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United States Government Accountability Office
Washington, DC 20548

January 15, 2009

The Honorable Byron L. Dorgan
United States Senate

The Honorable Kent Conrad
United States Senate

The Honorable Earl Pomeroy
House of Representatives

Subject: *Missouri River Navigation: Data on Commodity Shipments for Four States Served by the Missouri River and Two States Served by Both the Missouri and Mississippi Rivers*

The Missouri River reservoir system is a critical national resource that provides a variety of benefits, including navigation, flood control, irrigation, hydropower, municipal and industrial water supply, recreation, and fish and wildlife habitat. The U.S. Army Corps of Engineers (Corps) is responsible for operating the Missouri River system to serve these congressionally authorized purposes. Between 1933 and 1964, the Corps built six dams on the Missouri River to serve the water resource needs within the Missouri River basin. The resulting reservoirs form a series of lakes from Montana to the South Dakota-Nebraska border. The Corps manages the system of dams and reservoirs according to the water control plan presented in its *Missouri River Mainstem Reservoir System Master Water Control Manual*, which was first published in 1960 and most recently revised in 2006. The master manual provides water control criteria for the reservoir system for a spectrum of anticipated runoff conditions. Annual operating plans based on these criteria provide detailed reservoir regulation for each operating year.

Four states, Iowa, Nebraska, Kansas, and Missouri, are adjacent to the Missouri River and are served by barge and other vessel traffic along the river. Two states, Iowa and Missouri, are served by navigation on both the Missouri River and the Mississippi River (see fig. 1). Both private companies and the Corps have conducted navigation activities on the Missouri River to and/or from these states. Companies transport numerous commodities, such as fertilizer, which is shipped from a port of origin to a port of destination, or sand and gravel, which some companies mine from the river and then transport to a processing facility on shore. In addition, the Corps conducts river maintenance and habitat recovery projects, which require the shipment of

waterway improvement material, such as stone or rock.¹ In this context, you asked us to determine (1) the annual and total tonnage of commodity shipments for each state served by the Missouri River, and (2) the comparable tonnage of commodity shipments transported on the Mississippi River for states served by both the Missouri and Mississippi rivers.

Figure 1: States Served by Navigation on the Missouri River



Sources: GAO (data); MapInfo (map).

To determine the tonnage of commodities transported on the Missouri River and the comparable tonnage shipped to and/or from Missouri and Iowa on the Mississippi River, we obtained and analyzed data for January 1, 1994, through December 31, 2006, from the Corps' Waterborne Commerce Statistics Center.² We obtained the data for shipments on the Missouri River with an origin and/or destination in Missouri, Iowa, Kansas, or Nebraska. We also obtained data for shipments on the Mississippi River with an origin and/or destination in Missouri or Iowa, but did not collect or analyze data for shipments that passed through the Mississippi River waterways of Missouri or Iowa without starting or ending their trips in these states. We defined annual tonnage shipped for each state as all tons shipped that originate or terminate in a state. For example, if a shipment originates in Missouri and terminates in Kansas, that

¹The Corps also conducts maintenance activities that result in the transport of dredged material. According to Corps officials, the agency conducted two dredging projects on the Missouri River between 1994 and 2006, which resulted in 111,333 cubic yards of dredged material being transported on the river. Because the Corps does not track dredged material in the same manner as it does other commodity shipments, we did not include dredged material shipments in our review.

²The primary function of the Waterborne Commerce Statistics Center, under the authority of the Rivers & Harbors Act of 1922, is to collect, process, distribute, and archive vessel trip and cargo data. This data is self-reported to the Corps by vessel operating companies engaged in transporting goods upon navigable waters of the United States.

shipment's tonnage is counted toward the total for the state of Missouri and the state of Kansas. However, shipments that originate and terminate within the same state are only counted once.

For the purposes of our review, we generally aggregate commodities into three categories: (1) sand and gravel; (2) other commercial products—which include all manufactured equipment, machinery, and products (manufactured equipment); chemicals and related products (chemicals); coal, lignite and coal coke, crude material, inedible except fuel (crude material); food and farm products; petroleum and petroleum products (petroleum); primary manufactured goods; and (3) waterway improvement material. According to Corps officials, sand and gravel and other commercial products primarily constitute commercial shipments. In contrast, we consider waterway improvement material as primarily noncommercial shipments, because this material is mainly stone or rock transported on behalf of the Corps for river maintenance or habitat recovery purposes.

We assessed the reliability of the data we obtained by interviewing Corps officials, determining the Corps' process for collecting and reviewing the data, and performing various tests on the data—such as comparing a number of source documents submitted by vessel operators to data within the Corps' database. We determined that the data were sufficiently reliable for the purposes of this review.

On December 11, 2008, and December 19, 2008, we briefed your offices on the results of our review. This report summarizes the information presented in those briefings and officially transmits the slides used during the briefings in enclosure I.

Summary

Of the total commodity tonnage shipped on the Missouri River between 1994 and 2006, 83 percent (100,183,464 tons) originated and/or terminated in the state of Missouri. For the other states served by navigation on the Missouri River, Kansas accounted for 12 percent (14,171,543 tons), Nebraska accounted for 3 percent (3,279,355), and Iowa accounted for 2 percent (2,578,890) of the tonnage transported. Tonnage shipped per year over the 13-year period has ranged between 6.9 million and 9.7 million tons.

The majority of the shipments on the Missouri River during this period were of sand and gravel, which accounted for 84 percent (about 91.3 million tons) of the total tonnage shipped. Of this amount, approximately 54 percent of the sand and gravel was transported 1 mile or less, 31 percent between 2 and 9 miles, and 14 percent was transported 10 miles or more. According to Corps officials, the short distance traveled is because private companies often mine sand and gravel directly from the Missouri River and then ship the material short distances to a processing facility on shore. Other commercial products accounted for 14 percent of the total tonnage shipped between 1994 and 2006, including 5.2 million tons in food and farm products, 4 million tons of chemicals, 3 million tons of petroleum, 2.5 million tons of primary manufactured goods, 346,460 tons of crude material, and 14,663 tons of manufactured equipment. Waterway improvement material, with 2.2 million tons, accounted for 2 percent of the total tonnage during this period.

For the two states that are served by both the Missouri and Mississippi Rivers, tonnage shipped on the Mississippi River was greater than the tonnage shipped on the Missouri River for comparable products. For example, 2.8 million tons of food and farm material were shipped to and/or from Missouri or Iowa on the Missouri River between 1994 and 2006. In contrast, 189 million tons of food and farm material were shipped to and/or from Missouri or Iowa on the Mississippi River during the same period. Sand and gravel was the exception, with about 89 million tons shipped to and/or from Missouri on the Missouri River, compared to about 70 million tons of sand and gravel that were shipped to and/or from Missouri on the Mississippi River.

Agency Comments

We obtained oral comments on our draft briefing slides at a meeting with senior Corps staff, including the Acting Director for the Waterborne Commerce Statistics Center. In commenting on the slides, these Corps officials concurred with our analysis. The Corps provided technical comments, which we incorporated as appropriate.

We are sending copies of this report to the U.S. Army Corps of Engineers and interested congressional committees. In addition, the report also is available at no charge on GAO's Web site at <http://www.gao.gov>.

If you or your staffs have any questions concerning this report, please contact me at (202) 512-3841 or mittala@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Key contributors to this report were Vondalee R. Hunt (Assistant Director), Pedro Almoguera, Mehrzad Nadji, Benjamin Shouse, and Jay Spaan.



Anu K. Mittal
Director, Natural Resources
and Environment

Enclosure



The Missouri River reservoir system is a critical national resource that provides a variety of benefits, including navigation, flood control, irrigation, hydropower, municipal and industrial water supply, recreation, and fish and wildlife habitat. Iowa, Nebraska, Kansas, and Missouri are the four states adjacent to the Missouri River that are served by barge and other vessel traffic along the river. Two states, Missouri and Iowa, are served by navigation on both the Missouri River and the Mississippi River. In this context, you asked us to determine (1) the annual and total tonnage of commodity shipments for each state served by the Missouri River and (2) the comparable tonnage of commodity shipments transported on the Mississippi River for states served by both the Missouri and Mississippi rivers.

Scope and Methodology

To determine the tonnage of commodities transported on the Missouri River and portions of the Mississippi River, we obtained and analyzed data from the Corps' Waterborne Commerce Statistics Center. This data is self-reported to the Corps by vessel operating companies engaged in transporting goods upon the navigable waters of the United States. We obtained the data for January 1, 1994, through December 31, 2006. We assessed the reliability of the data and determined that the data were sufficiently reliable for the purposes of this review.

