Impact of a Lock Failure on Commodity Transportation on the Mississippi or Illinois Waterway

Executive Summary

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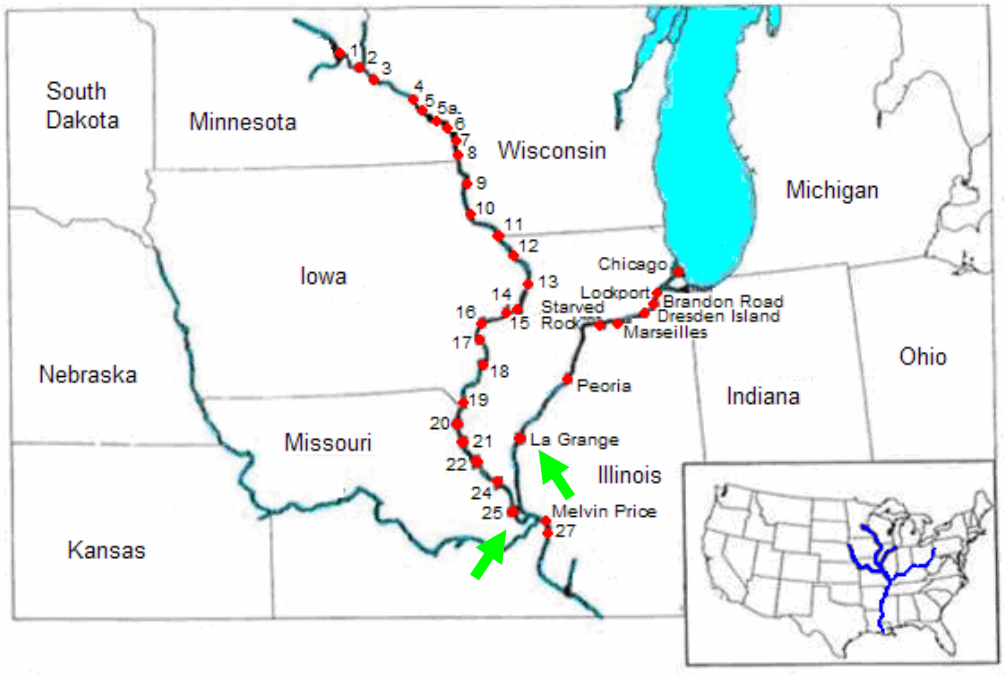

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Study Background

- The Illinois Chamber of Commerce Foundation contracted for an in-depth study to determine **the economic impact of lock failures on the Illinois and Upper Mississippi Rivers.**

  - The research was conducted by *The Food and Agricultural Policy Research Institute, University of Missouri – Columbia (FAPRI) Global Insight Transportation Group and Texas A & M University.*

  - The study offers insight regarding the potential economic damage caused by a lock failure on either the Mississippi or Illinois waterway. The Mississippi and Illinois waterways handle millions of tons of goods each year.

  - Most of the locks on both rivers have exceeded their operational lifespan.

  - The study assesses the impact of a lock failure at either Lock 25 on the Mississippi River or the La Grange Lock on the Illinois River on commodity producers and consumers.

  - The analysis takes a conservative look at the impacts by closing only one river at a time from October to December of 2005.

  - The study covers both agricultural and non-agricultural commodities.

Spatial Model and Cost Analysis Conclusions

- Barges represent the *low cost transportation mode* for the wide range of commodities shipped on the Mississippi and Illinois waterways.

- Over **60 million tons** of goods valued at over **$29 billion dollars**, including petroleum, chemicals, building materials and farm products crossed the La Grange Lock on the Illinois River and Lock 25 on the Mississippi River in 2005.

- To ship that same volume of all goods which traveled in the **fourth quarter of 2005** alone would cost an additional **$580 million dollars** to ship by rail and another $**1.6 billion dollars** to ship by truck, with a 20% markup by rail operators and a 8% markup by truck operators for the increased volume.

- Consumption patterns will likely change as prices at origin and destination adjust to higher transportation costs, thus the effect is not limited to commodities actually moving on the waterways. These price changes and supply disruptions affect the industries that rely on these commodities and may not be fully reflected in the change in transportation costs shown.

- A closure of either the La Grange Lock on the Illinois River or Lock 25 on the Mississippi River from October through December 2005 would reduce corn and soybean producer revenue by **$219 million dollars** if rail rates do not respond to **$585 million dollars** if rail rates increase by 25%.

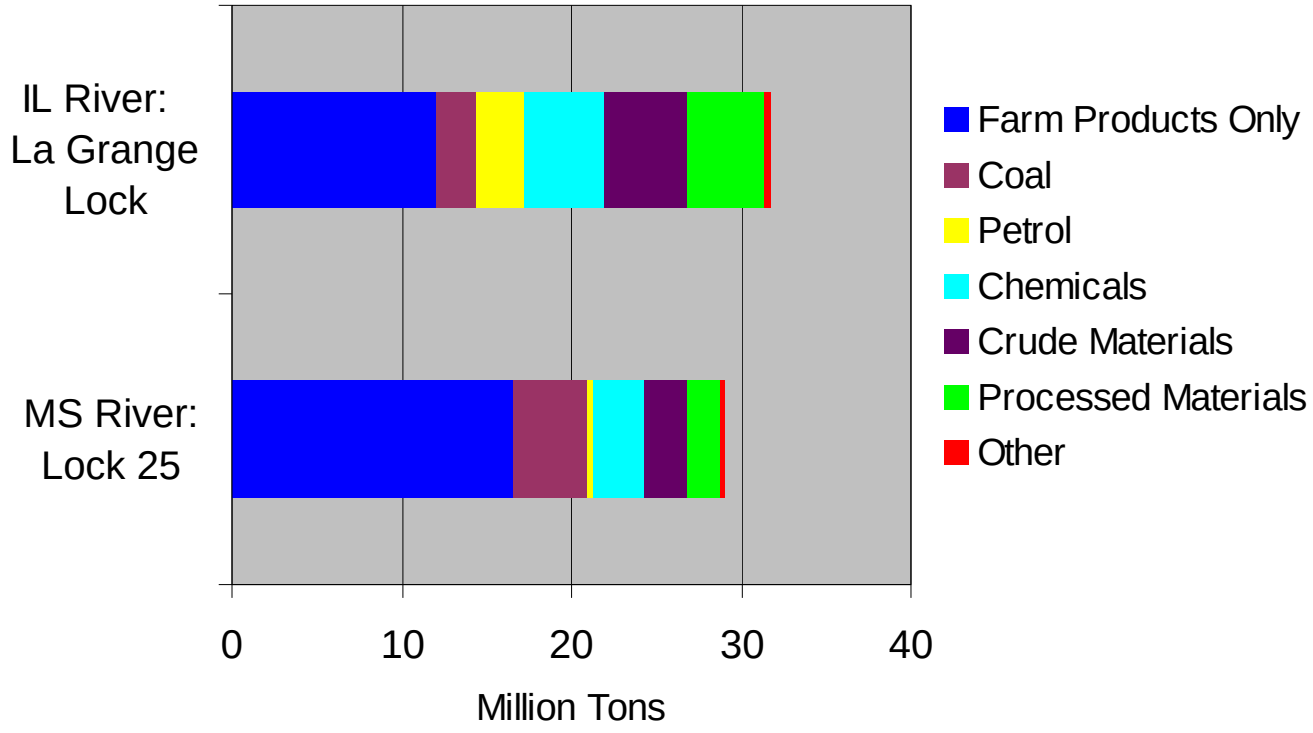
- Port facility and storage constraints place a limit on the ability to reroute traffic or store until the river reopens. Both deepen losses to producer revenue. Limited local demand also intensifies producer losses when transportation costs rise.

