RIVER TRANSPORTATION IN MINNESOTA

2001
DEPARTMENT OF TRANSPORTATION
PORTS & WATERWAYS SECTION

Minnesota's River Transportation Plan

Prepared by
Ports & Waterways Section,
Minnesota Department of Transportation

The Ports and Waterways Section of the Minnesota Department of Transportation (Mn/DOT) has prepared this river transportation plan to aid Mn/DOT in its efforts to Support and promote the continued effectiveness and development of commercial river navigation as a vital component of the total transportation system.

This plan includes an historical background of river transportation, a mode status report and issue identification for use by Mn/DOT and other interested agencies and individuals.

Information included in this plan was obtained from towboat, passenger boat, barge owners, operators, terminal operators, fleet operators, port authorities as well as federal, state and municipal agencies.

Summer 2001

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1.1 Purpose

The plan is necessary to aid the Minnesota Department of Transportation (Mn/DOT) in its efforts to support and promote the continued effectiveness and development of commercial navigation as a vital component of the total transportation system. Mn/DOT does this by encouraging federal, state and local agencies to respond to the need for effective commerce on the Upper Mississippi navigation system.

1.2 Scope

The plan provides historical background of the river commerce and the river transportation system, mode status report and issue identification for use by decision-makers within Mn/DOT and other agencies concerned for commercial navigation.

1.3 Minnesota Department of Transportation Authority

The Minnesota Department of Transportation is empowered by Minnesota Statutes 174.01 to participate in the development of policies, plans and programs for all modes of transportation including waterways. The department is the principal agency for development, implementation and administration of transportation policies including those related to the use of Minnesota's navigable rivers.

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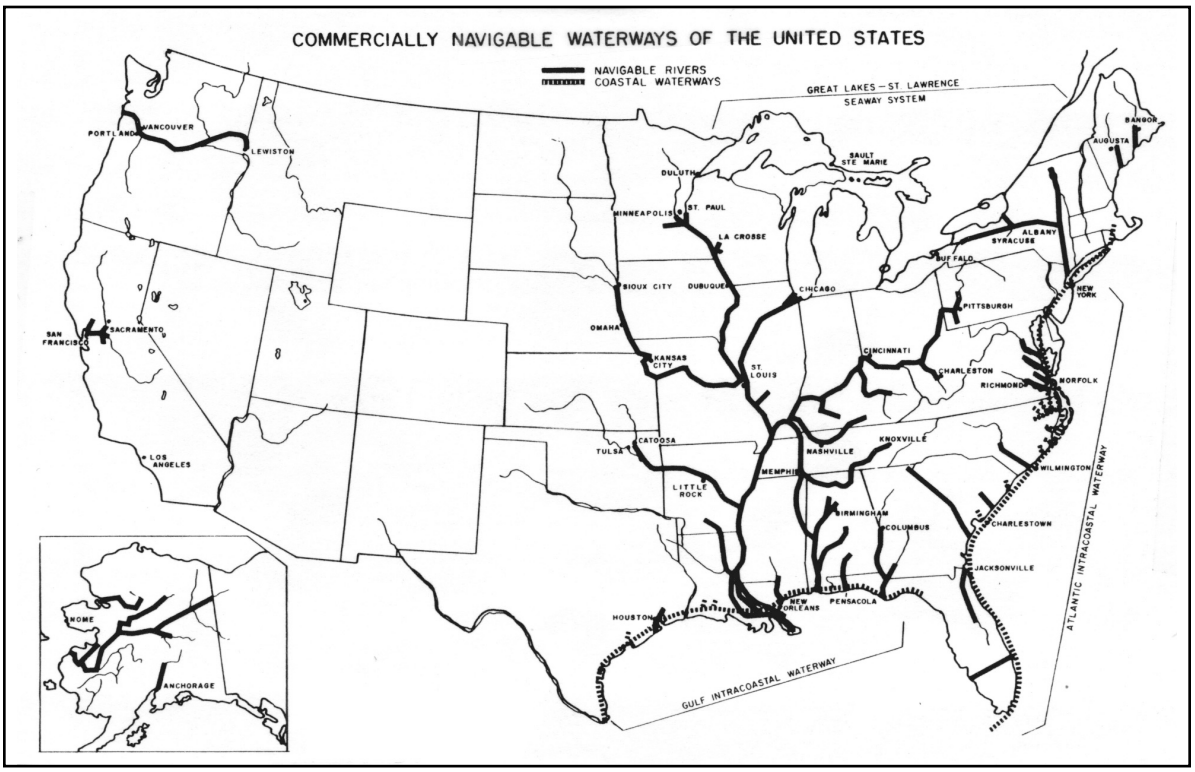
2.1 U.S. Inland and Coastal Waterway System



Map 2.1 Commercially Navigable Waterways of the United States

The U.S. Shallow draft waterway system, shown on map 2.1, provides low cost transportation of commodities for domestic and export commerce. Nearly 17% of U.S. Intercity freight tonnage is moved on water routes. These routes serve the Atlantic and Pacific coasts, the Gulf Coast and the industrial and agricultural heartland of the nation. The shallow draft system provides service to 38 states and nearly 95% of the nation's population.

This navigation system was originally developed with both public finds and private investments. Since 1980 the Federal government has collected a user tax on fuel (currently 24.3 cents per gallon), called the Inland Waterway user fee. Twenty cents of this tax is placed in an escrow account to pay for _ or 50% of any major federal project to enhance the Inland Waterway Navigation System. An example would be the reconstruction of a lock and dam on the system. Government has traditionally encouraged development of the system through technical and financial support. In addition to system development and operation, government's growing role includes actions to regulate the river transportation system to promote safety and protect the environment.

The Federal Environmental Management Program (EMP) is funded through the U.S. Army Corps of Engineers to improve fish and aquatic habitat and to lessen erosion in backwaters. This is a cooperative program with the U.S. Fish and Wildlife Agency and state DNRs on the Upper Mississippi River.

Although the rivers on the continent had historically provided inter-regional transportation corridors, it was the channel improvement projects and canals constructed in the early days of settlement that helped open the frontier. Most of the early private investors built navigation projects with some help from the colonial administrations. An example of public action to promote navigation is the legislation

passed by the Virginia House of Burgesses in 1772 to finance channel improvements on the Potomac River from the tidewater to Fort Cumberland, Maryland. Although the colonial and later the state and federal governments' planning efforts and land grants were major contributions to river development, early projects relied on private stock companies for funding. Early government capital investment in water projects included, besides the colonial funding of the Potomac project, the very profitable Erie Canal, that was built by the State of New York in the period 1817 to 1825. Those ventures encouraged expanded federal government involvement by demonstrating the economic benefits that can be realized from water transportation projects. Direct involvement by the U.S. government did not begin until 1824 when the U.S. Supreme Court upheld federal sovereignty over river and harbor improvements (based on the Commerce Clause of the U.S. Constitution). This landmark case, Gibbon vs. Ogden paved the way for further action by Congress and the President.

Also in 1824, Congress passed two acts pertaining to commercial navigation. The General Survey Act of 1824 authorized the U.S. Army Corps of Engineers to do land surveys and design studies of waterway improvements. The Rivers and Harbors Act of 1824 provided funds for research, project design and channel clearing. It also authorized the federal government to provide land grants and technical assistance to state and local governments for harbor improvements.

