

# Freight Optimization and Development in Missouri: Ports and Waterways Module

## Final Report

*Prepared for:*  
Missouri Department of Transportation

*February 2008*



EXPERIENCE | Transportation

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## Freight Optimization and Development in Missouri: Ports and Waterways Module

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**February 2008**

**TECHNICAL REPORT DOCUMENTATION PAGE.**

1. Report No.: OR 08-013	2. Government Accession No.:	3. Recipient's Catalog No.:	
4. Title and Subtitle:  Freight Optimization and Development in Missouri: Ports and Waterways Module		5. Report Date: February 2008	
		6. Performing Organization Code:	
7. Author(s): Sara Clark, Barb Frost, Scott Grasman, Chris Gutierrez, Robert Harrison, Kyle Kittrell, Blair Sells, Dennis Sheridan		8. Performing Organization Report No.: P104070004	
9. Performing Organization Name and Address: TranSystems Corporation 1001 Craig Road, Suite 260 St. Louis, MO 63146		10. Work Unit No.:	
		11. Contract or Grant No.: RI 06-036	
12. Sponsoring Agency Name and Address:  Missouri Department of Transportation, Organizational Results PO Box 270, Jefferson City, MO 65102		13. Type of Report and Period Covered: Final Report	
		14. Sponsoring Agency Code:	
15. Supplementary Notes: The analysis of Missouri's public and private ports and baseline commodity flow is supported by a review of previous studies and collection of statistics on freight movements including the Missouri Department of Transportation's 2006 <i>Missouri Public Port Authorities: Assessment of Importance and Needs Final Report</i> , its 2007 <i>Update of Missouri Port Authority Assessment</i> and the Waterborne Commerce Statistics maintained by the U.S. Army Corps of Engineers.			
16. Abstract: Missouri's ports and waterways have proven to be important to the region's economic growth and significant to the state's role in transporting waterborne freight. The ultimate objectives of this analysis are to provide an inventory of Missouri's public and private port operations and public port needs; discuss baseline commodity flow data for Missouri's waterways; explore regional, national and global trends that Missouri may capture to increase the state's role in freight movements; develop strategies that the state could adopt to accelerate or facilitate freight and logistics development in the state; and create a Waterways Prioritization Process that will assist MoDOT in making justifiable investment decisions that meet the needs of not only Missouri's ports, but the state itself. Missouri's centralized location and access to multimodal connections places the state in a prime position to strengthen its role as a national freight center. With opportunities such as the expanding container-on-barge and biofuel industries, in addition to other trends discussed in the analysis, Missouri's ports have the ability to promote trade and growth on its waterways.			
17. Key Words: Bio-fuel, Container-on-Barge, Inland Waterway, Logistics Terminal, Mississippi and Missouri Rivers, Port Authority, Prioritization Process, Private Port		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: 58	22. Price:

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## Executive Summary

Transporting freight has economic importance on both a national and international scale and waterborne freight traffic is projected to grow nationwide. To capture this growth, it is necessary to inventory Missouri's existing waterway operations and infrastructure and determine how Missouri can improve its overall viability and set the stage to strengthen Missouri's role as a national freight center. This report reflects current and projected commodity movements, reviews port infrastructure and resource needs, and discusses strategies that Missouri could adopt to increase the state's role in freight movements. Provided here is a summary of the *Freight Optimization and Development in Missouri: Ports and Waterways Module*.

The state of Missouri borders 488 miles of the Mississippi River, including 361 miles of the Upper Mississippi River and 127 miles of the Lower Mississippi River. Missouri also contains 186 miles of the Missouri River. A total of 14 public ports and over 200 private ports are located along Missouri's waterways. Three of these public ports and more than 50 private ports are on the Missouri River, while 11 public and over 150 private ports are on the Mississippi River. The 14 public Port Authorities currently report service to 36 counties in Missouri as well as to six other states; these Port Authorities occupy roughly 2,000 acres of land.

Missouri's centralized location and access to multiple modes of transportation effectively position the state for increased freight movements and growth on its waterways. Other valuable advantages to encourage waterborne commerce on Missouri's waterways network include: existing land for port expansion, available skilled labor force, favorable business climate and its impact on economic development, presence of Foreign Trade Zones, Enhanced Enterprise Zones, and lack of congestion currently on the waterways.

TranSystems conducted a review of commodity flows on the Missouri and Mississippi Rivers in order to provide guidance on market trends that may impact the development of public ports in Missouri. The analysis is derived from MoDOT's 2006 *Missouri Public Port Authorities: Assessment of Importance and Needs Final Report (Assessment)*, and 2007 *Update of Missouri Public Port Authority Assessment (Update)*, Waterborne Commerce Statistics for the years 1995 to 2005 obtained from the U.S. Army Corp of Engineers (USACE), brief interviews with a number of public ports in Missouri and TranSystems' knowledge of the regional cargo market based on previous project work.

The commodity flow analysis indicated that commodities such as food and farm products tend to be transported southbound, or "down" the rivers from Kansas City to the mouth of the Mississippi River and from Minneapolis, Minnesota to Baton Rouge, Louisiana on the Mississippi River. The majority of crude materials transported on these waterways are also traveling down river, except in the case of shipments on the Mississippi River from Minneapolis, Minnesota to the mouth of the Missouri River. In this case, the majority of these materials are transported northbound. Additionally, the majority of petroleum and petroleum products are transported northbound on the Mississippi River from Baton Rouge, Louisiana to the mouth of the Ohio River.

The historical review indicates that total port tonnage has grown at a relatively slow rate in recent years. One reason for this is that the expansion of the regional ethanol industry has consumed corn that previously moved out of the region by barge. This trend is expected to continue based on projected growth in ethanol production. However, the ethanol industry is also creating new opportunities for barge transport with increased shipments of ethanol to domestic consumption centers and dry distillers grains with solubles (DDGS) to export markets. Developments in major commodities (e.g., aggregates, sand) are primarily tied to local and regional economic developments and the health of specific economic sectors such as construction activity. Therefore, the availability of local supply (e.g., sand) has an impact on traffic in specific commodity groups (e.g., crude material). There may also be opportunities to move containerized cargo or empty containers if global containerized trade grows strongly over the next decade.

Also discussed are current and future trends that Missouri could capture to strengthen its role as a national freight center. These trends are related to tonnage growth of major commodities on the nation's inland waterway system, the impact of global freight transport on inland waterways, growth of container-on-barge operations, increased biofuel services, identity preserved agriculture, significance of the Jones Act on waterborne commerce, the increasing role of

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logistics terminals in the U.S., policy issues regarding navigation of the Missouri River, and lock/dam expansion on the Mississippi River. The following key points highlight these trends:

- ▶ Mining crude materials and minerals generates \$4.5-\$5 billion toward Missouri's economy annually. Missouri's population is estimated to grow 15% over the next 20 years. Given this growth, there will be a continued demand to ship these commodities via barge as it is a cost effective and secure mode of transport.
- ▶ In 2004, the reported value of U.S.-international trade by mode was 39.3% water, 26.8% air, 21.4% truck, 4.9% rail and 1.2% pipeline. Clearly, coastal and river ports play an important role in the current modal split for global trade and this is likely to strengthen in the next decade. The use of inland waterways to ship goods further inland is important as many Gulf coast ports are positioned to accept an increased number of containers due to trade growth from China and the expansion of the Panama Canal.
- ▶ Global containership capacity has nearly tripled in the last decade and it is estimated to grow another 50% in the next five years. To handle container-on-barge (COB) service, port terminals must have adequate ground storage and equipment to move containers on/off vessels and truck chasses. The lock and dam operation also needs to be reliable for timely shipments.
- ▶ U.S. ethanol production reached 4.86 billion gallons in 2006, compared to 1.63 billion gallons in 2000. The U.S. Department of Agriculture (USDA) forecasts an increase in ethanol production over the next five years to more than 11 billion gallons, as a result of the Renewable Fuel Program of the 2005 Energy Policy Act. The smaller biodiesel sector is also projected to expand from annual production of around 250 million gallons in 2006 to 700 million gallons by 2012, then stabilizing at this level. The projected growth of ethanol and other biofuels is expected to have a positive impact on tank barge demand. DDGS, a by-product of ethanol, could also have a positive impact on dry hopper barge demand.

Strategies were also developed to increase Missouri's role in waterborne freight movements and accelerate or facilitate freight and logistics development at Missouri's ports. These strategies considered data and other information gathered on the state's ports and waterways network, including industry trends and input from key stakeholders. The four major categories and subsequent strategies are as follows:

Preserve and enhance Missouri's ports and waterways system to ensure mobility and reliability.

- ▶ Complete construction of intermodal connections to maximize investment in established ports, giving priority to ports with incomplete connections like New Madrid and Pemiscot.
- ▶ Support the Water Resources Development Act appropriations in Congress to modernize the lock and dam system on the Upper Mississippi River.
- ▶ Utilize the proposed Waterways Prioritization Process to determine optimal investments that meet the needs of Missouri's ports.

Promote the health of existing commodities shipped on the waterway system.

- ▶ Leverage involvement in the Industrial Minerals Advisory Council to monitor commodity projections and protect the current and future interests of Missouri's ports.
- ▶ Investigate opportunities to serve on councils, associations, or other commodity-focused advocacy groups to support Port interests in all waterway commodities.

Support sound initiatives to capture new commodities and service opportunities for Missouri.

- ▶ Support or conduct a feasibility study for a biofuel consolidation and distribution facility initially focusing on ports in Northeast Missouri due to their proximity to production areas.
- ▶ Evaluate and consider proposals to support the development of a Logistics Terminal below the Mississippi River's lowest lock and dam and near a large production and consumption area like St. Louis.
- ▶ Consider participating in a Public/Private Partnership (P3) to capture new commodities or service options at Missouri ports to take advantage of lower rates on publicly borrowed funds.

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Pursue additional funding to implement projects that support freight development.

- Evaluate the economic impact of the ports on the state to provide additional support for funding on an annual basis.
- Pursue a dedicated funding source for waterways rather than relying on yearly appropriations from the General Assembly.
- Work to maintain the ability to use flexible funding mechanisms at ports regardless of its floodplain designation.
- Encourage modal associations by the establishment of a Multimodal Council to promote all modes in Missouri and raise awareness of the need for adequate funding.

Existing models and frameworks used for freight and logistics development were also reviewed. The intent of this research was to understand how best to apply these models to Missouri as a mechanism to select port projects based on how the projects matched with aforementioned strategies. A Waterways Prioritization Process was developed and proposed for Missouri, to provide justification for funding decisions by having a foundation of measures based on these strategies to increase freight movement on Missouri's waterways. Applications provided by the Port Authorities can then be inputted into the Decision-Support Tool, created to have the ability to sort projects by urgency of need and then based on their project "score". The input solicited during the Port Authorities' application process and evaluation of the criteria used in the Decision-Support Tool will yield a prioritized list of projects that can then be evaluated through a dialog with decision-makers to determine the best investments of funds. The Decision-Support Tool, including a description of the initial criteria and weights, is provided in the companion to this report, the *Waterways Prioritization Process Practitioner's Guide*.

In the future, because the Waterways Prioritization Process was developed to parallel MoDOT's Transportation Planning-Planning Framework, roundtable discussions with representatives of multiple modes could take place when prioritizing needs. Multimodal Operations is charged with managing the needs of not only ports and waterways throughout the state but also airports, public transit, and railroad. Sharing the needs of other modes during this process could serve two purposes. First, sharing among the modes could facilitate an overall understanding of the transportation needs across the state and reveal the linkages and relationships among the modal projects. Secondly, recognizing these linkages may assist in future cooperative prioritization dialog among the modes resulting in true transportation investments regardless of the source of the funds to meet the needs of Missouri. Fashioning this Process in a likeness of the Planning Framework lays the foundation for these future "apples to apples" comparisons and considerations.

The opportunities presented here as well as others mentioned in the report lend to Missouri's ability to promote trade and growth on the state's waterways. Additionally, by adopting the strategies proposed in this report and through the Waterways Prioritization Process, ports and waterways partners can engage in a justifiable dialog to consider the best investments to capture freight development and set the stage for Missouri to strengthen its role as a national freight center.

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## Section 1 – Introduction

Missouri's public ports were directly involved in the transport and processing of approximately 2.25 million short tons<sup>1</sup> of cargo in 2006. The Missouri and Mississippi Rivers directly connect 21 states. Missouri's extensive highways, combined with this river network, present the state as a prime location for businesses wishing to transport cargo on its waterways<sup>2</sup>. Transporting freight has economic importance on both a national and international scale and waterborne freight traffic is projected to grow nationwide. To capture this growth, it is necessary to inventory Missouri's existing waterway operations and infrastructure and determine how Missouri can improve its overall viability and set the stage to strengthen Missouri's role as a national freight center.

The purpose of this report is to review Missouri's existing ports and waterways system, to outline strategies that capture freight development, and to develop a Waterways Prioritization Process. To inventory Missouri's existing infrastructure and operations, Section 1 begins with an overview of Missouri's inland waterway network. Sections 2 and 3 provide a summary of Missouri's public and private ports, respectively, including their primary operations and infrastructure. The analysis of Missouri's public and private ports and a baseline commodity flow (Section 4) is supported by a review of previous studies and collection of statistics on freight movements. Sample sources are the Missouri Department of Transportation's (MoDOT) 2006 *Missouri Public Port Authorities: Assessment of Importance and Needs Final Report (Assessment)*, MoDOT's 2007 *Update of Missouri Port Authority Assessment (Update)* and the Waterborne Commerce Statistics maintained by the U.S. Army Corps of Engineers (USACE), which provides statistics on freight flows by commodity types through river ports.

As part of the process to develop strategies, Section 5 depicts national and regional trends regarding freight transport on waterways and how these trends impact Missouri. Several key strategies are proposed (Section 6) to increase the state's role in freight movements and accelerate or facilitate freight and logistics development. Finally, Section 7 presents a discussion regarding the Waterways Prioritization Process that evaluates Port Authorities' requests both subjectively and with an evaluating software program known as the Decision-Support Tool. This Process and Tool will help MoDOT select port projects supporting the strategies created to expand Missouri's role in waterborne transport. This Process is also designed to be compatible with MoDOT's existing Planning Framework for roadways and for potential frameworks associated with railways and airways.

### Overview of Missouri's Inland Waterway Network

The state of Missouri borders 488 miles of the Mississippi River, including 361 miles of the Upper Mississippi River and 127 of the Lower Mississippi River. Missouri also contains 186 miles of the Missouri River.<sup>3</sup> A total of 14 public ports and over 200 private ports are located along Missouri's waterways. Total annual statewide shipments are valued at approximately \$2 billion.<sup>4</sup> Figure 1 shows the location of Missouri's public ports on the Missouri and Mississippi Rivers. Sand mining is the current dominant use of the Missouri River, although grain, coal and petroleum products make up a large portion of the Missouri River's waterborne trade. The Mississippi River, on the other hand, carries mostly food/farm products from Minneapolis to the mouth of the Missouri River. From the mouth of the Missouri River to the mouth of the Ohio River and from the mouth of the Ohio River to Baton Rouge, Louisiana, the majority of cargo tons are coal, crude materials, and food/farm products.

There are many benefits related to shipping freight on waterways. Most rivers offer the ability to transport a high volume of cargo in one shipment, with considerably less congestion compared to the nation's highways. This mode of shipment is also relatively cost-efficient and environmentally sound. On the Missouri River alone, every full standard tow (equal to 15 barges plus a towboat) between St. Louis and Kansas City frees up 225 rail cars or 900 semi trucks

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<sup>1</sup> One short ton is equivalent to 2,000 pounds.

<sup>2</sup> McMichael, M. B., Martin, S., & Perry, E. *Missouri Public Port Authorities: Assessment of Importance and Needs; Final Report, Publication OR 06-012*. March 2006. Prepared by the Missouri Department of Transportation, 2-3.

<sup>3</sup> *Missouri State Profile*. (2002). Waterways Council, Inc. July 20, 2007. <http://www.waterwayscouncil.org>.

<sup>4</sup> McMichael, M. B., Martin, S., & Perry, E. *Missouri Public Port Authorities: Assessment of Importance and Needs; Final Report, Publication OR 06-012*. March 2006. Prepared by the Missouri Department of Transportation, 9.

to carry other loads. This is equivalent to a convoy of trucks 45 miles long that would burn approximately 75,000 gallons more fuel than one standard barge tow between the same cities.<sup>5</sup>

Figure 1: Missouri's Public Port Authorities



<sup>5</sup> McMichael, M. B., Martin, S., & Perry, E. *Missouri Public Port Authorities: Assessment of Importance and Needs; Final Report, Publication OR 06-012*. March 2006. Prepared by the Missouri Department of Transportation, 9.

## Section 2 – Summary of Missouri’s Public Ports

A Port Authority is the organizational and decision-making body that guides the development of public ports as established by the Missouri General Assembly. A Port Authority encourages economic development and job creation, approves any construction that may take place at the port, prevents or removes obstructions in harbor areas, acquires right-of-way within port districts and disburses funds for activities,<sup>6</sup> among other duties. The reporting Port Authorities in Missouri have more than 2,000 acres of land and currently report service to 36 Missouri counties and six other states. An overview of Missouri’s 14 public ports including their operations, infrastructure, and needs is discussed below.

### Missouri’s Public Port Operations and Infrastructure

MoDOT’s 2006 *Assessment* was written to evaluate Missouri’s 14 public ports by documenting their proposed needs and appraising their relative importance for the state. The *Assessment* includes port size, employment, beneficiaries, potential for improvement, and cargo quantities in terms of annual tonnage and dollar value. The proposed needs include those for navigation, infrastructure, equipment, and support facilities. Missouri’s Port Authorities were given the opportunity in 2007 to prioritize their port-specific development objectives and list the improvements, including cost estimates, proposed to carry out those objectives. Several ports changed their reported objectives between 2006 and 2007, illustrating the importance of staying up-to-date with port needs. It was determined that Missouri’s individual Port Authorities have needs unique to their port in terms of increasing efficiency and productivity; however, the majority of those needs can be categorized as either a need for improved navigation of the Missouri River or an infrastructure-related need. A summary of each port’s basic cargo operational status is provided in Table 1.

Missouri Public Ports	Cargo Status
City of St. Louis Port Authority	Operational
Howard/Cooper County Port Authority	Operational
Kansas City Port Authority	Operational
New Madrid County Port Authority	Operational
Pemiscot County Port Authority	Operational
Southeast Missouri Regional Port Authority	Operational
St. Joseph Regional Port Authority	Operational
Jefferson County Port Authority	Authorized but not operational
Lewis County – Canton Port Authority	Authorized but not operational
Marion County Port Authority	Authorized but not operational
Mid America Port Commission*	Authorized but not operational
Mississippi County Port Authority	Authorized but not operational
New Bourbon Regional Port Authority	Authorized but not operational
St. Louis Regional Port Authority	Authorized but not operational

Note: While developing ports may not have cargo operations (the focus of this report) they may be operational in terms of ferries, fleeting or other riverside activities.

\*Mid America is currently operational in Illinois but not yet in Missouri.

Source: Missouri Department of Transportation

The following provides a summary for each of Missouri’s 14 Port Authorities, including their current development objectives. Additional details on each Port Authority can be found in MoDOT’s 2006 *Assessment* and corresponding 2007 *Update*.

<sup>6</sup> Missouri General Assembly. *Chapter 68 – Port Authorities; Section 68.025*. August 28, 2006. Missouri Revised Statutes.

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### **City of St. Louis Port Authority, Mississippi River**

The City of St. Louis Port Authority has a working public port facility, manages the leases of all city-owned waterfront property, and promotes riverfront recreation. It manages approximately 40 leases, bringing in almost \$1.5 million for the City of St. Louis. As the chief income at the port is generated through leases, maintaining those leases is the Port Authority's primary function. The port's objectives include better flood control and drainage, replacement of aprons, repairing the office building, utility improvements, and several dock improvements. The Port Authority does not currently have an objective to develop containerized port facilities; however, they would be interested in helping or partnering with related private developers. Recreational development is another objective of the St. Louis Port Authority but exploring recreational development was beyond the scope of MoDOT's freight optimization goals, and is therefore not included.

