

Organizational Results Research Report

November 2007  
OR08.007

# Update of Missouri Port Authority Assessment

Prepared by  
Missouri Department  
of Transportation

Final Report.  
Publication OR 08 - 007.

## **Update of Missouri Port Authority Assessment.**

Prepared by MoDOT:  
Matthew B McMichael, Senior Transportation Performance Analyst, MoDOT Organizational Results.

Special Thanks to:  
Sherri Martin, MoDOT Multimodal Operations; Ernie Perry, MoDOT Organizational Results; all of the Port Authority staff that gave so freely of their time and answers; and John R LaRandeau, NWD, US Army Corps of Engineers.

Missouri Department of Transportation.  
Jefferson City MO.  
[www.modot.mo.gov](http://www.modot.mo.gov)

**November 2007.**

The opinions, findings and conclusions expressed in this report are those of the principal investigator and the Missouri Department of Transportation. They are not necessarily those of the U.S. Department of Transportation or the Federal Highway Administration. This report does not constitute a standard, specification or regulation.

## Technical Report Documentation Page.

1. Report No.: OR 08 – 007.	2. Government Accession No.:	3. Recipient’s Catalog No.:	
4. Title and Subtitle: Update of Missouri Port Authority Assessment.		5. Report Date: November 2007.	
		6. Performing Organization Code:	
7. Author(s):  Matthew B McMichael		8. Performing Organization Report No.: OR 08 – 007.	
9. Performing Organization Name and Address: Missouri Department of Transportation Organizational Results PO BOX 270, JEFFERSON CITY MO 65102		10. Work Unit No.:	
		11. Contract or Grant No.: RI 07 – 027.	
12. Sponsoring Agency Name and Address:  Missouri Department of Transportation Research, Development and Technology PO BOX 270, JEFFERSON CITY MO 65102		13. Type of Report and Period Covered: Final Report.	
		14. Sponsoring Agency Code:	
15. Supplementary Notes: The investigation was conducted in cooperation with the U. S. Department of Transportation, Federal Highway Administration.			
16. Abstract:  This fact-finding study updates data from the “ <a href="#">Missouri Public Port Authorities: Assessment of Importance and Needs</a> ” in support of pending studies. This paper shares general information from the study, in order to foster a better understanding of Missouri’s port authorities and waterways, especially as related to transportation. All port authorities in Missouri are unique, but the study found they can be grouped into four categories.  Most ports, public or private, have concerns about restrictions to floodplain development. All Missouri River and some Mississippi River port authorities have concerns about Missouri River cargo going through other states instead. Few port authorities encourage containerized cargo, despite the shipping revolution caused by containers. Nearly all port authorities are changing to support bio-fuels; either directly with plants at the ports, or indirectly with increased capacity for related cargo. Waterways are the most cost effective, most ecological, and safest way to meet booming and changing demands for cargo.			
17. Key Words: River Ports, Missouri Public Port Authorities, Inland Waterways, Waterborne Commerce, Mississippi River, Missouri River, Container-On-Barge, Bio-Fuels.		18. Distribution Statement: No restrictions. This document is available to the public through National Technical Information Center, Springfield, Virginia 22161.	
19. Security Classification (of this report): Unclassified.	20. Security Classification (of this page): Unclassified.	21. No of Pages: 34.	22. Price:

Form DOT F 1700.7 (06/98).

## Executive Summary:

This fact-finding study updates data from the “[Missouri Public Port Authorities: Assessment of Importance and Needs](#)” in support of other studies about to begin. This report shares general information from the study, in order to foster a better understanding of Missouri’s port authorities and waterways, especially as related to transportation.

Missouri has 2 navigable waterways, over 200 port facilities, and 14 public port authorities. Port authorities are like economic development organizations for public, commercial development of waterways. All port authorities in Missouri are unique, but the study found they can be grouped into four categories:

**Category 1:** Undeveloped Port Authorities. These typically have no land, no source of funding even for matching funds, and many needs—just to get started. There are four of these on the Mississippi River.

**Category 2:** Developing Port Authorities. These typically have land but face major roadblocks to operation. With little or no operations, they have little or no source of funding, even for matching funds. There are three of these on the Mississippi River.

**Category 3:** Developed Port Authorities. These have land, facilities, equipment and businesses. Their operations produce income for matching funds. However, their project costs tend to exceed state and federal programs’ annual budgets. There are four of these on the Mississippi River.

**Category 4:** Missouri River Port Authorities. All three of these would be in the “Developed Category,” except they are limited by Missouri River conditions. Their limited operations reduce income available for matching funds. However, their biggest need is for waterway traffic rather than port development. A study of “Techniques, Equipment and Strategies to Maximize Navigation on the Missouri River in Low Flow Situations” is beginning and should be completed in early 2008.

This study found most ports, public or private, have concerns about restrictions to floodplain development. All Missouri River and some Mississippi River port authorities have concerns about Missouri River cargo going through other states instead. Few port authorities encourage containerized cargo, despite the shipping revolution caused by containers.

Nearly all Missouri port authorities are changing to support bio-fuels; either directly with plants at the ports, or indirectly with increased capacity for related cargo. For Missouri to produce significant quantities of bio-fuels requires massive quantities of grain from farms. Farms require oversized equipment and massive quantities of fertilizers. Missouri’s highways and railways can handle some traffic increases due to bio-fuels, but only Missouri waterways have enough potential capacity for the quantities of cargo bio-fuel production will need.

Waterways are the most cost effective, most ecological, and safest way to meet booming and changing demands for cargo. The Mississippi River port authorities are developing to take advantage of these changes. A navigable Missouri River and a modern port in northwest Missouri would be better positioned to serve bio-fuel croplands to the northwest than Arkansas or Mississippi River ports, as illustrated in Figure 1.

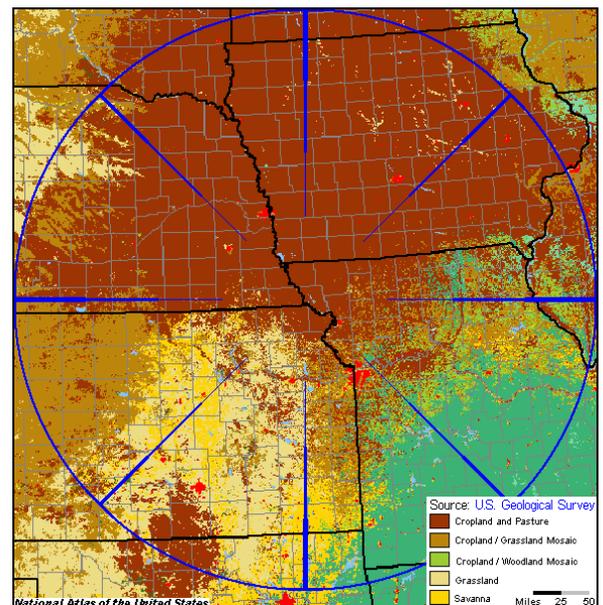


Figure 1. Bio-fuel croplands (brown) near northwest Missouri and the Missouri River.

## Table of Contents:

Technical Report Documentation Page .....	ii
Executive Summary: .....	iii
Table of Contents: .....	iv
List of Figures: .....	v
Introduction: .....	1
Study Purpose: .....	1
Report Purpose: .....	1
Scope: .....	1
Methodology: .....	2
Missouri Public Port Authorities, Generally: .....	3
Missouri Public Port Authorities, Individually: .....	6
Four Undeveloped Ports, Category 1: .....	6
Three Developing Ports, Category 2: .....	8
Four Developed Ports, Category 3: .....	10
Three Missouri River Ports, Category 4: .....	15
Summary: .....	18
Appendix A, Waterway Benefits: .....	19
Appendix B, Bio-Fuels, Affects on Transportation: .....	20
Capacity: .....	20
Location: .....	20
Appendix C, Containers-On-Barges: .....	21
Appendix D, Missouri River Cargo: .....	22
Past Shipping: .....	22
Potential Shipping: .....	25

## List of Figures:

Figure 1. Bio-fuel croplands (brown) near northwest Missouri and the Missouri River.....	iii
Figure 2. A tow on the Mississippi River passing the New Madrid Port where one barge is docked.....	1
Figure 3. Two barges in part of the Pemiscot County Port Authority’s slack water harbor.....	3
Figure 4. The developed category, New Madrid Port Authority.....	4
Figure 5. The Kansas City Port Authority on the Missouri River ready for waterway traffic.....	5
Figure 6. Location map of four Category 1, Undeveloped, Port Authorities.....	6
Figure 7. Canton Ferry, longest continually operating ferry on the Mississippi River.....	7
Figure 8. Location map of the St Louis <i>County</i> and the St Louis <i>City</i> Port Authorities.....	8
Figure 9. Location of the Mississippi County Port.....	8
Figure 10. Location map of the New Bourbon Regional Port Authority.....	9
Figure 11. Barges and tows in the Mississippi River at St Louis. Note the size of 18-wheelers on I-55.....	10
Figure 12. Aerial photograph of the silt filled Missouri River (left), which reflects brown light, and the clearer Mississippi River (right), which absorbs most light and appears black from overhead. Note the lack of mixing even in the Chain of Rocks rapids (lower left).....	11
Figure 13. Southeastern Port Authorities.....	12
Figure 14. Location map for the Pemiscot County Port Authority.....	12
Figure 15. Location map for the New Madrid Port Authority.....	13
Figure 16. Location map for the Semo Port Authority.....	14
Figure 17. Panorama photograph of the Semo Port Authority.....	14
Figure 18. Location map of the Missouri River Port Authorities at Boonville, Kansas City, and St Joseph.....	15
Figure 19. Location map of Howard - Cooper County Port Authority.....	15
Figure 20. Location map of the Kansas City Port Authority.....	16
Figure 21. Map showing Tulsa Oklahoma relative to Missouri, and a radius including regions north of Kansas City, which are reportedly sending goods to Tulsa for shipment on the Arkansas River, despite shorter distances to the Missouri and Mississippi Rivers.....	16
Figure 22. Location map of the Saint Joseph Regional Port Authority.....	17
Figure 23. New Madrid Port Authority.....	18
Figure 24. Maps of corn (ethanol) and soybean (bio-diesel) crops relative to northwest Missouri.....	20
Figure 25. Two photographs, one of a barge of grain being hand packed, one crane lifted pallet at a time, and the other of a barge of steel coils being unloaded, one crane lifted pallet at a time.....	21
Figure 26. Graph showing all commodities shipped on the Missouri River in tons per year.....	22

Figure 27. Graph showing the tons of commodities shipped on the Missouri River, not including waterway construction materials nor waterway mined materials. ....	23
Figure 28. The Missouri River at Kansas City. ....	24
Figure 29. Graph showing the tons of commodities shipped on the Missouri River (including waterway construction and mined materials) as compared to other rivers or the region and I-70.....	25
Figure 30. Waterways and Local Land Types. ....	26

## Introduction:

### Study Purpose:

The purpose of this study was to update port authority information from a previous study in preparation of a subsequent study. MoDOT previously surveyed Missouri's public port authorities for the report "[Missouri Public Port Authorities: Assessment of Importance and Needs](#)." That survey was conducted in late 2005. In mid 2007, MoDOT contracted for a new study called "Freight Optimization and Development in Missouri – Waterway and Port Module." To base the new study on current, and more complete information, a follow up survey was needed. Thus, the primary purpose of this study was to gather data in support of the pending study. Since then, another related study has begun and may also make use of the data.

### Report Purpose:

The purpose of this report is to share information gathered from the study, along with related information, to encourage a better understanding and appreciation for Missouri's public port authorities in particular, and Missouri's navigable waterways in general.