GAO Contact

If you have any questions concerning this briefing, please contact Anu K. Mittal at (202) 512-3841 or mittala@gao.gov.

Data on Commodity Shipments for Four States Served by the Missouri River and Two States Served by Both the Missouri and Mississippi Rivers

Background

Between 1933 and 1964, the U.S. Army Corps of Engineers (Corps) built six dams on the Missouri River to serve the water resource needs within the Missouri River basin. The resulting reservoirs form a series of lakes from Montana to the South Dakota-Nebraska border. The Corps manages the system of dams and reservoirs according to the water control plan presented in its *Missouri River Mainstem Reservoir System Master Water Control Manual*, which was first published in 1960 and most recently revised in 2006. The master manual provides water control criteria for the reservoir system for a spectrum of anticipated runoff conditions. Annual operating plans based on these criteria provide detailed reservoir regulation for each operating year.

Both private companies and the Corps transport commodities on the Missouri River. Private companies transport numerous commodities, such as fertilizer, which is shipped from a port of origin to a port of destination, and sand and gravel, which they often mine from the river and then transport to a processing facility on shore. In contrast, the Corps conducts river maintenance and habitat recovery projects, which require the shipment of waterway improvement material, such as stone or rock. The Corps also conducts maintenance activities that result in the transport of dredged material. According to Corps officials, the agency conducted two dredging projects on the Missouri River between 1994 and 2006, which resulted in 111,333 cubic yards of dredged material being transported on the river. Because the Corps does not track dredged material in the same manner as it does other commodity shipments, we did not include dredged material shipments in our review.

Commodities are classified according to the Waterborne Commerce Statistics Center Commodity Classification List and reflect the hierarchical structure of the Standard International Trade Classification Codes. For our review, we generally aggregated commodities into 3 categories: (1) sand and gravel; (2) other commercial products—including all manufactured equipment, machinery, and products (manufactured equipment); chemicals and related products (chemicals); coal, lignite and coal coke, crude material, inedible except fuel (crude material); food and farm products, petroleum and petroleum products (petroleum); and primary manufactured goods; and (3) waterway improvement material, such as stone or rock. Sand and gravel and other commercial products shipments are considered commercial shipments, while waterway improvement material shipments are considered noncommercial.

Briefing Structure

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Total Tonnage Shipped on the Missouri River

Of the total commodity tonnage shipped on the Missouri River between 1994 and 2006

- Missouri accounted for 83 percent,
- Kansas accounted for 12 percent,
- Nebraska accounted for 3 percent, and
- Iowa for 2 percent.

(See figure 1.)

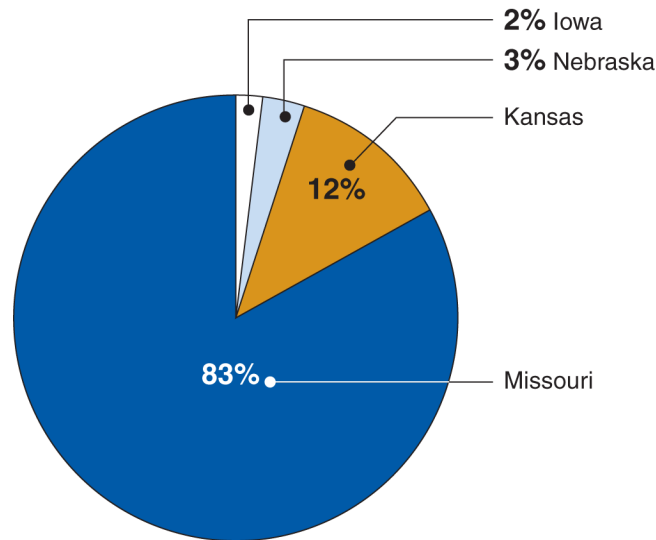
Between 1994 and 2006, tonnage shipped to and/or from Missouri was relatively consistent over time, peaking in 2001 at about 8.9 million tons, and approximately 8 million tons were shipped in 2006, the most recent year for which data are available.

Kansas experienced an increase in tonnage shipped from 2000 to 2001, peaking at 2.3 million tons in 2001, and slightly declining to 2 million tons in 2006.

Iowa experienced a decrease in tonnage shipped during this time, experiencing its highest level of tonnage shipped in 2000 with 343,258 tons. However, shipments declined from 2001 to 2003, and no shipments were reported for the state between 2004 and 2006.

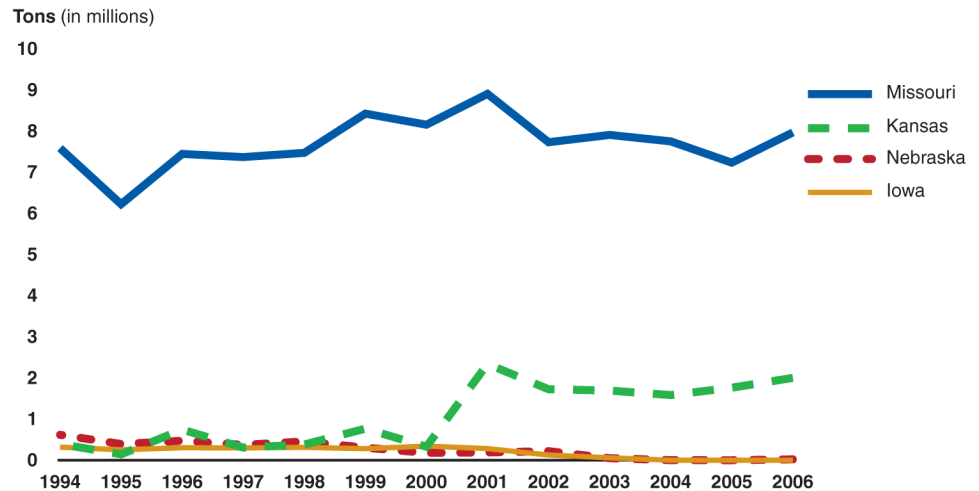
Similarly, Nebraska had its highest level of tonnage shipped in 1994 at 617,813 tons, but subsequently tonnage declined to zero in 2005, and 21,356 tons were shipped in 2006. (See figure 2.)

Figure 1: Percentage of Total Tonnage Shipped on the Missouri River, for Four States, 1994 to 2006



Source: GAO analysis of Corps Waterborne Commerce Statistics data.

Figure 2: Annual Tonnage Shipped on the Missouri River, for Four States, 1994 to 2006



Source: GAO analysis of Corps Waterborne Commerce Statistics data.

Note: Annual tonnage shipped for each state is defined as all tons shipped that originate or terminate in a state. For example, if a shipment originates in Missouri and terminates in Kansas, that shipment's tonnage is counted toward the total for the state of Missouri and the state of Kansas. Shipments that originate and terminate within the same state are only counted once.

Enclosure I

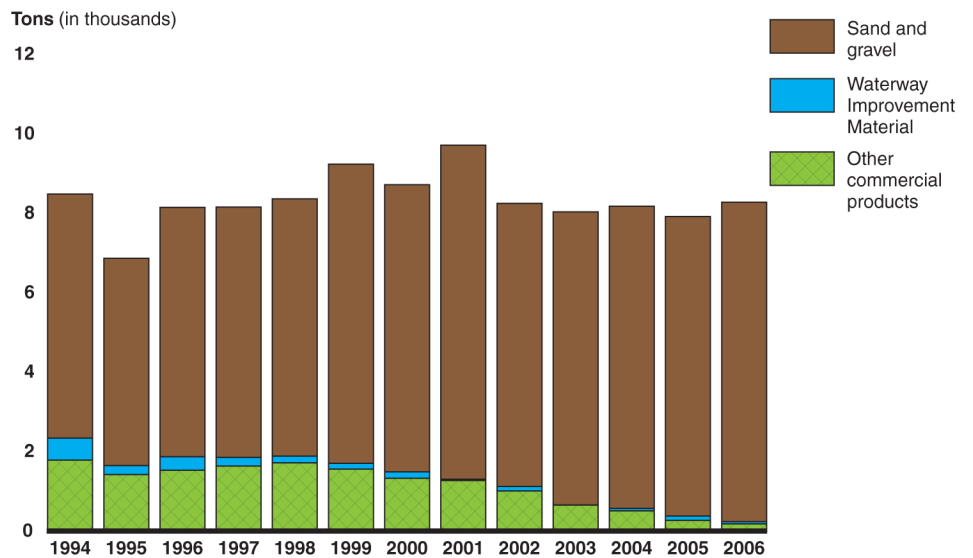
Between 1994 and 2006, more than 108 million tons of commodities were transported on the Missouri River. Of the total commodity tonnage shipped on the river

- sand and gravel accounted for 84 percent of the total with about 91.3 million tons;
- other commercial products accounted for 14 percent of the total with 5.2 million tons in food and farm products, 4 million tons of chemicals, 3 million tons of petroleum, 2.5 million tons of primary manufactured goods, 346,460 tons of crude material, and 14,663 tons of manufactured equipment; and
- waterway improvement material accounted for 2 percent of the total with 2.2 million tons.