### **Howard-Cooper County Regional Port Authority, Missouri River**

Howard-Cooper County Regional Port Authority employs approximately seven people on 32 acres of land, not including adjacent private port acreage and employment. Trains and trucks currently transport the majority of this port's commodities rather than barges, due to seasonally limited navigation on the Missouri River. Its objectives include developing the port to handle ethanol-related transportation needs, improving ability to weigh trucks, improving dock and facilities appearances, and increasing their ability to handle containerized cargo. Howard-Cooper County's major customer types include area farmers, Interstate Marine Terminals (now sold to ConAgra International Fertilizer Co.), and MFA, Inc (a Midwest-based farm supply and marketing cooperative). Services available at this port include grain bin facilities and the loading/unloading of bulk commodities. According to the Howard-Cooper County Regional Port Authority, it will be difficult to attract new commodities to the port until the Missouri River navigation season becomes more defined and the river depth is less variable.

### **Jefferson County Port Authority, Mississippi River**

Jefferson County does not have a port facility at this time. Its major objective is to buy land and develop a port in the near future. According to the Port Authority, Jefferson County's location is prime for waterway development due to a long Mississippi River border and good intermodal access near the river. However, the area has large deposits of limestone leaving large tracts of land undeveloped and unavailable for development (due to mining ownership). Jefferson County envisions wet and dry cargo as commodities the Port Authority would like to handle in the future.

### **Kansas City Port Authority, Missouri River**

Kansas City Port Authority currently employs approximately six people on 11 acres of land. Revenues at this port are primarily generated through bulk commodity storage and handling due to limited transportation on the Missouri River. The Port Authority indicates that shippers are sending their products to the Arkansas River System in Oklahoma because the Missouri River has limited navigation. The Missouri River has not been reliably accessible to commercial barge traffic due to inconsistent water flow. The port mainly serves land-based shippers utilizing trucks or trains. Their reported services include barge cleaning, product handling, product storage and transloading. The port's objectives include improving drainage to meet storm water regulations and promoting dry bulk transloading. The Kansas City Port Authority's future needs include improved handling systems, cranes, conveyors and other facilities related to containerized bulk commodities.

### **Lewis County-Canton Port Authority, Mississippi River**

Lewis County-Canton Port Authority owns the Canton Ferry equipment and leases it for operation. However, the Port Authority does not own any facilities or land. No commercial or public objectives were listed by Lewis County-Canton at this time.

### **Marion County Port Authority, Mississippi River**

Marion County and Mid-America Port Commission both want to develop their port facilities on-site at the same location. Mid-America port development in Marion County may eliminate the need for the Marion County Port Authority. If the Marion County Port Authority decides to proceed with development, its objectives include building a

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port to support and ensure development of a private ethanol plant located at the site, adding a biodiesel plant, and developing new intermodal capabilities for containers between existing barge, rail, and highway connections.

#### **Mid-America Port Commission, Mississippi River**

Mid-America Port Commission is a multi-state Port Authority authorized in Illinois, Iowa, and Missouri. Although their ultimate objective is to have port facilities in all three states, currently they do not have any port-specific land, facilities, or equipment in Missouri. Efforts are presently focused on providing facilities in Quincy, Illinois, which will serve all three states (including 11 counties in Missouri). Development in Missouri is estimated to occur within the next eight years, depending on local support. Their development objective includes locating container-on-barge capabilities at the Missouri port.

#### **Mississippi County Port Authority, Mississippi River**

Development for the Mississippi County Port Authority is currently limited by the lack of landside connections. The port is located in the northeast portion of Mississippi County and has a ferry operation in the southeast corner of the county. It lacks good connection to highways and adequate flood protection, and there are no existing railways in the county to connect to the port. Therefore, the port has never been used for loading or unloading; its primary purpose is for fleeting. Mississippi County Port Authority's objectives include providing water service to existing fleeting operations and developing loading/unloading capabilities. According to the Port Authority, container-on-barge or biofuel developments are not likely at this location due to limited multimodal access. Port development requires further investigation to identify services well-suited to this port's conditions.

#### **New Bourbon Regional Port Authority, Mississippi River**

New Bourbon Regional Port Authority is located on a 72-acre site. The Port Authority owns the Ste Genevieve-Modoc Ferry, carrying more than 14,000 vehicles and 33,000 passengers in 2006. However, the ferry does not take in enough tolls to cover expenses. New Bourbon Port Authority's objectives include constructing a slack water harbor with a conveyor to move materials and a new dock, providing direct rail-water loading, providing a dry warehouse capability for potential customers, building an office/administrative building, and improving the port's harbor and access. New Bourbon Regional Port Authority indicates they do not see biofuels as a foreseeable objective for them due to lack of local crop production; however, local mineral products and sand may be potential commodities of interest.

#### **New Madrid County Port Authority, Mississippi River**

New Madrid County Port Authority is located on approximately 80 acres and currently employs 99 people, including not only those employed by the Port Authority but also those working at the port and employed by others. Revenue at this port is primarily from leases, grants, and throughput fees. Its objectives include improving rail service, purchasing additional land, adding warehouse and dock capacity, improving ability to weigh trucks, improving roadway access, and maintaining the slack water harbor. New Madrid's major customer types include grain companies and mills. The services at this port include barge and boat docking, commodity movement, fleeting, loading/unloading, public dock availability, rail services, and general repairs. The New Madrid Port Authority would like to handle additional farming commodities, steel, and aluminum at its port.

#### **Pemiscot County Port Authority, Mississippi River**

Pemiscot County Port Authority is located on 83 acres and currently employs approximately 82 people, including not only those employed by the Port Authority but also those working at the port and employed by others. The Port Authority is primarily focused on improving current operations and future development. Its major objectives include completing a rail spur, improving utility services, improving public docking, dredging to maintain the harbor, and further developing the overall port. Pemiscot County's major customer types include barge lid manufacturers, grain exporters and dry fertilizer importers. The services at this location include barge cleaning, barge fleeting, and towing.

### **Southeast Missouri (SEMO) Regional Port Authority, Mississippi River**

SEMO Regional Port Authority reported 210 people employed by the port or at the port, on 500 acres (with an additional 80 acres available offsite). The Port Authority is focused on improving current operations and future development. Its objectives include increasing warehouse and storage capacity, developing an ethanol plan on port property or adjacent property, improving ethanol-related rail-to-truck loading, supporting local businesses and customers, and conducting bridge repairs. SEMO Regional Port Authority's major customer types include corn mills, fertilizer distributors, and wood chip mills. The services reported at this location include barge-rail-truck transport, barge fleet and repairs, general dock, outdoor storage, railroad scale, slack water harbor, team tracks, and a truck scale.

### **St. Joseph Regional Port Authority, Missouri River**

The St. Joseph Regional Port Authority reported four people employed at the port on 15 acres (an additional 46 acres is available off-site). The objectives at this port include replacing the office building with a more permanent structure (currently a trailer) to meet building codes, installing a new truck scale for better bulk handling, using the port more for fertilizer or bulk product, expanding the port, and improving multimodal transfers. St. Joseph's major customer types include steel suppliers and fertilizer distributors. The services available at this location include loading and unloading shipments.

### **St. Louis County Port Authority, Mississippi River**

According to the St. Louis County Port Authority, this location is a former industrial lead site with remediation issues. Previous efforts to bring port-related commercial uses to the site have not succeeded due to extensive remediation, lack of flood protection, and limited access to other transportation modes. The Missouri Gaming Commission, however, believes the site is well suited for a casino, hotel, and retail complex. St. Louis County Port Authority and related Economic Council have already begun development of a connector road (with casino funds) to solve access problems. Adjacent recreation and community developments are being considered; however, that type of development activity is beyond the scope of the *Assessment*.

## **Rollup of Needs**

As previously mentioned, the majority of needs can be categorized as either a need for improved navigation on the Missouri River or an infrastructure-related need. Options for improved navigation within current seasonal limits are the subject of another study being conducted. It should be noted that successful port operations require an understanding of both the supply and the demand sides of the businesses serving its location. The provision of infrastructure can be viewed as a supply-side issue, and most of the needs determined by the 2007 *Update* fit this category. Four key categories associated with infrastructure-related needs include:

- *New port construction* can include land acquisition for construction or expansion, or simply basic infrastructure needed to begin operations. This is a need faced by several of the ports that are authorized but not operational.
- *Existing port construction or improvements* may include general infrastructure needs (e.g., dock improvements, utilities), crane-related equipment, conveyor-related equipment, or general equipment needs for operations (e.g., forklifts, hooks).
- *Improving transportation connections* include rail-related infrastructure, roadway-related infrastructure, or water-related improvements (e.g., dredging) to improve access and operations.
- *Providing better support facilities* include a number of different needs such as providing an office building, constructing a container yard, supplying more grain bins, or additional land or warehousing for storage. Several ports have also expressed a desire to provide container-on-barge or biofuel-related services.

However, demand-side needs should be identified by the ports to further market each port's competitiveness and achieve a balanced business portfolio. Knowing the demand for port services is important for proactive and healthy growth of Missouri's ports and waterways.

## Section 3 – Summary of Missouri’s Private and Government-owned Ports

Missouri’s 200 private and government-owned ports are in 35 counties along the Missouri and Mississippi Rivers. These 200 private ports do not include personal docks and similar private structures. Approximately 74 percent of the ports are on the Mississippi River; the remaining 26 percent are on the Missouri River. Private port facilities are owned and operated by various organizations. Some private ports are owned by the USACE, Coast Guard, or other branches of government. The vast majority of Missouri’s private ports are privately or commercially owned and used for recreation or cargo. Private ports are currently not eligible for public funding through MoDOT’s Multimodal Operations Work Program. This section discusses primary operations at Missouri’s private ports.

### Summary of Missouri’s Private and Government-owned Port Operations

The majority of private port operations pertain to mooring barges for fleeting and receiving or shipping grain, sand, and/or gravel. Currently, 13 private ports are not in operation; although, this status may change as future needs vary. Table 2 categorizes Missouri’s private ports by their current primary operation. Although this information is dynamic, these ports may change their primary operations to take advantage of future trends or to capture new commodities and markets.

Table 2: Summary of Missouri’s Private Ports		
Waterway	# of Ports	% of Total
Mississippi River	147	74%
Missouri River	53	26%
<b>Total</b>	<b>200</b>	<b>100%</b>
Primary Operations	# of Ports	% of Total
Mooring Barges for Fleeting	31	16%
Receipt or Shipment of Grain	30	15%
Receipt or Shipment of Sand	30	15%
Other Operations	22	11%
Other Mooring	15	7%
Port Not Currently Used	13	6%
Receipt or Shipment of Dry Bulk Commodities*, General Cargo or Heavy-Lift	13	6%
Receipt or Shipment of Dry Bulk or Liquid Fertilizer	13	6%
Receipt or Shipment of Petroleum Products	9	5%
Receipt or Shipment of Coal	8	4%
Receipt or Shipment of Cement	7	4%
Receipt or Shipment of Stone	5	3%
Passenger or Vehicular Ferry/Vessel	4	2%
<b>Total</b>	<b>200</b>	<b>100%</b>

\*Commodities may include (but not limited to): aggregates, caustic soda, clay, coal, coke, copper, fertilizer, filter cake, grain, lead slag, ore, pipe, potash, rice, salt, sand, scrap metal, steel products, or stone

Source: U.S. Army Corps of Engineers, Navigation Data Center.

<http://www.iwr.usace.army.mil/ndc/data/datapwd.htm>.

Primary port operations are also compared according to waterway; this comparison can be found in Table 3. The majority of ports on the Mississippi River are involved in mooring barges for fleeting or the receipt or shipment of grain. The majority of ports on the Missouri River, on the other hand, are involved in the receipt or shipment of sand, followed by the receipt or shipment of grain. Seven ports on the Mississippi River (5%) and six ports on the Missouri River (11%) are also not in service at this time.

**Table 3: Summary of Private Ports, Primary Operations by River (2007)**

Primary Operations	Mississippi River		Missouri River	
	# of Ports	% of Total	# of Ports	% of Total
Mooring Barges for Fleeting	31	21%	0	0%
Other Mooring	11	8%	4	8%
Other Operations	19	13%	2	4%
Passenger or Vehicular Ferry/Vessel	4	3%	0	0%
Port Not Currently Used	7	5%	6	11%
Receipt or Shipment of Cement	5	3%	2	4%
Receipt or Shipment of Coal	7	5%	1	2%
Receipt or Shipment of Dry Bulk Commodities, General Cargo or Heavy-Lift	13	9%	0	0%
Receipt or Shipment of Dry Bulk or Liquid Fertilizer	7	5%	6	11%
Receipt or Shipment of Grain	22	15%	8	15%
Receipt or Shipment of Petroleum Products	9	6%	0	0%
Receipt or Shipment of Sand	6	4%	24	45%
Receipt or Shipment of Stone	5	3%	0	0%
<b>Total</b>	<b>147</b>	<b>100%</b>	<b>53</b>	<b>100%</b>

Source: U.S. Army Corps of Engineers, Navigation Data Center. <http://www.iwr.usace.army.mil/ndc/data/datapwd.htm>.

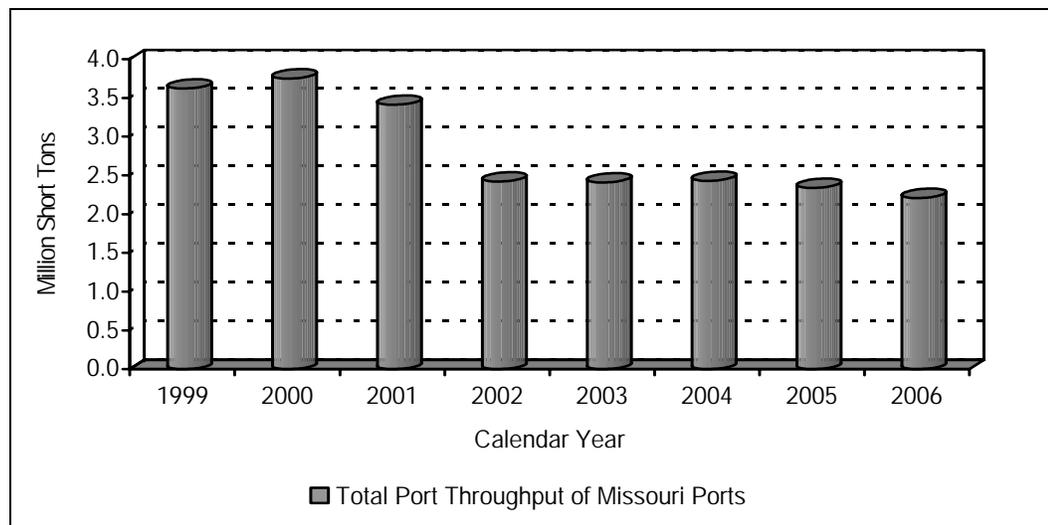
## Section 4 – Baseline Commodity Flow Analysis

TranSystems conducted a review of cargo flows on the Missouri and Mississippi Rivers in order to provide guidance on market trends that may impact the development of public ports in Missouri. The analysis is derived from MoDOT's *Assessment and Update*, Waterborne Commerce Statistics obtained from USACE, brief interviews with a number of public ports in Missouri, and TranSystems' knowledge of the regional cargo market based on previous project work.

### Recent Cargo Trends

The total throughput of Missouri's public ports has fluctuated between 2 and 2.5 million tons over the past five years (see Figure 2). This compares with pre-2002 throughput of approximately 3.5 million tons; the decrease in approximately 0.5-1 million tons between 2001 and 2002 can be attributed to a shift in trade patterns. The four largest public ports measured by waterborne cargo are SEMO, City of St. Louis Port Authority, Pemiscot County Port Authority, and New Madrid County Port Authority.

Figure 2: Total Throughput of Missouri Public Ports



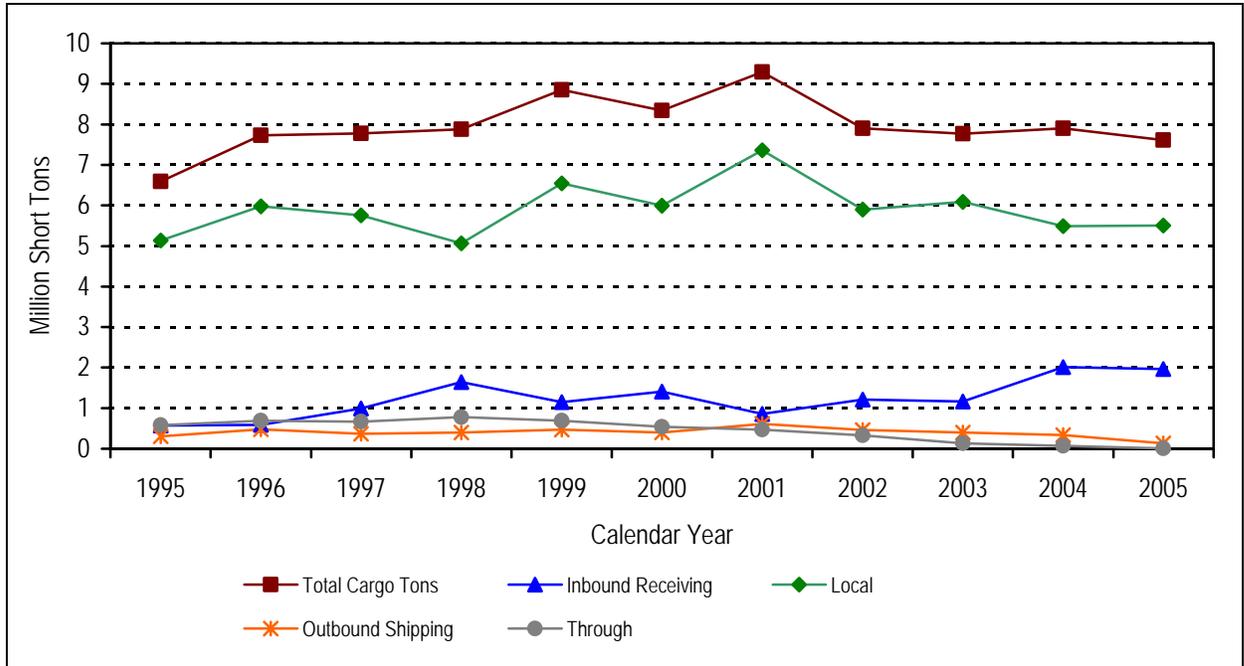
Source: Missouri Department of Transportation

Figure 3 shows the total annual cargo tons (for all ports, public and private) moving along the Missouri River from Kansas City to the Mississippi River. Total tonnage recorded a 10-year compound annual growth rate (CAGR) of 1.4 percent. However, this 10-year period has two distinct phases. Steady growth was recorded in the period 1995 to 2001 with a CAGR of 5.9 percent. The period 2001 to 2005 experienced a CAGR of -4.9 percent largely due to a sharp decline in shipments of crude material between 2001 and 2002. Total cargo tons has been reasonably stable since 2002.