The primary deliverable of the study was data to support pending studies. The only general "findings" of this study was a way to categorize Port Authorities to more easily understand them, and some related generalizations about the port authorities.

### Scope:

The scope of this study focused on public, commercial, multimodal access to waterways, for which public port authorities receive public funds. The survey was limited to MoDOT's multimodal interests, so other topics were beyond the scope of this study. For instance, highway maintenance and traffic patterns related to ports were not studied. Nor were subjects in the jurisdiction of other state agencies such as environmental compliance and gaming.



Figure 2. A tow on the Mississippi River passing the New Madrid Port where one barge is docked.

The 200 private ports in Missouri include marinas and docks that directly connect businesses to waterways. While these are obviously important to Missouri, they do not receive funding from MoDOT's multimodal section, and are beyond the scope of this study. In some cases, port authorities are involved in similar activities, and in fairness, such activities were also considered beyond the scope of this study.

## **Methodology:**

The previous survey was conducted by mail and e-mail, which produced some inconsistent results in the way questions were interpreted and answered. To avoid that problem, "in person" surveys were conducted for this study, allowing questions to be asked, discussed, and answered more consistently.

The previous survey also asked for itemized lists of "plans" for developments, without asking for information on "objectives." In a list of plans without objectives, it is not possible to see which plans depend on each other, or might even be mutually exclusive. This survey asked about "objectives" first, and then moved into detailed "plans," plus any "developments" since the previous survey, or developments currently underway. This change is intended to provide better data for subsequent studies.

All Port Authorities seemed to be openly sharing information about their objectives. However, many ports and objectives are in competition. To avoid sharing information ports may have offered in confidence, this paper only reports on objectives and plans in general. Meanwhile the detailed results of the survey were compiled separately for careful use in subsequent studies.

Both this survey and the previous survey also asked about "issues." This question allowed the survey to expand into unanticipated subjects such as flood control, dredging, and security. The issues raised are also reported in this paper.

The previous survey asked many more questions than this survey. To keep the in-person survey focused on objectives, plans, developments, and issues; this survey avoided asking questions about acreage, employment levels, cargo types, cargo quantities, capacities, and so forth. When describing Ports in this report, some of these items may be mentioned, based on the previous survey results or observations made during the surveys.

This report also includes several appendices to provide additional, general information relative to the subject. Rather than explaining general issues amid descriptions of the ports, the general information is summarized in the appendices, namely:

- Waterway Benefits,
- Bio-Fuels, Affects on Transportation,
- Containers-On-Barges, and
- Missouri River Cargo.

More information can be found in the previous report "[Missouri Public Port Authorities: Assessment of Importance and Needs](#)" or the brochure "[Missouri Waterway Facts](#)."

**Ports:** References to "ports" in this document usually refer to the 14 public port authorities, which were the subject of the study. Some generic references to ports refer to all ports combined, public and private.

**Port Objectives:** An "objective" is something general, such as an objective to build a bio-fuel plant at a port.

**Plans:** To achieve an objective, a port will have many specific "plans," such as extending a road, building a warehouse, or upgrading a loading crane.

**Developments:** Plans progressing beyond merely planning are referred to as developing, projects, or developments.

"Objectives" are often parts of "proposals" in competition with other proposals public or private. Subsequent "plans" depend on winning the competition and it is possible one port will have mutually exclusive proposals. For instance, two proposals for a bio-fuel plant at a port will not both win. If one wins the other is excluded.

**Issues:** In this survey, "issues" refers to matters of policy, attitude, or law that are of concern to ports.

## Missouri Public Port Authorities, Generally:

Missouri has two navigable waterways, the Mississippi River and the Missouri River. There are over 200 ports in Missouri and 14 of them are “Public Port Authorities.” They are similar to Industrial Parks and Economic Development Commissions. They work to develop land, regions, and businesses, which may not otherwise develop. More specifically, they provide waterway related intermodal access for public, commercial use. As such, they qualify for special funding, especially state and federal transportation funding. Some port authorities include ferry services, which also qualify for transportation funding. Some port authorities include gaming, marinas, or other non-waterway or non-transportation developments, which do not qualify for transportation funding.



Figure 3. Two barges in part of the Pemiscot County Port Authority's slack water harbor.

The fourteen public port authorities of Missouri are very different from each other. However, the study found they can be grouped into four categories:

**Category 1:** Undeveloped Port Authorities.

**Category 2:** Developing Port Authorities.

**Category 3:** Developed Port Authorities.

**Category 4:** Missouri River Port Authorities.

All port authorities on the Mississippi River are in the first three categories. All port authorities on the Missouri River would be in the third category, except limits on Missouri River navigation make them different.

Each category has different objectives and issues, which suggests an opportunity for improvement. Current practices treat all port authorities the same. With better understanding and well-defined state interests, the state could better match efforts and requirements to each level of development.

**Undeveloped Port Authorities, Category 1:** Four port authorities have no land, facilities, infrastructure, or equipment. They may have buildings, land, and equipment for business offices, but not for handling cargo. They cannot operate as a physical port in any way. Their primary objective is typically to find suitable land and businesses support to justify and even fund purchasing and developing waterway land. Funding is their most pressing issue. Without any physical location and businesses, they typically have no source of funding, making it nearly impossible for them to afford 20 percent matching funds.

**Developing Port Authorities, Category 2:** Three port authorities do have some land, facilities, infrastructure, and equipment. It is physically possible for them to have waterway related business. However, they are not yet developed enough to generate funding and often face major roadblocks to development. Thus, their pressing issues relate to solving major problems in order to allow development, with little or no funding. It is typically difficult for them to afford 20 percent matching funds.

**Developed Port Authorities, Category 3:** Four port authorities have developed land with facilities, infrastructure, and equipment such as shown in Figure 4. They support one or more waterway businesses and generate funds with which to continue development or expansion. Some of these ports have reached their desired level of development. Their objectives are developments needed to maintain businesses. Other developed ports still want to develop and expand more. Their objectives relate to developments to encourage even more businesses or more expansion. Developed ports can typically raise the 20 percent matching funds. Instead, their funding problems tend to be projects costing more than current state or federal budgets.

**Develop:** Developing means improving the existing land of a port. Some ports have more space available than others.

**Expand:** Expanding means increasing the land area of a port. Some ports have more expansion opportunities than others.



Figure 4. The developed category, New Madrid Port Authority.

**Missouri River Port Authorities, Category 4:** All three port authorities on the Missouri River have land, facilities, infrastructure, and equipment needed to function as developed ports. However, they are significantly different from other, developed ports due to the lack of commercial waterway transportation on the Missouri River. More information about the limits of Missouri River navigation and cargo is in “Appendix D, Missouri River Cargo:”.

To stay in business these port authorities are primarily focused on businesses that do not depend on waterways. Their most pressing issues are the same as land locked industrial parks, while their only waterway related issue is lack of waterway traffic. The non-waterway businesses generate funding, typically making it possible for these ports to afford 20 percent matching funding. Although, without waterway traffic, they are more interested in funding landside development rather than waterside development.

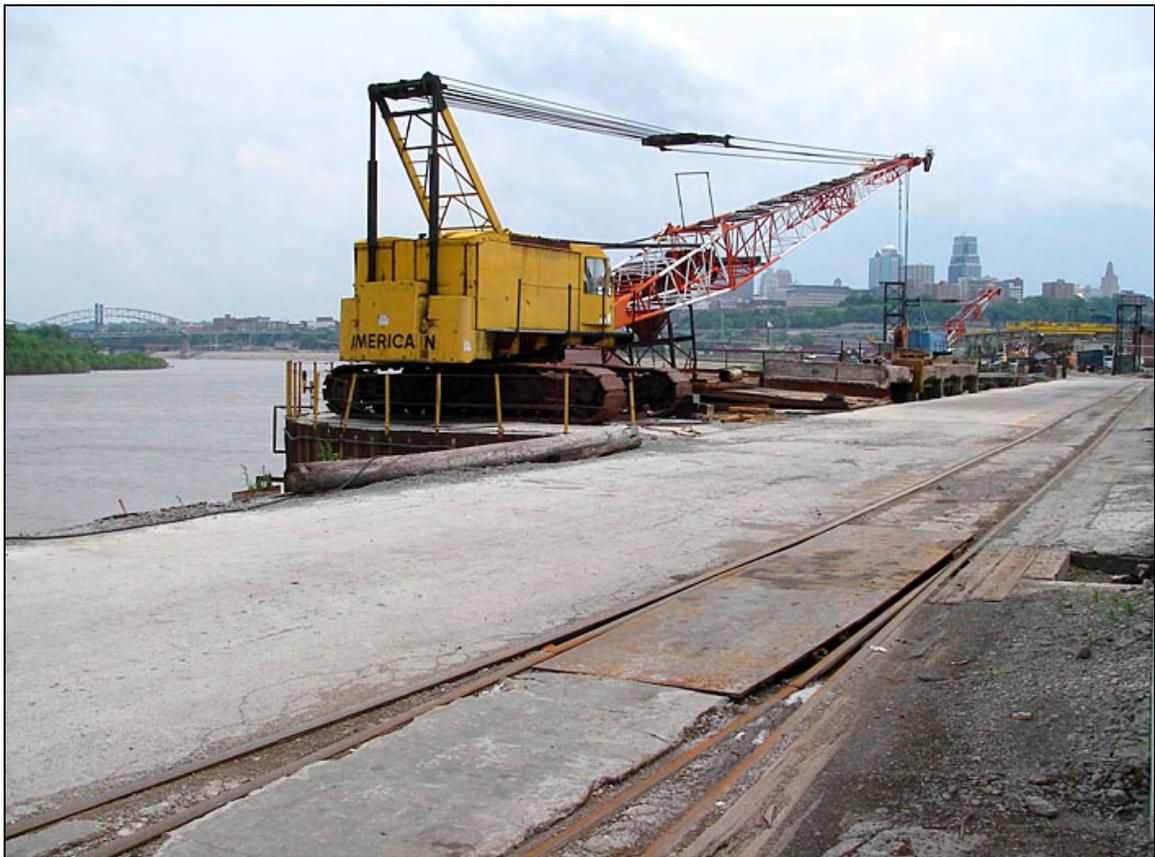


Figure 5. The Kansas City Port Authority on the Missouri River ready for waterway traffic.

The following chapter reports on each of the port authorities in the above category groups.

## Missouri Public Port Authorities, Individually:

In this chapter, port authorities are grouped by category, and then individually described. Their physical locations and various conditions are reported, including room for development or expansion. Their objectives, plans, any current developments, and issues are also reported.

### Four Undeveloped Ports, Category 1:

Four Missouri port authorities have no land, although their general locations are as shown in Figure 6. All of them are along the Mississippi River.

**Jefferson County Port Authority:** Jefferson County is well poised for waterway development due to a lengthy Mississippi River border, good freeway and railway lines near the river, and being near but south of the traffic congestion, river locks, and river ice of St. Louis City and County.

Limiting the region's waterway development is a large deposit of high quality limestone. The valuable stone is one of Missouri's significant natural resources, especially considering its location next to the waterway. Long ago, mining companies bought up large tracts of land along the Mississippi River. They maintain ownership of the land for future mining purposes. Thus, the county has large land areas that are both undeveloped and unavailable for development. This has caused the port authority difficulty in finding and developing land. At the time of the survey, the port did not own any land, facilities, or equipment. Thus, land is both its primary issue and primary objective.

**Marion County Port Authority:** Marion County is in competition with the Mid-America Port Commission, listed below. If Mid-America develops in Marion County, then there may be little or no need for a Marion County port, too. This fact has community leaders uncertain about how to proceed.