Total tonnage shipped per year over the 13-year period has ranged between 6.9 million and 9.7 million tons. As also shown in figure 3, sand and gravel shipments have increased by 24 percent, while other commercial products shipments have decreased by 89 percent. Similarly, over this period, shipments of waterway improvement material also decreased by 90 percent.

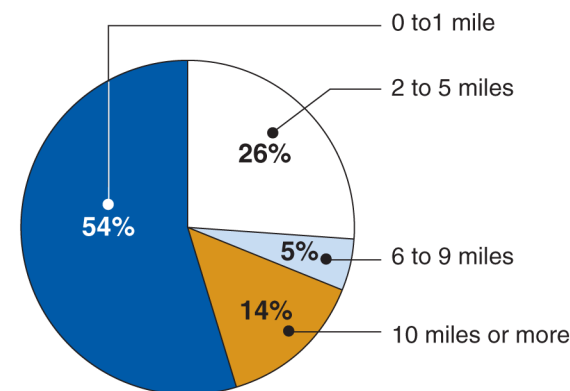
Of the total sand and gravel tonnage shipped between 1994 and 2006, about 54 percent were transported 1 mile or less, 26 percent between 2 and 5 miles, 5 percent between 6 and 9 miles, and about 14 percent 10 miles or more. According to Corps officials, the short distance traveled is because private companies often mine sand and gravel directly from the Missouri River and then ship the material short distances to a processing facility on shore. (See figure 4.)

Figure 3: Annual Tonnage Shipped on the Missouri River, by Commodity Group, 1994 to 2006



Source: GAO analysis of Corps Waterborne Commerce Statistics Center data.

Figure 4: Percentage of Total Sand and Gravel Tonnage Shipped, by Distance Traveled, 1994 to 2006



Source: GAO analysis of Corps Waterborne Commerce Statistics data.

Note: The sum of the totals does not add up to 100 percent due to rounding.

Commodity Shipments on the Missouri River, by State

Missouri

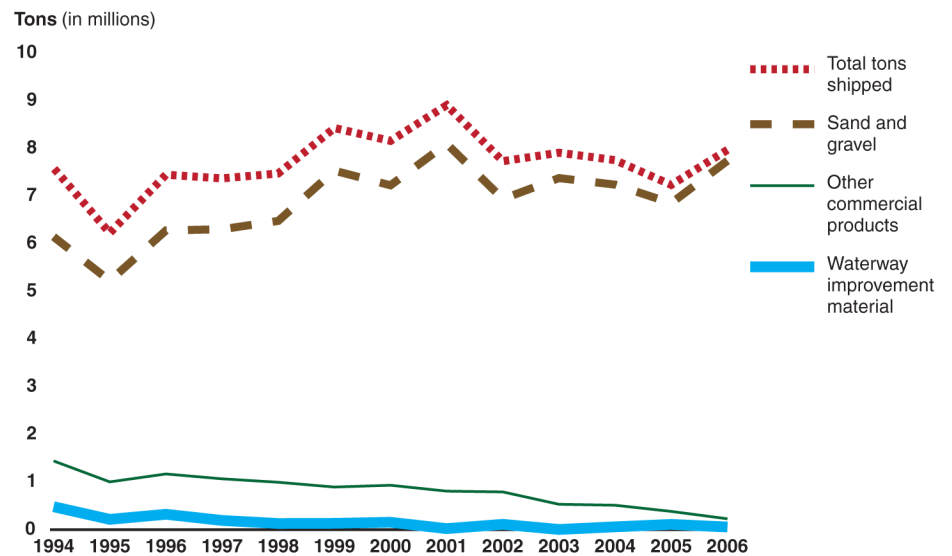
Between 1994 and 2006, barges and other vessels transported 100,183,464 tons of commodities on the Missouri River to and/or from Missouri. Sand and gravel accounted for almost 90 percent of the total tonnage shipped, while other commercial products, such as manufactured goods, accounted for 9 percent of the total. Waterway improvement material accounted for approximately 2 percent of the total tonnage shipped to and/or from the state. (See figure 5.)

Iowa

Between 1994 and 2006, barges and other vessels transported about 2.5 million tons of commodities on the Missouri River to and/or from Iowa. Of the total shipments, chemicals accounted for about 46 percent of the total, while other commercial products, such as food and farm products, accounted for 52 percent. Waterway improvement material accounted for about 1 percent of the total tonnage shipped for the state.

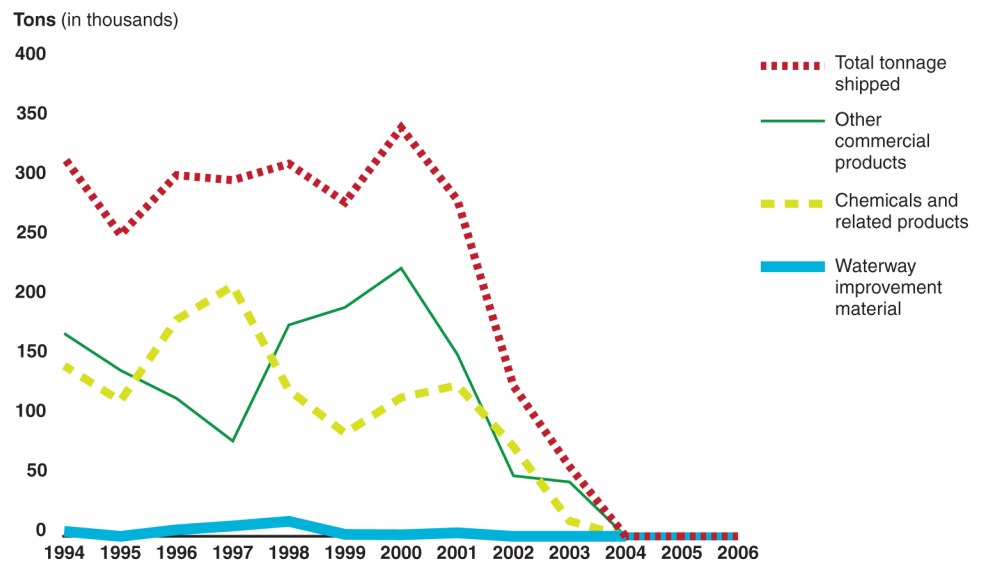
The decrease in tonnage shipped to and/or from Iowa was primarily in other commercial products, such as chemicals and food and farm products. The tonnage of chemicals shipped decreased by 89 percent between 2000 and 2003, while the tonnage of food and farm products decreased by 75 percent during the same time period. (See figure 6.)

Figure 5: Annual Tonnage Shipped on the Missouri River to and/or from Missouri, by Commodity Group



Source: GAO analysis of Corps Waterborne Commerce Statistics Center data.

Figure 6: Annual Tonnage Shipped on the Missouri River to and/or from Iowa, by Commodity Group



Source: GAO analysis of Corps Waterborne Commerce Statistics data.

Note: The Corps data indicate that there were no shipments of sand and gravel to and/or from Iowa between 1994 and 2006.

Kansas

Between 1994 and 2006, barges and other vessels transported 14,171,543 tons of commodities on the Missouri River to and/or from Kansas. Sand and gravel accounted for about 90 percent of the total tonnage shipped, while other commercial products, such as petroleum and food and farm products, accounted for 10 percent. Waterway improvement material accounted for less than 1 percent of total tonnage shipped for the state.