These early federal actions provided for the development of East Coast and Gulf Coast deep draft ports for commercial navigation and opened the full inland river system, including the Mississippi River for commercial uses. The transportation routes that were opened on the rivers were used to move agricultural products and raw materials from the hinterland to processing centers or to export ports. Inland farm areas and coal fields became more accessible as a result of river channel and canal improvements, providing food and fuel for the growing urban centers.

In order to implement the programs provided for in the Acts of 1824, President Madison appointed the first Board of Engineers. The board, which was made up of senior Army Engineers, was charged with the plan review and prioritization of projects to be implemented by the Corps of Engineers. By 1850 the federal government, through the U. S. Army Corps of Engineers, had full responsibility for the construction, operations and maintenance of most of the national waterway system. Along with the growth in federal waterways responsibility there is a strong measure of local involvement in areas of shore land development, economic expansion and accommodation of all waterway user needs.

Map 2.2

2.2 Mississippi Waterway System

Navigation System

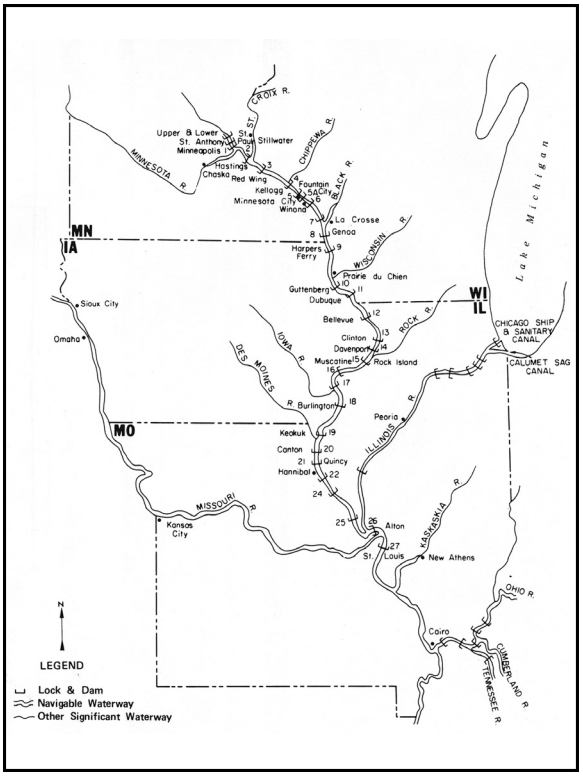
The Mississippi River commercial navigation system extends from Minneapolis, Minnesota to the Gulf of Mexico (1811 miles), as shown on Map 2.2. Major navigable tributaries of the Mississippi River System include the Missouri, Ohio, Illinois,

Tennessee and Arkansas. The Upper Mississippi River basin shown on Map2.3 includes Minnesota, Wisconsin, Iowa, Illinois and Missouri. It includes the reach of the Mississippi from the headwaters in Northern Minnesota (Lake Itasca) to its confluence with the Ohio River at Cairo, Illinois (1366 miles). Included in the Upper Mississippi River navigation system are the Mississippi's navigable tributaries: the Minnesota, St. Croix, Illinois, Kalkaska and Missouri Rivers as shown on Map 2.4. The total length of the Mississippi River from Lake Itasca to the Head of Passes is 2,320 miles.

In 1663 French explorers Marquette and Joliet explored the Mississippi from its headwaters at Lake Itasca to its confluence with the Arkansas River. On their second expedition, in 1678, they went all the way downstream from the Arkansas to the Head of Passes, where the river meets the Gulf of Mexico.

The first recorded commercial navigation movements on the Mississippi occurred in 1705 when some 15,000 fur pelts were shipped by raft from the Missouri River to the City of Biloxi. The economic value of transportation on the river grew from that beginning, with improvements in vessels and with the construction of channel and harbor projects.

Map 2.3 Upper Mississippi River Basin



Map 2.4

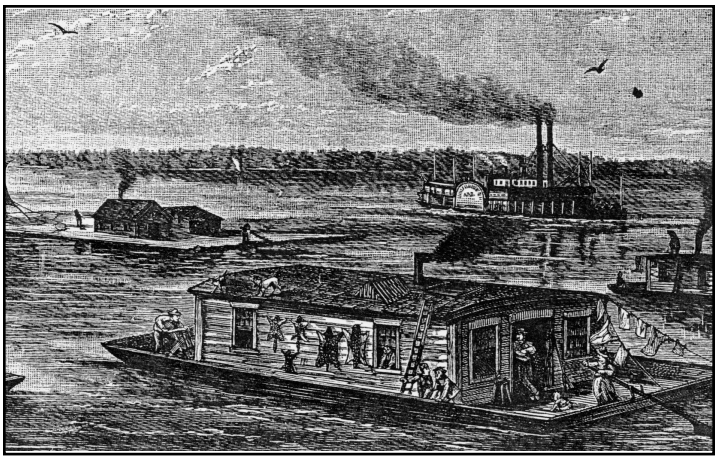


Figure 2.1 Flatboat

Vessels

Vessel improvements included the development of early flatboats and the Bullboat, which originally had a capacity of 3 tons of cargo. It was used mostly on short hauls and only down river.

The keelboat was a major advancement in vessel design. It was built with a pointed bow to make upstream shipments easier and faster. When used with steamboats, it was

tied to their sides. This use of the boat was the forerunner to the modern barge tow system used on the river. See attached drawing.

The use of steamboats on the lower Mississippi began in 1812, expanding river commerce to include passenger travel. In the early days, steamboat operation was confined to the lower river because operators thought traveling north of the Ohio River was impossible due to rocks, sandbars and debris. In 1823 the steamboat Virginia made the first trip from St. Louis to St. Paul. Although the 660-mile trip took 20 days, it did prove that the upper river could be navigated.

Figure 2.2 Keelboat

Congress passed the Rivers and Harbors Act of 1824 to fund the construction of workboats and the cost of channel clearing operations such as rock, snag, and sandbar removal. However, these improvements did not address the problems of rapids on the upper river. Even though channel clearing helped navigation to a great degree, costly groundings still occurred on the river.

In 1851, the U.S. Army Corps of Engineers responded to the need for safer navigation by initiating a major study of flood control and navigation on the Mississippi. The study provided the basis for the Rivers and Harbors Act of 1878, which authorized construction of a 4 foot navigation channel from St. Louis to St. Paul. That project included the construction of wing dams to help form a channel by confining and diverting the river current. It also included building closing dams to restrict flow to the backwaters and maximize the amount of water in the main channel. A more stable level of water facilitated steamboat movement.

Cargoes carried by the early steamboats north of St. Louis consisted almost entirely of furs and military supplies. In the mid 1800's when river population centers, such as St. Paul and Minneapolis began to grow, the list of cargoes expanded to include a wide variety of commodities as well as passengers. The steamboats that hauled freight and passengers were operated by individual entrepreneurs who were in strong competition with one another. Their operations were generally unorganized and had no scheduled arrival or departure times. That changed to a great extent in 1847 when the Minnesota Packet Company was created. It helped organize the industry by assigning steamboats to scheduled stops and timetables, especially on the passenger runs.

Early river commerce on the upper river also included sizeable amounts of raw and finished lumber. White pine from Minnesota and Wisconsin was shipped to sawmills located on the river between St. Paul and St. Louis. Finished lumber from the mills went to the growing urban centers in the east and south. Rafts of logs and steamers loaded with finished lumber were a common sight on the river as late as 1915.