Waterway Commodity Volume

- **Mississippi River** system handled over **600 million tons** of commodities, ranging from coal and farm products to manufactured equipment and chemicals in 2005.[1]

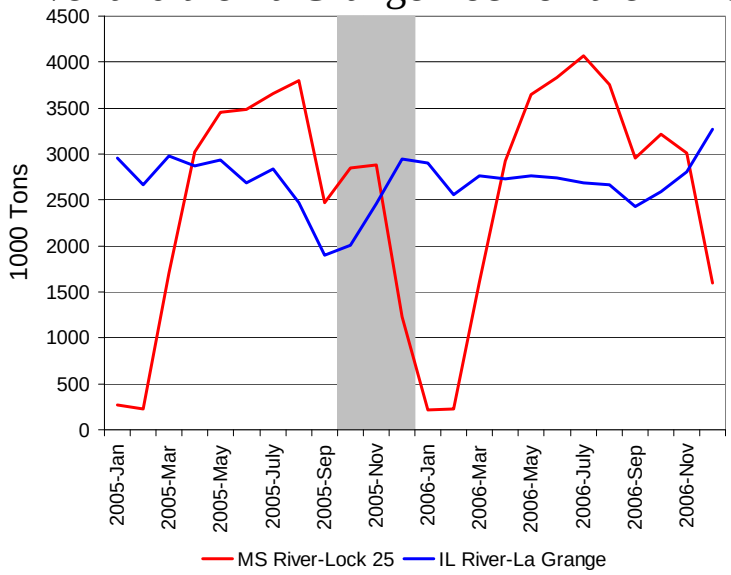
- Approximately **60 million tons** of commodities crossed lock 25 on the Mississippi River and the La Grange Lock on the Illinois River in 2005 and were valued at $29 billion dollars.[2]

Commodity Tonnage Moving Through Lock 25 on the Mississippi River and the La Grange Lock on the Illinois River, 2005[3]



[1]USACE Waterborne Commerce of the United States, 2005
[2]USACE for volume and Global Insight Cost Analysis for value
[3]USACE, Key Lock Report, 2005

Commodity Volume Seasonality at Lock 25 on the Mississippi River and the La Grange Lock on the Illinois River



- Traffic on the Mississippi River is more seasonal than on the Illinois River in part due to the higher proportion of farm commodities being shipped on the Mississippi River

Global Insight Transportation Cost Analysis

- Barge transportation is the least cost transportation alternative for a number of commodities over variety of origin and destinations.

- Global Insight analyzes individual records of commodities traveling on the two waterways, divides them into commodity groups based on their shipping costs per mile and evaluates the cost of alternative shipping modes including rail and truck transportation.

- The analysis also includes a both an carrier cost analysis and an assumed markup of 20% for rail and 8% for trucking, with a presentation of the differential in rates charged by mode.

- Analysis is based on a 3 month period from October through December of 2005.

Commodity Transportation Cost Groupings

	Commodity
Group A: Covered Hopper Barge	FARM PRODUCTS FOREST PRODUCTS FRESH FISH OR MARINE PRODUCTS FOOD OR KINDRED PRODUCTS TOBACCO PRODUCTS LUMBER OR WOOD PRODUCTS PULP,PAPER OR ALLIED PRODUCTS RUBBER OR MISC PLASTICS FABRICATED METAL PRODUCTS ELECTRICAL EQUIPMENT TRANSPORTATION EQUIPMENT MISC FREIGHT SHIPMENTS
Group B: Tanker/Liquid Cargo Barge	CHEMICALS OR ALLIED PRODUCTS PETROLEUM OR COAL PRODUCTS
Group C: Open Hopper Barge	METALLIC ORES COAL NONMETALLIC MINERALS CLAY,CONCRETE,GLASS OR STONE PRIMARY METAL PRODUCTS WASTE OR SCRAP MATERIALS

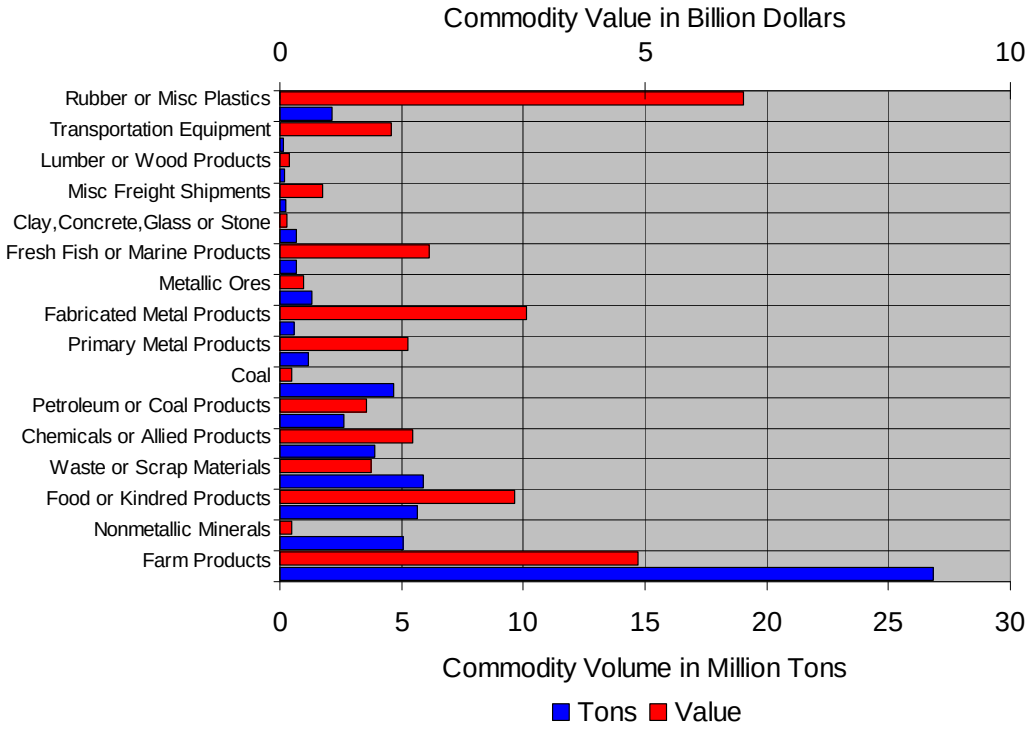
Transportation Rates by Mode and Commodity Group
Dollars per Ton-Mile, 2005

Group	Highway	Rail	Barge
A	$0.139	$0.045	$0.010
B	$0.136	$0.051	$0.022
C	$0.135	$0.055	$0.011

