THE TRANSPORTATION OF GRAIN

Introduction

Corn and wheat are the two largest grain crops produced in the U.S. Although it is technically an oilseed, soybeans are often included in the "grains" category, and is important agricultural crop that presents significant demands for transportation services. Some of the data reported in this study are from special studies that are done on an infrequent basis. However, regardless of the time period for which it is cited, the data series cited here provide a consistent qualitative picture of grain transportation in the United States.

The food manufacturing industry purchases approximately half of the value of all grain sold in the United States, with the primary uses being animal food manufacturing, flour milling and malt manufacturing, and wet corn milling. Over half of the value of soybeans sold goes to the soybean and other oilseed processing industry.[1] According to the most recent Agricultural Census in 2007, corn accounted for 53% of the market value of grain sold, with wheat and soybeans accounting for 8% each.[2] About 20%-25% of domestic grain production is typically exported and about 40% of soybeans are exported, although there is considerable fluctuation in the annual shares.[3]

The U.S. corn crop is mostly consumed domestically, with the major use being animal feed. In 2008-09, 44% of U.S. corn production was used for feed, 31% was used as feedstock for ethanol production, 4% was used to produce high fructose corn syrup, 7% went to other industrial uses and 14% was exported.[4] The top five corn-producing states—the "Corn Belt" states of Iowa, Illinois, Nebraska, Minnesota, and Indiana—account for nearly two-thirds of U.S. corn production.[5] An indication of this concentration is found in Figure 1, which shows rail shipments of corn by county of origin. In contrast to corn, a much greater proportion of U.S. wheat production is typically exported, as in fiscal year 2008-09, 57% of domestic wheat production was exported.[6] U.S. wheat production is concentrated in the northern and central plains, with significant quantities also grown in Idaho, Oregon, and Washington State. An indication of this concentration and illustration of the differences in wheat origins relative to corn origins is found in Figure 2, which shows rail shipments of wheat by county of origin.

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[1] U.S. Bureau of Economic Analysis, Benchmark Input-Output Accounts, http://www.bea.gov/industry/index.htm#benchmark_io

[2] U.S. Department of Agriculture, National Agriculture Statistics Service, 2007 Census of Agriculture, Vol.1, Chapter 1, Table 46.

[3] Over the period 2005 to 2009, total grain exports were 23 percent of grain production. Over that same period, 18 percent of corn production, 39 percent of soybean production, and 48 percent of wheat production was exported. See Association of American Railroads, *Railroads and Grain*, AAR Policy and Economics Department, August 2010, pp. 4-5.

[4] Association of American Railroads, *Railroads and Grain*, AAR Policy and Economics Department, July 2009, p. 4.

[5] U.S. Department of Agriculture, National Agriculture Statistics Service, 2007 Census of Agriculture, Vol. 1, Chapter 2, Table 2..

[6] http://www.fas.usda.gov/psdonline.

FIGURE 1
TONNAGE OF RAIL SHIPMENT OF CORN BY ORIGIN COUNTY, 2005[7]

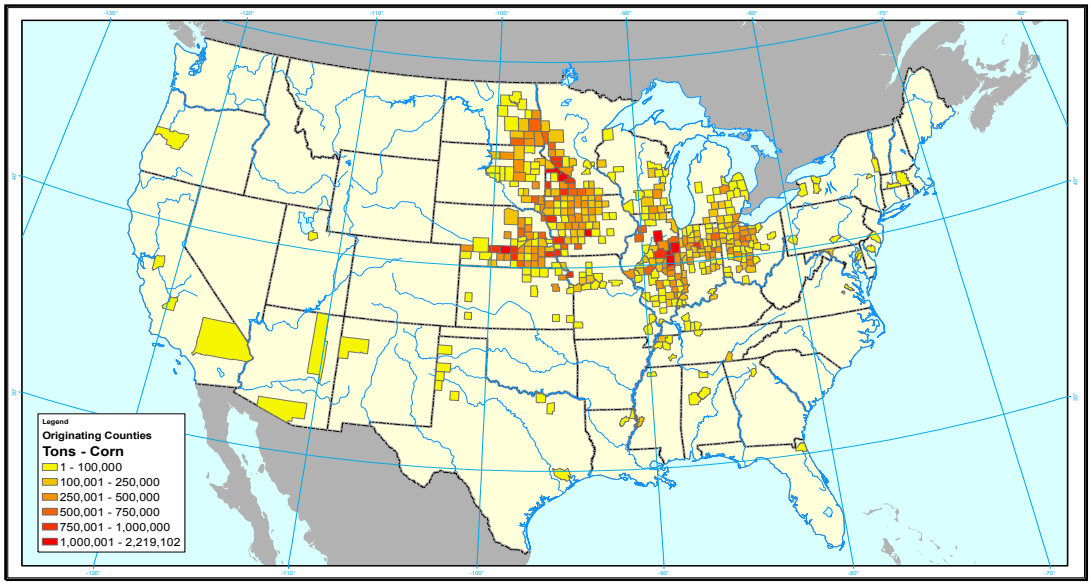
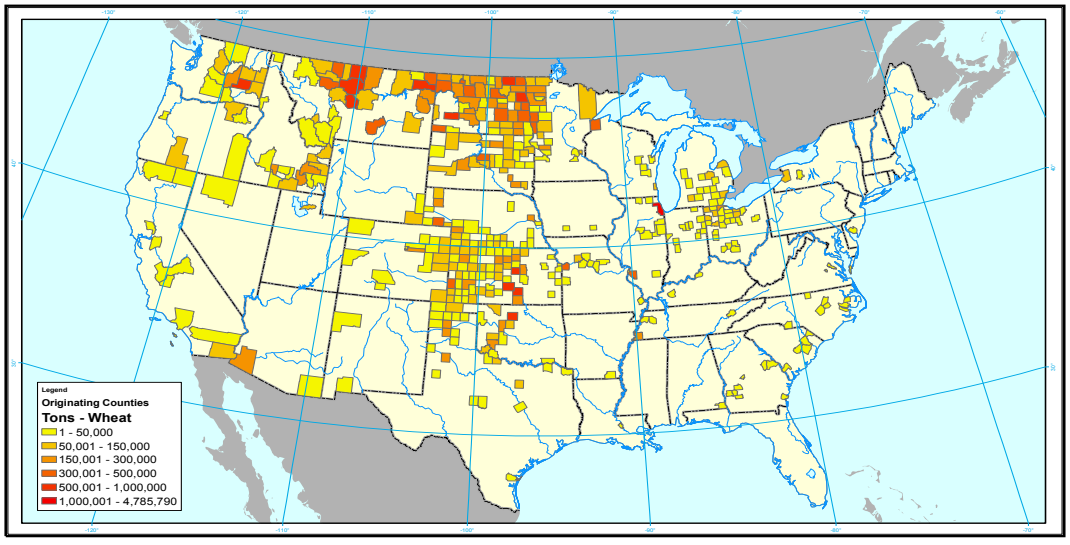


