Exploring the Economics of Using Barges on the Mississippi River to Transport Agricultural Commodities

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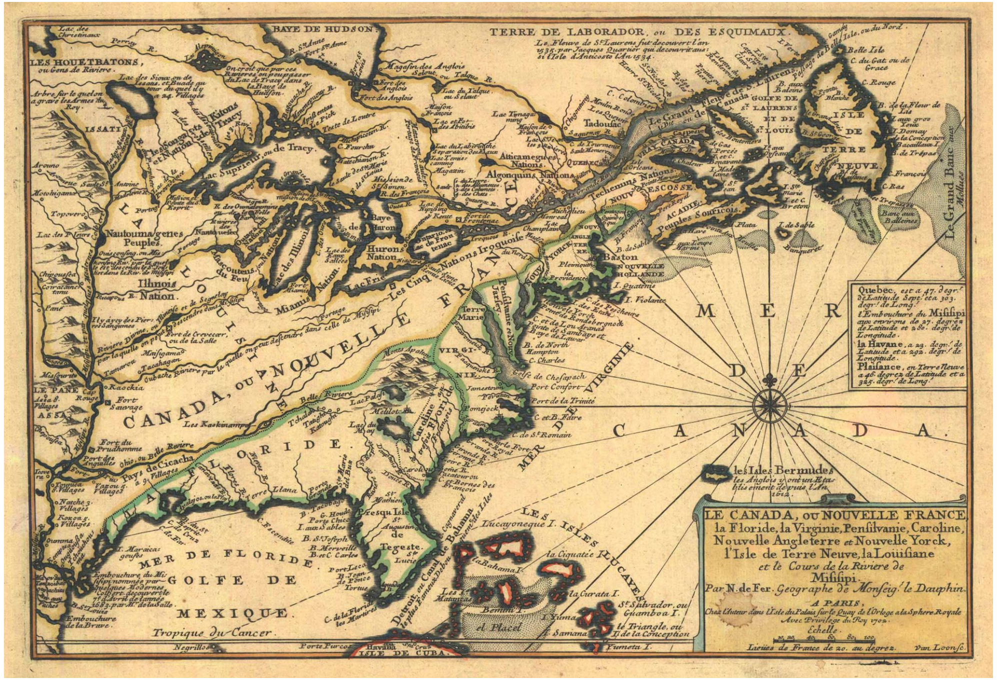
A bit of history:



The voyages of Columbus excited Europe, and explorers began searching for routes that would help them reach the riches of Asia without having to sail around the lands of the Americas. Without sea access across Central or South America, explorers began searching for a water route through North America.

As governor of Cuba, Hernando DeSoto is credited with discovering the Mississippi River in May 1541 on his travels through the southeastern part of North America what is now the states of Florida, Georgia, South Carolina, North Carolina, Tennessee, Alabama, Mississippi, Arkansas and Louisiana. When he died of a fever, his men weighted down his body and sunk it in the river.

LaSalle claimed all land drained by the Mississippi River for France and named it Louisiana.

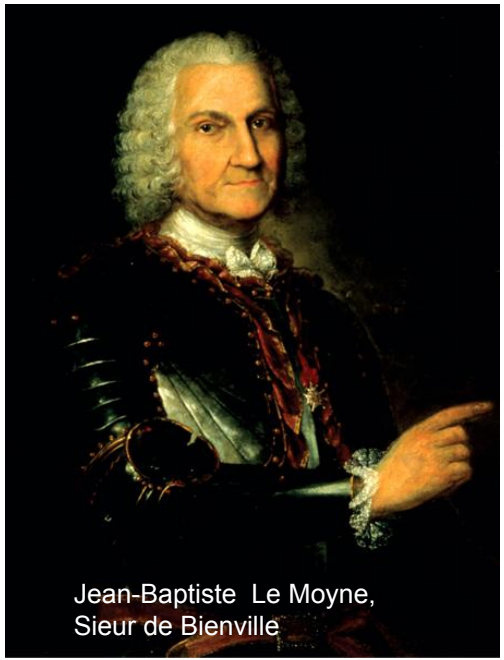
Over 140 years after DeSoto, the next important explorer was LaSalle, a Frenchman who traveled down the Mississippi River from Canada. Reaching the mouth in 1682, he claimed all of the land drained by the great river for France, naming it Louisiana in honor of King Louis XIV. He left for France with the great news and promised to return soon.

Henri de Tonti, the Iron Hand

Tonti of the Iron Hand, an Italian adventurer, friend of LaSalle and historian for the trek down the Mississippi River, left Canada for a second trip hoping to meet LaSalle along the way. Unfortunately, LaSalle misjudged the location of the mouth of the river from the Gulf of Mexico. After two years of difficulties, LaSalle was murdered by his own men. Tonti waited for his friend, but finally left a letter for him with an Indian chief whose camp was located between Baton Rouge and New Orleans.

Pierre Le Moyne, Sieur de Iberville

France had been at war with England so she had to wait for several years to colonize her immense Louisiana. Finally the time came to send explorers to create a French colony in the New World. That challenge was given to Iberville and his 18-year-old brother, Bienville. They traveled along the Gulf coast, stopping at several islands, finally making it to the mouth of the Mississippi River on March 2, 1699. The next day, a Tuesday, a bayou was discovered just up the river and named Mardi Gras Bayou. In later travels up the river, Iberville received the letter left years before by Tonti. That proved to him and his crew that they were indeed on LaSalle's great river!



Jean-Baptiste Le Moyne,
Sieur de Bienville

It was important to France to have a colony as an outlet for the fur trade in the upper Mississippi Valley. In 1705, a load of 15,000 bear and deer hides was the first commercial cargo to come down the Mississippi River. Bienville, left in charge to colonize Louisiana. chose the swampy land in the crescent of the Mississippi River as the location for his Nouvelle Orleans. New Orleans is excitedly awaiting the 300th anniversary of its founding in 2018!

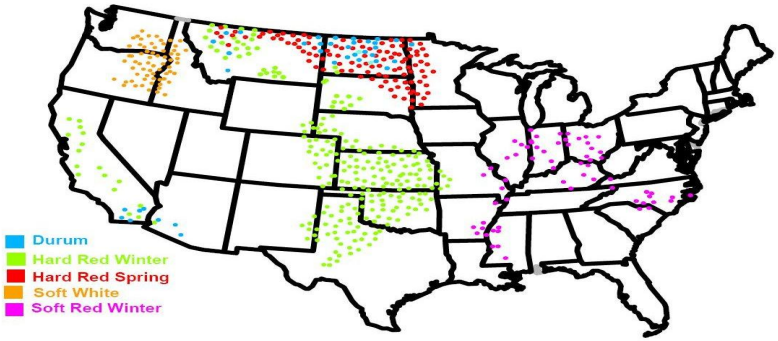
As it was over 300 years ago, the Mississippi River continues to be the lifeblood of our country. Commodities travel down the river on barges and are loaded onto massive cargo ships and are taken into the Gulf and out to the world. Little did DeSoto, LaSalle, Iberville and Bienville know the roles they would have in our history that keeps America vital in the economy of the world!

Today agricultural commodities are transported on highways, railways and the waterways throughout our country.