A primary issue of the port authority is federal funding for modernization and better maintenance of the upper Mississippi River navigation system. The capacity of old locks is a limiting factor for use of the Mississippi River, forcing more goods onto highways and railways. Limited river traffic also limits demand for port facilities and limits growth industries such as bio-fuels.

Despite uncertainty and limiting factors, the Marion County Port Authority is working on plans and agreements related to bio-fuels or a trans-modal facility. While the community might prefer a locally managed port authority, the ultimate goals of both port authorities are the same: development of regional jobs, industry, and the economy.

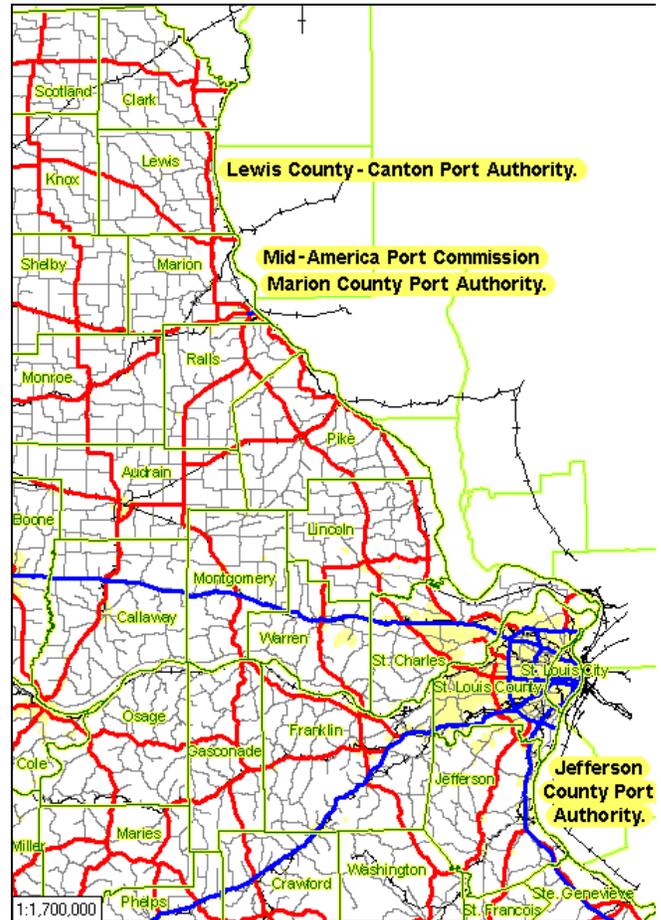


Figure 6. Location map of four Category 1, Undeveloped, Port Authorities.

**Mid-America Port Commission:** The Mid-America Port Commission is a unique three-state Commission. In Illinois, it is at least in the “developing” category. However, in Missouri and Iowa it is still “undeveloped.” Mid-America has no land in Missouri although it is considering land and development in Marion County, and even competing for land with the Marion County Port Authority.

Mid-America’s plans also put the states into competition with each other. It has plans for each state, and the selection of which plan to work on next depends on support and conditions in each state. Development started in Illinois due to availability of land, adjacent infrastructure, and other considerations. Similar factors will be used to decide on further development in Illinois, or new development in either Missouri or Iowa. Even though Mid-America is “undeveloped” in Missouri, its business in Illinois provides the funding power more like a “developed” port.

Mid-America’s primary issue is with changes in flood control laws among states. As a multi-state operation, the different standards and laws among states complicate its work. Mid-America supports federal standardization of flood control in particular. Mid-America’s primary objective, for Missouri, is purchasing land, probably in the Marion County area, and then development of the land, possibly related to containers-on-barges.

**Lewis County - Canton Port Authority:** The Canton Port Authority owns a ferry and provides transportation services, as shown in Figure 7. While not typically thought of as “ports,” ferries are short haul, commercial, waterway carriers with loading docks on each riverbank. As with other port operations, they must safely load, haul, and unload cargo, which is both public and commercial. Ferries are certainly part of the transportation system. Therefore, they fully qualify for transportation and port funding.

Other than the ferry, the port authority does not have any equipment, land, or facilities. Even the ferry terminal lands are public right of ways. Due to perceived local supply greater than demand for port facilities, the port’s commission has no plans to acquire land or otherwise develop the port authority. Consideration is being given to a marina for recreational access, but such objectives do not qualify for MoDOT, multimodal funding.



Figure 7. Canton Ferry, longest continually operating ferry on the Mississippi River.

### Three Developing Ports, Category 2:

Three port authorities on the Mississippi River have land, but lack business due to major roadblocks to commercial development.

**St. Louis County Port Authority:** The St. Louis County Port has owned land for several years. Efforts to market the land for commercial business purposes have failed, mostly due to lack of flood protection. Efforts to market the land for recreation purposes have succeeded, namely for a casino and related developments. Anticipated roadway traffic changes qualified for highway related funding rather than waterway related funding.

Since none of the port's objectives relate to commercial, waterway transportation they are beyond the scope of this survey and report. Still, the port authority has land and is proceeding with development, making it a public port authority in the second category of this report.

**Mississippi County Port Authority:** The Mississippi County Port Authority owns land near the confluence of the Mississippi and Ohio Rivers. As such, it is an ideal location for fleeting operations. The port supports a fleeting operation and has plans to improve drinking water service from the port to the fleeting operation.

The port authority's location could be ideal for other port developments, such as a multimodal facility, except for the lack of flood control and lack of railroad services in the county. Similar conditions exist on the other side of the river, plus railroad service. Thus, development on the Missouri side is unlikely, without expensive railroad developments.

The county has Interstate 57, two Mississippi River crossings, a prime waterway location, and rich farmland. Despite these advantages, commercial developments tend to skip the county going to Sikeston instead, or further into other counties or states, see Figure 9. Thus, the port authority's primary objective is job development for the county by commercial development of the port.

The port's primary issue is with finding an industry suited to its conditions, or with changing

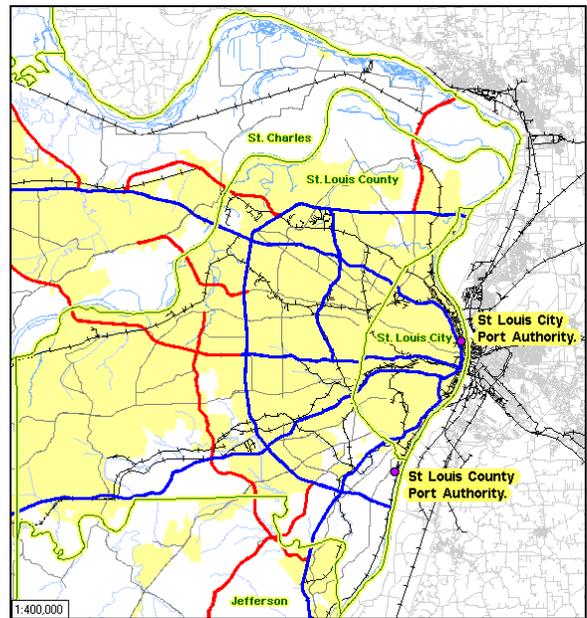


Figure 8. Location map of the St Louis County and the St Louis City Port Authorities.

**Recreation:** Other state and federal programs and agencies support and regulate waterway development for purposes such as recreational boating, riverside parks, and riverboat casinos.

**Fleeting:** This means reconfiguration of barges and tows on the water, rather than loading or unloading cargo between water and land. It requires very little landside services and offers very little landside employment or economic development.

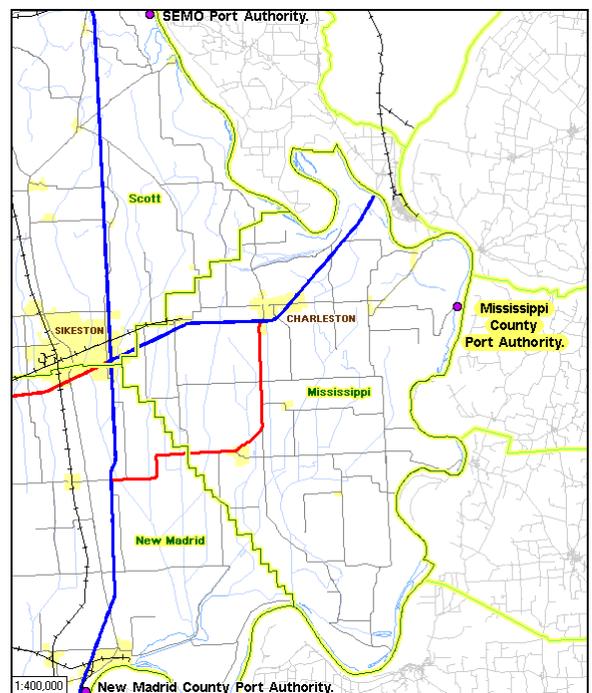


Figure 9. Location of the Mississippi County Port.

the conditions. Another issue for the port is flood control legislation. Mississippi County and other Missouri counties are entirely in the geological floodplain of the Mississippi River. Any legal restrictions to development in a “floodplain” would restrict all development in such counties, by some definitions of a floodplain.

The Mississippi County Port Authority also has a ferry operation in the south of the county, the Dorena-Hickman Ferry.

**New Bourbon Regional Port Authority:** Unlike other ports below St. Louis, the New Bourbon Port location is better suited to mineral businesses than agricultural businesses. Its land is just south of Ste. Genevieve, close to highways and railways, and not too close to other port authorities. However, its land is along the outside bank of a bend in the river. If any waterway vehicles loose control in the bend, they would tend toward the port’s property.

For maximum safety, the Corp of Engineers would prefer the port build a slack water harbor, which would move port activities beyond the riverbanks. Development of a slack water harbor is underway, expensive, and environmentally difficult. Until the harbor is developed, the port is not attractive to businesses and does not generate income. Once a harbor is completed, the port has extensive plans for development, with phased construction. However, the plans remain flexible to meet the changing needs of different potential businesses.

The Port Authority also has the Ste. Genevieve-Modoc Ferry, carrying more than 14,000 vehicles and 33,000 passengers in 2006. Even with subsidies, the port is not profiting from this ferry, and cannot use it to raise development dollars.

The lack of port business makes matching money difficult for the port to obtain and limits its ability to develop commercially. Thus, general development is the ports primary objective, and funding is its primary issue. Another major issue is legislation limiting floodplain development, as is the case with almost any port authority.

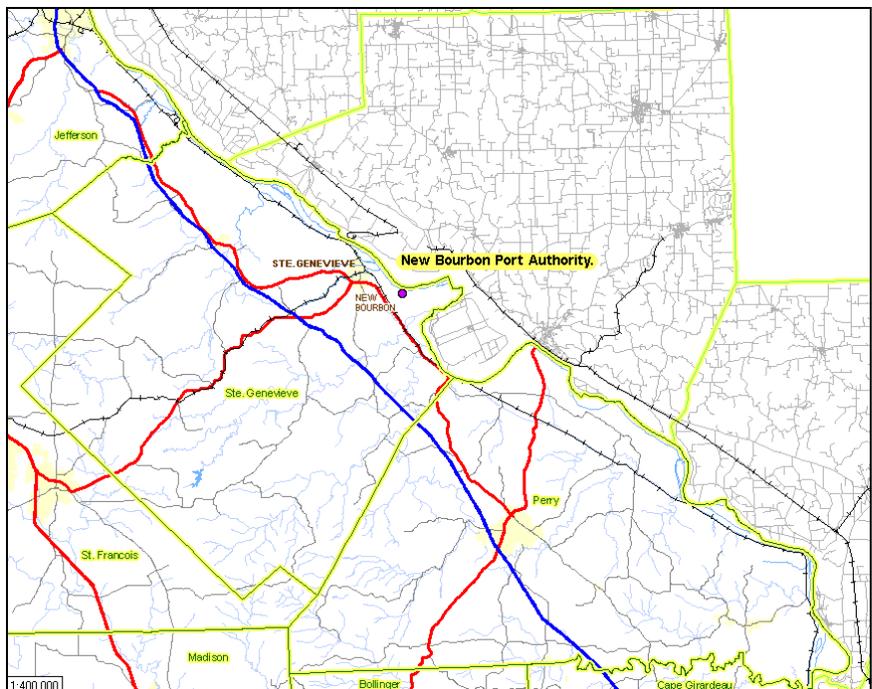


Figure 10. Location map of the New Bourbon Regional Port Authority.