FIGURE 2
TONNAGE OF RAIL SHIPMENT OF WHEAT BY ORIGIN COUNTY, 2005[8]



[7] Christensen Associates, *A Study of Competition in the U.S. Freight Railroad Industry and Analysis of Proposals that Might Enhance Competition*, report to the Surface Transportation Board, November 2008, Figure 13-5.
[8] Christensen Associates, *A Study of Competition in the U.S. Freight Railroad Industry and Analysis of Proposals that Might Enhance Competition*, report to the Surface Transportation Board, November 2008, Figure 13-6.

Commodity Supply Chains and Transportation

Transportation and handling charges are an important component in agricultural pricing and the returns received by producers. The amount received by producers of commodities is typically a residual, determined as the difference between prices determined in major markets—such as processing plants, feedlots and export terminals—and transportation and handling costs. The greater the transportation cost, the less received by producers.[9] Alternatively, to the extent transportation costs increase and it is attempted to pass such price increases through to final commodity prices, the commodity becomes less competitive in final commodity markets. The U.S. is the world's top grain producer and exporter, but competes with other countries such as China and South American countries. Export market prices depend on factors such as global grain production, exchange rates, grain prices, government policies, and transportation prices—all of which can vary significantly over time.[10]

The grain logistics chain begins with a movement from production sites to storage where grain is accumulated, and then movement from storage to domestic use and export markets. Grain elevators are used to accumulate and store grain for bulk shipment. Typically, trucks initially move grain from production sites to these elevators. Today, fewer elevators exist, and many of the smaller elevators have become "satellites" that are used primarily for storage and aggregation of grain that is reshipped in large quantities to a mainline subterminal.

Trucks, trains, and barges compete and complement one another in moving grain to successively larger elevators with shipping distance often determining each mode's particular role. A special USDA study found that the tonnage of all grains transported increased by 63% over the 1978-2004 period. Most of this volume was comprised of corn, soybeans and wheat. In 2004, corn accounted for about 61% of grains transported, soybeans accounted for 18% and wheat accounted for 16%. By mode over the 1978-2004 period, trucked grain increased by 157%, barged grain increased by 31%, and railed grain increased by 16%.[11] As discussed below, the mode of transportation varies considerably by destination and by type of grain.

Trucks have cost advantages for shorter distances (less than 250 to 500 miles) and function primarily as the short haul mode. Railroads have a cost advantage in moving grain longer distances, but barges have an even greater advantage where a waterway is available. A barge tow can carry the equivalent of roughly 15 rail cars or 60 trucks at a fraction of the cost of these other modes.[12] The availability of barge transportation also helps check rates charged by rail.[13]

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[9] Randy Schnepf, *Upper Mississippi River – Illinois Waterway Navigation Expansion: An Agricultural Transportation and Environmental Context*, CRS Report for Congress, July 15, 2004, p. 27.
[10] Association of American Railroads, *Railroads and Grain*, AAR Policy and Economics Department, July 2009, p. 4.
[11] United States Department of Agriculture, *Transportation of U.S. Grains A Modal Share Analysis, 1978-2004*, USDA Agricultural Marketing Services, October 2006, p. v.
[12] Mary Jane Bolle, *Trade in the U.S. Gulf Region: Hurricanes Katrina, Rita and Beyond*, CRS Report for Congress, November 12, 2005, p. 3
[13] Christensen Associates, *A Study of Competition in the U.S. Freight Railroad Industry and Analysis of Proposals that Might Enhance Competition*, report to the Surface Transportation Board, November 2008, Chapter 13.

