



BI-STATE REGION FREIGHT PLAN

A Region of Production Clusters

Executive Summary

The Bi-State region is comprised of five counties spanning two States – Iowa and Illinois. As of the 2010 Census the region had a population of approximately 425,000. The region is split by one of the largest river systems in the world, the Mississippi River System, which presents a challenge to both personal and freight mobility. Goods movement is largely driven by the industrial and consumer demands of a region; major industries such as Alcoa, Deere & Company and Tyson call the Quad Cities home. The Bi-State nature of the region means that these businesses must consider Illinois' and Iowa's unique regulatory environments as part of their day-to-day operations. These, and other, infrastructure and operational issues were explored as part of this Freight Plan.

ABOUT THE FREIGHT PLAN

The Bi-State Region Freight Plan identified projects, programs and strategies to guide investment in the multimodal freight transportation system in the two-state region. During Freight Plan development the following questions were answered:

- **Vision** – What does the region want from its freight system?
- **The Bi-State Freight System Infrastructure** – What is the current and planned status of freight system components and services?
- **The Demand for Freight** – What is the current freight system demand today? In the future?
- **External Factors and Trends** – What drives the freight system demand in the region? What changes should the region plan for in the future?
- **The Bi-State Freight System Needs Assessment** – Where are improvements needed to best match the supply and demand? Which are most important?
- **Recommendations** – What are the next steps toward advancing the Bi-State Region's vision given anticipated needs and system conditions?
- **Rationale for Investment of Public Funds in the Freight System** – What is the value of public investment in the freight system to the region? How should the Region pay for the needed improvements?

FREIGHT GOALS

To bring focus to the study on those aspects of the freight system most important to the Bi-State Region, freight goals were established as part of Freight Plan development. These goals are:

- **Economy** - Use the Bi-State Freight System Support the Region's Economy
- **Infrastructure** - Maintain and Enhance Highway System Infrastructure
- **Operations** - Promote Freight Rail System Operational Efficiencies
- **Access and Modal Options** - Increase Accessibility and Mobility Options for the Region
- **Resiliency** - Work Towards System Resiliency and Reliability

PLAN SUMMARY

A multipronged process that blended stakeholder outreach with technical analysis provided a comprehensive multimodal evaluation of the Bi-State Region's freight system and identified issues where the Bi-State Regional Commission and its public and private sector freight partners should consider focusing on in the future. The process, technical data, and findings are documented within the Plan.

The Freight Plan identified a number of needs and issues related to the Regional Freight Goals described above. These needs were vetted with the Bi-State Regional Commission, funding partners and key stakeholders, and used to develop recommended investments and strategies for the region. Physical investment strategies consist of identifying and prioritizing freight-related projects on the highway system in the region's TIP, and working through partnerships to identify, prioritize, and further projects on the region's rail, water, and air systems. One key theme for the region is developing local intermodal and multimodal connections, thus increasing system resiliency, reducing reliance on outside connections via highway, and increasing the competitiveness of the region.

In addition to the Plan itself, several supplemental resources were developed as part of the study.

- **Freight Profiles.** Five profiles were developed to represent the four key freight modes in the region and to provide an overview of key industries, commodity movements, system needs, and recommended strategies.
- **Commodity Flow Analysis Tool.** The Commodity Flow Analysis Tool combines current and future year freight commodity flows and existing facility points in a common database that can be queried in a variety of ways. The data can be accessed by selecting a county of interest to find out about it -- commodity flows by mode and origin-destination (O-D), truck link volumes, air and port volumes, and other. Or can be accessed by focusing on a flow or type of modal move. Locational (Lat-Long) data is available on each data record in the O-D and the facility tables. This tool was used to develop the regional commodity flow snapshot in Section 2.4, and will be provided to Bi-State Regional Commission for their continued use.

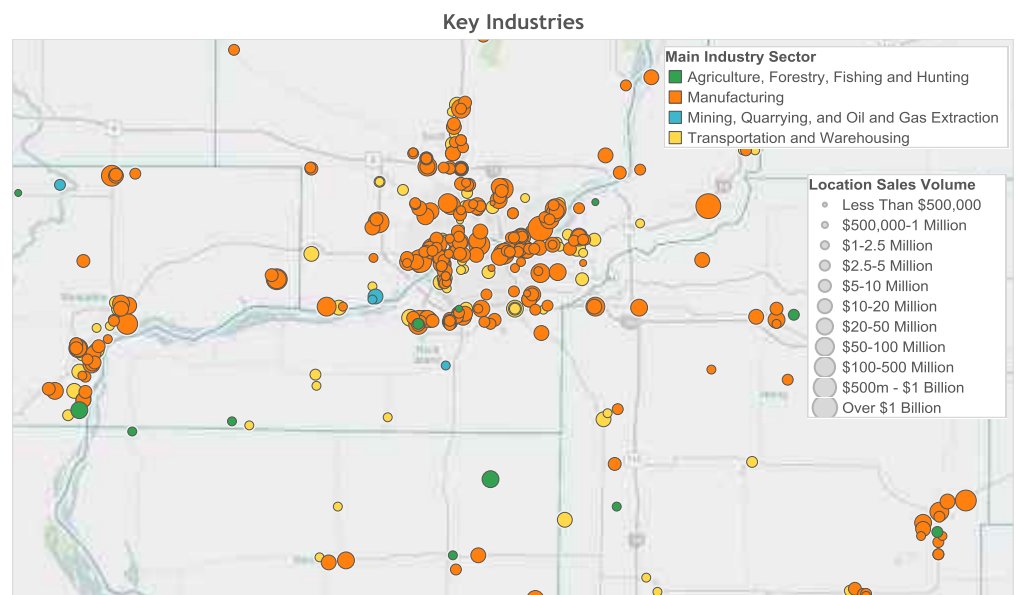
The following pages contain these profiles and highlight system use, condition, needs, and indicate high level recommendations made for each as part of this Freight Plan.

The Bi-State Region is largely characterized by its dual nature. It spans across two States – Iowa and Illinois – and is split by one of the largest river systems in the world, the Mississippi River System. Comprised of a mid-sized urban center, smaller towns, and rural areas, the region is known as a producer of agricultural and manufacturing goods that are destined for both domestic uses and international trade. Focusing on the industries that make up the backbone of the Bi-State economy, this profile is one in a series of five that documents and characterizes the movement of freight to, from, within, and through the Bi-State region on each of the modal freight networks.

OVERVIEW OF INDUSTRIES IN THE BI-STATE REGION

The Bi-State Region's diverse industries generally span the region's counties, while some clusters have formed along transportation corridors such as interstate highways and the Mississippi River, as shown in Figure 1. Linking these industries together is the network of supply chains, which constitute the movement of goods from where they are produced to where they are consumed, and through any intermediate steps, such as value-add manufacturing, distribution facilities, or others. In many respects, the Bi-State Region is defined overall as a **production**

Figure 1. Freight-Intensive Firms in the Bi-State Region by Industry Sector and Revenue



Source: Reference USA; Cambridge Systematics, Inc. 2015

location – it is distinguished by the number of manufacturing operations in the area. The raw materials used in production may come from the immediate area, such as agricultural crops and farm animals, or can arrive in large, bulk quantities by rail. Trucks and barges are also used. Customers and the points of consumption may be in the area, in North America and overseas, such as in the case of John Deere products that are exported via the Port of Baltimore (Figure 2).

Warehouses, distribution centers, and transportation service provider facilities may locate near large operations in support functions. In addition, production operations that use similar freight services and/or input products may select to locate nearby.

Figure 2. Port of Baltimore



Source: Anne Strauss-Weider, 2011

Such agglomerations or clusters help in terms of attracting and retaining the needed transportation services and workforce by creating a critical mass of activity. However, the business clusters are spread throughout the Bi-State Region, leading to transportation related challenges. In particular, while some individual businesses may be large enough to provide sufficient quantities in attract and retain rail service, the geographically diverse locations of the clusters, including some in more isolated rural settings, makes obtaining sufficient quantities for rail service more challenging.

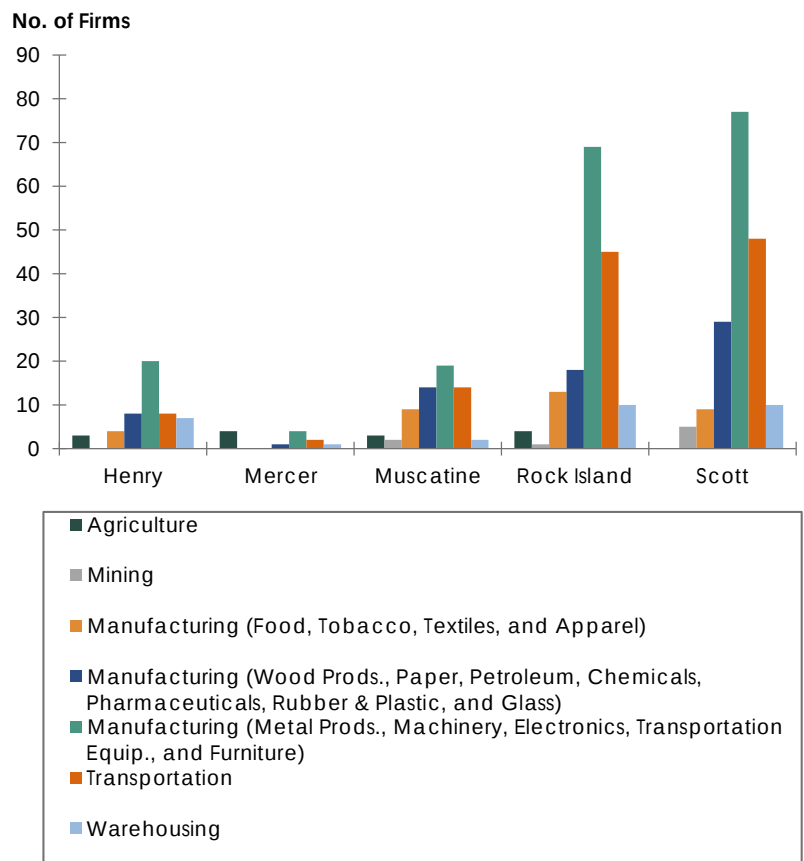
INDUSTRIES

Firms that rely on the freight system in the Bi-State Region, such as those within the agricultural and manufacturing sectors, play a large and important role in the regional economy. Within the manufacturing sector, firms producing metal products, electronics, machinery, furniture, and wood products are most heavily represented, as shown in Figure 3. Businesses that manufacture wood cabinets and countertops, ready-mix concrete, general purpose machinery, and machine shops are prominent in the region as well. Based on location data from Reference USA, reviews of satellite imagery from Google Earth, and stakeholder interviews of firms in the Bi-State Region it was determined that the key production clusters having an outsized effect on goods movement in the area include:

- Agricultural crops and farm animal processing
- Steel fabrication operations
- Transportation equipment production

Each of these is examined in more detail below:

Figure 3. Distribution of Firms in the Bi-State Region

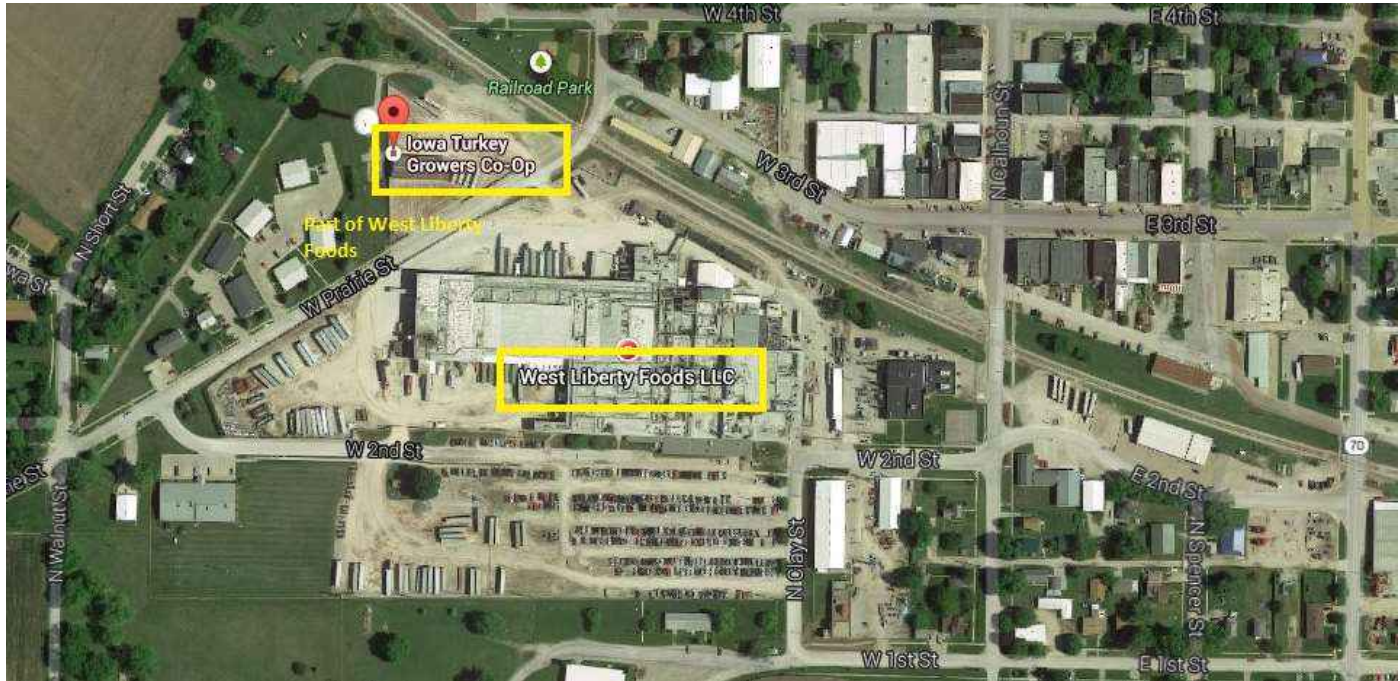


Source: Reference USA

Agricultural and Farm Animal Processing

A wide range of agricultural and farm animal processing operate in the Bi-State Region. Some of these facilities are located in rural settings, such as Tyson Fresh Meats in Hillside Illinois. Some are in more suburban settings, such as Heinz in Muscatine, IL and West Liberty Foods and Iowa Turkey Growers Cooperative in West Liberty, IA, as shown in Figure 4.

Figure 4. Agricultural and Food Processing Cluster in West Liberty, IA



Source: Google Earth.

West Liberty Foods is a major food processor in the area specializing in poultry, namely turkey. West Liberty Foods, and other food processors in the region, require temperature-controlled conveyances for delivering their products to customers. Thus, trucks are the most efficient mode of transport for finished products as well as the main production input – livestock. Accordingly, these clusters tend not to have rail service.

The Bi-State Region also has production clusters specializing in bulk agricultural commodities for which rail is most efficient. River Valley Cooperative, with several locations in the Quad Cities, has a corporate objective “to increase the efficiency and productivity of our members’ agribusiness operations.”¹ As a facility with silos that serves as a collection point for grains, the River Valley Coop locations in Geneseo, Illinois and Galva, Illinois are located adjacent to freight rail lines.

The Kent Corporation’s Grain Processing Corporation (GPC) in Muscatine, IA is a wet milling company that makes products including ethyl alcohol, corn starches for food markets, maltodextrin (corn syrup solids), corn oil, and corn-based cat litter – all of which are inputs for other industries. The Muscatine facility moves 60 percent of its outbound bulk products by rail. Indeed, large rail yards serve the location along with barge services.

¹ <http://www.rivervalleycoop.com/about-us>.

Steel Fabrication Operations

The Bi-State Region has a large number of steel fabrication companies ranging from very large to smaller, more specialized firms. The larger companies generally require rail service because they produce and take in substantially bigger quantities of material. Rail service allows the steel companies to achieve cost efficiencies that might otherwise be unattainable. Clustering occurs around rail service locations and where the needed specialized workforce can be found.

Figure 5. Steel Fabrication Cluster in Bettendorf, IA



Source: Google Earth.

The Bettendorf, IA area demonstrates the clustering of steel fabrication industries in the Bi-State Region. There is a significant Alcoa operation located along the Mississippi River in Riverdale, Iowa, as shown in Figure 5. The Sivyer Steel Corporation, LeClaire Manufacturing (a maker of aluminum castings and machining), and Olympic Steel are all located nearby. Access to rail services also draws to these clusters unrelated industries that require similar logistics needs. In the case of the Bettendorf example, two plastics companies – Berry and Graystone Manufacturing – are located within the industrial cluster dominated by the steel industry.

Transportation Equipment Production

The Deere Company (John Deere) is headquartered in Moline, IL and is likely the transportation equipment company most often associated with the region. Besides its headquarters, the Deere Company has its John Deere Harvester Works in East Moline, IL, tractor cab assembly operations in Waterloo, IA, and a manufacturing operation in Ankeny, IA.² Figure 6 depicts the transportation equipment production cluster in Moline. The Deere Company overhauled its supply chain in 2004 to reduce

² http://www.deere.com/en_US/corporate/our_company/fans_visitors/tours_attractions/factorytours.page?

inventory costs and optimize their network.³ The supply chain was restructured to a two-tiered distribution center (DC) operation, with inventory maintained at large DCs near production locations (at merge centers that combine inventory from various plants) and at dealerships.

As expected for a transportation equipment production facility, the Moline operation has rail service. The company's largest distribution center is approximately 2.6 million square feet and located in Milan, Illinois. This facility supplies slower moving and obsolete parts to depots, independent dealers, and customers around the world. It has truck service, but no rail service.⁴ The company's Davenport, IA distribution facility is a regional distribution center for articulated dump trucks, log skidders, harvesters, and other industrial and agricultural equipment, as well as a training center.

Figure 6. Transportation Equipment Production Cluster in Moline, IL



Source: Google Earth.

The Bi-State Region has additional transportation equipment operations. The Union Tank Car Company, for example, has a large repair and maintenance operation in Muscatine, IA. Union Tank Car is North America's leading manufacturer, lessor and maintainer of railroad tank cars used primarily by the chemical, petrochemical and food industries.⁵ As a rail car operation, the facility is rail served.

DEMAND DRIVERS

As mentioned above, the Bi-State Region is a source for large volumes of both raw materials and finished goods traveling domestically and destined for export.

Illustrated in Figure 7, the largest outbound commodities consist of cereal grains and other agricultural products moving via water south to Louisiana. These are goods that enter the region from surrounding farms and travel through the Mississippi River

³ <http://www.supplychainbrain.com/content/research-analysis/supply-chain-innovation-awards/single-article-page/article/a-supply-chain-overhaul-that-delivers-it-all-to-deere-co-1/>.

⁴ http://www.mwpvl.com/html/john_deere.html.

⁵ http://www.marmon.com/union_tank_car_company_bc.html.

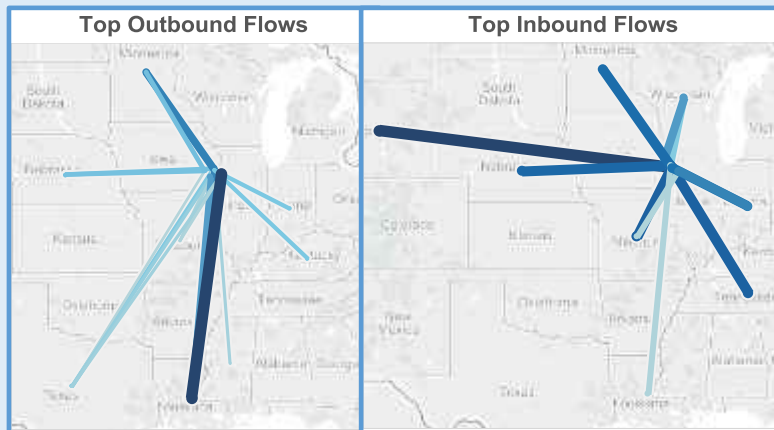
Industry and Commodity Flows

south to Ports in the Gulf. Significant flows of gravel go to Kentucky and Mississippi. Nonmetal mineral products move out from the region to Minnesota, and fertilizers to Nebraska.

The largest inbound flows to the Bi-State Region are coal shipments from Wyoming, Wisconsin, and Colorado. These support local energy production. Large quantities of base metals and cereal grains also arrive to the Bi-State Region. These are products that make their way to docks in the Bi-State Region where they can be transferred to barges on the Mississippi River. Gravel also moves into the region from states such as Missouri and Wyoming.