### Four Developed Ports, Category 3:

**City of St. Louis Port Authority:** The St. Louis *City* Port Authority is unique in that it manages all leases of city owned waterway property. About 40 leases generate about \$1.5 million for the port and city per year. No other public port authority in Missouri has such extensive leasing opportunities.

Leasing instead of selling the property generates long-term funding for the port and city while maintaining public ownership of the land. Managing these leases is the primary, day-to-day work of the port authority. As part of its land management, the port authority supports recreational uses such as casinos. However, the majority of its leases relate to fleeting activities. Generally, the port does not develop leased property. Leaseholders develop the property.

The Chain of Rocks bypass canal is northeast of St. Louis City and the start of where locks and dams limit the size of tows on the Mississippi River. Thus, tows at St. Louis typically need to re-fleet to fit the upper river's limited tows, or to make use of the lower river's nearly unlimited tows. There are also many private port facilities in the St. Louis area. These factors, as shown in Figure 10, contribute to the success of the port authority's leases.



Figure 11. Barges and tows in the Mississippi River at St Louis. Note the size of 18-wheelers on I-55.

The port authority has property north of the Arch. Please see the earlier Figure 8 on page 8 for a location map. The land is a well-developed port facility, putting it in the developed category, and the city leases make the port well funded, too.

The port facilities could be impacted by development of a new, major Mississippi River crossing bridge. Thus, the bridge is an issue for the port to watch and respond to, as plans continue to develop. The port has several objectives for routine maintenance and improvement of its property. However, it does not have objectives for major new developments or for encouraging new businesses.

While the St. Louis metro region spans between the Mississippi River and the Missouri River, official city property is limited to the Mississippi River, as shown before in Figure 8, on page 8. The port authority still has a concern with the lack of Missouri River traffic, since it means cargo could be going through St. Louis, but instead it is going elsewhere, such as through Tulsa. More traffic on the Missouri River would mean more business for the St. Louis region and Missouri in general.

The port authority also reported a concern with quantity and quality of water from the Missouri River. The Missouri River contributes significantly to the flow of the Mississippi River. Therefore, more stable water *quantities* from the Missouri River result in more stable water levels in the Mississippi River.

Regarding *quality*, Missouri River water is slow to mix with water from the Upper Mississippi River, as shown in the aerial photograph of Figure 12. Thus, the quality of the Mississippi River on the Missouri side depends heavily on the quality of the Missouri River. Muddier water from the Missouri River causes more siltation in downstream Missouri ports than in Illinois ports, giving an advantage to Illinois ports.

The port authority has two issues due to water quality: dredging and silt controls such as dikes or mid-stream “chevrons.” Both dredging and silt controls are in the jurisdiction of the U.S. Corps of Engineers, which has its own funding problems.

Cleaner water coming from the Missouri River would reduce the need for both dredging and silt controls, which would improve competitiveness of Missouri ports. It would have additional benefits for businesses and others who use either of the rivers as a water source.

**Siltation:** Silt is fine-grained material carried by the river. In calm places, such as around dikes and in harbors, the silt settles to the bottom. As it builds up, it makes the harbor shallower. This processes is referred to as “Siltation.”

**Chevrons:** These are chevron shaped dikes not connected to either bank.



Figure 12. Aerial photograph of the silt filled Missouri River (left), which reflects brown light, and the clearer Mississippi River (right), which absorbs most light and appears black from overhead. Note the lack of mixing even in the Chain of Rocks rapids (lower left).

### Ports in Friendly Competition:

In southeast Missouri, the three developed port authorities (and to a lesser extent, two of the developing port authorities) are in friendly competition. They are close enough to compete with each other. However, they are also far enough apart to serve different customers and make it a friendly competition.

Southernmost Pemiscot is just now adding a railway connection, while New Madrid (center) and Semo Port (north) already have railways. Semo Port is probably the most developed port authority in Missouri. All of these ports have capacity for more waterway traffic and more development.

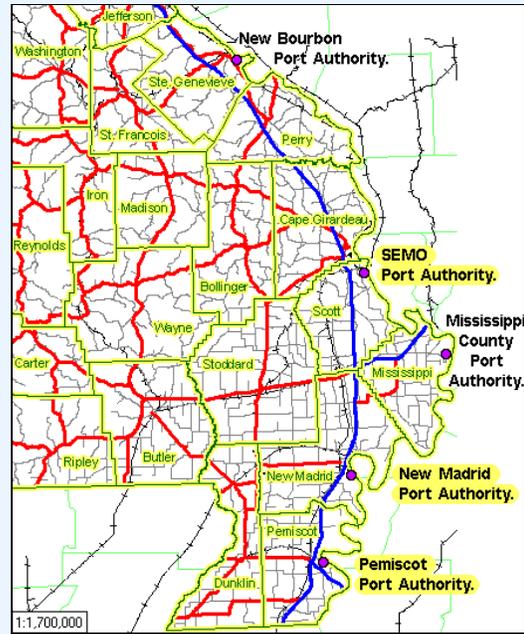


Figure 13. Southeastern Port Authorities.

**Pemiscot County Port Authority:** Pemiscot is Missouri’s southern most public port authority. They are south of the Ohio River and thus along the busiest stretch of Missouri’s Mississippi River. Part of the port was shown before in Figure 3 on page 3.

The port has a well-developed slack water harbor built in a natural channel that was the former line of the Mississippi River. This poses a greater security challenge than a constructed harbor, due to public perception and legal aspects of access to public waterways. The situation is further complicated by land on the opposite bank of the channel belonging to the State of Tennessee, even though it is west of the current Mississippi River channel.

The port’s first railway connection is currently being built. This project gives the port multimodal access typical of a well-developed port. It already has good connections to highways. From them, two interstates, a Mississippi River bridge, and other highways give it direct access to counties in three states, including rich farmlands of the Mississippi River floodplain.

It has room for more development and the potential for even more land near by. In addition to the current railway develop-

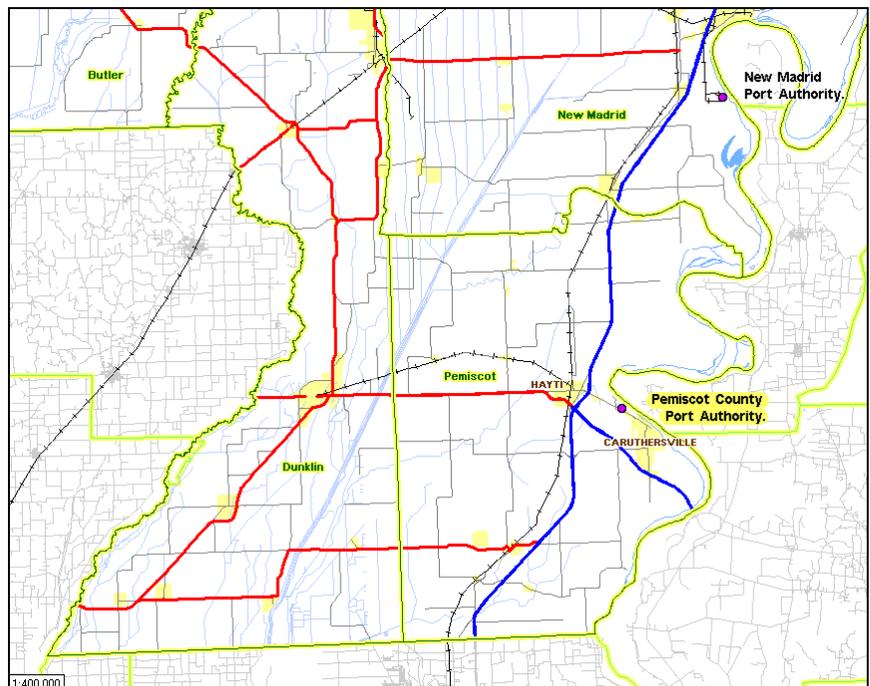


Figure 14. Location map for the Pemiscot County Port Authority.

ment, it has far-reaching objectives. Some objectives relate to bio-fuels and containers-on-barges. Others relate to improving public, commercial access with a new port-owned dock. All together, it has many objectives totaling millions of dollars. Its existing businesses generate income to potentially supply matching funds.

**Public vs. Private:** Port authorities often include both “public” docks facilities built and owned by the port, and “private” facilities built and owned by tenants.

Like other ports in the group, Pemiscot’s issues and objectives are the same as big business in general. Pemiscot has concerns about legislation limiting development in floodplains, and concerns about changes in the Corp of Engineer’s dredging. Especially since it wants to use dredged material for fill material and further improvement of the port.

**New Madrid County Port Authority:** The New Madrid Port is well developed with a constructed slack water harbor and multimodal connections to railways and highways. Like Pemiscot, New Madrid is south of the Ohio River, along Missouri’s busiest stretch of the Mississippi River. The port is shown in several pictures of this report, such as Figure 4, page 4.

New Madrid is well positioned to serve agricultural interests in several counties of Missouri and Arkansas. It has room for additional commercial development with infrastructure already in place, and it has the potential to expand into adjacent land.

New Madrid has many plans and objectives totaling millions of dollars. Objectives discussed were related to improvements for existing businesses, or encouraging new businesses in general rather than specifically for businesses such as bio-fuels or containers-on-barges. For instance, objectives to improve railway and highway connections would benefit existing businesses and encourage new business in general. Its existing businesses generate income to potentially supply matching funds for development.

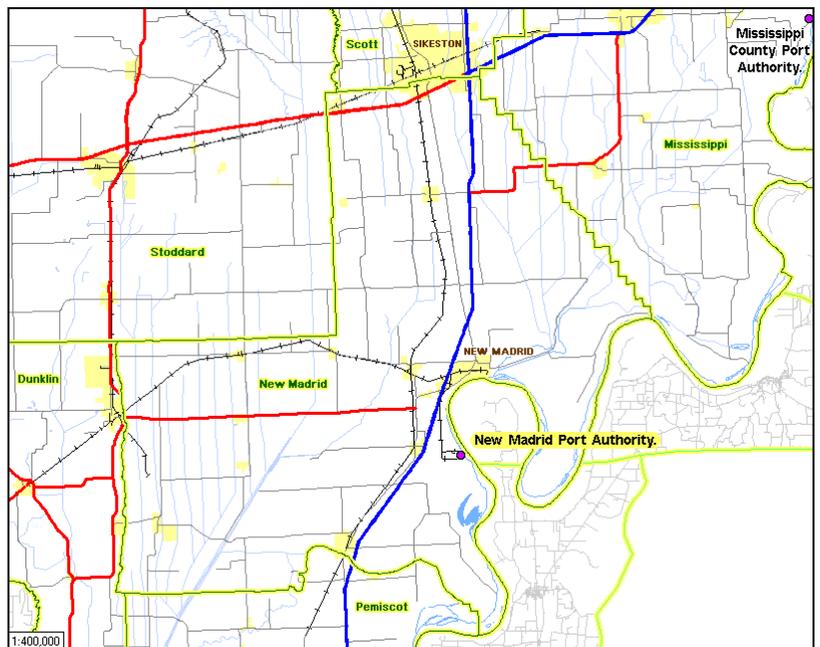


Figure 15. Location map for the New Madrid Port Authority.

