Mississippi River Research Conclusions

Executive Summary

FAPRI-UMC Report #10-06

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June 2006

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Mississippi River Research Conclusions

Non-Structural alternatives

Congestion fees

- With 78% of the variation in locking time explained by factors outside the control of the tow operator and only a small percentage of the remaining variation explained by vessel ID, congestion fees would do very little to improve locking efficiency.
- Even after correcting for environmental and tow characteristics, any congestion fee schedule would still, for the most part, randomly punish tow operators diluting the intended incentives.
- Congestion fees could incentivize risk taking behavior resulting in safety issues.
- About 68% of the towboats have an average locking time that is +/- 4.9 minutes from the average.
- The impact from locking at night or locking during daylight hours (10 minutes) is double the standard deviation of average locking differences.

Scheduling

- The very nature of agriculture transportation demand insures that scheduling would be extremely difficult.
- With crop size, harvest period and farmer marketing varying from year to year, anticipating transportation demand is virtually impossible.
- Unpredictable delay-causing weather events including fog, rain, ice, wind, river currents, etc. further exacerbates scheduling problems.

N-up/N down locking

- Review of locking behavior indicates that the U.S. Army Corp of Engineers already uses a pattern of 3-up/3-down in order to improve locking efficiency.
- Results from the locking study demonstrate that this procedure saves an average of 12 minutes per tow compared with a 1-up/1-down procedure.

Mississippi River Research Conclusions

Characteristics of 1200’ locks versus 600’ locks

Lock characteristics

- Locks 19, 26 (Mel Price), and 27 are 1200’ locks.
- Locks 3 through 25, with the exception of Lock 19 are 600’ locks.
- The 600’ locks were built over the 1935 to 1940 period.
- Lock 19 was built in 1957, Mel Price in 1990, and Lock 27 in 1953.

Locking time

- Locking times in 2003 for Lock 19 were an average of 40 minutes faster than for Locks 3 through 13, and 50 minutes faster than the other 600’ locks that have higher traffic.
- Locking times in 2003 for Locks 26 and 27 were an average of 60 minutes faster than Locks 3 through 13, and 70 minutes faster than the other 600’ locks that have higher traffic.
- 1200’ locks are less impacted by day light and seasonality.
- The standard deviation in locking times on 1200’ locks was 11.18 minutes compared to 22.44 minutes on 600’ locks

Queue times

- While calendar year 2003 was a light export year with only 1.69 billion bushels of corn exported, delays in 2003 were still significant.
- Locking queue times in 2003 averaged 1.71 hours on the 600’ locks from Lock 14 through Lock 25, while queue times for 1200’ locks averaged 0.86 hours.
- 2003 queue times on the 600’ locks including Lock 20, Lock 21, Lock 22, Lock 23, Lock 24 and Lock 25 averaged 1.7, 1.5, 2.4, 2.4, and 2.2 hours, respectively.
- In calendar year 2002, U.S. corn exports totaled 1.86 billion bushels of corn, generating much larger delays.
- Locking queue times in 2002 averaged 2.55 hours for 600’ locks compared with 0.93 hours for 1200’ locks.

Mississippi River Research Conclusions

Lock usage and total queue time

Lock usage

- The heaviest utilized locks are from Lock 14 through Lock 27.
- Locking data over the 1992 – 2004 period illustrate noticeable increase in the number of commercial tows locking beginning at Lock 5, increasing again at Lock 10, again at Lock 14 and again at Lock 20.
- The percentage of tows required to wait in a queue follows a similar pattern to locking traffic with the exception of the 1200' locks.
- From Lock 14 to Lock 18, 58 – 59% of the tows were forced to queue in 2003, and 61 – 67% of the tows were forced to queue in 2002.
- From Lock 20 to 25, 58 – 71% of the tows were forced to queue in 2003, and 68 – 79% of the tows were forced to queue in 2003.

Total queue time

- Total hours in queue for all commercial tows varies considerably by lock and by year, with longest hours in queue recorded on Locks 20 through 25.
- At Lock 20, total hours in queue reached 11,088 in 1993 and 10,314 in 1996. Total hours in queue in 2003 were lower at 4,134 with lower traffic.
- At Lock 21, total hours in queue reached 9,783 in 1995 and 9,335 in 1996. Total hours in queue in 2003 were lower at 3,754 with lower traffic.
- Locks 22 through 25 compete for the position of having the largest total queues:
    - Lock 22 exceeded 13,000 hours in 1992, 1995, 1996, and 2001.
    - Lock 24 exceeded 14,000 hours in 1992, 1995, 1996, and 2002.
    - Lock 25 reached 22,425 hours in 1992, 18,573 hours in 1995 and 15,356 hours in 2001.

Lock degradation

- Analysis of locking data over the 1992 through 2004 period reveals a significant increase in total locking times, particularly on the 600' locks.
- For Locks 20 through 25, the average locking time for a two cut tow increased by 13 minutes from 1992 to 2004.

Mississippi River Research Conclusions

Demand for barge transportation on the Mississippi River

Barge transportation overview

- 50 – 65% of corn exports go through the Mississippi River
- 30 – 45% of soybean exports go through the Mississippi River
- 2 – 8% of wheat exports go through the Mississippi River

Factors affecting historical demand for barge transportation

- Strong value of the U.S. dollar in corn importing countries.
  - The trade weighted exchange rate for corn bottomed in 1995 making U.S. corn cheaper in the major importing countries.
  - Since 1995 the exchange rate index has grown from 85 to as high as 115 and is currently running at 101.
- Growth in barge rates and ocean shipping rates
  - Continued degradation of the locks have increased locking times and total transportation time of moving exports via the Mississippi River to the Gulf resulting in higher barge rates.
  - Ocean shipping rates from the Gulf to Asia increased from $19.61 per ton in August 2002 to a high of $72.74 per ton in March 2004.
- Increase in domestic corn utilization
  - Increased feed use to support the livestock industry
  - Increase industrial use for biofuels.
- Record levels of global crop production
- Capacity limitations on the Mississippi River system
  - Current traffic volumes may represent the capacity of the current locking system as evidenced by the dramatic increase in total queue times for small increases in the number of tows locked.
  - New barge construction has slowed dramatically in recent years with the majority of orders for double hulled liquid cargo barges.