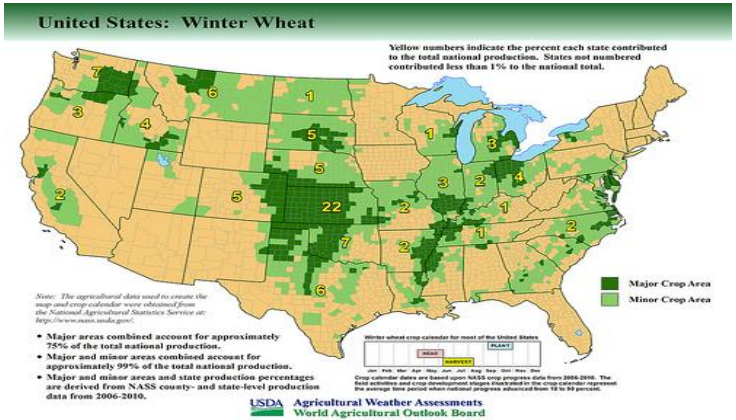
Corn production regions

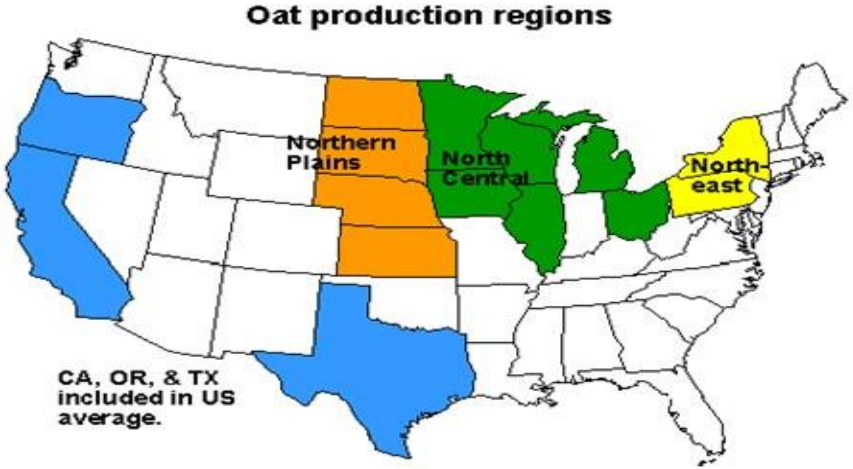
Soybean production regions

Major US. Wheat Growing Regions

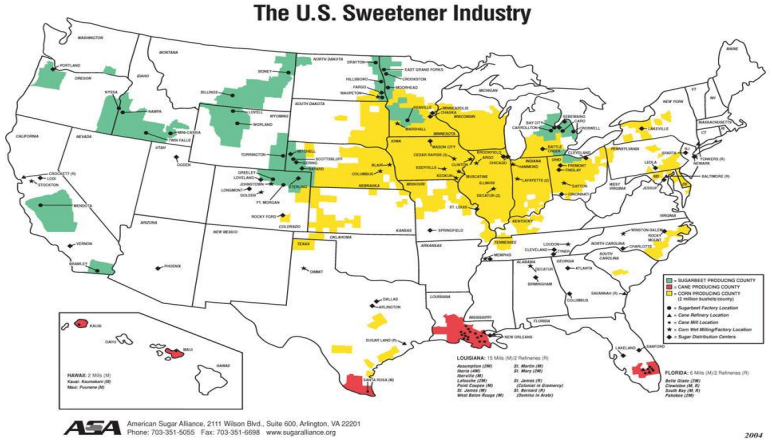


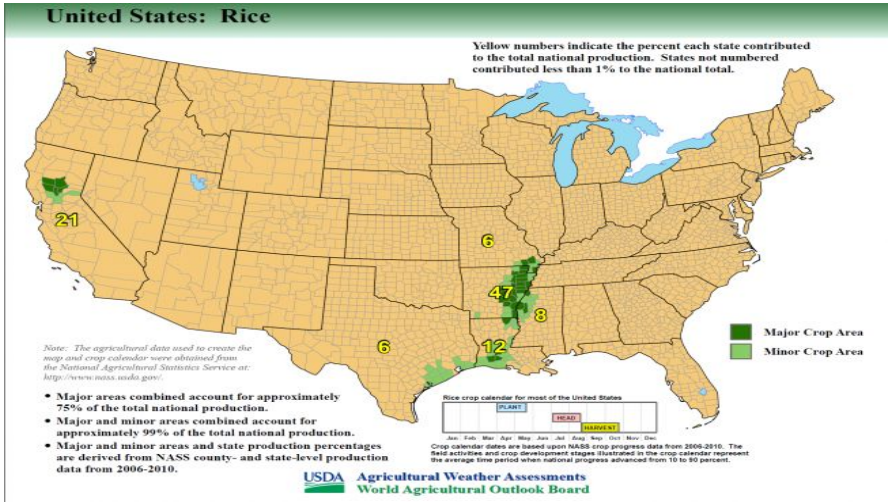
Source : US. Wheat Associates

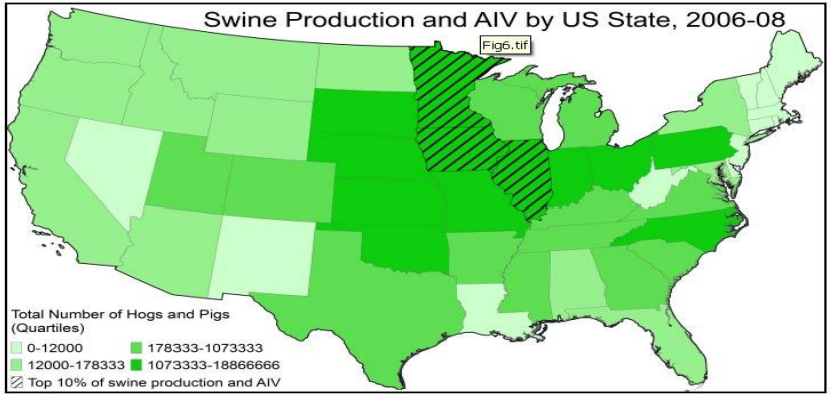


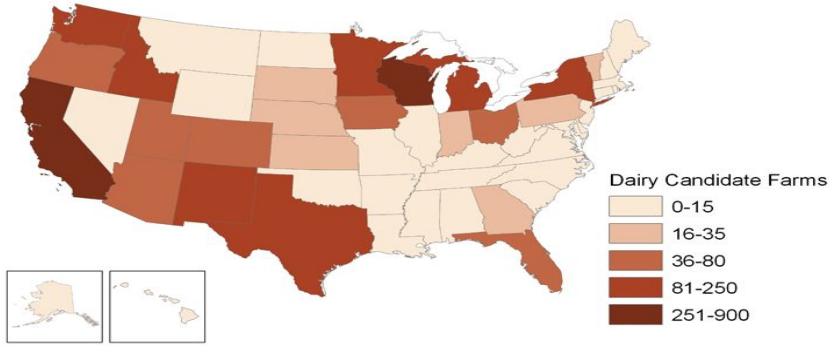


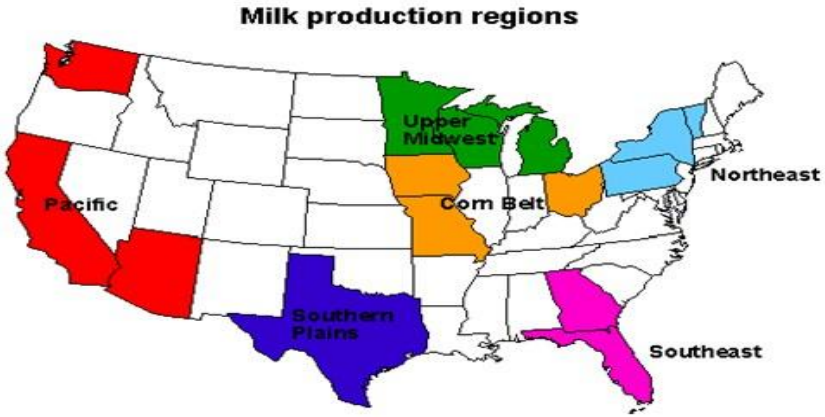
US Sweeteners: Sugarbeets Sugarcane Corn

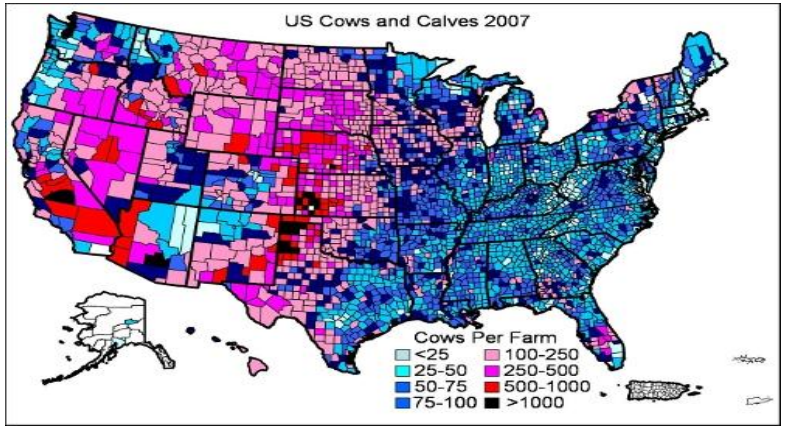





Swine Production and AIV by US State, 2006-08
Fig6.tif
Total Number of Hogs and Pigs
(Quartiles)
0-12000
12000-178333
178333-1073333
1073333-18866666
Top 10% of swine production and AIV


Dairy Candidate Farms
0-15
16-35
36-80
81-250
251-900


Milk production regions
Upper Midwest
Northeast
Pacific
Corn Belt
Southern Plains
Southeast


US Cows and Calves 2007
Cows Per Farm
<25
25-50
50-75
75-100
100-250
250-500
500-1000
>1000