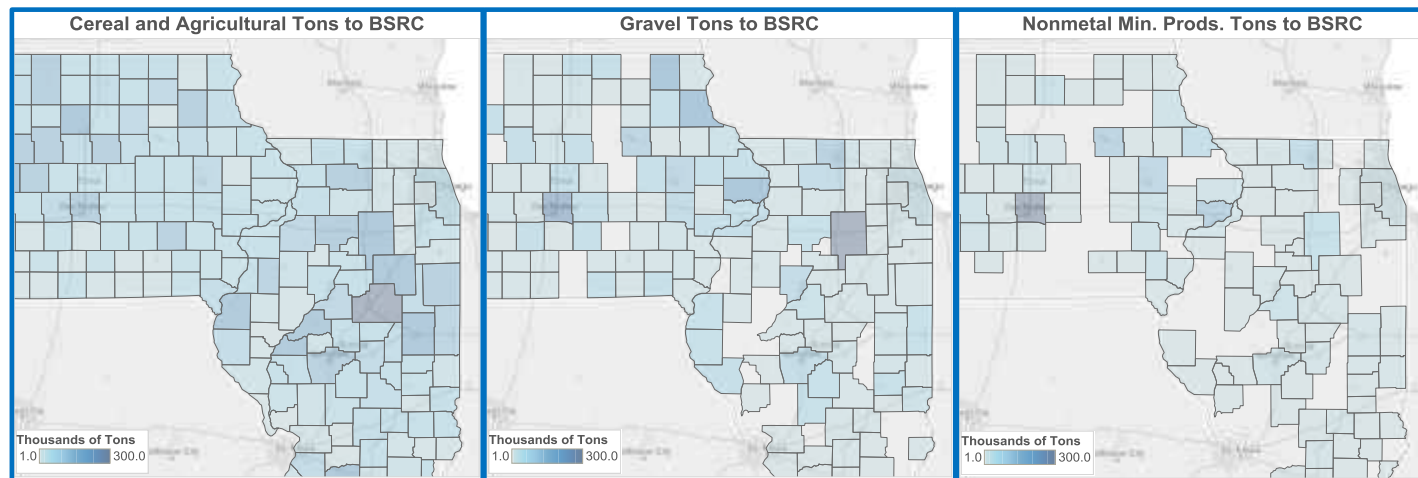
To better understand where these commodities are coming from or going to, a detailed analysis was conducted on the commodity flows at the county level in Illinois and Iowa. As illustrated in Figure 8 the counties in and surrounding the Bi-State Region are key freight generators and attractors from its parent states of Iowa and Illinois.

Figure 7. Origins and Designations for Top Commodities Shipped in the Bi-State Region



Source: PB Disaggregated Freight Analysis Framework, 2007.

Figure 8. Origins and Designations for Top Commodities Shipped in the Bi-State Region



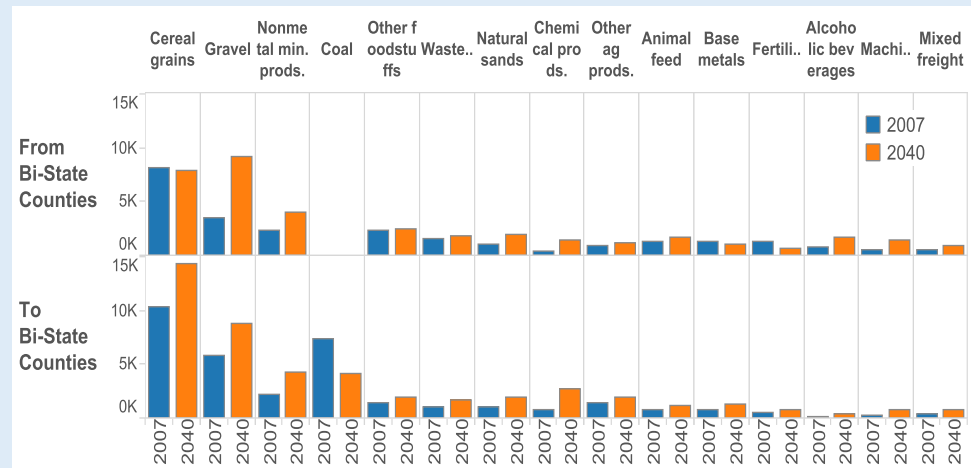
Source: PB Disaggregated Freight Analysis Framework, 2007.

The top county in the area for originating cereal and agricultural flows was McLean, IL, at 11.5 million tons per year. Henry IL generated 3.3 million tons per year in 2007, and the remaining Bi-State Region counties generated more than 1.2 million tons per year each. These are important commodities that drive much of the freight demand in the Midwest, as well as this region.

The other two largest commodities by tonnage were gravel and non-metallic minerals. The top county nearby for originating gravel tons was La Salle, IL, at 9 million tons per year in 2007. The Bi-State Region counties generated between 0.7 million tons to 1.8 million tons each in 2007.

While gravel, cereal grains, agricultural products, and coal represent the largest commodities by tonnage, Bi-State Region counties are also important generators of other commodities that have much higher value per weight. Scott County, IA, where Davenport is located, registers as a large generator of machinery products and chemical products. This can be explained by the many manufacturing facilities in the first map shown in this overview.

Figure 9. Volume of Goods Shipped to and from the Bi-State Region



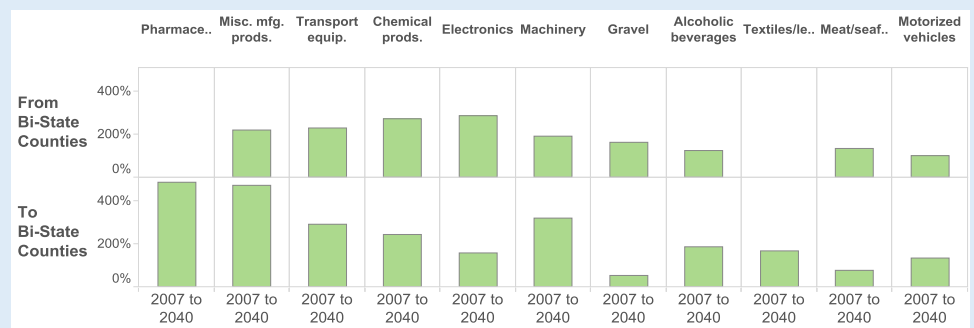
Source: PB Disaggregated Freight Analysis Framework, 2007.

Figure 9 provides an overview of how commodity flows, to and from the Bi-State Region, are expected to change in the following decades. Some of the notable findings are:

- Several commodities are expected to see increases in tonnages, such as gravel (96%), nonmetal mining products (82%), and inbound shipments of cereal grains (40%). These commodities were already of primary importance in the region.
- There are many commodities that will see rapid growth, albeit totaling less in tons than the three mentioned above. These are natural sands, chemical products, animal feed, alcoholic beverages, and machinery. While some of these gains might be small on a tonnage basis, they are likely to be relatively large on a value basis. Machinery exports are expected to almost triple by 2040, potentially providing a great boon to the local economy.
- The main commodity that is expected to decrease over the coming decades is coal. In 2040, coal tonnages will be 59% of what they were in 2007.

Figure 10 shows the top commodities to and from the Bi-State Region by growth percentage from 2007 to 2040. Several of those that will see the fastest growth are commodities typically associated with high values per ton, such as pharmaceuticals, manufactured products, transport equipment, chemical products, electronics, machinery, gravel, alcoholic beverages, textiles/leather, meat/seafood, and motorized vehicles.

Figure 10. Top Bi-State Region Commodities by Growth Rate

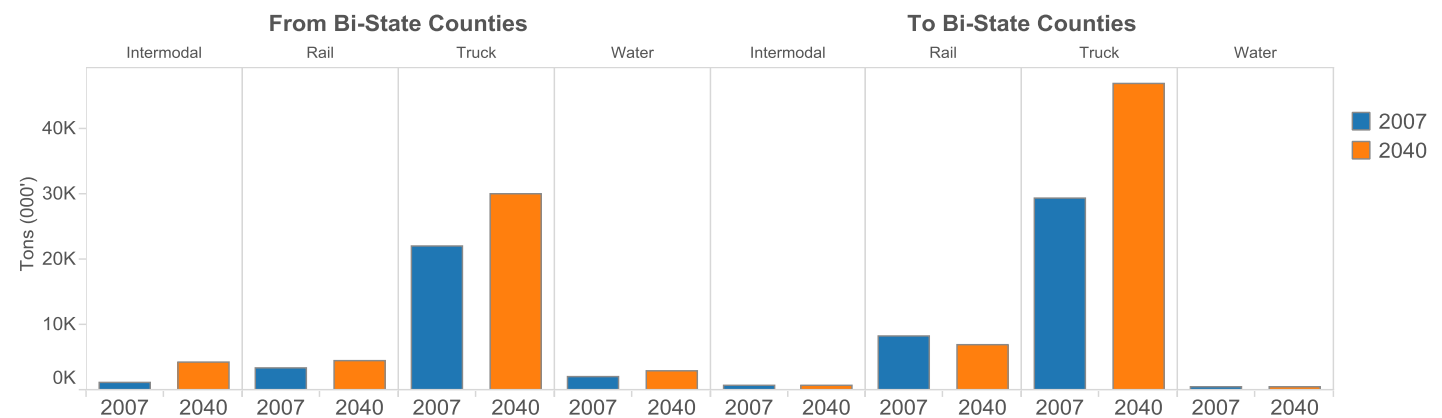


Source: PB Disaggregated Freight Analysis Framework, 2007.

chemical products, and electronics. With the exception of pharmaceuticals, which just enter the region, the rest of these commodities will see strong growth in both exports and imports to the region.

In terms of modal use, trucking is currently the most important mode by tonnage, and is expected to consolidate this position into the future. The rail and water modes play a secondary role overall, but as will be seen they are important for particular commodities. Intermodal shipping combining different modes, such as truck-water or truck-rail, for example, is expected to grow significantly over the coming years.

Figure 11. Current and Forecast Tonnages by Mode



Source: PB Disaggregated Freight Analysis Framework, 2007.

RECOMMENDATIONS AND INVESTMENTS

Investment in the freight system, whether through physical infrastructure, operational, or policy changes, can bring important economic and competitiveness benefits to a region. Investments such as **expanded rail service**, a **new road/rail bridge**, or an **intermodal, transload, or consolidation facility**, are an opportunity for partnership between multiple agencies, jurisdictions, and the private sector, as they can bring benefits to the region as a whole.