Factors shaping the future demand for barge transportation for corn exports

- Increased global demand for corn
  - Growth in corn demand from the livestock sector in Mexico.
  - Reduced competition from China in markets such as South Korea.
  - Continued growth in other Latin American imports, particularly northern South America, Central America and the Caribbean.
- Domestic ethanol production will compete with U.S. corn exports, but if crude oil prices fall beyond 2010 and the biofuels mandate is filled, expansion in ethanol production is expected to slow.
- Corn yield growth per acre is expected to average 1.9 bushels/acre/year requiring both export demand and biofuels demand to support corn prices.

Mississippi River Research Conclusions

Impact of Hurricane Katrina on barge transportation on the Mississippi River

- Barge rates typically run about 50-60% of rail rates and about 25-33% of truck rates. In the weeks following Katrina, barge rates doubled, placing them slightly above rail rates for a brief period of time.
- Missouri corn basis along the Mississippi River was 40 cents lower than the previous five year average on Sept 1, 2005.
- Missouri soybean basis along the Mississippi River was 55 cents lower than the previous five year average on Sept 1, 2005.
- Four weeks after Katrina basis along the Mississippi River had improved to 20 cents and 35 cents lower than the previous five year average for corn and soybeans, respectively.
- Complete basis recovery occurred approximately 8 weeks after Katrina when Mississippi River traffic returned to near normal levels.

Value of the Mississippi River

- Approximately half of the volume of barge shipments on the Mississippi River is agricultural products.

- In 1998, researchers at Texas A&M University, using a spatial inter-temporal equilibrium model, conservatively estimated the impact on commodity prices of losing the Upper Mississippi and Illinois Rivers for barge traffic. The reduction in gross market receipts to farmers was estimated to be 350 million dollars per year, assuming that rail rates did not change from current levels. Note that the 350 million dollar estimate only captures the value to agriculture.

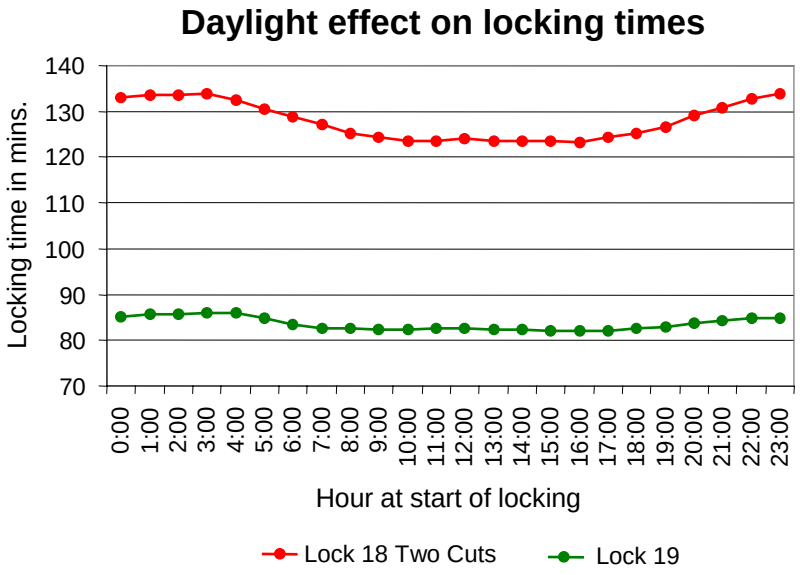
- In August 2005, after Hurricane Katrina shut down transportation on the Mississippi River, the change in basis for corn and soybeans along the Mississippi River in Missouri suggests that the 350 million dollar estimate may be conservative.

- FAPRI has been working with researchers at Texas A&M University to update their 1998 results. This research is expected to be completed in September 2006.

Locking Study Results

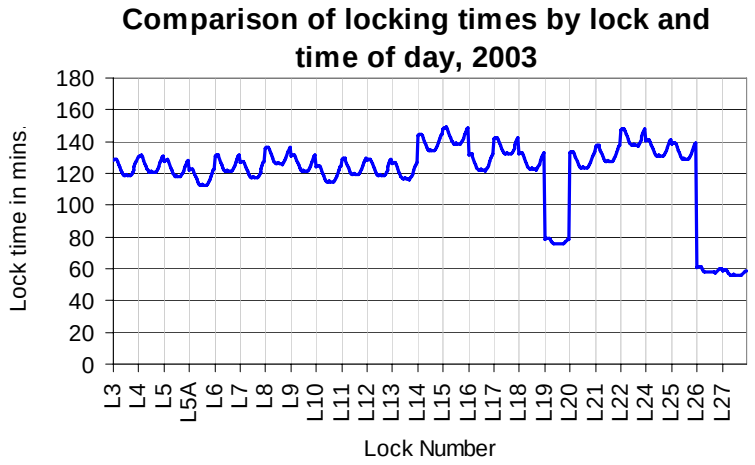
- Locking times are significantly impacted by whether the tow locks in daylight or darkness.

- The daily variation in locking times is also much smaller for 1200' locks, averaging only 3.8 minutes compared to 10.3 minutes for 600' locks.



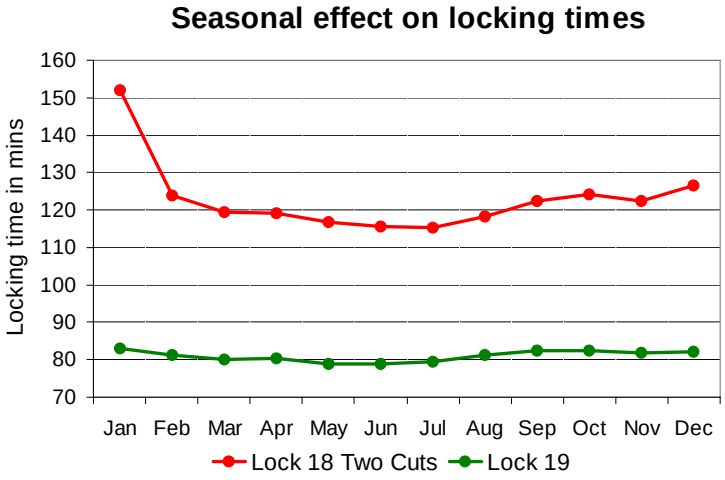
- Locks 19, 26 (Mel Price), and 27 are 1200' locks with much faster average locking times than the 600' locks.