River System Development

Congress created the Mississippi River Commission in 1879 to oversee the management of the Mississippi River Valley resources. The Commission included seven presidential appointees, three from the U.S. Army Corps of Engineers and four civilians representing the midwestern states. The Commission's many recommendations included deepening the river channel and constructing of locks at river rapids to improve transportation on the Upper Mississippi River system. In 1907 action began on their recommendations when Congress authorized a 6-foot navigation channel from St. Louis to St. Paul, included the construction of 3 locks at the Des Moines River rapids, the Rock Island River rapids and the Minneapolis rapids.

Work on the six-foot navigation channel created concern about natural resources in the river valley. In 1910, President Theodore Roosevelt responded to those concerns by appointing the Inland Waterways Commission, which was charged with preparing a plan for waterway development and conservation.

The Inland Waterways Commission's investigated the economics of the river transportation industry which had succumbed to intense competition from the railroads. When the railroads built tracks parallel to the river, they offered generally safer and faster service to the midwestern grain farmers. As a result, many small vessel operators were bought up by railroad companies, which eliminated most competition. The railroads were also acquiring ocean and Great Lakes shipping companies at this time. The Commission's investigation, which proved the need for effective modal competition, caused the Congress to pass the Panama Canal Act of 1912. The Act was directed toward the development of renewed competition between the railroads and the water transportation industry. Its main theme is the prohibition of ownership of water carrier companies by railroads, which would normally be in competition with them.

Another product of the Inland Waterways Commission was the development of certain provisions, which were contained in the Transportation Act of 1920. That Act created the Inland and Coastwise Waterways Service to promote water transportation through research and public information programs. In 1924, this agency became the federally owned and operated Inland Waterway Corporation. Its mission was to revitalize the commercial navigation industry. The Corporation helped water carriers by designing and building towboats and barges to add cargo capacity and improve operating efficiencies. With these improvements the river transportation industry was able to compete for and capture a substantial share of the market for Midwest grain shipments.

2.3 Upper Mississippi River System

When commerce began to expand again on the Upper Mississippi, the Inland Waterway Corporation helped river towns with financial and technical assistance for port and terminal development. By 1935, twelve cities on the Upper Mississippi had built cargo transfer facilities with help from the corporation. River transportation grew with the economy of the Upper Mississippi Valley. In 1930, in response to that growth, Congress authorized a 9-foot navigation project on the Mississippi River and parts of the Minnesota and St. Croix Rivers. The project included construction of 27 locks and dams as well as supplemental channel dredging.

Building the locks and dams created river pools with stable water levels. The dams provide the ability to control river pool elevations to ensure adequate channel depth for vessels with 9 feet of draft. The locks allow the river vessels to traverse the 404-foot elevation change between St. Louis and Minneapolis. Levees and bank revetments to protect riverbanks and adjacent flatlands were another important part of the 9-foot navigation project.

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3.1 U.S. Shallow Draft Navigation System

The national shallow draft navigation system has a total length of over 25,000 miles. There are nearly 22,000 miles of river channel and over 3,000 miles of coastal waterways in the system. Channel depths, which refer to the maximum vessel draft that can be safely accommodated, vary throughout the system from less than 5 feet in the Alaskan river network to over 45 feet in the New Orleans area. Depths for the channels in the central river system, which included the Mississippi and Ohio Rivers and their tributaries, are generally dredged to accommodate vessels with 9 feet of draft.

The shallow draft waterway system currently carries nearly 17 % of the nation's total intercity freight movement. That percentage of the nation's freight traffic cost isf about 2% of the nation's freight movement bill. Figure 3.1 compares movement of commodities on the national shallow draft system with other waterway systems.

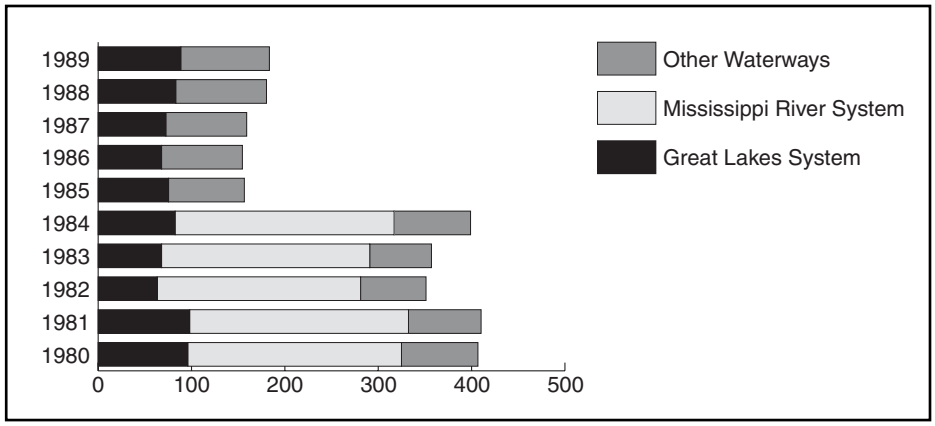
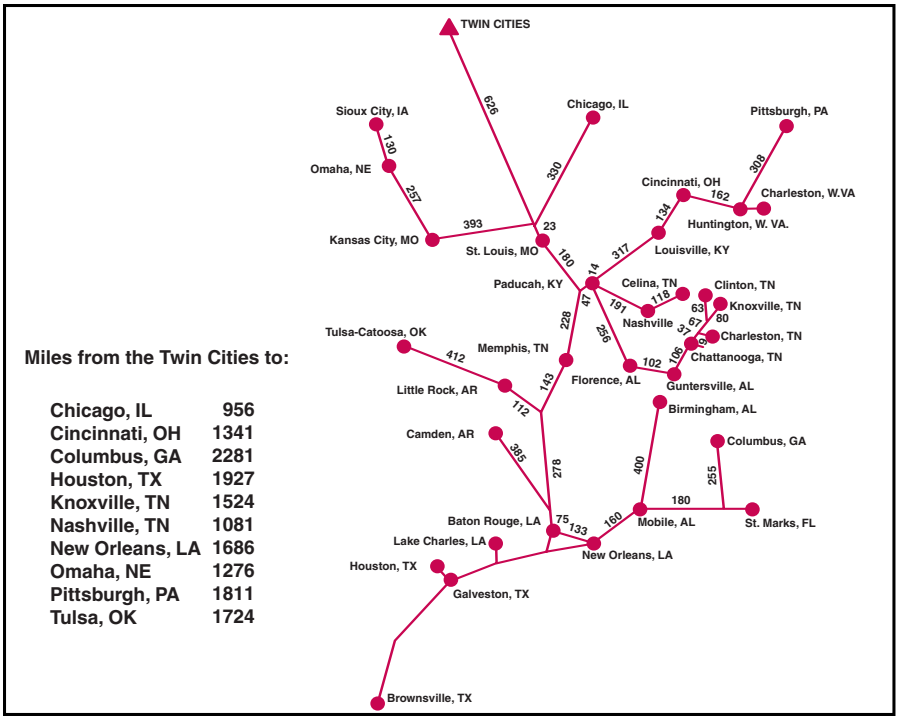


Figure 3.1 Ton-miles of U.S. Waterborne Freight (one ton/mile equals moving one ton of freight a distance of one mile)

The shallow draft system provides water transportation service to 38 of the 50 states. Even those states, which are not directly on the navigation system, profit from its existence through low cost transportation of their material needs and products.