In 2005, the following were key cargo characteristics for this portion of the Missouri River:

- Crude material (largely sand) accounted for 96 percent of total cargo tons
- Local movements, nearly all crude material, accounted for 72 percent of total cargo tons
- Inbound receiving tons (crude material, petroleum and petroleum primary products, and primary manufactured goods) were 26 percent of total cargo tons

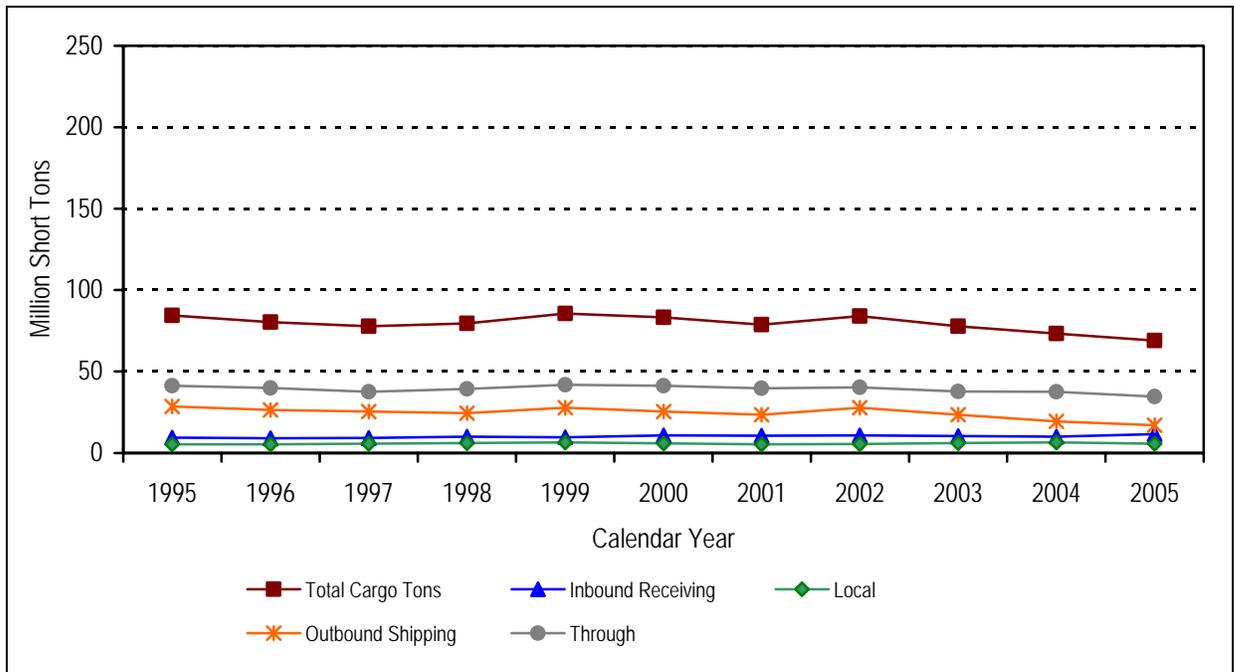
Figure 3: Missouri River Cargo Tons, Kansas City to Mississippi River



Source: US Army Corp of Engineers, Waterborne Commerce Statistics

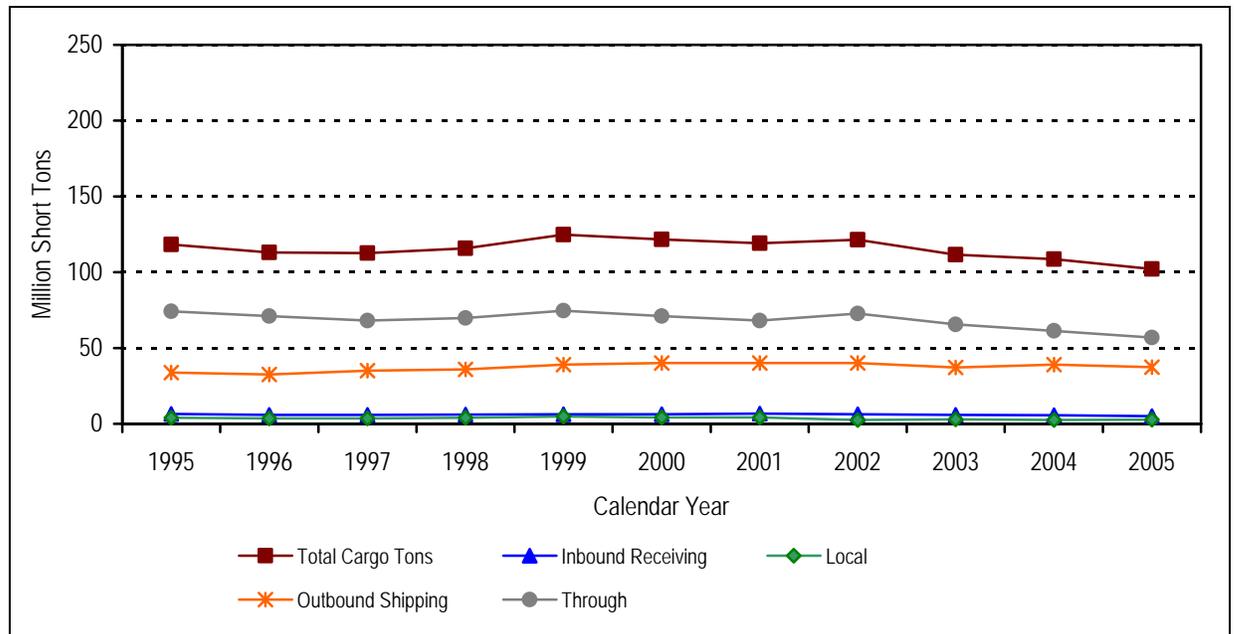
Figures 4, 5 and 6 illustrate the trend in cargo tons (for all ports, public and private) for selected portions of the Mississippi River. Since 2002, there has been a decline in total tons partly due to a fall in shipments of food and farm products (mainly grains) southbound on the Mississippi River. This decline is driven by the expansion of ethanol production in Midwestern states. The ethanol industry is consuming an increasing share of the region's corn production.

Figure 4: Mississippi River Cargo Tons, Minneapolis, MN to Mouth of Missouri River



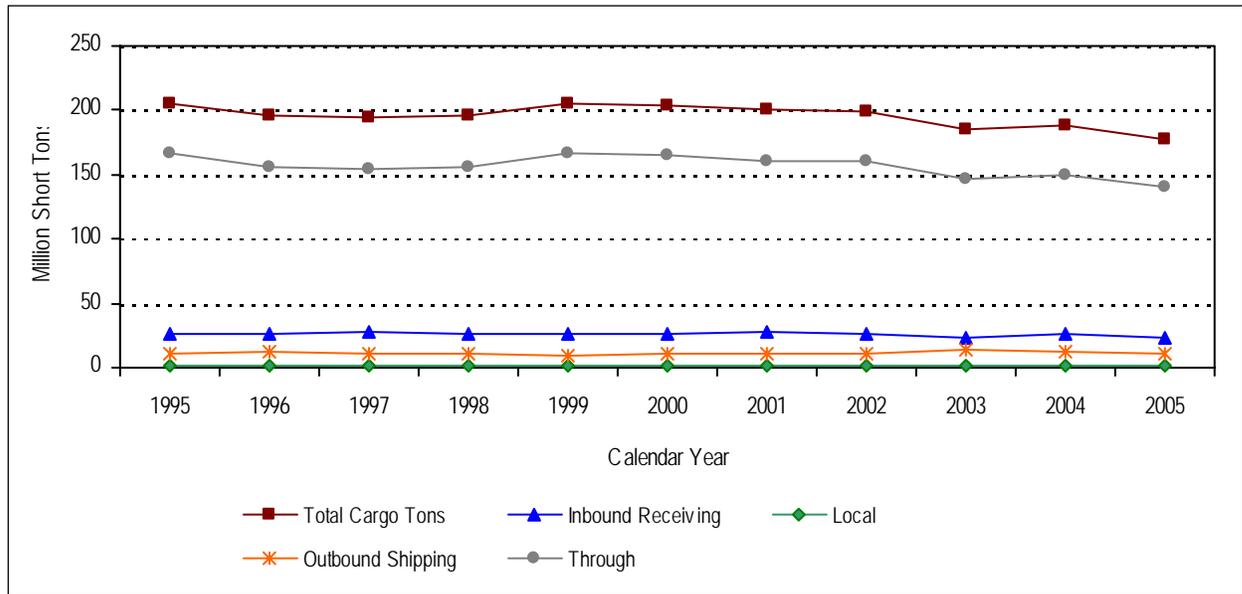
Source: US Army Corp of Engineers, Waterborne Commerce Statistics

Figure 5: Mississippi River Cargo Tons, Mouth of Missouri River to Mouth of Ohio River



Source: US Army Corp of Engineers, Waterborne Commerce Statistics

Figure 6: Mississippi River Cargo Tons, Mouth of Ohio River to Baton Rouge



Source: US Army Corp of Engineers, Waterborne Commerce Statistics

### Commodity Statistics Summary

Tables 4 to 7 at the end of this section provide the commodity group detail for traffic moving on the Missouri and Mississippi Rivers. The tables follow the same regional analysis presented in MoDOT's 2006 *Assessment*. Data is shown for the period 1995 to 2005 in order to provide historical trends as input to the evaluation of future trends. The data for each region includes "inbound receiving" tons, "outbound receiving" tons and "local"; it excludes "through" tons. The exclusion of the latter provides a better indication of trends in port traffic for each region.

Directionally, commodities such as food and farm products tend to be transported southbound, or "down" the rivers from Kansas City to the mouth of the Mississippi River on the Missouri River, and from Minneapolis, Minnesota to Baton Rouge, Louisiana on the Mississippi River. The majority of crude materials transported on these waterways are also traveling down river, except in the case of shipments on the Mississippi River from Minneapolis, Minnesota to the mouth of the Missouri River. In this case, the majority of these materials are transported northbound. Additionally, the majority of petroleum and petroleum products are transported northbound on the Mississippi River from Baton Rouge, Louisiana to the mouth of the Ohio River.

The data shows that overall traffic was effectively stagnant in the period 1995 to 2005, gains earlier in the decade offset by declines later in the decade. Total cargo tonnage (comprising "inbound receiving" tons, "outbound receiving" tons and "local") registered negative or close to zero growth in three of the four regions. The only region to experience reasonably positive growth was the Missouri River, from Kansas City to the Mississippi River with a CAGR of 2.4 percent between 1995 and 2005. However, this region did experience a period of slightly negative growth in the 5-year period to 2005. The poor traffic growth was partially driven by the expansion of ethanol production (see Figure 7, page 31), which absorbed corn that was previously shipped out of the region by barge.

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## A Brief Outlook

The historical review indicates that total port tonnage is growing, at best, in the low single digits, and in some port regions total tonnage growth is negative. One reason for this slow growth is that the expansion of the regional ethanol industry has consumed corn that previously moved out of the region by barge. This trend is expected to continue based on projected growth in ethanol production (discussed in Section 5 of this report). However, the ethanol industry is also creating new opportunities for barge transport with increased shipments of ethanol to domestic consumption centers and dry distillers grains with solubles (DDGS) to export markets.

Developments in major commodities (e.g., aggregates, sand) are primarily tied to local and regional economic developments and the health of specific economic sectors (e.g. construction activity). Therefore, the availability of local supply (e.g., sand) has an impact on traffic in specific commodity groups (e.g., crude material). There may also be opportunities to move containerized cargo or empty containers as global containerized trade is expected to grow strongly over the next decade. Future trends and opportunities are discussed in a later section of this report.

**Table 4a: Missouri River Total Cargo Tons by Commodity Group,  
Kansas City to Mississippi River (1,000 Short Tons)**

Year	Chemicals and Related	Crude Material	Food and Farm Products	Machinery	Petroleum and Petroleum Products	Primary Manufactured Goods	Grand Total
1995	232	5,203	175	0	187	220	6,017
1996	255	6,234	153	1	184	217	7,044
1997	236	6,175	310	0	213	180	7,114
1998	260	6,211	298	1	157	173	7,100
1999	198	7,323	311	2	196	137	8,167
2000	122	7,011	259	0	198	207	7,797
2001	143	8,022	259	0	205	191	8,820
2002	124	6,884	246	0	131	189	7,574
2003	79	7,105	59	0	195	204	7,642
2004	41	7,377	39	0	159	222	7,838
2005	4	7,323	10	0	170	88	7,595
<i>CAGR 00-05</i>	<i>-49.5%</i>	<i>0.9%</i>	<i>-47.8%</i>	<i>n/a</i>	<i>-3.0%</i>	<i>-15.7%</i>	<i>-0.5%</i>
<i>CAGR 95-05</i>	<i>-33.4%</i>	<i>3.5%</i>	<i>-24.9%</i>	<i>n/a</i>	<i>-0.9%</i>	<i>-8.8%</i>	<i>2.4%</i>

Note: Includes "inbound receiving" tons, "outbound shipping" tons and "local"; and excludes "through" tons  
Source: US Army Corp of Engineers, Waterborne Commerce Statistics

**Table 4b: Missouri River Total Cargo Tons by Commodity Group,  
Kansas City to Mississippi River – Down or West or South Bound (1,000 Short Tons)**

Year	Chemicals and Related	Crude Material	Food and Farm Products	Machinery	Petroleum and Petroleum Products	Primary Manufactured Goods	Grand Total
1995	12	1,936	158	0	0	0	2,106
1996	9	2,772	145	0	0	0	2,926
1997	0	2,622	292	0	0	0	2,914
1998	0	2,913	286	1	0	0	3,200
1999	0	3,377	302	0	0	0	3,679
2000	0	4,215	255	0	0	0	4,470
2001	1	2,879	252	0	0	0	3,132
2002	0	2,945	240	0	0	0	3,185
2003	0	2,696	59	0	0	83	2,838
2004	0	3,965	39	0	0	105	4,109
2005	0	3,158	10	0	0	0	3,168
<i>CAGR 00-05</i>	<i>n/a</i>	<i>-5.6%</i>	<i>-47.7%</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	<i>-6.7%</i>
<i>CAGR 95-05</i>	<i>-100.0%</i>	<i>5.0%</i>	<i>-24.1%</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	<i>4.2%</i>

Note: Includes "inbound receiving" tons, "outbound shipping" tons and "local"; and excludes "through" tons  
Source: US Army Corp of Engineers, Waterborne Commerce Statistics

**Table 4c: Missouri River Total Cargo Tons by Commodity Group,  
Kansas City to Mississippi River – Up or East or North Bound (1,000 Short Tons)**

Year	Chemicals and Related	Crude Material	Food and Farm Products	Machinery	Petroleum and Petroleum Products	Primary Manufactured Goods	Grand Total
1995	220	3,267	17	0	187	220	3,911
1996	246	3,462	8	1	184	217	4,118
1997	236	3,553	18	0	213	180	4,200
1998	260	3,298	12	0	157	173	3,900
1999	198	3,946	9	2	196	137	4,488
2000	122	2,796	4	0	198	207	3,327
2001	142	5,143	7	0	205	191	5,688
2002	124	3,939	6	0	131	189	4,389
2003	79	4,409	0	0	195	121	4,804
2004	41	3,412	0	0	159	117	3,729
2005	4	4,165	0	0	170	88	4,427
<i>CAGR 00-05</i>	<i>-49.5%</i>	<i>8.3%</i>	<i>-100.0%</i>	<i>n/a</i>	<i>-3.0%</i>	<i>-15.7%</i>	<i>5.9%</i>
<i>CAGR 95-05</i>	<i>-33.0%</i>	<i>2.5%</i>	<i>-100.0%</i>	<i>n/a</i>	<i>-0.9%</i>	<i>-8.8%</i>	<i>1.2%</i>

Note: Includes "inbound receiving" tons, "outbound shipping" tons and "local"; and excludes "through" tons  
Source: US Army Corp of Engineers, Waterborne Commerce Statistics

**Table 5a: Mississippi River Total Cargo Tons by Commodity Group,  
Minneapolis, MN to Mouth of Missouri River (1,000 Short Tons)**

Year	Chemical and Related	Coal	Crude Material	Food and Farm Products	Machinery	Petroleum and Petroleum Products	Primary Manufactured Goods	Waste and Scrap	Grand Total
1995	3,208	4,805	4,873	23,356	28	4,771	2,157	0	43,198
1996	3,078	4,826	4,553	22,197	13	4,118	1,731	0	40,516
1997	2,809	4,360	5,728	20,366	26	5,050	1,894	0	40,233
1998	2,896	5,852	5,339	19,380	36	4,738	2,100	0	40,341
1999	2,867	5,787	5,507	23,213	23	4,123	2,276	0	43,796
2000	3,120	5,451	6,012	21,126	18	4,070	2,300	5	42,102
2001	2,861	5,508	5,581	19,405	34	3,797	1,976	0	39,162
2002	3,001	5,976	5,665	23,161	20	3,961	2,127	0	43,911
2003	3,387	5,253	5,514	19,343	19	4,480	2,055	0	40,051
2004	3,334	5,417	5,940	15,056	12	3,747	2,282	0	35,788
2005	2,941	6,253	5,590	14,347	9	2,947	2,225	0	34,312
<i>CAGR 00-05</i>	<i>-1.2%</i>	<i>2.8%</i>	<i>-1.4%</i>	<i>-7.4%</i>	<i>-12.9%</i>	<i>-6.3%</i>	<i>-0.7%</i>	<i>n/a</i>	<i>-4.0%</i>
<i>CAGR 95-05</i>	<i>-0.9%</i>	<i>2.7%</i>	<i>1.4%</i>	<i>-4.8%</i>	<i>-10.7%</i>	<i>-4.7%</i>	<i>0.3%</i>	<i>n/a</i>	<i>-2.3%</i>

Note: Includes "inbound receiving" tons, "outbound shipping" tons and "local"; and excludes "through" tons  
Source: US Army Corp of Engineers, Waterborne Commerce Statistics

**Table 5b: Mississippi River Total Cargo Tons by Commodity Group,  
Minneapolis, MN to Mouth of Missouri River – Down or West or South Bound (1,000 Short Tons)**

Year	Chemical and Related	Coal	Crude Material	Food and Farm Products	Machinery	Petroleum and Petroleum Products	Primary Manufactured Goods	Waste and Scrap	Grand Total
1995	850	13	651	23,197	3	2,895	1,009	0	28,618
1996	759	85	708	21,918	0	2,254	877	0	26,601
1997	758	94	728	20,156	3	3,047	902	0	25,688
1998	696	270	662	19,168	5	3,365	733	0	24,899
1999	692	179	633	23,023	2	2,962	751	0	28,242
2000	726	198	582	20,915	0	2,656	769	0	25,846
2001	675	115	349	19,151	3	1,913	904	0	23,110
2002	775	147	474	22,902	3	2,095	842	0	27,238
2003	839	149	608	19,063	5	2,141	1,094	0	23,899
2004	886	783	724	14,781	1	2,202	675	0	20,052
2005	395	620	885	14,143	3	1,710	794	0	18,550
<i>CAGR 00-05</i>	<i>-11.5%</i>	<i>25.6%</i>	<i>8.7%</i>	<i>-7.5%</i>	<i>n/a</i>	<i>-8.4%</i>	<i>0.6%</i>	<i>n/a</i>	<i>-6.4%</i>
<i>CAGR 95-05</i>	<i>-7.4%</i>	<i>47.2%</i>	<i>3.1%</i>	<i>-4.8%</i>	<i>0.0%</i>	<i>-5.1%</i>	<i>-2.4%</i>	<i>n/a</i>	<i>-4.2%</i>

Note: Includes "inbound receiving" tons, "outbound shipping" tons and "local"; and excludes "through" tons  
Source: US Army Corp of Engineers, Waterborne Commerce Statistics

**Table 5c: Mississippi River Total Cargo Tons by Commodity Group,  
Minneapolis, MN to Mouth of Missouri River – Up or East or North Bound (1,000 Short Tons)**

Year	Chemical and Related	Coal	Crude Material	Food and Farm Products	Machinery	Petroleum and Petroleum Products	Primary Manufactured Goods	Waste and Scrap	Grand Total
1995	2,358	4,792	4,222	159	25	1,876	1,148	0	14,580
1996	2,319	4,741	3,845	279	13	1,864	854	0	13,915
1997	2,051	4,266	5,000	210	23	2,003	992	0	14,545
1998	2,200	5,582	4,677	212	31	1,373	1,367	0	15,442
1999	2,175	5,608	4,874	190	21	1,161	1,525	0	15,554
2000	2,394	5,253	5,430	211	18	1,414	1,531	5	16,256
2001	2,186	5,393	5,232	254	31	1,884	1,072	0	16,052
2002	2,226	5,829	5,191	259	17	1,866	1,285	0	16,673
2003	2,548	5,104	4,906	280	14	2,339	961	0	16,152
2004	2,448	4,634	5,216	275	11	1,545	1,607	0	15,736
2005	2,546	5,633	4,705	204	6	1,237	1,431	0	15,762
<i>CAGR 00-05</i>	<i>1.2%</i>	<i>1.4%</i>	<i>-2.8%</i>	<i>-0.7%</i>	<i>-19.7%</i>	<i>-2.6%</i>	<i>-1.3%</i>	<i>-100.0%</i>	<i>-0.6%</i>
<i>CAGR 95-05</i>	<i>0.8%</i>	<i>1.6%</i>	<i>1.1%</i>	<i>2.5%</i>	<i>-13.3%</i>	<i>-4.1%</i>	<i>2.2%</i>	<i>n/a</i>	<i>0.8%</i>

