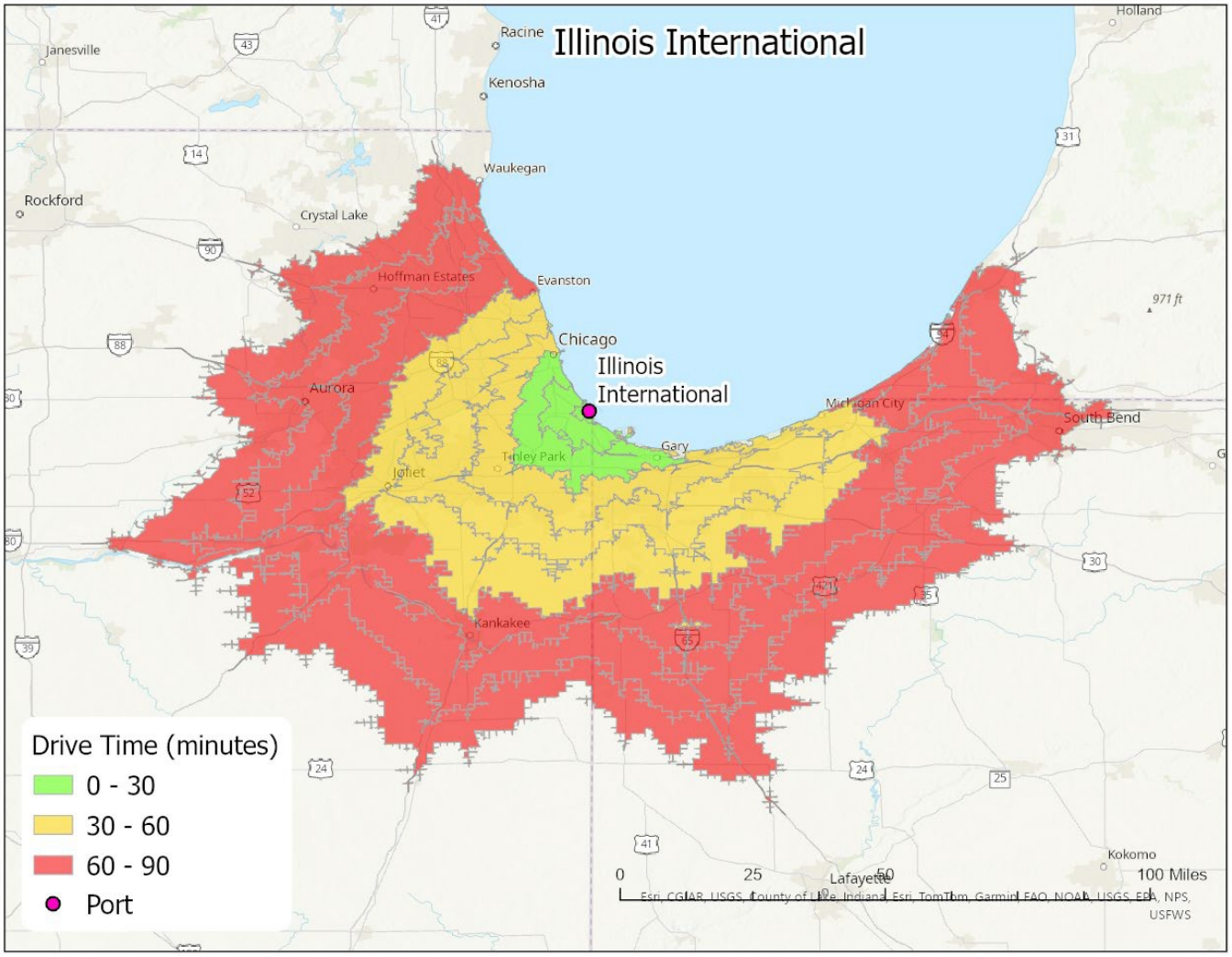
Name	State	Public/Private
Blencoe	IA	Private
Dubuque	IA	Public
Quad Cities	IA	Public
America's Central	IL	Public
Illinois International	IL	Public
Kaskaskia	IL	Public
Burns Harbor	IN	Public
Jeffersonville	IN	Public
Mt Vernon	IN	Public
Atchison	KS	Public
Kanas City	MO	Public
St. Joe	MO	Public
Cincinnati	OH	Public
Owensboro	KY	Public
Paducah	KY	Public
Bay City (Port Fisher Terminals)	MI	Private
Detroit	MI	Public
Monroe	MI	Public
Duluth-Superior	MN	Public
Saint Paul	MN	Public
Winona	MN	Public
AGRIServices	MO	Private
Pemiscot County Port	MO	Public
Semo Port	MO	Public
Cleveland	OH	Public
Mid-Ohio Ports	OH	Public

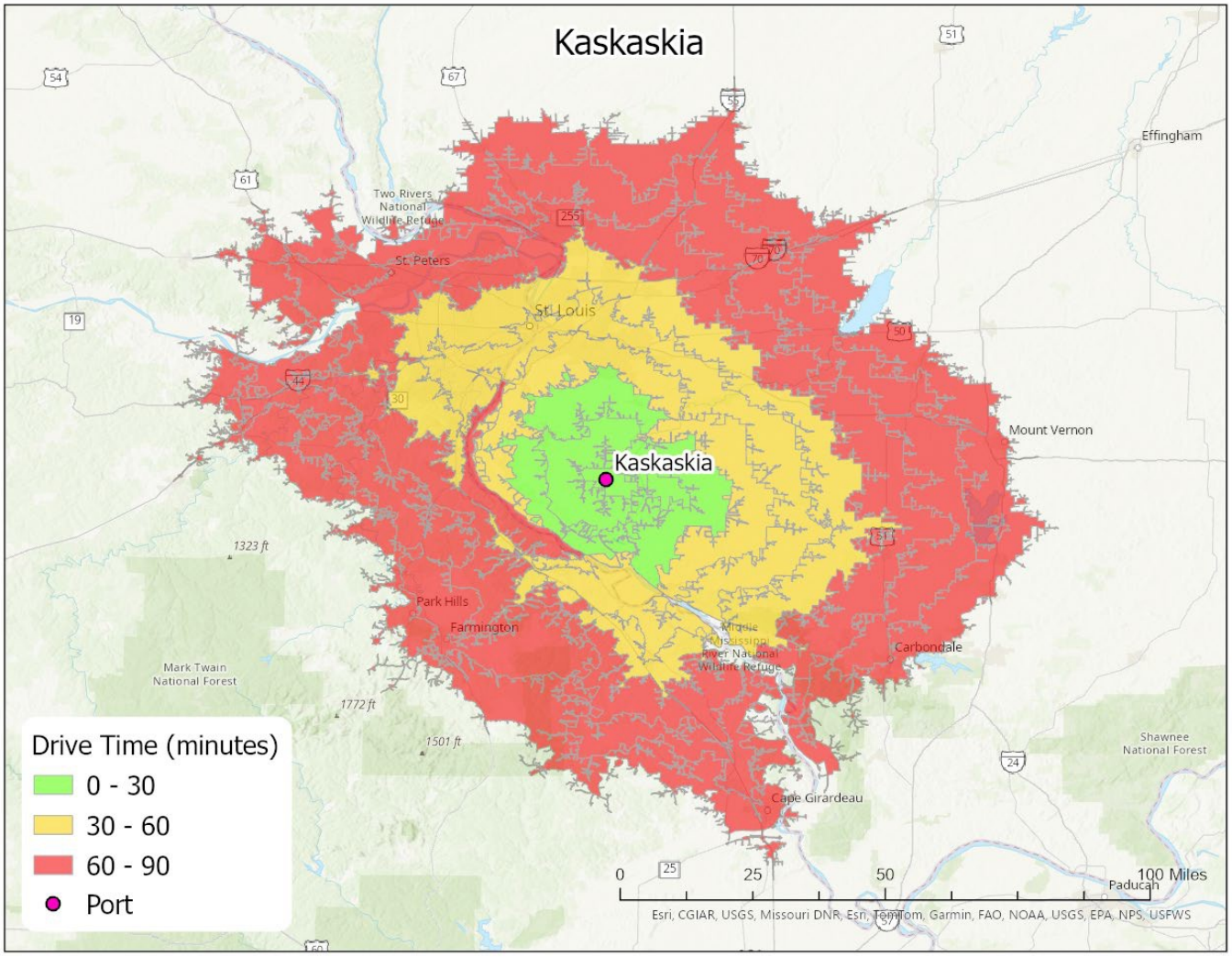
Toledo	OH	Public
Green Bay	WI	Public
La Crosse	WI	Public
Milwaukee	WI	Public