Miles from the Twin Cities to:

Chicago, IL	956
Cincinnati, OH	1341
Columbus, GA	2281
Houston, TX	1927
Knoxville, TN	1524
Nashville, TN	1081
New Orleans, LA	1686
Omaha, NE	1276
Pittsburgh, PA	1811
Tulsa, OK	1724

Figure 3.2

The central river system connects 21 states in the industrial and agricultural heartland of the nation with each other and the seacoast ports. Figure 3.2 shows some of the distances between major cities on the Mississippi River system.

3.2 The Mississippi River

The Mississippi and its major tributaries serve the freight transportation needs of 14 states in the agricultural belt. With the Ohio River system added, the coverage expands to 21 states, which include most of industrial America. Table 3.1 shows the volumes of freight that move on the Mississippi River System.

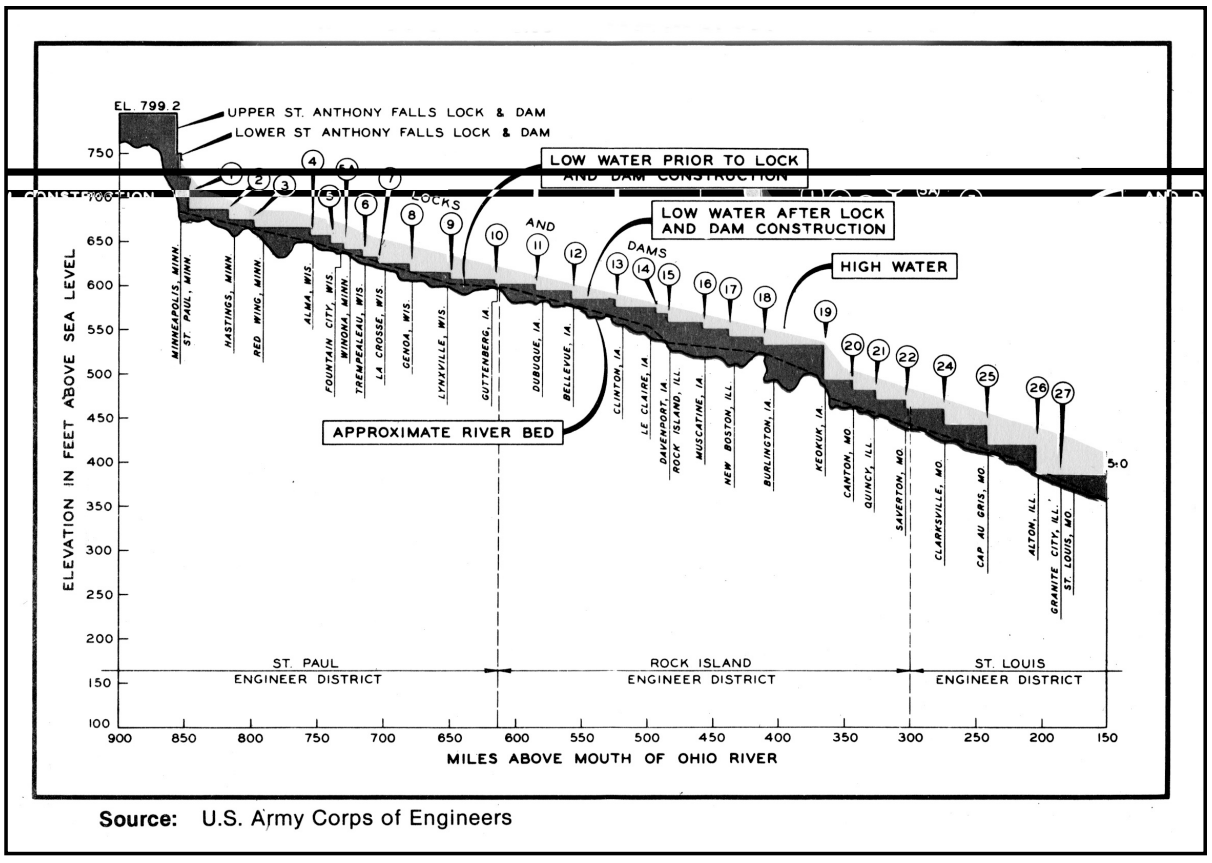
The Lower Mississippi, from Cairo downstream, is free flowing without locks and dams. Depths on the lower river are maintained at nine feet to Baton Rouge, Louisiana. From there downstream the channel is maintained at a depth of 45 feet, sufficient for ocean vessels. The Lower Mississippi has over 830 miles of navigable channel.

The navigation portion of the Upper Mississippi River system includes the Mississippi River and all of its navigable tributaries from the mouth of the Ohio River at Cairo, Illinois, 857.6 miles upstream to the Minneapolis Upper Harbor. The Upper Mississippi River has 29 locks and dams. The locks lift or lower vessels and their tows a total of 404 feet from lock 27 at Granite City, Illinois to the Upper St. Anthony Falls Lock and Dam in Minneapolis. The lift at the Upper St. Anthony Falls lock is 49.2 feet, the greatest on the system. Figures 3.3 and 3.4 describe the locations, sizes and lefts of the Upper Mississippi River locks.

YEAR	MISSISSIPPI RIVER SYSTEM*	UPPER MISSISSIPPI**
1980	365,569,149	76,394,879
1985	378,852,148	72,039,185
1990	457,497,000	88,402,000
1991	445,149,000	84,069,000
1992	447,000,000	86,185,000
1993	451,731,000	72,158,000***
1994	478,673,000	79,421,000
1995	479,421,000	84,394,000
1996	482,711,000	80,372,000
1997	488,876,000	77,838,000
1998	490,741,000	79,628,000

*Includes Illinois, Ohio, Mississippi & Missouri Rivers to New Orleans. (No foreign freight)
** From Minneapolis, Minnesota to the Mouth of the Missouri River just above St. Louis.
*** Major flood on the Upper Mississippi.
Source: U.S. Army Corps of Engineers

Table 3.1 Historic Traffic Volumes Total Cargo (Short Tons)