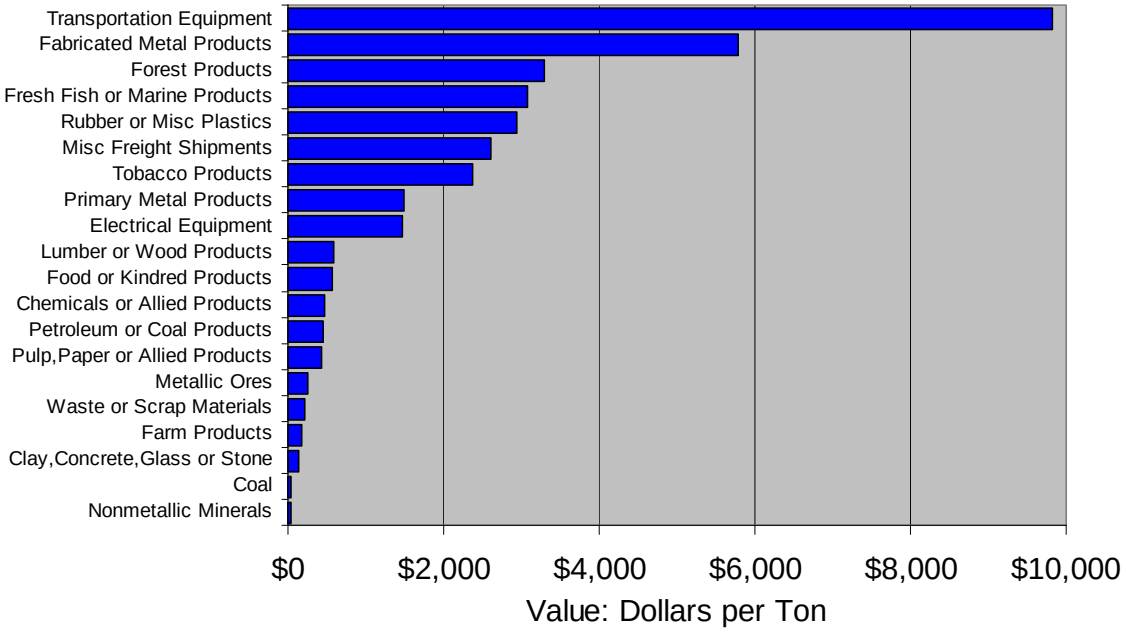
Commodity Value at Lock 25 and La Grange Lock

Global Insight

Commodity Volume and Value 2005*



Commodity Value per Ton Shipped 2005



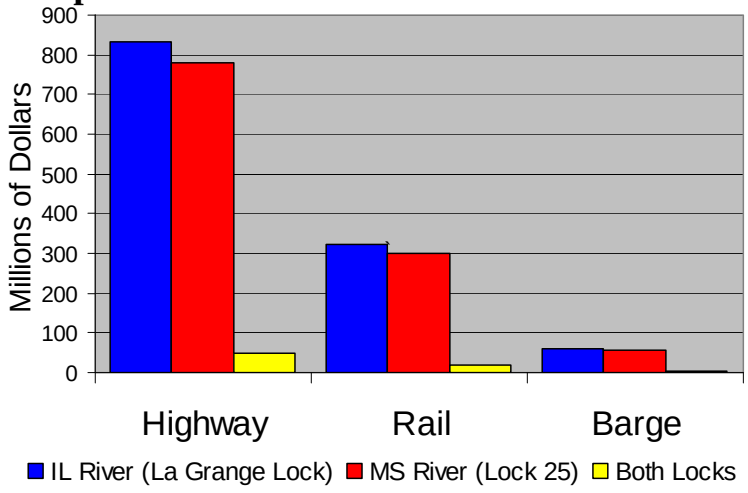
*Negligible Volume and Value of Forest Products, Electrical Equipment, Tobacco Products and Pulp Paper and Allied Products Not Shown

Volume and Value of Waterborne Freight Traffic

	Tons	Value	Barge Units
Annual Totals			
Illinois River (La Grange Lock)	31,360,452	14,733,366,452	19,600
Mississippi River (Lock 25)	28,724,260	13,494,864,444	17,953
Both: ILWW + Miss. River	1,812,452	851,503,017	1,133
Grand Total	61,897,164	29,079,733,914	38,686
4th Quarter 2005 Share of Total			
Illinois River (La Grange Lock)	7,335,548	3,446,293,109	4,585
Mississippi River (Lock 25)	6,884,067	3,234,184,225	4,303
Both: ILWW + Miss. River	428,934	201,516,228	268
Grand Total	14,648,548	6,881,993,562	9,155

Now assume the same volume must be shipped by an alternative transportation mode.

Alternative Shipping Costs for Waterborne Volume (14.6 million tons) by Transportation Mode for October-December 2005



Alternative Shipping Costs for the 61.9 Million Tons of Waterborne Volume by Mode, 2005

	Highway	Rail	Barge
Annual Totals			
Illinois River (La Grange Lock)	$3,504,680,062	$1,355,422,440	$336,224,361
Mississippi River (Lock 25)	$3,210,073,035	$1,241,484,229	$307,960,994
Both: ILWW + Miss. River	$202,550,154	$78,335,545	$19,431,815
Grand Total	$6,917,303,251	$2,675,242,214	$663,617,170

Alternative Shipping Costs for the 14.6 Million Tons of Waterborne Volume by Mode, 4th Quarter 2005

4th Quarter 2005 Share of Total			
Illinois River (La Grange Lock)	$831,354,031	$321,523,189	$80,693,847
Mississippi River (Lock 25)	$780,186,713	$301,734,412	$73,910,639
Both: ILWW + Miss. River	$48,612,037	$18,800,531	$4,663,636
Grand Total	$1,660,152,780	$642,058,131	$159,268,121

Shipping Rate Summary: Global Insight

Shipping Cost and Rate Charged Differential, 4th Quarter 2005

	Highway	Rail	Barge
Differential v. Waterway (carrier costs)			
Illinois River (La Grange Lock)	$ 750,660,184	$ 240,829,342	$ -
Mississippi River (Lock 25)	$ 706,276,074	$ 227,823,773	$ -
Both: ILWW + Miss. River	$ 43,948,401	$ 14,136,895	$ -
Grand Total	$ 1,500,884,659	$ 482,790,010	$ -
Differential v. Waterway (rates charged[1])			
Illinois River (La Grange Lock)	$810,712,999	$288,995,210	$ -
Mississippi River (Lock 25)	$762,778,160	$273,388,528	$ -
Both: ILWW + Miss. River	$47,464,273	$16,964,274	$ -
Grand Total	$1,620,955,432	$579,348,013	$ -