Similarly trucking rates are also constrained by the availability of barge transportation options. Low internal transportation costs afforded by barge transportation from the upper Midwest to Louisiana Gulf ports relative to export competitors have helped U.S. products compete in international corn and soybean markets.[14] However, relative to other modes, barges cannot compete on transit time and are not always available because of weather or other waterway issues such as water levels that are too low or too high.[15]

Class I railroad consolidation is a contributing factor to the overall consolidation of the grain handling network, which also affects barge transportation as well. Smaller capacity elevators and short line railroads are increasingly being bypassed in the grain supply chain. Class I railroads are exploiting operating efficiencies by consolidating their trackage and rolling stock around larger, sub-terminal grain elevators. The rail consolidation process emphasizes unit and shuttle trains, de-emphasizing carload service in favor of shipment sizes that can fill entire trains.[16]

However, consolidation of grain elevators typically requires longer and more costly truck hauls. The increasing role of truck transport has raised debate over infrastructure constraints in these areas. Many of the highways that link farms and satellite elevators with mainline subterminals are minor rural arterial or collector roads. Many of these roads are subject to seasonal load limits in spring, resulting in circuitous truck routes and less efficient delivery patterns.[17] Because of railroad branch line abandonments and concentration within the elevator industry farm-to-market trip distances have increased. For example, in North Dakota the average trip distance was 12 miles in the 1980s and, by 2000 had increased to 32 miles for wheat and 44 miles for barley.[18]

The mode of transportation is also highly dependent on the particular supply chain. In general, three grain supply chains can be identified (1) export of bulk grain, (2) bulk grain for the domestic market, and (3) export of containerized specialty grain products and containerized refrigerated meat products in which grain was used as feed. Each of these supply chains are tied to their own infrastructure network. The bulk export system relies most heavily on river navigation and Class I railroad trunk lines to reach seaports. The domestic bulk market relies more heavily on rural interstates or short line railroads to reach domestic processors and

[14] Randy Schnepf, *Upper Mississippi River – Illinois Waterway Navigation Expansion: An Agricultural Transportation and Environmental Context*, CRS Report for Congress, July 15, 2004, p. 27-28.
[15] Randy Schnepf, *Upper Mississippi River – Illinois Waterway Navigation Expansion: An Agricultural Transportation and Environmental Context*, CRS Report for Congress, July 15, 2004, p. 30.
[16] Randy Schnepf, *Upper Mississippi River – Illinois Waterway Navigation Expansion: An Agricultural Transportation and Environmental Context*, CRS Report for Congress, July 15, 2004, p. 31.
[17] Upper Great Plains Transportation Institute, *Grain Transportation in the Great Plains Region in a Post-Rationalization Environment, Volume 1*, Prepared for Bureau of Transportation Statistics, U.S. Department of Transportation, December 2005, p. 2.
[18] Upper Great Plains Transportation Institute, *Grain Transportation in the Great Plains Region in a Post-Rationalization Environment, Volume 1*, Prepared for Bureau of Transportation Statistics, U.S. Department of Transportation, December 2005, p. 24.

livestock farms. The container export system relies heavily on interstate highways, railroad trunk lines, and efficient intermodal exchanges at rail ramps and marine terminals.[19]

There are diverse transportation modes and corridors for various types of grain. Important factors include the origination point of shipments and the proximity to navigable waterways. For example, the Corn Belt has relatively good access to navigable portions of the upper Mississippi, Missouri, and Ohio River systems. Accordingly, barge transportation is the predominant mode for U.S. corn shipments; 2006 rail shipments represent approximately one-third of combined domestic consumption and corn exports. Rail originations of corn are concentrated in the Midwestern Corn Belt, but there are gaps in the vicinities of navigable waterways where no (or few) rail shipments originate. In examining origin-destination combinations for counties close to waterways where there were originating rail corn shipments, the study found that these corn shipments by rail were to destinations not amenable to transportation on the Mississippi River system, for example shipments to Pacific Ocean ports or to west Texas feedlots.[20]

As mentioned above, U.S. wheat production is concentrated in the northern and central plains, and Idaho, Oregon, and Washington State. Relative to the transportation of corn, rail transportation is much more important for wheat as it accounts for approximately 60 percent of wheat shipments, and as much as 75% of the shipments of wheat for export.[21] With the notable exception of Oregon and Washington counties close to the Columbia River system, many rail shipments of wheat (unlike corn) originate in areas that are relatively remote from waterway facilities, export points, and other population centers.