- Note the average locking times for the more heavily used 600' locks from Lock 14 to Lock 25.



- There is some seasonal variation in locking times with the highest seasonality in January when few lockings occur and much of the river is closed.

- Note the increase in seasonal lockings as traffic on the river increases in the August through December time period.



Locking Study Results

- The type of approach required by the towboat as it begins locking has a significant impact of locking times.

- This supports the assertion that maintaining direction, such as locking several tows in the same direction, improves locking time and reduces congestion during periods of long queues.

- Definitions
  - FLY: Lock is idle at beginning/end of locking
  - TURNBACK: There is a vessel locking (to be locked) upon arrival (exit) which is traveling in the SAME direction
  - EXCHANGE: There is a vessel locking (to be locked) upon arrival (exit) which is traveling in the OPPOSITE direction

- Direction of travel significantly affects locking time for the tow.

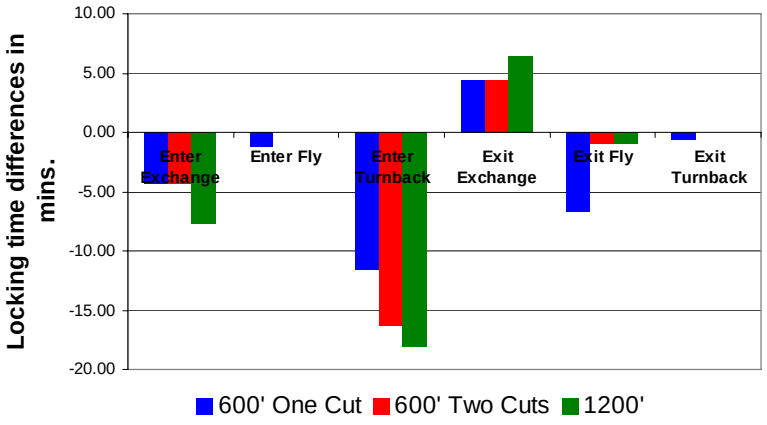
- A greater percentage of tows heading downstream are loaded than those heading upstream.

- Tows going upstream are more maneuverable and required less time to lock through.

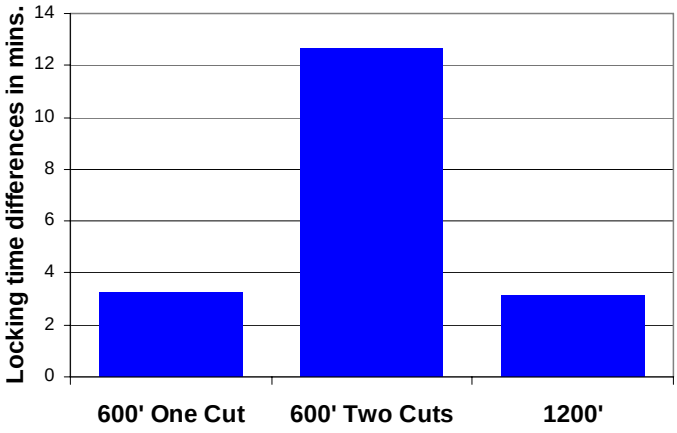
- Tows are configured differently depending on the type (size) of barges in the flotilla.

- Liquid cargo tows lock faster because there are typically fewer but larger barges in their configurations and subsequently less rigging to handle.

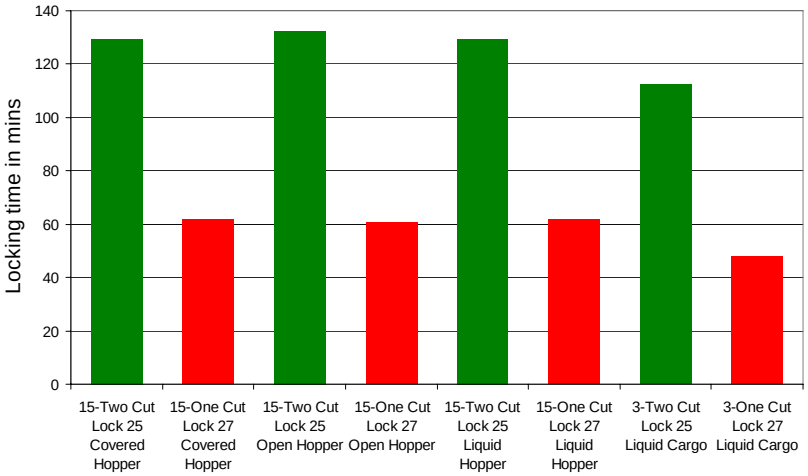
Differences in locking time by entry and exit type



Additional locking time required going down-stream vs. up-stream



Difference in locking times by barge type

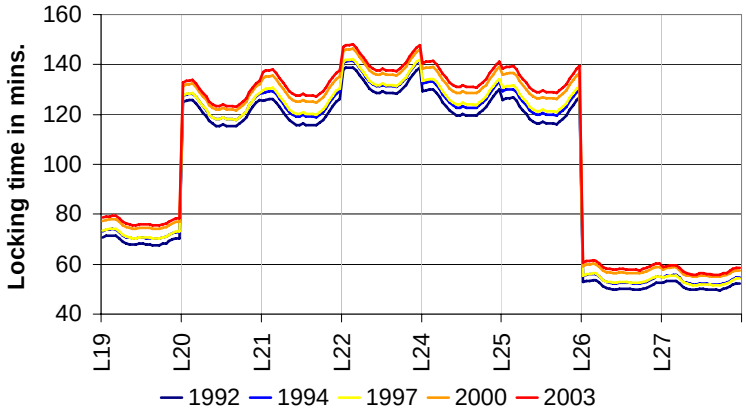


Locking Study Results

- Locking times have increased from 1992 through 2003 reflecting a declining capacity in the locks, with the 600' locks seeing greater increases in locking times than the 1200' locks.