Source: U.S. Army Corps of Engineers

Figure 3.3 Mississippi – Stairway of Water

Locks and Dams	Miles Above Ohio River	Location or Miles to Nearest Town	Dimensions (Feet)						Year Opened
			Width of Chamber	Available Length for full Width	Lift	Upper Normal Pool Elevation (MSL)	Upper	Lower	
St. Anthony Falls, upper lock	853.9	Minneapolis, MN	56	400	49.2	799.2	15.7	13.7	–
St. Anthony Falls, lower lock & dam	853.3	Minneapolis, MN	56	400	26.9	750.0	13.7	10.3	1959
Lock and Dam 1	847.6	Minneapolis-St.Paul, MN	56 56	400 400	39.5 39.5	725.1 –	13.5 12.5	10.1 7.6	1917
Lock and Dam 2	815.2	1.3 above Hastings, MN	110 110	500 600	12.2 12.2	– 687.2	16.0 22.2	15.0 13.0	1930 1948
Lock and Dam 3	796.9	6.1 above Red Wing, MN	110	600	8.0	675.0	17.0	14.0	1938
Lock and Dam 4	752.8	Alma, WI	110	600	7.0	667.0	17.0	13.0	1935
Lock and Dam 5	738.1	Minneiska, MN	110	600	9.0	660.0	18.0	12.0	1935
Lock and Dam 5a	728.5	3.0 above Winona, MN	110	600	5.5	651.0	18.0	12.5	1936
Lock and Dam 6	714.3	Trempealeau, WI	110	600	6.5	645.5	17.0	12.5	1936
Lock and Dam 7	702.3	Dresbach, MN	110	600	8.0	639.0	18.0	12.0	1937
Lock and Dam 8	679.2	Genow, WI	110	600	11.0	631.0	22.0	14.0	1937
Lock and Dam 9	647.9	3.3 below Lynxville, WI	110	600	9.0	620.0	16.0	13.0	1938
Lock and Dam 10	615.1	Guttenberg, IA	110	600	8.0	611.0	15.0	12.0	1936
Lock and Dam 11	583.0	3.7 above Dubuque, IA	110	600	11.0	603.0	18.5	12.5	1937
Lock and Dam 12	556.7	Bellevue, IA	110	600	9.0	592.0	17.0	13.0	1938
Lock and Dam 13	522.5	4.3 above Clinton, IA	110	600	11.0	583.0	19.0	13.0	1938
Lock and Dam 14	493.3	3.7 below Le Claire, IA	110	600	11.0	572.0	20.5	13.5	1939
Le Claire Lock (Canal)	493.1	3.9 below Le Claire, IA	80	320	11.0	–	17.6	10.9	1922
Lock and Dam 15	482.9	Foot of Arsenal Island, Rock Island, IL	110 110	600 360	16.0 16.0	561.0 –	24.0 17.0	11.0 11.0	1934
Lock and Dam 16	457.2	1.8 above Muscatine, IA	110	600	9.0	545.0	17.0	12.0	1937
Lock and Dam 17	437.1	4.2 above New Boston, IL	110	600	8.0	536.0	16.0	13.0	1939
Lock and Dam 18	410.5	6.5 above Burlingtron, IA	110	600	9.8	528.0	16.5	13.7	1937
Lock and Dam 19	364.2	Keokuk, IA	110 110	358 1,200	38.2	518.00	14.5 15.0	9.2 13.0	1913 1957
Lock and Dam 20	343.2	0.9 above Canton, MO	110	600	10.0	480.0	15.0	12.0	1936
Lock and Dam 21	324.9	2.1 above Quincy, IL	110	600	10.5	470.0	16.5	12.0	1938
Lock and Dam 22	301.2	1.5 below Saverton, MO	110	600	10.2	459.5	18.0	13.8	1938
Lock and Dam 24	273.4	Clarksville, MO	110	600	15.0	449.0	19.0	12.0	1940
Lock and Dam 25	241.4	Cap Au Gris, MO	110	600	15.0	434.0	19.0	12.0	1939
Melvin Price Lock and Dam	202.9	Alton, IL	110 110	1,200 600	24.0 24.0	419.0 –	23.0 23.0	18.0 18.0	1990 1994
Locks 27	185.5	Grantie City, IL	110 110	1,200 600	5-18	398.0	18.0	27.5	1953

Figure 3.4

The shipping season on the Upper Mississippi River runs from mid-March through the last week of November from the Twin Cities downstream to Davenport, Iowa, but it runs year round below the confluence of the Illinois River. The U.S. Corps of Engineers has concluded studies to determine the feasibility of season extensions. They show that upstream of Davenport; Iowa there is little economic gain in a season extension.

3.3 Minnesota's Navigable River System

Within Minnesota, there are 183.8 miles of commercially navigable channel on the Mississippi River, 24.5 miles on the St. Croix River and 14.7 miles on the Minnesota River, for a total of 223 miles.

All types of bulk freight are moved on the river system. Major movements to and from Minnesota include: coal, grain, liquid and dry fertilizers, potash, salt, raw steel, scrap, slag, anhydrous Ammonia, caustic soda, steel forms, pig iron, cement, sand and gravel, crude oil, petroleum products, newsprint and all types of heavy general cargo. Experiments in moving beer and automobiles were not economically effective. Of all the transportation modes, the river navigation system is the most environmentally friendly and economical way to move large quantities of bulk products.

Commodity movements through Minnesota's river terminals have reached volumes exceeding 17 million tons in a single season. One half or more of the annual tonnage total is grain. Over

60% of all grain rose for export in the state is shipped on the river system. Intrastate movement of petroleum products and sand and gravel accounts for about 10% of the total. Commodity movement figures show a steady growth trend with a few downward turns, which reflect national economic conditions or crop productions and export market losses. Table 3.2 shows historic commodity movements from Minnesota.

YEAR	COAL	CHEMICAL	MINERALS	AG PRODS	MISC	TOTAL
1981	2,637	3,069	815	10,116	217	16,854
1985	2,593	2,898	1,019	7,791	150	14,451
1990	1,486	2,867	1,685	11,446	186	17,670
1991	1,183	2,869	820	10,444	70	15,386
1992	1,092	3,437	644	11,376	66	16,615
1993	496	1,788	2,856	5,500	1,018	11,658
1994	466	3,419	2,488	6,672	665	13,710
1995	457	2,985	2,396	8,139	484	14,461
1996	313	3,167	2,415	9,671	515	16,081
1997	188	2,932	2,787	8,754	825	15,486
1998	373	3,460	2,913	8,911	467	16,125
1999	590	2,996	3,365	10,460	323	17,734
2000	583	3,012	3,547	9,607	555	17,304

Table 3.2 Tonnage Through Minnesota's Port Terminals(In 1,000's of tons)

St. Croix River

Coal was the major product moved on the St. Croix River to the Northern States Power plant at Bayport, Minnesota. With the change to low sulfur coal from the Powder River Basin in Montana and Wyoming and the 1986 construction of a direct rail siding to serve this Plant, coal movement on the St. Croix has stopped. 1998 was also the last year that fertilizer moved on the St. Croix as the Stillwater terminal closed. No freight currently moves on the St. Croix. The Coast Guard still maintains navigation buoys, that aid recreational boaters.