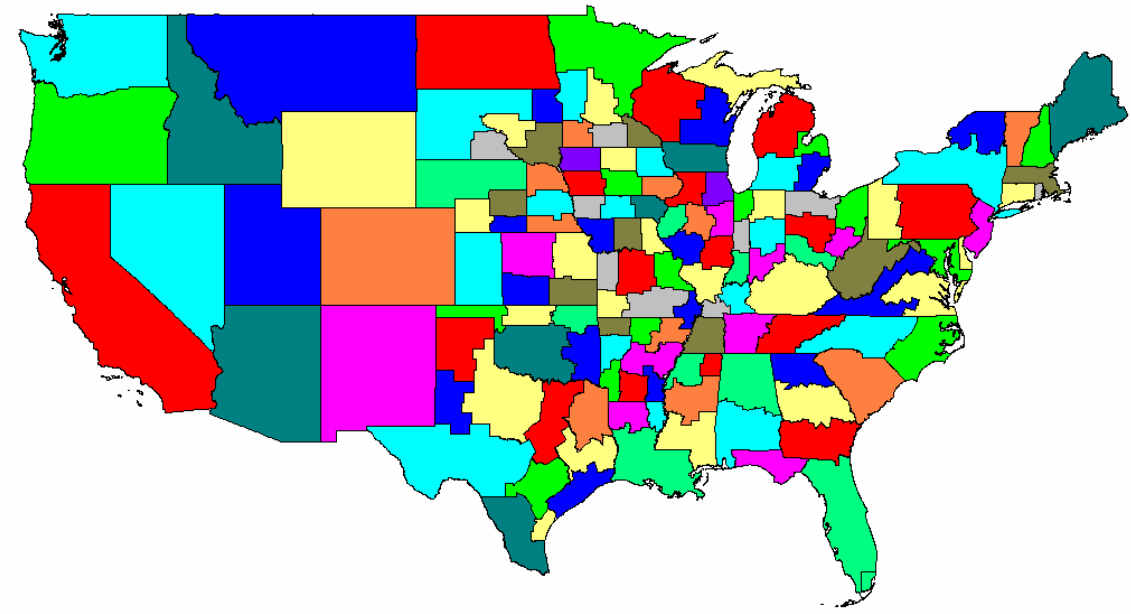
[1]includes a 20% markup over carrier costs for rail rates and a 8% markup for trucking rates

- **61.9 million tons** of goods were shipped through the two locks with **14.65 million tons** shipped in the fourth quarter of 2005.
- These goods were valued at **$29.1 billion** dollars in 2005 and **$6.9 billion dollars** in the fourth quarter and cover a wide range of commodities. Farm products represent only 17% of the annual value
- Shipping the same quarterly barge volume of **14.65 million tons** by rail would cost an additional **$579 million dollars** and by truck would cost an additional **$1.621 billion dollars**.
- The Global Insight analysis looks at the cost of moving the historic commodity volume via another transportation mode. In the event of a lock failure this increase in transportation costs would push down commodity prices at the origin and push up commodity prices at the destination affecting not only the commodity being shipped but all commodity producers and consumers linked by transportation.
- To investigate these issues, a spatial model is used to examine the response of corn and soybean prices and transportation to a lock closure on the Mississippi or Illinois Rivers.

Background on the Soybean and Corn Spatial Model

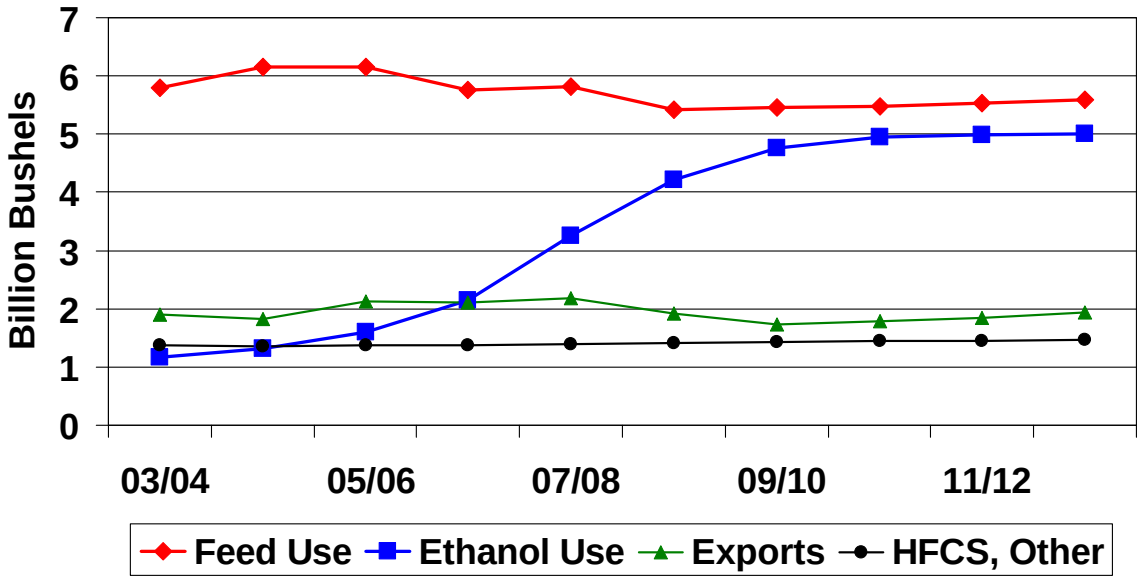
Global quarterly quadratic programming model:

- Covers 144 regions in the contiguous US and 23 foreign regions.
- Includes commodity coverage for corn and soybeans.
- Utilizes own-price supply and demand elasticities from models developed by The Food and Agricultural Policy Research Institute at The University of Missouri-Columbia (FAPRI-MU).
- Based on the original spatial model developed at Texas A&M University. The grain model (supplies, demands and prices) replicates the 2005/06 crop year:
  - The 2005/06 crop year represents the most recent data. Prior to 2005/06 ethanol production in the Midwest was insignificant.
  - Forecasting the impact on a future period would involve a number of assumptions, from crop production and yields, changes in the geographic demand in livestock and ethanol, transport prices and export demand.
  - Each year has unique features, however, 2005/06 provided the best combination of data and representative supplies and demand.
- The model incorporates realistic constraints on behavior:
  - Loading facilities are constrained by historical volume limits.
  - State level storage constrains ensure a reasonable response to higher transportation cost.