- Specific data on the reduction in lock capacity by lock, are listed on page 5 of this report.

Comparison of locking times by year and time of day:
Locks 18 through 27



- The variation in unexplained locking time is 50% smaller for 1200' locks than for 600' locks, indicating that the longer locks are less sensitive to weather and towboat characteristics. Therefore, the 1200' locks have both lower locking times and smaller variation in locking times.

Distribution of unexplained locking time impacts

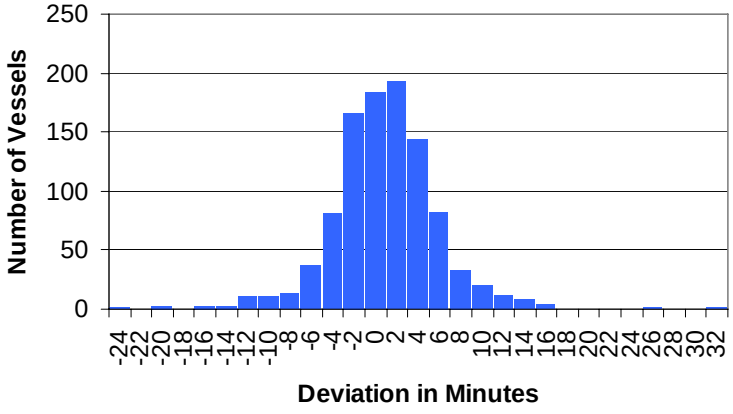
	Observations (ε_i)	Standard Deviation in Minutes
600' Locks with one cut	130,474	14.45
600' Locks with two cuts	398,512	22.44
1200' Locks with one cut	180,778	11.18

- The towboat identification numbers explained very little of the remaining variation in locking time.

- About 68% of the towboats have an average locking time that is +/- 4.9 minutes from the average.

- The impact from locking at night or locking during daylight hours (10 minutes) is larger than the standard deviation of average locking differences.

Distribution of average corrected locking differentials by towboat



Locking Study Results

Mississippi River lock charecteristics

Lock No.	River Mile	Year Operational	Width	Length (Feet)	Lift
Upper St. Anthony Falls*	853.9	1963	56	400	49
Lower St. Anthony Falls*	853.3	1959	56	400	25
Lock & Dam 1*	847.6	1930	56	400	38
Lock & Dam 2*	815.0	1930	110	500	12
Lock & Dam 3	769.9	1938	110	600	8
Lock & Dam 4	752.8	1935	110	600	7
Lock & Dam 5	738.1	1935	110	600	9
Lock & Dam 5A	728.5	1936	110	600	5
Lock & Dam 6	714.0	1936	110	600	6
Lock & Dam 7	702.0	1937	110	600	8
Lock & Dam 8	679.0	1937	110	600	11
Lock & Dam 9	647.0	1938	110	600	9
Lock & Dam 10	615.0	1936	110	600	8
Lock & Dam 11	583.0	1937	110	600	11
Lock & Dam 12	556.0	1938	110	600	9
Lock & Dam 13	522.0	1938	110	600	11
Lock & Dam 14	493.3	1939	110	600	11
Lock & Dam 15	482.9	1934	110	600	16
Lock & Dam 16	457.2	1937	110	600	9
Lock & Dam 17	437.1	1939	110	600	8
Lock & Dam 18	410.5	1937	110	600	10
Lock & Dam 19	364.2	1957	110	1200	38
Lock & Dam 20	343.2	1936	110	600	10
Lock & Dam 21	324.9	1938	110	600	10
Lock & Dam 22	301.2	1938	110	600	10
Lock & Dam 24	273.4	1940	110	600	15
Lock & Dam 25	241.4	1939	110	600	15
Melvin Price	200.8	1990	110	1200	24
Lock & Dam 27	185.1	1953	110	1200	21

Source: U.S. Army Corps of Engineers

* Not included in study as their primary chambers are less than 600' in length

Trend change in locking time (reduction in lock capacity) from 1992 to 2004

Lock 3 - One Cut	3.6	Lock 10 - One Cut	4.4	Lock 18 - One Cut	6.0
Lock 3 - Two Cuts	8.1	Lock 10 - Two Cuts	10.2	Lock 18 - Two Cuts	10.2
Lock 4 - One Cut	4.4	Lock 11 - One Cut	2.0	Lock 19	10.2
Lock 4 - Two Cuts	11.6	Lock 11 - Two Cuts	7.2	Lock 20 - One Cut	4.4
Lock 5 - One Cut	1.1	Lock 12 - One Cut	4.4	Lock 20 - Two Cuts	10.2
Lock 5 - Two Cuts	10.2	Lock 12 - Two Cuts	10.2	Lock 21 - One Cut	8.3
Lock 5A - One Cut	10.2	Lock 13 - One Cut	4.4	Lock 21 - Two Cuts	14.3
Lock 5A - Two Cuts	7.2	Lock 13 - Two Cuts	10.2	Lock 22 - One Cut	7.2
Lock 6 - One Cut	0.7	Lock 14 - One Cut	10.3	Lock 22 - Two Cuts	11.5
Lock 6 - Two Cuts	11.9	Lock 14 - Two Cuts	20.5	Lock 24 - One Cut	9.9
Lock 7 - One Cut	4.4	Lock 15 - One Cut	4.4	Lock 24 - Two Cuts	13.9
Lock 7 - Two Cuts	7.2	Lock 15 - Two Cuts	17.2	Lock 25 - One Cut	8.0
Lock 8 - One Cut	4.4	Lock 16 - One Cut	3.2	Lock 25 - Two Cuts	15.3
Lock 8 - Two Cuts	10.2	Lock 16 - Two Cuts	7.4	Melvin Price	10.2
Lock 9 - One Cut	4.4	Lock 17 - One Cut	8.7	Lock 27	8.3
Lock 9 - Two Cuts	12.6	Lock 17 - Two Cuts	16.9		