In addition to infrastructure investments on the system, there are a number of cross-cutting strategies that the Bi-State Regional Commission should pursue related to the freight system, including:

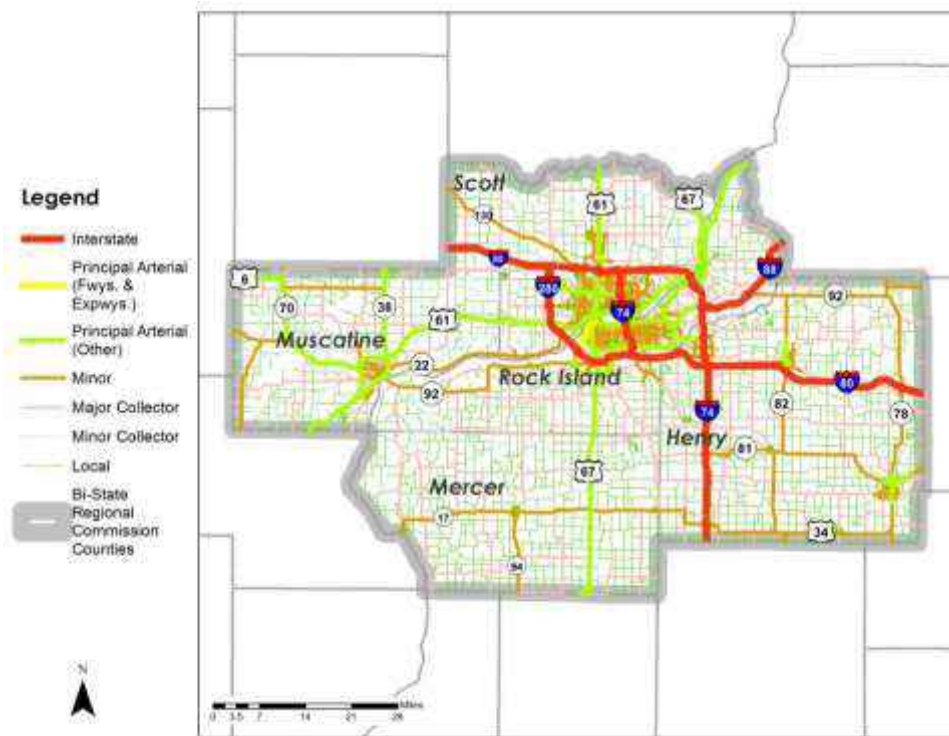
- **Supporting existing freight clusters and new freight focused development.** Industries located in freight “clusters” can share horizontal and vertical efficiencies through efficient use of the transportation system and reduced supply chain costs. The Bi-State Regional Commission should support development and re-development of industry clusters in the region, and in particular near existing or planned transportation facilities.
- **Considering freight in overall project planning across modes.** The impacts to the freight system and local industry should be a consideration when prioritizing and making investments in the transportation system.
- **Collecting freight data.** Due to the large private sector community using the freight system it is often difficult to fully understand system operations and needs. Improved data collection (e.g., truck counts) and data provided by the private sector could help government to do better freight planning.
- **Cultivating a public and private sector dialog.** The Bi-State Regional Commission should convene regular and on-going opportunities for public and private sector freight stakeholders to discuss freight-related issues and priorities for the region. The Bi-State Regional Commission should also engage and partner with federal, state, regional and local public agencies, and with producers, shippers/receivers, carriers and other private sector freight stakeholders to address the regions freight issues together.
- **Promoting workforce development programs for the transportation industry.** Programs in cooperation with community colleges and private sector can be developed to ensure workforce is available for industry needs (e.g., truck drivers).

HIGHWAYS

Bi-State Freight Profile

The Bi-State Region is largely characterized by its dual nature. It spans across two States – Iowa and Illinois – and is split by one of the largest river systems in the world, the Mississippi River System. The freight network encompasses multiple modes of transportation which work together to ensure a smooth flow of goods throughout the region. This profile is one in a series of five that documents and characterizes the movement of freight to, from, within, and through the Bi-State Region on each of the modal freight networks.

Figure 12. Map of Highway Facilities in the Bi-State Region



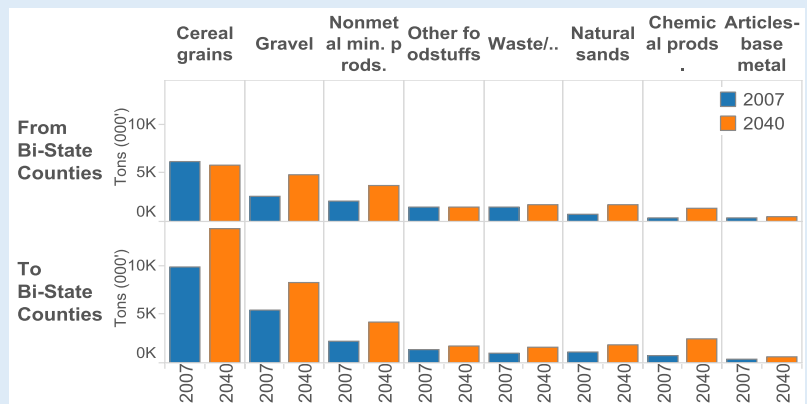
THE HIGHWAY SYSTEM IN THE BI-STATE REGION

Highways serve as the backbone of the Bi-State Region's freight transportation system. They touch most of the shipments, providing access for trucks to, from, and through the region, or providing first- and last-mile connectivity to other modes such as rail and water. Major interstate highways in the region, shown in Figure 12, include I-80, I-88, I-74, and I-280, and connect east to Chicago and Indianapolis, and west to Des Moines and Omaha. U.S. Highways 61 and 67 connect the region to St. Louis in the south and Minneapolis to the north.

DEMAND DRIVERS

The Bi-State Region has a diverse economy, with strengths in manufacturing and agriculture – both freight-intensive industries. These industries rely on the highway system, whether to connect to intermodal facilities to transport goods in/out of the region, or to/from final destinations. As shown in Figure 13, movements to the Bi-State Region are increasing by 44 percent by 2040. The fastest growing commodities are expected to be nonmetal mining products, gravel,

Figure 13. Volume of Goods Moving on the Highway System in the Bi-State Region



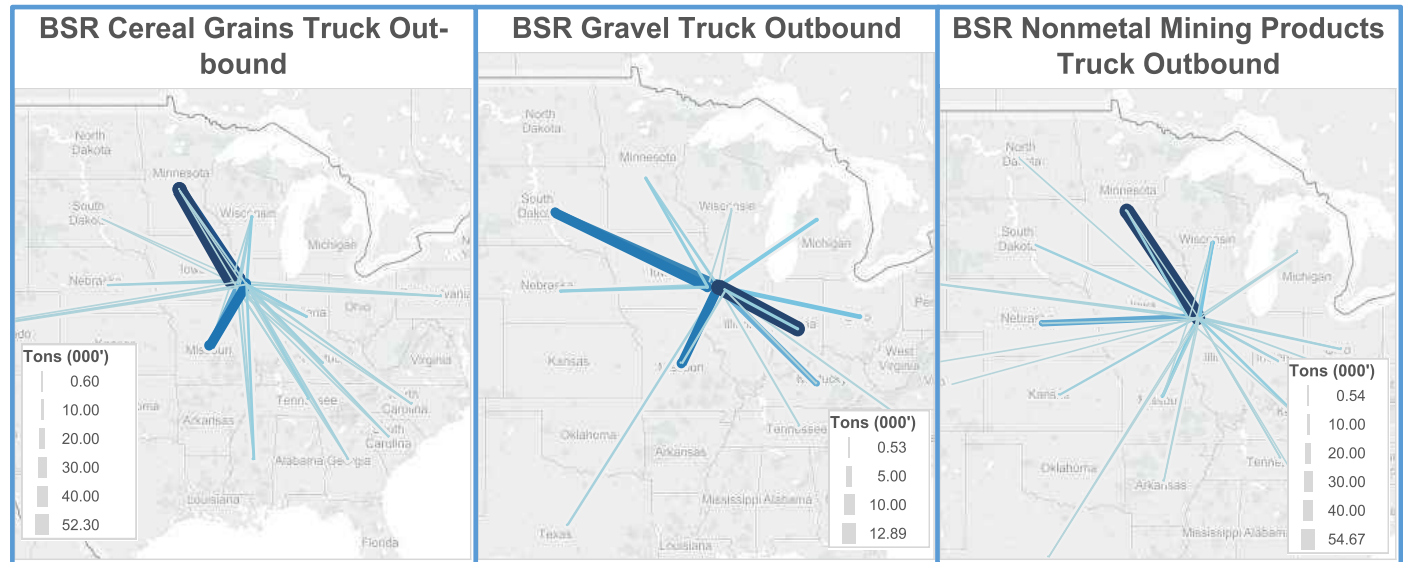
Source: Parsons Brinkerhoff Disaggregation of Freight Analysis Framework

Highways

cereal grains, natural sands, and chemical products.

Figure 14 illustrates the principal destinations of the three top outbound commodities – cereal grains, gravel, and nonmetal mining products. Most of the cereal grains are destined to Missouri and Minnesota, gravel is destined to Indiana, South Dakota, and Missouri, and nonmetal mining products are destined to Minnesota.

Figure 14. Destinations for Top Commodities Shipped From the Bi-State Region via Truck, 2007



Source: PB Disaggregation of Freight Analysis Framework

Table 1. Truck Tonnage in the Bi-State Region by County, 2007

	Truck Tons Originated (000')	Truck Tons Received (000')	Truck Tons Within County (000')
Henry, IL	3,458	5,152	82.9
Mercer, IL	1,393	1,341	10.9
Rock Island, IL	5,129	5,766	136.9
Muscatine, IA	5,133	6,271	84.7
Scott, IA	8,032	10,741	365.3
Total	23,145	29,271	681

Source: PB Disaggregation of Freight Analysis Framework

Table 1 provides county-level detail on the tonnage of the flow identified above. Scott County, IA is the main driver of trucking demand in the region, but the others are also important. Both Scott County and Henry County are consumption centers that receive from 1/3 to 1/2 more freight than they originate.