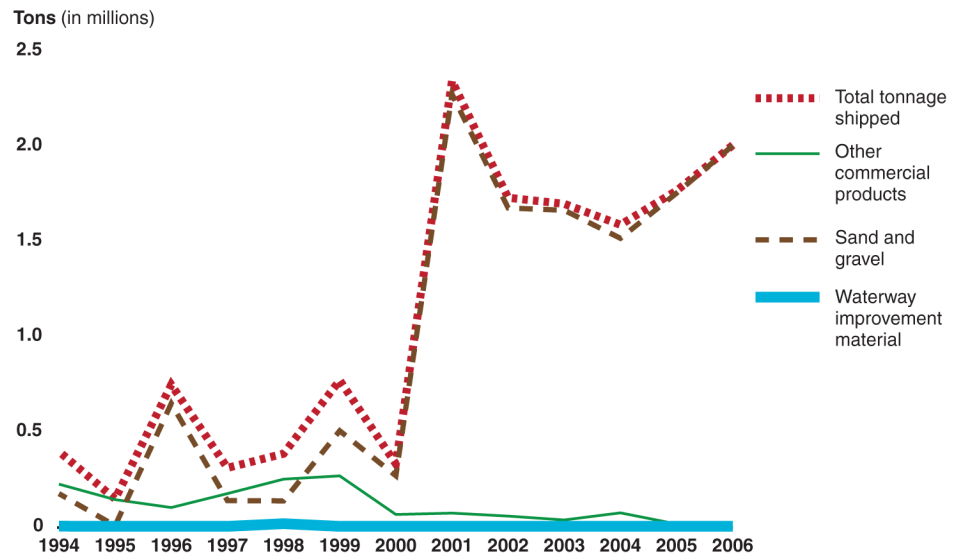
Kansas experienced a significant increase in total tonnage shipped between 2000 and 2001. The increase can be attributed to an 88 percent increase in sand and gravel tonnage shipped on the river. However, while sand and gravel tonnage increased, food and farm products tonnage decreased by 96 percent between 1999 and 2004, from 200,166 tons to 7,444 tons. (See figure 7.)

Nebraska

Between 1994 and 2006, barges and other vessels transported approximately 3.3 million tons of commodities on the Missouri River to and/or from Nebraska. Nearly 47 percent of the total tonnage was food and farm products, while other commercial products, such as chemicals, accounted for 44 percent. Waterway improvement material accounted for approximately 9 percent of the total tonnage shipped.

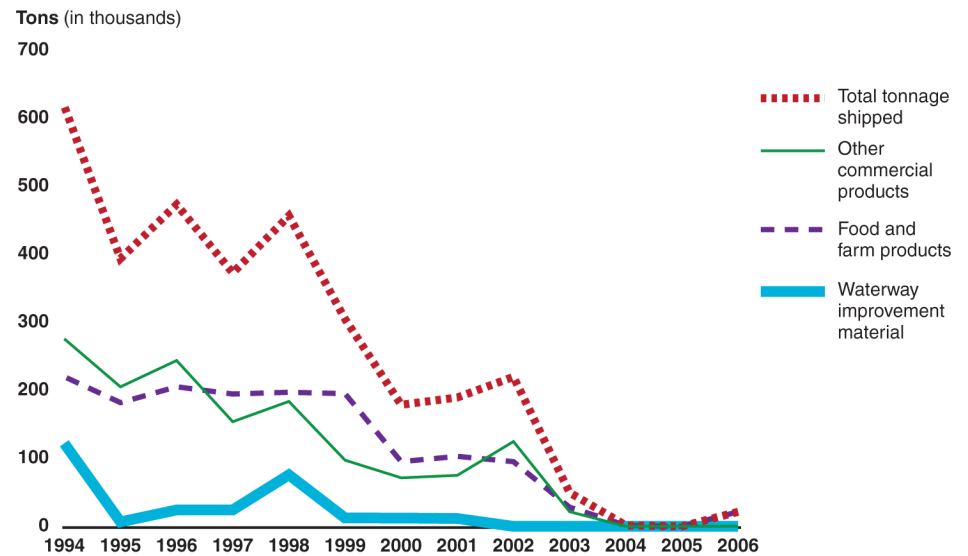
The decline in tonnage shipped to and/or from Nebraska can be primarily attributed to decreases in other commercial products, such as food and farm products and chemicals. The tonnage of food and farm products shipped decreased 90 percent during 1994 to 2006, from 220,076 tons to 21,356 tons. The tonnage of chemicals decreased 85 percent during 1994 to 2003, from 145,722 tons to 21,555 tons. (See figure 8.)

Figure 7: Annual Tonnage Shipped on the Missouri River to and/or from Kansas, by Commodity Group, 1994 to 2006



Source: GAO analysis of Corps Waterborne Commerce Statistics Center data.

Figure 8: Annual Tonnage Shipped on the Missouri River to and/or from Nebraska, by Commodity Group, 1994 to 2006



Source: GAO analysis of Corps Waterborne Commerce Statistics Center data.

Note: The Corps data indicate that there were no shipments of sand and gravel to and/or from the state of Nebraska between 1994 and 2006.

Comparable Tonnage Shipped on the Mississippi and Missouri Rivers for the State of Missouri

All Manufactured Equipment

Between 1995 and 1999, Missouri had some shipments of all manufactured equipment on the Missouri River ranging from 300 to 1,650 tons for those 5 years. There were no shipments of these commodities between 2000 and 2006. In contrast, for this same commodity group between 1994 and 2006, Missouri had shipments on the Mississippi River ranging from 4,990 to 47,920 tons. (See figure 9.)

Chemicals

Missouri experienced a range in the tonnage of chemicals shipped on the Missouri River from 3,796 to 338,487 tons. In contrast, the tonnage of chemicals shipped to and/or from Missouri on the Mississippi River remained relatively stable, fluctuating between a low of about 1.3 million tons to a high of 1.7 million tons. (See figure 10.)

Crude Materials

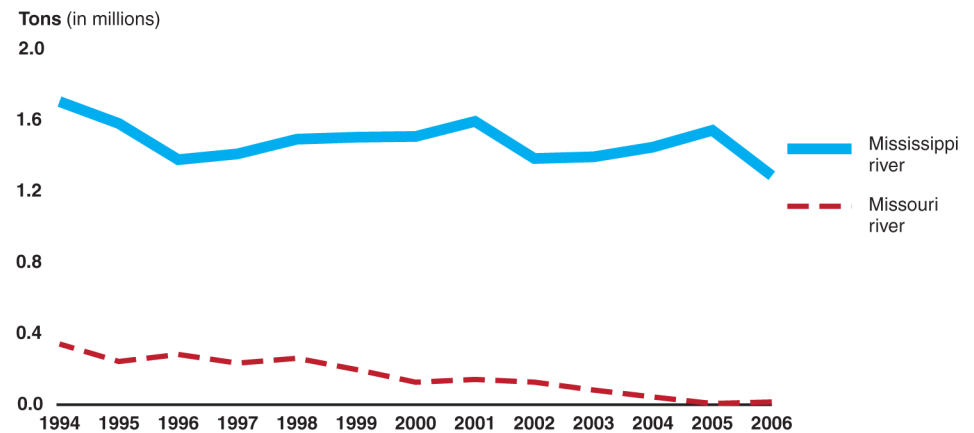
Between 1994 and 2003, Missouri had some shipments of crude materials on the Missouri River ranging from 4,767 to 41,544. There were no shipments of these commodities between 2004 and 2006. In contrast, the tonnage of this same commodity group shipped on the Mississippi River has fluctuated from a low of about 1.8 million to a high of 3.8 million tons. (See figure 11.)

Figure 9: Annual Tonnage of All Manufactured Equipment, Machinery, and Products Shipped on the Mississippi and Missouri Rivers to and/or from Missouri, 1994 to 2006



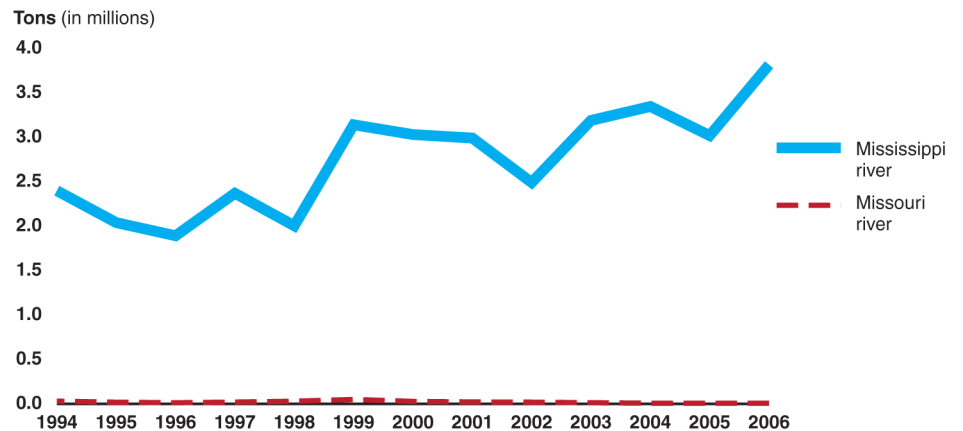
Source: GAO analysis of Corps Waterborne Commerce Statistics data.