Most of New Madrid’s issues and objectives are the same as big business in general, such as balancing new developments to meet new needs or to encourage new business opportunities. As with other ports, it has concerns about legislation limiting floodplain development.

An issue for the port is dredging. Changes in this year’s dredging plan, under the jurisdiction of the U.S. Army Corp of Engineers, has the port worried about dependability of future dredging. Slack water harbors are safer in that they move waterway activities out of the river’s current and out of the way of waterway traffic. Constructed harbors also benefit from a public perception of being private and not open to recreational boats. However, the still water in a slack water harbor allows sediment to settle. Silt builds up and must be routinely removed to keep the harbor open and navigable. The trade off, for the Corp of Engineers and others, is that safer slack water harbors require more dredging maintenance.

**Semo Port, Southeast Missouri Regional Port Authority:** The Semo Port is just south of Cape Girardeau, placing it north of the Ohio River. This section of the Mississippi River is slightly less busy than south of the Ohio River. The port is well poised to serve Cape Girardeau businesses, the floodplain farming to the southwest, and hill country forestry and mining to the northwest. Plus, a local railway bridge and a new highway bridge give them access into Illinois and beyond.

Semo Port is likely Missouri's most developed public port authority, as illustrated in Figure 17. They are multimodal with railways and paved roadway connections to highways. Despite its development, it still has room for more development of existing land, plus the potential for expansion into additional land.

Semo Port has an extensive list of objectives, totaling millions of dollars. Some objectives are for general port improvement. Many objectives overlap and compete. For instance, a bio-fuel objective has a couple different proposals in competition with each other. Within some objectives, plans overlap or are mutually exclusive. At the same time the port has plans in case objectives do not develop, such as a plan in case no bio-fuel proposals work out.

Containers-on-barges is not a particular objective, but rather something it has done since the 1980s. Currently, the port does not see much demand for containers.

Like other ports in the group, its issues and objectives are the same as big business in general. It has the same concerns about floodplain legislation and dredging problems as other port authorities.

Semo Port Authority's "can do" attitude is, "Do what we can with the money we have." Due to the extent of its development and success, it may well have the best ability to generate matching funds and funds for maintaining existing capabilities.

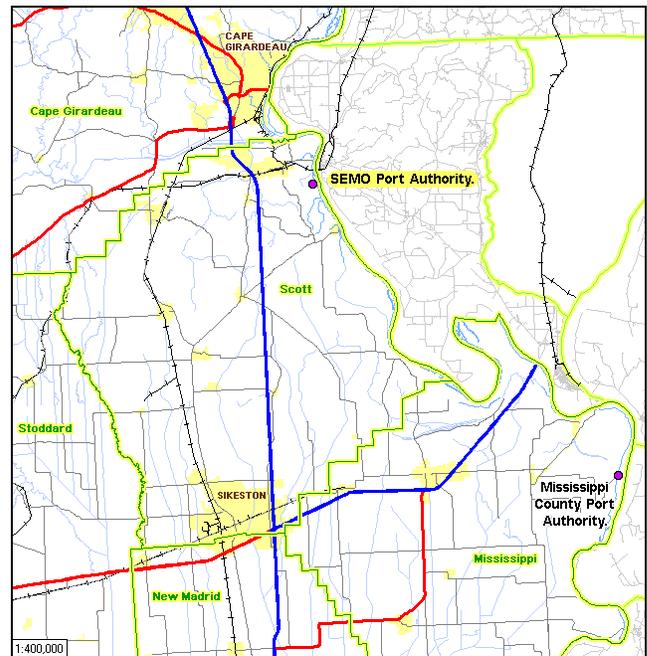


Figure 16. Location map for the Semo Port Authority.



Figure 17. Panorama photograph of the Semo Port Authority.

### Three Missouri River Ports, Category 4:

Three port authorities are located along the Missouri River, as shown in Figure 18. All of them would be in the developed category, except the Missouri River conditions make them different enough to be a separate category.

The river depth is seasonal and complicated. Seasonally, the river is closed to towboat navigation for at least four months per year. In a full flow season, the depth should be nine feet or more. During extended drought the season can be as short as six months, and the depth as low as eight feet.

Also, if upstream reservoirs are low enough on the 1<sup>st</sup> of March, then they will not release water to support navigation at all. The last few years have not been full navigation seasons. Thus, waterway traffic prefers to go to Iowa (upper Mississippi River) or Oklahoma (Arkansas River). The majority of current Missouri River cargo is sand and gravel, which is mined from the river and does not go through any public port authorities.

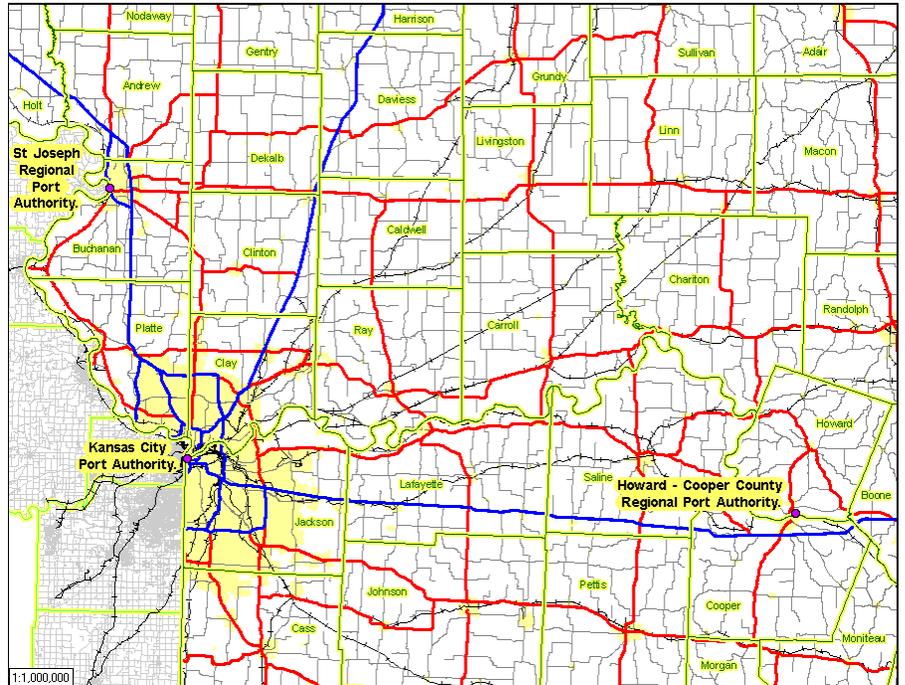


Figure 18. Location map of the Missouri River Port Authorities at Boonville, Kansas City, and St Joseph.

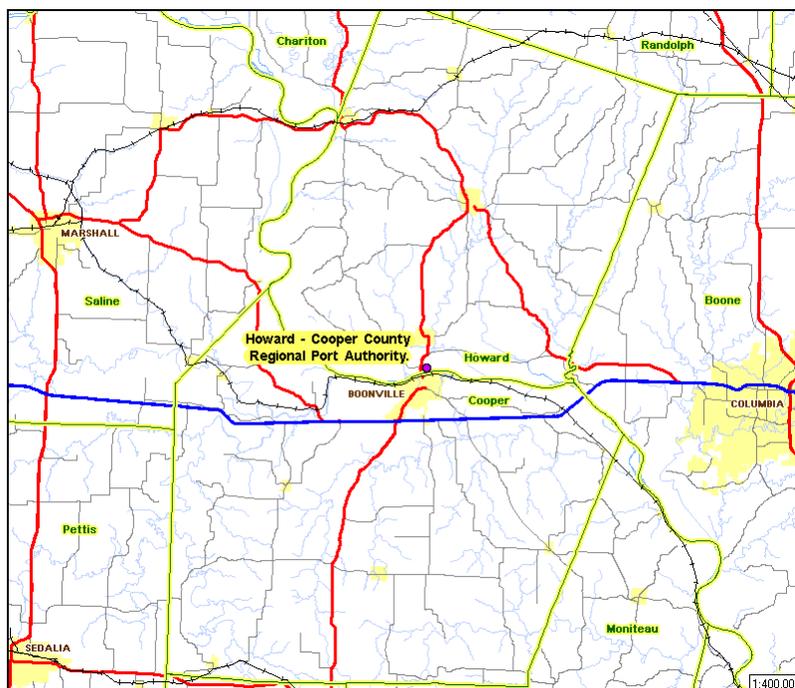


Figure 19. Location map of Howard - Cooper County Port Authority.

#### Howard - Cooper County Regional Port Authority:

At the time of the interviews, the land leased by the port authority was being auctioned off. As of this writing, the land is under new ownership, and the affects for the port remain to be seen. The port authority's land is a leased portion of a larger, private port on the north bank of the Missouri River, across from Boonville. The sand mining and liquid tanks on the land are not part of the port authority. This location and a new Missouri River bridge give the port good access to the rich, lowland farms of the Missouri River floodplain, and to the highland farms north and south of the river.

As with other ports along the Missouri River, lack of waterway traffic has effectively eliminated waterway related business. Instead the port uses its facilities for agriculture related, land based shipping.

Reliable navigation is the port's primary issue, other than issues related to the sale of its property. Likewise, all of its objectives are pending affects of the sale. But, if the sale does not cause problems, if waterway navigation develops, then its primary objective is to support bio-fuel related products, grain, and fertilizer. The port is also interested in development to support containers-on-barges, or any other waterway traffic on the Missouri River.

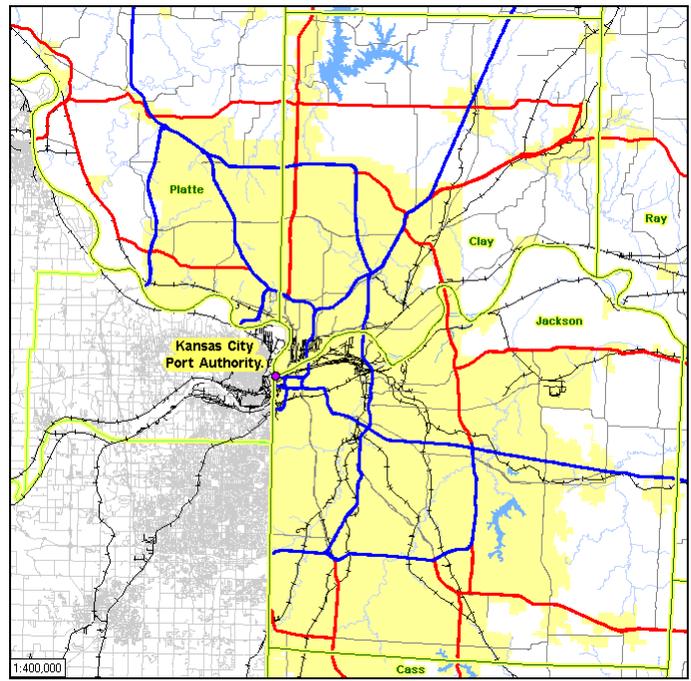


Figure 20. Location map of the Kansas City Port Authority.