Average time in queue in hours, all commercial tows

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*	2003*
Lock 3	0.6	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.4	0.5	0.6	0.6
Lock 4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.3
Lock 5	0.5	0.4	0.4	0.4	0.6	0.4	0.4	0.5	0.4	0.4	0.4	0.3
Lock 5A	0.4	0.5	0.3	0.4	0.4	0.5	0.4	0.5	0.5	0.4	0.4	0.4
Lock 6	0.7	0.7	0.5	0.6	0.7	0.7	0.6	0.7	0.6	1.1	0.6	0.5
Lock 7	0.7	0.7	0.5	0.6	0.7	0.7	0.8	0.7	0.7	0.9	0.7	0.5
Lock 8	0.9	0.6	0.6	0.9	1.0	0.9	0.8	0.8	0.8	0.9	0.8	0.6
Lock 9	0.6	0.4	0.5	0.6	0.6	0.7	0.7	0.7	0.8	0.7	0.7	0.6
Lock 10	0.7	0.5	0.4	0.8	0.9	1.0	0.7	0.8	0.7	0.8	0.7	0.6
Lock 11	1.2	0.7	0.7	1.3	1.0	1.0	0.8	1.0	0.9	1.0	0.9	0.7
Lock 12	1.2	0.7	0.6	1.0	1.1	1.0	0.8	1.1	0.9	1.3	1.2	0.8
Lock 13	1.3	0.9	0.7	1.3	1.3	0.8	0.7	1.0	1.0	1.0	1.0	0.7
Lock 14	1.2	0.9	0.9	1.7	2.3	2.7	2.5	3.9	2.6	2.5	2.5	1.7
Lock 15	2.7	1.9	1.1	2.4	3.1	1.7	1.9	2.7	1.8	2.5	2.3	1.6
Lock 16	2.2	2.7	0.9	1.6	1.7	1.3	1.6	1.8	1.3	2.0	1.4	1.1
Lock 17	2.3	5.2	0.9	2.3	1.8	1.6	2.2	2.2	1.6	1.8	2.5	1.5
Lock 18	2.6	2.9	1.0	3.2	2.5	1.5	1.3	1.8	1.6	2.1	2.1	1.5
Lock 19	1.1	1.1	0.7	0.8	0.9	0.8	0.7	0.7	0.8	0.8	0.9	0.8
Lock 20	2.7	5.2	1.0	2.3	3.5	1.8	1.7	2.2	2.7	2.4	2.3	1.7
Lock 21	2.3	1.9	1.0	3.2	3.0	1.7	1.7	1.9	2.2	2.7	1.7	1.5
Lock 22	4.2	3.4	1.8	6.6	8.3	3.5	2.9	3.8	3.6	5.2	3.0	2.4
Lock 24	4.2	3.1	1.5	5.1	4.8	3.0	4.6	2.9	2.7	4.1	4.9	2.4
Lock 25	6.5	2.9	2.7	5.8	4.0	3.1	4.8	3.8	3.2	5.7	2.8	2.2
Melvin Price	1.7	1.0	1.4	0.8	0.7	0.6	0.6	0.7	1.0	1.0	0.8	0.8
Lock 27	1.0	1.2	1.0	1.3	1.1	1.6	0.7	1.1	0.9	0.9	1.1	1.0

* Analysts estimates based upon raw Corps data

Percent of tows forced to queue

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*	2003*
Lock 3	51%	43%	47%	48%	46%	45%	41%	44%	50%	52%	46%	45%
Lock 4	47%	38%	39%	43%	44%	48%	44%	45%	43%	42%	40%	34%
Lock 5	48%	38%	42%	41%	50%	46%	39%	38%	39%	36%	33%	27%
Lock 5A	47%	41%	44%	48%	51%	51%	46%	48%	42%	46%	41%	38%
Lock 6	52%	43%	46%	52%	53%	53%	48%	48%	46%	50%	40%	31%
Lock 7	59%	52%	50%	51%	53%	52%	53%	50%	50%	52%	44%	40%
Lock 8	58%	45%	46%	51%	55%	52%	50%	50%	49%	49%	44%	39%
Lock 9	43%	34%	36%	47%	46%	51%	48%	49%	50%	50%	44%	38%
Lock 10	46%	38%	34%	49%	55%	53%	45%	49%	41%	46%	44%	37%
Lock 11	58%	45%	50%	60%	61%	61%	56%	59%	55%	55%	50%	44%
Lock 12	61%	46%	42%	55%	60%	56%	52%	59%	53%	56%	52%	44%
Lock 13	56%	43%	42%	54%	58%	53%	48%	57%	52%	55%	48%	44%
Lock 14	63%	50%	47%	66%	71%	72%	71%	81%	74%	71%	66%	59%
Lock 15	72%	62%	51%	69%	70%	61%	64%	74%	66%	67%	62%	59%
Lock 16	75%	61%	52%	72%	74%	65%	67%	74%	68%	70%	61%	55%
Lock 17	72%	60%	52%	73%	72%	68%	67%	76%	69%	70%	67%	59%
Lock 18	76%	66%	53%	75%	76%	67%	64%	74%	70%	71%	66%	58%
Lock 19	64%	54%	49%	60%	58%	56%	54%	57%	57%	60%	55%	49%
Lock 20	77%	68%	57%	75%	77%	68%	66%	76%	73%	73%	68%	58%
Lock 21	76%	64%	55%	74%	76%	69%	71%	76%	73%	73%	69%	60%
Lock 22	86%	72%	63%	86%	86%	78%	78%	85%	83%	79%	77%	66%
Lock 24	84%	72%	64%	83%	83%	76%	80%	82%	81%	77%	78%	63%
Lock 25	100%	77%	64%	82%	81%	77%	80%	84%	83%	83%	79%	71%
Melvin Price	81%	73%	71%	65%	56%	50%	57%	56%	59%	63%	57%	48%
Lock 27	64%	73%	65%	75%	69%	67%	62%	66%	65%	66%	69%	57%