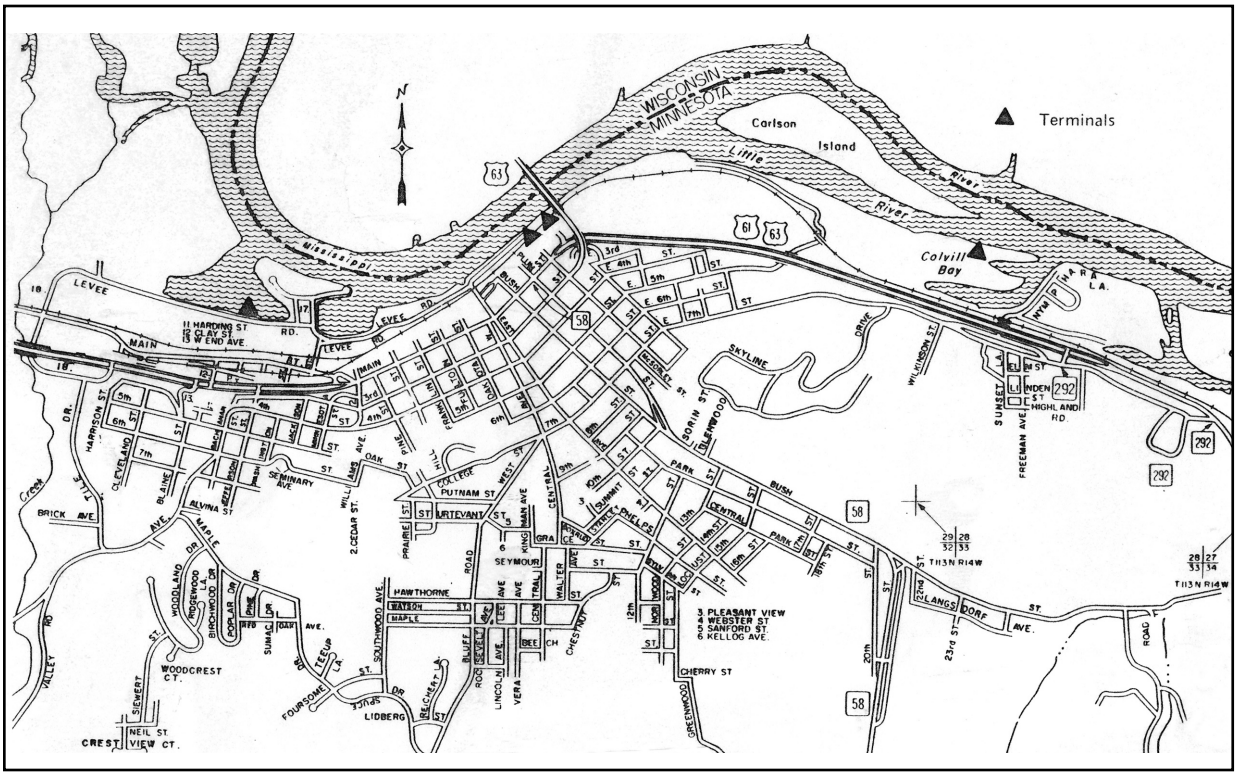
Minnesota River

The majority of the cargo moved through the six operating terminals on the Minnesota River is grain. Fertilizer, salt, petroleum products and aggregates also move on the 14.7 miles of navigable river channel. Rail and highway transportation provide excellent access to the Minnesota River terminals from the southern and central Minnesota farm production areas as well as to grain producers in North and South Dakota. Each year, over 5 million tons of products move on the Minnesota River.

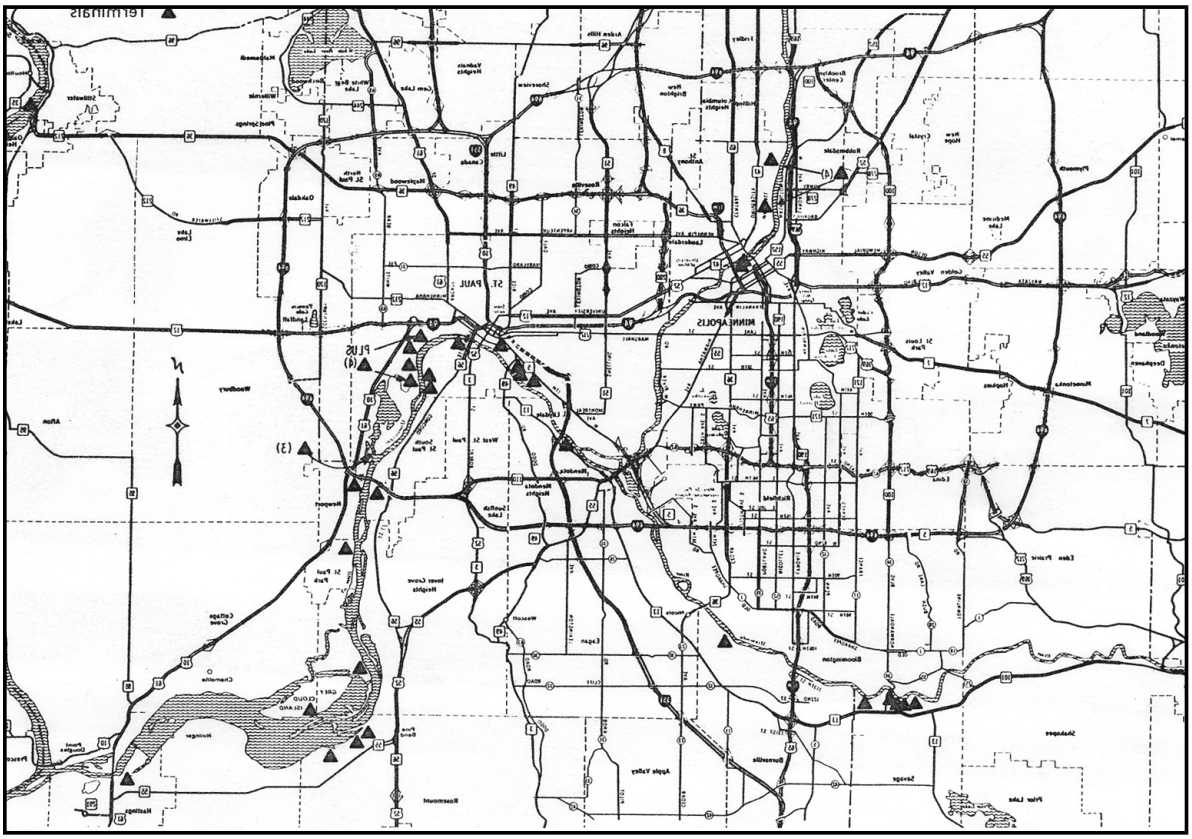
Mississippi River Port Segments

Most of the river terminals in Minnesota are on the Mississippi. There are a total of 38 active Mississippi River terminals in four port areas. Those areas are: the Upper Minneapolis river pool; pool two, which includes St. Paul and its neighboring communities (Map 3.1); Red Wing (Map 3.2); and Pool 6 Winona (Map 3.3).

The heavy commercial river traffic generated by these Minnesota terminals joins Wisconsin traffic from Alma, LaCrosse, Genoa, Prairie du Chien and Cassville. These terminal areas generate similar kinds of freight, but not the high volume.