Figure 10: Annual Tonnage of Chemicals and Related Products Shipped on the Mississippi and Missouri Rivers to and/or from Missouri, 1994 to 2006



Source: GAO analysis of Corps Waterborne Commerce Statistics data.

Figure 11: Annual Tonnage of Crude Materials, Inedible Except Fuels Shipped on the Mississippi and Missouri Rivers to and/or from Missouri, 1994 to 2006



Source: GAO analysis of Corps Waterborne Commerce Statistics data.

Food and Farm Products

The tonnage of food and farm products shipped to and/or from Missouri on the Missouri River has fluctuated between a low of 10,247 and a high of 239,164 tons. In contrast, for shipments of this same commodity group on the Mississippi River, the tonnage shipped has ranged from about 4.9 million tons to about 7.3 million tons. (See figure 12.)

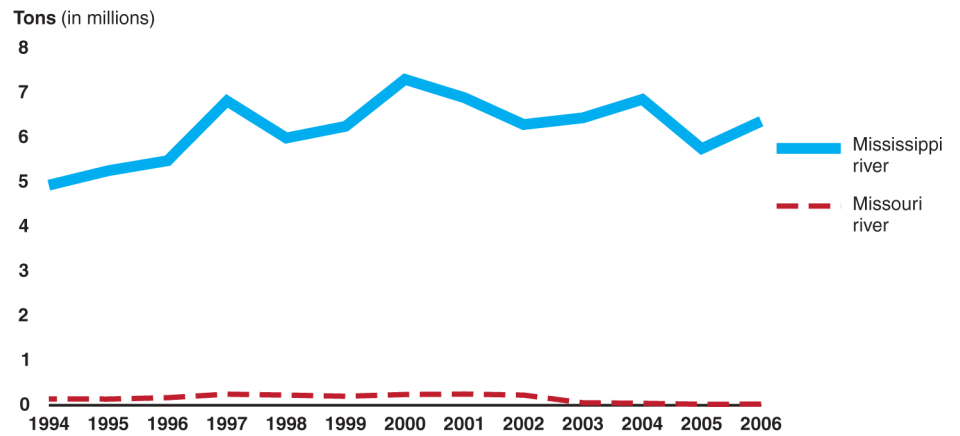
Petroleum

Missouri experienced a range in the tonnage of petroleum shipped on the Missouri River from 80,640 to 237,722 tons. On the Mississippi River, tonnage of this same commodity group shipped to and/or from Missouri has fluctuated between a low of 954,687 to a high of about 1.9 million tons. (See figure 13.)

Primary Manufactured Goods

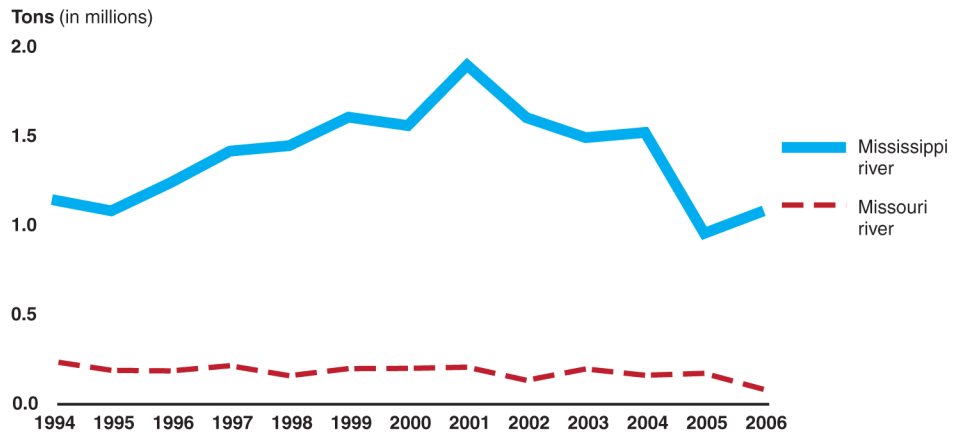
Between 1994 and 2006, the tonnage of primary manufactured goods shipped to and/or from Missouri on the Missouri River ranged from 66,504 to 231,727 tons. On the Mississippi River, the tonnage of this same commodity group shipped to and/or from Missouri has remained relatively stable between 3.8 million and 4.7 million tons. (See figure 14.)

Figure 12: Annual Tonnage of Food and Farm Products Shipped on the Mississippi and Missouri Rivers to and/or from Missouri, 1994 to 2006



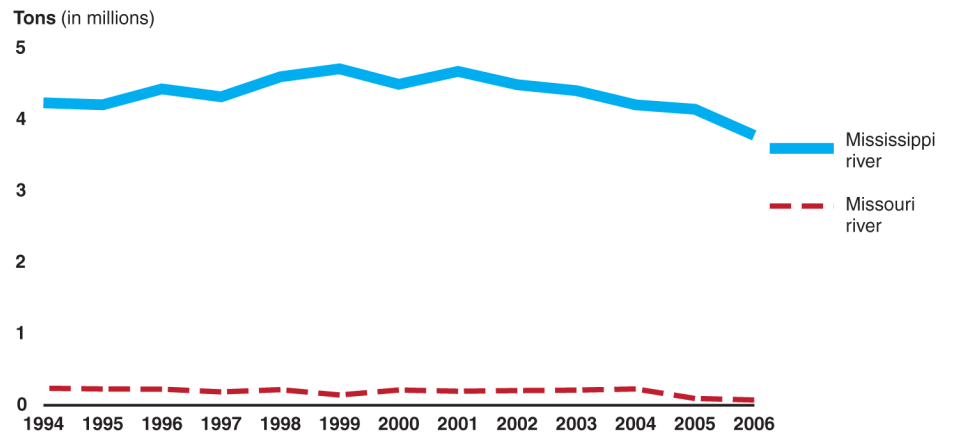
Source: GAO analysis of Corps Waterborne Commerce Statistics data.

Figure 13: Annual Tonnage of Petroleum and Petroleum Products Shipped on the Mississippi and Missouri Rivers to and/or from Missouri, 1994 to 2006



Source: GAO analysis of Corps Waterborne Commerce Statistics data.

Figure 14: Annual Tonnage of Primary Manufactured Goods Shipped on the Mississippi and Missouri Rivers to and/or from Missouri, 1994 to 2006



Source: GAO analysis of Corps Waterborne Commerce Statistics data.

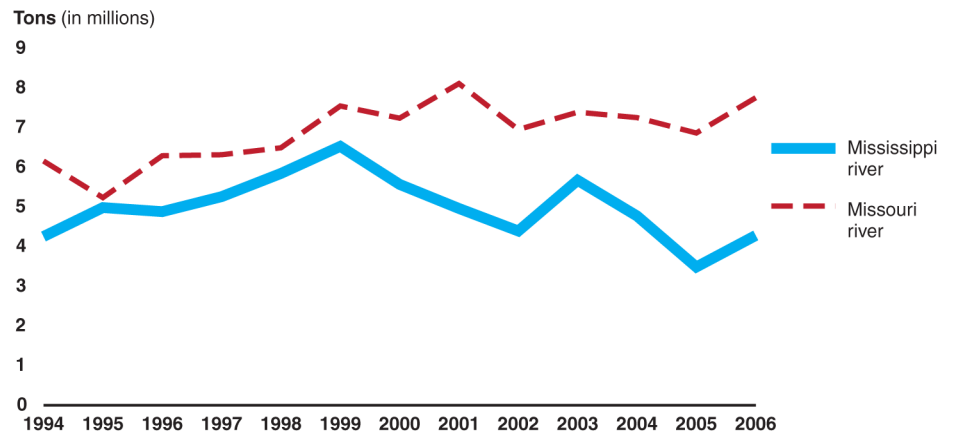
Sand and Gravel

Missouri has experienced fluctuations in the tonnage of sand and gravel shipped on the Missouri River ranging from 5.2 million to about 8.1 million tons. Similarly, the tonnage of sand and gravel shipped on the Mississippi River to and/or from Missouri has ranged from a low of 4.2 million to a high of 6.5 million tons. (See figure 15.)