APPENDIX B – DRIVE TIME BUFFER FOR PARTICIPATING PORTS

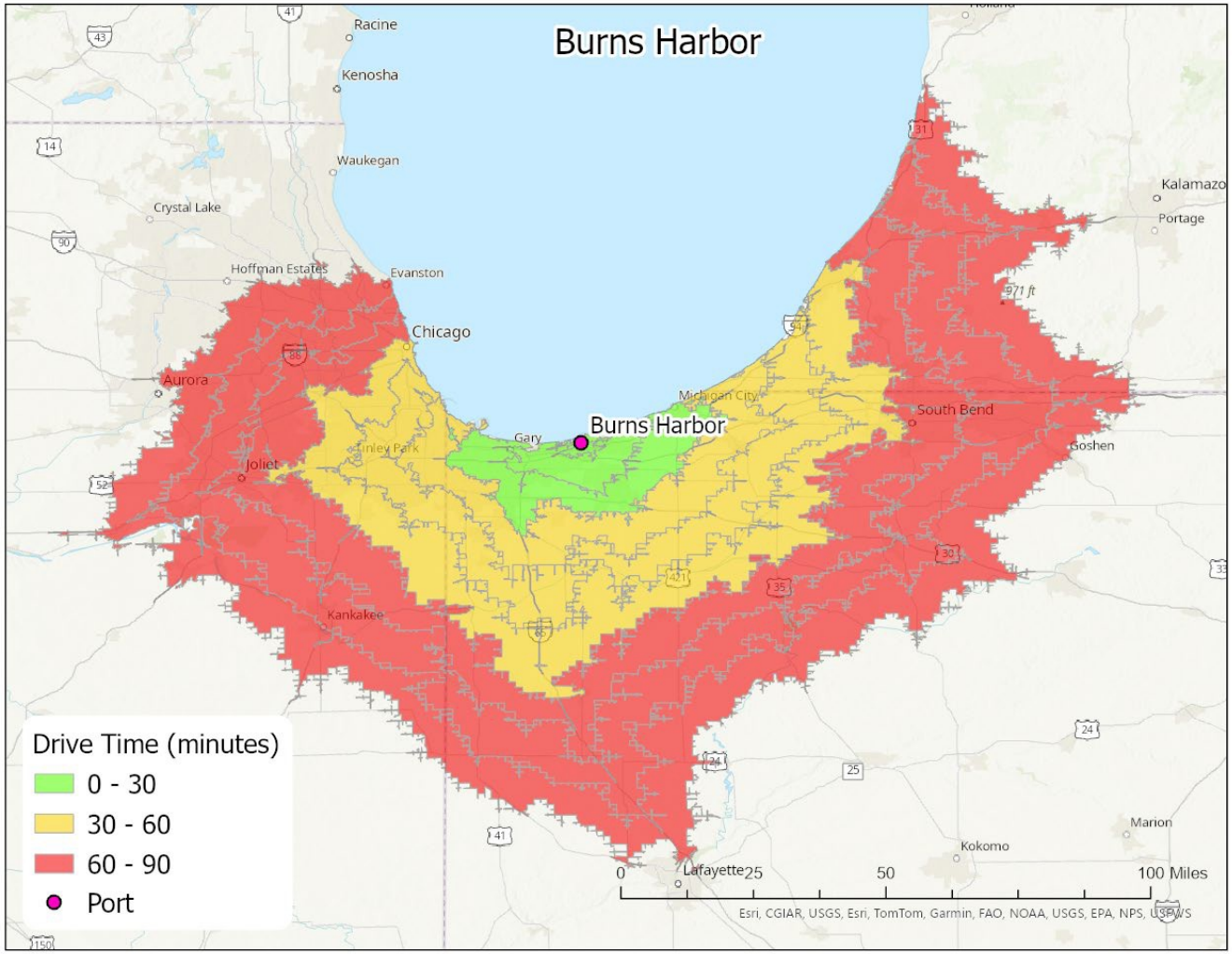
Illinois Ports

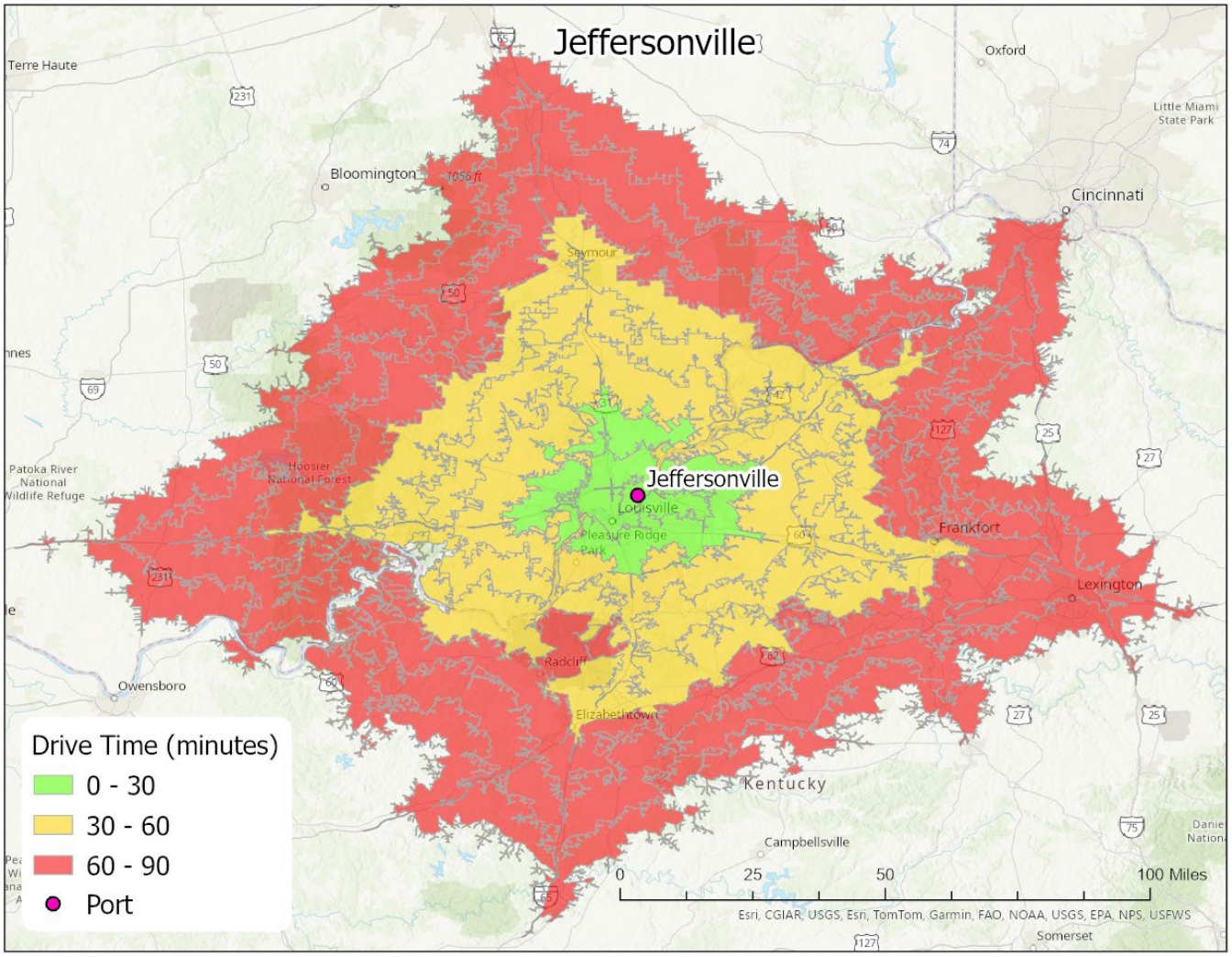


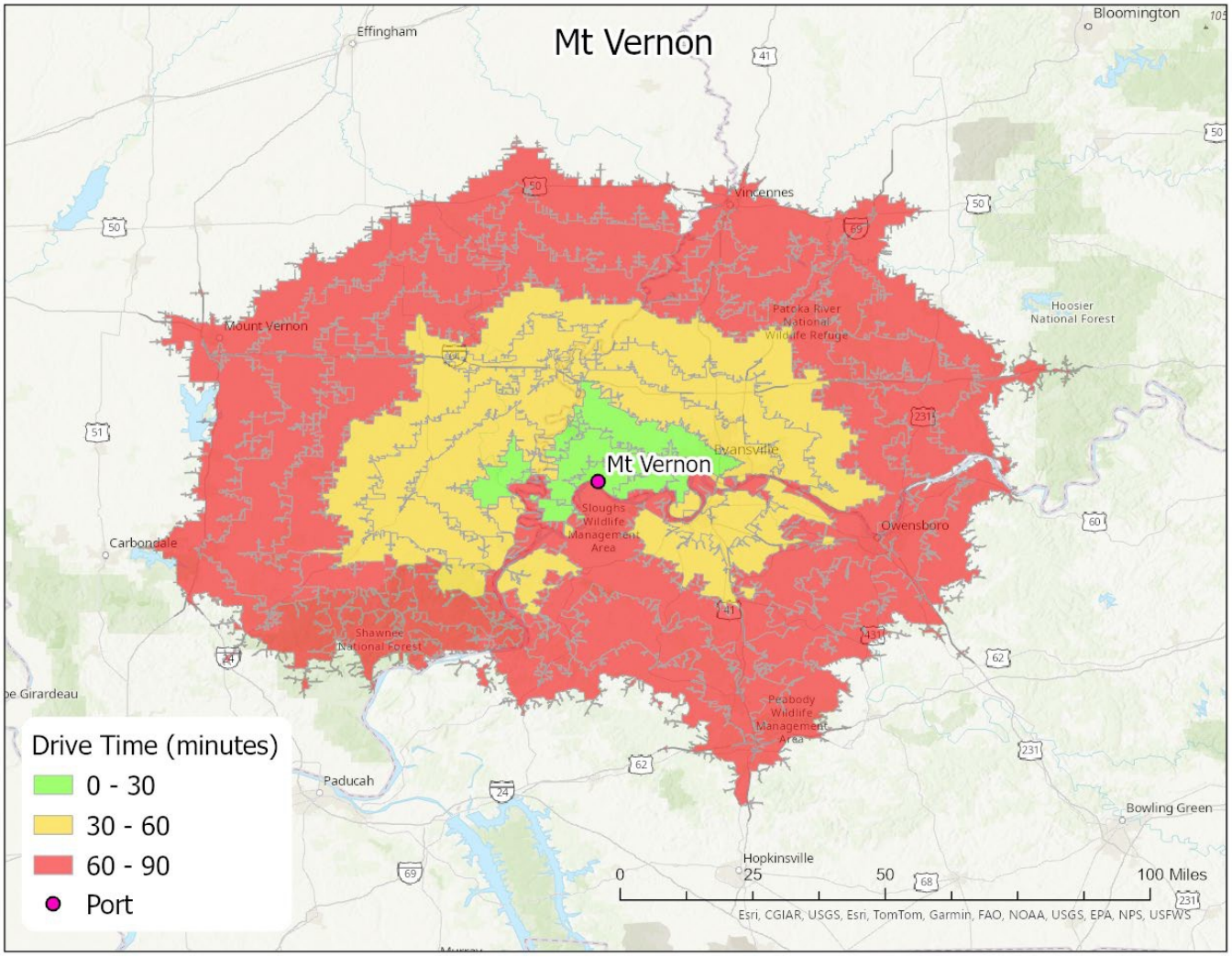

Illinois International
Drive Time (minutes)
0 - 30
30 - 60
60 - 90
Port
Chicago
Illinois
International
Racine
Kenosha
Waukegan
Rockford
Crystal Lake
Janesville
Holland
Hoffman Estates
Evanston
Aurora
Joliet
Tinley Park
Gary
Michigan City
South Bend
Kankakee
Lafayette
Kokomo
971 ft
0
25
50
100 Miles
Esri, CGIAR, USGS, County of Lake, Indiana, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NPS, USFWS


Kaskaskia
Effingham
Two Rivers National Wildlife Refuge
St. Peters
St. Louis
Mount Vernon
Kaskaskia
1323 ft
Park Hills
Farmington
Middle Mississippi River National Wildlife Refuge
Carbondale
Mark Twain National Forest
1772 ft
1501 ft
Shawnee National Forest
Cape Girardeau
Paducah
Drive Time (minutes)
0 - 30
30 - 60
60 - 90
Port
0
25
25
50
100 Miles
Esri, CGIAR, USGS, Missouri DNR, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NPS, USFWS