Major Agricultural Commodity Production in the United States

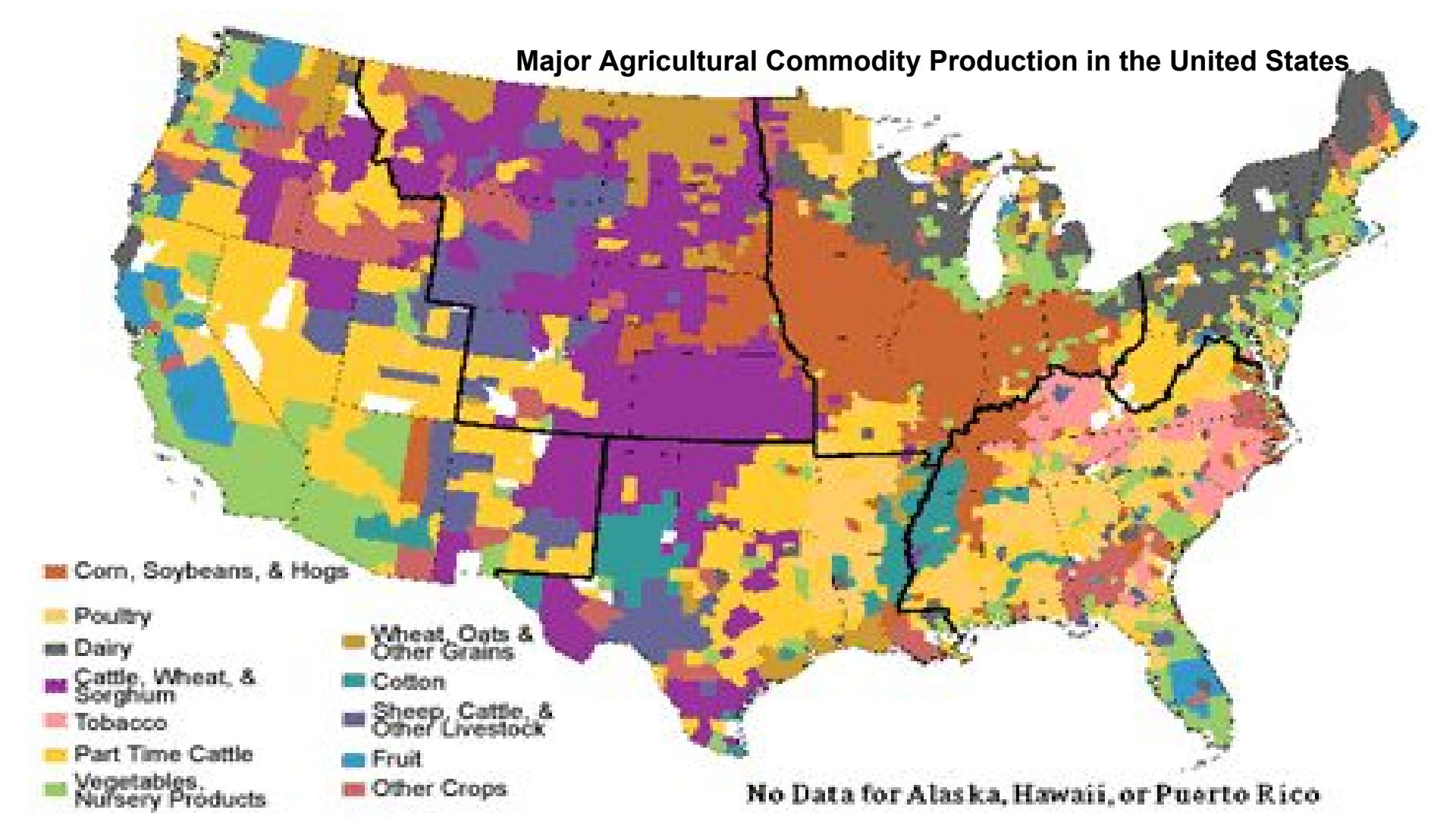
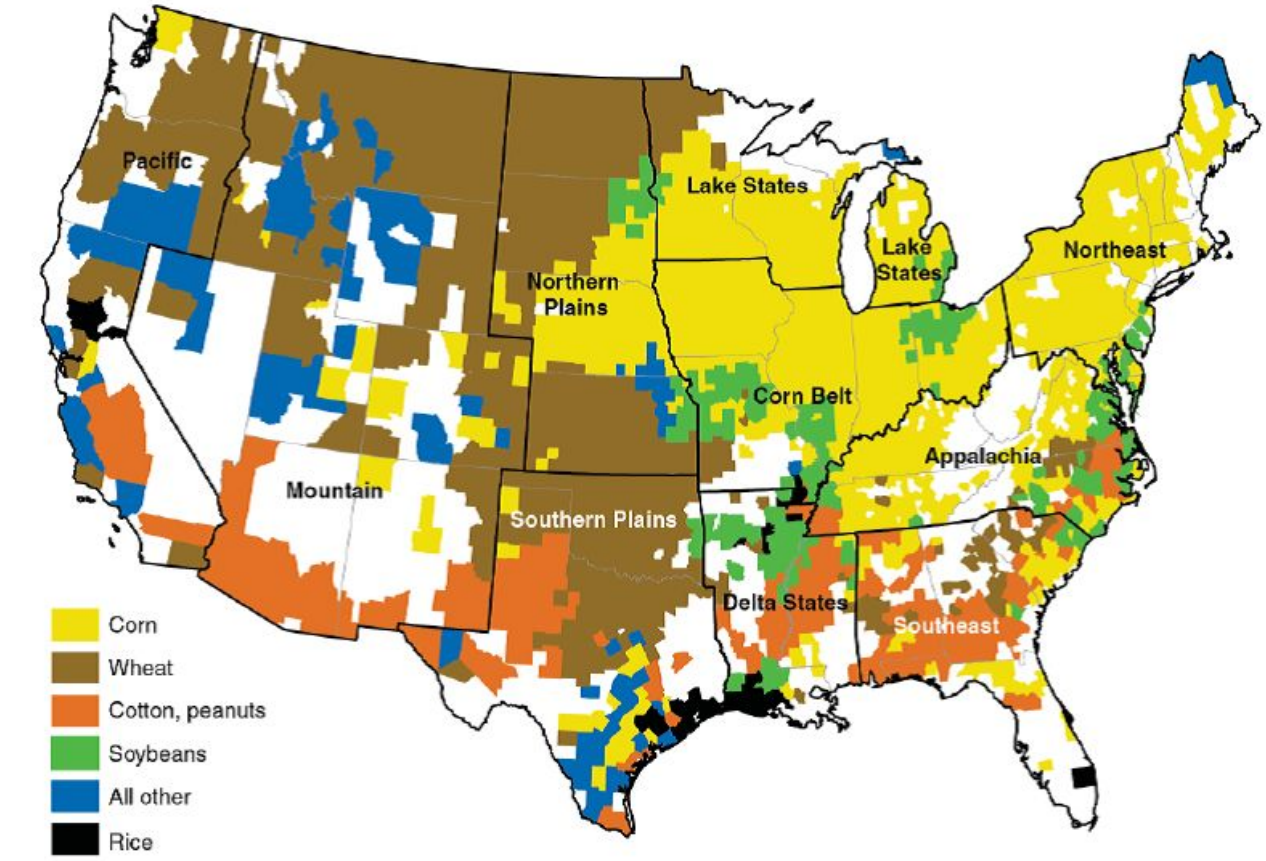


Figure 1
Base acres, by major commodity and U.S. county, 2004-08



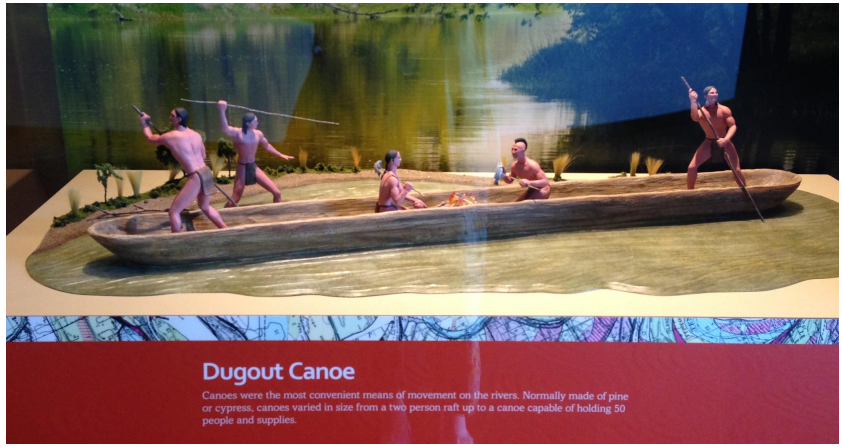
Note: Counties with fewer than 2,000 base acres of the leading commodity or with fewer than 5,000 acres of cropland in the 2007 Census of Agriculture are shown in white.