**Kansas City Port Authority:** The Kansas City Port is the most developed and most landlocked port of the Missouri River ports. It is located in downtown Kansas City, just past the confluence of the Missouri and Kansas Rivers. Its property actually extends partly into Kansas, with all the jurisdictional complications that arise from that, as well as easy access to two states.

The port has excellent multimodal connections with a railway in the port, paved access to Interstate 70, and even nearby access to the Kansas City Downtown Airport. The port is well positioned to serve commercial needs of the Kansas City region, and farming needs beyond Kansas City.

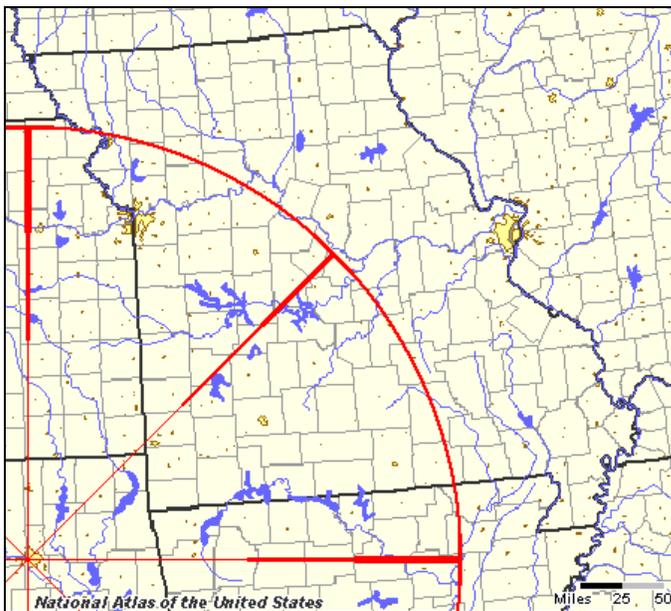


Figure 21. Map showing Tulsa Oklahoma relative to Missouri, and a radius including regions north of Kansas City, which are reportedly sending goods to Tulsa for shipment on the Arkansas River, despite shorter distances to the Missouri and Mississippi Rivers.

Lack of waterway traffic is the port's biggest issue and a subject discussed more here, than in any other ports during the survey. It reported the only waterway related cargoes in the last few years were too big or too heavy to move by any other modes. Otherwise, it reports cargoes of the Kansas City area, and even further north (see Figure 21), go southwest to Tulsa, Oklahoma and the Arkansas River, rather than to Missouri ports. They believe the highway to Tulsa and port conditions in Tulsa make it more desirable or more economical than I-70 and any Mississippi River ports.

The port also reported redevelopment of Missouri River traffic will require many years and several steps. First, the River will need to be reliable and deep enough for several years in a row, to prove it can

be trusted. Then, it will take years of successful, cooperating ventures between businesses willing to send cargo by waterway, and businesses willing to supply barges and tow boats. Only then will waterway traffic return to routine operations.

The Kansas City Port Authority facilities are being used primarily for agriculture related, land based shipping. Its only objectives at this point are property developments to stay in business and continue land based shipping business.

**St. Joseph Regional Port Authority:** The St. Joseph Port is newest and most optimistic of the Missouri River port authorities. It is developed, with room to further develop existing land and the potential to expand into new land. It is located in downtown St. Joseph, well positioned to serve the commerce of the city and farms of surrounding counties and states. The St. Joseph Port has excellent multimodal connections with a railway in the Port, paved access to highways, a good bridge into Kansas, and even nearby access to the St. Joseph Airport.

The Port facilities are currently used for transferring commercial goods from either railway or waterway to truck for local delivery, as shown later with the coils in Figure 25 on page 21. This business makes use of the Missouri River when possible, and railways otherwise. Still, the port's primary issue is with the lack of waterway traffic, as typical of Missouri River ports.

The port authority is an active part of local commercial, industrial economic developments that are beyond the scope of this survey. Likewise, many of its objectives are related to development beyond the port. Its current, major, port related objective is a new roadway connector. As railway traffic passes through the waterfront area, it blocks all roadways. A new overpass connector would improve commerce and safety of the entire area by preventing trains from blocking deliveries or emergency vehicles. Future objectives focus on making the port better for agricultural products and for more trans-modal operations.

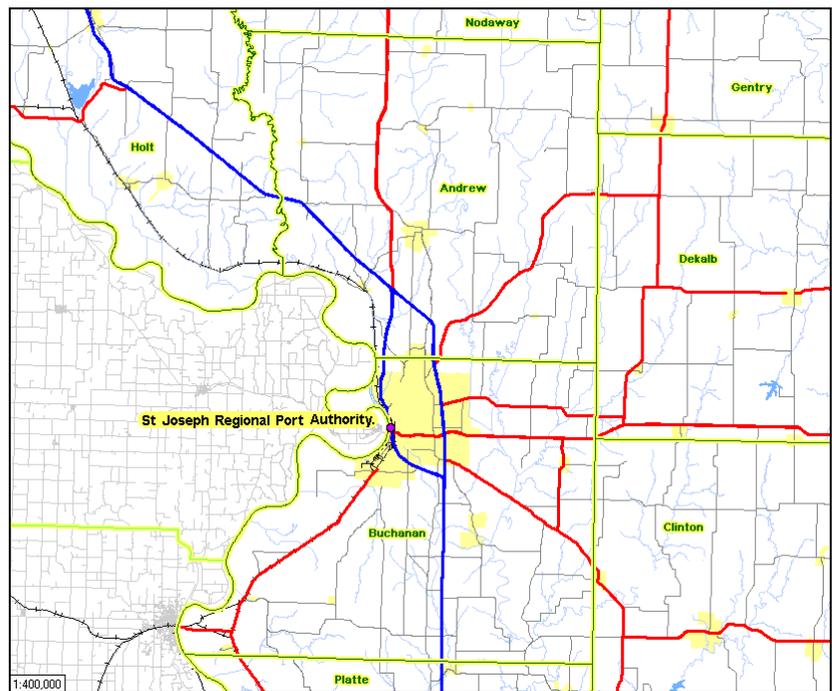


Figure 22. Location map of the Saint Joseph Regional Port Authority.

## Summary:

The primary purpose of the survey was to gather detailed data on which to base further studies. That purpose was achieved, and the data compiled for use in future studies. A secondary purpose of the study was to generally learn more about Missouri's port authorities and waterways. Achieving that purpose is the reason for compiling this report. There are some general findings from the study, but the most valuable findings are a better understanding of Missouri's port authorities, individually.

The survey found port authorities can be grouped into four categories, as they were presented in the report. Within each category some findings can be generalized:

**Category 1:** Undeveloped Port Authorities generally need land and have little or no money for purchasing it or even for matching funds. Their objectives are to find land and begin development.

**Category 2:** Developing Port Authorities generally have major roadblocks to progress such as land that is not developed enough to attract businesses. They typically have little or no money. Their objectives are development of basic port features.

**Category 3:** Developed Port Authorities tend to be either developed to the point they want to be, or still developing further. Both types have businesses generating income, which can be used for matching funds.

- Developed Ports' objectives are typically limited to maintaining existing businesses.
- Still developing Ports' objectives are typically big business problems, needing big budget solutions, often exceeding annual public budget limits.

**Category 4:** All Missouri River Port Authorities would be in Category 3, except for the lack of Missouri River traffic. Like developed Ports, they typically have businesses to provide funding, but their main problem and main objective is more waterway traffic, which cannot be solved with port improvement programs.

Some other findings generally apply to port authorities: All ports have issues with limits placed on development in floodplains, since all of them are necessarily on riverbanks. Most of them want to change to support bio-fuels. Few of them want to change to support containerized cargo, although they are not opposed to containers. All Missouri River port authorities, and some Mississippi River port authorities want dependable Missouri River navigation.

The following appendices provide additional, general information about topics mentioned in the report.



Figure 23. New Madrid Port Authority.

## Appendix A, Waterway Benefits:

Although discussed extensively in the previous report [“Missouri Public Port Authorities: Assessment of Importance and Needs”](#) or the brochure [“Missouri Waterway Facts,”](#) the benefits of waterways are important enough to summarize in this report. Thus, this page gives a quick comparison of waterways to highways and railways.

Perhaps the most cited benefit of cargo on tows is: One standard tow carries as much tonnage as 900 semi-trucks, or 225 rail cars. Many benefits follow from this. For instance, one tow is operated by a 10 to 12 person crew working in shifts (including the cook), as opposed to 900 semi-trucks being operated by 900 drivers, or 1800 drivers if working in shifts (not including cooks). Thus, one tow has far less labor costs than 900 trucks.

One tow burns 44 gallons of fuel per mile, while 900 trucks burn 381 gallons of fuel per mile. If 900 trucks were to carry the same cargo from St Louis to Kansas City as 1 standard tow, the trucks would make a convoy 45 miles long on I-70, and burn 75,000 more gallons of fuel. Fuel savings make waterways the least polluting method of transportation. While environmentalists complain about waterway development, they still have to agree: waterways are ecologically the best mode of transportation.

Highways have the most speed and connectivity, while waterways have the most economy of scale. Railways are in between. They go faster and connect more locations than waterways, but do not have as much economy of scale as waterways.

Waterways are best for bulky products where minimum shipping costs are more important than fast shipping. Farm products, fertilizers, and farm equipment are best suited to waterways and Missouri’s supply, and demand. Coal, fuels, rocks, mulch, steel, and other raw products are also well suited to Missouri waterways. Containers give other products the benefits of bulk products, and open the possibility of shipping more products on waterways. Most of all, waterways can carry weights and sizes not possible by any other mode.

Missouri’s two waterways directly connect 39 adjacent Missouri counties (plus other states), and indirectly connect another 44 nearby counties—about 70 percent of Missouri. The Missouri River is a border of 23 Missouri counties and next to more than 50 Missouri communities. (For comparison, I-70 is only in 10 counties).

If rural I-70 is used as a benchmark of a busy interstate highway, then waterway cargo can be compared to equivalent interstate cargo. The Mississippi River below the Ohio River carries cargo equal to 4.7 busy interstates. The Mississippi River from St Louis to the Ohio River carries cargo equal to 2.3 busy interstates. The Mississippi River above St Louis is limited by locks and only carries cargo equal to 1.6 busy interstate highways.

Waterways carry that much cargo without any roadway or railway congestion. Except at ferries and drawbridges, waterways are inherently grade separated from highways and railways. Thus, more waterway traffic does not cause more congestion of highways or railways. Also, more cargo on waterway tows does not increase accident risks to roadway users as much as equivalent increases in highway trucks or railway trains.

The U.S. Army Corp of Engineers attributes 34 million tons of waterway cargo to the State of Missouri. The dollar value of cargo depends on what is carried. A ton of sand is worth about \$3, while a ton of soybeans is worth about \$140. Presuming an average value of \$70 per ton, Missouri’s waterway commerce is worth \$2 billion annually.

1 Tow  
Carries  
1500  
Tons.

225  
Rail  
Cars  
Carry  
1500  
Tons.

900  
Trucks  
Carry  
1500  
Tons.

Shown  
nearly  
to scale.

## Appendix B, Bio-Fuels, Affects on Transportation:

Bio-Fuels were a hot topic of the interviews. Ethanol is made from corn, while bio-diesel is made from soybeans, or other materials. Both crops are produced in Missouri, and produced even more north and west of Missouri. The pros and cons of bio-fuels are beyond the scope of this report. However, their affects on Missouri transportation are relevant.