Note: Includes "inbound receiving" tons, "outbound shipping" tons and "local"; and excludes "through" tons  
 Source: US Army Corp of Engineers, Waterborne Commerce Statistics

**Table 6a: Mississippi River Total Cargo Tons by Commodity Group,  
Mouth of Missouri River to Mouth of Ohio River (1,000 Short Tons)**

Year	Chemicals and Related	Coal	Crude Material	Food and Farm Products	Machinery	Petroleum and Petroleum Products	Primary Manufactured Goods	Waste and Scrap	Grand Total
1995	1,334	17,705	11,325	8,655	37	1,479	3,664	0	44,199
1996	1,225	17,497	8,800	8,553	48	1,796	4,016	0	41,935
1997	1,161	17,394	10,064	10,172	26	1,659	3,919	0	44,395
1998	1,276	17,704	10,313	10,210	26	1,843	4,675	0	46,047
1999	1,275	18,663	12,460	11,511	24	1,759	4,495	0	50,187
2000	1,127	19,988	11,950	11,098	8	2,117	4,246	0	50,534
2001	1,420	20,619	11,074	11,042	9	2,483	4,316	0	50,963
2002	1,346	20,797	10,152	10,258	17	2,098	4,178	0	48,846
2003	1,316	18,226	11,111	9,533	3	1,600	4,040	0	45,829
2004	1,457	18,757	10,092	11,361	17	1,667	3,996	5	47,352
2005	1,552	20,275	8,077	9,463	24	1,823	4,008	0	45,222
<i>CAGR 00-05</i>	<i>6.6%</i>	<i>0.3%</i>	<i>-7.5%</i>	<i>-3.1%</i>	<i>24.6%</i>	<i>-2.9%</i>	<i>-1.1%</i>	<i>n/a</i>	<i>-2.2%</i>
<i>CAGR 95-05</i>	<i>1.5%</i>	<i>1.4%</i>	<i>-3.3%</i>	<i>0.9%</i>	<i>-4.2%</i>	<i>2.1%</i>	<i>0.9%</i>	<i>n/a</i>	<i>0.2%</i>

Note: Includes "inbound receiving" tons, "outbound shipping" tons and "local"; and excludes "through" tons  
Source: US Army Corp of Engineers, Waterborne Commerce Statistics

**Table 6b: Mississippi River Total Cargo Tons by Commodity Group,  
Mouth of Missouri River to Mouth of Ohio River – Down or West or South Bound (1,000 Short Tons)**

Year	Chemicals and Related	Coal	Crude Material	Food and Farm Products	Machinery	Petroleum and Petroleum Products	Primary Manufactured Goods	Waste and Scrap	Grand Total
1995	252	14,098	9,492	8,547	7	594	2,057	0	35,047
1996	220	14,667	6,146	8,376	32	811	2,613	0	32,865
1997	160	14,632	7,566	10,043	13	784	2,651	0	35,849
1998	155	14,632	7,958	10,049	10	832	2,986	0	36,622
1999	158	15,029	9,646	11,374	11	817	2,837	0	39,872
2000	160	15,606	9,258	10,967	7	1,075	2,551	0	39,624
2001	170	16,526	8,209	10,943	1	1,060	2,928	0	39,837
2002	152	16,547	7,887	10,178	8	589	2,674	0	38,035
2003	130	14,350	8,694	9,451	0	723	2,758	0	36,106
2004	162	15,597	7,551	11,229	0	834	2,622	5	38,000
2005	223	15,104	5,682	9,407	24	1,386	2,702	0	34,528
<i>CAGR 00-05</i>	<i>6.9%</i>	<i>-0.7%</i>	<i>-9.3%</i>	<i>-3.0%</i>	<i>27.9%</i>	<i>5.2%</i>	<i>1.2%</i>	<i>n/a</i>	<i>-2.7%</i>
<i>CAGR 95-05</i>	<i>-1.2%</i>	<i>0.7%</i>	<i>-5.0%</i>	<i>1.0%</i>	<i>13.1%</i>	<i>8.8%</i>	<i>2.8%</i>	<i>n/a</i>	<i>-0.1%</i>

Note: Includes "inbound receiving" tons, "outbound shipping" tons and "local"; and excludes "through" tons  
Source: US Army Corp of Engineers, Waterborne Commerce Statistics

Table 6c: Mississippi River Total Cargo Tons by Commodity Group, Mouth of Missouri River to Mouth of Ohio River – Up or East or North Bound (1,000 Short Tons)									
Year	Chemicals and Related	Coal	Crude Material	Food and Farm Products	Machinery	Petroleum and Petroleum Products	Primary Manufactured Goods	Waste and Scrap	Grand Total
1995	1,082	3,607	1,833	108	30	885	1,607	0	9,152
1996	1,005	2,830	2,654	177	16	985	1,403	0	9,070
1997	1,001	2,762	2,498	129	13	875	1,268	0	8,546
1998	1,121	3,072	2,355	161	16	1,011	1,689	0	9,425
1999	1,117	3,634	2,814	137	13	942	1,658	0	10,315
2000	967	4,382	2,692	131	1	1,042	1,695	0	10,910
2001	1,250	4,093	2,865	99	8	1,423	1,388	0	11,126
2002	1,194	4,250	2,265	80	9	1,509	1,504	0	10,811
2003	1,186	3,876	2,417	82	3	877	1,282	0	9,723
2004	1,295	3,160	2,541	132	17	833	1,374	0	9,352
2005	1,329	5,171	2,395	56	0	437	1,306	0	10,694
<i>CAGR 00-05</i>	<i>6.6%</i>	<i>3.4%</i>	<i>-2.3%</i>	<i>-15.6%</i>	<i>-100.0%</i>	<i>-16.0%</i>	<i>-5.1%</i>	<i>n/a</i>	<i>-0.4%</i>
<i>CAGR 95-05</i>	<i>2.1%</i>	<i>3.7%</i>	<i>2.7%</i>	<i>-6.4%</i>	<i>-100.0%</i>	<i>-6.8%</i>	<i>-2.1%</i>	<i>n/a</i>	<i>1.6%</i>

Note: Includes "inbound receiving" tons, "outbound shipping" tons and "local"; and excludes "through" tons

Source: US Army Corp of Engineers, Waterborne Commerce Statistics

**Table 7a: Mississippi River Total Cargo Tons by Commodity Group,  
Mouth of Ohio River to Baton Rouge, LA (1,000 Short Tons)**

Year	Chemicals and Related	Coal	Crude Material	Food and Farm Products	Machinery	Petroleum and Petroleum Products	Primary Manufactured Goods	Waste and Scrap	Grand Total
1995	2,163	6,574	14,726	6,529	12	6,599	2,104	0	38,707
1996	2,080	6,216	13,803	7,848	7	7,353	2,121	0	39,428
1997	2,298	6,327	14,589	7,220	8	7,393	2,281	0	40,116
1998	2,260	7,044	12,317	6,894	6	8,188	2,588	10	39,307
1999	2,095	6,903	13,168	6,570	25	7,046	2,287	0	38,094
2000	2,088	7,079	12,032	7,431	25	8,267	2,724	0	39,646
2001	2,051	8,554	11,893	7,749	5	8,020	2,180	1	40,453
2002	1,992	7,768	12,655	7,817	1	6,395	1,933	0	38,561
2003	2,100	6,337	11,068	9,805	1	7,194	2,073	0	38,578
2004	2,230	7,322	11,399	8,836	41	7,546	2,363	0	39,737
2005	1,904	7,207	9,286	6,939	58	8,276	2,717	0	36,387
<i>CAGR 00-05</i>	<i>-1.8%</i>	<i>0.4%</i>	<i>-5.0%</i>	<i>-1.4%</i>	<i>18.3%</i>	<i>0.0%</i>	<i>-0.1%</i>	<i>n/a</i>	<i>-1.7%</i>
<i>CAGR 95-05</i>	<i>-1.3%</i>	<i>0.9%</i>	<i>-4.5%</i>	<i>0.6%</i>	<i>17.1%</i>	<i>2.3%</i>	<i>2.6%</i>	<i>n/a</i>	<i>-0.6%</i>

Note: Includes "inbound receiving" tons, "outbound shipping" tons and "local"; and excludes "through" tons  
Source: US Army Corp of Engineers, Waterborne Commerce Statistics

**Table 7b: Mississippi River Total Cargo Tons by Commodity Group,  
Mouth of Ohio River to Baton Rouge, LA – Down or West or South Bound (1,000 Short Tons)**

Year	Chemicals and Related	Coal	Crude Material	Food and Farm Products	Machinery	Petroleum and Petroleum Products	Primary Manufactured Goods	Waste and Scrap	Grand Total
1995	414	6,316	12,341	6,425	4	1,711	910	0	28,121
1996	471	5,931	11,416	7,645	1	2,010	591	0	28,065
1997	670	6,077	11,601	7,005	8	2,051	758	0	28,170
1998	641	6,555	9,455	6,733	3	2,063	651	0	26,101
1999	465	6,860	9,877	6,372	22	1,643	587	0	25,826
2000	418	6,950	8,847	7,223	9	1,528	794	0	25,769
2001	429	8,277	9,490	7,503	3	1,088	736	1	27,527
2002	505	7,613	10,365	7,603	0	767	579	0	27,432
2003	484	6,284	8,789	9,528	0	1,041	850	0	26,976
2004	558	7,273	8,100	8,297	41	1,089	919	0	26,277
2005	288	7,054	6,874	6,753	56	1,466	1,055	0	23,546
<i>CAGR 00-05</i>	<i>-7.2%</i>	<i>0.3%</i>	<i>-4.9%</i>	<i>-1.3%</i>	<i>44.1%</i>	<i>-0.8%</i>	<i>5.8%</i>	<i>n/a</i>	<i>-1.8%</i>
<i>CAGR 95-05</i>	<i>-3.6%</i>	<i>1.1%</i>	<i>-5.7%</i>	<i>0.5%</i>	<i>30.2%</i>	<i>-1.5%</i>	<i>1.5%</i>	<i>n/a</i>	<i>-1.8%</i>

Note: Includes "inbound receiving" tons, "outbound shipping" tons and "local"; and excludes "through" tons  
Source: US Army Corp of Engineers, Waterborne Commerce Statistics

**Table 7c: Mississippi River Total Cargo Tons by Commodity Group,  
Mouth of Ohio River to Baton Rouge, LA – Up or East or North Bound (1,000 Short Tons)**

Year	Chemicals and Related	Coal	Crude Material	Food and Farm Products	Machinery	Petroleum and Petroleum Products	Primary Manufactured Goods	Waste and Scrap	Grand Total
1995	1,749	258	2,385	104	8	4,888	1,194	0	10,586
1996	1,609	285	2,387	203	6	5,343	1,530	0	11,363
1997	1,628	250	2,988	215	0	5,342	1,523	0	11,946
1998	1,619	489	2,862	161	3	6,125	1,937	10	13,206
1999	1,630	43	3,291	198	3	5,403	1,700	0	12,268
2000	1,670	129	3,185	208	16	6,739	1,930	0	13,877
2001	1,622	277	2,403	246	2	6,932	1,444	0	12,926
2002	1,487	155	2,290	214	1	5,628	1,354	0	11,129
2003	1,616	53	2,279	277	1	6,153	1,223	0	11,602
2004	1,672	49	3,299	539	0	6,457	1,444	0	13,460
2005	1,616	153	2,412	186	2	6,810	1,662	0	12,841
<i>CAGR 00-05</i>	<i>-0.7%</i>	<i>3.5%</i>	<i>-5.4%</i>	<i>-2.2%</i>	<i>-34.0%</i>	<i>0.2%</i>	<i>-2.9%</i>	<i>n/a</i>	<i>-1.5%</i>
<i>CAGR 95-05</i>	<i>-0.8%</i>	<i>-5.1%</i>	<i>0.1%</i>	<i>6.0%</i>	<i>-12.9%</i>	<i>3.4%</i>	<i>3.4%</i>	<i>n/a</i>	<i>1.9%</i>

Note: Includes "inbound receiving" tons, "outbound shipping" tons and "local"; and excludes "through" tons

Source: US Army Corp of Engineers, Waterborne Commerce Statistics

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## Section 5 – Ports and Waterways Trends and Outlook

This section examines current trends regarding ports and waterways and how those trends may be adopted to benefit the state of Missouri. Discussed in this section are trends related to tonnage growth of major commodities on the nation's inland waterway system, the impact of global freight transport on inland waterways, growth of container-on-barge operations, increased biofuel services, identity preserved agriculture, significance of the Jones Act on waterborne commerce, the increasing role of logistics terminals in the U.S., policy issues regarding navigation of the Missouri River, and lock/dam expansion on the Mississippi River.

### Commodities on the Inland Waterway System

The 12,000 miles of inland and intercoastal waterways in the U.S. are maintained by USACE as multi-purpose, multi-objective resources. These waterways provide commercial navigation, hydropower, municipal water supply, agricultural irrigation, recreation, and regional development. For commercial navigation purposes they provide connections to higher classification water routes on the Great Lakes and oceans much like the roadway classification system has local, collector, and highway routes.<sup>7</sup>

According to a recent report for USACE<sup>8</sup>, the U.S. inland and coastal waterways experienced 1.4 percent growth in tonnage from 1985 to 2004 with most of the growth occurring before 1995. The relatively flat growth since 1995 confirms that the results reported to USACE are consistent with nationwide trends. The growth of major commodities shipped on the inland waterway system, such as crude materials, coal, minerals, and chemicals, drive growth on the inland waterway system. None of these commodities are predicted to either grow or decline considerably and diversion to other modes is always a possibility.

The Mining Industry Council of Missouri reports that mining crude materials and minerals generates approximately \$4.5 - \$5 billion of the state's economy annually.<sup>9</sup> Galena (lead), fire clay, lime, zinc, coal, sand and gravel, barite, iron oxide, copper, cement, crushed limestone, and silver are common materials mined in Missouri. The U.S. Geological Survey (USGS) partnered with the Missouri Department of Natural Resources' Geological Survey and Resource Assessment Division to evaluate Missouri's existing inventory of minerals; data is available from 1994-2004<sup>10</sup> (see Table 8). According to this study, Missouri has been a key producer of construction sand and gravel throughout the last decade. Production of construction sand and gravel was approximately 12 million metric tons<sup>11</sup> in 2004; this is a 13 percent increase from production in 2003. The unit value of construction sand and gravel also increased by approximately 2 percent since 2003, due primarily to the rising cost of fuel used in the mining process.<sup>12</sup>

The economic activity that comes with population growth continues to drive the demand for basic commodities like crude materials used in construction. According the U.S. Census, Missouri's population is estimated to grow 15 percent over the next 20 years. Given this expected growth in Missouri's population, there will continue to be a demand to ship these commodities via barge as it is a cost effective mode of transport.

There has also been interest in moving forest products by barge on Missouri's inland waterway system. This may be a less expensive method of transporting such commodities, although containerized protection must be offered since the material cannot get wet. The U.S. Department of Agriculture (USDA) Forest Service ranks Missouri third based on

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<sup>7</sup> *The U.S. Waterway System – Transportation Facts*. February 2007. Navigation Data Center, U.S. Army Corps of Engineers.

<sup>8</sup> *Maritime Transportation System: Trends and Outlook*. March 13, 2007. Submitted by CDM and The Tioga Group. Submitted to US Army Corps of Engineers Institute for Water Resources. 61.

<sup>9</sup> Mining Industry Council of Missouri. December 3, 2007. <http://www.momic.com/bridge.asp?pagenumber=48659>.

<sup>10</sup> *The Mineral Industry of Missouri*. 2004. U.S. Geological Survey Minerals Yearbook. <http://minerals.usgs.gov/minerals>.

<sup>11</sup> One metric ton is equivalent to 2,204.6 pounds.

<sup>12</sup> *The Mineral Industry of Missouri*. 2004. U.S. Geological Survey Minerals Yearbook. <http://minerals.usgs.gov/minerals>.

economic impacts of forestry. The impact of forest product industries in Missouri is over \$4.32 billion, constituting about 2% of Missouri's Gross State Product (GSP).<sup>13</sup>

**Table 8: Production History of Construction Sand and Gravel in Missouri, 1994-2004**

Year	Tonnage (in thousands Mt)	Value (in thousands \$)
1994	9,760	36,500
1995	8,840	32,400
1996	9,820	35,600
1997	9,530	35,600
1998	9,470	39,300
1999	12,400	50,300
2000	10,700	41,700
2001	10,900	45,800
2002	10,000	42,300
2003	10,600	49,400
2004	12,200	60,000

Source: The Mineral Industry of Missouri. 2004. U.S. Geological Survey Minerals Yearbook. <http://minerals.usgs.gov/minerals/>.

### International Freight Movements

U.S. economic growth in the past five years was strong, fueled by the liberalization of world trade, increased domestic demand, low-cost global manufacturing, and efficient transportation. The latter includes the culmination of 30-years of development centered on containerizing non-bulk commodities and moving them on increasingly larger vessels, double stack railroad systems, and trucks through a variety of ports and terminals. In addition, logistics has become an essential management tool in U.S. product and services competitiveness. Logistics has exerted a strong influence on rationalizing the structure and nature of the distribution systems handling trade increases.

U.S. Gross Domestic Product (GDP) grew from \$4.9 trillion in the mid 1980s to \$13.2 trillion in 2006.<sup>14</sup> This profound change altered not only the composition and size of the business sector but also the role the nation now plays in the global economy. The nation is now firmly international and the economy of Missouri reflects this change. The increase in global trade made a significant impact on the state's transportation system, especially its multimodal components. In 2004, the Bureau of Transportation Statistics reported that the value of U.S. international merchandise trade by mode was 39.3% water, followed by 26.8% air, 21.4% truck, 4.9% rail, and 1.2% pipeline. Clearly, coastal and river ports play an important role in the current modal split for global trade and this is likely to strengthen in the next decade.

International cargo growth includes a range of modes and commodities, classified as bulk, break-bulk, containerized, and project. All have grown with the global economy, but containerized traffic has grown at a faster rate and offers multimodal flexibility which is most critical to river port terminal development. More bulk and break-bulk commodities are now being containerized. Containerization is a more efficient and secure method of shipment. Global containership capacity, reflecting the actual and expected demand, increased from 2.8 million twenty-foot equivalent

<sup>13</sup> *Economic Impacts of Forest Products Industry*. October 2007. Missouri Economic Research and Information Center. <http://www.moforest.org/Missouri%20Forest%20Economic%20Impacts%20Study%20Oct%2007.pdf>.

<sup>14</sup> Bureau of Economic Analysis (BEA), National Economic Accounts. November 29, 2007. <http://www.bea.gov/national/>.

units (TEUs)<sup>15</sup> in 1996 to 8.1 million TEUs in 2006. It is estimated that containership capacity will grow to 12.1 million TEUs by 2011. This represents a sector that could be served, in some capacity, by U.S. river ports.

Table 9 depicts the increased magnitude of total container moves that occurred in 1995 and then in 2005, signifying the growth of the global container sector. Empty containers have grown in market share and have become an important future commodity for ports on rivers serving deep water terminals. Empty containers are a diverse, heterogeneous commodity. However, they are a commodity that is difficult to capture due to diverse ownership, varying sizes, and contract requirements (e.g., demurrage). Exploring the possibility of block moves of homogeneous containers (i.e., same owner, same size, same contract terms) is an option to potentially increase these freight moves on the waterways.

Table 9: Global Port Movements 1995-2005, by Millions of TEUs				
Year	# of Full TEUs	# of Empty TEUs	# of Transshipment TEUs	Total TEUs
1995	115	25	35	175
2005	265	65	80	410

Source: Rodolfo, Sabonge. *Expanding Capacity of the Panama Canal*, presented at TRB 2006 Summer Conference, La Jolla, California. July 2006.

In 2006, U.S. ports alone handled nearly 27.5 million TEUs; almost 9 million of those TEUs were exported and the remaining 18.5 million TEUs were imported. Compare that to almost 15 million TEUs handled by U.S. ports in 1997, in which almost half of all TEUs were exported and the other half were imported. In 2006, the top 10 U.S. ports handled 90 percent of U.S.-international containerized trade; those ports included Los Angeles/Long Beach, New York, Seattle/Tacoma, Savannah, Charleston, Norfolk, Oakland, Houston, Miami, and Port Everglades. Additionally, while the number of TEUs exported and imported at U.S. ports increased dramatically, the average size of containerships also increased by 25 percent from 2001-2006.