Source: USDA, Economic Research Service calculations based on USDA, Farm Service Agency direct payments base acre data.

These are the main commodities that are shipped on the rivers of our country, and make their way down the Mississippi River, into the Gulf of Mexico and out to the world.

Major Rivers of the Eastern Half of the United States

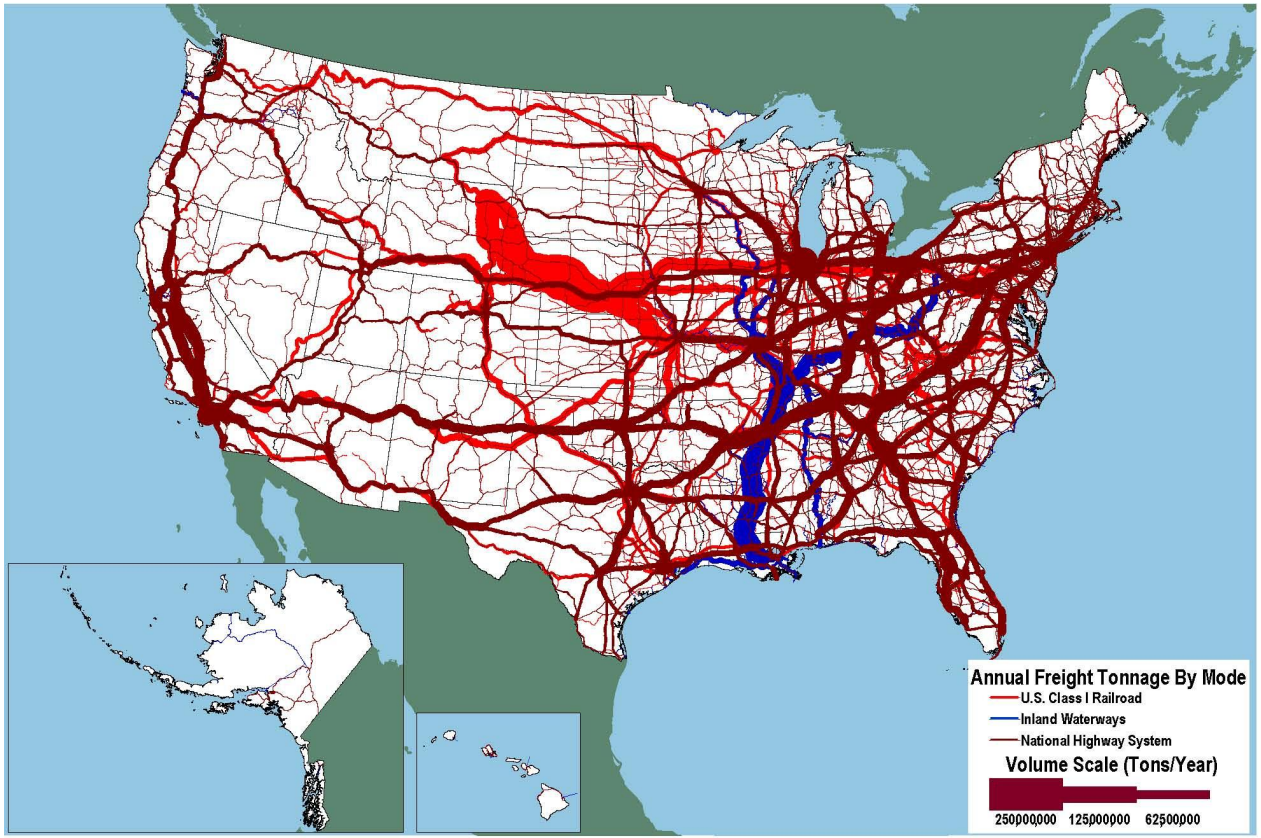
Early travelers on the river carried goods in dugout canoes, rafts and small wooden boats.



Steamboats also brought passengers up and down the river.

Cotton Steamers brought cotton from the plantations down to New Orleans and other ports. Other goods would be picked up for the return trip to the plantations.

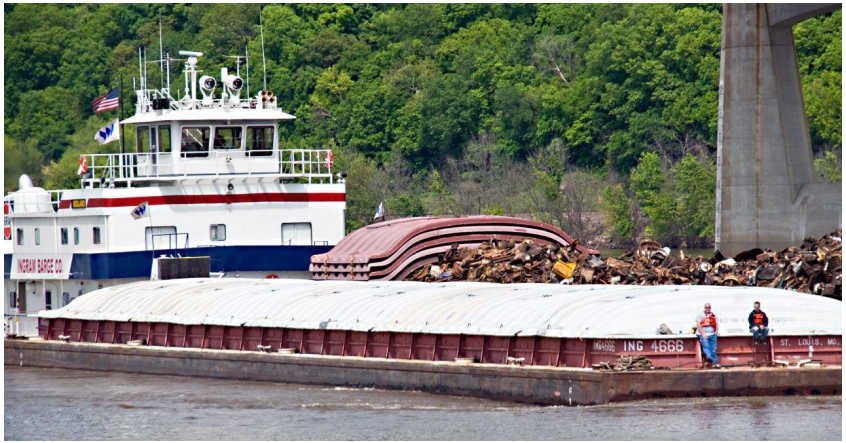
Tonnage on Highways, Railroads and Inland Waterways: 2002

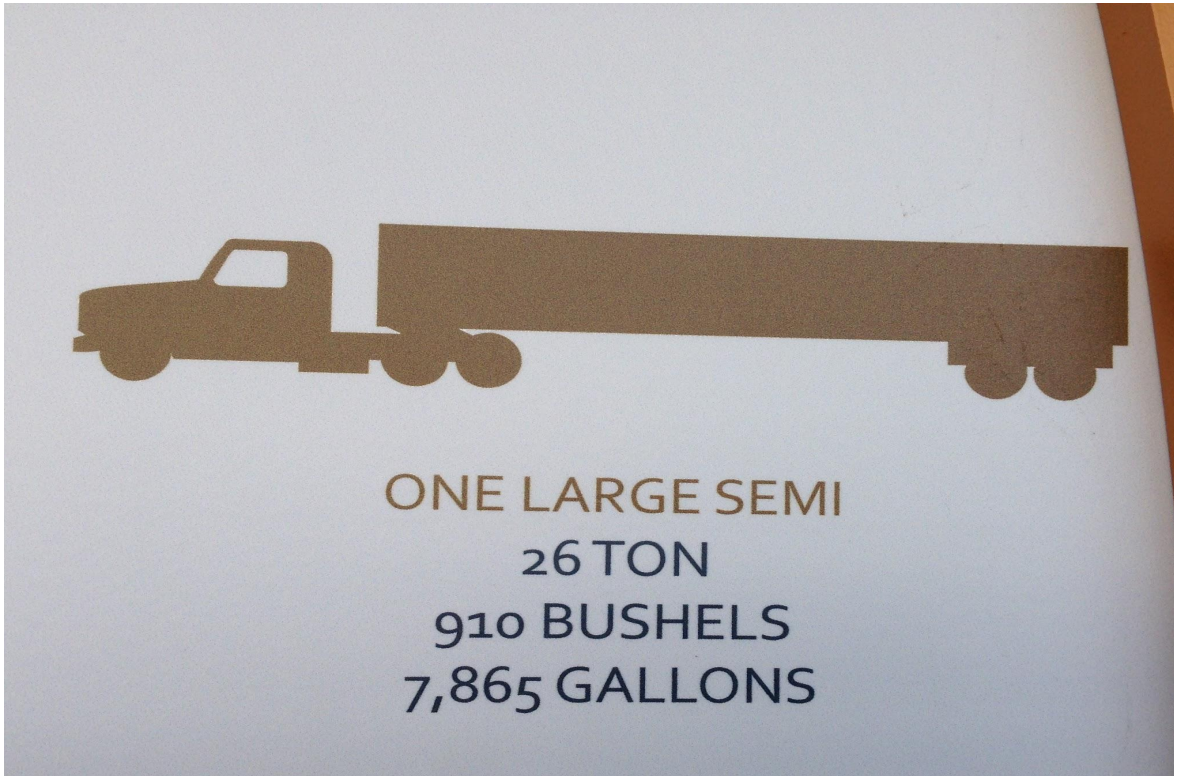


Sources: Highways: U.S. Department of Transportation, Federal Highway Administration, Freight Analysis Framework, Version 2.2, 2007. Rail: Based on Surface Transportation Board, Annual Carload Waybill Sample and rail freight flow assignments done by Oak Ridge National Laboratory. Inland Waterways: U.S. Army Corps of Engineers (USACE), Annual Vessel Operating Activity and Lock Performance Monitoring System data, as processed for USACE by the Tennessee Valley Authority; and USACE, Institute for Water Resources, Waterborne Foreign Trade Data, Water flow asssignments done by Oak Ridge National Laboratory.