Part of the growth in domestic demand for feed grains is due to increased Asian demand for livestock and poultry products, which are exported in refrigerated containers. Large share of chilled and frozen meat products for export are moved by truck rather than railroad because of the product's high value and high service requirements (in terms of transit time and temperature control). To the extent this continues, one can view it as the displacement of bulk grain exports moved by barge down the Mississippi with containerized meat exports moved by truck to coastal ports.[22]

If grain is being sold in domestic markets, depending on distance, either truck or short line railroads move the grain from country elevator to the domestic processor, feed manufacturing plant or off-farm feed lot operator. The USDA reports that in 2004, trucks transported about

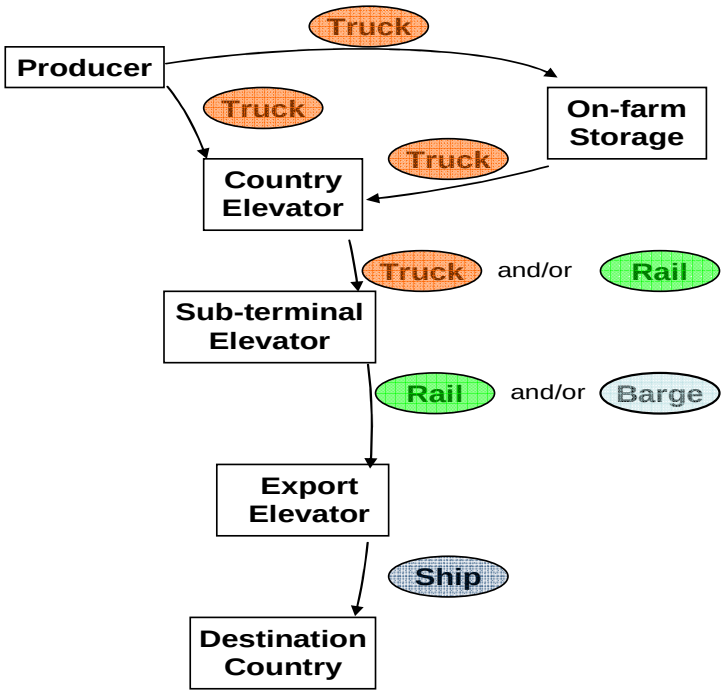
[19] John Fritelli, *Grain Transport: Modal Trends and Infrastructure Implications*, CRS Report for Congress, January 5, 2005, p. 14.
[20] Christensen Associates, *A Study of Competition in the U.S. Freight Railroad Industry and Analysis of Proposals that Might Enhance Competition*, report to the Surface Transportation Board, November 2008, (Christensen Report).
[21] U.S. Department of Agriculture, Economic Research Service, *Agricultural Outlook* (March 1998), p. 2.
[22] Randy Schnepf, *Upper Mississippi River – Illinois Waterway Navigation Expansion: An Agricultural Transportation and Environmental Context*, CRS Report for Congress, July 15, 2004, p. 31.

two-thirds of grain tonnage sold in domestic markets while railroads carried about one-third and barges carried a small percentage.[23]

Railroads also haul large amounts of grain-related food products including flour and other grain mill products, animal feed, corn syrup and corn starch, milled rice, soybean oil, cake, and meal, and pasta. For Class I railroads, in 2009, grain related food products account for 2.5% of carloads, 3.5% of tons, and 3.7% of revenue. Overall, grain and grain related food products accounted for 7.9% of carloads, 11.3% of tons, and 12.2% of revenues for Class I railroads in 2009.[24]

Much of the grain exported has to travel long distances (more than 1,000 miles) to reach U.S. ports, so Class I railroads and barges are the primary modes in moving grain for export markets. Trucks are used for the initial leg of the move (to elevator or port) as well as for the movement of grain domestically to a processor or a feed lot.[25] Barges and rail are particularly important for the transportation of exported grain to ports for shipment to foreign destinations by water. Figure 3 illustrates a typical grain supply chain for export markets.