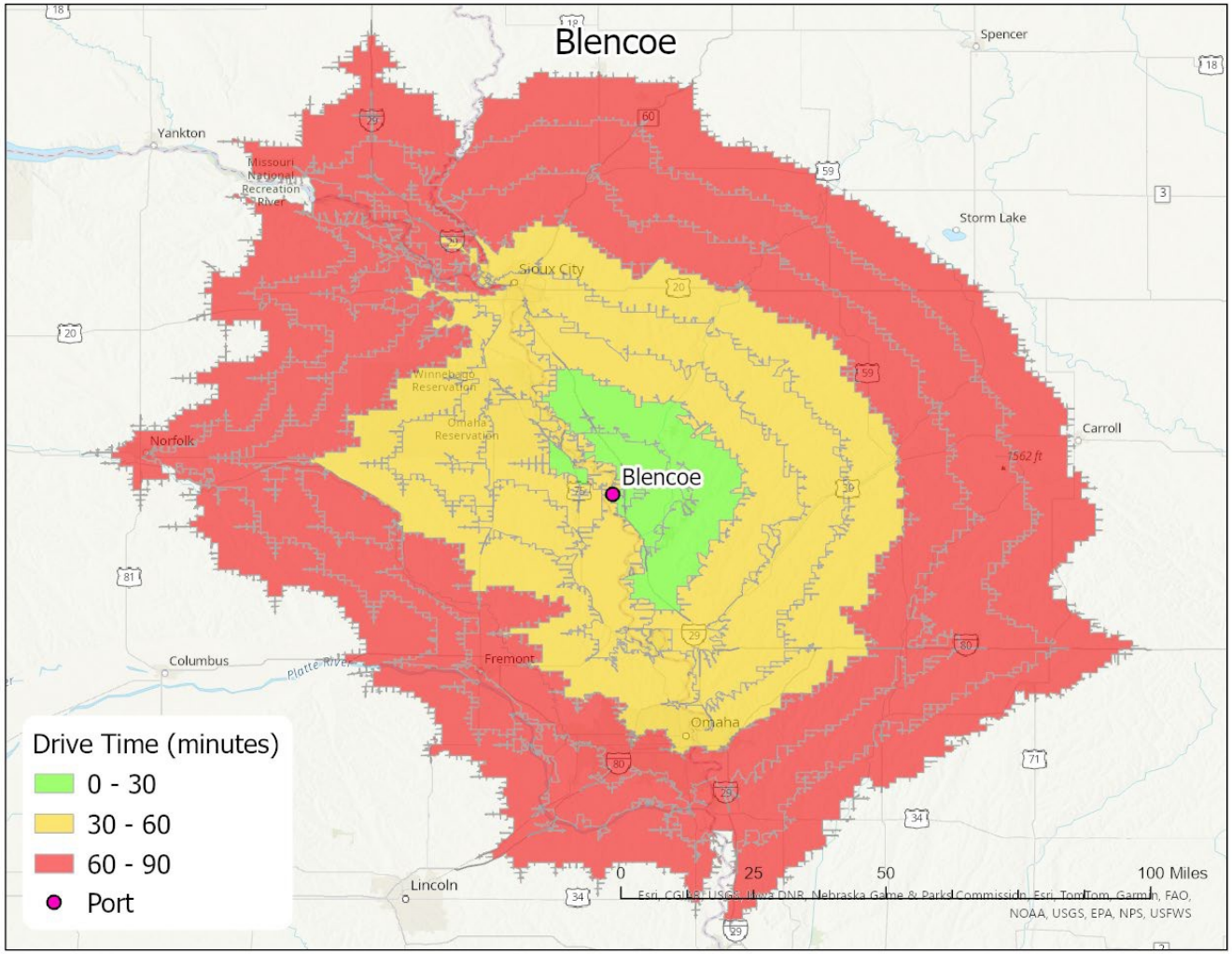
Indiana Ports

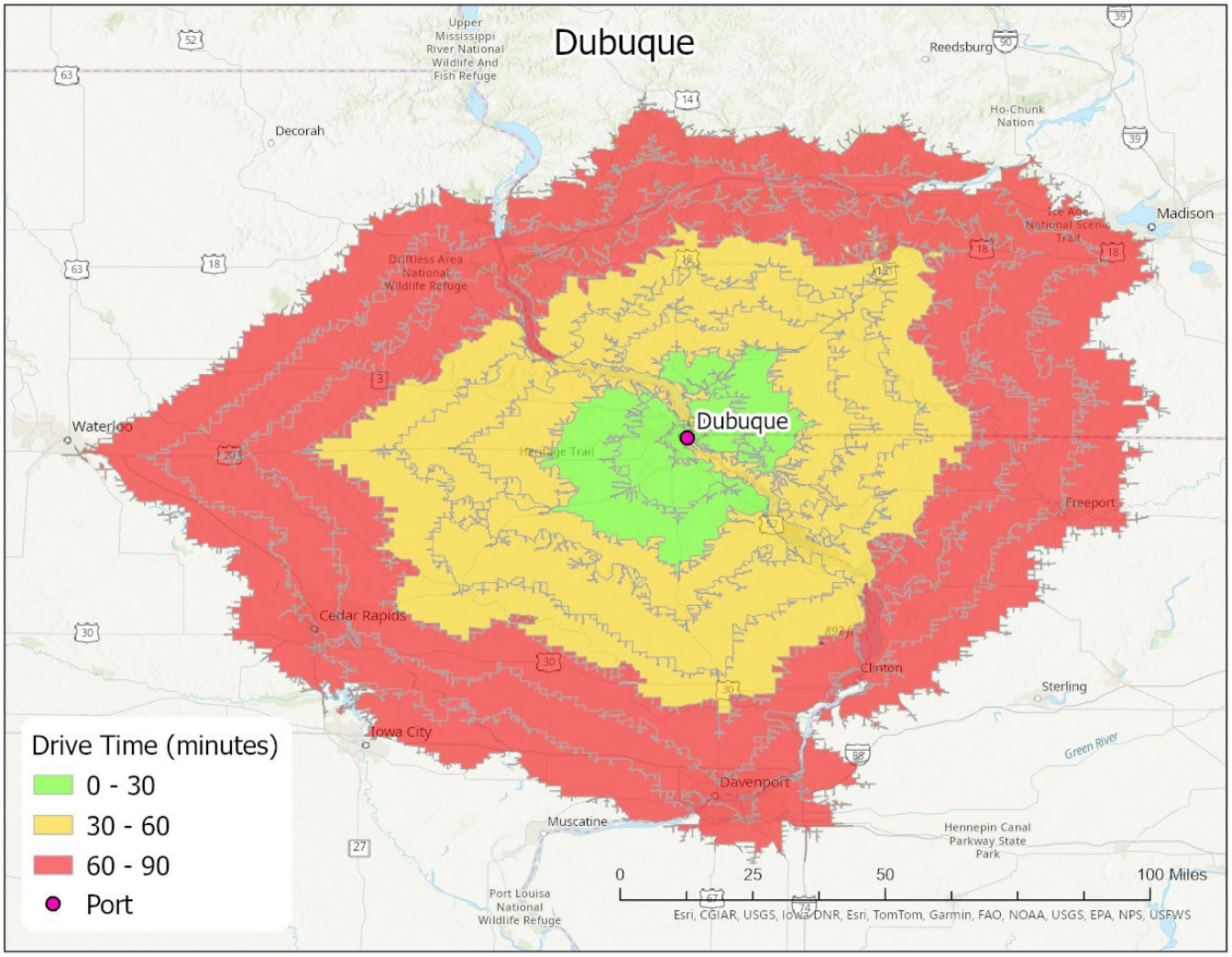


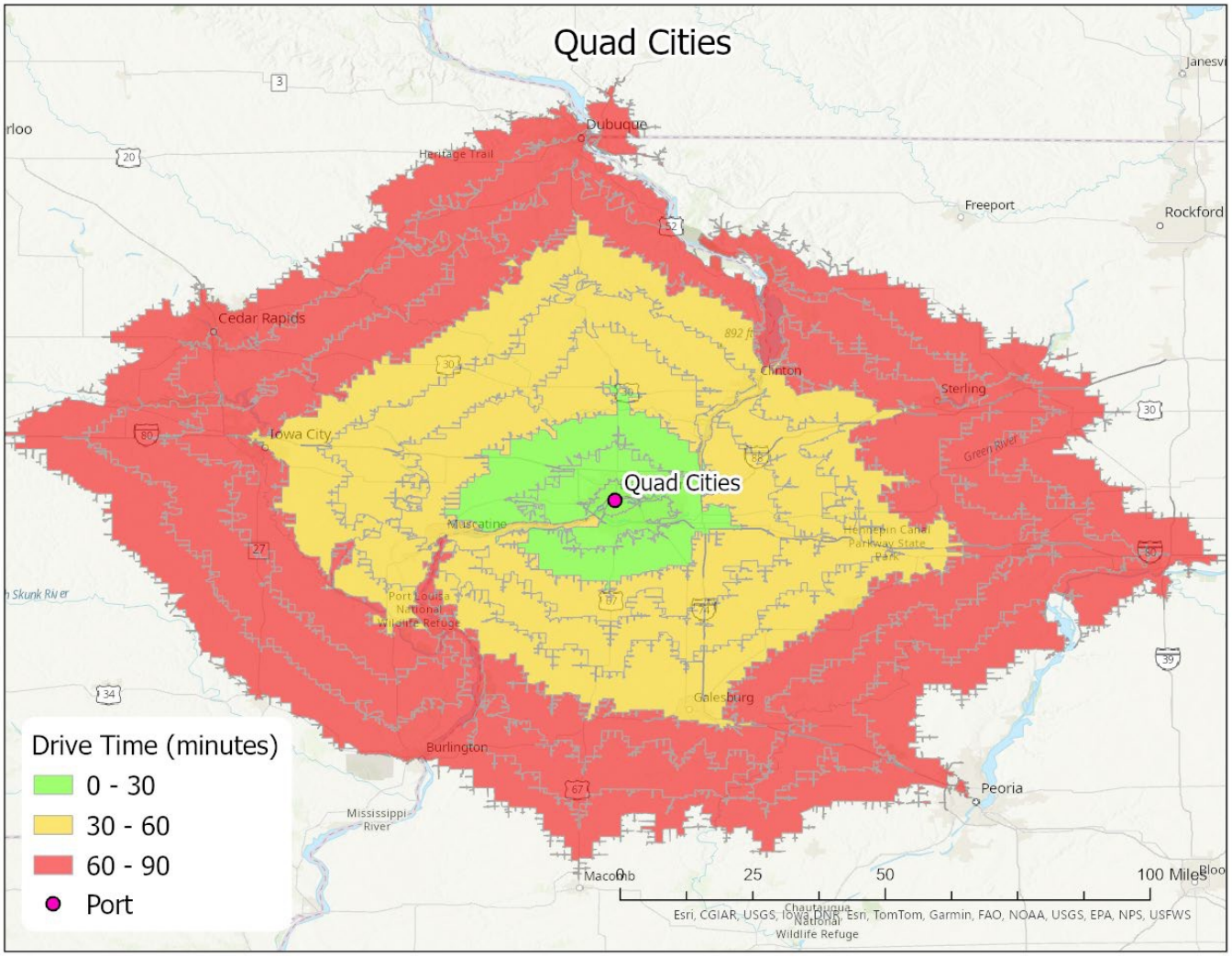

Jeffersonville
Terre Haute
Oxford
Little Miami State Park
Bloomington
1056 ft
Cincinnati
Seymour
Patoka River National Wildlife Refuge
Hoosier National Forest
Jeffersonville
Louisville
Pleasure Ridge Park
Frankfort
Lexington
Owensboro
Radcliff
Elizabethtown
Kentucky
Campbellsville
Somerset
Drive Time (minutes)
0 - 30
30 - 60
60 - 90
Port
0
25
50
100 Miles
Esri, CGIAR, USGS, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NPS, USFWS


Mt Vernon
Effingham
Bloomington
Vincennes
Mount Vernon
Patoka River National Wildlife Refuge
Hoosier National Forest
Evansville
Mt Vernon
Sloughs Wildlife Management Area
Owensboro
Carbondale
Shawnee National Forest
Peabody Wildlife Management Area
Paducah
Bowling Green
Hopkinsville
Drive Time (minutes)
0 - 30
30 - 60
60 - 90
Port
0
25
50
100 Miles
Esri, CGIAR, USGS, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NPS, USFWS

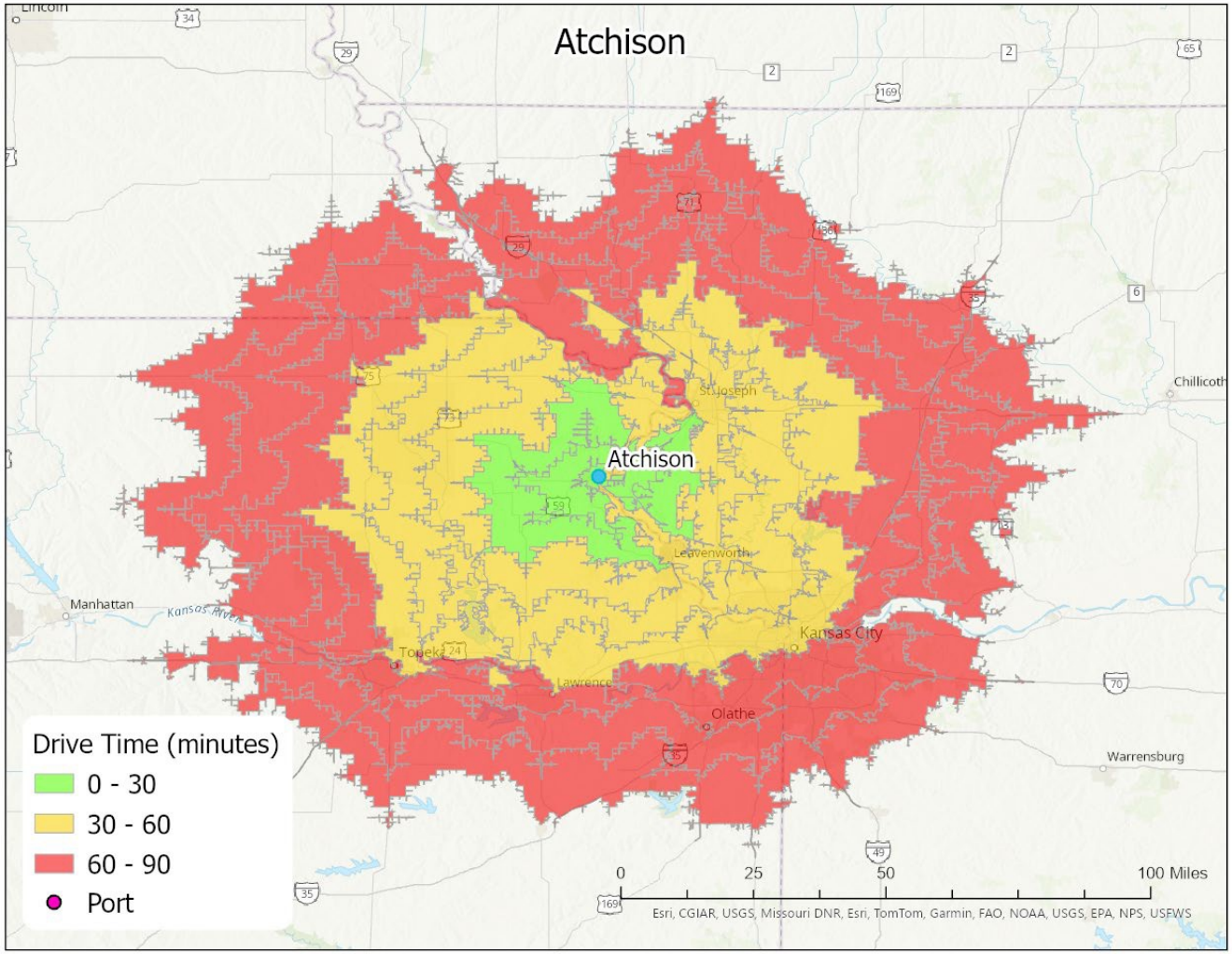
Iowa Ports

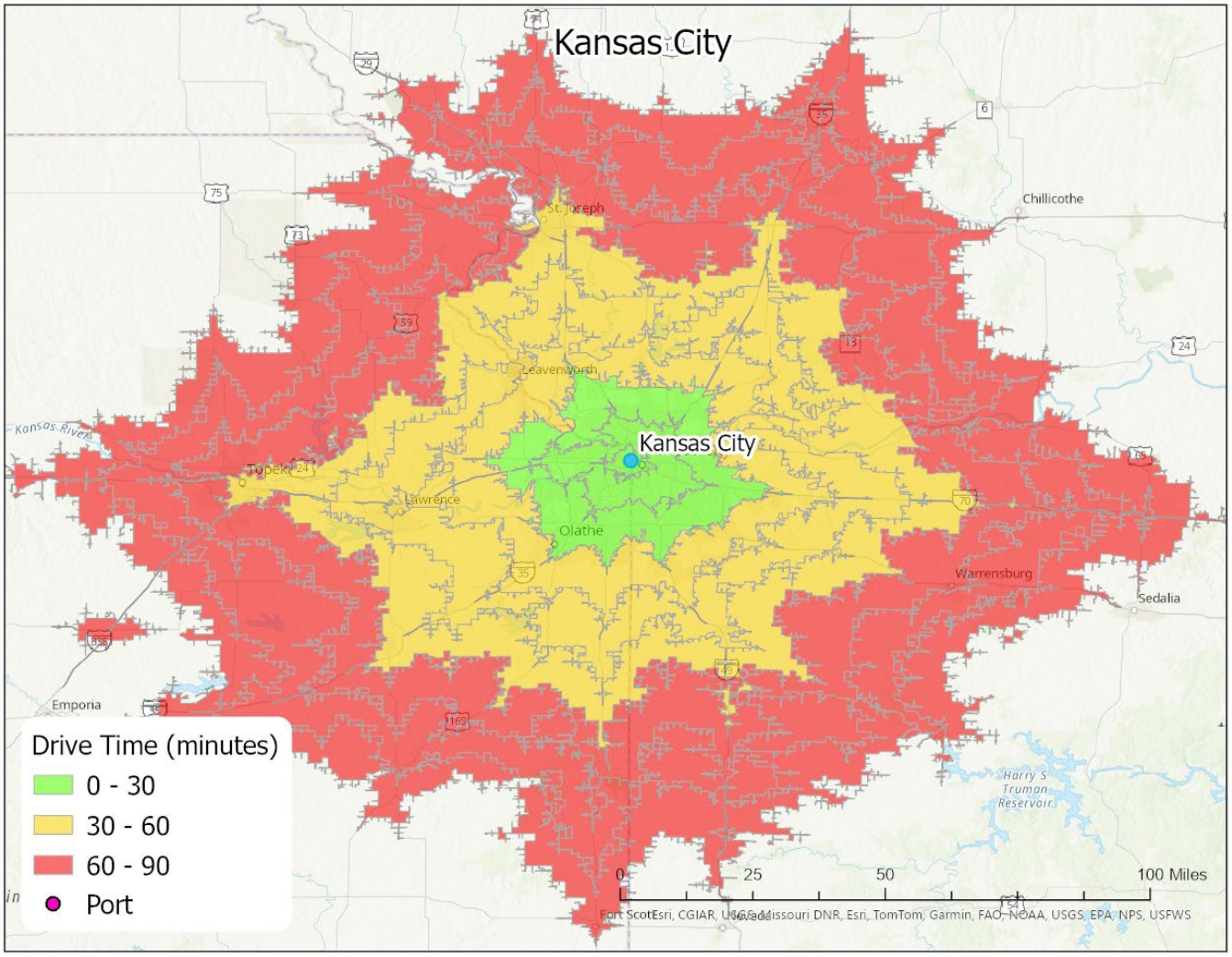

Blencoe
Spencer
Yankton
Missouri National Recreation River
Storm Lake
Sioux City
Winnebago Reservation
Omaha Reservation
Norfolk
Carroll
1562 ft
Blencoe
Columbus
Platte River
Fremont
Omaha
Lincoln
Drive Time (minutes)
0 - 30
30 - 60
60 - 90
Port
0
25
50
100 Miles
Esri, CGIAR, USGS, Iowa DNR, Nebraska Game & Parks Commission, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NPS, USFWS

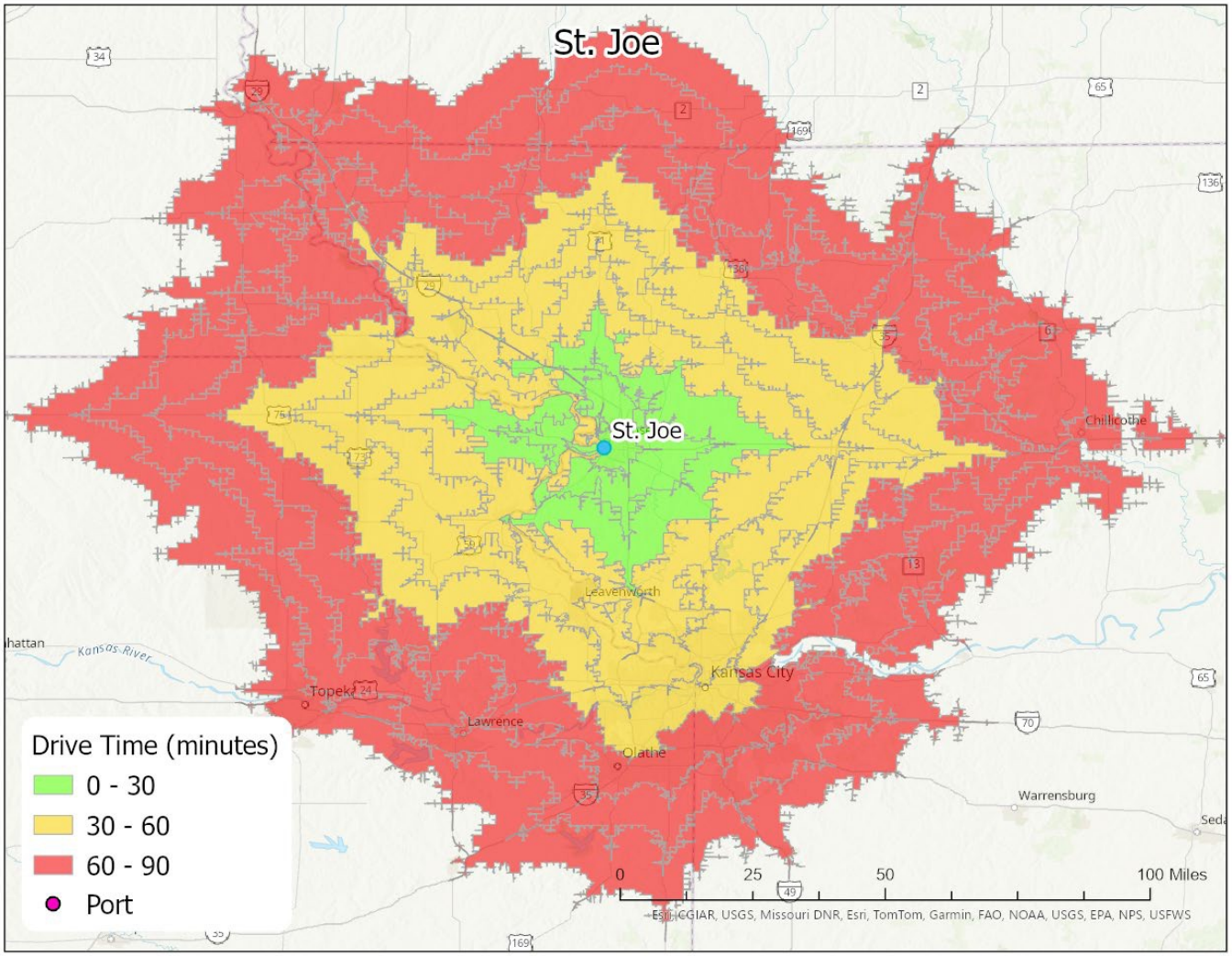

Dubuque
Upper Mississippi River National Wildlife And Fish Refuge
Reedsburg
Ho-Chunk Nation
Decorah
Madison
Ice Age National Scenic Trail
Driftless Area National Wildlife Refuge
Waterloo
Dubuque
Heritage Trail
Freeport
Cedar Rapids
Clinton
Sterling
Iowa City
Green River
Davenport
Muscatine
Hennepin Canal Parkway State Park
Port Louisa National Wildlife Refuge
Drive Time (minutes)
0 - 30
30 - 60
60 - 90
Port
0
25
50
100 Miles
Esri, CGIAR, USGS, Iowa DNR, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NPS, USFWS