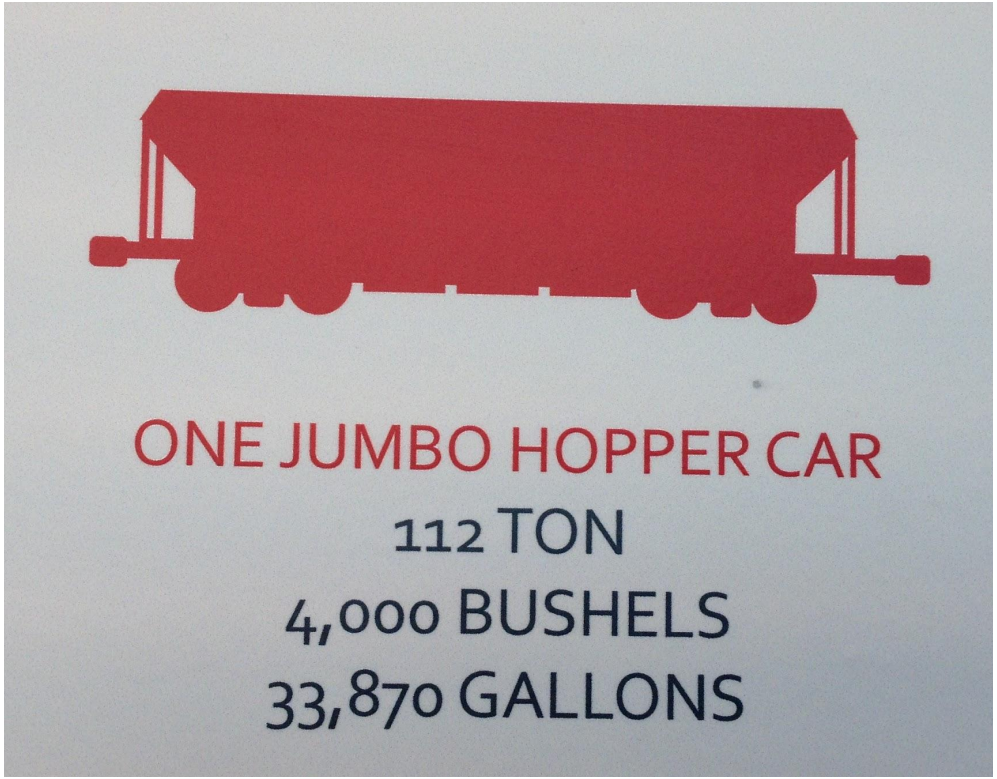
This map shows tonnage of commodities that are transported on the rivers, railroads and highways of our nation.

In the US, commodities are shipped by truck, rail or barge.





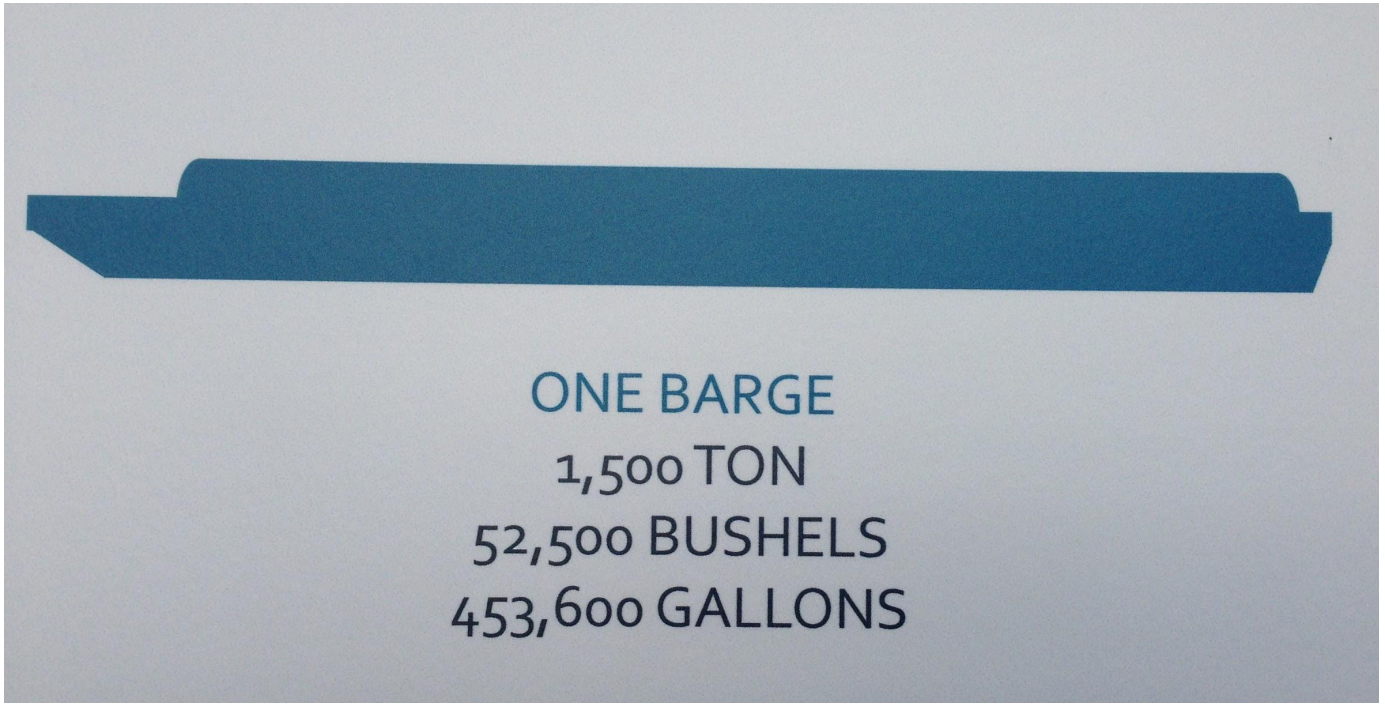
Tractor trailers may be the first method of transporting some commodities from the farm to the processing plant. They also may be used to transport the processed product.



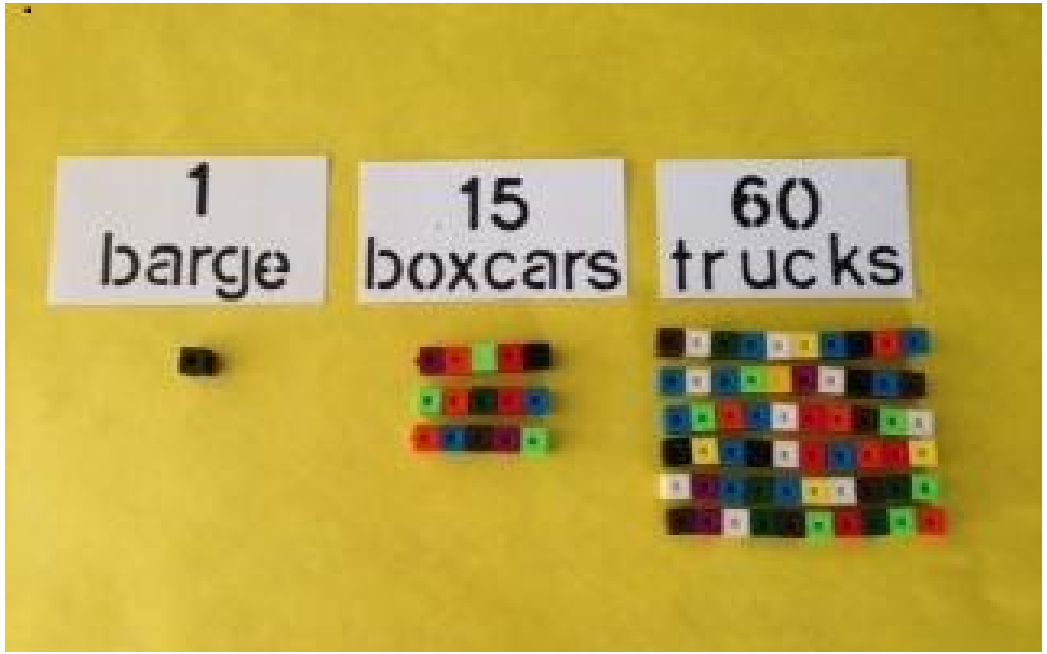
From the processing plant, the product may be loaded into railroad hopper or boxcars. Sometimes the hoppers are used to carry the goods to the port to be loaded onto barges.