A factor attributed to the increase in TEUs handled by U.S. ports is the dramatic increase in containerized imports from China and other developing Asian economies. The quantity of containers coming from the Pacific encouraged shippers to examine gateway alternatives such as Gulf of Mexico ports and Atlantic coast ports to deliver goods inland. Additionally, the growth of Latin American trade with the U.S. increased containerized shipments. Several ports on the west coast of Mexico, such as Manzanillo and Lazaro Cardenas, are in the early stages of development. Although these Mexican ports are not expected to capture container traffic from U.S. west coast ports, they are expected to supply Mexican markets and to serve as relievers for U.S. ports that reach capacity. The Mexican ports are likely to use rail for U.S. destinations and are not anticipated to impact the inland waterway system. There are too many modal interchanges to make these shipments cost effective.

Growth of trade from China led shippers to examine a variety of alternative routes. The most successful of these routes to-date is the Panama Canal. The Canal's projected vessel-cargo segments are shown in Table 10. The increased amount of containerized traffic through the Panama Canal has prompted strong growth at Gulf of Mexico and southern Atlantic ports, particularly Houston, which has access to the Mississippi River through the Gulf Intra-Coastal Waterway (GIWW). Increased containerization and typically larger ocean vessels are the catalysts for Panama's canal expansion to provide more cargo capacity.

<sup>15</sup> A TEU is a twenty-foot equivalent unit; a standard 40-foot container is 2 TEUs.

**Table 10: Projected 2007 Vessel-Cargo Segments  
(in million tons) Through Panama Canal**

Vessel	Tonnage
Containership	153
Dry Bulk	61
Liquid Bulk	36
General Cargo	7
Reefers	19
Cruise	9
Auto Carriers	35
Other Vessels	20

Source: Rodolfo, Sabonge. *Expanding Capacity of the Panama Canal*, presented at TRB 2006 Summer Conference, July 2006.

The expansion of the Panama Canal presents an opportunity to increase the number of international containers arriving at Gulf coast ports that may, in turn, use the Mississippi and Missouri Rivers for moving goods further inland. Plans for expansion include construction of two new lock facilities – one on each side, Atlantic and Pacific – each with three chambers, excavation of new access channels, and widening and deepening of the navigation channels. Construction of the expansion project is anticipated to be completed by 2014.

According to the Panama Canal Authority (Autoridad del Canal de Panama – ACP), cargo transiting the canal is expected to grow at a rate of 3 percent per year. This growth rate doubles canal tonnage from 2005 to 2025. Canal expansion offers greater capacity to accommodate larger vessels destined for U.S. East and Gulf coast ports. At present, the Canal's share of total container shipments between Asia and the U.S. is approximately 38 percent, up from 11 percent in 1999. The major competitor to all-water service through the Panama Canal is the U.S. intermodal system. The U.S. system boasts approximately 61 percent share of current container shipments. However, the ACP reports that some of the increase in Canal traffic is attributed to the reduction in U.S. intermodal system reliability.<sup>16</sup>

In anticipation of the Canal expansion, ports on the Gulf coast are preparing their infrastructure for handling an increase in container shipments. The use of the inland waterway system to ship goods inland is important because many of the Gulf coast ports are connected to congested highways and railroads. The capacity of the inland waterway system lends more reliability to shippers than highways and rail that are currently over capacity. Table 11 describes characteristics of Gulf coast ports with the potential to become hubs for container shipments. Each of these ports are linked to Missouri's ports by the Mississippi River or GIWW. According to these characteristics, Missouri is positioned to capture this container traffic via its inland waterway network.

<sup>16</sup> Panama Canal Authority. November 30, 2007. [www.pancanal.com](http://www.pancanal.com).

**Table 11: Potential Container-On-Barge (COB) Hubs on Gulf Coast**

Port	Terminal Name	Characteristics
Beaumont, TX	None	Interested in promoting COB idea
Brownsville, TX	None	Promoting COB idea, but no service yet, GIWW link
Corpus Christi, TX	La Quinta	Preliminary evaluation only, good channel access
Freeport, TX	Velasco	Broke ground in late 2006 on the first phase of a 0.8 to 1.0 million TEUs terminal with scheduled completion in 2008; Port of Freeport is seeking an operator.
Galveston, TX	Pelican Island	Port of Galveston and Port of Houston signed an MOU in May 2007 to evaluate a new terminal that would be developed in the next 10-15 years based on market needs.
Houston, TX	Barbours Cut	1.5 million TEUs in 2005, served Osprey COB operations
Houston, TX	Bayport 1A	300,000 TEUs in 2007
Houston, TX	Bayport 1B	300,000 TEUs projected in 2009
Houston, TX	Bayport 2	900,000 TEUs projected in 2012-2014
Mobile, AL	None	New container terminal opening in 2008 under a concession to APM Terminals and CMA-CGM.
New Orleans, LA	None	Has recovered from hurricane impact on container operations
Texas City, TX	Shoal Point	Proposed 2.0 million TEUs terminal located between Galveston and Houston; SSA Marine involvement.
Victoria, TX	None	Interested in providing COB service, GIWW link

Sources: Harrison, Robert, et. al. *Planning for Container Growth along the Houston Ship Channel and Other Texas Seaports*. Center for Transportation Research, University of Austin, TX. November 2006, revised February 2007. [http://www.utexas.edu/research/ctr/pdf\\_reports/0\\_5068\\_2.pdf](http://www.utexas.edu/research/ctr/pdf_reports/0_5068_2.pdf); TranSystems.

### Container-on-Barge Service

The capability of the inland waterway system is no longer restricted to bulk commodities such as liquid bulk or crude materials. Container-on-barge (COB) service allows for higher value commodities typical of highway and rail modes to be transported on the inland waterway system. Self-propelled or deck barges can be manufactured or easily converted to carry 72 TEUs.

Containerized trade can be classified as one of the following: a single broad commodity group and single customer type, multiple commodities and a single customer type, or all commodities and multiple customer types. As containerized volumes increase, the mix of commodity and customer types becomes more complex. The heterogeneous nature of containers introduces complexities to starting a COB service, especially if empties are the focus as touched on under the International Freight Movements heading.

There are many advantages to this shipping option. Shipping containers on barges or small container vessels diminishes roadway congestion, reduces fuel consumption and emissions, improves safety over other modes, increases shipper options, and expands freight movements. However, there are obstacles to overcome before a viable service can be established. Obstacles relating to COB service include inadequate infrastructure and equipment, intense competition with other modes, lack of U.S. shipper interest, landside planning needs, and clear examples of viability in the U.S.

To accommodate COB service the port terminal must have adequate ground storage with cranes and/or forklifts to move containers on/off vessels and on/off truck chasses. Providing adequate ground storage also means having a

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ground surface able to support loaded containers. Overweight containers are a notable advantage to COB. These heavier containers can be carried on barges at weights that would not be permitted on most U.S. highways.

A significant infrastructure obstacle to COB service is the aging lock and dam system on the Mississippi River. The reliability of the lock operation needs to be improved to ensure that shipments are not delayed. These delays increase labor and fuel costs while leaving a shipper uncertain of the delivery time. Additionally, delays caused by preferential service to government or passenger vessels at the locks and dams may increase shipment times for COB. Recent legislation has begun to address this problem. However, funding authorization is still a challenge.

U.S. COB service exists only in limited areas and has mixed commercial success. Osprey Lines currently provides weekly service from New Orleans to/from Memphis. They have explored service opportunities as far north as St. Louis but have not yet identified a concentration of shippers to make the service viable. Some service in other parts of the U.S. has been discontinued due to intense modal price competition and lack of regular service or shippers. Introducing COB service adds a competitive mode for shippers that may otherwise use railroads to ship their goods. This competition may reduce rates overall; however, history demonstrates that railroads respond by cutting prices and driving the COB service out of business.<sup>17</sup> Additionally, if there is a lack of regular service, shippers look to other modes. COB is not viable if there is a lack of shippers. A final but vitally important consideration is that COB service must be located near its customer base or hinterland. Otherwise, drayage costs drive up the total transportation cost to a point that forces a shipper to consider other modes.

Table 9 (on page 26) shows large numbers of empty containers being moved through the global supply chain - a future business opportunity for U.S. river ports. When an import container is emptied in the United States, the owner (often a steamship company) tries to find a suitable return load. The empty is stored until a return load can be found or the empty is taken back to a deep water port where a liner service can pick it up. Moving an empty container is a costly business, even when moved by double stack rail service. This provides a market opportunity for river ports, suitably close to major markets or a large logistics terminal. River ports may offer both storage and COB service to the nearest deep water terminal served by the container owner or the steamship company. This service is already provided on European rivers like the Rhine and Danube. Rivers are the most efficient way to move empty containers, as speed is not crucial but cost savings are. It forms an example of demand-side analysis which has to be part of the future growth strategy of Missouri's river ports.

## Biofuel Industry

Another growing trend at U.S. ports is providing capabilities to transport biofuels, including ethanol, ethanol-related by-products, and biodiesel. Biofuels are alternative fuels produced from renewable resources such as plant biomass or vegetable oils. Ethanol is produced through the fermentation of products like corn or other starch crops. DDGS is the nutrient-rich by-product of the fermentation process and is used as livestock feed. Biodiesel is manufactured using primarily vegetable oils (e.g., soybean oil) or other greases. Both ethanol and biodiesel can be blended with gasoline and conventional diesel fuel, respectively, to expand current fuel supply. Biofuels create fewer harmful emissions than traditional fuels, reduce dependence on foreign oil, and offer a renewable source of fuel.

The expansion of the ethanol industry and its growing consumption of corn is the most significant recent event impacting cargo flows in the Midwest region. The ethanol industry is in a period of rapid growth with 128 refineries currently online nationwide and 85 refineries under construction or undergoing expansion. U.S. production of ethanol reached 4.86 billion gallons in 2006 compared to 1.63 billion gallons in 2000 (Figure 7).

The expansion of ethanol and biodiesel production is in response to the national climate in favor of energy diversification, higher costs of traditional fuels, government subsidies, and government mandated targets for ethanol use. The Renewable Fuel Program of the Energy Policy Act of 2005 mandates that renewable fuel use in gasoline

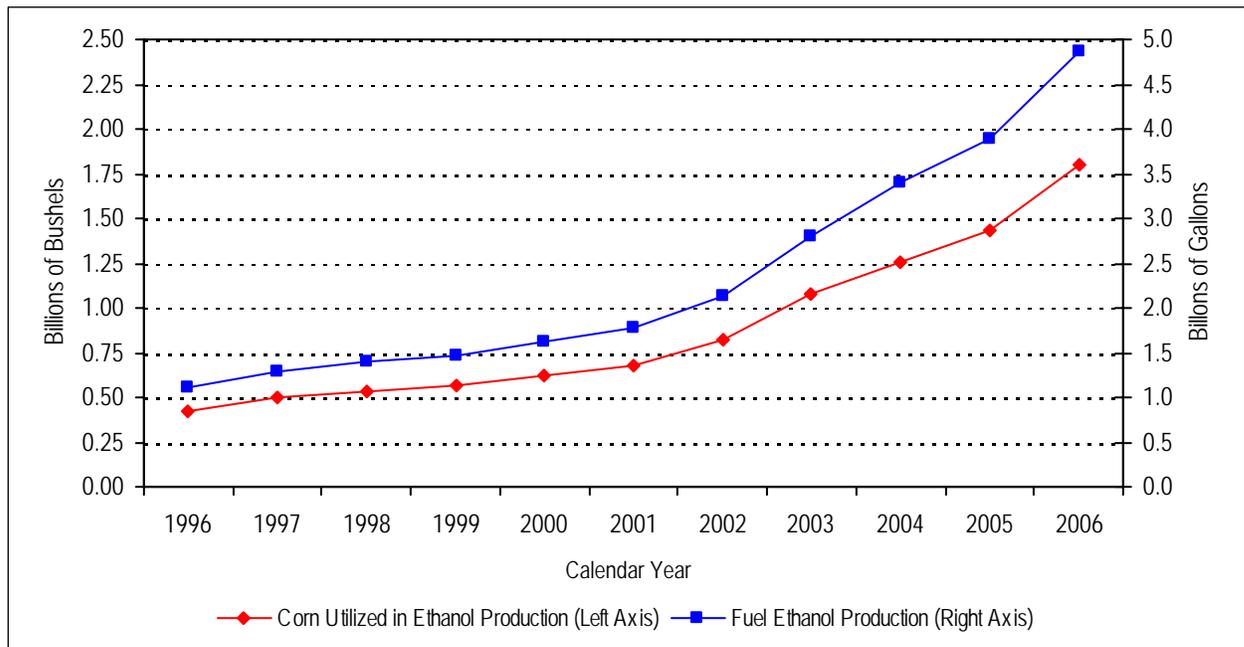
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<sup>17</sup> Bomba, Michael S. and Robert Harrison. Feasibility of a Container-on-Barge Network along the Texas Gulf Coast. Center for Transportation Research, University of Texas at Austin. 2002. 27.

reaches 7.5 billion gallons by calendar year 2012;<sup>18</sup> most of this increase will be met by ethanol. The projections in this section assume this mandate remains in effect through the projection period. Any future revisions to legislative mandates or government subsidies may change the projections for ethanol production and corn usage by the ethanol industry. USDA forecasts an increase in ethanol production over the next five years to more than 11 billion gallons (see Figure 8). The smaller biodiesel sector is also projected to expand from annual production of around 250 million gallons in 2006 to 700 million gallons by 2012, then stabilizing at this level.

The ethanol industry has steadily increased its usage of corn over the past decade and today the ethanol industry is the third largest market for U.S. corn, preceded by the feed sector and the export market. The increased usage of corn by the ethanol industry has had a negative impact on waterway shipments of corn (as discussed in Section 4 of this report) but the ethanol industry is creating new opportunities for barge transport. These opportunities include the shipment of ethanol to domestic markets and increased exports of DDGS via barge.

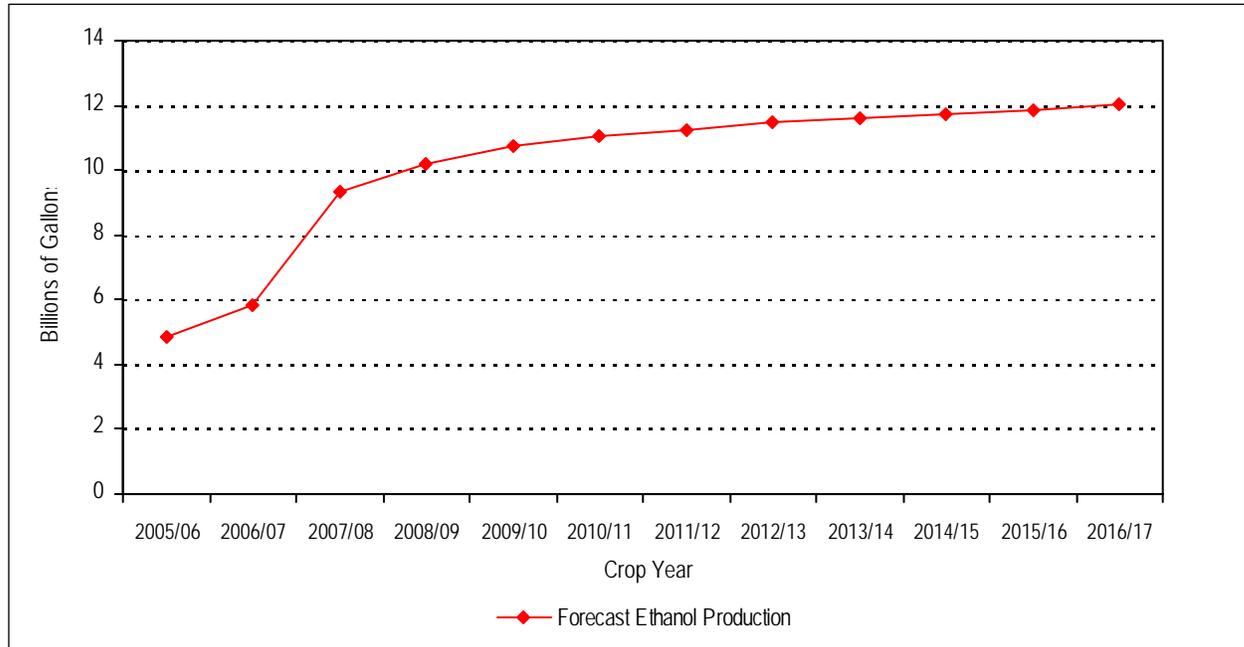
**Figure 7: Annual Fuel Ethanol Production and Corn Usage**



Source: Renewable Fuels Association and National Corn Growers Association

<sup>18</sup> *USDA Agriculture Projections to 2016*. February 2007. Written by Interagency Agricultural Projections Committee. <http://www.ers.usda.gov/publications/oce071/oce20071fm.pdf>. 3.

Figure 8: Forecast Ethanol Production



Source: US Department of Agriculture

At present, approximately 75 percent of ethanol is moved by rail and the remaining by truck. Barge movements are equivalent to about 10 percent of total production, representing transfers of rail or truck shipments.<sup>19</sup> Combined rail/barge or truck/barge moves are expected to grow as new plants built on or in close proximity to rivers are expected to boost the use of barges for the distribution of their ethanol. In 2006, the industry produced a record 12 million metric tons of DDGS, and 1.25 million metric tons of DDGS were exported.<sup>20</sup> Industry expansion is anticipated to yield a growing supply of distillers grains and U.S. exports are projected to increase. These two elements create demand for barge transport. The principal growth markets are Mexico and Asia.<sup>21</sup> In addition, expansion of corn production is likely to support growth of fertilizer shipments into the Midwest region, as well as agriculture-related equipment and machinery often shipped via barge.

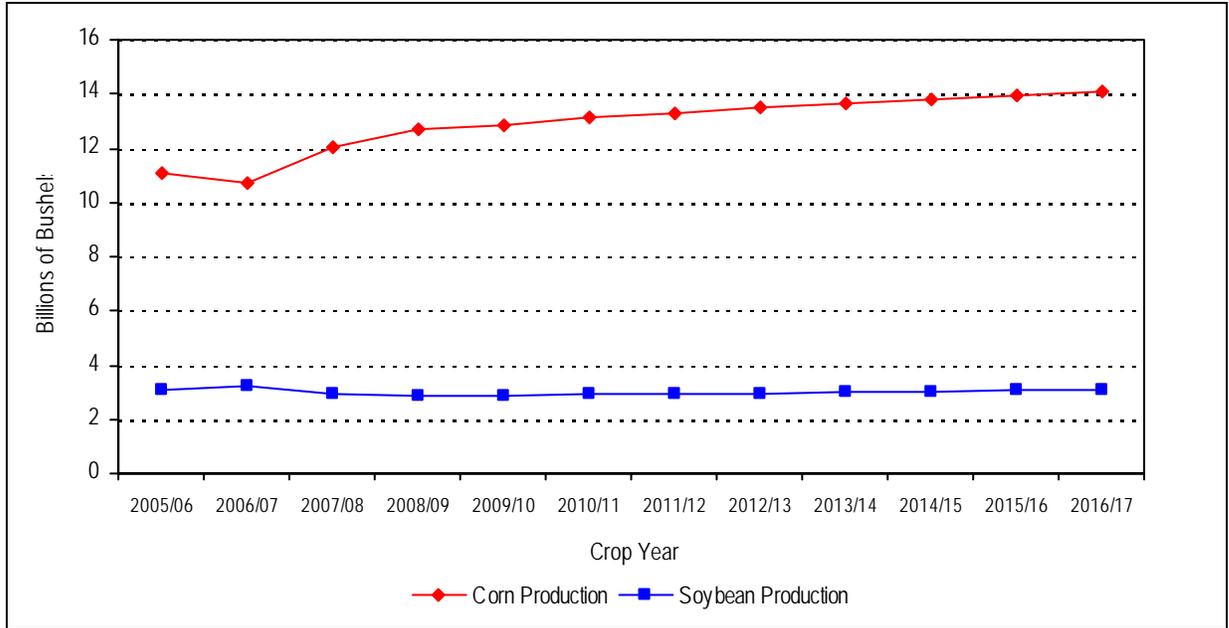
As mentioned, the expanding production of biofuels is projected to have impacts on the future production and distribution of corn, soybeans and other crops. Figure 9 illustrates that corn production is projected to increase steadily over the next decade in response to the expansion of the ethanol industry. Soybean production is projected to decline slightly and then stabilize, as more acreage devoted to corn offsets increased biofuel demand for soybeans. However, any new legislative mandates may change the future projections for soybean production.