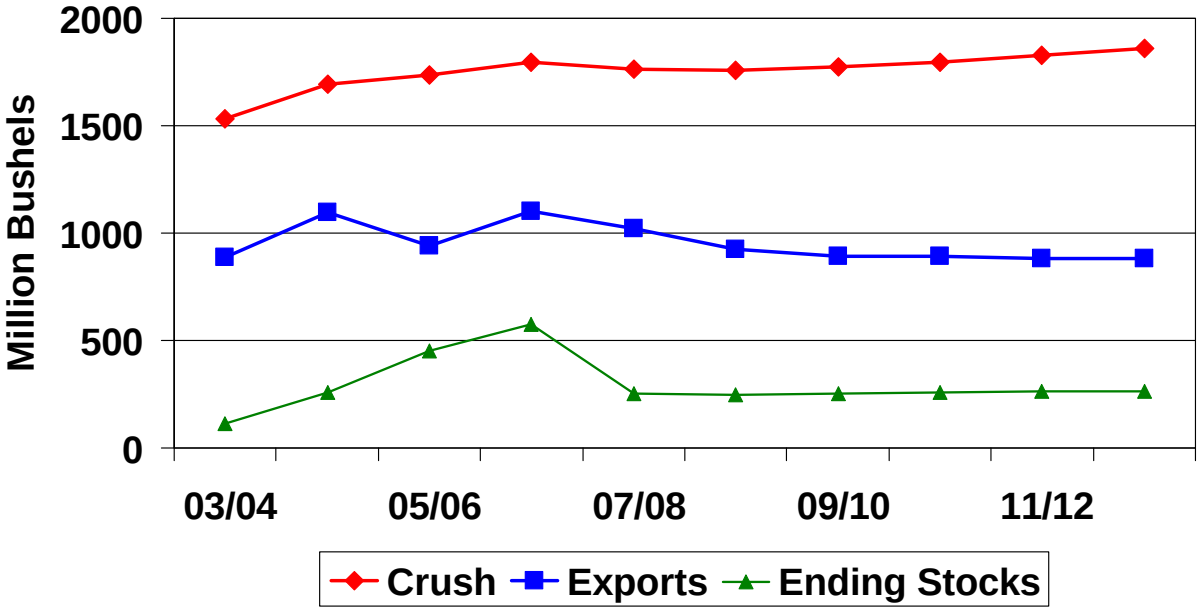


Corn and Soybean Use and Exports*

U.S. Corn Use



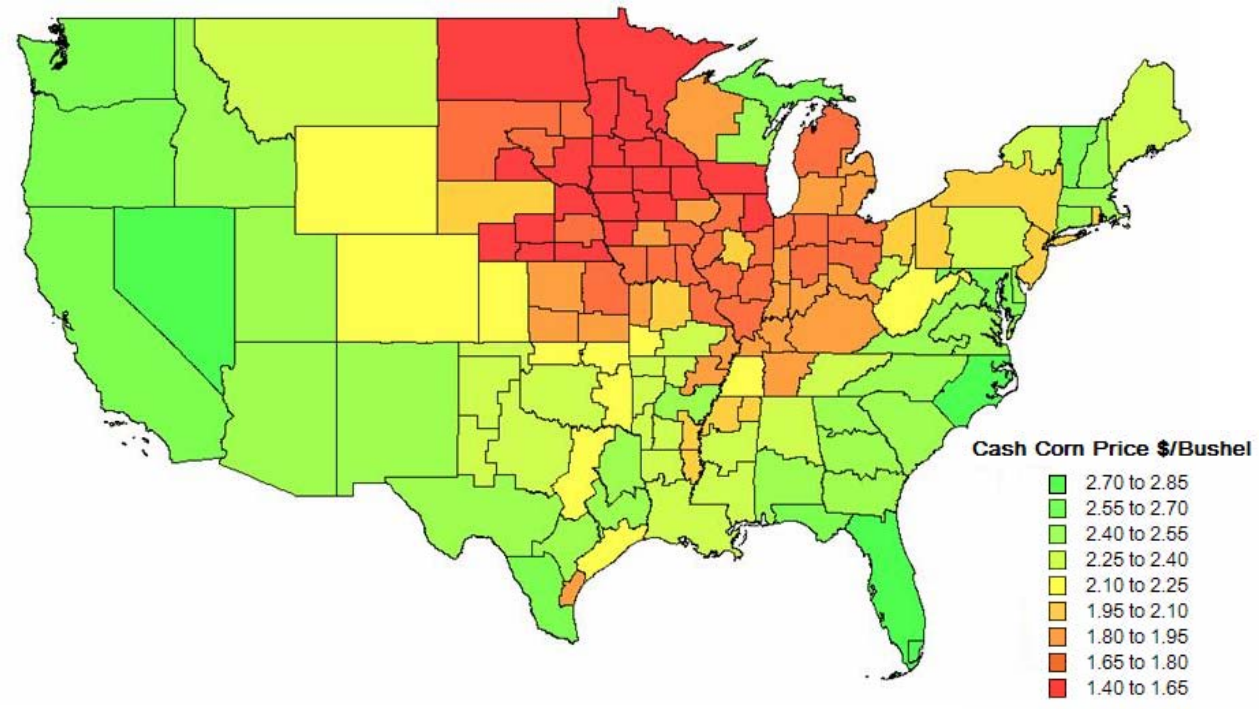
U.S. Soybean Use



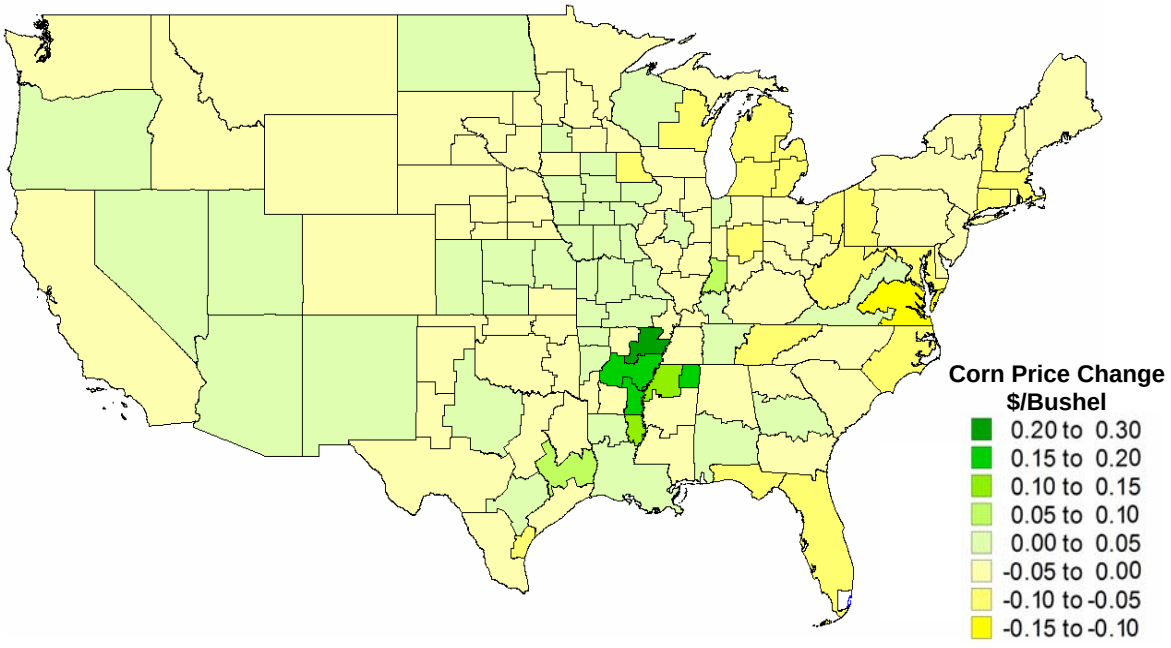
* Source: FAPRI "Baseline Update for Agricultural Markets", August 2007