Barges

- Barges are flat bottomed vessels, built for river and canal transport of heavy goods.
- Much grain produced in upper Midwest is destined for foreign countries and is shipped by barges to serve an important export market. In 2013, 65% of corn exports were shipped from the Mississippi River Gulf outlet.
- About half of the barge traffic on the Mississippi River involves the shipping of grain that is loaded onto ships traveling down to the Gulf of Mexico for overseas transport.



Thousands of barges are used to carry grain down the Mississippi River to the Port of South Louisiana. There the grain is stored in grain elevators and loaded onto ships to be exported to many countries of the world. Some barges carry coal, sand, lumber, building materials, and also petroleum products that are produced at the many chemical plants on the lower Mississippi River.

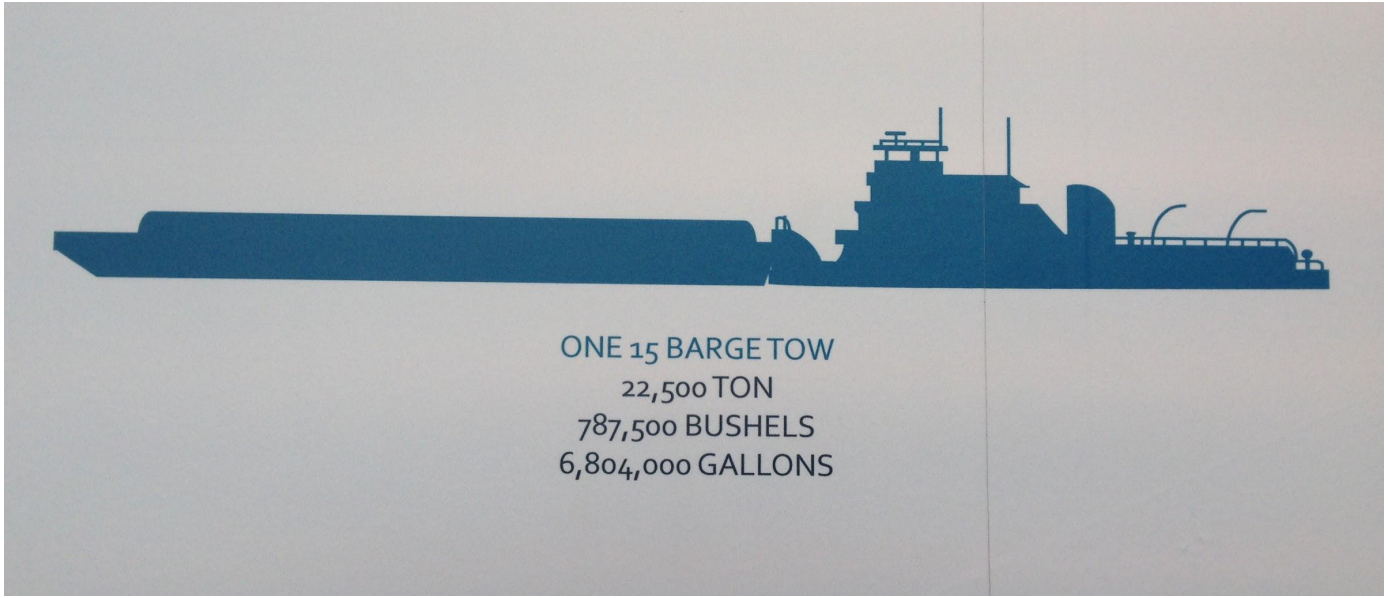


How much does each carry?

- **1 barge = 1500 tons**
- **1 hopper/boxcar = 112 tons**
- **1 tractor trailer = 26 tons**

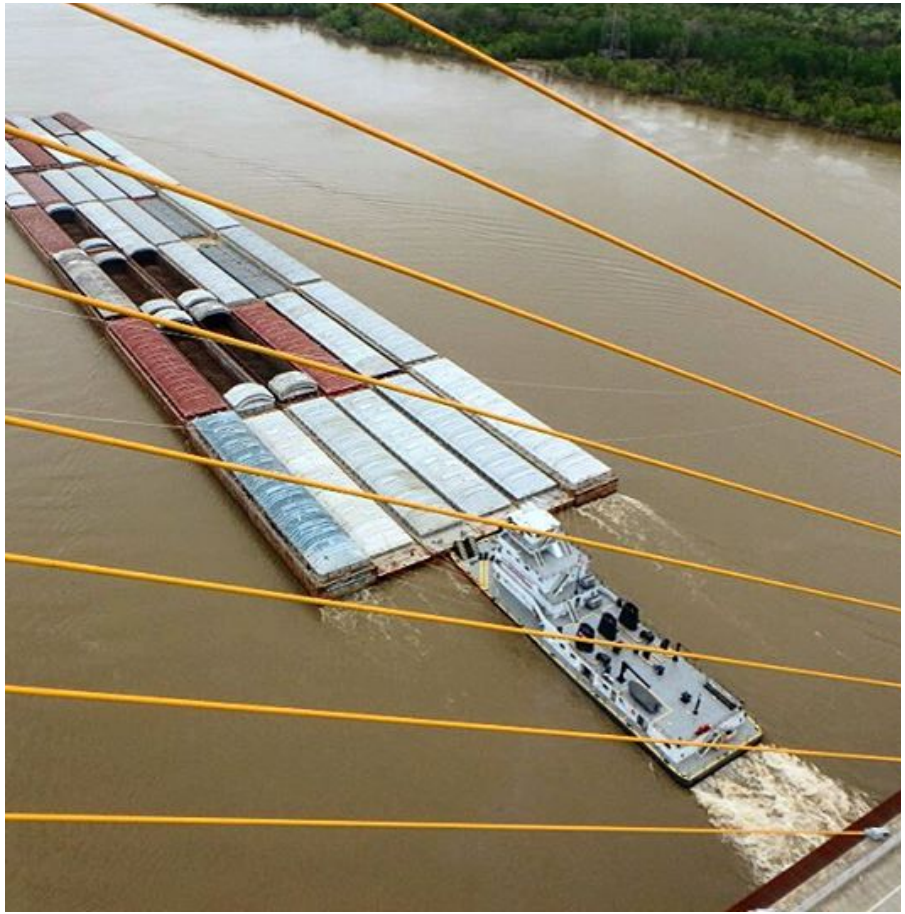
How many are needed to carry the capacity of just 1 barge?

- **15 boxcars**
- **60 tractor trailers**



Barges are moved up and down the river by tow boats. A set of barges moving together is called a tow. A tow usually has at least 15 barges.

- **The capacity of a 15-barge tow is 22,500 tons.**



Can you count the number of barges in this tow?

Although the numbers are calculated based on a 15-barge tow which is the maximum for the Upper Mississippi River and other rivers, this picture shows a more realistic tow on the Lower Mississippi!

Let’s compare capacity of one tow!