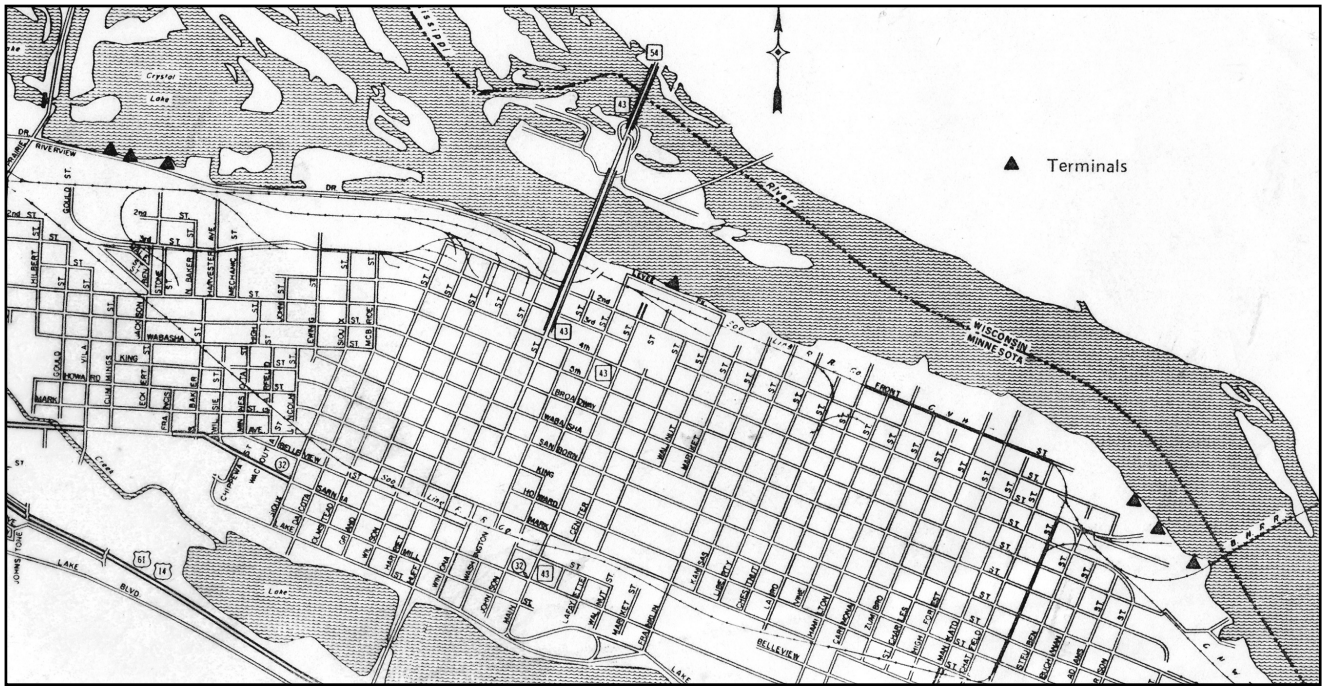


Map 3.2 Red Wing



Map 3.1 Twin Cities

River Transportation in Minnesota.



Map 3.3 City of Winona

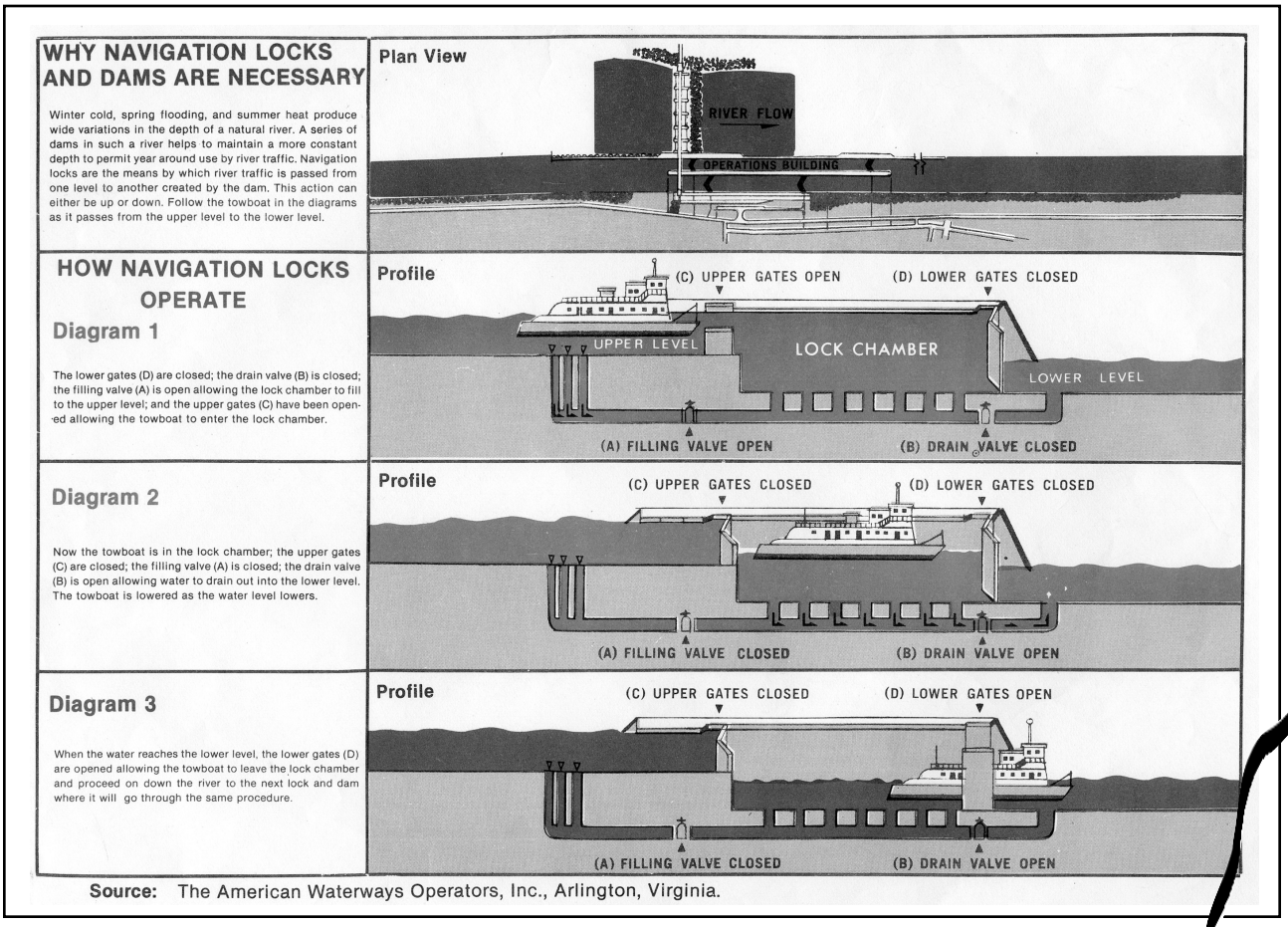
3.4 Navigation Structures- Their Operations and Maintenance

There are many structures on the nation's shallow draft navigation system, such as wing dams and closing dams, which provide aid to navigation by helping to maintain stable channels. The most important structures, however, are the 214 lock chambers on the nation's rivers and coastal waterways. These locks and dams provide a means for vessels to traverse the rivers elevation changes and the impounded pools of water, which help ensure adequate channel depth. In addition, the impoundments created by dams also provide huge fishery and recreation areas as well as water supplies for drinking, irrigation, electric power generation and industrial use. Figure 3.5 shows a typical lock and dam. Some of the locks, such as Lock 27 on the Mississippi, (which circumvents the Chain of Rocks rapids at St. Louis), are not constructed as part of a pool-impounding dam.

Figure 3.5

The near lock chamber with a tow in it is 1,200 feet long by 110 feet wide. All of the locks on the Ohio River are this size. (= 1 1/2 hour locking time)
The upper right chamber is 600 feet long by 110 feet wide. Most of the locks on the Upper Mississippi River are this size. (= 2 hour locking time)

There are a number of different types of locks on the river and coastal waterways. They operate in the same manner, (as shown in Figure 3.6), but their sizes vary. The U.S. Army Corps of Engineers, the agency with the responsibility to construct, maintain and operate the navigation channels, established the following standard lock dimension for the shallow draft system of the United States:



Source: The American Waterways Operators, Inc., Arlington, Virginia.

Figure 3.6 How Navigation Locks Operate

1) Lock width of 56 feet with length of either 400 feet or 600 feet.
2) Lock width of 84 feet with length of 600 feet, 800 feet or 1,200 feet.
3) Lock width of 110 feet with length of 600 feet, 800 or 1,200 feet.

These standard dimensions were established in 1959. Many locks built prior to that time or which were under construction at that time do not conform to the standards.

The average lock is designed to accommodate the passage of vessels in a 20 to 30 minute operation. Single 15 barge tows, which are too large to pass through a 600-foot lock in a single operation, require double lockage. Breakup and reassembly of the tow together with two lockage operations generally takes about an hour and a half to two hours depending on the lock lifts and the efficiency of the boat and lock crews.