Quad Cities
Dubuque
Heritage Trail
Freeport
Rockford
Cedar Rapids
Clinton
Sterling
Iowa City
Quad Cities
Muscatine
Hennepin Canal Parkway State Park
Port Louisa National Wildlife Refuge
Galesburg
Burlington
Peoria
Mississippi River
Macomb
Chautauqua National Wildlife Refuge
Drive Time (minutes)
0 - 30
30 - 60
60 - 90
Port
0
25
50
100 Miles
Esri, CGIAR, USGS, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NPS, USFWS

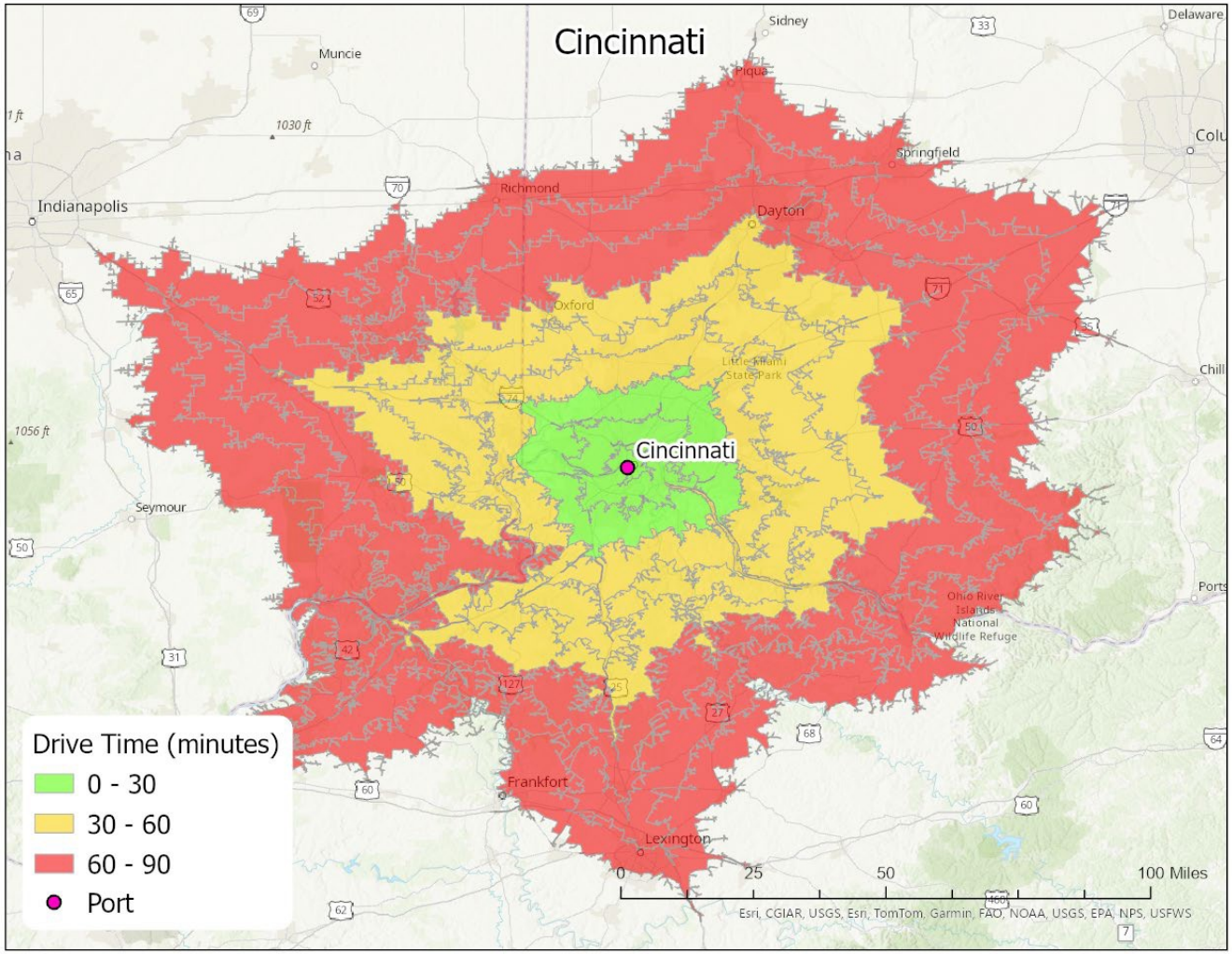
Kansas Ports

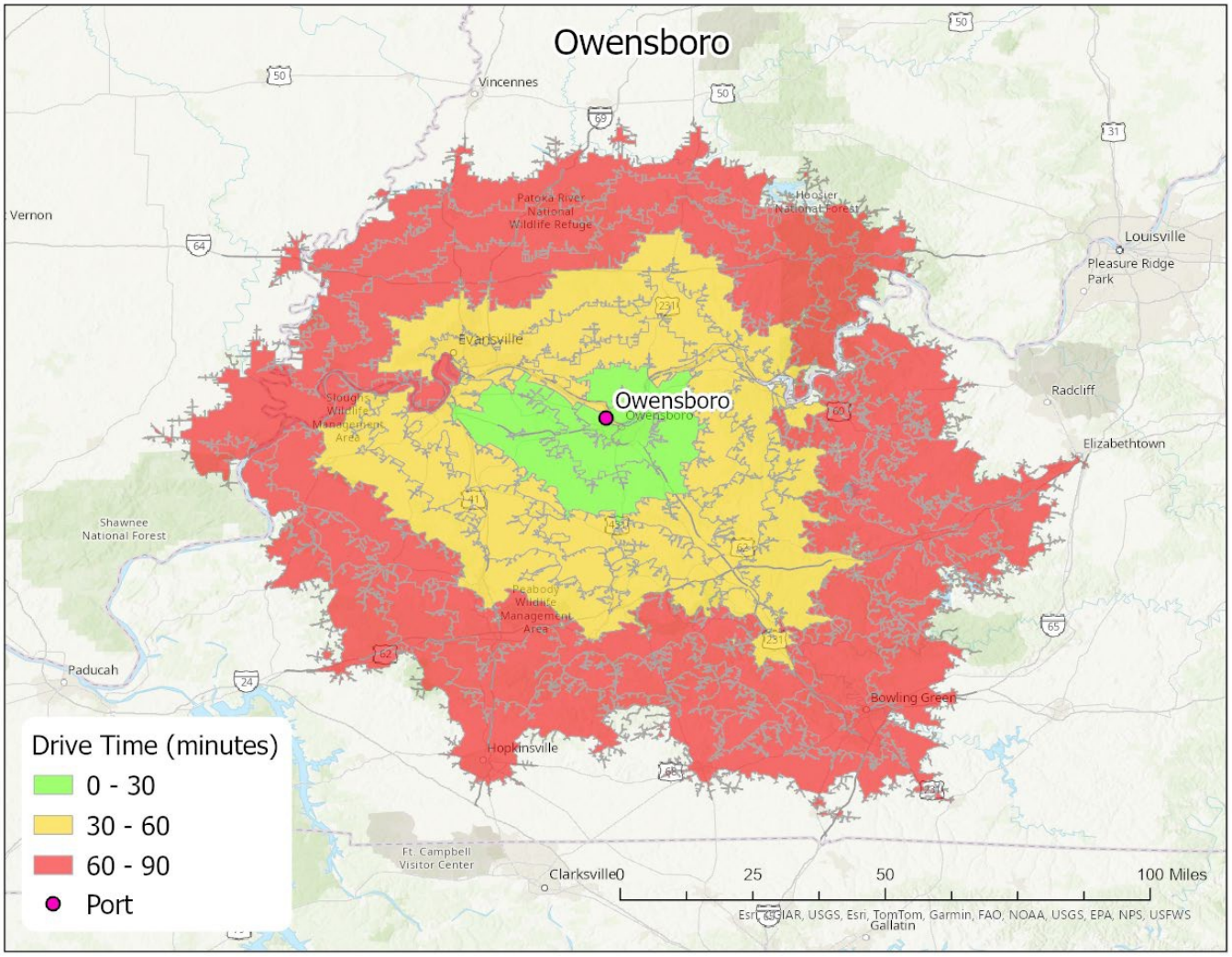


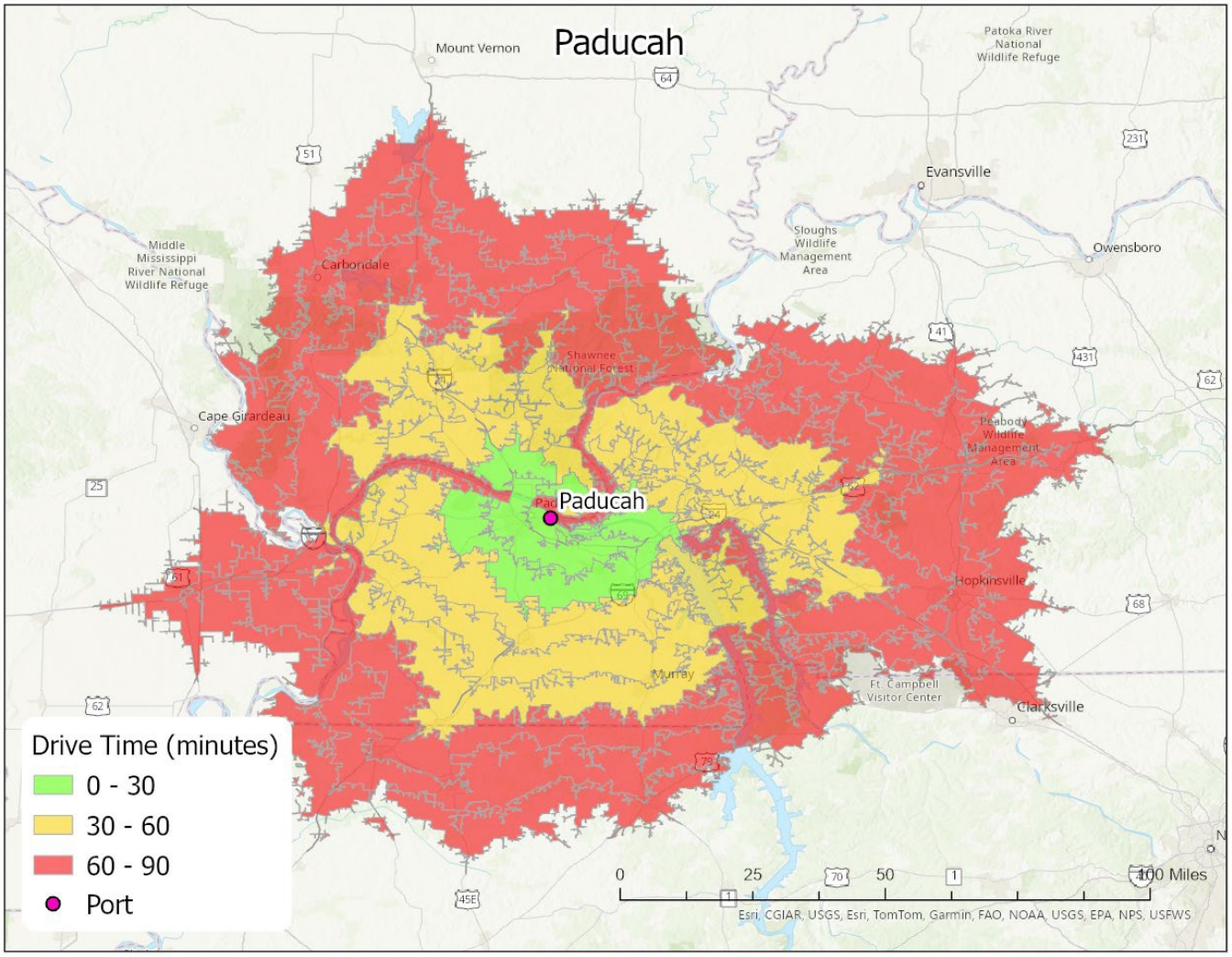

Kansas City
Kansas City
St. Joseph
Chillicothe
Leavenworth
Topeka
Lawrence
Olathe
Warrensburg
Sedalia
Emporia
Kansas River
Harry S Truman Reservoir
Drive Time (minutes)
0 - 30
30 - 60
60 - 90
Port
0
25
50
100 Miles
Esri, CGIAR, USGS, Missouri DNR, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NPS, USFWS


St. Joe
St. Joe
Chillicothe
Leavenworth
Kansas City
Topeka
Lawrence
Olathe
Warrensburg
Kansas River
Drive Time (minutes)
0 - 30
30 - 60
60 - 90
Port
0
25
50
100 Miles
Esri, CGIAR, USGS, Missouri DNR, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NPS, USFWS