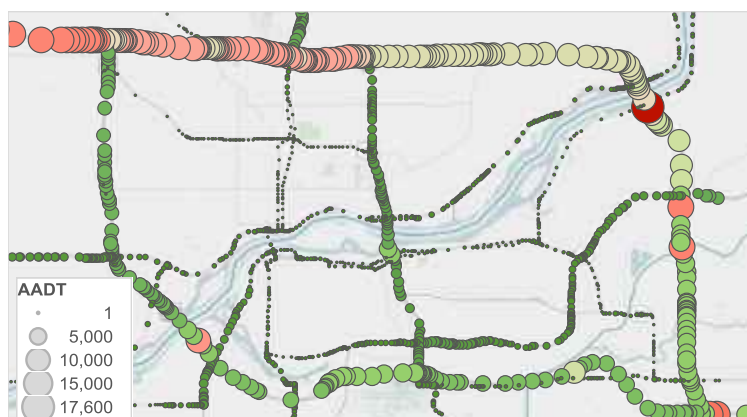
CHALLENGES AND NEEDS OF THE SYSTEM

Ensuring a safe, efficient, and reliable highway system is important for users and policy makers in the region. Three key metrics are used to characterize trucking performance in the region: observed truck volumes, crash rates, and congestion. Each of these is described in brief below.

Truck Volumes

Ensuring safe and reliable routes for all users on the highest volume truck corridors is essential for system efficiency. Figure 15 shows truck Annual Average Daily Traffic (AADT) along key routes in the region. As expected, the main interstates highways have the highest flows. The route with the highest truck volumes is I-80, looping north of Davenport. West of the I-280 interchange traffic, truck volumes remain high between 9,000 and 10,000 AADT. West of the I-74 interchange, volumes decrease slightly to 8,000 – 9,000 AADT up until the Mississippi River, after which they decrease to around 5,000 truck AADT. This is the main truck route in the region, supporting both pass-through traffic and cargo entering/exiting the Davenport area. Indeed, this route continuing through I-80 has been designated as part of FHWA's Primary Freight Network. Highways of secondary importance in terms of volumes, such as I-280 and I-74, carry around 1,500 and 2,500 truck AADT, are also critical links in the network.

Figure 15. Multi-unit Truck Annual Average Daily Traffic (AADT)

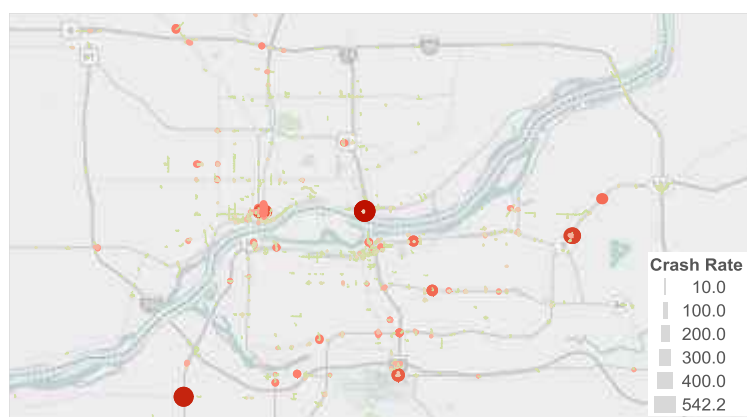


Source: Illinois DOT and Iowa DOT

Safety

Identifying safety hazards is critical for understanding the potential for truck related accidents and incidents. Figure 16 illustrates the locations that have a high propensity for accidents involving trucks. This crash data, which spans 2009 to 2013, points to several areas of concern in the roadway network. The locations with the highest crash rates are: the intersection between State Street and the I-74 on/off ramp, several blocks surrounding Brady St and 5th Street in downtown Davenport, the intersection between 78th Avenue West and Centennial Expressway, and the intersection between R-92 and Barstow Rd, among several others.

Figure 16. Truck Related Accidents per Mile 2009 to 2013

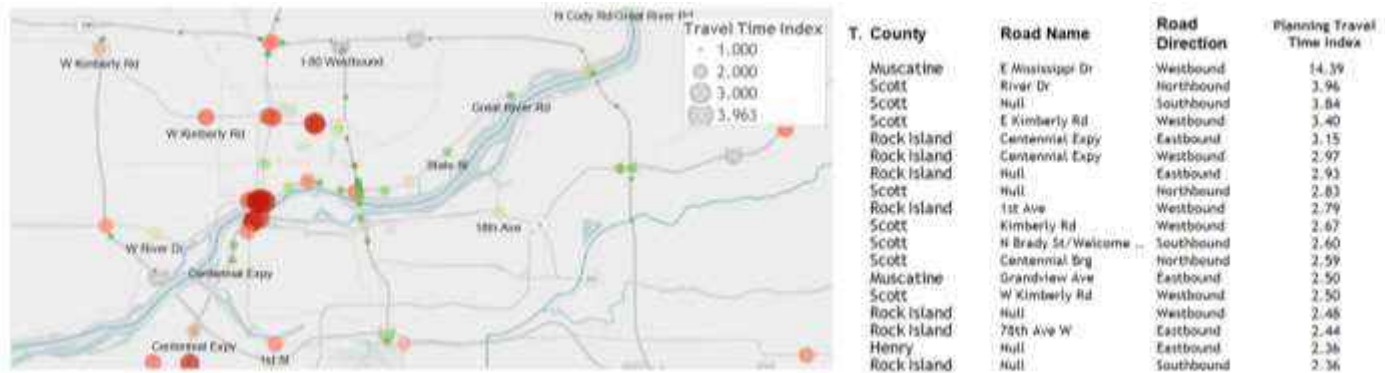


Source: Illinois DOT and, Iowa DOT

Congestion

When congestion occurs and travel times are uncertain, the affected system is considered "unreliable," adversely impacting shippers and leading to increased costs for consumers. Figure 17 shows congestion "hot-spots" in the region and lists key locations where the roadway network is unreliable, according to performance data provided by the FHWA. This dataset provides truck speeds on many roadway segments in the region throughout the day, allowing segments to be identified where speeds fluctuate widely, which is a common sign of congestion and unreliability. Truck congestion occurs mostly in downtown Davenport and Rock Island, although it is also present on facilities that have much higher truck volumes, such as the interchange between I-80 and U.S. 61, and along I-80.

Figure 17. Truck Travel Time Index (Proxy for Unreliability)



Source: FHWA National Performance Measurement Data Set (NPRMDS)

The region's bridges are also bottlenecks where both congestion and safety are issues. There are relatively higher numbers of truck-involved collisions around the Mississippi River bridges that link the Iowa and Illinois portions of the Bi-State Region. Trucks, as well as passenger vehicles, must use these bridges for both local and long-distance travel. In addition, many of the Bi-State Region's industry clusters and rail access points are located along the Mississippi River.

RECOMMENDATIONS AND INVESTMENTS

Each year the Bi-State Regional Commission prepares the Transportation Improvement Programs (TIP) for the Quad Cities, Iowa/Illinois Metropolitan Planning Area (MPA) and for Region 9 (an area that includes all of Muscatine County and the non-urban portions of Scott County). The TIP is a listing of transportation projects to be funded under federal transportation programs for a four-year period. As part of this freight study, projects on the TIP were examined with respect to their ability to serve and enhance goods movement. The Top 10 funded highway projects anticipated to provide the freight system the greatest benefit are located throughout the Bi-State region and displayed in Figure 18. The total costs of these projects amounts to over \$188M. There are a total of over \$300M funded freight benefitting highway projects identified in the region.

Figure 18. Bi-State Freight-Related TIP Project Locations



Identification of freight-related infrastructure projects is important in order to prioritize key investments that maintain freight mobility, and position the region to take advantage of future grant opportunities. Yet physical infrastructure projects alone are not enough to maintain a competitive freight system – supporting strategies must also be articulated to shape future freight investments and opportunities. A few of these strategies related to the highway system include:

- **Increasing last-mile connectivity to local businesses.**
- **Maintaining important roadway freight corridors and prioritize projects that mitigate chokepoints and reduce congestion on these corridors.**
- **Encouraging system resiliency and develop disaster contingency plans.**

The Bi-State Region is largely characterized by its dual nature. It spans across two States – Iowa and Illinois – and is strategically located on one of America's most important waterways, the Mississippi River. The river's source lies near the Canadian border, where it travels south through the fertile plains of the Midwest until reaching the Gulf and connecting to global shipping routes. Though the railroads and later the interstate highway system displaced the inland waterway system as the primary freight mode, the Mississippi River continues to provide a cost-efficient alternative for transporting bulk goods. This profile is one in a series of five that documents and characterizes the movement of freight to, from, within, and through the Bi-State Region on each of the modal freight networks.

THE BI-STATE WATERWAY SYSTEM

Bisecting the Bi-State Region, the Mississippi River is the nation's primary navigable inland waterway and is represented on America's Marine Highway System as M-35 (Figure 19). Largely, the Bi-State Region ships grain, gravel, and other raw materials via bulk cargo barges south to Gulf ports, where they are shipped to international markets. However, some commodities, such as coal, move from terminals in the region to plants north on the Mississippi River.

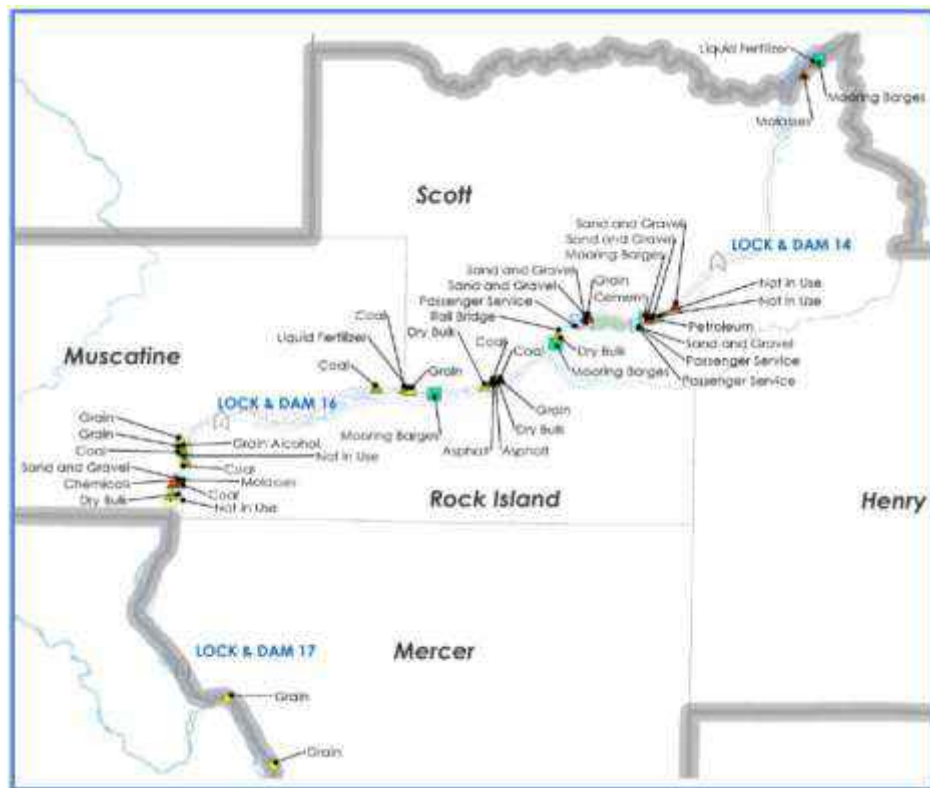
The Bi-State Region is centrally located along the Mississippi between key waterway hubs in St. Paul and St. Louis. The Bi-State Region's portion of the river includes four locks and dams and numerous facilities that serve a variety of commodities, including coal, sand and gravel, and grain. The majority of these terminals are concentrated near the cities of Muscatine, Davenport, and Rock Island, as shown in Figure 20.