1 barge = 1500 tons

- **one tow = 15 barges = 22,500 tons**

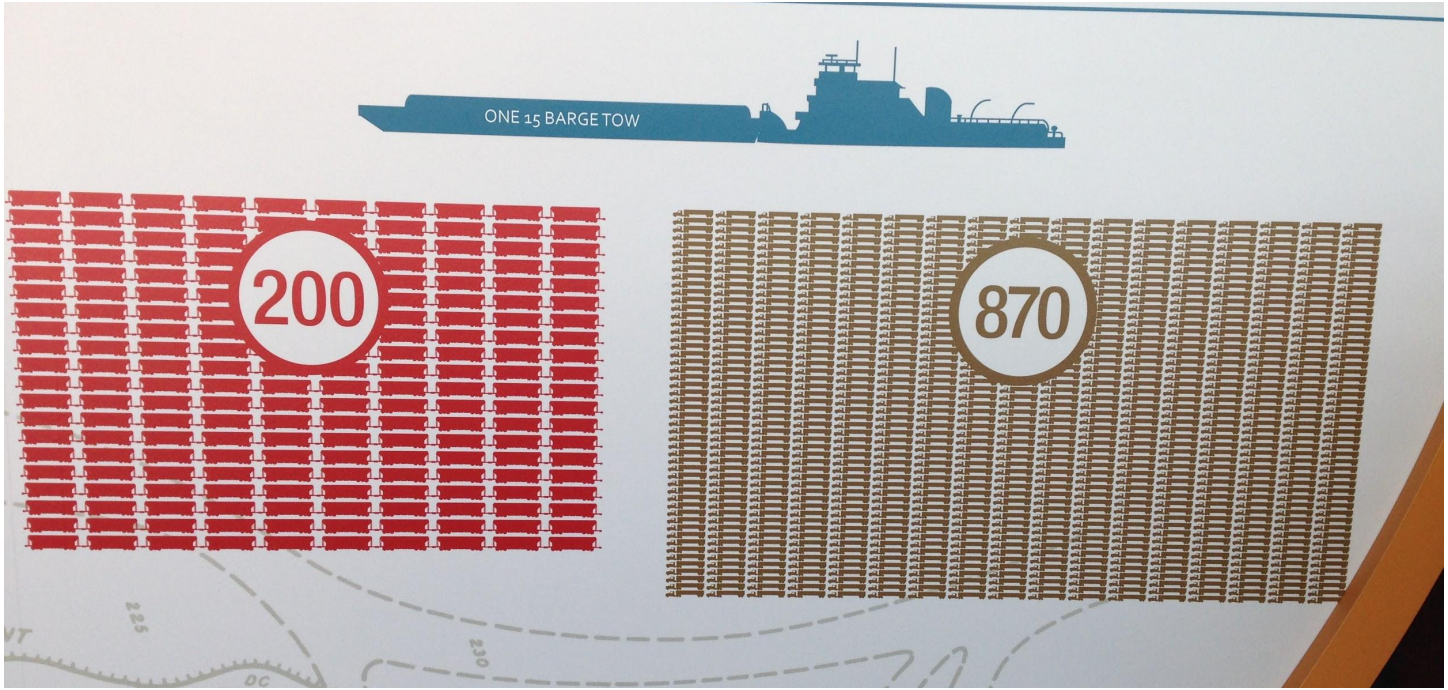
1 boxcar = 112 tons

- **22,500 tons = 200 railcars**

1 tractor trailer = 26 tons

- **22,500 tons = 870 tractor trailers**

Here's what that looks like!



Length Comparisons

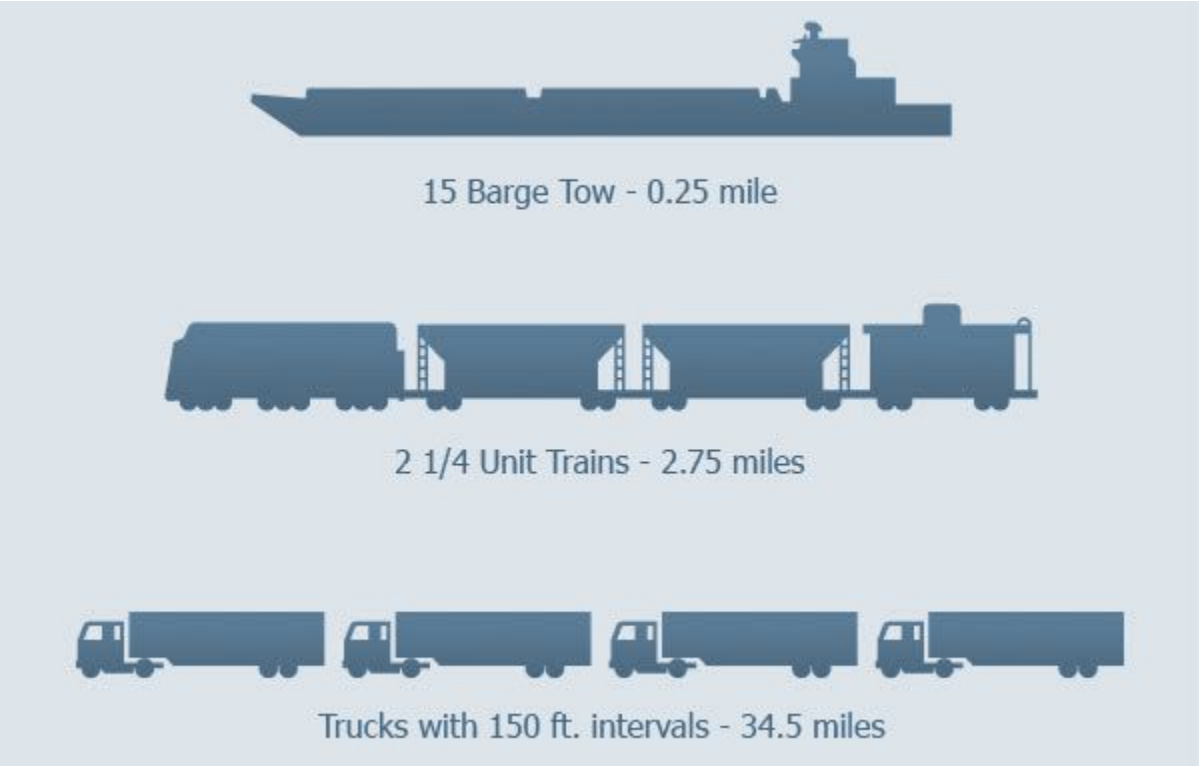
Barge
- 195 feet long

Boxcar
- 55 feet long

Tractor trailer
- 73 feet long

Imagine the lengths of the three methods of moving commodities:

- A 15-barge tow is ¼ mile long.
- 200 railroad cars are 2¼ miles long.
- 870 trucks are 7¼ miles long!



We do have to remember that boxcars and trucks cannot move end to end on rail or highway. The actual lengths of 200 boxcars or 870 trucks would be much longer!

Fuel costs vary greatly also!

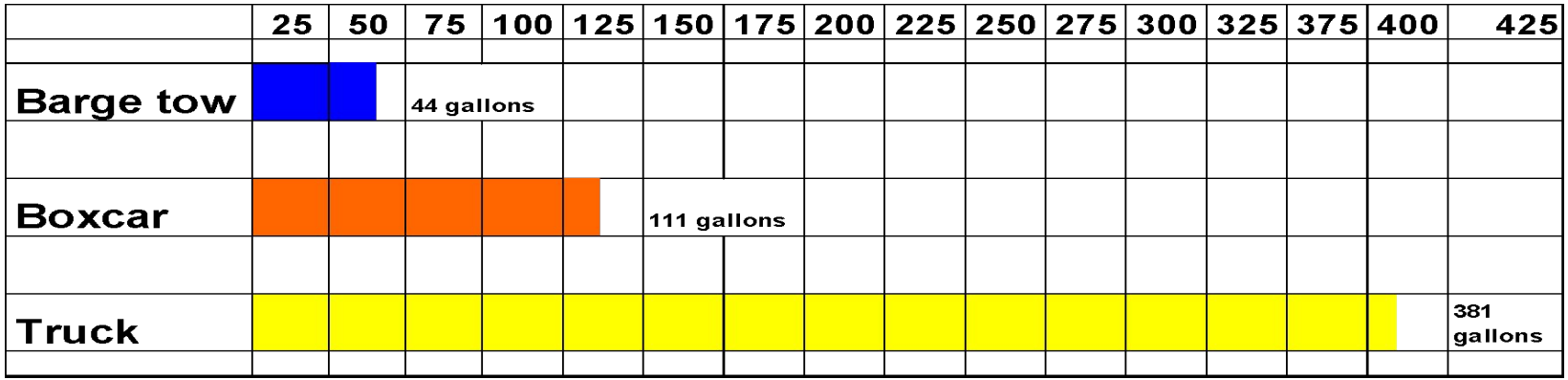
How much fuel is needed to move 22,500 tons one mile?

- **A 15-barge tow holds 22,500 tons and uses 44 gallons of fuel to move the tow one mile.**

- **200 rail cars hold 22,500 tons and use 111 gallons of fuel to move one mile**
  - **or 2 ½ times as much fuel as the barge tow.**

- **870 tractor trailers hold 22,500 tons and use 381 gallons of fuel to move one mile**
  - **or 8 ⅔ times as much fuel as the barge tow.**

Fuel Consumption to Move 22,500 tons the Distance of One Mile



1. How many gallons of fuel does it take to move one barge tow of 22,500 tons the distance of one mile? _____ gallons
2. How many gallons of fuel does it take to move 200 rail cars holding 22,500 tons the distance of one mile? _____ gallons
3. How many gallons of fuel does it take to move 870 trucks holding 22,500 tons the distance of one mile? _____ gallons
4. How many barge tows of 22,500 tons could be moved for same fuel as the 200 rail cars? _____tows (sets of 15 barges)
5. How many tons is that? _____ tons
6. How many barge tows of 22,500 tons could be moved for the same fuel as the 870 trucks? _____tows (sets of 15 barges)
7. How many tons is that? _____ tons
8. Which do you think is the most economical way of transporting agricultural commodities? _____
9. Why? _____