FIGURE 3
TYPICAL MODAL FLOW OF GRAIN EXPORTS

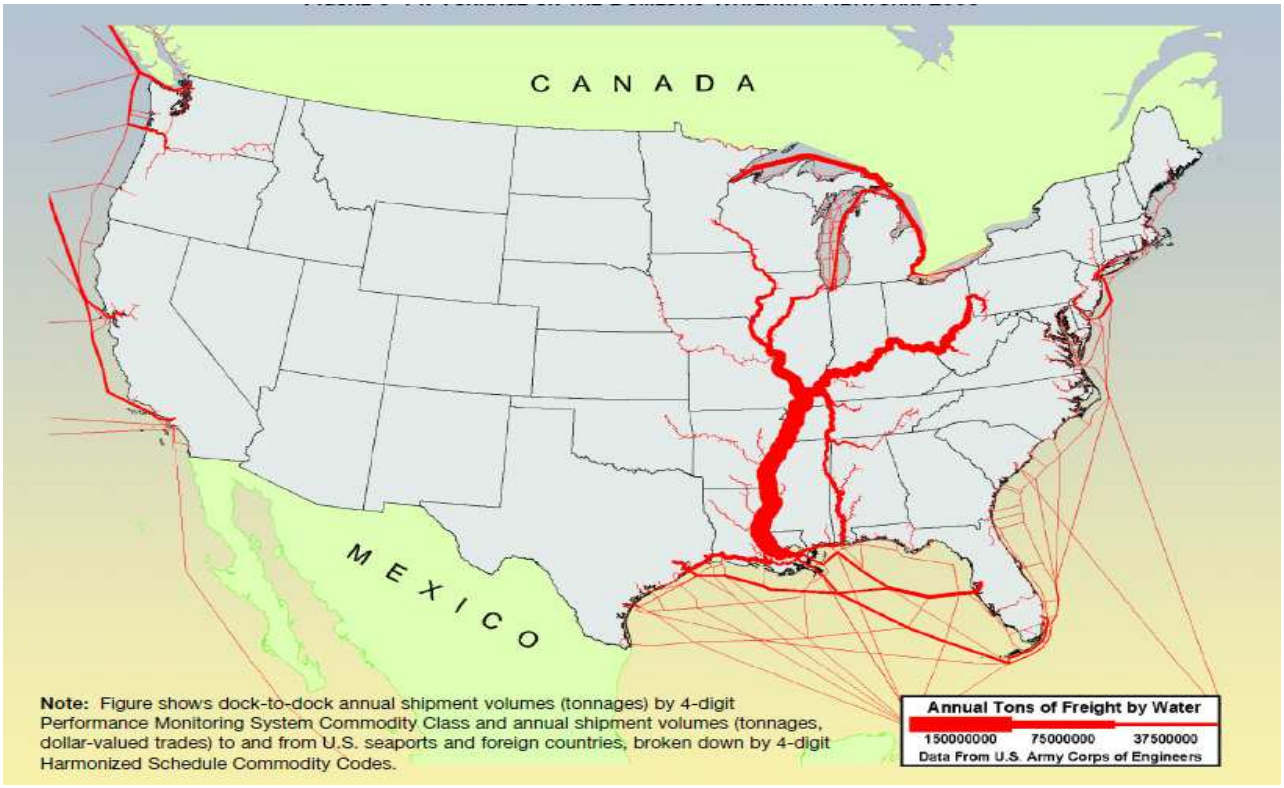


[23] United States Department of Agriculture, *Transportation of U.S. Grains A Modal Share Analysis, 1978-2004*, USDA Agricultural Marketing Services, October 2006, p. 6.
[24] Association of American Railroads, *Railroads and Grain*, AAR Policy and Economics Department, August 2010, p. 2.
[25] Randy Schnepf, *Upper Mississippi River – Illinois Waterway Navigation Expansion: An Agricultural Transportation and Environmental Context*, CRS Report for Congress, July 15, 2004, p. 30.

The U.S. is the world's largest agricultural exporter, facilitated by the Mississippi River, which is an important component of the U.S.'s comparative advantage in agricultural trade.[26] A large portion of exported corn and soybeans moves by barge since a significant amount of production is located relatively close to the Mississippi, Ohio, or Illinois waterways. A sign of the importance of barge transportation for the grain industry is the fact that four of the top ten barge operators are owned by grain companies (ADM, ConAgra, Cargill, Bunge), which together control 40% of barge fleet[27] The importance of the Mississippi River (and the Ohio and Illinois) is apparent in Figure 4, which illustrates the tonnage on U.S. domestic waterways in 2005.

Over the 1990-2002 period, corn, soybeans and soybean products composed the bulk of agricultural trade on the Upper Mississippi and Illinois Waterways (UMR-IWW), representing 93% of agricultural freight and 50% of all freight on UMR-IWW. Corn accounted for about two-thirds of this volume.[28]