### Capacity:

Bio-fuels have been legislatively mandated and encouraged to eliminate foreign dependence on oil, and encourage U.S. farming and industry. The U.S. imports 10.4 million barrels of oil per day, much of it brought to us in supertankers. If import oil is replaced with bio-fuel, and moved by trucks, then each day's bio-fuel will require enough trucks to completely fill at least 500 miles of interstate highways, at 10 lanes wide. To make that much bio-fuel requires at least that much grain, enough to fill at least another 10 lanes of interstates. To grow that much grain requires fertilizers, equipment, and other farming supplies, maybe enough to fill another 10 lanes of interstates. While this over simplifies the situation, it illustrates the size of the situation: if bio-fuel related trucks eliminate foreign oil, then every day, those trucks will fill more than 15,000 interstate lane miles. That much more highway capacity would cost roughly \$50 billion to build.

While a supertanker fills 10,000 trucks, it only fills 11 standard tows. Accounting for return shipping empty tanks, and estimate tripling it to account for grain, fertilizer, and equipments; then daily 350 tows are needed instead of 310,000 trucks. If Missouri gets only 10 percent of the bio-fuel industry, then it is either 35 more tows, or 31,000 more trucks, daily. That many trucks will fill 1,500 interstate lane miles or about the size of two I-70s, filled all day, everyday with trucks only. Since waterways do not reach every farm and gas station, trucks (and railways) will be required to carry plenty of the bio-fuel cargos. But without two, I-70s to spare, Missouri needs waterways if it wants bio-fuels.

None of the Ports complained of waterside capacity problems. Even Mississippi River port authorities were not filled to capacity. Waterways have capacity available, even though they are sometimes congested at bottlenecks such as old locks. Thus, bio-fuel sized capacity is available in waterways—not in highways and not in railways.

### Location:

While Missouri has rich farmlands, some of our neighbor states have more. Ports along the Mississippi River are well located to serve most Missouri croplands and related bio-fuel production plants. However, they will have competition with ports and bio-fuel plants on the other side of the Mississippi River, especially for nearby croplands of the other states.

The situation is different in northwest Missouri. If we make the Missouri River fully navigable year round, with a modern port in northwest Missouri, then the Missouri River becomes better located to serve northwest bio-fuel croplands than either the Mississippi or Arkansas Rivers. Even if the Missouri River were fully navigable only to Kansas City, it would enrich Missouri's position. More cargo would pass through Missouri instead of bypassing Missouri.

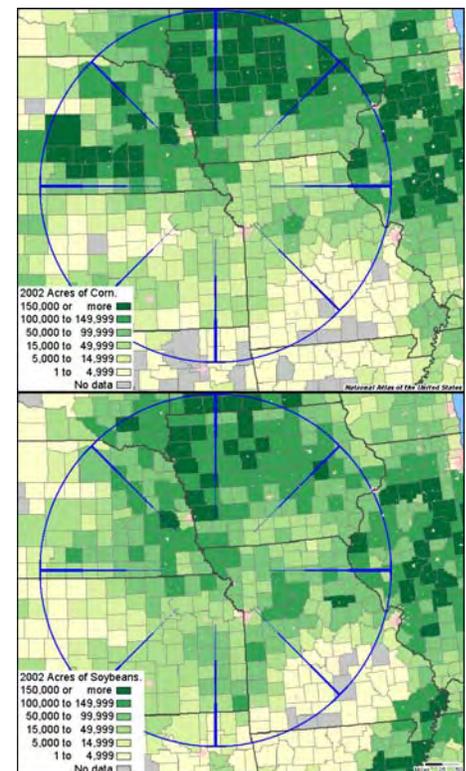


Figure 24. Maps of corn (ethanol) and soybean (bio-diesel) crops relative to northwest Missouri.

## Appendix C, Containers-On-Barges:

Containerized cargo is an industrial modernization, invented in the United States in 1956 by Malcom McLean. The old way is to directly handle cargo, in bulk (like a truck full of fuel) or in packages (like a truck full of boxed clothing), manually moving the cargo between vehicles specialized for only one type of cargo. The containerized way puts any cargo in containers, and moves whole containers with factory like efficiency between any vehicles capable of carrying containers. Plus, the containers protect cargo from contamination, damage, or pilfering. No matter what the cargo is, if it fits in a container, it can be moved with factory efficiency. Containers were opposed, especially in European ocean ports. But opposition melted when businesses relocated to ports supporting containers. Missouri Port Authorities are not opposed to containers, but they are not pushing for them, either.

Not everything about containers is perfect. For instance, containers become a commodity of their own. Imbalances in trade accumulate empty containers where they are not needed, and return-shipping empties may cost more than the containers are worth. The standard size and weight limits of containers were set by international committee. So they are not ideally matched to the limits of U.S. highways, railways, and waterway. Thus, some domestic industries are resisting standard containers, while international industries are adapting to them. U.S. waterways have not adapted. Containers are placed in generic hopper barges, which have been optimized for bulk cargo, not containers. Current demand for traditional tows and barges exceed production capacity, so development of container-optimized tows and barges is not happening.



Figure 25. Two photographs, one of a barge of grain being hand packed, one crane lifted pallet at a time, and the other of a barge of steel coils being unloaded, one crane lifted pallet at a time.

With barges, most commodities are loaded in bulk. Even if they are dry goods, they are effectively poured in and pumped out. This has made barge companies less interested in containers, and conversely barge companies are not attracting as much business as they could. But, containers open the benefits of waterways to cargos not previously suited to barges, creating a new opportunity for more waterway customers.

Containers change the shipping paradigm. They create opportunity for those willing to adapt. Ports, facilities, and waterways vehicles need redesigning to take full advantage of containerized cargo. Even load limit laws need minor changes for Missouri to maximize benefits from the container revolution.

## Appendix D, Missouri River Cargo:

The Missouri River is a complicated subject—past and future. It has changed from frontier interstate to modern conundrum. Management of the river must compromise between upstream and downstream states, as well as between landowners, environmentalist, and waterway users. The U.S. Army Corp of Engineers has primary jurisdiction for the river and strives to accommodate all users. This appendix presents the Missouri River’s past cargo and its potential for future cargo.

The graphs below show the history of Missouri River cargo, in commodity groups, based on the Corps of Engineer’s data, “[Waterborne Commerce of the U.S.](#)” The commodity groups and names are defined by the Corps, and have changed at times. For more detailed information, please refer to the Corps’ data at [www.iwr.usace.army.mil](http://www.iwr.usace.army.mil).

### Past Shipping:

In the first graph, Figure 26, all cargo types are shown from 1935 to 2005. The blue line (with triangles) is “Waterway Construction Materials.” It shows a construction effort after World War II, and then a drop in that effort to merely maintenance levels in the mid 60s. Finally, even maintenance dropped to a minimum starting in the mid 70s. Most cargos followed the construction trend, especially the green (with diamonds) line of “Farm Products.”

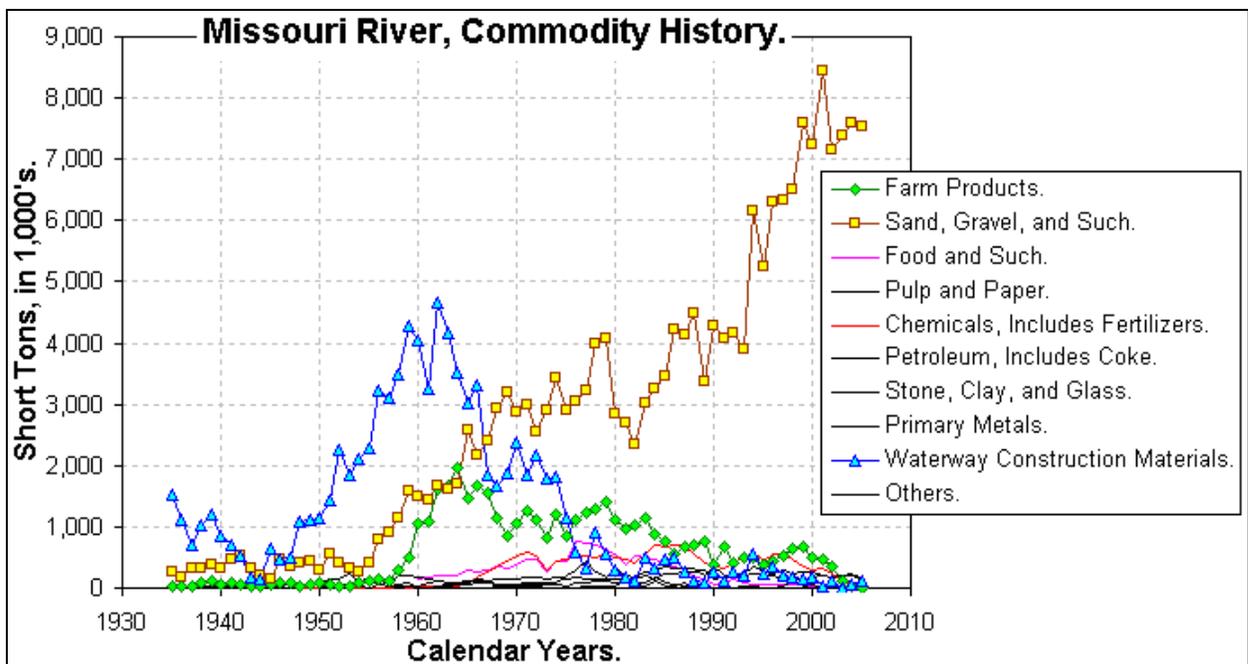


Figure 26. Graph showing all commodities shipped on the Missouri River in tons per year.

The yellow line (with squares) represents sand and gravel, which is mined from the river and carried only to land. It is the only cargo with an ongoing increase, and it is critically important to local construction. But, local construction materials do not represent interstate nor international trade. Removing these commodities allows the scale of the graph to change and show more details for farm and industry products.

Figure 27 below shows accumulated trade commodities. The height of each bar shows the total tonnage of commodities per year. Colored sections of each bar then show relative amounts of commodities in the total. As noted before, “Farm Products” in green are most of the commodities. “Chemicals” in red are mostly farm fertilizers, and therefore also related to farming. “Food and Such,” in magenta is likely farm related. The remaining commodities are probably more related to commerce than to farming.

Using only small sections of the data can suggest trends. However, the overall data shows market shifts and plateaus. For instance, the period between 1955 and 1965 could be seen as either a sharp growth trend or a market shift from pre-waterway construction to post-waterway construction levels. The overall plateau for the next thirty years suggests only a market shift to the higher level. Between 1960 and 1990, annual levels were 2.5 million tons, plus or minus 0.5 million tons. The market then down shifted to a level held steady through the 1990’s at approximately 1.5 million tons. Recent data suggests another down shift; perhaps back to pre construction levels, but there is not enough data to show what the new level will be. Thus, the graph suggests tonnage has not had trends of growth and decline that can be projected into the future. Instead, it has had market shifts between different levels.