Waterway Improvement Material

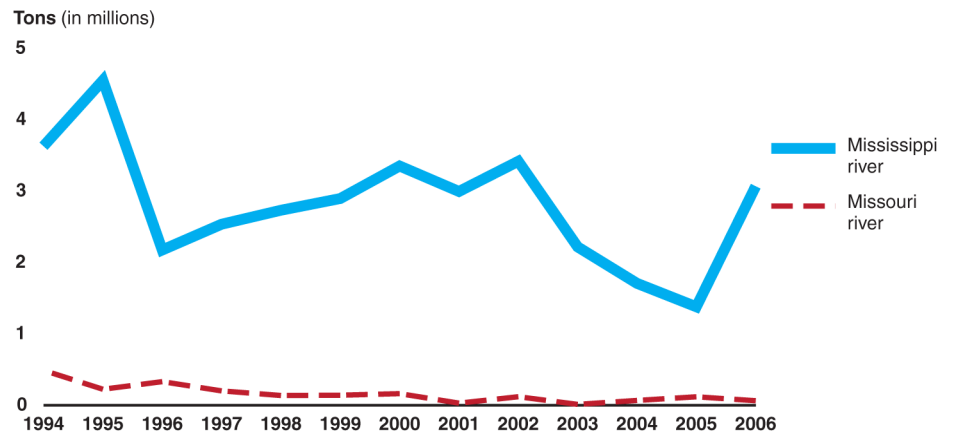
The tonnage of waterway improvement material shipped to and/or from Missouri on both the Missouri River and the Mississippi River varied between 1994 and 2006. Tonnage shipped on the Missouri River has ranged from 4,950 to 481,704 tons. On the Mississippi River, tonnage of this material shipped has fluctuated from a low of about 1.4 million to a high of 4.5 million tons. (See figure 16.)

Figure 15: Annual Tonnage of Sand and Gravel Shipped on the Mississippi and Missouri Rivers to and/or from Missouri, 1994 to 2006



Source: GAO analysis of Corps Waterborne Commerce Statistics data.

Figure 16: Annual Tonnage of Waterway Improvement Material Shipped on the Mississippi and Missouri Rivers to and/or from Missouri, 1994 to 2006



Source: GAO analysis of Corps Waterborne Commerce Statistics data.

Comparable Tonnage Shipped on the Mississippi and Missouri Rivers for the State of Iowa

Chemicals

Between 1994 and 2003, Iowa had some shipments of chemicals on the Missouri River ranging from 12,898 to 182,102 tons. There were no shipments of these commodities between 2004 and 2006. In contrast, for this same commodity group between 1994 and 2006, Iowa had shipments on the Mississippi River ranging from 705,458 tons to about 1.1 million tons. (See figure 17.)

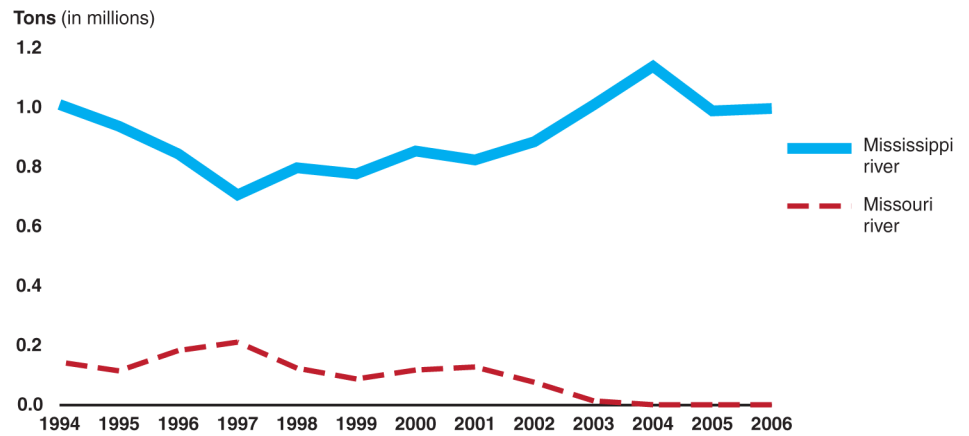
Crude Materials

Tonnage of crude materials shipped to and/or from Iowa on the Missouri River occurred in 6 of the 13 years covered by our review—1994, 1997, 1998, 1999, 2000, and 2001. Annual tonnage shipped during those years has ranged from 1,200 to 5,626 tons. In contrast, the tonnage of crude materials shipped to and/or from Iowa on the Mississippi River has fluctuated between a low of 493,471 to a high of about 1.2 million tons. (See figure 18.)

Food and Farm Products

Between 1994 and 2003, the tonnage of food and farm products shipped on the Missouri River to and/or from Iowa has ranged from 39,970 to 158,455 tons. There were no shipments of these commodities between 2004 and 2006. In contrast, the tonnage of this same commodity group shipped on the Mississippi River varied over the years between a low of 6.3 million to a high of about 10.6 million tons. (See figure 19.)

Figure 17: Annual Tonnage of Chemicals and Related Products Shipped on the Mississippi and Missouri Rivers to and/or from Iowa, 1994 to 2006



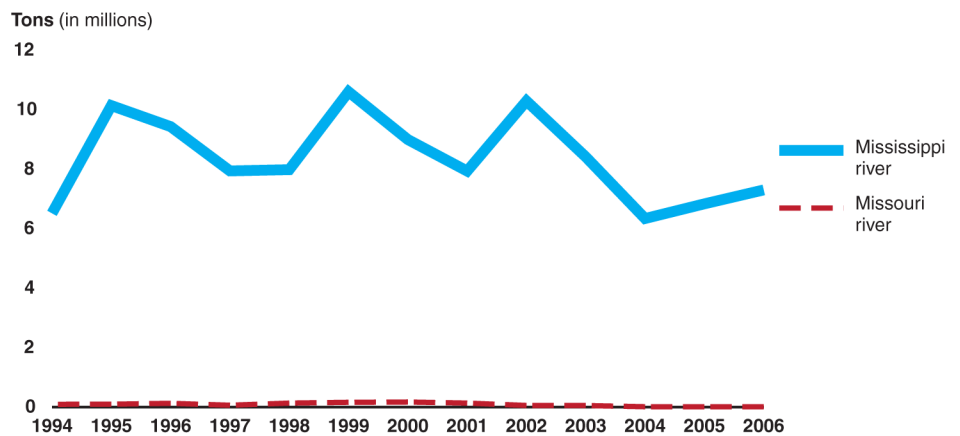
Source: GAO analysis of Corps Waterborne Commerce Statistics data.

Figure 18: Annual Tonnage of Crude Materials, Inedible Except Fuels Shipped on the Mississippi and Missouri Rivers to and/or from Iowa, 1994 to 2006



Source: GAO analysis of Corps Waterborne Commerce Statistics data.

Figure 19: Annual Tonnage of Food and Farm Products Shipped on the Mississippi and Missouri Rivers to and/or from Iowa, 1994 to 2006



Source: GAO analysis of Corps Waterborne Commerce Statistics data.

Petroleum

Tonnage of petroleum shipped to and/or from Iowa on the Missouri River occurred in 8 of the 13 years covered by our review—1994, 1995, 1997, 1998, 1999, 2000, 2002 and 2003. Annual tonnage shipped during those years ranged from 4,318 to 78,633. The tonnage of this same commodity group shipped on the Mississippi River to and/or from Iowa has ranged from 85,925 to 384,697 tons. (See figure 20.)

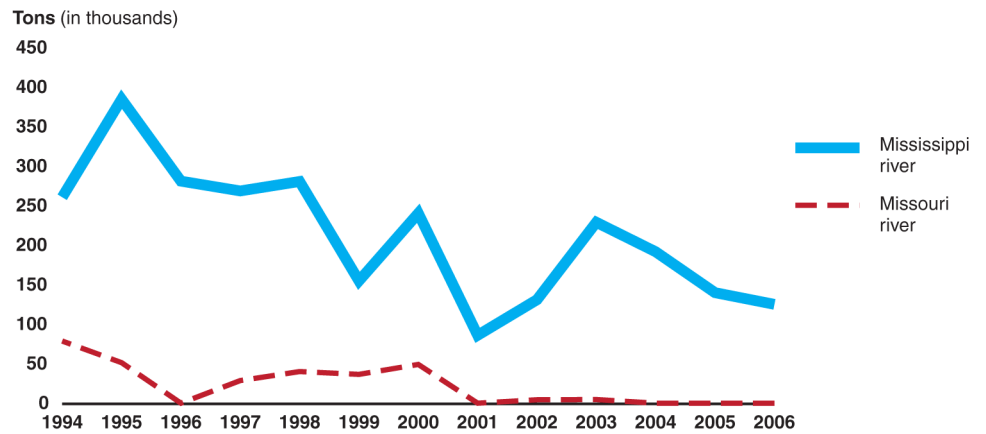
Primary Manufactured Goods

On the Missouri River, the tonnage of primary manufactured goods shipped to and/or from Iowa has ranged from 1,042 to 25,494, with no shipments during 1997, 2004, 2005, and 2006. In contrast, the tonnage of this same commodity group shipped on the Mississippi River has fluctuated from a low of 319,922 to a high of 620,595. (See figure 21.)