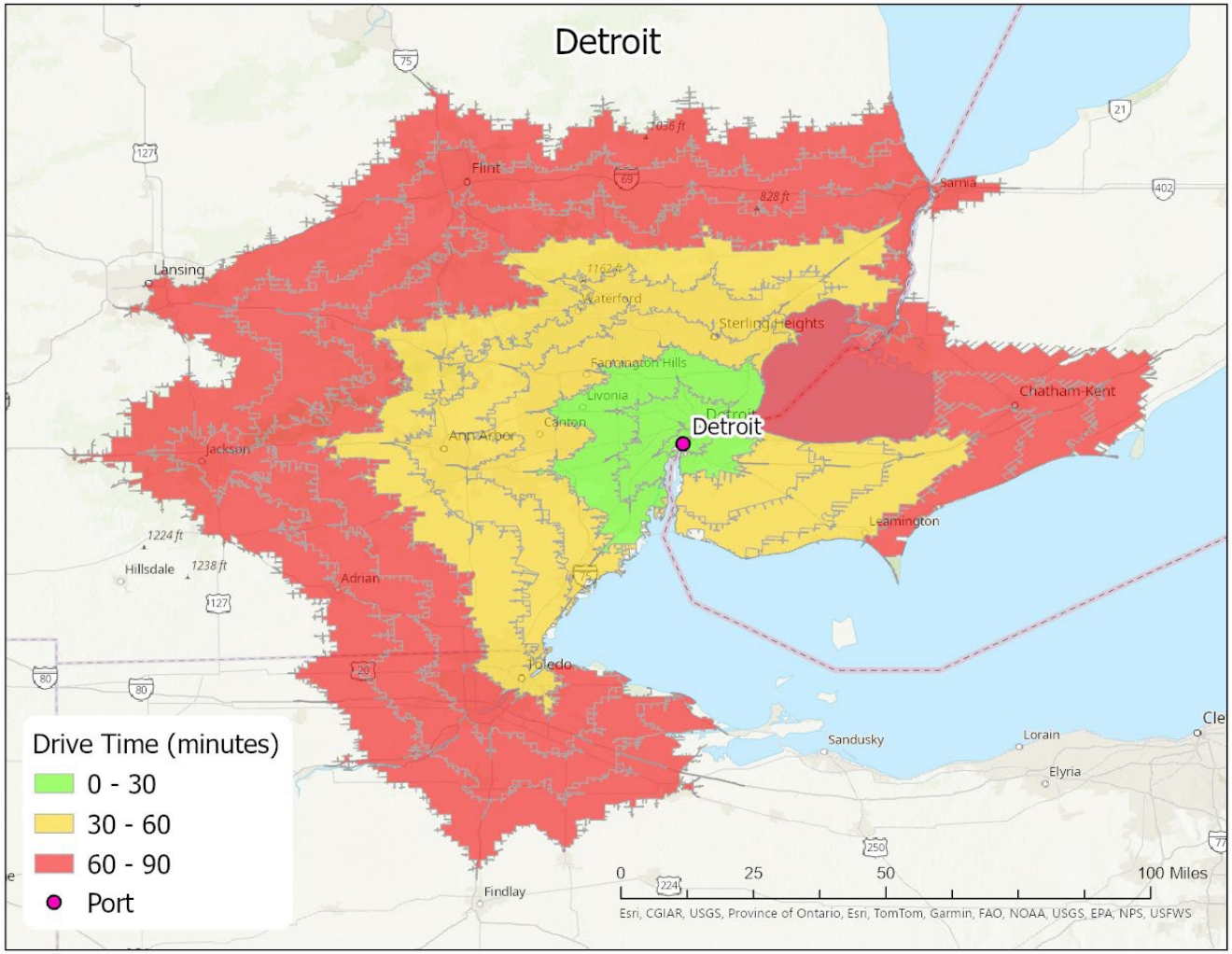
Kentucky Ports

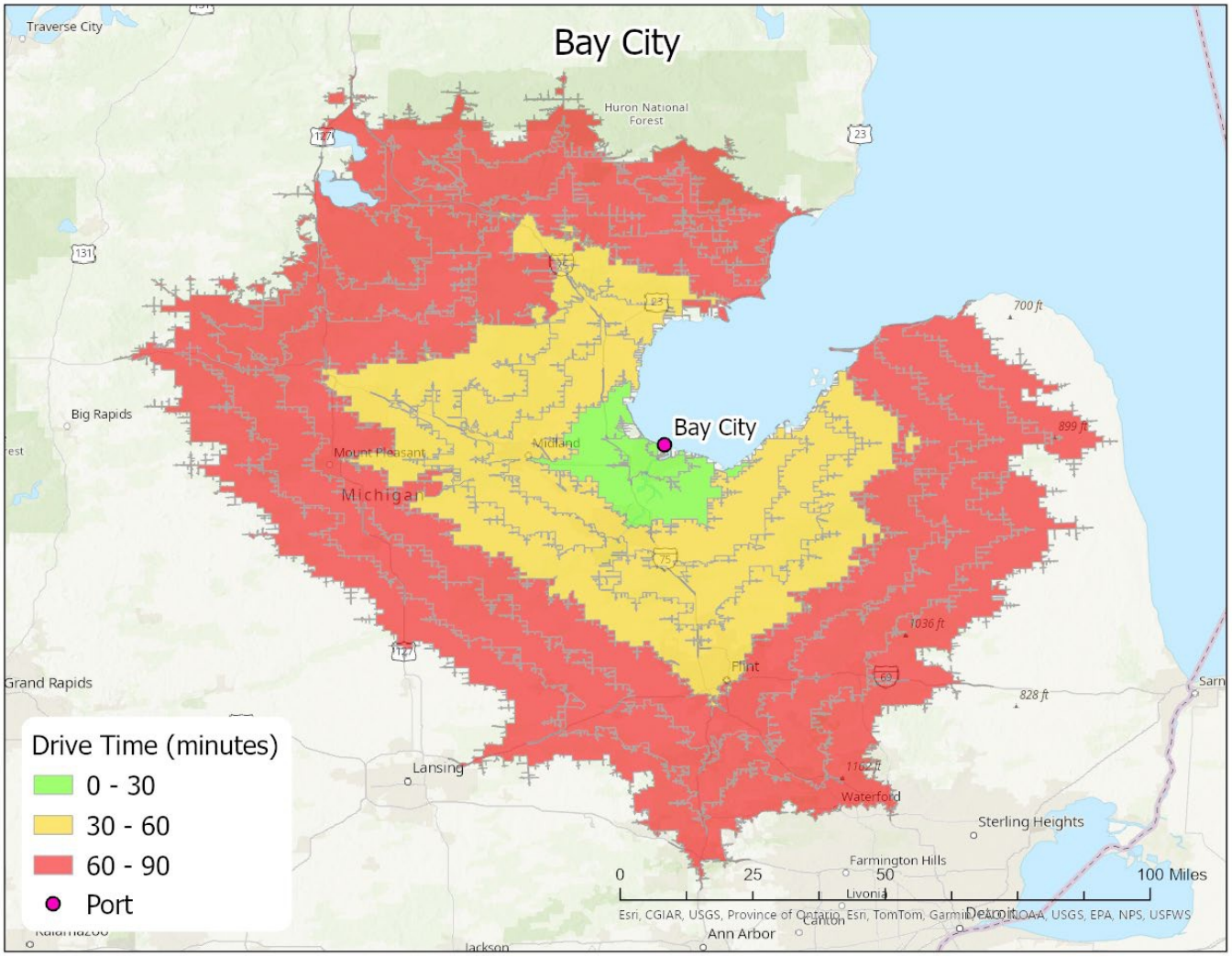


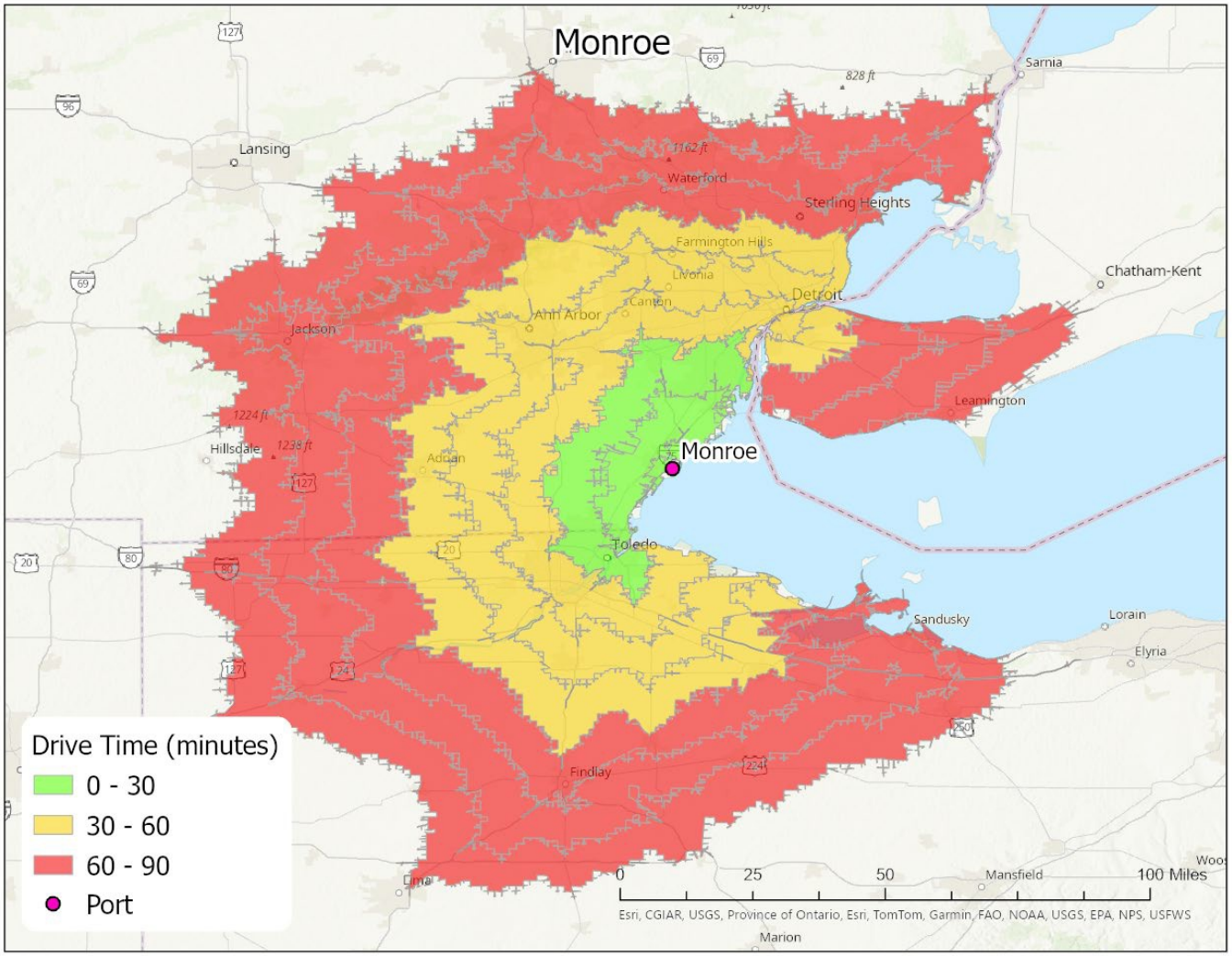

Owensboro
Vincennes
Vernon
Patoka River National Wildlife Refuge
Hoosier National Forest
Louisville
Pleasure Ridge Park
Evansville
Owensboro
Owensboro
Radcliff
Elizabethtown
Slough Wildlife Management Area
Shawnee National Forest
Peabody Wildlife Management Area
Paducah
Bowling Green
Hopkinsville
Ft. Campbell Visitor Center
Clarksville
Gallatin
Drive Time (minutes)
0 - 30
30 - 60
60 - 90
Port
0
25
50
100 Miles
Esri, DeLorme, NAVTEQ, USGS, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NPS, USFWS


Paducah
Mount Vernon
Patoka River National Wildlife Refuge
Evansville
Sloughs Wildlife Management Area
Owensboro
Middle Mississippi River National Wildlife Refuge
Carbondale
Shawnee National Forest
Cape Girardeau
Peabody Wildlife Management Area
Paducah
Hopkinsville
Murray
Ft. Campbell Visitor Center
Clarksville
Drive Time (minutes)
0 - 30
30 - 60
60 - 90
Port
0
25
50
100 Miles
Esri, CGIAR, USGS, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NPS, USFWS