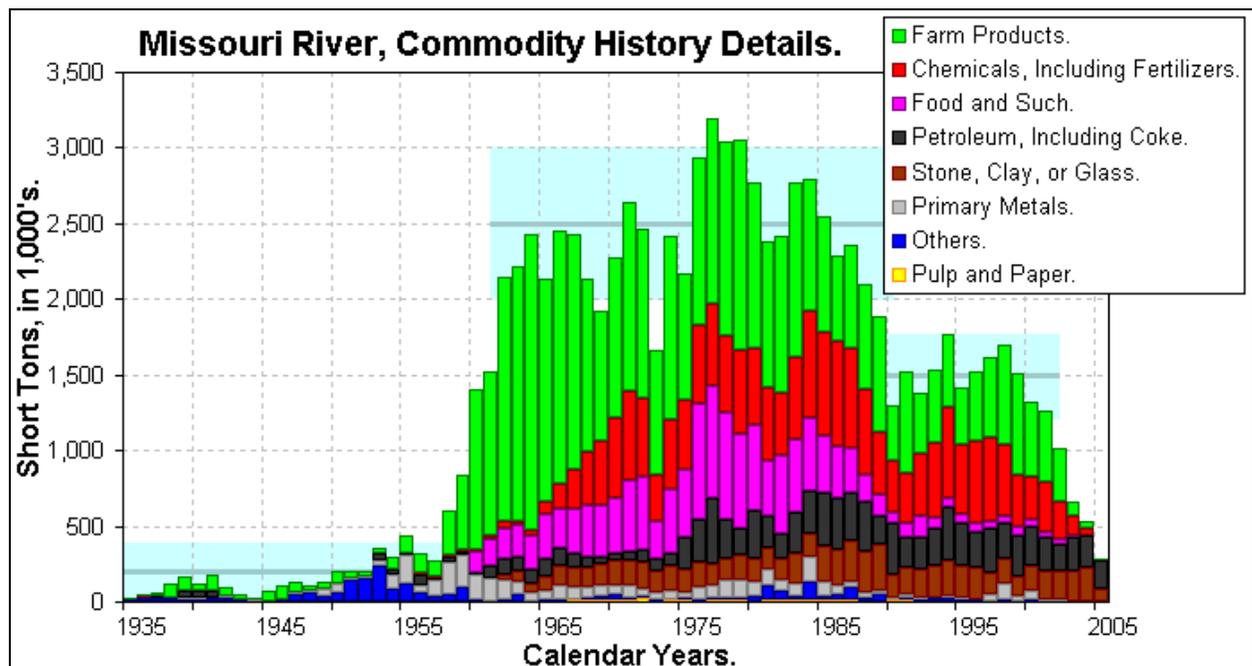


Figure 27. Graph showing the tons of commodities shipped on the Missouri River, not including waterway construction materials nor waterway mined materials.

John R. LaRandeau, NWD ([John.R.LaRandeau@nwd01.usace.army.mil](mailto:John.R.LaRandeau@nwd01.usace.army.mil)) of the U.S. Army Corps of Engineers informally offered the following information to account for market shifts:

- Russian grain embargo by President Carter [in 1980].
- The completion of the Arkansas River [navigation] in early 1980 that diverted grain such as wheat away from the Missouri River.
- The drought of 1988-1993. Lighter drafts and shortened seasons took profits away.
- The flood of 1993, 1995 and the high water of 1997 made for a rocky rebound from the previous 1988 tonnage.

- The Master Manual process that took 14.5 years caused reliability issues. Shippers protected themselves by using more surface transportation options.
- The Missouri River Biological Opinion of 2000 and the 2003 update with the outbreak of lawsuits over river operations caused additional reliability issues.
- The drought of 2000 to present. Again lighter drafts and shortened season has greatly impacted the ability for a robust navigation industry to stay and to return to the Missouri River.
- The barge industry recently sold off 600 barges as well as many towboats to the world, such as to South America. The barge shortage has made it difficult for new barging entry into the Missouri River.
- The barge profits are on the Mississippi, Ohio and Illinois rivers.
- Missouri River basin shipper apathy is now a major concern, as many shippers are not even looking at a barge option because they have been too long away from the benefits. Firm relationships with surface transportation have made any move back to the river difficult.

Thus, Figure 26 and Figure 27 above show the Missouri River has carried and can carry millions of tons of cargo per year. Figure 26 shows cargo increasing after increasing development, and decreasing after decreases in development. Figure 27 shows a pattern of different market levels, up and down, rather than a pattern of gradual market increases and declines. The Corps' and industry's input suggest the loss of cargo carrying stems mostly from competing development and an unreliable waterway.



Figure 28. The Missouri River at Kansas City.

## Potential Shipping:

How much cargo could the Missouri River carry? Figure 29 below shows the Missouri River cargo history (including waterway construction materials and waterway mining materials) as compared to cargo levels of other, similar waterways, in 2003, shown by the blue lines. Based on this, the potential maximum for seasonal cargo can be estimated.

For comparison, the red line shows an *estimate* of I-70 cargo quantities, since similar data is not available for interstate highways. The estimate is based on MoDOT studies of traffic volumes, and a federal study of the various sizes and cargo capacities of trucks. The estimate presumes trucks carry an average of 75 percent of their weight limit, counting empty trucks returning for another load. It is also based on rural I-70 truck traffic; presuming most trucks there are long distance trade rather than local deliveries.

The Missouri River is similar to these other rivers in terms of quantity of water and seasonal environment changes. Based on this, the Missouri River should be able to carry as much as these rivers—between 10 and 80 million tons of cargo per year. However, the Missouri River is different from other rivers.

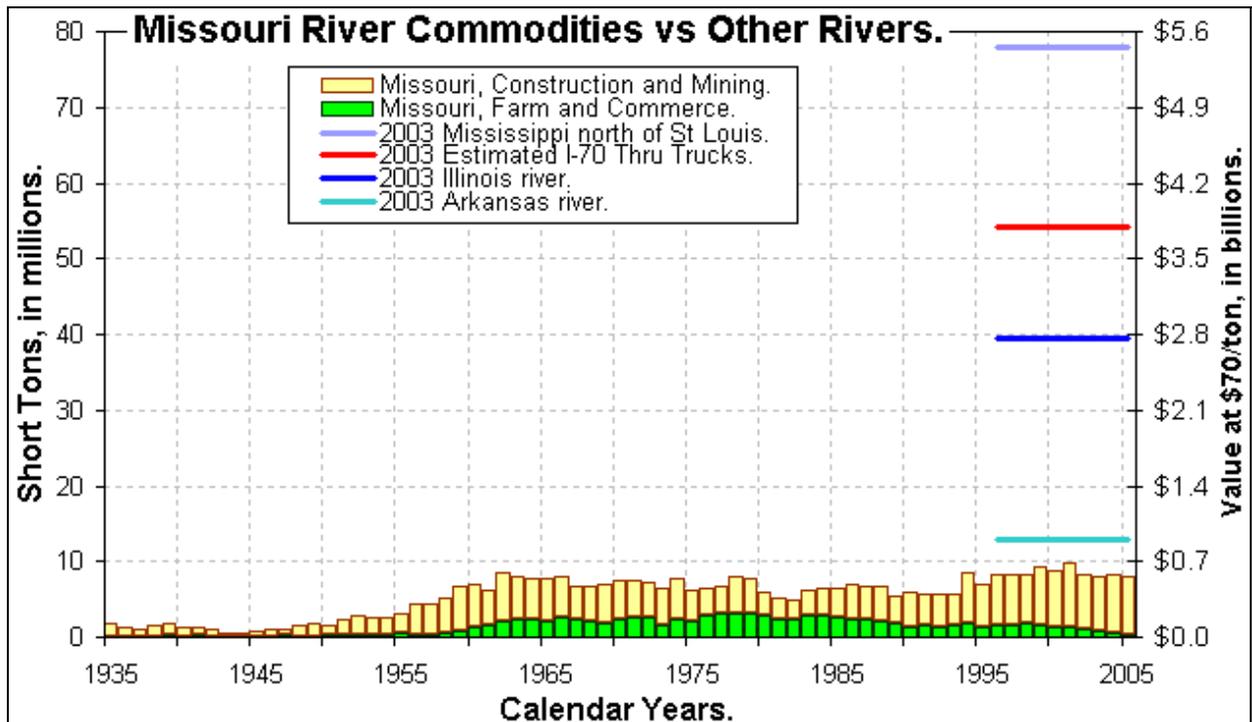


Figure 29. Graph showing the tons of commodities shipped on the Missouri River (including waterway construction and mined materials) as compared to other rivers or the region and I-70.

The biggest difference between the Missouri River and other waterways, such as the Arkansas and Illinois Rivers, is that they are lock and dam controlled, offering channels nine feet deep and open year-round. The Missouri River in Missouri is free flowing, without locks and dams. The river is commercially open only eight months per year, and in the last few years, it has not been open that much. During upstream, long-term droughts, the river only offers a channel eight feet deep. Existing plans also make it possible, in future years, for upstream reservoir levels to be so low that they will not release any water for a navigation season.

The seasonal and potential depth limits on the Missouri River are as devastating to waterway commerce as it would be devastating to Missouri commerce to close I-70 four months per year to cargo trucks, and even when it is open, to sometimes block normal weight trucks.

To make the Missouri River equally navigable as other rivers would require a massive capital improvement program. Costs would be several billion dollars, similar to the costs of rebuilding I-70. However, waterway development challenges would be far greater than I-70 development challenges, as well as the challenge of funding such costs. Thus, current efforts are looking at technologies and developments to use the river as is.

As shown in Figure 30, the Arkansas River and Tulsa Oklahoma do not reach into farmlands as extensive as the Missouri River reaches. Thus, the Missouri River could have much more agricultural tonnage than the Arkansas River. A Corps of Engineer's estimate for maximum Missouri River cargo was about 20 million tons per season. However, the estimate was before bio-fuel development.

Scaling back other rivers to 67 percent of their total, to estimate a season at 67 percent of the year, as is the Missouri River season, they would range between 9 and 50 million tons of cargo carried per season. The Corp's estimate of 20 million tons is easily within this range, and the range has room to more than double the tonnage due to bio-fuels, without the Missouri River becoming more congested than the northern Mississippi River.

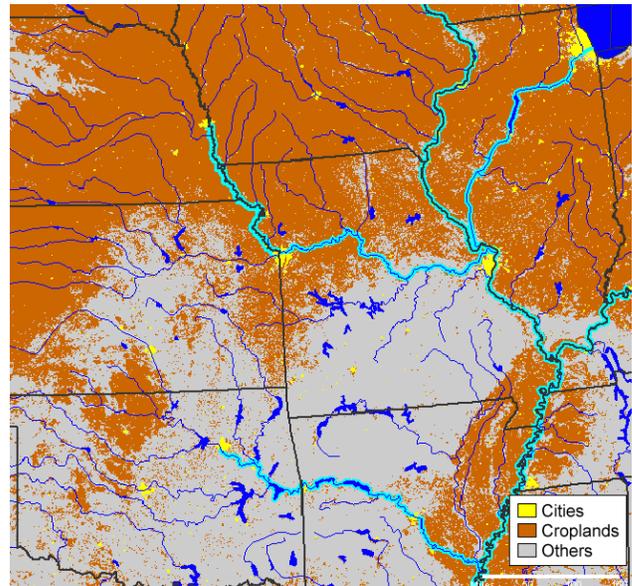


Figure 30. Waterways and Local Land Types.

If technology changes made the river fully usable in season, it could carry 20 million tons. Presuming \$70 per ton on average, the season would be worth and estimated \$1.4 billion. If waterway development made the river usable year round, a 33 percent increase would be worth only \$0.5 billion more, per year. A possible maximum limit for technology and waterway development could make it equal to the upper Mississippi, worth about \$5 billion per year.

Currently, a “low flow” study is developing a baseline of information and awareness to assist the barge and logistics industries in determining the potential alternatives they can use for shipping on the Missouri River. The study is looking at the river as it is, rather than at possibilities to change the river, and at what other countries do to continue shipping on similar rivers.



**Missouri Department of Transportation**  
**Organizational Results**  
P. O. Box 270  
Jefferson City, MO 65102

**573.526.4335**  
**1 888 ASK MODOT**  
**[innovation@modot.mo.gov](mailto:innovation@modot.mo.gov)**