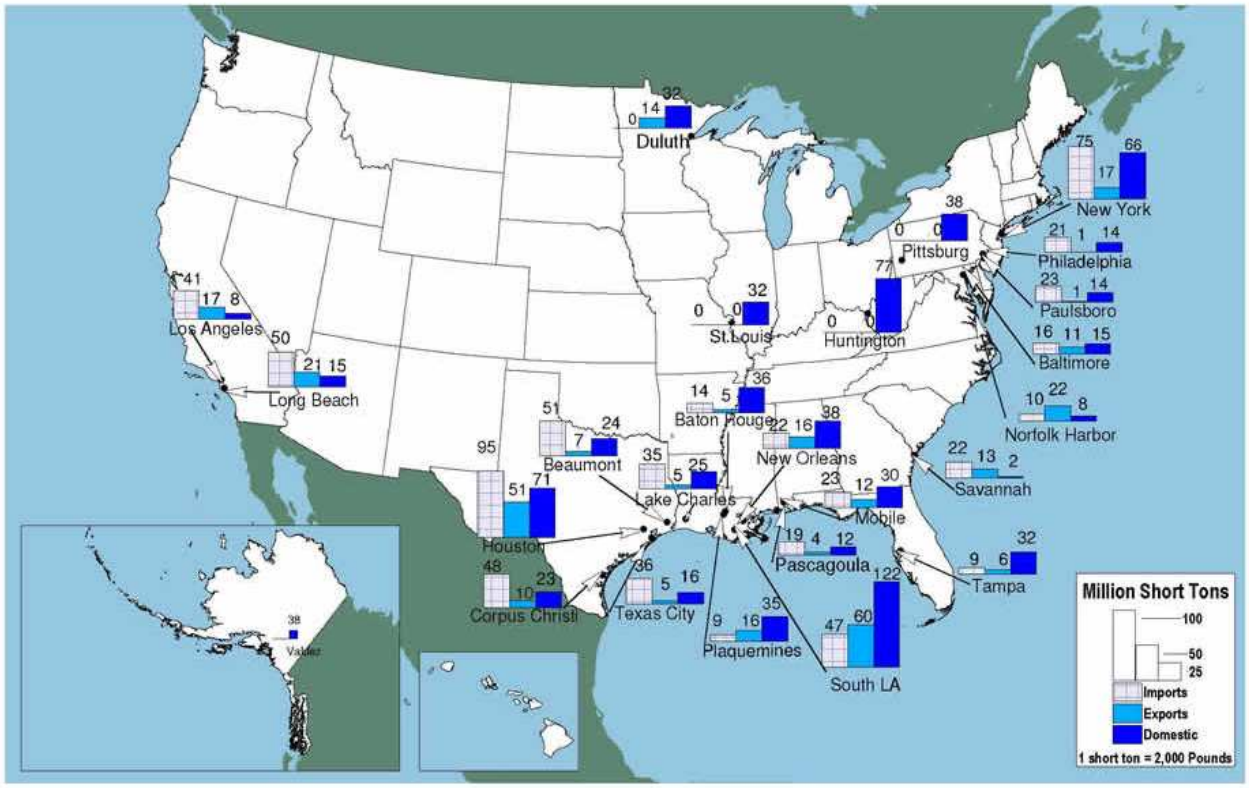
FIGURE 4
TONNAGE ON THE DOMESTIC WATERWAY NETWORK[29]



[26] Mary Jane Bolle, *Trade in the U.S. Gulf Region: Hurricanes Katrina, Rita and Beyond*, CRS Report for Congress, November 12, 2005, p. 3.
[27] John Fritelli, *Grain Transport: Modal Trends and Infrastructure Implications*, CRS Report for Congress, January 5, 2005, p. 5.
[28] Randy Schnepf, *Upper Mississippi River – Illinois Waterway Navigation Expansion: An Agricultural Transportation and Environmental Context*, CRS Report for Congress, July 15, 2004, p. 15.
[29] http://ops.fhwa.dot.gov/freight/freight_analysis/index.htm

Reflecting the amount of agricultural trade on the UMR-IWW, four of the top five tonnage ports in the U.S. (South Louisiana, Houston, Beaumont, and New Orleans) are located on Central Gulf Coast—handle nearly 40% of nation's waterborne tonnage (see Figure 5).[30] The Port of South Louisiana is the largest bulk cargo port in the world. It is a critical link in the distribution chains for grain and petroleum shipments. The port handles more than 60% of all grain exports from the Midwest. Many of the grain shipments serviced by the port are transloaded from barges, which carry cargo to and from inland locations on the Mississippi, Missouri, and Ohio River systems.[31]

FIGURE 5
TOP 25 WATER PORTS BY TONNAGE, 2007[32]



The West Coast and the Pacific Northwest, in particular, are the primary conduits for the nation's wheat exports. Pacific Northwest terminals handle about one-fourth of U.S. grain exports.[33]

[30] Lance R. Grenzeback and Andrew T. Lukmann, *Case Study of the Transportation Sector's Response to and Recovery from Hurricanes Katrina and Rita*, Cambridge Systematics, Inc., p. 24.
[31] Lance R. Grenzeback and Andrew T. Lukmann, *Case Study of the Transportation Sector's Response to and Recovery from Hurricanes Katrina and Rita*, Cambridge Systematics, Inc., p. 28
[32] http://ops.fhwa.dot.gov/freight/freight_analysis/nat_freight_stats/topwaterportston2007.htm
[33] *Katrina and Rita: Lingering Effects on Agriculture*, Center for the Study of Rural America, Federal Reserve Bank of Kansas City, October 2005, p. 4.

Arriving primarily at the Lower Columbia River ports by rail or barge, wheat grown in Eastern Washington, Montana, and the Upper Midwest is loaded onto ships and exported to large markets in Asia. In 2006, 11.1 million tons of wheat was exported from West Coast ports, representing half of all overseas shipments of U.S. grown wheat. In that year, 5.1 million tons was shipped from Texas Gulf ports, and 4.1 million tons of wheat was shipped from Mississippi Gulf ports.[34]

Class I railroads are more interested in long-distance trainload-size shipments, which suits the export market more than the domestic market[35] Most exported wheat moves by rail since wheat production is concentrated in the central and northern plains, farther from waterway access.[36]

Based on 2004 data from a special USDA study, Table 1 summarizes the differences in transportation mode for corn, wheat and soybeans and also how mode differs by whether the destination is domestic or the export market. While these figures are for 2004, the actual figures have not likely changed much and Table 1 represents the qualitative distribution of modal shares by grain types and domestic versus export destinations.