<sup>19</sup> *Ethanol Industry Outlook 2006*, Renewable Fuels Association. [http://www.ethanolrfa.org/objects/pdf/outlook/outlook\\_2006.pdf](http://www.ethanolrfa.org/objects/pdf/outlook/outlook_2006.pdf).

<sup>20</sup> *Ethanol Industry Outlook 2007*, Renewable Fuels Association. [http://www.ethanolrfa.org/objects/pdf/outlook/RFA\\_Outlook\\_2007.pdf](http://www.ethanolrfa.org/objects/pdf/outlook/RFA_Outlook_2007.pdf).

<sup>21</sup> *Ibid.*

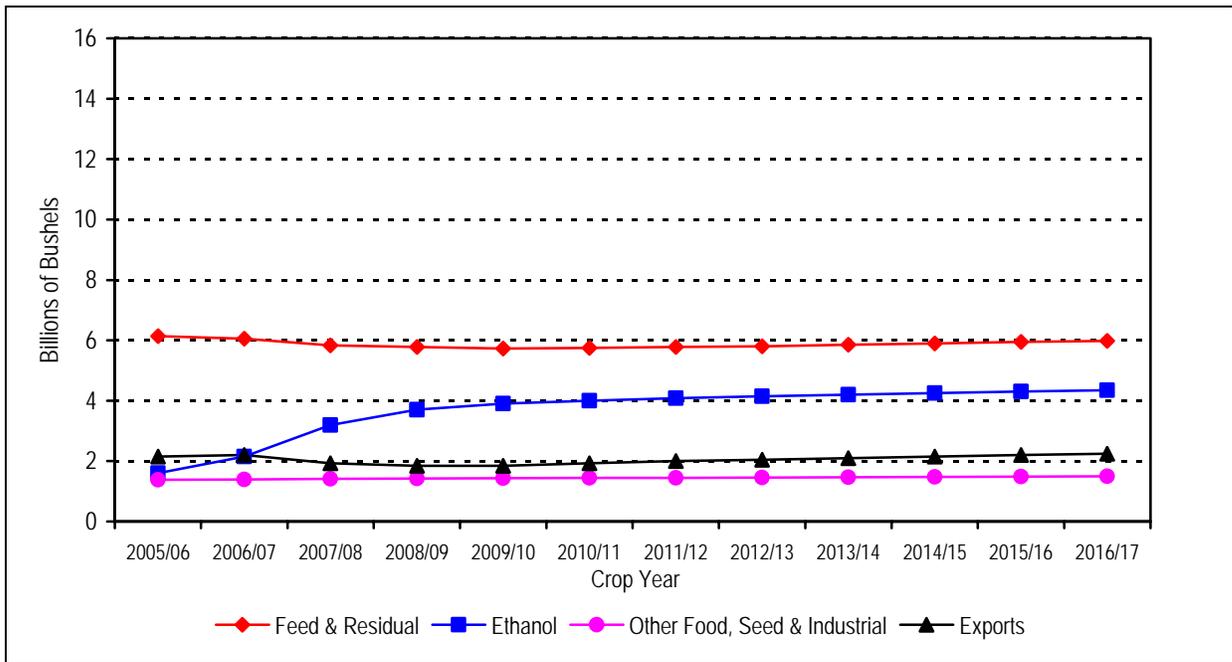
Figure 9: Forecast Corn and Soybean Production



Source: US Department of Agriculture – Agricultural Projections to 2016, published in February 2007

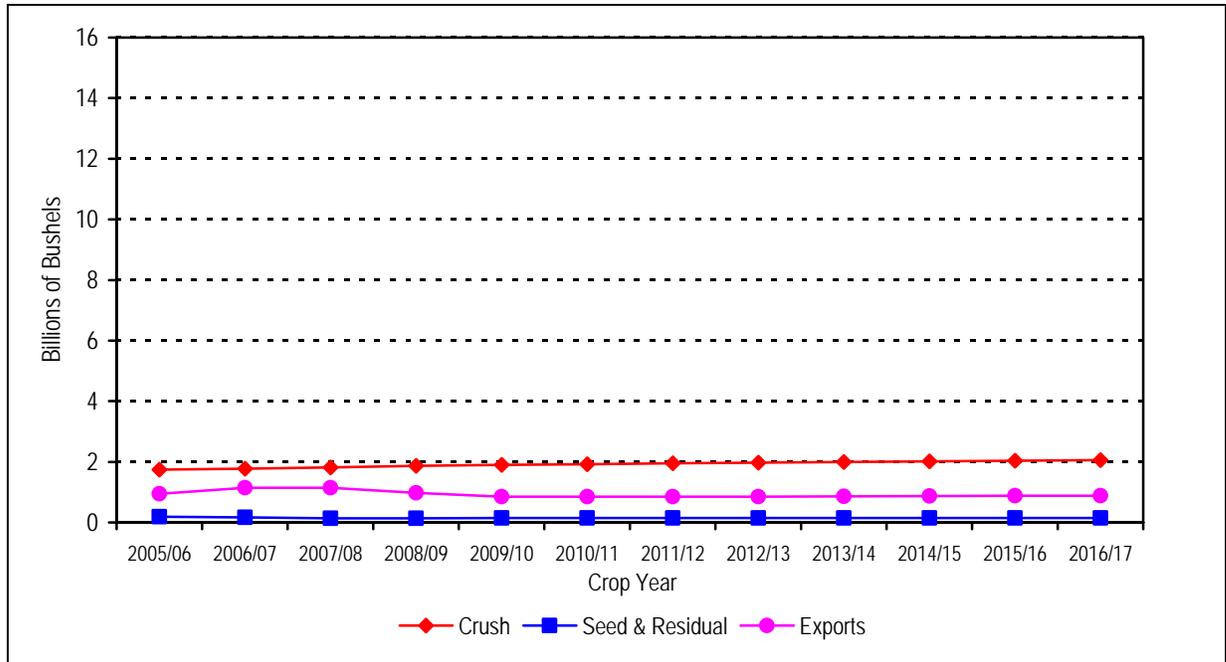
Figure 10 shows the expansion in corn usage by the ethanol industry, while other uses such as feed and exports initially decline and then stabilize. The projected use of soybeans is illustrated in Figure 11. Crush (for soybean oil) uses a larger share of production at the expense of exports.

Figure 10: Forecast Use of Corn



Source: US Department of Agriculture – Agricultural Projections to 2016, published in February 2007

Figure 11: Forecast Use of Soybeans



Source: US Department of Agriculture – Agricultural Projections to 2016, published in February 2007

The expanding biofuel industry is expected to have a number of impacts on river traffic and ports throughout the Midwest and in Missouri. Increased corn usage by the ethanol industry, for example, is expected to impact corn distribution patterns. Ethanol production supports more local processing with corn trucked to the plant. This trend may result in slower growth in longer distance transportation of corn for export, feed lots, and other processing. The projected growth in corn production by USDA over the next 10 years is dependent, almost exclusively, on expansion of the ethanol industry. Local demand for biofuel-related products is reflected in the waterway shipment changes for food/farm products, which is especially apparent in Tables 4 and 5 (pages 16-19).

The expansion of corn production for the ethanol industry is projected to reduce the acreage devoted to soybean production. USDA projects that acreage planted with corn will increase from 78 million acres in 2006 to nearly 90 million acres after 2010, while land devoted to soybeans will decline from 75 million acres in 2006 to roughly 69 million acres beyond 2010.

These projected trends in corn and soybean usage are likely to have a number of impacts on demand for barge transportation not only in Missouri but throughout the nation's inland waterway system:

- The projected weakness in direct exports of corn and soybeans is expected to have a negative impact on dry hopper barge demand
- Projected growth in exports of DDGS is anticipated to trigger a positive impact on dry hopper barge demand
- The projected growth of ethanol and other biofuels production is expected to produce a positive impact on tank barge demand

USDA projections would be impacted if:

- Greater market access for imported ethanol increases competition and dampen expansion of domestic ethanol production
- A curtailment of government subsidies dampen expansion of domestic ethanol production
- The increased price of corn affects the viability of proposed ethanol projects and thus curtails the expansion of production
- The above risks are also applicable to the smaller biodiesel sector

## Identity Preserved Agriculture

The process of identity preserved agriculture, namely grains, involves upholding the distinctive traits and qualities of crops from the producer to the shipper and finally to the receiver. Demand for quality assurance in identity preserved agriculture has grown both domestically and internationally. As food safety and traceability needs are more prevalent, consumers now have higher expectations related to food quality and monitoring, and customers are willing to pay premiums for organic or non-genetically modified grains. Estimates vary, but it is projected that the market-driven demand for identity preserved crops will be 25-35 percent of total crop production by the year 2010.<sup>22</sup>

Containerized shipping of such grains has grown steadily over the past decade as a cost-efficient method of moving high-value and delicate cargo, especially overseas. Table 12 presents the percentage by weight of containerized U.S. exports for soybeans, animal feed, and pulses (field peas, lentils, field beans, soybeans) in 1992 and 2002. This trend is anticipated to strengthen as containerization of grains can provide:

- Reduced shipping costs resulting in higher profits
- A secure storage facility for grains during transport
- A versatile method of transport compatible with other modes such as rail and trucks

	Soybeans	Animal Feed	Pulses
1992	0.4%	2.6%	66%
2002	1.8%	6.7%	70%

Source: Reichert, Heidi and Kimberly Vachal. *Identity Preserved Grain: A Logistical Overview*. March 2003.

The cost of growing identity preserved grains can be much more than the cost of growing traditional commodity crops. There are extensive equipment and monitoring systems required to ensure the quality of grains. Therefore, many Midwestern exporters of high-value identity preserved crops consider the close proximity to the Mississippi River and/or a major railroad as a means to help reduce overall transportation costs<sup>23</sup> and thus lessen the financial responsibility associated with farming such products. This is advantageous to those Missouri's ports with direct access to the Mississippi River and rail connections.

Since November 2007, Consolidated Grain & Barge has loaded corn and soybeans into containers at its facility at the Pemiscot County Port. These containerized agriculture products are transported via truck to the Union Pacific intermodal facility in Marion, Arkansas and then transported to destinations in Asia. The Pemiscot port currently does not have a complete rail connection but future shipments may be transported via all rail service upon the completion of the port's rail system. This operation may be replicated at other ports as identity preserved crop production increases around the state.

## The Jones Act

Section 27 of the Merchant Marine Act of 1920, otherwise known as the Jones Act, is the collective name for U.S. laws governing the domestic transportation of passengers and cargo via water. According to the U.S. Department of Transportation Maritime Administration, "to encourage a strong U.S. merchant marine for both economic security and national defense, the nation's domestic waterborne commerce is reserved for vessels built in the United States,

<sup>22</sup> Wagner, Gary and Eliot Glassheim. *Traceability of Agricultural Products*. Northern Great Plains Inc., prepared with funding from Northwest Minnesota Foundation and the United States Department of Agriculture. May 2003.

[http://www.ngplains.org/documents%5Ctraceability\\_report.pdf](http://www.ngplains.org/documents%5Ctraceability_report.pdf).

<sup>23</sup> Ibid.

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owned and crewed by American citizens, and registered under the American flag.<sup>24</sup> All major container steamship companies are currently foreign-owned with ships built in the European Union (E.U.) or Asia. With only 3 percent of the global container market, Horizon Lines is the largest Jones Act steamship company. The Jones Act has contributed to many investments in domestic marine transportation and business opportunities, in addition to providing the important economic and security benefits intended.

Requirements related to the Jones Act concerning containerized trade have effected how and where international containers can be transported domestically. For example, cabotage is specifically prohibited. This means that a foreign vessel cannot pick up a container in one U.S. port (e.g., New York) and move it to another (e.g., Houston) even if its overall route passes the ports in question. While this currently limits U.S. coastal shipping of containers, it does not impose COB limitations on inland river ports.

European river container services are often provided by self propelled vessels (around 400 TEUs), rather than barges. One specific requirement of the Jones Act is that vessels used for domestic trade be U.S. built. Vessel operators who desire to start coastal services face two challenges. First, they cannot take advantage of cheaper foreign made ships. Second, they come under U.S. Coast Guard rules that result in higher crew numbers than in the E.U. However, the opportunity to run COB operations on the U.S. river systems does remain possible. The increasing highway and rail capacity constraints suggest that a future COB market opportunity will present itself to Missouri's port operators.

### The Role of Logistics Terminals

A logistics terminal is a site located away from traditional land, air and coastal borders. Their objective is to facilitate and process international trade through strategic investments in multimodal transportation assets. These terminals also promote value-added services as goods move through the supply chain. Logistics terminals are also known as inland ports, but should not be confused with an inland *waterway* port. Logistics terminals may not have direct connections to the waterway mode. Containerized trade, both on a global and national scale, provided a major impetus for the term "logistics terminal" and how that term is used by planners and those in the logistics industry. Currently, logistics terminals are critical in handling the "tsunami of containers" processed by the U.S. economy and secondary gateways on the container supply chain.

Logistics terminals can generally be classified as one of the following<sup>25</sup>:

- Air cargo port - air cargo ports exist in conjunction with passenger facilities but are becoming more common as dedicated cargo ports
- Inland waterway - these ports are not a new concept in international and domestic freight movement; this class is listed by virtue of its inland location and volume of goods transported
- Maritime feeder - the concept behind this class of logistics terminals is to provide a de/consolidation point for cargo shipped to a congested maritime port
- Trade and transportation center - this is a location where border processing of trade is shifted inland and multiple modes of transportation are available in combination with value-added services

Regardless of the classification, all logistics terminals experience stages of preparation, establishment, expansion, stabilization and reduction. The role of the logistics terminal developer and corresponding transportation agency differs during each stage of development. During the preparation stage, evaluation criteria are fulfilled and proponents begin to attract companies and local support. The establishment stage occurs at the beginning of operations; modes are established or planned and anchor tenants arrive. The expansion stage is characteristically marked by a growth in modes and services. During expansion, planned modal investment takes place and more sectors begin to locate on site. Stabilization occurs when non-commercial activities are undertaken; companies invest in the expansion of current facilities and there is a reduction in new arrivals. Finally, the reduction stage is marked by a change in logistics and

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<sup>24</sup> U.S. Department of Transportation Maritime Administration. *Domestic Shipping: Vital to Our Nation's Economy, Security and Transportation*. October 9, 2007. <http://marad.dot.gov/Publications/ports.htm>.

<sup>25</sup> Leitner, S. and R.H. Harrison. August 2001. *The Identification and Classification of Inland Ports*. Center for Transportation Research, The University of Texas at Austin. Research Report 0-4083-1, Texas Department of Transportation.

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distribution. Companies begin to leave for better options elsewhere and new private sector trends force changes in operations.<sup>26</sup> It is important to note that logistics terminals take time to develop and are most successful when developed as a Public-Private Partnership (P3).

Currently, capacity constraints can be found at many coastal ports. It is becoming increasingly important for freight to move inland and a logistics terminal is a prime model for how this freight can be managed. Societal benefits of logistics terminals include economic development, creation of jobs, increased tax revenues, and reduced congestion and environmental pollution at traditional ports of entry. Private benefits include the facilitation of lower cost freight movements, access to multimodal transportation, and improved supply chain management.

## Navigation and Recreation

In addition to providing transportation corridors for waterborne commerce, the nation's waterway network can also be used for recreation and tourism. Recreational waterways are important to tourism in the state of Missouri. Currently, policy guiding the development of Missouri's waterways to their maximum potential is divided between recreational and navigational interests. This debate may reduce the interest of potential companies to invest in trade on the state's waterway system. Several Port Authorities suggest that the state government be an advocate for emphasizing navigational use of the Missouri River including guaranteed navigation seasons, guaranteed depths of the Missouri River, and encouragement of barge towing companies to utilize the Missouri River for commercial activities.

According to the St. Louis Regional Chamber and Growth Association (RCGA), the Missouri River provides over half of the water for the Mississippi River. Thus, the water level directly impacts commerce along the Mississippi River and across the nation. As the water level on the Missouri River decreases, the length of the navigational season is shortened; this equates to higher transportation costs of goods and natural resources.<sup>27</sup> Missouri is faced with the challenge of resolving this debate surrounding usage of the state's rivers and while continuing to promote long term care for these resources.

## Water Resources Development Act

The newly-passed Water Resources Development Act of 2007 (WRDA) authorizes critically important projects on the nation's inland waterway system, such as improving ports, implementing flood and hurricane protection systems, and restoring important ecosystems and marine habitats. Although WRDA authorizes projects, it does not fund any of them; additional legislation is required to fund such projects.

One key piece of the WRDA is the modernization of seven locks along the Upper Mississippi and Illinois Rivers to increase the volume of shipments along these integral waterways. Five of the proposed lock improvements are located along the Mississippi River from Hannibal, Missouri to St. Louis, Missouri. Many of these locks were originally constructed in the 1930s and built to accommodate 600-foot tows. The new locks will have 1,200-foot capacity.<sup>28</sup> According to the RCGA, the improvement of these five locks will produce an estimated 6,000 jobs annually over the next 10 to 15 years. In addition to modernizing the lock and dam system, the levees and floodwalls must be repaired and secured to protect the ports from flooding catastrophes.<sup>29</sup>

The WRDA has been the subject of extensive debate and whether it serves USACE's ability to carry out its core responsibilities of inland navigation and flood control. The bill was vetoed by President Bush but Congress overturned the veto in November 2007. The controversy surrounding projects included in the bill may place funding appropriations under continued scrutiny, thus further delaying upgrades to the inland river system negatively impacting the barge industry.

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<sup>26</sup> Leitner, S. and R.H. Harrison. August 2001. *The Identification and Classification of Inland Ports*. Center for Transportation Research, The University of Texas at Austin. Research Report 0-4083-1, Texas Department of Transportation.

<sup>27</sup> *Federal Initiatives, Missouri River Water Level*. (2007) The St. Louis Regional Chamber and Growth Association. November 2007. <http://www.stlrcga.org/x849.xml>.

<sup>28</sup> Ibid.

<sup>29</sup> Ibid.

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## A Regional Perspective

Advantages related to increasing waterborne commerce on Missouri's ports and waterways network include its centralized location and access to other modes. Additionally, the state has an availability of land that could be used for port expansion, available skilled labor force, a favorable business climate, and a lack of congestion on its waterways. Missouri is currently a leader in tax credits. The state has Foreign Trade Zone designations, Enhanced Enterprise Zones, and machinery/equipment tax exemptions. The state of Missouri has a strong base of transportation and logistics infrastructure and companies. The centralized location of the state and its investment in highway, rail, air, and waterway infrastructure position Missouri for growth. The Missouri Department of Economic Development Research Center confirms the transportation and logistics sector is the largest employer in Missouri, representing 7.6 percent of Missouri's total workforce. As the Mississippi River in Missouri moves 170 million tons of freight each year, the barge industry in Missouri continues to grow, especially in the southeast, with the free flowing Mississippi River.

Challenges facing the optimization of freight on Missouri's waterways include intense competition with other transportation modes, low flow on the Missouri River, and limited public funds for ports and waterways projects. It is imperative that Missouri stay abreast of international, national, regional, and local trends to continue to capture more freight business and provide for its efficient transport.

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## Section 6 – Strategies for Missouri

In this section, strategies are proposed for Missouri that could be adopted to increase the state's role in freight movements and accelerate or facilitate freight and logistics development. Another element of the strategies is the desire to balance needs of existing customers with the desire to capture new, emerging customers to keep Missouri's ports competitive and marketable. During the development of these strategies, the data and information gathered in this report on Missouri's ports and waterways system was considered, including the industry and commodity trends. Additionally, the input gathered from a Ports and Waterways Symposium held on September 27, 2007 in Chesterfield, Missouri played a significant role in strategy development. During this symposium, key stakeholders from Missouri's ports and other entities discussed ways to grow trade on Missouri's ports and waterways through sound yearly investment in public port infrastructure.