Figure 19. Overview of the Waterway System in the Eastern U.S.



The characteristics of the locks and dams (Table 2), have a direct influence on the efficiency of the waterway. None of these locks have the ability to accommodate a typical 3-barge by 5-barge configuration powered by a single tow. The required length for such a configuration is 1,200 feet. Due to this, barge configurations must be broken apart, which requires multiple lockages and can double or triple processing times.

Figure 20. Waterborne Facilities in the Bi-State Region



Source: U.S. Army Corps of Engineers.

Table 2. Characteristics of the Locks and Dams in the Bi-State Region

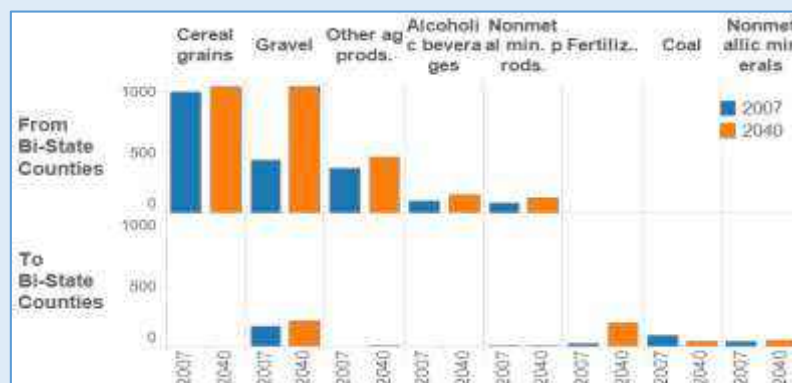
Lock and Dam	River	Navigation Mile	Status	Length (feet)	Chamber Width (feet)	Normal Lift (feet)
Lock 14	Mississippi	493.0	Operational	600	110	11
Aux	Mississippi	493.0	Seasonal	320	80	11
Lock 15	Mississippi	482.9	Operational	600	110	16
Aux	Mississippi	482.9	Operational	360	110	16
Lock 16	Mississippi	457.2	Operational	600	110	9
Lock 17	Mississippi	437.1	Operational	600	110	8

Source: U.S. Army Corps of Engineers.

DEMAND DRIVERS

Currently around 85 percent of the commodities moving to and from the Bi-State Region via waterway are outbound, with just 15 percent of the volumes moving inbound. Bulk commodities, especially cereal grains, gravel, and other agricultural products, enter the Bi-State Region from the adjacent area for transshipment onto barges to move

Figure 21. Top Waterborne Commodities Shipped to and from the Bi-State Region



Source: PB Disaggregation of Freight Analysis Framework, 2007.

south along the Mississippi River. This is shown in Figure 21 and Figure 22. Farm products moving downstream account for the majority of the River's traffic.

Commodities moving upstream through the Bi-State Region include coal, chemicals, manufactured goods, and crude materials. It is forecasted that the waterway will continue to be an important mode for the region. Particularly strong growth is expected in commodities such as in gravel, which is projected to grow by 239 percent from 2007 to 2040 (Figure 21).

Table 2 contains a county level breakdown of the tonnage flows moving through the region. Henry County, IL and Rock Island County, IL are the top locations for trans-loading commodities onto barges and contribute to the high volumes of goods moving south from the Bi-State Region. In all, around 5.6 times more freight leaves the area by water than enters.

Table 3. Waterborne Tonnages by County

	Water Tons Originated (Thousands)	Water Tons Received (Thousand)	Water Tons within County (Thousands)
Henry, IL	768	28	0.0
Mercer, IL	373	12	0.0
Rock Island, IL	788	196	0.0
Muscatine, IA	55	31	0.0
Scott, IA	67	95	5.8
Total	2,051	361	5.8

Source: PB Disaggregation of Freight Analysis Framework, 2007.

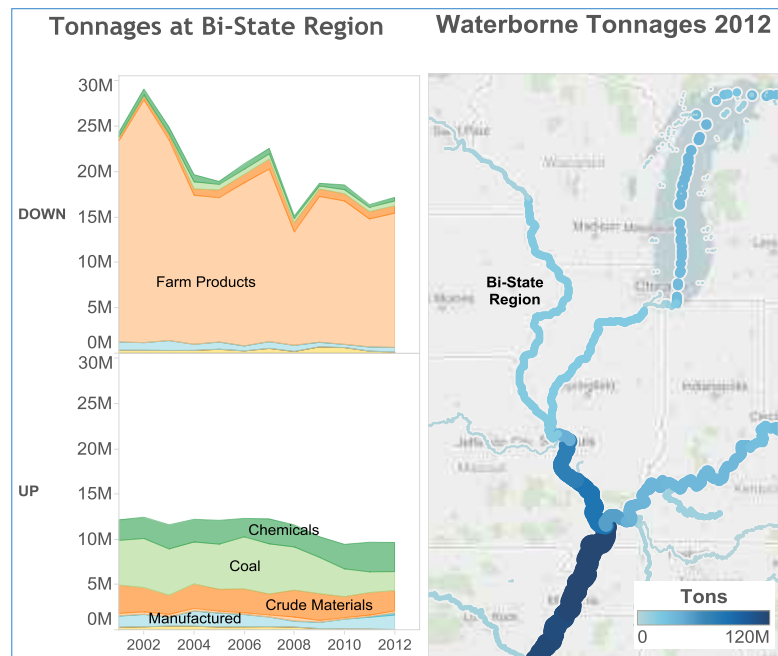
NEEDS AND CHALLENGES

There are many facilities in the Bi-State Region that abut the waterway. The U.S. Army Corps of Engineers has identified over 30 docks owned by private and public interests, serving as transshipment points or providing direct access to river-side production facilities. These and other facilities provide shippers and business in the area access to this valuable natural transportation asset.

However, the primary challenges regarding the efficiency of the Bi-State Region's waterway system is the maintenance and capacity of its vital lock and dam infrastructure that serves not only the region but are also essential to national inland waterway transportation. Lock 14 is located at LeClaire, Iowa, Lock 15 at Rock Island, Illinois, Lock 16 at Muscatine, IA, and Lock 17 at New Boston, Illinois. All of these were constructed in the 1930s, with the exception of Lock 14 which was opened in 1922.

Lack of maintenance on the inland waterway system as a whole is challenging waterborne transportation in the U.S. The condition of the locks lessens the reliability of the waterway system. Unreliability, in turn, makes companies hesitant to rely heavily on the waterway system. Figure 23 illustrates the performance of the four sequential locks on the Mississippi River. This

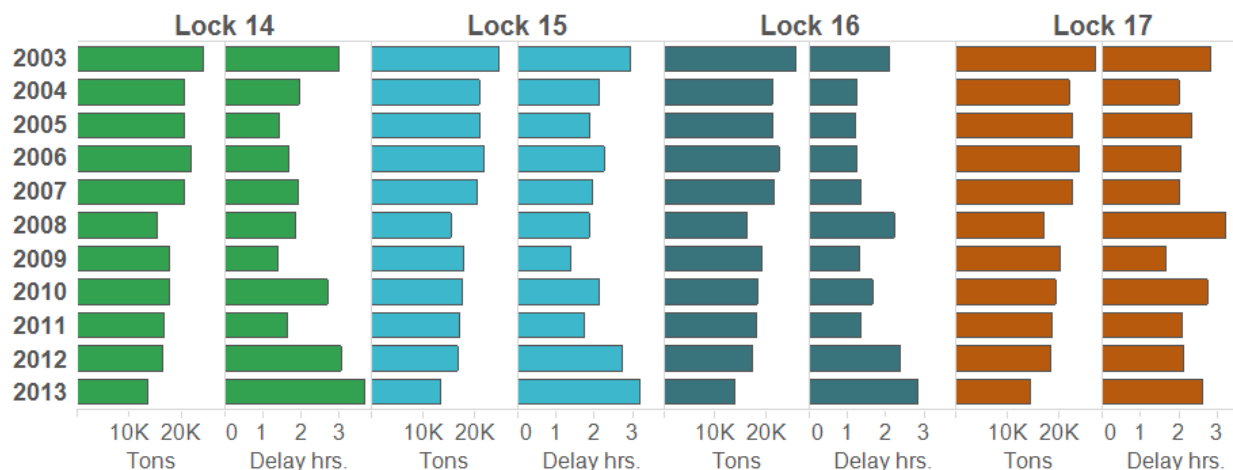
Figure 22. Waterborne Facilities in the Bi-State Region



Source: U.S. Army Corps of Engineers.

is a powerful figure because it shows clearly the relationship between delays, measured in hours, and freight tonnages. At these locks, 36 percent of vessels are delayed, and the amount of time delayed is increasing.

Figure 23. Delay at Locks and Dams in the Bi-State Region



Source: U.S. Army Corps of Engineers.

An additional factor causing lock delays is that none of the locks can accommodate a typical 3-barge by 5 barge configuration powered by a single tow. To go through, this barge configuration must be broken apart, requiring several lockages and doubling or tripling the crossing time.

RECOMMENDATIONS AND INVESTMENTS

One concept has been identified to enable the Bi-State Regions waterway system to better serve industry needs is to build an **intermodal, transload, and/or consolidation facility**. On both the water and railway systems, the presence of facilities that can handle and consolidate goods for transport will increase the attractiveness of the region to industries. Already, one company in Muscatine, IA is exploring the potential for expanded port facilities and capabilities (including Container on Barge) on their property as a means to provide system redundancy and to help take trucks off the road. One role of the Bi-State Regional Commission in furthering this effort can be to help make the "business case" for new or expanded facilities in the region, ensure the long-term feasibility of the market, and pursue funding and investment, as warranted.