Waterway Improvement Material

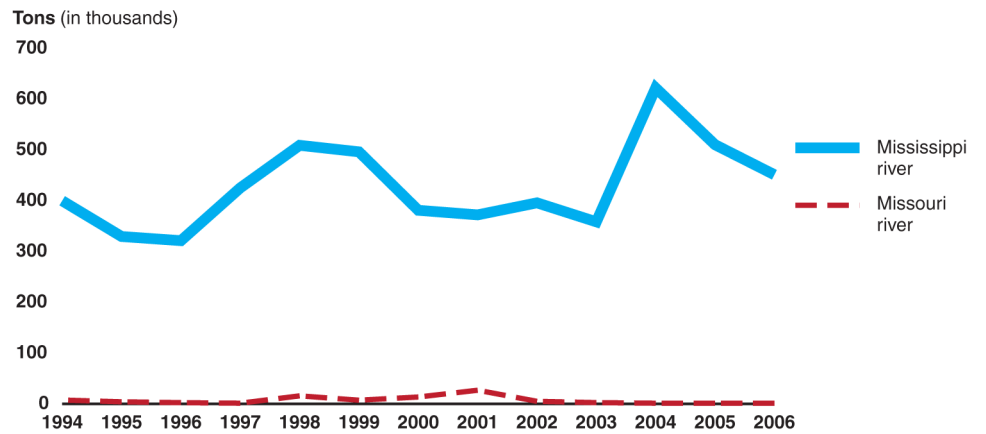
On the Missouri River, waterway improvement material was shipped to and/or from Iowa during 7 of the 13 years in our review period—1994, 1996, 1997, 1998, 1999, 2000, and 2001. Annual tonnage shipped during these years has ranged from 1,320 to 12,600 tons. The data show only 2 years of shipments of this material on the Mississippi River, with 652 tons shipped in 1995 and 1,300 tons shipped in 2003. (See figure 22.)

Figure 20: Annual Tonnage of Petroleum and Petroleum Products Shipped on the Mississippi and Missouri Rivers to and/or from Iowa, 1994 to 2006



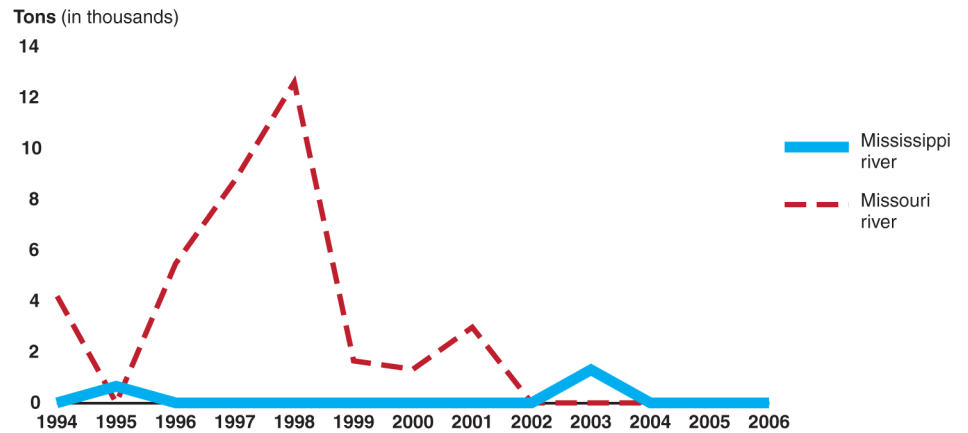
Source: GAO analysis of Corps Waterborne Commerce Statistics data.

Figure 21: Annual Tonnage of Primary Manufactured Goods Shipped on the Mississippi and Missouri Rivers to and/or from Iowa, 1994 to 2006



Source: GAO analysis of Corps Waterborne Commerce Statistics data.

Figure 22: Annual Tonnage of Waterway Improvement Material Shipped on the Mississippi and Missouri Rivers to and/or from Iowa, 1994 to 2006



Source: GAO analysis of Corps Waterborne Commerce Statistics data.

To determine the tonnage of commodities transported on the Missouri River, we obtained and analyzed data from the U.S. Army Corps of Engineers' (Corps) Waterborne Commerce Statistics Center. This data is self-reported to the Corps by vessel operating companies engaged in transporting goods upon the navigable waters of the United States. We obtained data for January 1, 1994, through December 31, 2006, for shipments on the Missouri River with an origin and/or destination in Missouri, Iowa, Kansas, and Nebraska.

To determine the comparable tonnage of commodity shipments transported on the Mississippi River for states served by both the Missouri River and the Mississippi River, we obtained and analyzed commodity shipment data from the Corps' Waterborne Commerce Statistics Center. We obtained data for January 1, 1994, through December 31, 2006, for shipments on the Mississippi River with an origin and/or destination in Missouri or Iowa. In order for the data for the Missouri River and Mississippi River to be comparable in methodology, we did not collect or analyze data for shipments that passed through the Mississippi River waterways of Missouri or Iowa without starting or ending their trips in these states.

Some shipments on the Mississippi River can be grouped into categories comparable to the categories of shipments on the Missouri River, and we only compared data for those commodity categories that were shipped on both rivers. For example, there were shipments of coal, lignite, and coal coke on the Mississippi River to and/or from the states of Missouri and Iowa between 1994 and 2006, but we do not show these data in our comparison analysis because there were no such shipments on the Missouri River. Instead, we present these data, along with the rest of the data for this report, in Appendices II and III. Furthermore, the broad commodity categories may include shipments of varying types of products within the same category. For example, the commodity category all manufactured equipment, machinery, and products includes products such as motor vehicle parts, boats, and machinery specialized for particular industries.

For the purposes of our review, we generally aggregate commodities into three categories: (1) sand and gravel; (2) other commercial products—which include all manufactured equipment, machinery, and products; chemicals and related products; coal, lignite and coal coke; crude material, inedible except fuel; food and farm products; petroleum and petroleum products; and primary manufactured goods; and (3) waterway improvement material. We consider sand and gravel and other commercial products as shipments that may serve commercial purposes. We consider waterway improvement material as primarily noncommercial, as this material is primarily stone or rock transported on behalf of the Corps for river maintenance or habitat recovery purposes. In addition, the Corps conducts maintenance operations that result in dredged material. However, the Corps does not track dredged material in the Waterborne Commerce Statistics database. While the Corps does collect information on dredging projects in the Dredging Statistics database, the information is not comparable with data in the Waterborne Commerce Statistics database. As such, we did not include this material in our review.

We assessed the reliability of the data by interviewing Corps officials about the data, determining the Corps' process for collecting and reviewing the data, and performing various tests on the data—such as comparing a number of source documents submitted by vessel operators to data within the Corps' database. We determined that the data were sufficiently reliable for the purposes of this review.

Appendix II: Annual Tonnage Shipped on the Missouri River, by Commodity Group, for Four States, 1994 to 2006

Missouri

Annual Tonnage													
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Petroleum and Petroleum Products	237,722	187,330	183,903	212,860	157,028	196,632	198,034	204,869	131,389	194,805	159,475	170,334	80,640
Chemicals and Related Products	338,487	240,117	279,654	230,885	258,239	194,738	123,511	139,120	123,958	79,479	40,523	3,796	12,449
Crude Materials, Inedible Except Fuel	23,146	10,749	4,767	12,337	22,306	41,544	20,152	13,678	11,295	4,899	0	0	0
Primary Manufactured Goods	231,727	220,651	218,103	179,829	210,872	136,484	206,337	189,297	198,185	204,613	221,370	87,800	66,504
Food and Farm Products	129,295	126,915	157,631	236,717	215,564	190,127	229,031	239,164	215,655	44,014	31,686	10,247	12,475
All Manufactured Equipment, Machinery and Products	0	300	1,593	680	1,650	1,505	0	0	0	0	0	0	0
Waterway Improvement Material	481,704	216,939	323,357	193,822	129,462	133,522	155,187	22,448	112,051	4,950	60,225	111,125	56,504
Sand and Gravel	6,144,007	5,221,670	6,277,647	6,302,919	6,477,577	7,531,597	7,224,970	8,097,123	6,938,603	7,375,715	7,238,921	6,850,791	7,739,757

Note: Annual tonnage shipped for each state is defined as all tons shipped that originate or terminate in a state. For example, if a shipment originates in Missouri and terminates in Kansas, that shipment's tonnage is counted toward the total for the state of Missouri and the state of Kansas. Shipments that originate and terminate within the same state are only counted once.