### **Preserve and enhance Missouri's ports and waterways system to ensure mobility and reliability.**

System preservation, or maintenance, is a means of optimizing the potential of existing infrastructure and repairing deficiencies so as to extend the life of facilities or equipment. This is a cost-efficient and beneficial option for Missouri's ports, as compared to completely replacing infrastructure or equipment. According to MoDOT's *Update*, many of the ports' needs were related to improving and maintaining existing infrastructure. Enhancing various facilities through new construction can also be an important port need, to provide better service to existing customers. At times, projects will require new construction rather than routine maintenance and repairs in order to continue providing quality service.

Strategies:

- **Complete construction of intermodal connections to maximize investment in established ports, giving priority to ports with incomplete connections like New Madrid and Pemiscot.** SEMO, Kansas City and St. Joseph ports have direct rail and highway connections today. St. Joseph has increased cargo handled every year since their rail connection was established even though waterway traffic has diminished on the Missouri River. Success has been attributed to the ability of the port to provide reliable service to its customers even when river navigation is not possible. Investment in intermodal connections at this port has shown positive returns that could be seen at other ports if more connections are provided. Future investments should take into account practical and reasonable requests with consideration of length of connections, lack of obstacles like river crossings, and congestion on the connected railroad or highway.
- **Support the Water Resources Development Act (WRDA) appropriations in Congress to modernize the lock and dam system on the Upper Mississippi River.** The five lock and dams on the Upper Mississippi River in Missouri present challenges to successful commercial operations on the river. The expansion and reconstruction of the locks and dams authorized by WRDA are important to the success of any port operations in Northeast Missouri. Preserving and enhancing the lock and dam infrastructure is necessary to ensure that barge tows can reliably navigate the Mississippi River system. Due to the difficulty in authorizing WRDA, it is anticipated that the appropriations process will have its own challenges. MoDOT should work with the Department of Natural Resources (DNR), the lead State agency on river issues, on appropriations to ensure waterborne commerce in Northeast Missouri.
- **Utilize the proposed Waterways Prioritization Process to determine optimal investments that meet the needs of Missouri's ports.** As part of this report, the Waterways Prioritization Process was developed. This Process provides justification for project prioritization, selection, and scheduling by having a foundation of measures based on the adopted strategies to increase freight movement on Missouri's waterways. The input solicited during the application process and evaluation of the criteria using the Decision-Support Tool yields a prioritized list of projects. This list can then be evaluated through a dialog with decision-makers. Armed with measurable results, the decision-makers would determine the best investments of the funds to meet the needs of Missouri's ports. The Process can be used by individual ports to evaluate their own needs, as well as by MoDOT to evaluate the needs of the state.

### Promote the health of existing commodities shipped on the waterway system.

Missouri's central location within the nation's freight transportation system and its ports and waterways network are the keys to helping Missouri become a major freight handling center. Additionally, the availability and transport of commodities such as sand and gravel, limestone, coal and food/farm products along the state's waterways are important to Missouri's economic vitality. By promoting the health of such existing commodities traveling through Missouri's waterway network, ports are better suited to remain competitive in those growing markets.

In 2005, for instance, 96 percent of total cargo tons shipped through Missouri on the Missouri River was crude material (namely sand). Sand and gravel production throughout the state increased since 2002, from 10 million metric tons in 2002, to 10.6 million metric tons in 2003 and then to 12.2 million metric tons in 2004.<sup>30</sup> The available supply and projected demand of these types of major commodities shipped on the inland waterway system directly impacts those freight movements on Missouri's rivers.

Strategies:

- **Leverage involvement in the Industrial Minerals Advisory Council to monitor commodity projections and protect the current and future interests of Missouri's ports.** An Industrial Minerals Advisory Council is being developed for 2008 by Missouri's Department of Natural Resources, in accordance with Senate Bill 54. The objective of this Council is to advise the Geology and Land Survey Division on activities related to expenditures of the Geologic Resources Fund. Any person who applies for a surface mining permit from Missouri's Land Reclamation Commission must pay an annual geologic resources fee, which is then deposited into the Geologic Resources Fund. The Council will decide how that Fund is expended in order to collect, manage, analyze and distribute research related to the resource potential of industrial minerals in Missouri. A total of nine representatives will serve on the Advisory Council, including members representing interests of limestone/dolomite, clay, granite, sandstone, sand/gravel and barite. Additionally, a representative from MoDOT will serve on the Council. Service on this council will give MoDOT the opportunity to monitor the local supply of bulk commodities and their future demand. This knowledge will enable MoDOT to determine if they should continue to focus their efforts on ports transporting these goods or redirect their attention to other commodities.
- **Investigate opportunities to serve on councils, associations, or other commodity-focused advocacy groups to support Port interests in all waterway commodities.** As with the Industrial Minerals Advisory Council, serving on commodity-focused councils will help MoDOT monitor local supplies and focus attention in positive directions. If advisory councils are not already established for other commodity groups, like farming or crude materials, MoDOT should encourage their creation.

### Support sound initiatives to capture new commodities and service opportunities for Missouri.

It is important for ports to pursue new markets and trends. In doing so, Missouri's ports are more competitive and offer more balanced services. In MoDOT's *2007 Update*, not only did ports want to provide better service to existing customers, but many of them also conveyed a desire to attract new clientele by making use of available land, waterways, railways, roadways and other existing infrastructure.

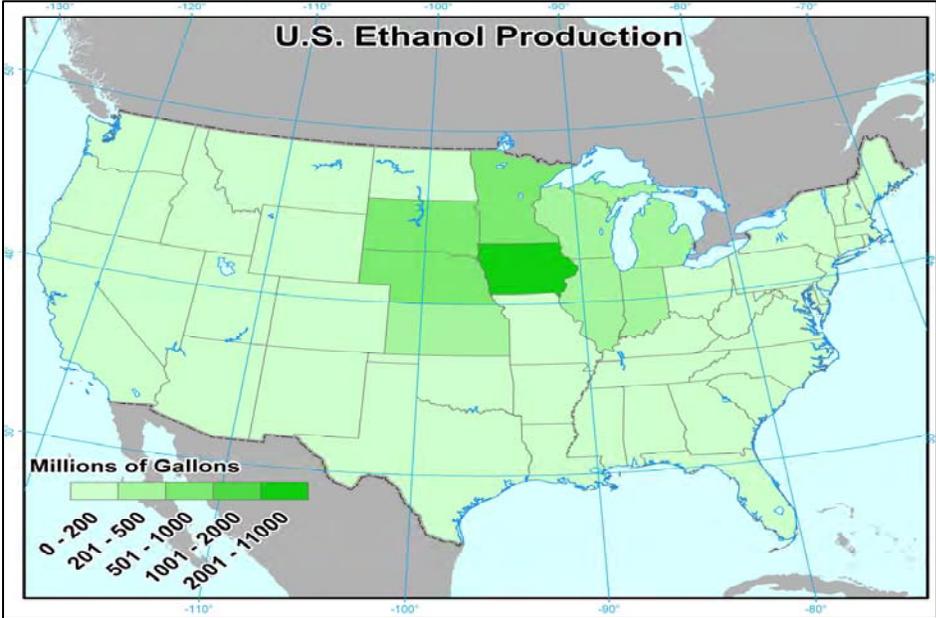
Strategies:

- **Support or conduct a feasibility study for a biofuel consolidation and distribution facility initially focusing on ports in Northeast Missouri due to their proximity to production areas.** The biofuels industry has created a need for multimodal terminals to access inbound raw materials and transport outbound product via highway, rail and barge. Ethanol production, in particular, has increased the demand for regional transport of corn, fertilizer, farm machinery, DDGSs, and ethanol, itself. Today, the center of ethanol production is in Iowa, Kansas, South Dakota and Minnesota (see Figure 12) - all points accessible to Missouri via the inland waterway system. Consumption is also high in states like Minnesota, Illinois, Texas and Louisiana. These states are also accessible via inland rivers (see Figure

<sup>30</sup> The Mineral Industry of Missouri. 2004. U.S. Geological Survey Minerals Yearbook. <http://minerals.usgs.gov/minerals>.

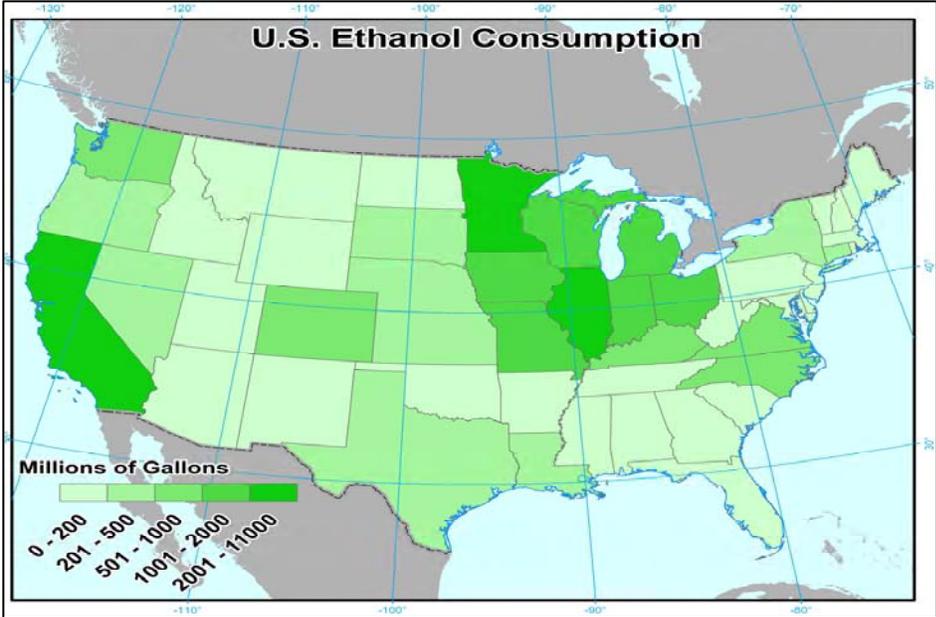
13). A consolidation and distribution facility for biofuels is an attractive option for producers. There is typically a lack of onsite storage at production facilities and a need for multiple transport options that a production plant may not have. A feasibility study should focus on ports in Northeast Missouri on the Mississippi River because they are closest to the production areas for corn and ethanol and the Mississippi River has more reliable navigation. However, WRDA projects need to take place to ensure reliable navigation for these Northeast Missouri ports. Ports along the Missouri River may also be viable locations for a facility in the future if navigation becomes more reliable. The existing ethanol plants in Missouri are located in relatively close proximity to the Missouri River. In addition, ports along the Lower Mississippi River may also become viable as more ethanol plants are constructed or biodiesel becomes more common over time.

Figure 12: Current U.S. Ethanol Production



Source: TranSystems

Figure 13: Current U.S. Ethanol Consumption



Source: TranSystems

- **Evaluate and consider proposals to support the development of a Logistics Terminal below the Mississippi River's lowest lock and dam and near a large production and consumption area like St. Louis.** Containerization offers multi-modal flexibility which may be critical in river port terminal development. Global containership capacity, reflecting the actual and expected demand, has nearly tripled in the last decade and it is estimated to grow another 50 percent in the next five years. This represents a sector that can be served, in some capacity, by U.S. river ports developed as logistics terminals. Successful logistics terminals supporting container-on-barge service must have a large consumer base, manufacturing/assembly core, and reliable transportation network. It appears that the optimal location in Missouri would be near St. Louis, specifically below the lowest lock and dam on the Mississippi River. This choice of location guarantees more reliability in shipment times. Proposals for development of a logistics terminal should include a market analysis and a plan to provide sufficient storage, equipment and marketing, as well as consideration of competition from other near-by terminals. These development proposals need private industry, local and state government, and community assistance to be viable.
- **Consider participating in a Public/Private Partnership (P3) to capture new commodities or service options at Missouri ports by taking advantage of lower rates on publicly borrowed funds.** P3s are not new to ports. Port Authorities and private terminal operators have partnered together for a long time in the port business. Typically, transportation infrastructure projects are unattractive to private investors. They are unattractive because of the long and uncertain development time due to regulatory requirements and inability to secure contractual agreements with users. Ports offer less uncertainty regarding demand and carriers typically make long-term commitments at service points. However, environmental regulations are usually quite stringent, extending the project implementation time. In the case of a container-on-barge service, for example, MoDOT may enter into a P3 because COB investments may have a longer capital cost recovery period than a private investor will tolerate. However, the ability to charge user fees for these services builds a case for private investment in COB infrastructure initiatives. MoDOT may want to consider ways to work jointly with private interests to optimize freight development at Missouri's ports where biofuel services or COB are offered.

### **Pursue additional funding to implement projects that support freight development.**

Unlike highway and bridge project funding in Missouri, state funds for multimodal projects are approved annually by the General Assembly. Multimodal Operations performs statewide planning and grant administration for aviation, railroads, transit, and waterways. Specific to waterways, administered funds provide technical, financial, and capital assistance to Port Authorities through administrative grants, ferryboat grants, and the capital improvement program. Historically, funding for waterways has been very limited while the needs are great.

From 2001 to 2005 no funding was provided to the capital improvement program, \$500,000 was appropriated in 2006 and \$1.5 Million in 2007. The needs listed in the 2006 *Assessment* totaled \$61 Million and the 2007 *Update* totaled over \$100 Million. These needs do not necessarily reflect the actual project funding requested by the ports for these years but it does illustrate the wide gap between appropriated funding and possible funding needs.

Strategies:

- **Evaluate the current and projected economic impact of the ports on the state to provide additional support for funding on an annual basis.** The money generated by the salaries and wages from port employees and the revenue generated to the state by these jobs can be valuable information to ensure that port funding is looked at as a worthwhile investment in the state economy. Before and after studies of ports with funded projects can also be valuable marketing tools to illustrate the positive impact state funding of capital projects can have.
- **Pursue a dedicated funding source for waterways rather than relying on yearly appropriations from the General Assembly.** A multimodal fund established for Missouri's ports, airports, transit, and railroads provides a reliable funding source to address the capital needs of these modes in the state. Using a multimodal approach in seeking a dedicated fund reaches more geographic areas of the state and builds more support for the fund. For example, areas without water ports likely have railroad, airport,

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or transit operations that would benefit from the fund. This approach broadens the field of support by offering a larger constituency base for the legislature. Once a fund is established, a modal funding split could be determined with stakeholder input.

- **Work to maintain the ability to use flexible funding mechanisms at ports regardless of its floodplain designation.** Senate Bill 225, the Hunting Heritage Protection Areas Act enacted in early 2007 by the Missouri General Assembly, prohibits using Tax Increment Financing as a means to construct or expand in flood plains on the Missouri and Mississippi Rivers. The Act does exempt land used for the operation of actual physical ports; however, it does not exempt all land governed by Port Authorities in the state. To ensure that Port Authority developments are able to utilize all funding mechanisms available, work should be undertaken to exempt all public port property from restrictions listed in this Act.
- **Encourage modal associations by establishing a Multimodal Council to promote all modes in Missouri and raise awareness of the need for adequate funding.** A non-profit advocacy group representing all modes provides geographic coverage and is able to promote their needs at the General Assembly level in a manner unlike state agencies. With membership of individual associations the overall Council can provide the General Assembly with concise, aggregated data on the impacts of multimodal transportation in the state. A committed, organized Council can illustrate to the legislators a true need for additional funding straight from the impacted ports, railroads, transit agencies, and airports. It could supplement staff-level advocacy for funding.

## Section 7 – Developing a Waterways Prioritization Process for Missouri

Limitations on funding are a consistent challenge for decision-makers in the public and private sectors. For roadway needs, MoDOT currently operates within the Transportation Planning-Planning Framework. The Planning Framework sets out defined steps, roles of local officials and the public, as well as a process for prioritizing needs and projects. Multimodal Operations desires to refine the mechanism by which they prioritize needs and allocate project funds based on “freight optimization”. Rather than develop such a mechanism for all freight modes at once, this report focused on waterway freight. The report includes the development of a process with both cooperative planning and a comparative, software-based evaluation - the Decision-Support Tool. It also aimed to make this process compatible with existing, roadway planning methods. The reality is that the funding sources for roadway and waterways are separate so the process cannot be completely merged. However, coordination with the Planning Framework can open the table for the discussion of Missouri’s transportation needs becoming truly multimodal. Roadway and waterway stakeholders can begin communicating the overall goals for Missouri and consider the overlapping needs - addressing port needs with roadway solutions and vice versa.

MoDOT needs a better mechanism to select port projects based on how the projects match with the strategies to develop Missouri as a freight hub. The research team reviewed existing models/frameworks used for freight and logistics development to understand how best to apply these in Missouri. Arkansas’s Intermodal Cost Analysis Software and the Federal Highway Administration’s Intermodal Transportation and Inventory Cost-State Tool are examples of decision-support models that the research team investigated, in addition to the University of Missouri-Rolla’s research on a dynamic approach to multimodal routing decisions.

It is imperative to review and evaluate how any decision-support model can be incorporated into the Multimodal Operations Process. It is also important that the process be flexible enough to prioritize not only the hard, waterways infrastructure projects but programs and policies that may influence the freight and logistics situation. The strategies outlined in Section 6 provide structure to the Waterways Prioritization Process, and can be incorporated in the Decision-Support Tool by applying weights to corresponding data inputs to determine relative importance. Those strategies include both the hard infrastructure priorities as well as those for program and policy implementation.

### What are other States Doing?

In the waterways arena, MoDOT has developed relationships with counterparts at other Departments of Transportation that have inland waterway ports. Two states of note are Arkansas and Mississippi.

Arkansas has incorporated tools in their decision-making process to consider the economic impact of a project at a single port or even scenarios considering the impacts of a string of ports. Arkansas State Highway and Transportation Department (SHTD) uses a priority rating system as shown in Table 13. This is an initial step in their funding allocation process. The system categorizes the urgency of the needs presented in a project submittal.

Table 13: Arkansas SHTD Priority Rating System	
Critical	The port structures or equipment are unsafe or could fail.
Immediate	The improvement is required for minimum operations within a 1-2 year timeframe.
Short Term	The project would improve the level of efficiency to serve customers within a 3-5 year timeframe.
Long Term	The project drives future growth and the ability to attract new business.

Source: Arkansas State Highway and Transportation Department.

Arkansas is home to the largest Economic and Development Administration (EDA) research university staff in the country residing at the Institute for Economic Advancement at the University of Arkansas at Little Rock. The Institute developed a Rural Inland Waterways Economic Impact Kit. In simplest terms, this model considers input that includes a scenario of improvements either for a single port or for a string of ports and the model assists in determining the potential economic impacts of those improvements. The Kit's details are reviewed in the next subsection.

Arkansas has been working to incorporate more of a cost benefit analysis for ports projects as they have successfully done for their railroad projects. One challenge for ports and waterways is the need for a reduced planning horizon to do relevant projections in this area. They discovered that five to ten years is the limit to achieve reliable results, unlike roadway projects that are typically evaluated over 20 years. They are considering ways to add to the Kit to calculate baseline from a no build scenario and then compare that to the transportation efficiency benefits for a particular need. In addition to transportation efficiencies of a proposed improvement there is a desire to include the costs of preservation as opposed to delayed maintenance or ultimate replacement/repair and defining those thresholds. All these elements could be incorporated to determine overall transportation benefits of proposed projects to increase the likelihood of the best investment of dollars for the projected return. This process would require not only policies for future development but also adopting policies about maintenance practices.

Mississippi Department of Transportation (MDOT) has a framework structured by the nature of the legislation passed to appropriate the dedicated funding source for ports projects under a multimodal program. The project evaluation mechanism is in the form of an application that is used during the prioritization process phase of their framework to allocate the funds. Figure 14 illustrates Mississippi's most recent version of their application.