Maintaining the reliability of the waterway system – both in the Bi-State region and throughout the inland United States, is crucial to maintaining competitive shipping options for the region's industries. The Bi-State Regional Commission can serve as an advocate for waterway investments, and support innovative funding and public-private partnerships to invest in the regional waterway system, inland waterway port infrastructure, shipping channel maintenance, and lock and dam infrastructure.

The Bi-State Region's rail infrastructure dates back to the Chicago, Rock Island and Pacific Railroad ("Rock Island"), which was founded in Rock Island, Illinois in the mid-1800s to connect the region to Chicago and freight centers in the western and southern U.S. Today, rail remains essential for moving raw materials, finished goods, and agricultural products to, from, within, and through the Bi-State Region. This profile is one in a series of five that documents and characterizes the movement of freight to, from, within, and through the Bi-State Region on each of the modal freight networks.

THE RAIL SYSTEM IN THE BI-STATE REGION

Today, rail service in the Bi-State Region is provided via direct connections to two Class I railroads and one short line rail carrier,¹ as described in Table 4. In total, there are nearly 300 miles of rail infrastructure across the three railroads in the region. Rail operations are largely divided by the state borders. The Iowa Interstate Railroad (IAIS) bisects the region and runs east-west over trackage rights with both BNSF Railway (BNSF) and Canadian Pacific (CP/DM&E). BNSF interchanges with IAIS in Moline, IL and serves industries on the Illinois side of the Mississippi River and continues south to Galesburg, IL and north to Minneapolis-St. Paul, MN. CP/DM&E interchanges with IAIS in Davenport, IA and continues southwest to Kansas City, MO and north to Minneapolis-St. Paul. Track ownership is well-defined in the area, though trackage rights are shared by all three for the majority of network in and around the Bi-State Region.

Table 4. Railroad Infrastructure in the Bi-State Region

Railroad	Quad Cities Track Mileage ^a	Quad Cities Subdivisions	Yard Locations
BNSF	80 Miles	Barstow Mendota	Barstow Rock Island (with IAIS, DM&E) Silvis
CP/DM&E	110 Miles	Davenport Eldridge Nitin Ottumwa	Bettendorf (with BNSF) Buffalo Muscatine Nahant West Davenport
IAIS	102 Miles	Subdivision 1	Rock Island (with BNSF, DM&E) Silvis

Source: Oak Ridge National Laboratory (ORNL) Operational Network, National Transportation Atlas Database (NTAD).

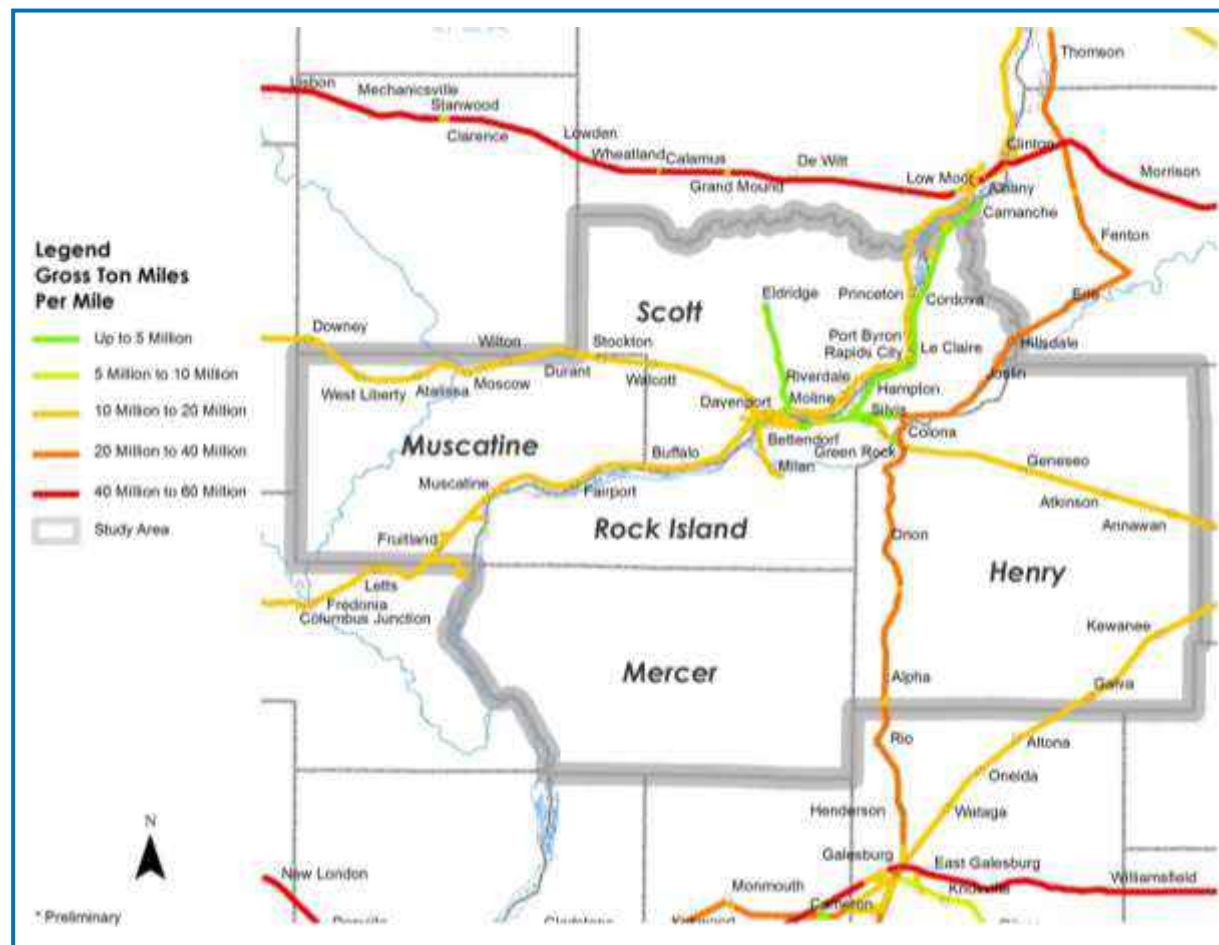
^aMileages are approximate.

Density of rail traffic (measured in million gross ton-miles per mile) is relatively substantial in the Quad Cities metropolitan area, but moderate in the towns along the Mississippi River outside of the urban area. The highest density corridor is the Union Pacific (UP) line which sits just outside the 5-county Bi-State Region, as shown in Figure 24.

Though rail carriers operating in the Bi-State Region offer access to a range of markets throughout North America, the Bi-State Region is not home to any large rail yards, intermodal facilities, or bulk loading facilities. It is, however, within reasonable rail and truck distance to Class I intermodal facilities and is in close proximity to major classification yards in Savanna and Galesburg, IL. The nearest intermodal terminal is UP's Global III Park in Rochelle, IL - approximately 90 miles east. UP's Global II facility in Proviso and BNSF's Logistics Park Chicago are about 160 miles east of the Bi-State Region.

¹ In the U.S., railroads are regulated by the Surface Transportation Board and classified based on annual operating revenues. According to the Association of American Railroads, current criteria are: Class I: \$467 million or more; Class II: \$37.4 million but less than \$467 million; and Class III: less than \$37.4 million.

Figure 24. Rail Density in the Bi-State Region



Source: Oak Ridge National Laboratory Operational Network; Bureau of Transportation Statistics National Transportation Atlas Database.

DEMAND DRIVERS

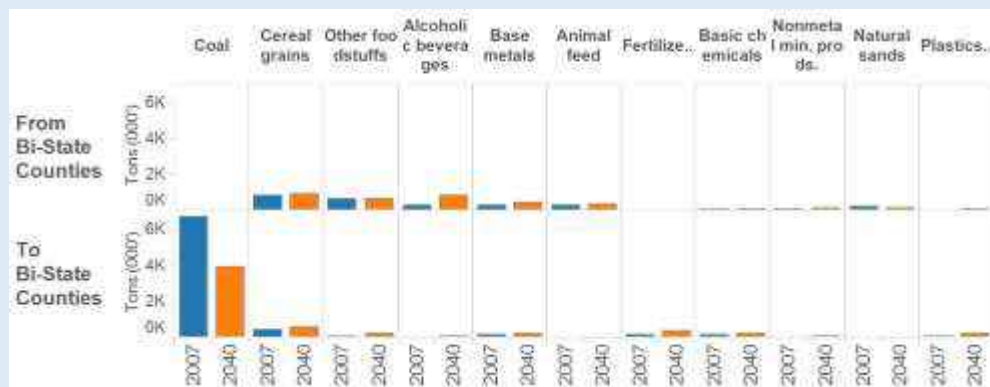
Rail serves the Bi-State Region in two different ways:

- 1) direct connection to facilities by Class I or short line railroads, or
- 2) drayage via truck to regional intermodal facilities.

The main commodity transported by rail is coal, as shown in Figure 25. Coal is brought to the region by rail primarily from Wyoming, but

also from Wisconsin and Colorado to a lesser degree, as shown in Figure 26. Table 5 shows the rail tons, by county. Scott and Muscatine Counties are the top receivers of rail tons, primarily coal. In 2007, there were five coal power plants served by rail operating in the region. However, since then one of them has closed and two are in the process of converting to natural gas.

Figure 25. Primary Commodities Shipped to and from the Bi-State Region



Source: PB Disaggregation of Freight Analysis Framework, 2007.

This is a national trend toward energy sources to be cleaner and less carbon intensive, leading to a reduction in coal traffic in future years. Other commodities also move by rail, such as cereal grains, food products, alcoholic beverages, and mining products. Even though they represent less tons than coal, on a value basis they are likely to be more significant.

Figure 36. Origins and Destinations of Coal and Cereal Grains in the Bi-State Region.



Source: PB Disaggregation of Freight Analysis Framework, 2007.

Cereal grains – one of the most important commodities for the region – has very different inbound and outbound flow profiles as shown in Figure 3. About twice as much grain enters the region by truck as exists. This grain is then put on rail to be transported outbound to several states in the South, mainly to Louisiana, Mississippi, and Texas.