* Analysts estimates based upon raw Corps data

Total queue time in hours for all commercial tows

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*	2003*
Lock 3	744	419	417	541	591	499	502	559	475	417	567	478
Lock 4	504	309	279	417	461	452	499	643	477	314	415	305
Lock 5	620	358	410	458	654	496	496	553	471	353	422	286
Lock 5A	508	366	330	483	505	549	525	623	536	344	397	326
Lock 6	953	633	493	807	977	875	836	975	831	1,063	712	506
Lock 7	947	562	577	763	914	908	1,054	966	943	865	924	532
Lock 8	1,359	556	669	1,176	1,322	1,149	1,076	1,253	1,080	920	1,047	675
Lock 9	879	389	517	862	870	916	1,075	1,114	1,127	730	907	684
Lock 10	1,274	605	524	1,438	1,572	1,548	1,202	1,485	1,310	1,083	1,284	934
Lock 11	2,279	1,017	1,090	2,400	1,897	1,719	1,640	2,029	1,813	1,399	1,694	1,200
Lock 12	2,634	921	831	1,941	2,291	1,791	1,602	2,261	1,693	1,997	2,239	1,417
Lock 13	2,763	1,296	1,072	2,699	2,592	1,480	1,380	2,138	1,931	1,494	1,972	1,247
Lock 14	3,614	1,771	2,045	4,787	6,570	7,304	7,142	12,257	7,429	5,633	6,598	3,791
Lock 15	7,676	3,915	2,626	6,671	8,648	4,128	4,849	7,858	4,928	6,017	6,053	4,352
Lock 16	6,814	6,026	2,177	4,908	5,117	3,485	4,450	5,591	3,674	5,009	3,987	2,807
Lock 17	6,738	9,534	1,772	6,157	4,971	3,869	5,572	6,343	4,229	4,010	6,645	3,424
Lock 18	7,872	5,519	1,975	8,902	7,075	3,709	3,303	5,370	4,450	5,023	5,737	3,535
Lock 19	3,404	2,151	1,476	2,330	2,443	1,940	1,791	2,174	2,205	1,868	2,322	1,829
Lock 20	8,825	11,088	2,326	7,175	10,314	4,645	4,532	6,542	7,603	5,854	6,311	4,134
Lock 21	7,785	4,340	2,562	9,783	9,335	4,780	4,637	6,108	6,386	6,954	4,956	3,754
Lock 22	13,842	7,782	4,327	20,583	25,284	9,328	7,767	11,680	10,327	13,509	8,536	5,636
Lock 24	14,435	7,510	3,862	16,302	14,853	8,192	12,362	8,959	7,816	10,819	14,179	6,054
Lock 25	22,425	7,178	6,910	18,573	12,244	8,269	12,943	11,746	9,350	15,356	8,208	5,524
Melvin Price	12,954	6,273	9,189	4,188	3,763	2,908	3,640	3,625	4,765	4,581	4,580	3,825
Lock 27	6,750	8,672	6,688	9,541	6,841	9,430	4,673	7,208	5,893	5,928	7,200	6,469

* Analysts estimates based upon raw Corps data

Number of commercial tows

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002*	2003*
Lock 3	1,625	795	936	1,065	1,130	1,047	1,202	1,201	1,131	784	1,004	854
Lock 4	1,593	797	947	1,075	1,158	1,078	1,229	1,230	1,171	824	1,065	914
Lock 5	1,574	811	985	1,104	1,181	1,116	1,253	1,243	1,175	831	1,072	925
Lock 5A	1,629	815	989	1,118	1,181	1,114	1,256	1,243	1,179	832	1,074	928
Lock 6	1,653	901	1,064	1,279	1,352	1,267	1,397	1,491	1,370	1,009	1,257	1,087
Lock 7	1,695	871	1,062	1,273	1,355	1,280	1,404	1,497	1,372	1,011	1,259	1,098
Lock 8	1,666	929	1,073	1,315	1,373	1,295	1,419	1,503	1,394	1,033	1,277	1,148
Lock 9	1,609	999	1,124	1,442	1,448	1,395	1,542	1,595	1,475	1,131	1,380	1,242
Lock 10	2,014	1,192	1,335	1,784	1,764	1,636	1,792	1,968	1,789	1,315	1,771	1,535
Lock 11	1,965	1,368	1,533	1,924	1,958	1,800	1,958	2,118	1,932	1,466	1,895	1,781
Lock 12	2,380	1,299	1,447	1,995	2,019	1,789	1,934	2,114	1,935	1,538	1,927	1,682
Lock 13	2,468	1,375	1,511	2,057	2,042	1,810	1,958	2,147	1,944	1,542	1,968	1,700
Lock 14	3,325	1,999	2,222	2,879	2,914	2,669	2,816	3,146	2,891	2,269	2,670	2,271
Lock 15	3,093	2,113	2,453	2,769	2,763	2,483	2,585	2,873	2,791	2,376	2,644	2,708
Lock 16	3,367	2,215	2,366	3,068	3,074	2,797	2,876	3,146	2,903	2,450	2,858	2,534
Lock 17	3,247	1,842	2,007	2,739	2,758	2,469	2,591	2,948	2,731	2,290	2,654	2,308
Lock 18	3,298	1,911	2,038	2,804	2,804	2,526	2,630	3,005	2,783	2,379	2,763	2,383
Lock 19	3,355	2,023	2,106	2,852	2,842	2,527	2,565	2,962	2,730	2,361	2,719	2,306
Lock 20	3,402	2,143	2,341	3,185	2,987	2,646	2,644	3,028	2,796	2,463	2,804	2,411
Lock 21	3,605	2,289	2,458	3,105	3,086	2,761	2,777	3,143	2,886	2,621	2,903	2,473
Lock 22	3,614	2,276	2,443	3,121	3,051	2,650	2,668	3,046	2,837	2,596	2,825	2,381
Lock 24	3,757	2,447	2,578	3,210	3,096	2,693	2,687	3,059	2,889	2,637	2,904	2,480
Lock 25	3,776	2,444	2,601	3,205	3,094	2,694	2,684	3,072	2,898	2,688	2,882	2,467
Melvin Price	7,861	6,052	6,392	4,992	5,826	5,311	5,736	5,260	4,954	4,490	5,531	5,093
Lock 27	7,084	7,442	6,940	7,489	6,108	6,076	6,438	6,762	6,369	6,682	6,761	6,337