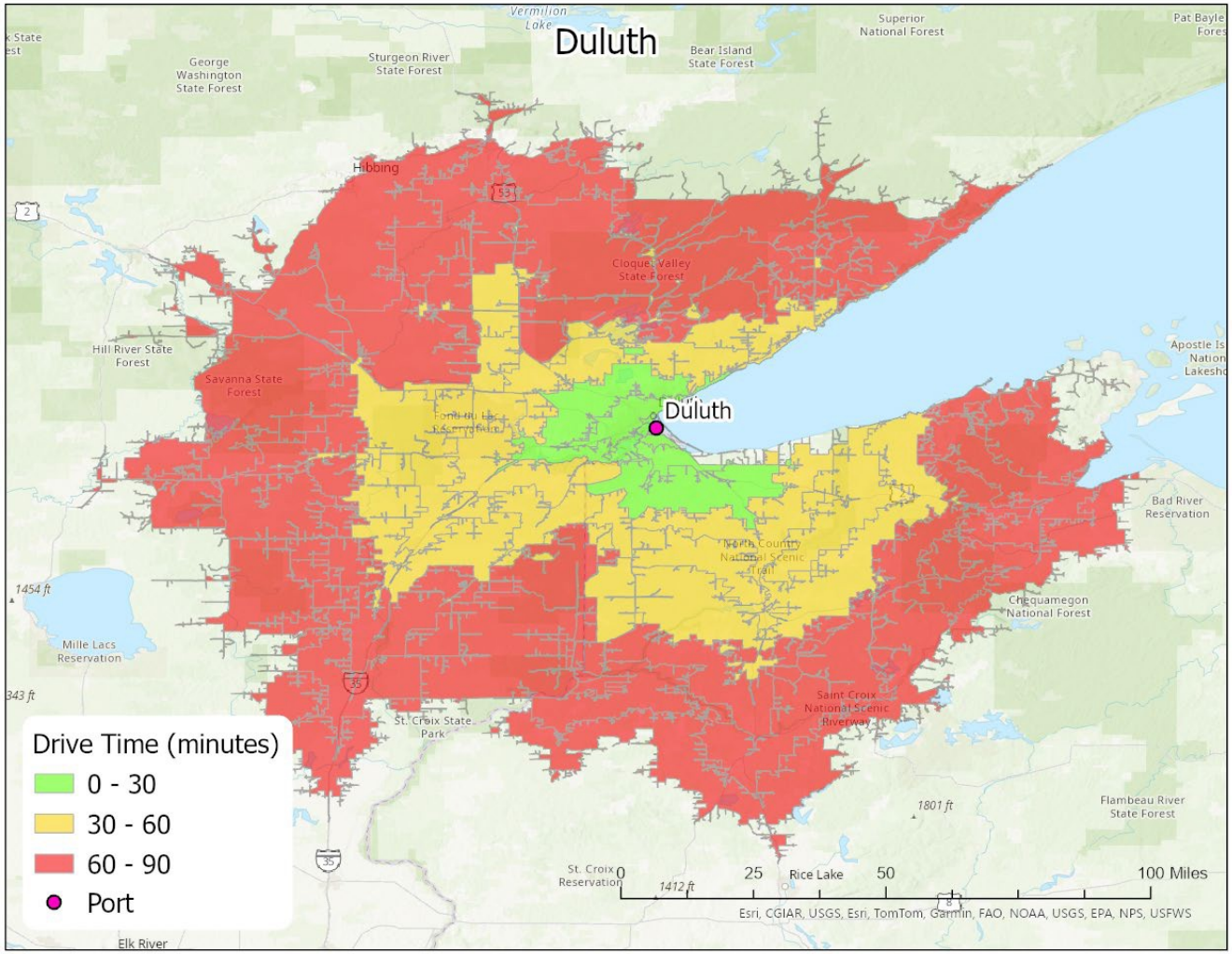
Michigan Ports

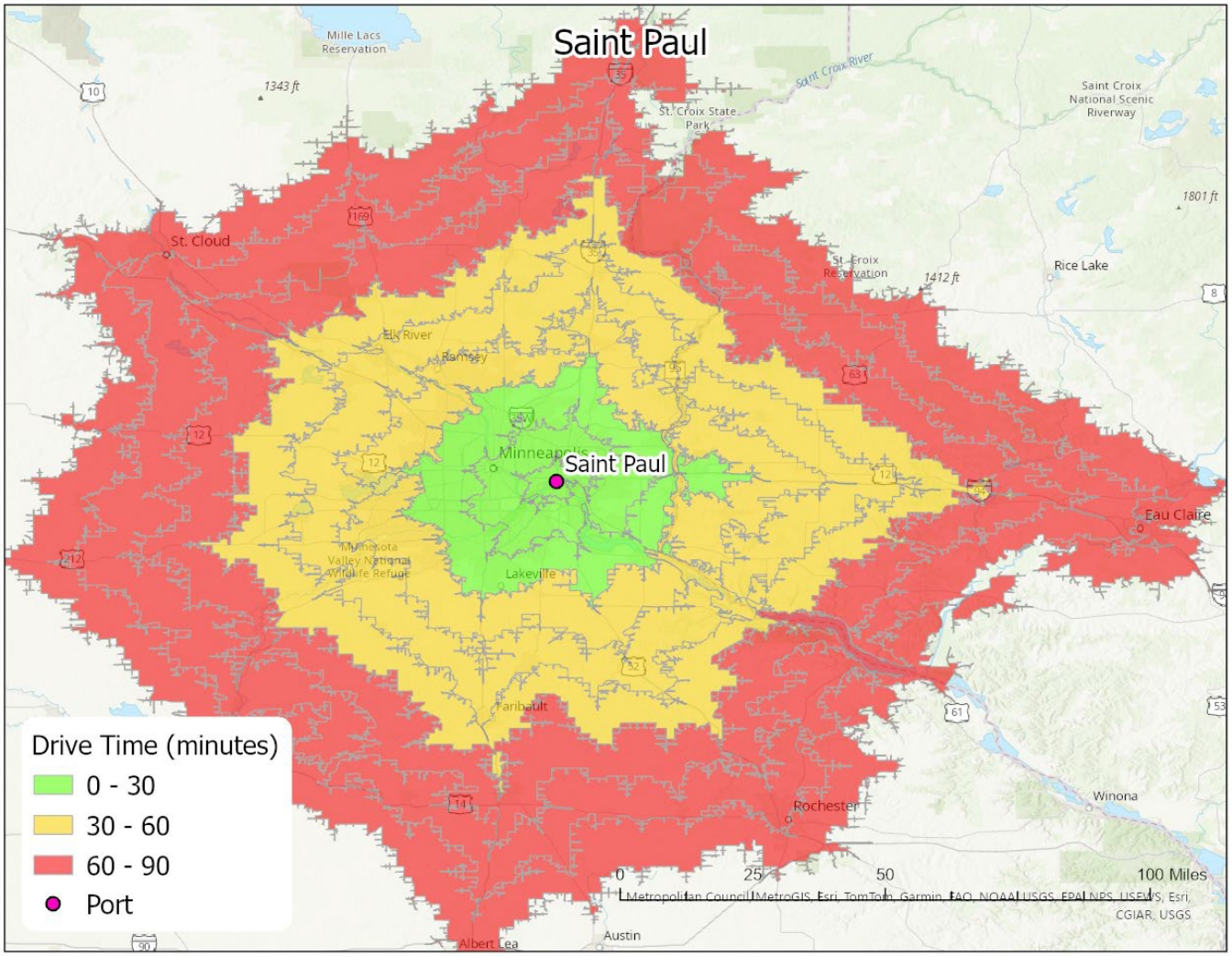


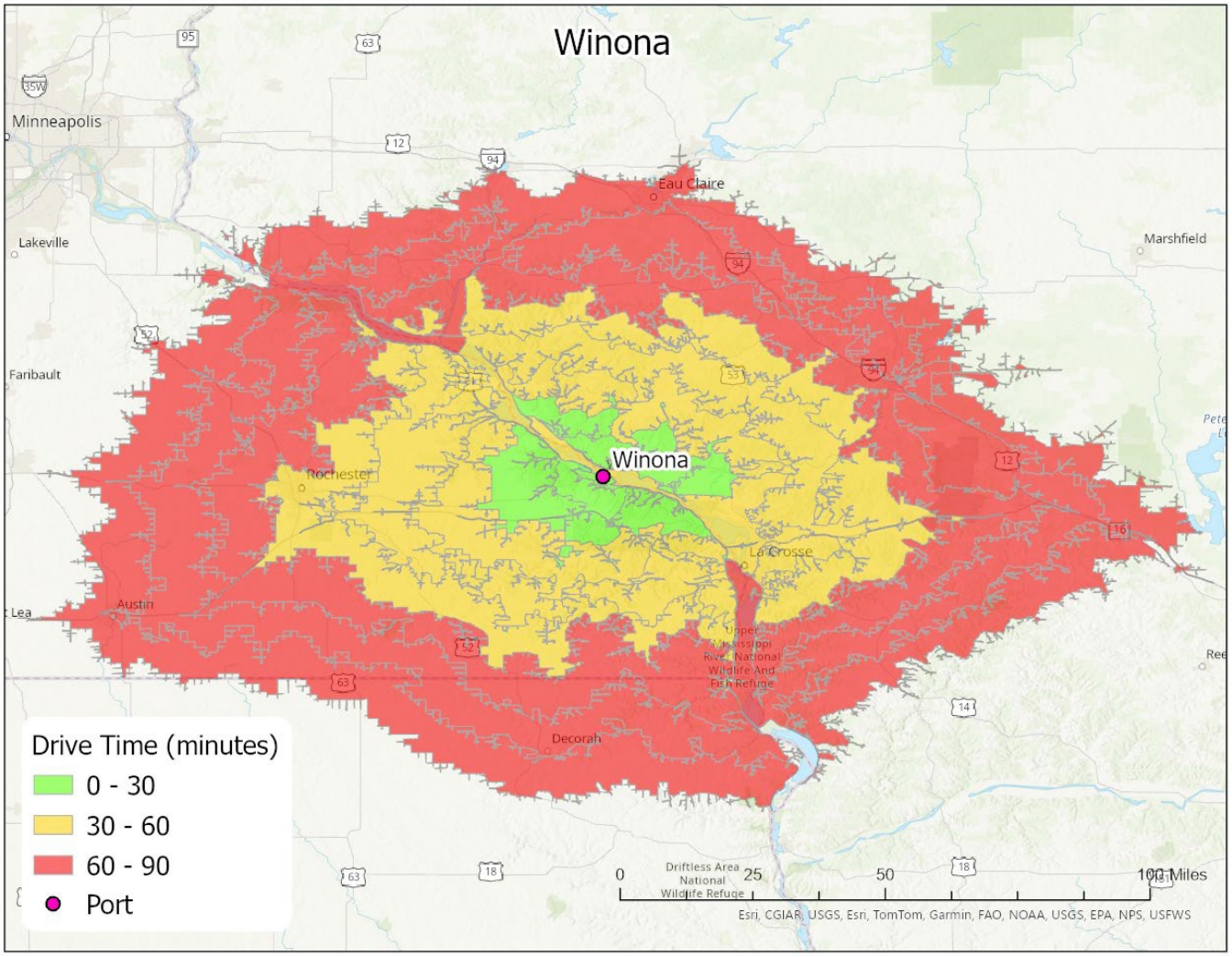

Bay City
Traverse City
Huron National Forest
Big Rapids
Bay City
Midland
Mount Pleasant
Michigan
Flint
Grand Rapids
Lansing
Waterford
Sterling Heights
Farmington Hills
Livonia
Ann Arbor
Canton
Detroit
700 ft
899 ft
1036 ft
828 ft
Drive Time (minutes)
0 - 30
30 - 60
60 - 90
Port
0
25
50
100 Miles
Esri, CGIAR, USGS, Province of Ontario, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NPS, USFWS


Monroe
Sarnia
828 ft
Lansing
1162 ft
Waterford
Sterling Heights
Farmington Hills
Livonia
Canton
Detroit
Chatham-Kent
Ann Arbor
Jackson
1224 ft
1238 ft
Hillsdale
Adrian
Monroe
Leamington
Toledo
Sandusky
Lorain
Elyria
Findlay
Mansfield
Lima
Marion
Drive Time (minutes)
0 - 30
30 - 60
60 - 90
Port
0
25
50
100 Miles
Esri, CGIAR, USGS, Province of Ontario, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NPS, USFWS