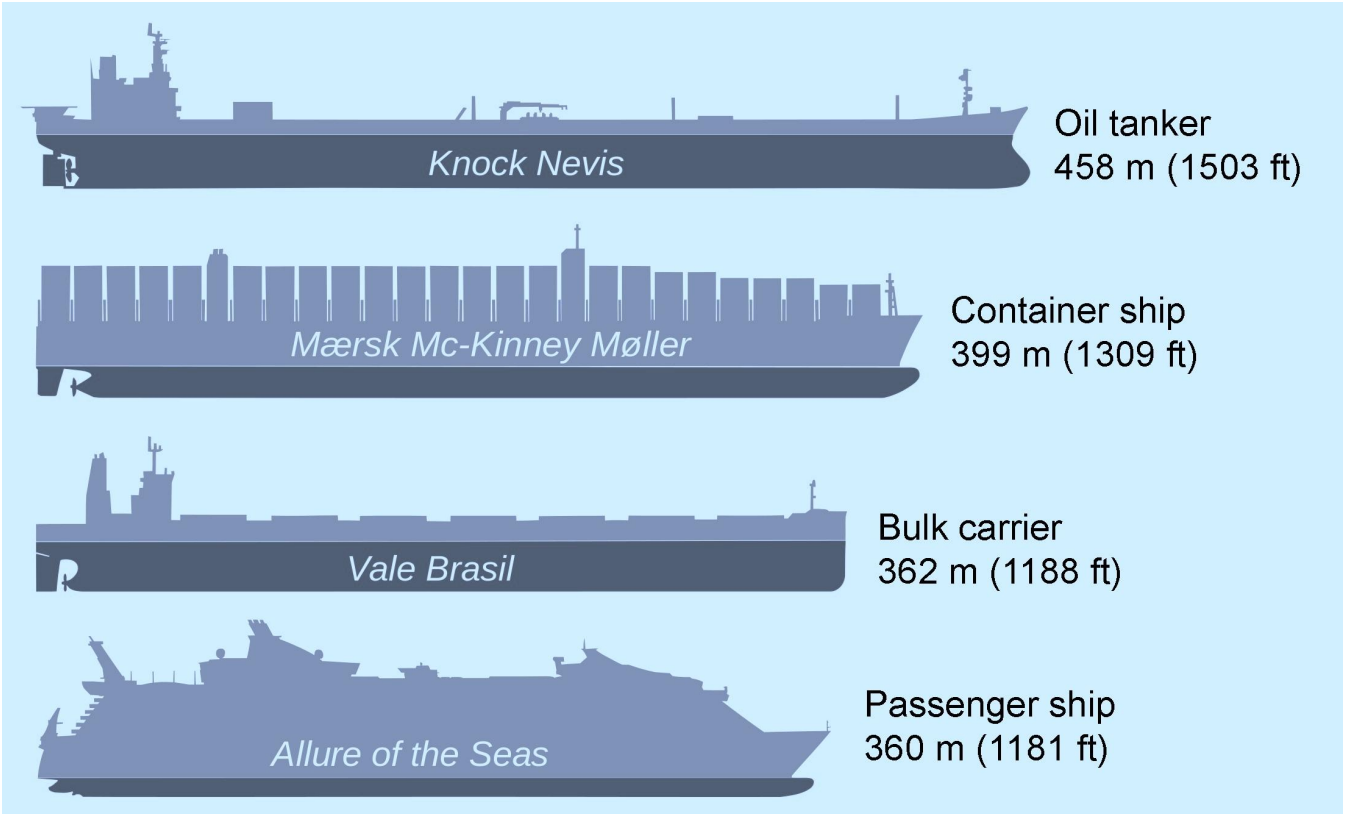
Traffic: Water vs. Rail and Highway

- Traffic growth in the US has far outstripped any increase in the infrastructure capacity. When traffic demand exceeds supply, congestion results leading to safety problems and delays.
- Water transportation has few congestion problems and seldom causes problems for others.
- The waterway industry has met increases in additional cargo demand, not by building more towboats of the same size, but fewer ones with greater horsepower that are capable of pushing more barges at one time.

Advantages of River Commerce

- Barges use less fuel to move goods compared to other methods and create less air pollution.
- Noise generated by barges and visual intrusion of barges are less than other methods of transportation.
- Barges in coastal waters are traveling well away from other vessels so chances of accidents or loss of goods are relatively limited.
- The internal navigation system is safest mode of transportation.

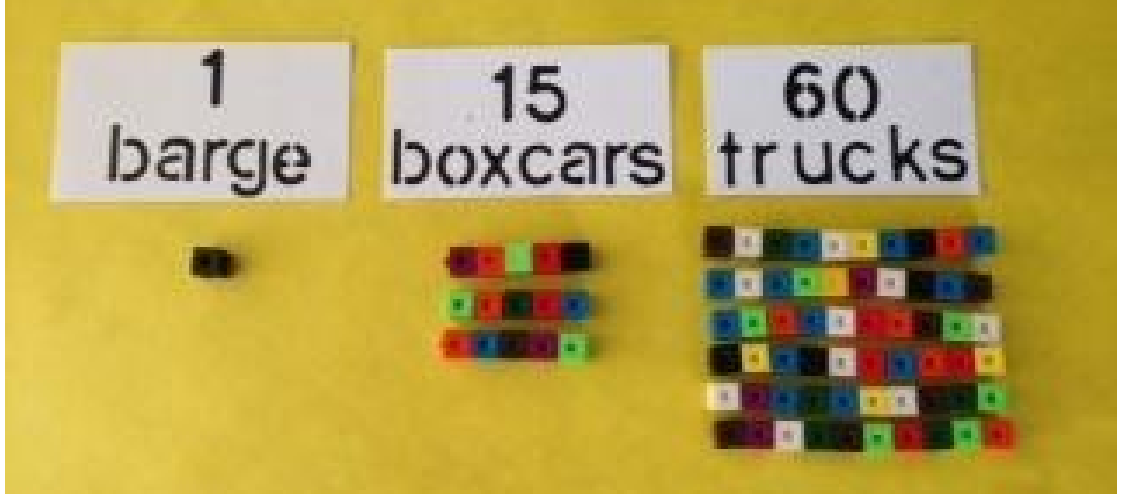
- America’s river systems serve as highways to connect people and places.
- The Mississippi River is America’s main artery of commerce extending 2,350 miles from Minnesota to the Gulf of Mexico.
- Commerce greatly added to the Mississippi River Valley’s early growth and played a critical role in shaping the modern United States.
- The US Army Corps of Engineers uses dikes, concrete mattresses on the levees, and dredging to provide a stable navigation channel.
- Today, millions of tons of bulk products move up and down the river, providing jobs and fueling the economy.
- Barges carry agricultural commodities of cotton, grain, soybeans, wheat, corn, lumber and wood products, as well as fertilizer, coal, construction materials, metals, sand and gravel.
- Gasoline, petroleum products and other chemicals account for 200 million tons of shipping annually on the Mississippi River.



These are examples of types of ships that are commonly seen on the Mississippi River at the Port of South Louisiana.

Barges are Best!

Many barge companies travel the inland waterways transporting agricultural commodities and other goods. One of these companies is Ingram Barges. Visit their website at www.ingrambarges.com to learn more about barge traffic on the rivers in our country.



Let's show what this looks like! Work with your classmates to create 60 trucks, 15 boxcars and 15 barge containers.

- Design your farm's trucks. Glue 60 trucks end to end to form your caravan of trucks.
- Design your farm's railroad boxcars. Glue 15 boxcars end to end to form your train.
- Design your farm's barge containers. Glue 15 containers to form your barge.
- Work with your classmates to measure the length of your truck caravan. Now hold and stretch out your caravan!
- Work with your classmates to measure the length of your train. Now hold and stretch out your train!
- Work with your classmates to measure the length of your barge. Now hold up your barge!

How much longer is the truck caravan than the train? How much longer is it than the barge?
How much longer is the train than the barge?
Which do you think is the best way to move commodities in our country?

This presentation focuses on transporting agricultural products by truck, rail and barge. However, coal is the major item shipped by barge. Regardless of what is being shipped, barge shipping is usually more economical and environmentally friendly than rail or truck shipping. These were valuable sources of information.

- **The Mississippi River Museum, Vicksburg, MS**
- **Ingram Marine Group: https://www.ingrambarge.com/sustainability.php**
- **US Army Corps of Engineers website: http://www.mvn.usace.army.mil/Portals/56/docs/PAO/Brochures/FinalPALBrochure.pdf**
- **Wikipedia**
- **Ingram Barge Company: www.ingrambarges.com**
- **Corn Transportation Profile, AMS Transportation and Marketing Program: https://www.ams.usda.gov/sites/default/files/media/Corn%20Transportation%20Profile.pdf**
- **USDA.gov: https://www.ams.usda.gov/sites/default/files/media/RTIReportChapter12.pdf**
- **Mid-America Freight: http://midamericafreight.org/rfs/network-inventory/waterways/top-commodities-by-waterway/**

Thanks to Pam Brierre, Lower School Science Teacher, St. Martin's Episcopal School, Metairie, LA, 2011 Louisiana AITC Teacher of the Year for sharing her creative ideas!

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