Iowa

	Annual Tonnage												
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Petroleum and Petroleum Products	78,633	51,293	0	28,632	40,017	36,461	49,031	0	4,318	4,604	0	0	0
Chemicals and Related Products	143,294	113,821	182,102	210,415	122,868	86,664	116,652	126,911	75,476	12,898	0	0	0
Crude Materials, Inedible Except Fuels	4,146	0	0	1,369	1,200	1,533	5,626	5,341	0	0	0	0	0
Primary Manufactured Goods	6,206	2,720	1,042	0	14,420	5,871	12,174	25,494	3,692	1,102	0	0	0
Food and Farm Products	81,417	85,528	114,882	50,117	121,996	148,526	158,455	122,127	42,871	39,970	0	0	0
Waterway Improvement Material	4,210	0	5,475	8,750	12,600	1,650	1,320	2,970	0	0	0	0	0

Note: Annual tonnage shipped for each state is defined as all tons shipped that originate or terminate in a state. For example, if a shipment originates in Missouri and terminates in Kansas, that shipment's tonnage is counted toward the total for the state of Missouri and the state of Kansas. Shipments that originate and terminate within the same state are only counted once.

Kansas

Annual Tonnage													
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Petroleum and Petroleum Products	46,685	38,612	51,659	47,897	41,494	44,438	9,206	0	15,617	13,683	56,227	9,622	0
Chemicals and Related Products	52,031	50,583	22,285	16,993	22,715	20,488	2,867	15,714	3,816	4,222	7,232	2,842	2,292
Crude Materials, Inedible Except Fuels	0	0	0	0	0	0	1,416	3,941	0	0	0	0	0
Primary Manufactured Goods	0	0	0	0	0	0	415	5,270	0	0	0	0	0
Food and Farm Products	121,849	51,213	24,796	107,163	169,567	200,166	48,419	44,288	34,345	15,662	7,444	0	0
All Manufactured Equipment, Machinery and Products	0	0	0	0	0	0	0	337	0	0	0	0	0
Waterway Improvement Material	918	0	0	0	13,999	0	0	0	0	0	0	0	0
Sand and Gravel	171,750	3,300	645,105	135,000	133,740	501,825	265,925	2,269,715	1,671,985	1,659,970	1,512,880	1,750,210	1,999,710

Note: Annual tonnage shipped for each state is defined as all tons shipped that originate or terminate in a state. For example, if a shipment originates in Missouri and terminates in Kansas, that shipment's tonnage is counted toward the total for the state of Missouri and the state of Kansas. Shipments that originate and terminate within the same state are only counted once.

Nebraska

Annual Tonnage													
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Petroleum and Petroleum Products	0	0	0	0	0	0	0	12,248	21,742	0	0	0	0
Chemicals and Related Products	145,722	78,354	126,357	124,045	77,639	54,930	48,962	53,566	43,225	21,555	0	0	0
Crude Materials, Inedible Except Fuels	22,979	20,268	26,157	25,087	21,682	23,459	7,477	6,280	5,026	0	0	0	0
Primary Manufactured Goods	105,437	104,434	90,354	4,745	83,185	17,894	13,915	2,931	54,020	0	0	0	0
Food and Farm Products	220,076	181,938	205,212	194,607	197,141	195,180	95,192	102,913	95,116	28,102	1,541	0	21,356
All Manufactured Equipment, Machinery and Products	1,600	2,091	1,000	0	1,203	1,023	1,001	0	680	0	0	0	0
Waterway Improvement Material	121,999	6,600	24,125	24,175	75,739	12,310	12,210	11,550	0	0	0	0	0
Sand and Gravel	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: Annual tonnage shipped for each state is defined as all tons shipped that originate or terminate in a state. For example, if a shipment originates in Missouri and terminates in Kansas, that shipment's tonnage is counted toward the total for the state of Missouri and the state of Kansas. Shipments that originate and terminate within the same state are only counted once.

Appendix III: Annual Tonnage Shipped on the Mississippi River, by Commodity Group, for Two States, 1994 to 2006

Missouri

Annual Tonnage													
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Coal, Lignite & Coal Coke	5,103,058	2,582,071	2,563,147	2,853,583	3,175,116	3,620,470	3,411,242	2,982,675	1,926,788	3,709,658	3,101,523	2,090,653	2,282,802
Petroleum and Petroleum Products	1,143,435	1,080,753	1,238,540	1,415,260	1,445,811	1,605,610	1,558,464	1,896,822	1,602,861	1,490,804	1,519,838	954,687	1,080,615
Chemicals and Related Products	1,701,792	1,578,367	1,375,261	1,407,829	1,490,534	1,501,544	1,505,828	1,590,524	1,381,855	1,391,196	1,445,790	1,540,234	1,285,485
Crude Materials, Inedible Except Fuels	2,389,877	2,031,088	1,883,594	2,361,285	1,995,846	3,132,251	3,021,832	2,982,712	2,482,502	3,180,587	3,337,761	3,010,366	3,806,300
Primary Manufactured Goods	4,228,717	4,201,336	4,423,111	4,313,104	4,593,566	4,704,922	4,487,985	4,669,108	4,482,278	4,399,020	4,200,416	4,138,676	3,773,354
Food and Farm Products	4,921,071	5,244,774	5,469,209	6,808,931	5,977,022	6,239,766	7,291,958	6,881,799	6,279,347	6,430,178	6,843,335	5,738,836	6,351,432
All Manufactured Equipment, Machinery and Products	7,150	19,177	21,953	22,256	25,583	44,940	16,352	24,231	23,999	7,206	4,990	18,087	47,920
Waste Material; Garbage, Landfill, Sewage Sludge, Waste Water	0	0	0	0	0	0	0	0	0	0	4,964	0	0
Waterway Improvement Material	3,622,226	4,543,048	2,167,342	2,528,382	2,724,196	2,888,144	3,343,738	2,987,358	3,409,623	2,210,877	1,700,208	1,371,904	3,059,693
Sand and Gravel	4,241,855	4,970,367	4,868,340	5,245,802	5,831,114	6,513,772	5,555,299	4,948,083	4,380,546	5,658,245	4,759,528	3,473,192	4,266,841

Note: Annual tonnage shipped for each state is defined as all tons shipped that originate or terminate in a state. For example, if a shipment originates in Missouri and terminates in Kansas, that shipment's tonnage is counted toward the total for the state of Missouri and the state of Kansas. Shipments that originate and terminate within the same state are only counted once.

Iowa

Annual Tonnage													
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Coal, Lignite & Coal Coke	3,381,754	3,019,593	2,612,370	2,384,706	3,197,424	3,213,062	3,530,853	3,459,093	3,635,700	3,290,244	3,317,914	3,238,542	3,991,400
Petroleum and Petroleum Products	260,741	384,697	281,004	268,598	280,574	154,825	240,323	85,925	130,920	228,917	191,629	139,868	125,105
Chemicals and Related Products	1,009,088	936,184	843,235	705,458	796,522	775,921	852,821	822,870	884,091	1,007,997	1,137,553	987,761	995,852
Crude Materials, Inedible Except Fuels	791,336	730,394	493,471	1,034,647	790,825	895,539	602,532	1,102,573	1,077,977	925,546	1,244,942	669,442	651,692
Primary Manufactured Goods	398,402	328,104	319,922	423,824	507,629	494,799	379,701	370,712	394,403	357,010	620,595	508,846	449,780
Food and Farm Products	6,504,848	10,123,738	9,416,628	7,927,529	7,969,107	10,588,157	8,981,445	7,923,014	10,277,539	8,399,255	6,326,726	6,820,247	7,287,436
All Manufactured Equipment, Machinery and Products	5,368	7,976	8,427	1,600	11,202	7,023	200	5,737	5,707	9,031	8,497	3,977	13,500
Waste Material; Garbage, Landfill, Sewage, Sludge	0	0	0	0	0	0	4,600	0	0	0	0	0	0
Waterway Improvement Material	0	652	0	0	0	0	0	0	0	1,300	0	0	0
Sand and Gravel	424,728	307,831	446,611	565,823	552,629	621,211	658,175	321,229	212,449	194,551	197,401	257,352	330,726

Note: Annual tonnage shipped for each state is defined as all tons shipped that originate or terminate in a state. For example, if a shipment originates in Missouri and terminates in Kansas, that shipment's tonnage is counted toward the total for the state of Missouri and the state of Kansas. Shipments that originate and terminate within the same state are only counted once.

Appendix IV: GAO Contact and Staff Acknowledgments

If you have any questions concerning this briefing, please contact Anu K. Mittal, Director, Natural Resources and Environment, at (202) 512-3841 or mittala@gao.gov.

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