Table 5. Freight Rail Flows by County

	Rail Tons Originated (Thousands)	Rail Tons Received (Thousands)	Rail Tons Within County (Thousands)
Henry, IL	766	350	3.1
Mercer, IL	344	67	0.0
Rock Island, IL	627	663	0.0
Muscatine, IA	623	1,777	0.0
Scott, IA	939	5,373	13.7
Total	3,300	8,230	16.8

Source: PB Disaggregation of Freight Analysis Framework, 2007

NEEDS AND OPPORTUNITIES

There are a number of needs and opportunities related to the rail system in the Bi-State Region. The region is served by three railroads (with a fourth – UP – nearby), which provides opportunities for national connectivity, but can also lead to operational challenges. To reach local industries, shipments often have to switch between railroads (for example, from CP/DM&E to BNSF) causing delays and resulting in slower travel times for businesses.

In terms of infrastructure, Iowa DOT conducted a study of railroad bottlenecks, shown in Figure 27, which identified the bridge labeled as '16' as a major freight bottleneck in the region. Rail traffic is restricted at this bridge to 10 mph, and the bridge is not equipped to handle rail cars with standard 286,000-pound loads. Barge movements that require the bridge to open also further delay rail traffic.

Another challenge in the region is the lack of nearby intermodal service. The closest intermodal yards are relatively far away. The closest yards are located in Rochelle and Chicago, Illinois, about 150 to 200 miles away, leading drayage trips to be

relatively expensive, offsetting line-haul economies from rail transport. There is also substantial vehicular and rail congestion in the Chicago area, causing shippers to prefer to ship directly by truck to destinations in the east. Shipping west by intermodal is even less competitive as the closest terminals are located in Council Bluffs, Iowa near Omaha, Nebraska.

Figure 27. Freight Rail Bottlenecks in the Bi-State Region.



Source: Iowa DOT

Perhaps the biggest issues facing the users of the Bi-State Region's rail system are accessibility and competitiveness of service. As described above, rail carriers operating in the region offer access to a range of markets throughout North America, yet the Bi-State Region's industries mostly depend on rail spurs or smaller connections for individual industries, instead of transload, intermodal, or bulk loading facilities which can provide efficiencies in loading large amounts of goods to and from the rail system. Because of this, the region does not attract the type of competitive service that the region's shippers desire, despite the fact that the Quad Cities is a multistate manufacturing and production center. Increasing access to rail infrastructure and encouraging more competitive rail service are priorities of many area businesses.

RECOMMENDATIONS AND INVESTMENTS

The lack of major rail facilities within the Bi-State Region affects regional mobility. The Bi-State Region's close proximity to Chicago encourages rail operators to serve the Quad Cities out of the larger market, despite the Bi-State Region's role as a production hub. A new or expanded Bi-State region **intermodal, transload, and/or consolidation facility** that can handle and consolidate goods for transport will increase the attractiveness of the region to industries. One role of the Bi-State Regional Commission in furthering this effort can be to help make the "business case" for new or expanded facilities in the region, ensure the long-term feasibility of the market, and pursue funding and investment. Additional recommended investments on the rail system include:

- **Increase rail spurs and connections from Iowa Interstate Railroad.** IAIS is the primary short line railroad in the region, and needs efficient and reliable connections with other railroads to provide a high level of service to regional companies.
- **Consider a new Rail Bridge over Mississippi River.** Rail bridges in the Bi-State Region are significant freight bottlenecks. Seasonally, the Arsenal Bridge is prone to flooding, limiting the usability of the bridge and limiting system resiliency.

While pursuing these new opportunities, the Bi-State Regional Commission should continue to work with local businesses and railroads to increase access to existing rail facilities in the region.

The Bi-State Region is a diverse region comprised of a mid-sized urban center, smaller towns, and rural areas. A producer of agricultural and manufacturing goods, the region is a source for both domestic and international trade. With limited air cargo service in the region, the Bi-State Region relies on its freight network to connect to air hubs such as Chicago O'Hare International Airport. This profile is one in a series of five that documents and characterizes the movement of freight to, from, within, and through the Bi-State Region.

THE AIR TRANSPORTATION SYSTEM IN THE BI-STATE REGION

The Bi-State Region is home to six airports, of which Quad City International (MLI) has commercial service, and Davenport Municipal serves as a larger general aviation airport. In the 1990s, the Quad City was served by scheduled, integrated carriers such as Burlington Air Express (BAX Global), Emery, and Airborne Express; however, none of these serve the market today. The sole remaining air cargo carrier is Ameriflight, which is an air feeder service for United Parcel Service (UPS) on smaller, turboprop aircraft. MLI remains a hub for non-air industrial and consolidation activities, with developing industrial parks and nearby UPS and FedEx ground facilities.

Figure 28. Map of facilities at Quad City International Airport (MLI).



Source: Quad City International Airport, 2012

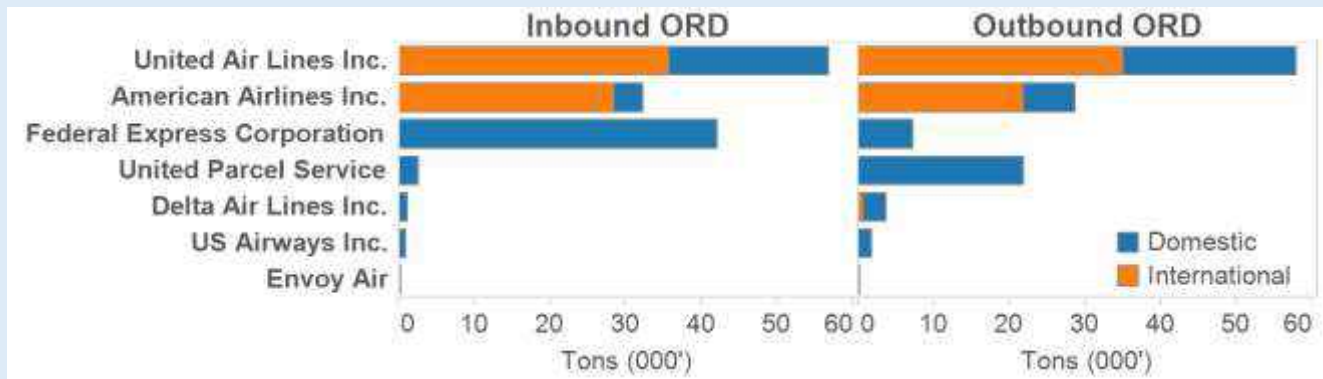
Currently, the region is dependent on gateways outside of the region – primarily Chicago O'Hare International Airport (ORD), 200 miles to the east in Chicago, IL for air freight service. This reflects national trends towards consolidation of air freight facilities into a few key hubs. Goods moving to and from the Bi-State Region travel via truck to these hubs, where they are shipped to domestic and international destinations. Performance and reliability of the highway transportation system are essential for making smooth connections for air transportation.

DEMAND DRIVERS AND FACILITIES

ORD, which serves as the primary cargo gateway for the Bi-State Region, is one of the largest air cargo airports in the US, offering connections to all regions of the US and most key airports in Europe and Asia.

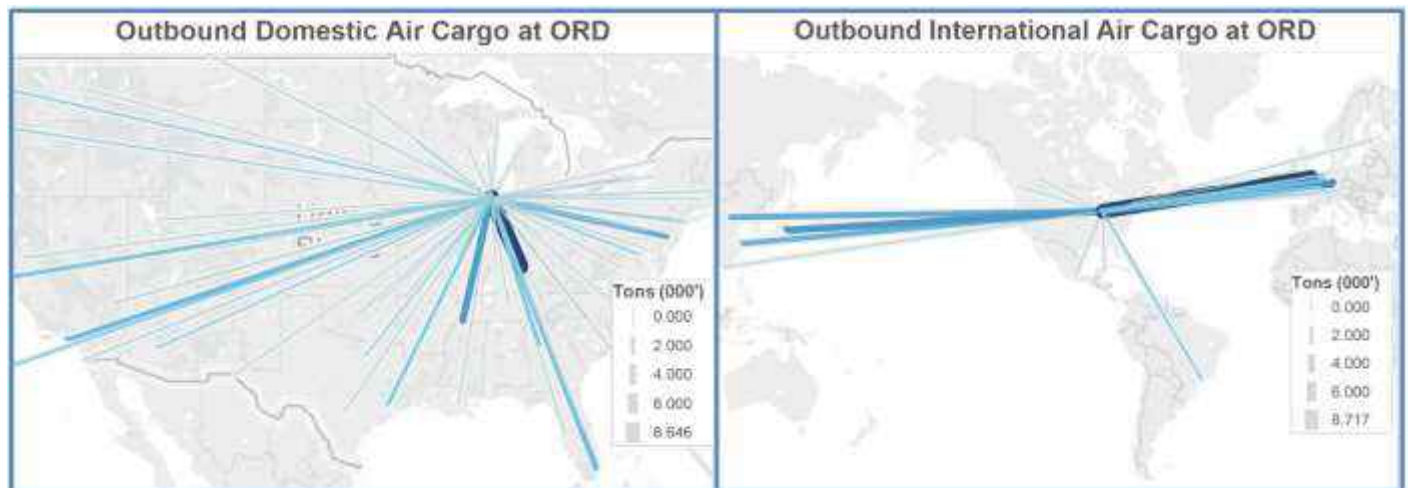
ORD is served by several airlines on international and domestic routes. United Airlines, American Airlines, FedEx, and UPS are the largest air cargo carriers. FedEx and UPS provide domestic service exclusively, mostly connecting back to their respective air cargo hubs in Memphis and Louisville.

Figure 29: Volume of Air Cargo at O'Hare International Airport



Source: 2013 USDOT BTS T-100 Dataset

Figure 30: Origins and Destinations for Air Cargo Shipments at O'Hare International Airport



Source: USDOT BTS T-100 Dataset

NEEDS AND OPPORTUNITIES

Access to air service is important to industry – not only for shipping freight and packages, but also travel for employees and executives of the Bi-State Region's many businesses. Due to its reliance on service outside the region, smooth and resilient connections via the highway system are of utmost importance, as many air shipments are both high-value and time-sensitive.

There is an opportunity for increased development of the region's airports to support the local economy. Whether as an air hub and Midwest distribution center for a niche product (i.e. flowers), or through increased industrial development of the land surrounding the Quad City International in particular, the region's airports continue to be an asset and opportunity for investment.

RECOMMENDATIONS AND INVESTMENTS

The Bi-State Regional Commission can play a supporting role in furthering activities underway or planned by the Quad City International Airport and other regional airports – both opportunities to develop air cargo, passenger, and general aviation services on the "airside," and development of industrial parks or freight facilities on the "landside."