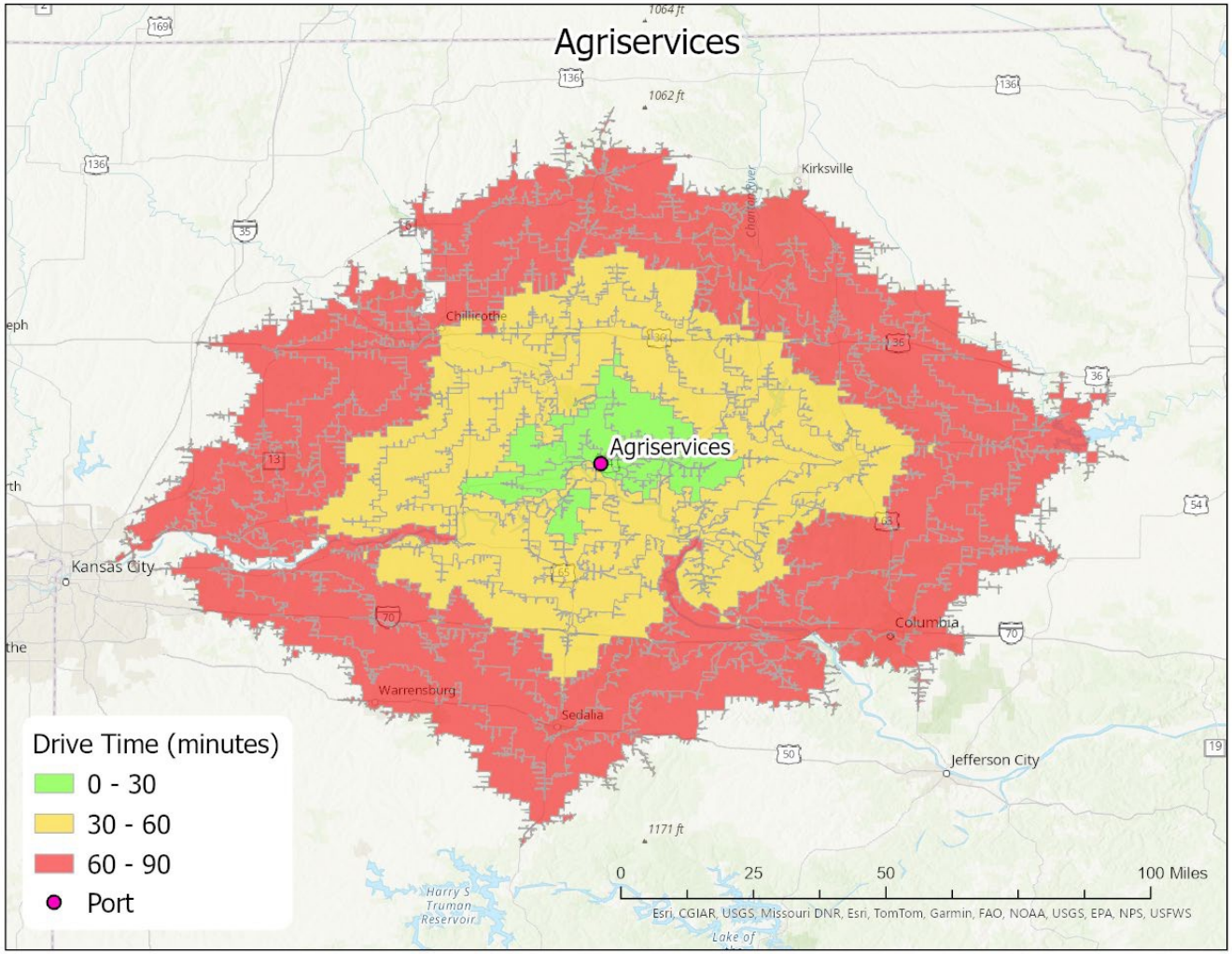
Minnesota Ports

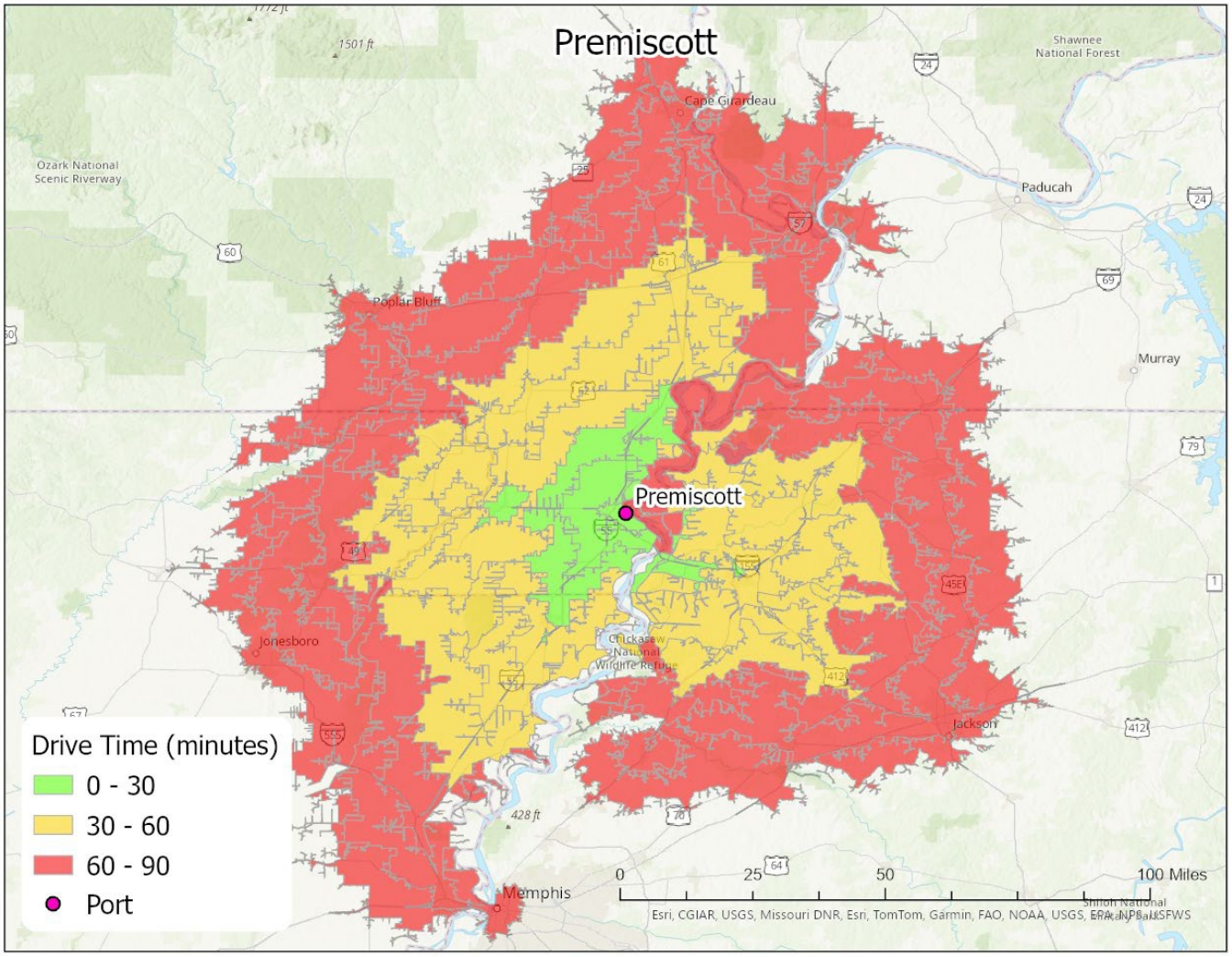


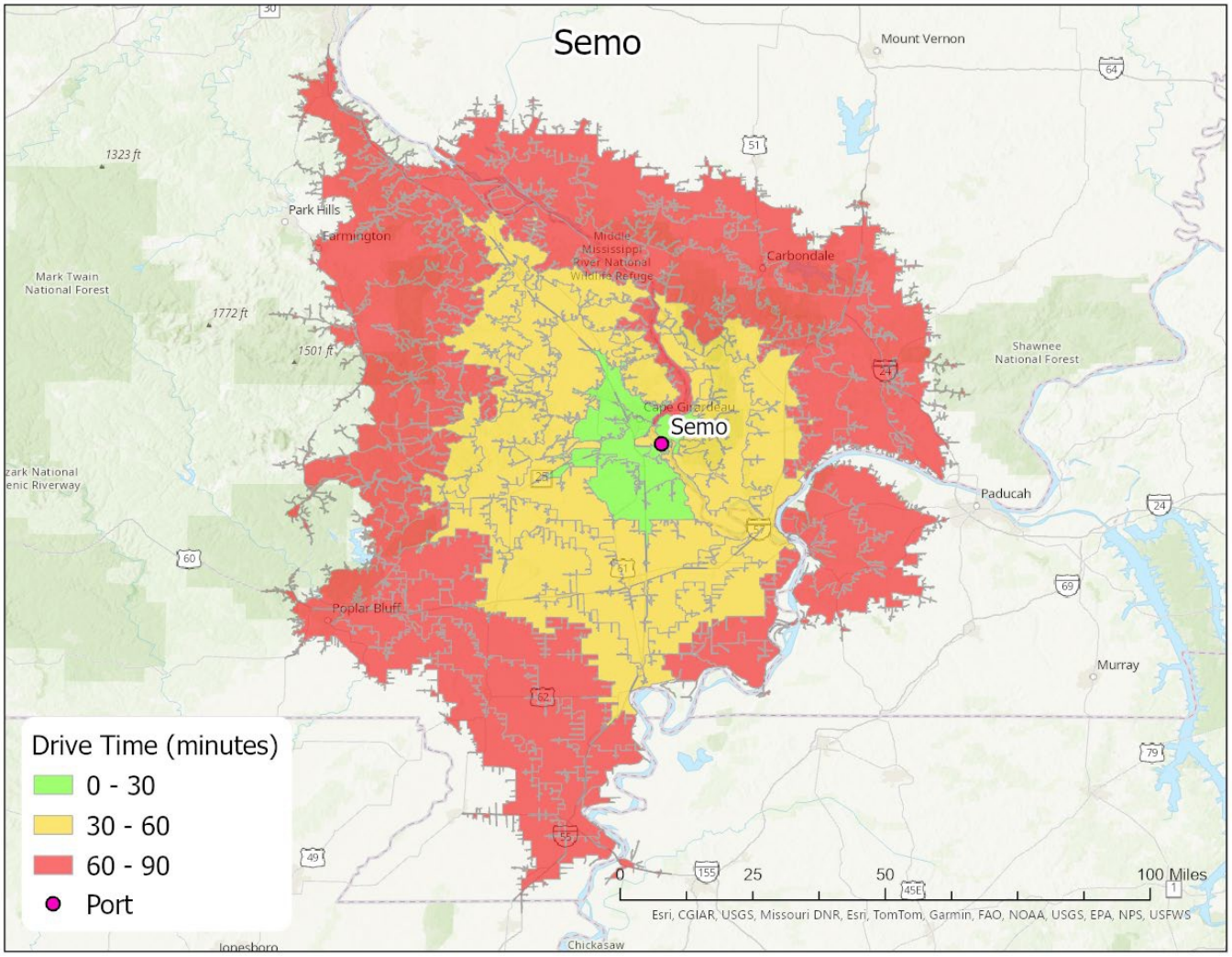

Saint Paul
Drive Time (minutes)
0 - 30
30 - 60
60 - 90
Port
Minneapolis
Saint Paul
St. Cloud
Rice Lake
Eau Claire
Rochester
Winona
Austin
Albert Lea
Faribault
Lakeville
Ramsey
Elk River
Mille Lacs Reservation
St. Croix State Park
Saint Croix National Scenic Riverway
St. Croix Reservation
Minnesota Valley National Wildlife Refuge
0
25
50
100 Miles


Winona
Minneapolis
Eau Claire
Lakeville
Marshfield
Faribault
Winona
Rochester
La Crosse
Austin
Lea
Decorah
Driftless Area National Wildlife Refuge
Upper Mississippi River National Wildlife And Fish Refuge
Drive Time (minutes)
0 - 30
30 - 60
60 - 90
Port
0
25
50
100 Miles
Esri, CGIAR, USGS, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NPS, USFWS

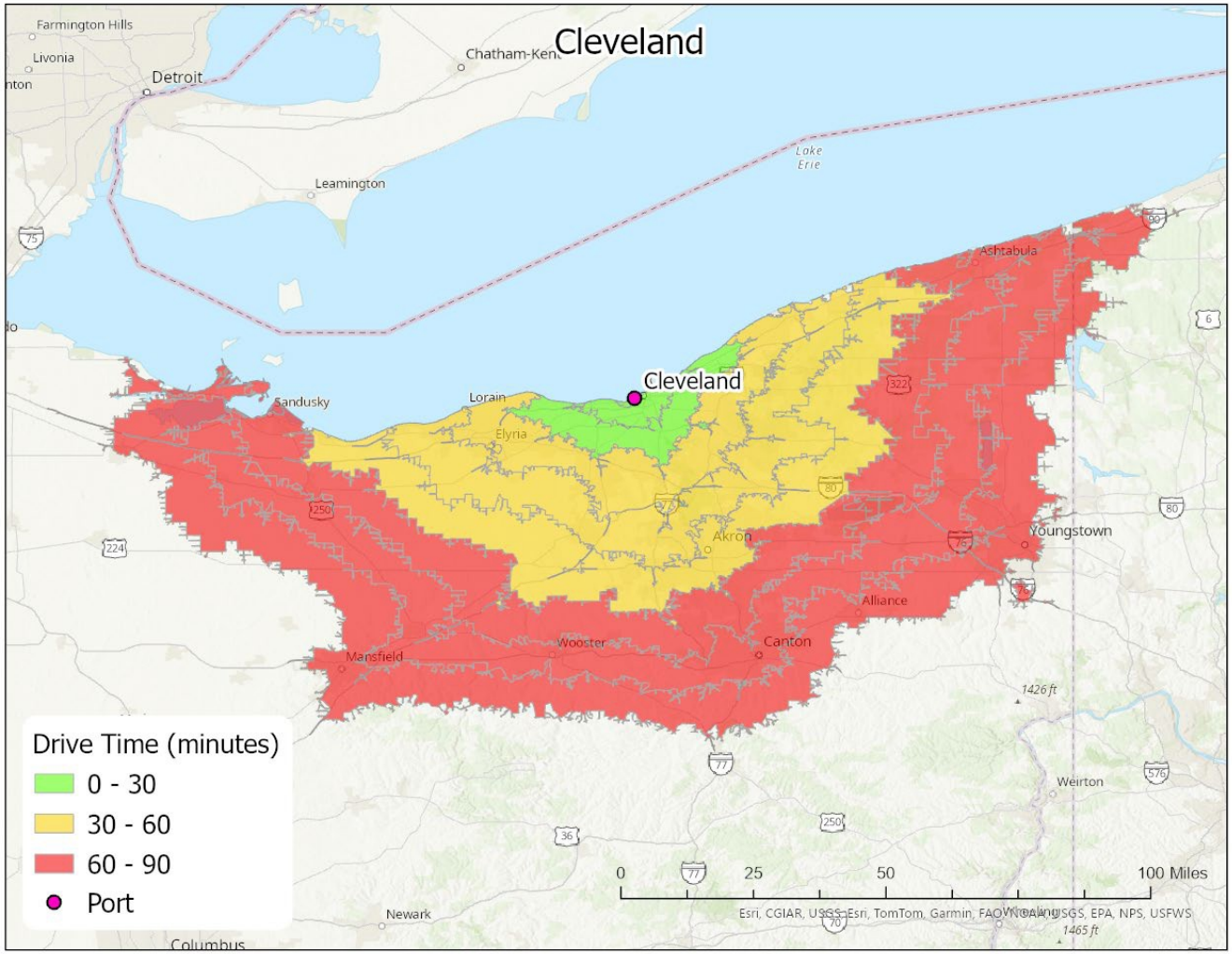
Missouri Ports

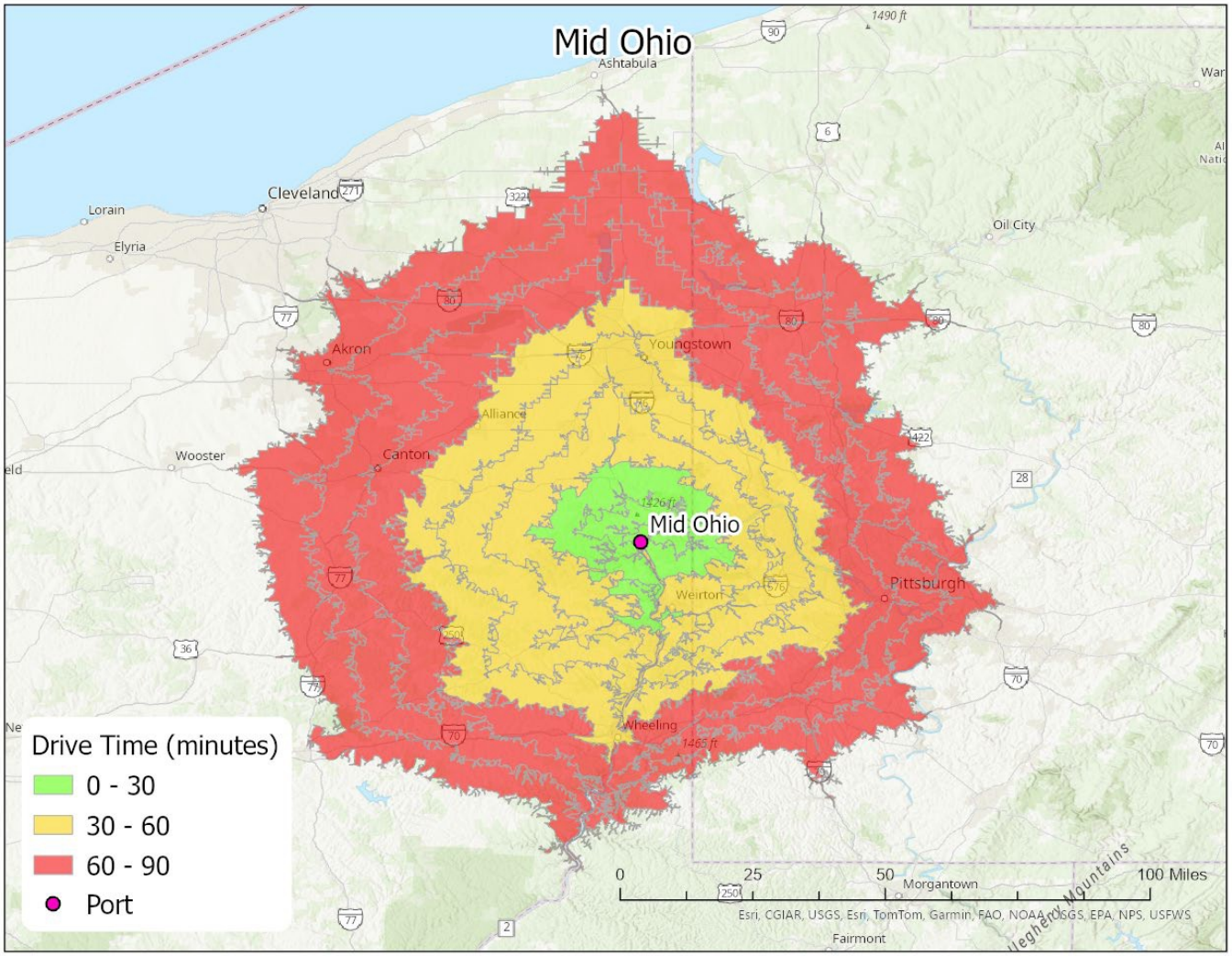


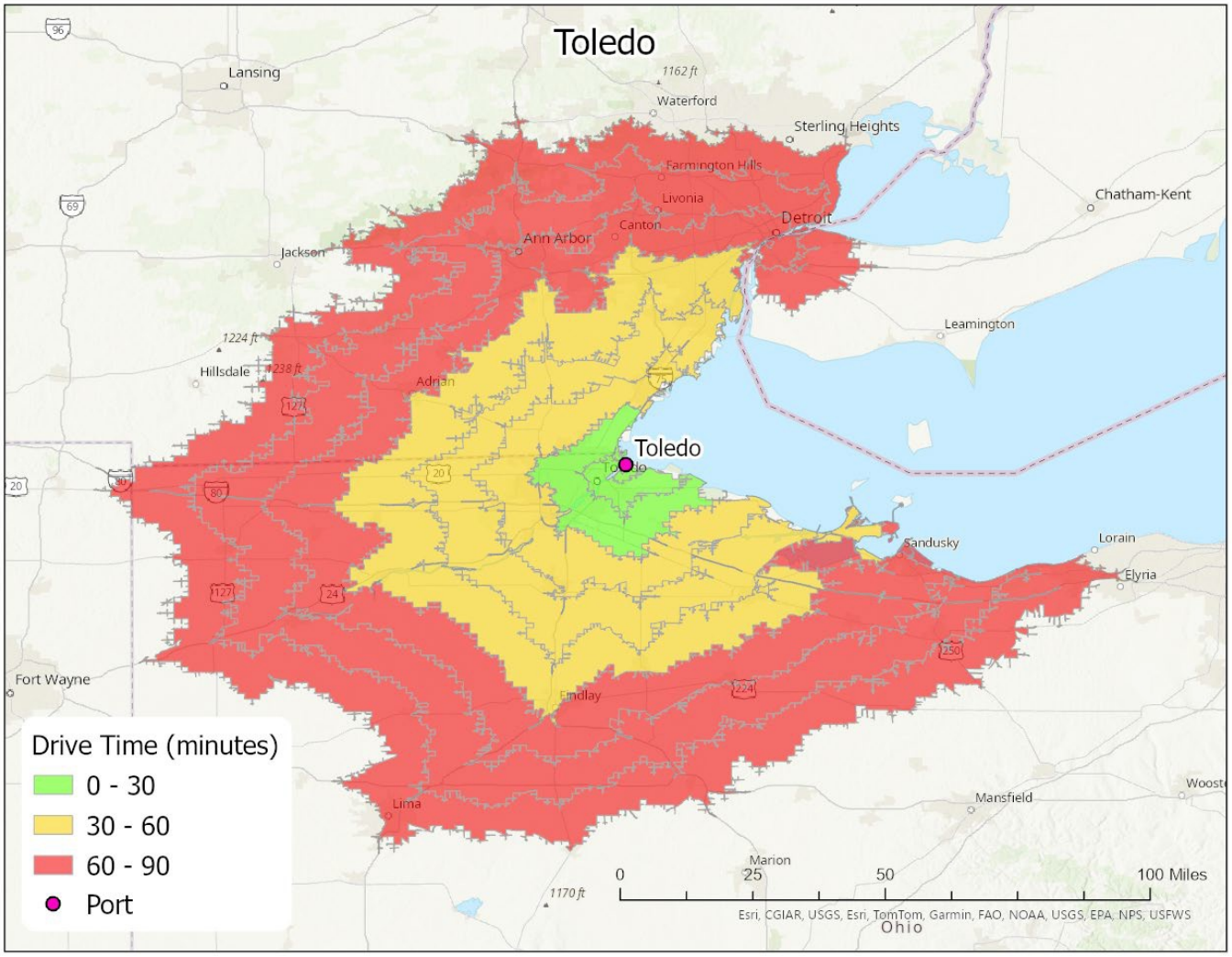

Premiscott
Premiscott
Cape Girardeau
Shawnee National Forest
Ozark National Scenic Riverway
Paducah
Poplar Bluff
Murray
Jonesboro
Chickasaw National Wildlife Refuge
Jackson
Memphis
1501 ft
428 ft
Drive Time (minutes)
0 - 30
30 - 60
60 - 90
Port
0
25
50
100 Miles
Esri, CGIAR, USGS, Missouri DNR, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NPS, USFWS