TABLE 1
2004 MODAL SHARES FOR CORN, WHEAT AND SOYBEANS[37]

	Rail	Barge	Truck
Corn			
Total	32%	15%	53%
Export	33%	64%	4%
Domestic	32%	2%	66%
Wheat			
Total	60%	19%	21%
Export	65%	35%	0%
Domestic	55%	2%	44%
Soybeans			
Total	23%	24%	54%
Export	34%	56%	10%
Domestic	16%	4%	81%

[34] Cambridge Systematics, *West Coast Corridor Coalition Trade and Transportation Study, Final Report*, April 2008. P. 2-1
[35] Randy Schnepf, *Upper Mississippi River – Illinois Waterway Navigation Expansion: An Agricultural Transportation and Environmental Context*, CRS Report for Congress, July 15, 2004, p. 31.
[36] John Fritelli, *Grain Transport: Modal Trends and Infrastructure Implications*, CRS Report for Congress, January 5, 2005, p. 6.
[37] United States Department of Agriculture, *Transportation of U.S. Grains A Modal Share Analysis, 1978-2004*, USDA Agricultural Marketing Services, October 2006, Tables 3, 4 and 5.

The FHWA's Freight Analysis Framework (FAF) provides information on the commodity group "cereal grains," which include wheat, corn, rye, barley, oats, and sorghum. Based on provisional 2009 FAF data, Louisiana ports are the top gateways for exports of cereal grains transported by sea. The New Orleans CSA accounts for 27% of 2009 export volume while the "LA remainder" FAF region, which encompasses southern Louisiana ports near New Orleans, accounts for 21% of the 2009 export volume. West coast ports in Seattle, the rest of Washington and Portland account for over 30% of the 2008 sea export volume.

The bulk volumes of cereal grains to Canada and Mexico move across the border at a few distinct points. For 2009 FAF volumes to Canada, almost 52% move through Detroit, and 30% move through North Dakota. In addition, the modal mix of cereal grains volumes to Canada is distinctly different than truck-dominated domestic movements, with 62% of the 2009 volumes moving by rail and only 38% moving by truck. For 2009 volumes to Mexico, 40% move through El Paso, 33% move through Laredo, and 23% move through "Texas remainder." As with Canada, the modal shares of cereal grains going to Mexico are dominated by rail, which has 97% of the 2009 volume going to Mexico

Supply Chain Disruptions

Five of the nation's top agricultural production states—Iowa, Minnesota, Illinois, Missouri, and Wisconsin—have traditionally relied on UMR-IWW navigation system as primary corridor for export-bound products (mostly corn and soybeans) These states account for approximately half of U.S. corn and soybean production and nearly half of the value of U.S. corn and soybean exports.[38] Given the importance of the Mississippi River and the Louisiana Gulf ports for U.S. grain exports (primarily corn and soybeans), we focus on two types of disruptions to the flow of agricultural exports over this corridor. First, we examine issues related to infrastructure—e.g., aging locks and dams. Next, we also discuss impacts of natural disasters, such as Hurricane Katrina.

The U.S. Army Corps of Engineers ("Corps") has estimated that, relative to transportation alternatives, UMR-IWW system generates $0.8 billion to $1.2 billion (2001$) in transportation cost savings based on 2000 traffic levels, compared to average annual operation and maintenance costs of $115 million[39] However, the Corps reports that UMR-IWW system has over half of the most delayed lock sites in the country's inland waterway system. Delays are due to traffic backups caused by congestion as well as closures for operation and maintenance. From 1990 - 2001 the Corps estimated cumulative average delays per tow of 48.5 hours on the UMR and 10.6

[38] Randy Schnepf, *Upper Mississippi River – Illinois Waterway Navigation Expansion: An Agricultural Transportation and Environmental Context*, CRS Report for Congress, July 15, 2004, p. 15.
[39] Randy Schnepf, *Upper Mississippi River – Illinois Waterway Navigation Expansion: An Agricultural Transportation and Environmental Context*, CRS Report for Congress, July 15, 2004, p. 28.

hours on the IWW. Given that the trip from Minneapolis to St Louis takes about 11.4 days, including delays, this implies that without delays the trip would be about a 9 days.[40]

Barge delays increase costs. A key determinant of the amount of freight that can be carried in a season is the time it takes to make each haul—shorter the haul time, the more hauls that can be made. Thus, delays associated with aging locks and dams represent lost time, lost freight and lost profits. Waiting delays also represent lost fuel (towboats burn about 80 gallons of diesel per hour). Delays also cause increases in barge rates and corresponding decrease in barge demand[41]

A significant part of the problem with barge delays is that the size of barge tows, size has grown from over 600 to 1,100 feet. On 600-foot lock chambers, a standard tow must move through locks in two passes, requiring the breakup and reassembly of some tows. Passage through a 1,200 foot lock can take about 45 minutes or less, but takes about 90 minutes through 600-foot lock. Several of the lower locks on the Upper Mississippi have been targeted for extension from 600 feet to 1200 feet to enable larger barge tows top pass through more quickly and, thus, reduce the cost of barge transport of exported grain and other bulk commodities.[42]