Spatial Model Results Closure of Lock 25: Corn Prices

Baseline Elevator Cash Corn Prices, 4th Quarter 2005

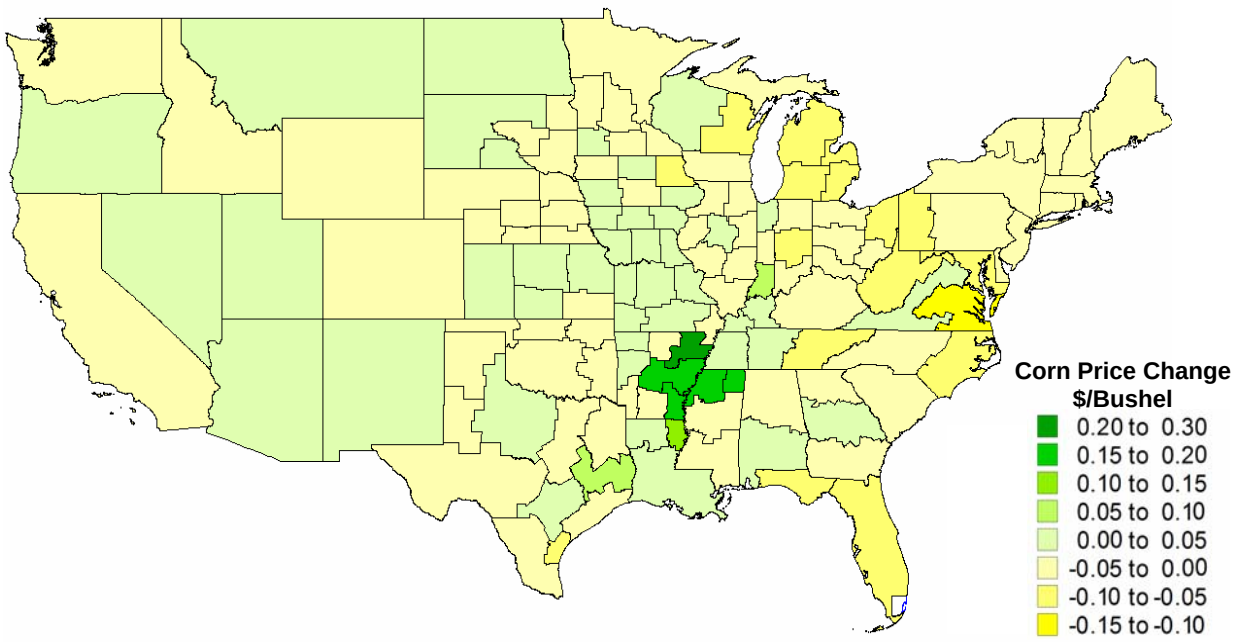


Impact on 4th Quarter 2005 Cash Corn Prices of Closing Lock 25 on the Mississippi River (No Change in Rail In Rail Rates)

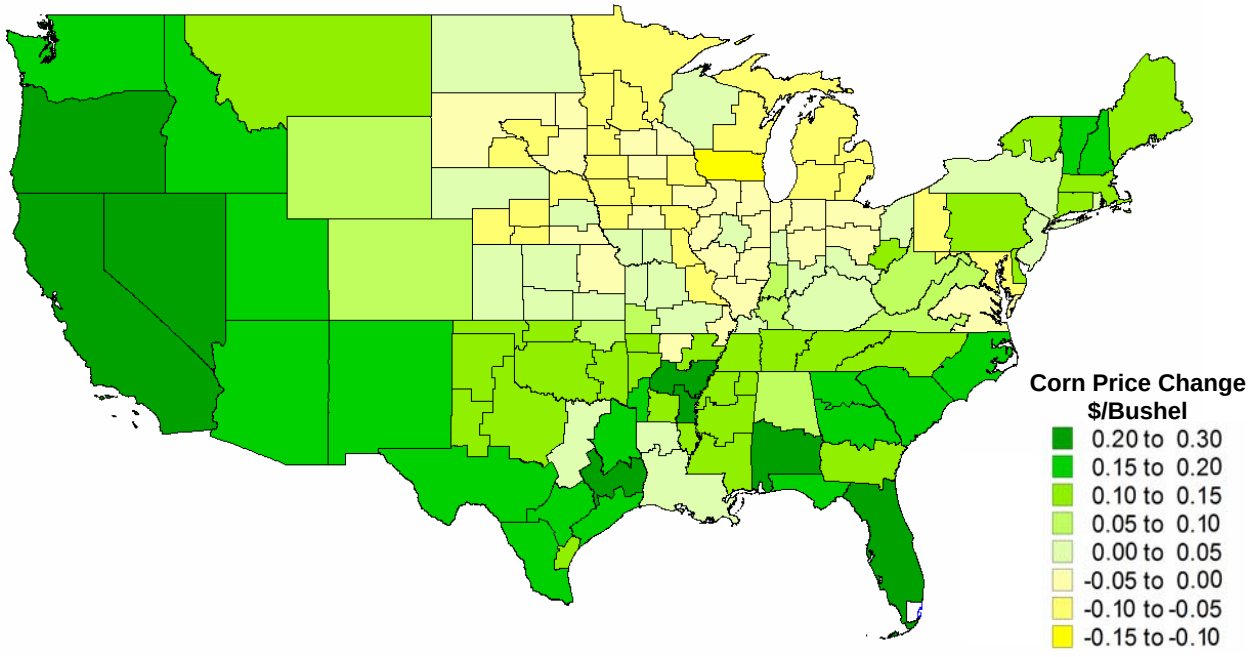


Spatial Model Results Closure of Lock 25: Corn Prices

Impact on 4th Quarter 2005 Cash Corn Prices of Closing Lock 25 on the Mississippi River (25% Increase in Rail Rates to Export Ports)*



Impact on 4th Quarter 2005 Cash Corn Prices of Closing Lock 25 on the Mississippi River (25% increase in All Rail Rates)*