Figure 14: Ports Multimodal Application Rating Form, Mississippi Department of Transportation

Name of Applicant: <input type="text"/>		Amount Requested: \$ <input type="text"/>	
Brief Description of Project: <input type="text"/>		Scored by: <input type="text"/>	
PART 1 – THRESHOLD CRITERIA <small>(An answer of "NO" to any of the following will result in the Project being deemed ineligible for funding)</small>		PART 2 – SCORING	
THRESHOLD CRITERIA	YES or NO	SCORING CRITERIA	SCORE
The Project is directly related to capital improvements or the rebuilding or rehabilitation of basic infrastructure or purchase of major handling equipment, <u>not</u> for routine maintenance, administrative or operational matters or expenses.		Operational Impact on port <ul style="list-style-type: none"> <li>Improve current operational capability of the port?</li> <li>Provide a new operational capability for the port?</li> <li>Necessary to keep an existing client of the port?</li> <li>Necessary to acquire a new client for the port?</li> </ul> (30 pts max)	
The Project is directly related to the operation of the port in its role as a water transportation facility.		Economic Impact of the Project <ul style="list-style-type: none"> <li>Produce revenue or result in cost savings for the port?</li> <li>Benefit the economy of the surrounding community?</li> <li>Provided a thorough cost-benefit analysis of the Project evidencing the net value of the Project to the port and surrounding community?</li> <li>Create or support jobs, directly or indirectly, at the port or in the local community?</li> </ul> (30 pts max)	
The Project is outside the normal operating budget of the port.			
Is the port owned by a public body – State, county, or municipality?		Port Activity Supports the Proposed Project <ul style="list-style-type: none"> <li>Support current operations or new operations at the port?</li> </ul> (20 pts max)	
A portion of the projected cost of the Project has or will be funded from public or private sources, as a match to the grant sought from the Multi-Modal Transportation Fund.		Funding <ul style="list-style-type: none"> <li>Are funds necessary for the Project?</li> <li>Needed to complete an ongoing project or development?</li> <li>Be used as matching funds or to leverage other funding?</li> <li>Are project costs and/or budget reasonable?</li> </ul> (20 pts max)	
<b>ELIGIBLE?</b>			
		<b>Total Score</b>	

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Mississippi statutes provide that a Ports Committee reviews and approves applications for funding. MDOT only reviews the applications for eligibility while the committee does the approval. The Ports Committee includes one member from the Mississippi Development Authority (MDA), one from MDOT (appointed by their directors), and the port directors of the public ports of Mississippi, or their designees. Currently this Committee comprises three coastal and three inland port directors and the MDOT and MDA representatives have agreed, out of practice, not to vote but to be available to provide input in the process. Some of these practices could be adopted by MoDOT in conjunction with the funding strategy outlined in Section 6.

## Tools Investigated

University of Missouri-Rolla conducted a critical review of existing technical models and frameworks used for freight and logistics development. They investigated the intended functions of these decision-support tools and their applicability for MoDOT's Decision-Support Tool. Summaries of their findings are provided as follows:

### *RURAL INLAND WATERWAYS ECONOMIC IMPACT KIT*

*By Gregory L. Hamilton, David Rasmussen, Xiaogin Zeng*

*Institute for Economic Advancement, University of Arkansas at Little Rock*

The primary objective of this model is to allow users to evaluate the economic impact of existing rural inland waterways ports and terminals. The importance of a port and terminals can be quantified using the Kit. It is designed so that users can follow a step-by-step procedure that focuses on the economic impact of the totality of a port or terminal operation and linkage to the community's industrial structures and transportation systems. It is based on the design of the Maritime Administration Port Economic Impact Kit developed in the 1970s. The kit is designed to run on a PC with a Windows® operating system, and was developed using the Visual Basic programming language. It operates as a stand-alone program so Visual Basic is not required to run the program.

The economic analysis provided by the Kit is extremely complex and requires a significant amount of data collection. For example, users are required to input two types of industry-related data in order to regionalize: 1) employment data by industry are needed to regionalize the industrial sectors of the model and 2) earnings by industry are necessary to regionalize the personal consumption expenditures. The model was last updated in 2000 and is based on a database that contains price indexes for 1987-1997. Price indexes are adjusted from nominal values into 1992 constant dollar amounts. This data requires significant updates. The most interesting characteristic of the model is that it attempts to link the port flows to inland transportation such as rail, truck, or barge. However, the user inputs into these models are very arbitrary.

The Kit could potentially be used to provide input on economic criteria into the Decision-Support Tool; however, this requires significant model revision effort that outweighs the benefits of its inclusion. Another drawback is that it only considers a single criterion and thus has limited ability to assist with developing a decision-support tool for ports and waterways.

### *INTERMODAL TRANSPORTATION AND INVENTORY COSTING MODEL STATE TOOL*

*Federal Highway Administration*

The Intermodal Transportation and Inventory Costing Model State Tool (ITIC-ST) examines the commodity attributes and transportation characteristics for annual shipments between origination and destination pairs, and then estimates the transportation and inventory costs of alternative freight transportation modes. The model is a more user-friendly update to the U.S. DOT Comprehensive Truck Size and Weight Study. The user can choose a national analysis or limit the analysis to a few states.

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The usefulness of the model for prioritized investment and development decisions related to increased freight and logistics development is limited to the impact on truck operations from a relative improvement in rail intermodal operations. The model estimates the impact on vehicle miles traveled for each truck configuration and the transportation and inventory costs. The analogous impact of port operations on truck operations is interesting, and could potentially be useful as an input to the MoDOT tool. ITIC-ST is a deterministic model using truck annual shipment data, truck rate data, and county-to-county mileage estimates. The model includes origin-destination distances grouped into 25-mile increments and market truck rate estimates for approximately 1,500 market origin-destination pairs. The data in these models could be used for newly developed dynamic optimization models.

#### *MULTIMODAL TRANSPORTATION IMPROVEMENT PROGRAM*

##### *Mississippi Department of Transportation*

The Multimodal Capital Improvement Fund (MCIF) was established in 2002 for the improvement of airports, ports, railroads, and transit systems in the state. The goal is to maximize the impact of the available funds by funding projects that will improve the service, operations, and competitive position of ports within Mississippi and to provide economic benefits to the Mississippi communities in which such ports are located. Projects must be directly related to capital improvements, the rebuilding or rehabilitation of basic infrastructure, the operation of the port in its modal role, and a purpose outside the normal operating budget of the port.

All applications for MCIF funding are rated based on the established scoring criteria, with the final rating score as the average of the individual scores of reviewers. The applications provide a listing of threshold and evaluation criteria and pairs that with the subjective opinion of the reviewing committee. This process most aligns with MoDOT's desire to balance objective measures and criteria with subjective input from MoDOT's Multimodal Operations leadership and the port stakeholders.

#### *ANOTHER TOOL: The Analytic Hierarchy Process*

The Analytic Hierarchy Process (AHP) was developed by T. Saaty in the 1970s as a multiple-criteria methodology for evaluating alternatives. It is a technique for decision making where there are a limited number of choices (alternatives), but where each has a number of different attributes (criteria). AHP can assist with identifying and weighting selection criteria, analyzing the data collected for the criteria, and expediting the decision-making process. It helps capture both subjective and objective evaluation measures, providing a useful mechanism for checking the consistency of the evaluation measures and suggested alternatives. In many cases, the process can be used to create subgroups of alternatives, such as "High Priority", "Low Priority", and "No Priority". The method allows for formalization of both qualitative and quantitative criteria, and is especially applicable when decisions are being made by a group.

The process works well in practice and is extremely popular among decision-makers in applications such as portfolio selection, transportation planning, manufacturing system design, policy making, and artificial intelligence. The process is based on a series of pairwise comparisons that are checked for internal consistency and then combined. First, alternatives and the significant criteria are identified. Second, each criterion is given a weight either "arbitrarily" or through pairwise comparisons. In the former case, the decision makers specify their preference for each criterion, while, in the latter case, the relative significance of each criterion is obtained by indicating the importance of pairs of criteria. Third, alternatives are compared for *each* criterion. Again, these may be directly input, calculated from available data, or determined via pairwise comparison. Once the data is input, each matrix of preferences is evaluated by using eigenvalues to check the consistency of the responses, which creates a consistency coefficient. Values close to 1 indicate the data is relative comparisons of

alternatives and criteria are consistent. Extreme inconsistency may indicate data collection errors. Finally, a prioritized ranking of alternatives is provided as output.

After a review of these models and tools, and after considering MoDOT's interests and stakeholder suggestions, a combined system of dialog and Decision-Support Tool software were developed. As discussed in this section, the Decision-Support Tool provides a multiple-criterion methodology for evaluating alternatives. When reviewing and evaluating previous models, it was determined that utilization of those models would be computationally complex, involve significant extraneous data and provide non-intuitive user interfaces. The Decision-Support Tool developed for MoDOT, on the other hand, can be incorporated into MoDOT's Transportation Planning-Planning Framework as a less complex and more user-friendly process. The Tool was designed in Microsoft Excel and can be sent via email.

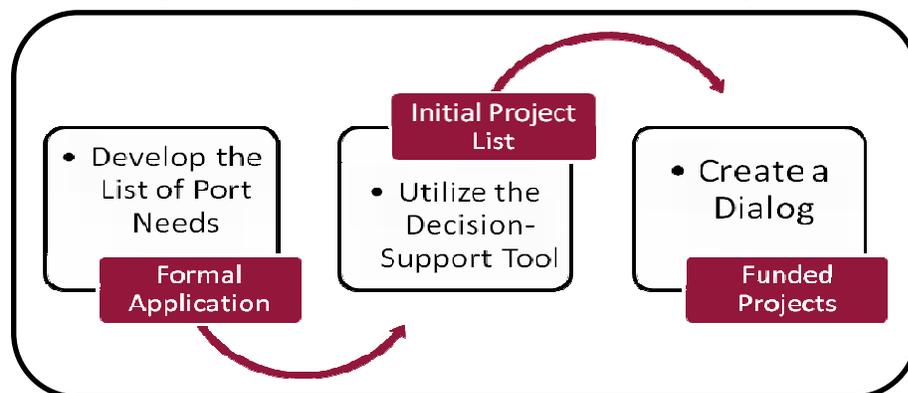
The Decision-Support Tool software evaluates a set of alternatives based on a number of different attributes or criteria, and helps capture both subjective and objective evaluation measures. Input from Missouri's Port Authorities is required to initiate the decision-making process. Ports responses to predetermined questions are used to calculate "scores" for each criterion, which can then be weighted to provide a final ranking mechanism.

The output can be used to assist with prioritization by incorporating a dialog to create subcategories of projects, such as "High Priority", "Low Priority", and "No Priority". In addition, the method allows for formalization of both qualitative and quantitative criteria, which is especially applicable when decisions are being made by a group. This process works well in practice and is extremely popular among decision-makers in a variety of applications due to the visibility provided throughout the entire decision making process, and the consistency of the evaluation measures and suggested alternatives.

### A Proposed Waterways Prioritization Process for Missouri

The proposed Waterways Prioritization Process is a natural progression from Multimodal Operations' current process of surveying the Port Authorities to assess the needs and allocating the limited funds. This Process provides justification for the decisions by having a foundation of measures based on the adopted strategies to increase freight movement on Missouri's waterways. The input solicited during the application process and evaluation of the criteria using the Decision-Support Tool yields a prioritized list of projects. This list can then be evaluated through a dialog with decision-makers armed with measurable results to determine the best investments of the funds to meet the needs of Missouri's ports. However, as with MoDOT's Planning Framework for the highways side of the business, the project prioritization process is not a black box that generates a list of Missouri's next waterway projects solely based on objective "scores". Rather, the Waterways Prioritization Process follows steps starting with developing a list of port needs resulting in Port Authorities submitting applications for their top projects. The applied projects are then evaluated by the Decision-Support Tool to create an initial prioritized list. Finally, a subjective dialog is considered before a project is funded. The Process is illustrated in Figure 15.

Figure 15: Waterways Prioritization Process Flow Diagram



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## Develop the List of Port Needs

As illustrated in MoDOT's *Assessment* and *Update*, the public ports in Missouri have an extensive list of critical, immediate, short- and long-term needs for capital improvements. This list of port needs is the first element in the Process and can be completed through a formal survey each year or could be left to ports who internally consider their needs on an on-going basis.

From their list of needs Port Authorities provide the input for the Decision-Support Tool through an application in the form of a questionnaire for the projects they determine are most important to consider for funding. As part of this report, a general questionnaire was developed and tested. The initial questionnaire is provided in the companion to this report, the *Waterways Prioritization Process Practitioner's Guide*.

The initial questionnaire requests information including the project type and description, estimated project cost, data and projections related to employment, and cargo tonnage as well as other relevant information. This initial step is the Port Authority's first opportunity to consider the ramifications of combining multiple improvements into a single project submittal or presenting them as separate improvements to compete for funds. There are pros and cons to both approaches. Multiple improvements may make a project more competitive in terms of rating higher in the project evaluation criteria; however, this may also make the overall project estimate cost prohibitive and subject it to consideration in outer years for funding.

Multimodal Operations will need to set a schedule for an application submittal period based on funding cycles. It is imperative to give Port Authorities sufficient time to consider their applications due to the information required to fill out the questionnaire. Staff also requires sufficient time to review the initial applications for eligibility and completeness before inputting the projects into the Decision-Support Tool.

## Utilize the Decision-Support Tool

The Tool is created to have the ability to sort by urgency of need and then based on the evaluation "scores". The Tool provides a fairly straight-forward way of inputting, evaluating, and comparing project data without being overly technical or complex. It requires less non-applicant provided data input than other tools and provides very intuitive and logical outputs. The project "score" is of a consistent scale with that of the Planning Framework. This is significant; it enables future inclusion of other modes in that process.

Parallel to MoDOT's Planning Framework, the Decision-Support Tool provides the means for a more objective approach to decision-making and yet these decisions are more complex than just calculable "scores". This process relies on the right people being involved in making decisions and adjusting to the changing factors. There is flexibility incorporated in the design of the Tool to enable MoDOT to change the criteria and the weights to reflect shifts in program goals and objectives. The criteria also define the urgency of the need addressed by the project. The criteria measure the proposed projects' impacts on overall port operations, economics, trucking, rail, waterway, and funding. The Tool also captures some elements of regional considerations that are not scored but just included for informational purposes.

The product of this step in the Process is lists of fundable projects categorized by urgency of the need. These projects are also evaluated based on outcomes anticipated from the completion of the projects and from the investment of the funds. This list will be paired with supplemental information collected from the project applications that were not scored to assist with the subjective dialog in the next step of the Process. The Process is similar to that practiced with the Planning Framework for the roadway projects. The Planning Framework categorizes projects in terms of High, Medium, and Low and it is recommended that Multimodal Operations adopt that same terminology at this phase of the allocation process. There is a direct correlation between these terms and the classification of the urgency of the need as defined for the Port Authorities.

The Decision-Support Tool, including a description of the initial criteria and weights, is provided in the companion to this report, the *Waterways Prioritization Process Practitioner's Guide*.

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## Create a Dialog

Multimodal Operations, as with the process for roadways, can gather together ports and waterways partners as a selection committee to discuss the list of projects as prioritized by the Tool. This results in a justifiable dialog to consider the best investments to complement the Multimodal strategies to capture freight development and set the stage for Missouri to strengthen its role as a national freight center. This Process step is necessary to balance the measurable outcomes reflected in the evaluation of each individual project for each individual port with a statewide perspective regarding what is the best investment for the overall ports and waterways program throughout Missouri.

The outcome of this step in the Process is the finalized list of funded projects. This step in the Process ensures that all applicants are involved in the selection and buy into the final list of funded projects.

## Future Enhancements

The Waterways Prioritization Process parallels MoDOT's Transportation Planning-Planning Framework. This parallel structure enables future roundtable discussions with representatives of multiple modes when prioritizing statewide needs. Multimodal Operations is charged with managing the needs of not only ports and waterways throughout the state but also airports, public transit, and railroad. Sharing the needs of other modes during this process serves two purposes. Sharing among the modes facilitates an overall understanding of the transportation needs across the state and reveals the linkages and relationships among the modal projects. Secondly, recognizing these linkages assists in future cooperative prioritization dialog among the modes resulting in true 'transportation' investments regardless of the source of the funds to meet the needs of Missouri. Fashioning this Process in a likeness of the Planning Framework lays the foundation for these future "apples to apples" comparisons and considerations.

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## Section 8 – Summary and Conclusions

The preceding analysis provides the following information:

- An inventory of Missouri's public and private port operations and public port needs
- Baseline commodity flow data calculated for Missouri's waterways
- Regional, national and global trends that Missouri may capture to increase the state's role in freight movements
- Strategies that Missouri could adopt to accelerate or facilitate freight and logistics development in the state
- A Waterways Prioritization Process that will assist MoDOT in making justifiable investment decisions that meet the needs of not only Missouri's ports, but the state itself

Missouri's ports and waterways prove to be important to the region's economic growth and significant to the state's role in the transport of waterborne freight. Although relatively slow tonnage growth has been reported at Missouri's 14 public ports in recent years, there are opportunities moving forward that offer potential for the state. For instance, Missouri is a key producer of construction sand and gravel. The local supply of such commodities has a direct impact on waterway traffic. Therefore, it is important to monitor that supply and demand in order to determine where Missouri's ports should focus their efforts. Likewise, future principal changes regarding traffic on Missouri's waterways are anticipated to be in the agricultural sector due to the growth of ethanol production in the Midwest. As biofuel production requires a significant amount of corn and soybeans, there may be less grain transported on Missouri's waterways. However, the projected growth in exports of DDGS and biofuel transport are expected to positively impact traffic on the state's waterways network. Containerized trade and the development of logistics terminals that can offer COB service is another opportunity that Missouri may wish to capture, as capacity constraints can be found at many coastal ports.

This report proposes strategies to help grow trade on Missouri's ports and waterways and to balance existing customers' needs with new markets. These strategies can ensure that Missouri stays on the pulse of the transportation and logistics industry to assist in making Missouri a national freight center. These strategies are listed below:

### **Preserve and enhance Missouri's ports and waterways system to ensure mobility and reliability.**

- Complete construction of intermodal connections to maximize investment in established ports, giving priority to ports with incomplete connections like New Madrid and Pemiscot.
- Support the Water Resources Development Act appropriations in Congress to modernize the lock and dam system on the Upper Mississippi River.
- Utilize the proposed Waterways Prioritization Process to determine optimal investments that meet the needs of Missouri's ports.

### **Promote the health of existing commodities shipped on the waterway system.**

- Leverage involvement in the Industrial Minerals Advisory Council to monitor commodity projections and protect the current and future interests of Missouri's ports.
- Investigate opportunities to serve on councils, associations, or other commodity-focused advocacy groups to support Port interests in all waterway commodities.

### **Support sound initiatives to capture new commodities and service options to expand traffic on Missouri's waterways.**

- Support or conduct a feasibility study for a biofuel consolidation and distribution facility initially focusing on ports in Northeast Missouri due to their proximity to production areas.
- Evaluate and consider proposals to support the development of a Logistics Terminal below the Mississippi River's lowest lock and dam and near large production and consumption areas like St. Louis.

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- Consider participating in a Public/Private Partnership (P3) to capture new commodities or service options at Missouri ports by taking advantage of lower rates on publicly borrowed funds.

**Pursue additional funding to implement projects that support freight development.**

- Evaluate the current and projected economic impact of the ports on the state to provide additional support for funding on an annual basis.
- Pursue a dedicated funding source for waterways rather than relying on yearly appropriations from the General Assembly.
- Work to maintain the ability to use flexible funding mechanisms at ports regardless of its floodplain designation.
- Encourage modal associations by establishing a Multimodal Council to promote all modes in Missouri and raise awareness of the need for adequate funding.

The proposed Waterways Prioritization Process assesses the needs of Missouri's ports and helps to allocate the limited funds. The intent of the Process is to provide justification for project selection by having a foundation of measures based on the adopted strategies in Section 6. As a component of the Waterways Prioritization Process, the Decision-Support Tool is designed to yield a list of prioritized projects based on criteria evaluated from input solicited from the Port Authorities' applications. This list of projects, categorized by urgency of need and evaluated based on outcomes anticipated from the completion of the projects, can arm decision-makers with measurable results to determine the best investments of funds to meet the needs of Missouri's ports.

Missouri's centralized location and access to multimodal connections places the state in a prime position to strengthen its role as a national freight center. As the Mississippi River moves 170 million tons of freight each year through Missouri, the barge industry continues to grow with concentration on the east side of the state along the Mississippi River. With these opportunities, along with many others discussed in this report, Missouri's ports have the ability to promote trade and growth for the state.