In addition to infrastructure capacity constraints, weather-related disruptions are a concern for freight transportation. This is especially true for barge transportation. For example, Hurricane Katrina halted grain exports out of the Mississippi River for nearly two weeks. Hurricane Katrina reached the Louisiana shore on August 29, 2005 and directly affected a number of Gulf Coast ports, including the Port of South Louisiana. The Port of South Louisiana is located along the Mississippi River between Baton Rouge and New Orleans. It is the largest bulk cargo port in the world and a critical link in the supply chain for grain. The port handles more than 60 percent of all grain exports from the Midwest. Most of the grain shipments are transloaded from barges that carry cargo from points along the Mississippi, Missouri, and Ohio Rivers to oceangoing vessels.[43]

The Port of South Louisiana itself did not suffer major damage from the hurricane, and most of its facilities were operational within five days of the storm. But parts of the lower Mississippi needed to be closed for more than a week as inspectors needed to determine whether there were new navigation obstructions. In addition, more than 300 barges were set adrift by the hurricane, and approximately 70 percent of the channel markers in the lower Mississippi were destroyed, creating additional hazards. Even after the river was reopened, numerous restrictions were placed on traffic. Restrictions along part of the river included limiting traffic to daylight hours,

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[40] Randy Schnepf, *Upper Mississippi River – Illinois Waterway Navigation Expansion: An Agricultural Transportation and Environmental Context*, CRS Report for Congress, July 15, 2004, p. 6.
[41] Randy Schnepf, *Upper Mississippi River – Illinois Waterway Navigation Expansion: An Agricultural Transportation and Environmental Context*, CRS Report for Congress, July 15, 2004, p. 28.
[42] John Fritelli, *Grain Transport: Modal Trends and Infrastructure Implications*, CRS Report for Congress, January 5, 2005, p. 2.
[43] Lance R. Grenzeback and Andrew T. Lukmann, "Case Study of the Transportation Sector's Response to and Recovery from Hurricanes Katrina and Rita," American Institute of Chemical Engineers, p. 28, http://www.aiche.org/uploadedFiles/FSCarbonMgmt/Resources/Case_Study_-_Katrina.pdf.

allowing only one-way traffic, and allowing only shallow-draft barges (which effectively limited the size of the shipments).[44]

In the immediate wake of the hurricane, corn and soybean prices plummeted in some of the prime growing regions, as people foresaw limited barge traffic for an extended period of time. Between August 26 and September 2, corn prices dropped 20 percent in Southern Illinois and 23 percent in Southeastern Missouri.[45] Barge rates on the Mississippi River, which had generally ranged between $10 and $20 per ton during most of 2004 and 2005, increased sharply in September, peaking at $39 per ton during the week of October 12.[46] Grain exports from Louisiana in September were 52 percent below their levels of a year earlier.[47] Restoration of the Mississippi River waterway was accomplished more rapidly than initially thought, and after approximately 8 weeks, barge traffic returned to its normal level.[48]

As significant as these disruptions were, a much larger crisis was avoided due to the fact that the disruption did not occur during the peak shipment season. The largest shipments of corn and soybeans occur between October and February. Had the system not been restored by then, the grain elevator operators would not have had sufficient storage capacity to hold the crops until the river system was restored. Alternative ports on the West Coast, Texas Coast, and the Great Lakes, and overland shipments to Mexico and Canada would have been significantly more expensive options for the export market. Furthermore, these options would have been running near capacity already, without the additional grain shipment demand resulting from the loss of the Mississippi River barge traffic.[49] With the more limited supply chain options, the impact of the disruption on commodity and transportation prices would have been much more significant, and grain exports would have been significantly affected.

[44] ibid., p. 28.
[45] Mark Drabenstott and Jason Henderson, "Katrina and Rita: Lingering Effects on Agriculture," *The Main Street Economist*, Center for the Study of Rural America, Federal Reserve Bank of Kansas City, October 2005, p. 4, http://www.kc.frb.org/RegionalAffairs/Mainstreet/MSE_1005.pdf
[46] Statement of Keith Collins, Chief Economist, U.S. Department of Agriculture, before the U.S. Senate Committee on Agriculture, Nutrition, and Forestry, November 9, 2005, p.6, http://www.usda.gov/oce/newsroom/archives/testimony/2005-1997files/collins_11092005.doc.
[47] ibid., p. 8.
[48] United States Department of Agriculture, Office of Inspector General, Great Plains Region, "Audit Report, Hurricane Relief Initiatives – Barge Movement, Barge Unloading, Alternative Grain Storage, and Transportation Differential Agreements," Report Nos. 03601-21_KC and 03601-22-KC, March 2007, http://www.usda.gov/oig/webdocs/03601-21-KCand03601-22-KC.pdf
[49] Grenzeback and Lukmann, op. cit., p. 32.