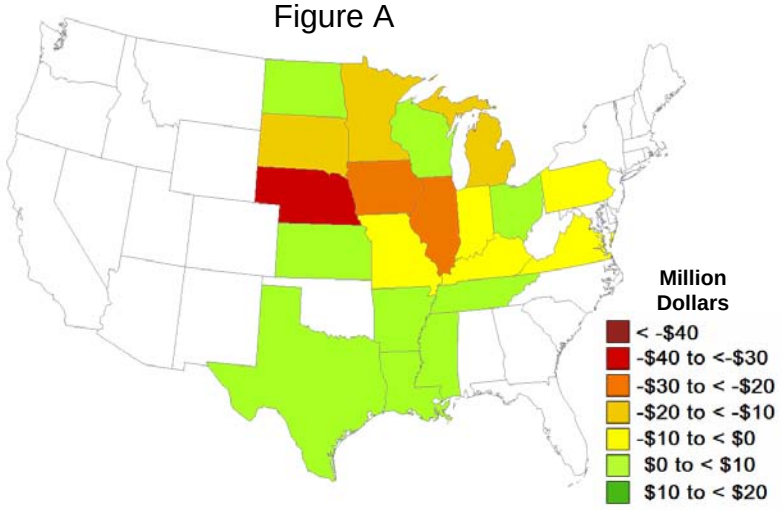


***Explanation of export rail rates and all rail rates presented graphically on page 13**

4th Quarter 2005 Lock 25 Closure
Corn and Soybean Producer Aggregate Losses

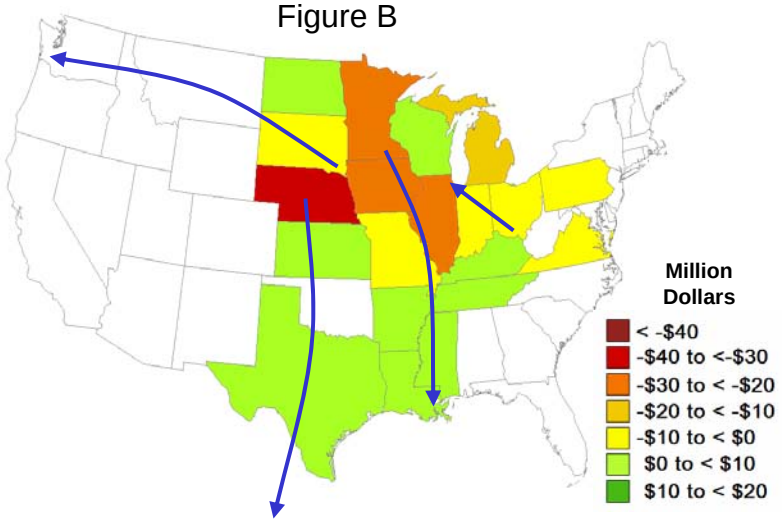
- With ***No Rail Response***, closure of Lock 25 on the Mississippi River corn and soybean producers in **Iowa and Illinois** are heavily impacted with producer cash receipt losses between **$20 and $30 million dollars**.
- Producers in **Nebraska** are even more severely impacted due to local supplies and dependence on interior locations where they now face increased competition

Figure A



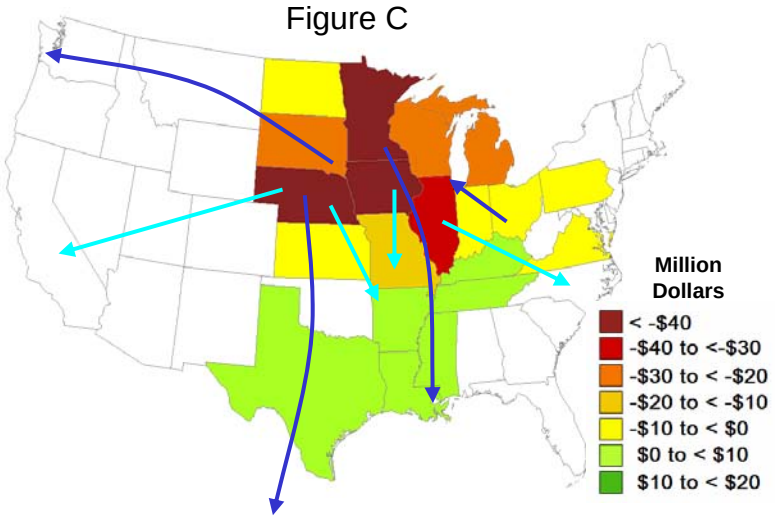
- With a ***25% increase in export route rail rates***, corn and soybean producer losses increase modestly. Impacting those shipping to the Atlantic and Pacific costs
- Effects on those shipping to the Atlantic and Pacific costs via rail is the greatest.

Figure B



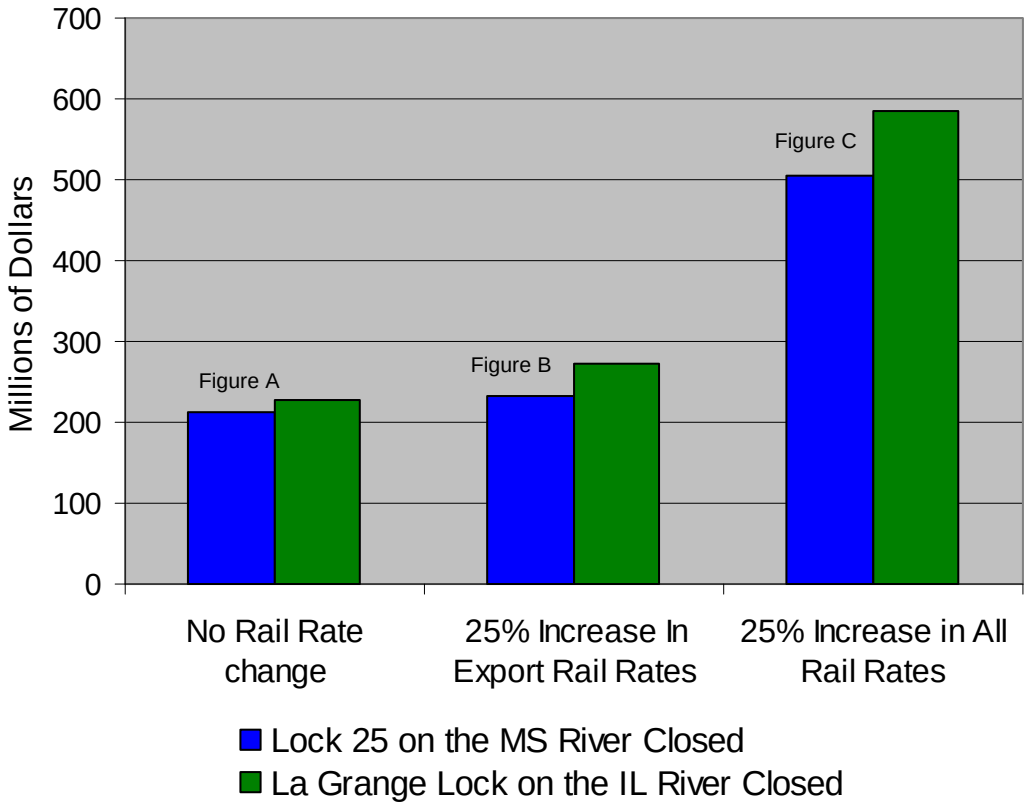
- When ***all rail rates increase by 25%*** all major corn and soybean producing states, located in the Midwest, show sizable producer losses.
- Iowa shows the greatest producers looses, in excess of **$40 million dollars**, as it is cut off from both the Mississippi River and rail rates to its traditional domestic demand points pushes crop prices down.
- Producer losses in **Illinois**, while significant, are less than losses in **Iowa**, **Nebraska** and **Minnesota** as the Illinois River waterway remains open

Figure C



Summary and Conclusions

Corn and Soybean Producer Losses Due to a 4th Quarter of 2005 Lock Closure Under Alternative Rail Rate Response



- Increasing rail rates amplify producer losses under both scenarios. Even with no rail rate response, producer losses **exceed $200 million dollars**. Increasing all rail rates more than doubles the impact which rises to **over $500 million dollars** in the event of a closure of either lock.

- An increase in only export rail rates has limited effect a closure of one river system leaves the other open with access to the gulf.

- A closure of the La Grange lock has a marginally greater effect than a closure of the Mississippi River.