* Analysts estimates based upon raw Corps data

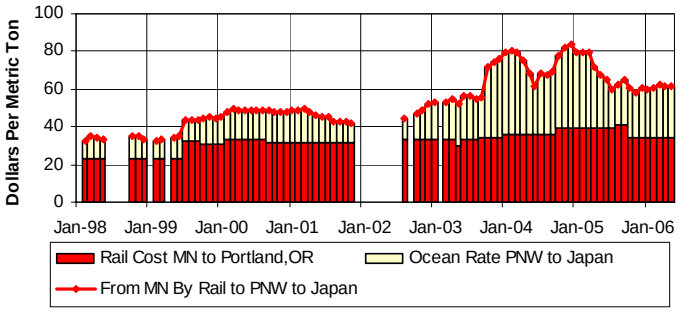
Transportation Rates

- Ocean freight rates out of the Pacific Coast to Asia also increase but not as much as Gulf rates due to the closer proximity to Asia.

- Rail rates have remained steady as reported by USDA with a slight increase after Hurricane Katrina.

- Rail rates fell in January 2006 and have remained steady since then.

Transportation Cost of Moving Corn From Minnesota to Japan via Rail

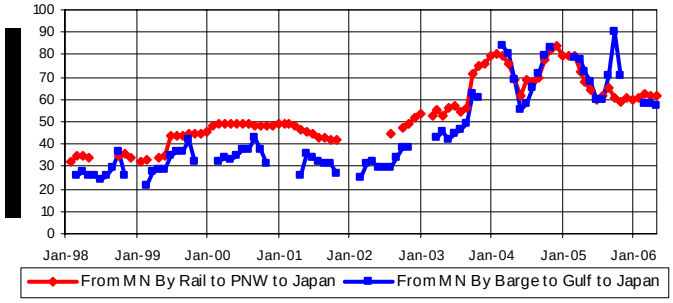


Data Source: Weekly Grain Transportation Reports, USDA/AMS

- The convergence of transportation costs to Asia via rail or barge has resulted in an increase in corn moving out the Pacific Coast.

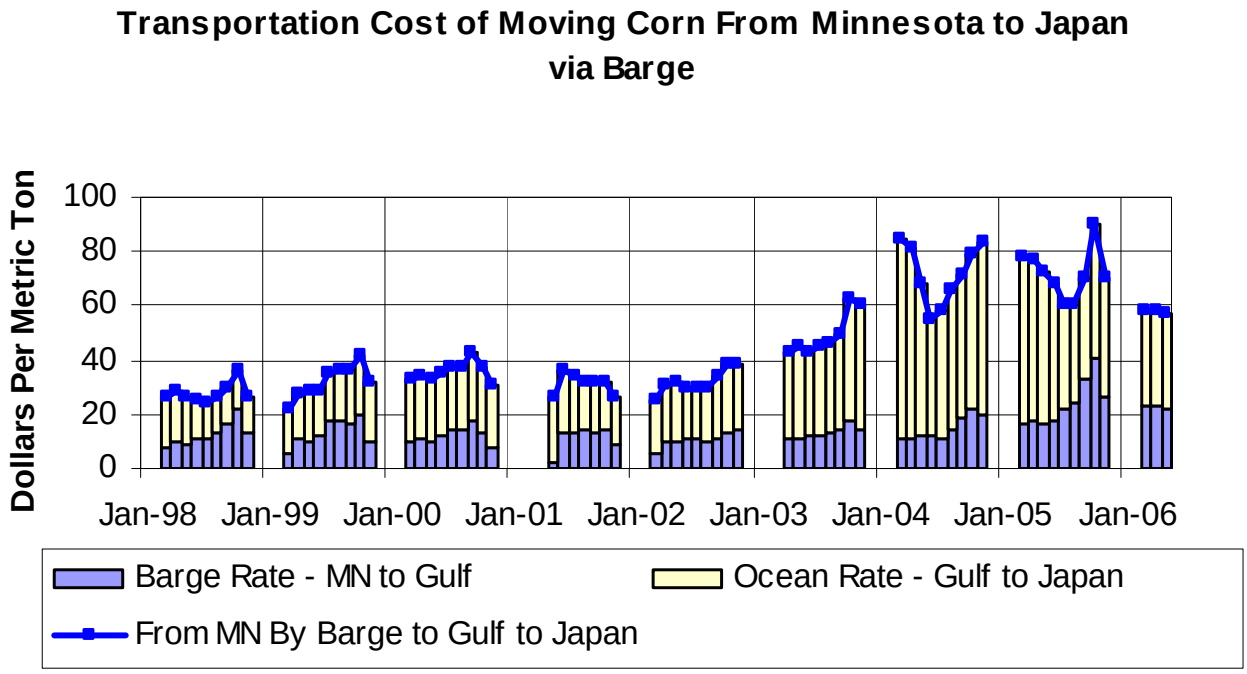
- In 2006, the transportation to Asia via barge has again fallen below rail costs.