Semo
Mount Vernon
1323 ft
Park Hills
Farmington
Middle Mississippi River National Wildlife Refuge
Carbondale
Mark Twain National Forest
1772 ft
1501 ft
Shawnee National Forest
Cape Girardeau
Semo
Paducah
Poplar Bluff
Murray
Drive Time (minutes)
0 - 30
30 - 60
60 - 90
Port
0
25
50
100 Miles
Esri, CGIAR, USGS, Missouri DNR, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NPS, USFWS
Jonesboro
Chickasaw

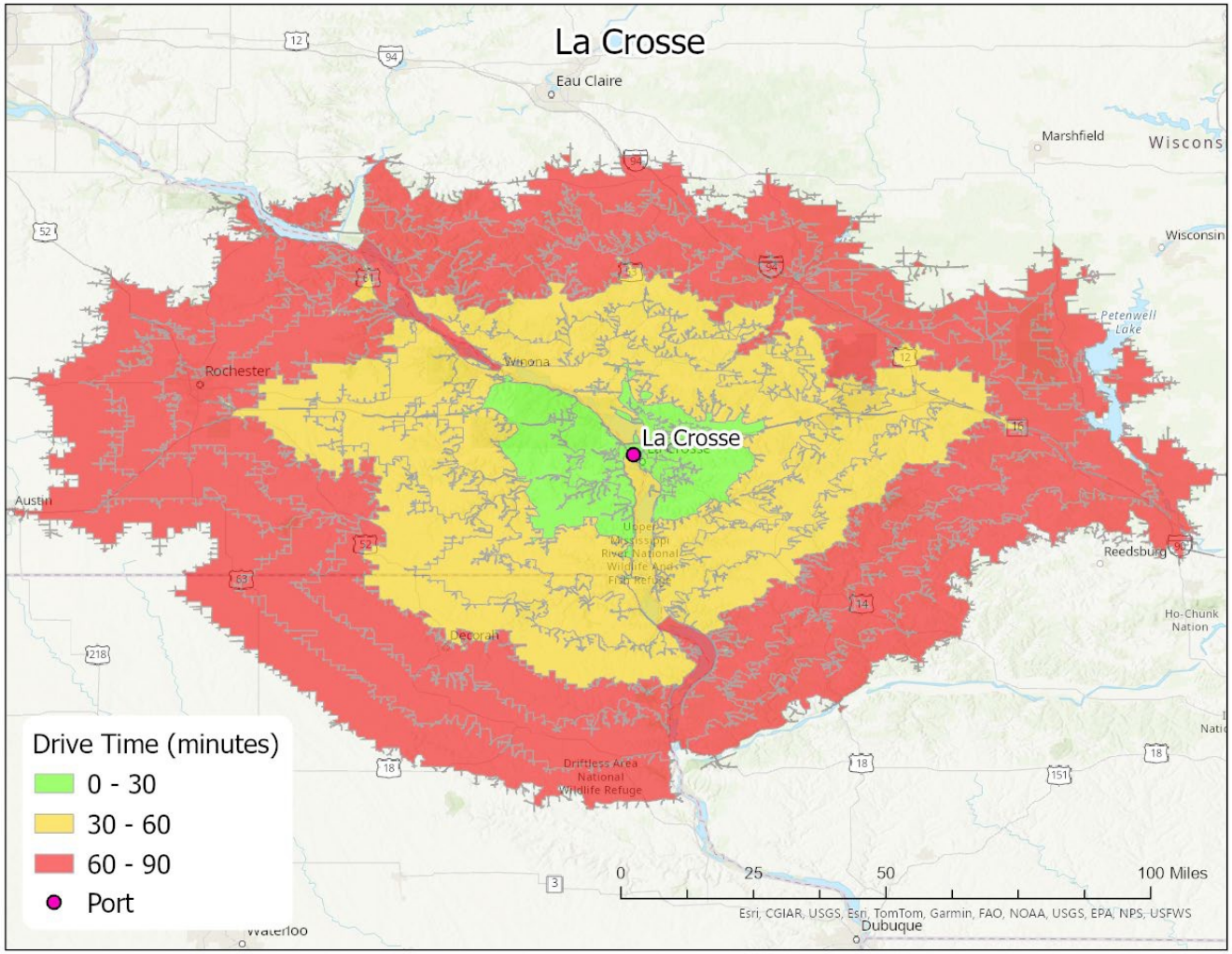
Ohio Ports

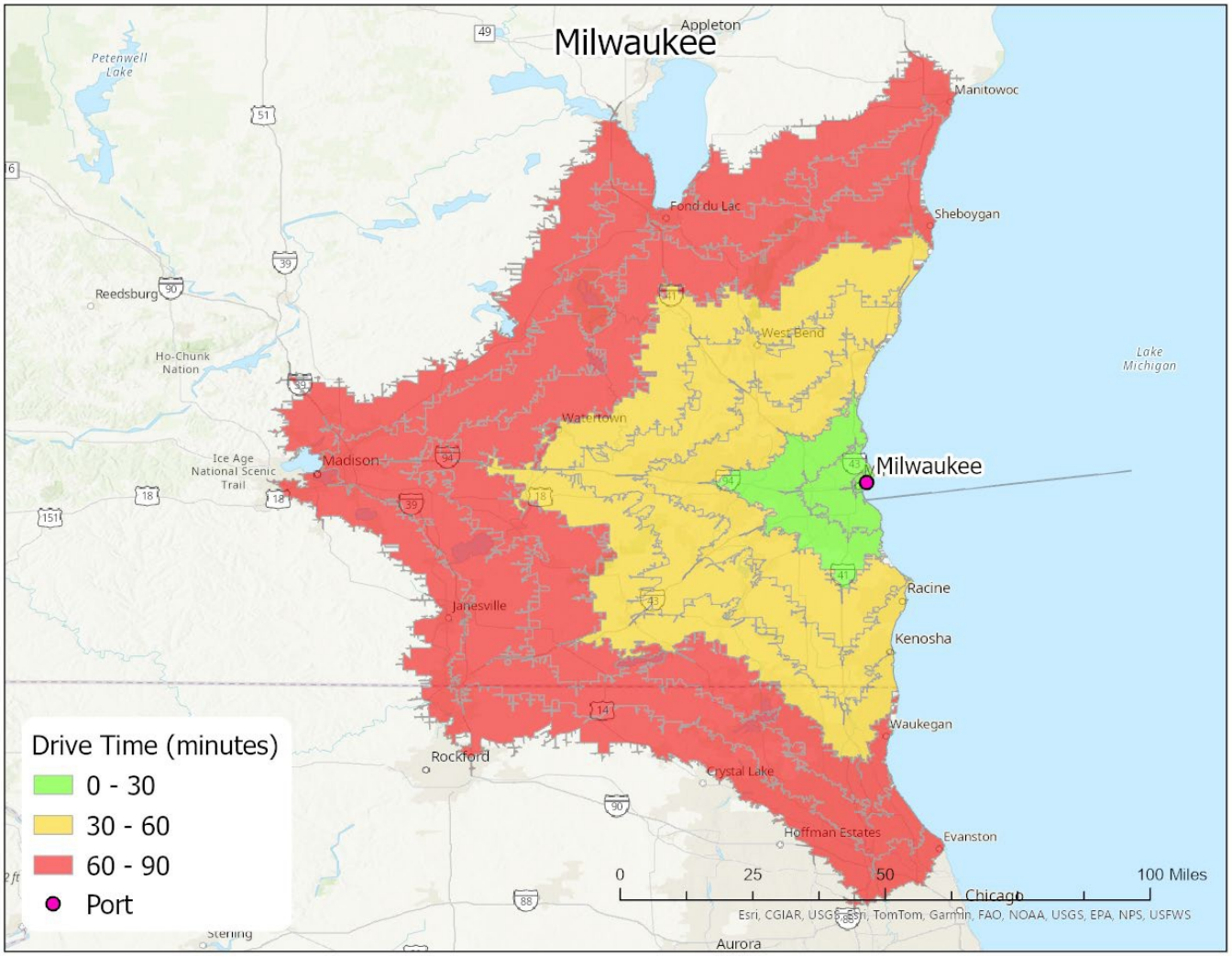

Cleveland
Farmington Hills
Livonia
Detroit
Chatham-Ken.
Lake Erie
Leamington
Ashtabula
Cleveland
Sandusky
Lorain
Elyria
Akron
Youngstown
Alliance
Wooster
Canton
Mansfield
1426 ft
Weirton
Newark
Columbus
1465 ft
Drive Time (minutes)
0 - 30
30 - 60
60 - 90
Port
0
25
50
100 Miles
Esri, CGIAR, USGS, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NPS, USFWS

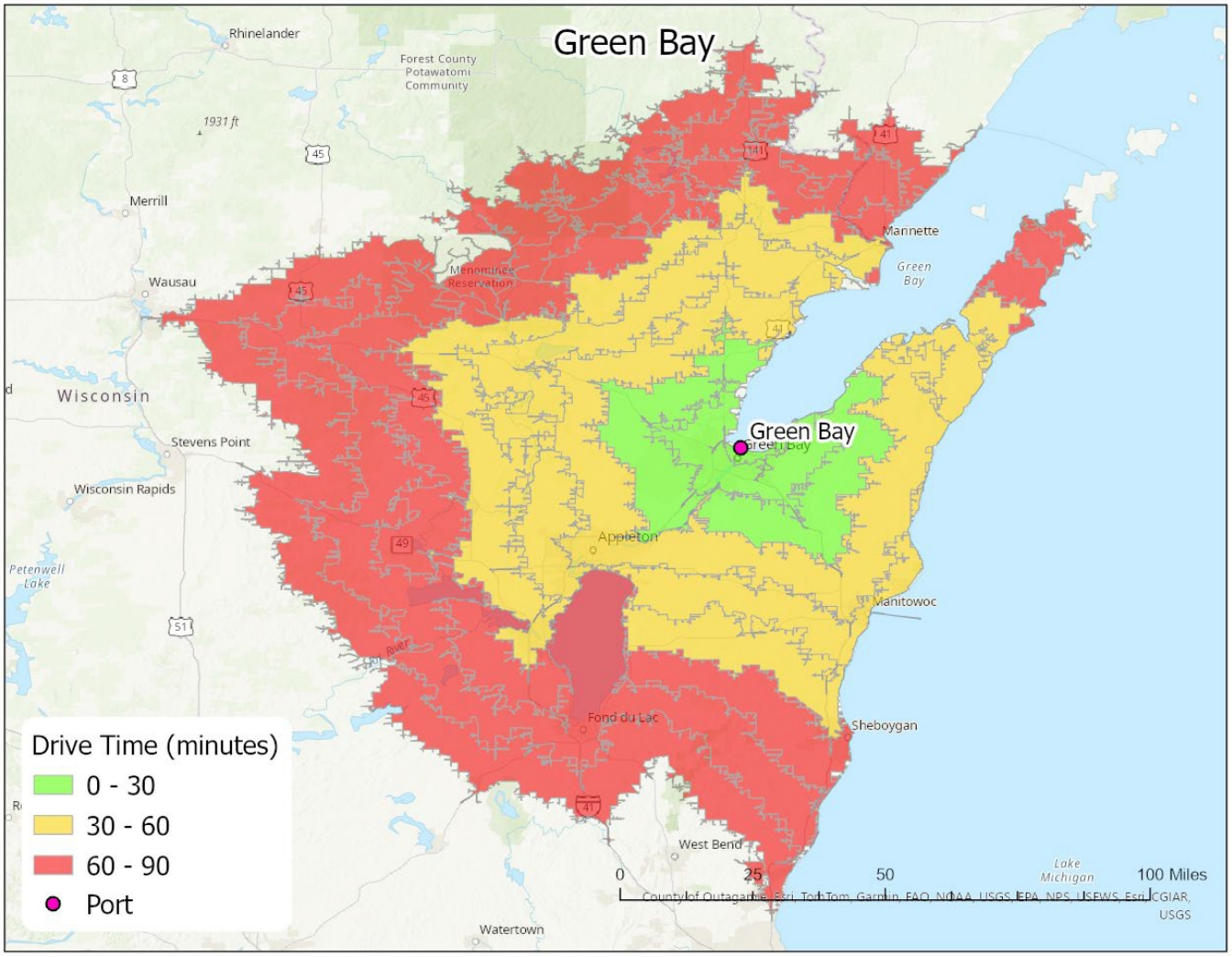

Mid Ohio
Ashtabula
Cleveland
Lorain
Elyria
Akron
Youngstown
Alliance
Wooster
Canton
Mid Ohio
Weirton
Pittsburgh
Wheeling
Morgantown
Fairmont
Oil City
Drive Time (minutes)
0 - 30
30 - 60
60 - 90
Port
0
25
50
100 Miles
Esri, CGIAR, USGS, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NPS, USFWS


Toledo
Lansing
1162 ft
Waterford
Sterling Heights
Farmington Hills
Livonia
Chatham-Kent
Detroit
Canton
Ann Arbor
Jackson
Leamington
1224 ft
Hillsdale
1238 ft
Adrian
Toledo
Sandusky
Lorain
Elyria
Fort Wayne
Findlay
Mansfield
Lima
Marion
1170 ft
Drive Time (minutes)
0 - 30
30 - 60
60 - 90
Port
0
25
50
100 Miles
Esri, CGIAR, USGS, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NPS, USFWS
Ohio

Wisconsin Ports




Milwaukee
Appleton
Manitowoc
Sheboygan
Fond du Lac
Reedsburg
West Bend
Lake Michigan
Ho-Chunk Nation
Waterfown
Ice Age National Scenic Trail
Madison
Milwaukee
Racine
Janesville
Kenosha
Waukegan
Rockford
Crystal Lake
Hoffman Estates
Evanston
Chicago
Aurora
Petenwell Lake
Drive Time (minutes)
0 - 30
30 - 60
60 - 90
Port
0
25
50
100 Miles
Esri, CGIAR, USGS, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NPS, USFWS


Green Bay
Rhinelander
Forest County Potawatomi Community
1931 ft
Merrill
Wausau
Menominee Reservation
Marinette
Green Bay
Wisconsin
Stevens Point
Wisconsin Rapids
Green Bay
Appleton
Petenwell Lake
Manitowoc
Fond du Lac
Sheboygan
West Bend
Watertown
Lake Michigan
Drive Time (minutes)
0 - 30
30 - 60
60 - 90
Port
0
25
50
100 Miles
County of Outagamie, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NPS, USFWS, Esri, CGIAR, USGS