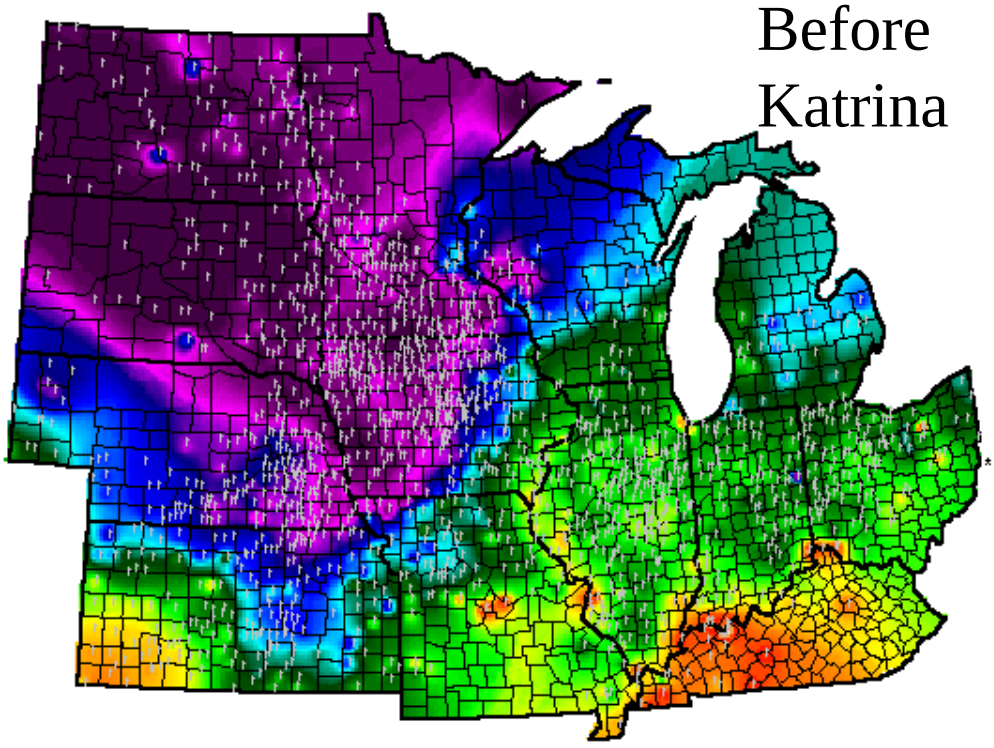
Spatial Model Summary and Conclusions

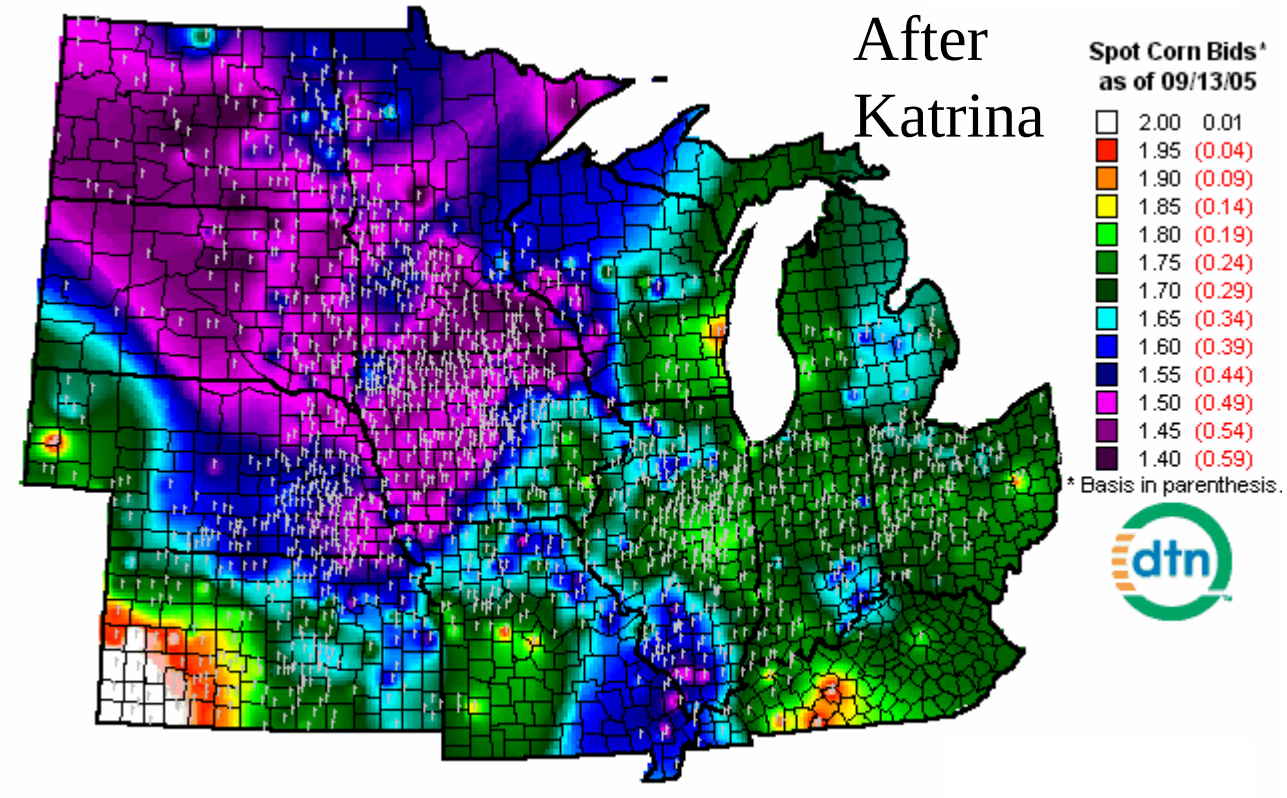
Impact of Closing the Upper Mississippi or Illinois Rivers in the 4th Quarter of 2005 on Corn and Soybean Producer Revenues under Alternative Rail Rate Response, ***Millions of Dollars***

	No Rail Response		Rail Rates Increase 15%	Rail Rates Increase 25%
Closure of Lock 25 Mississippi River	$219.35	Export Rail Routes	$223.17	$232.92
		All Rail Routes	$392.15	$505.91
Closure of La Grange Lock Illinois River	$228.48	Export Rail Routes	$250.55	$272.27
		All Rail Routes	$416.04	$585.17

- The scenarios presented in this study suggest a short run impact of a 90 day lock failure on either river of **$219 to $585 million** annually for corn and soybean producers depending on rail rate behavior.
  - Under a longer failure, rail capacity to move to lower Mississippi and rail unloading capacity would expand allowing the impacts to fall over time.
  - This study considers only the impacts on corn and soybean movement on the Upper Mississippi and Illinois Rivers which account for about **44% of total volume (17% of value)** of all goods transported annually through the two locks.
  - Economic losses include only annual producer revenue losses associated with corn and soybean sales.
  - Alternative transportation rates assumptions may understate the change in cost for other transportation modes.
  - The model captures short run impacts, but does not fully consider rail pricing behavior in the event of a long run (permanent) closure.

Corn Bids Before and After Hurricane Katrina





► Mississippi River system handled over **600 million tons** of commodities, ranging from coal and farm products to manufactured equipment and chemicals in 2005.

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Cost of Commodity Transportation by Mode