Transportation Cost of Moving Corn From Minnesota to Japan



Data Source: Weekly Grain Transportation Reports, USDA/AMS

Transportation Rates

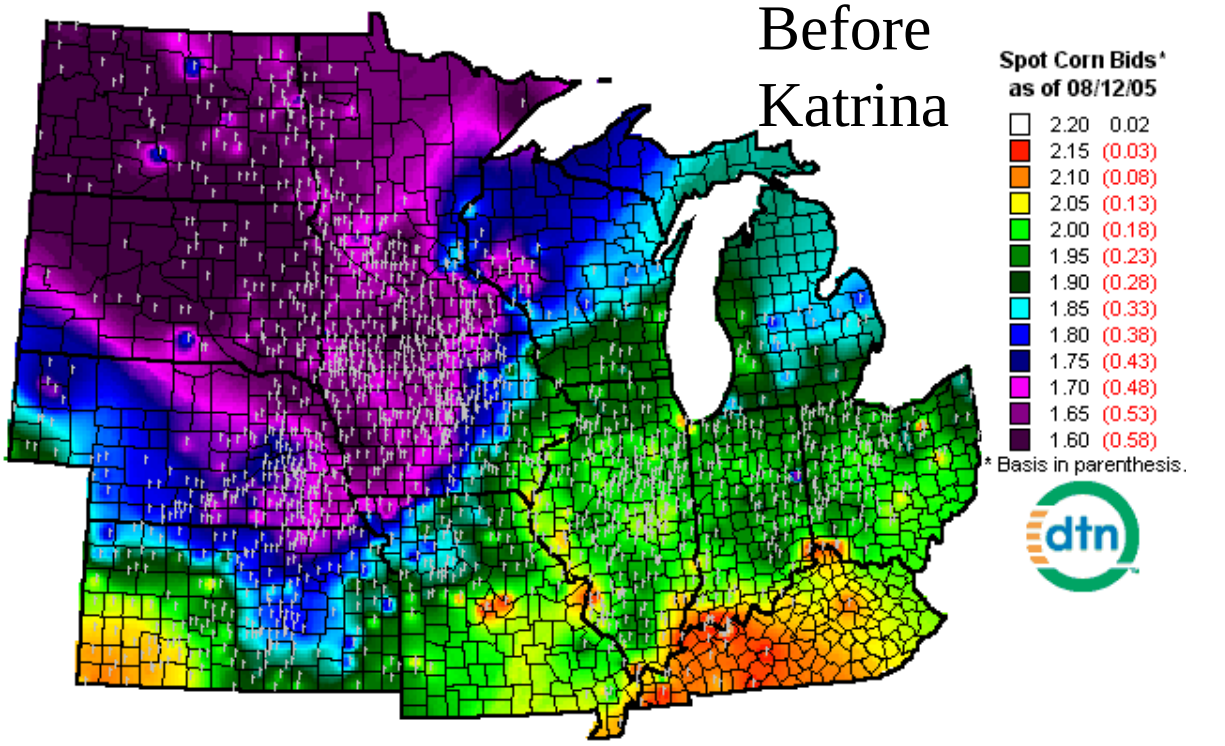


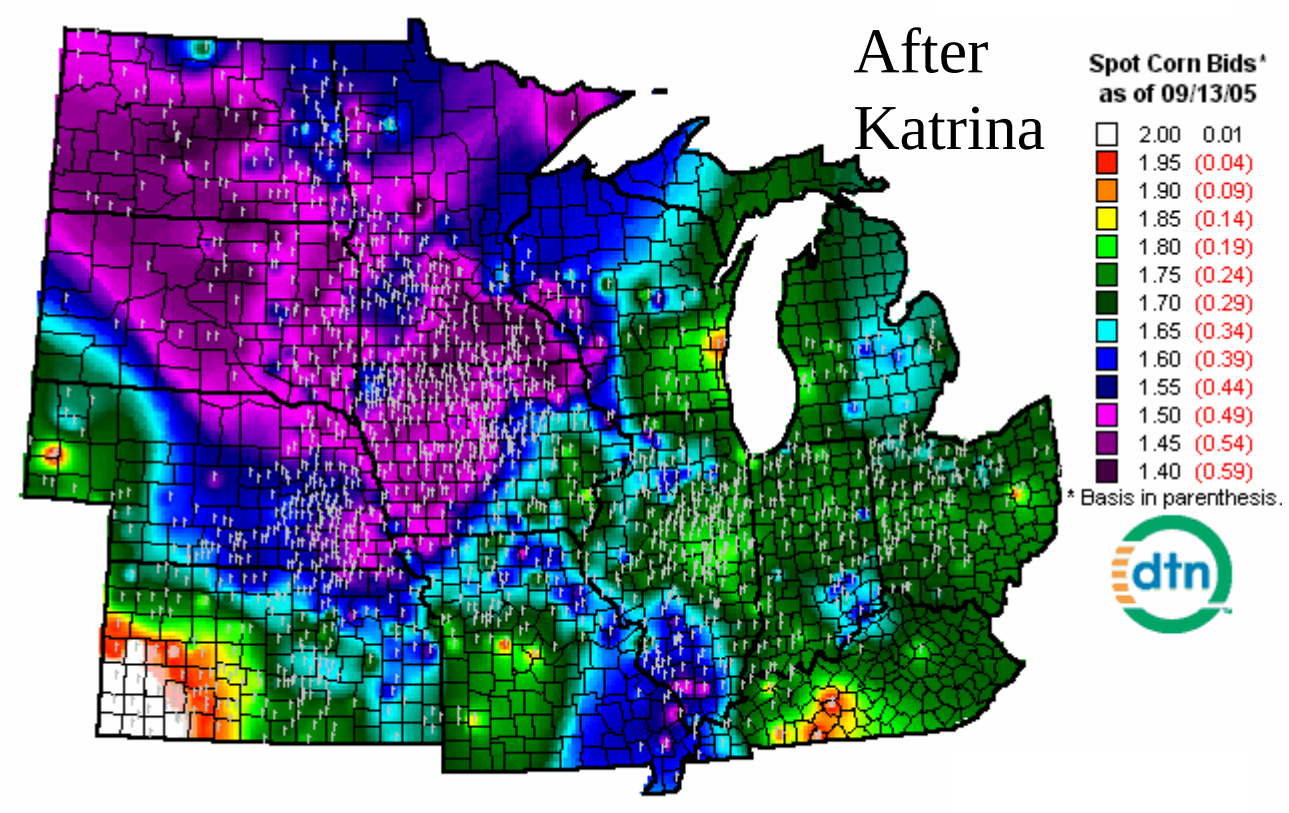
Data Source: Weekly Grain Transportation Reports, USDA/AMS

- The dramatic increase in ocean rates from the Gulf to Asia beginning in late 2002 resulted in reduced demand for barge transportation.

- Ocean freight rates have begun to ease in the last six months with less demand for bulk carriers from China and completion of new dry cargo ships.

Corn Bids Before and After Hurricane Katrina





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