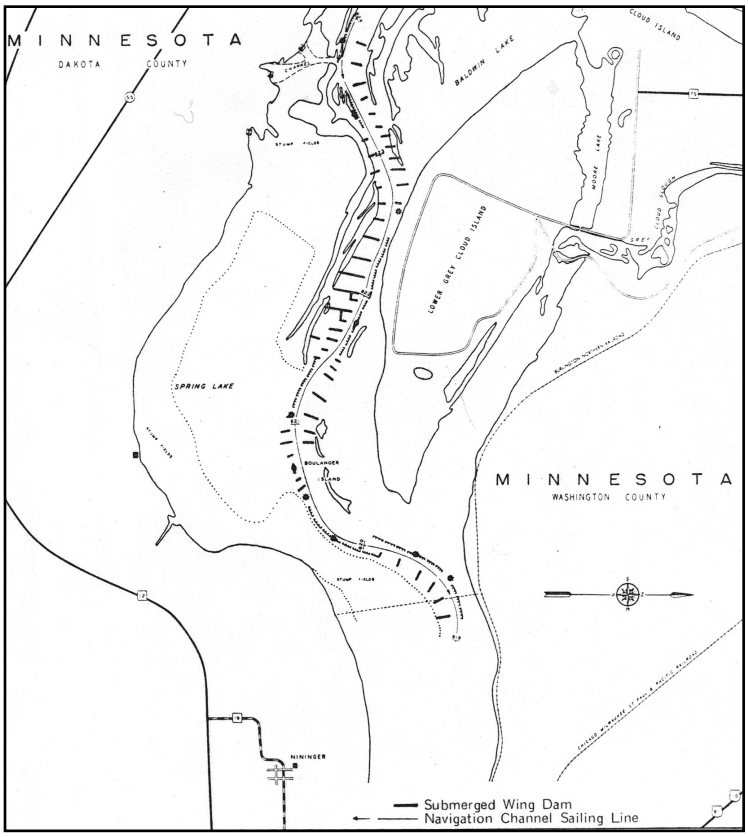
Although dams are essential to maintain reasonable constant water depth of year-round navigation on most rivers, they do much more. They also provide municipal, industrial and agricultural water supplies. Some dams include facilities for electricity generation as one of their purposes. The pools created by dams afford ideal opportunities for pleasure boating and fishing and backwater habitat for wildlife. All of these related development assets enhance the value of lands adjacent to the waterways, creating an added source of economic and environmental enhancement.

Other Structures

Wing dams and closing dams were built during the construction of the early 4-$^{11}/_{42}$ and 6 foot navigation project discussed in chapter 2. Their main function is to control the river's current so that the greatest amount of water possible stays in the navigation channel, which keeps the

main channel water velocity high enough to help keep the channel free of sediment build up. Hundreds of wing dams were constructed between 1866 and 1930. For example, in the twenty-mile stretch from Reads Landing (at the foot of Lake Pepin) downstream to Minneiska, Minnesota, 257 wing dams were built. The wing dams, usually built in pairs, extend at a slight angle into the current from each side of the river restricting the width of the channel and increasing currently velocity. Over the years sediment and sand have filled the spaces below some of the wing dams, which has altered habitat in the areas.

Map 3.4, which are a reproduction of a U.S. Army Corps of Engineers navigation chart for a part of the Pine Bend channel, show the location of wing dams in that area. Figure 3.7 is a picture of the Pine Bend area prior to the construction of the 9-foot channel project. It shows the wing dams as they looked at low water. Figure 3.8 shows how the area looks today.



Map 3.4 Pine Bend River Area Wing Dam Locations

Closing dams were built to close openings to side channels and backwaters. These structures helped increase the amount of water available for the main channel.

In recent years, new closing dam and wing dam construction has been studied as a possible means of reducing the need for dredging in the navigation channel. Other devices intended to help reduce dredging volumes include sediment traps, such as those built into the mouth of the Chippewa River near Reads Landing. Huge holes dug in the river bottom reduce water velocity. The result is sediment deposited before it gets to the navigation channel in the Mississippi.

Although levees were built where needed for flood protection, rather than as a part of the navigation system, some were incorporated as part of the 9-foot project on the Mississippi. Existing levees are constantly being expanded to meet new needs. New levees are also under study. Figure 3.9 shows a typical levee structure.

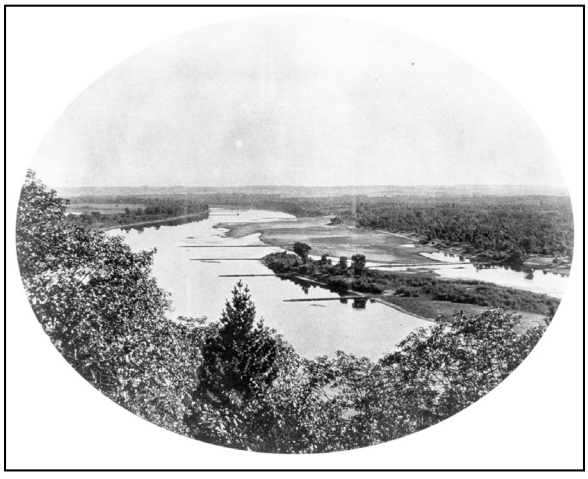


Figure 3.7 Pine Bend prior to 9-foot channel

Figure 3.8 Pine Bend Today

Figure 3.9 Typical levee structure

Figure 3.10 Hydraulic Dredge

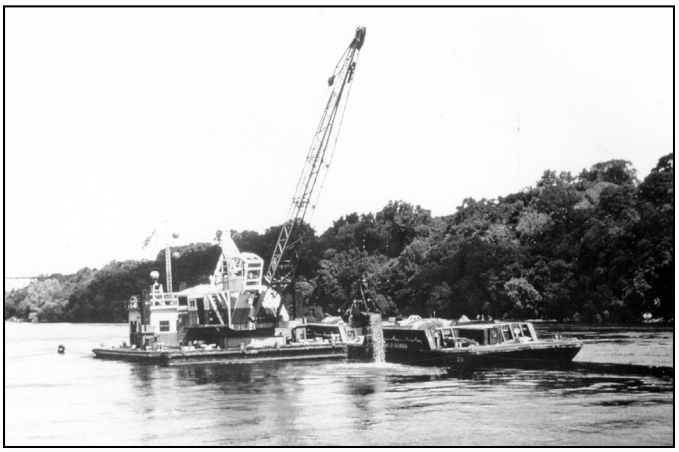


Figure 3.11 Mechanical Dredge

Dredging

Dredging is the major activity in navigation channel maintenance. It is done to maintain channel depth and channel width. Dredging is done by the U.S. Army Corps of Engineers or private contractors with both hydraulic and mechanical equipment. The Corps administers all navigation channel dredging. Figures 3.10 and 3.11 show the two types of dredges used on the river. Figure 3.12 demonstrates the hydraulic dredging process. Prior to the mid-1970's the Corps would deposit dredge material on the existing islands or river banks or put it in shallow areas. This method produced many excellent beach areas, upland wildlife habitat areas, and small islands suitable for many recreational uses. Figure 3.13 shows as island built from dredged material and figures 3.14 and 3.15 show typical dredge material beaches. That dredge material placement method has changed for a number of reasons. In response to growing concern for any potential adverse environmental impacts of such dredge material placement methods, Congress authorized formation of the Great River Environmental Action Team (GREAT) study through the 1976 Water Resources Development Act. Congress also passed the 1969 National Environmental Policy Act, the 1972 Federal Water Pollution Control Act and the Clean Water Act of 1977. These Congressional actions caused significant changes in dredged material placement practices.

In recent years, many of the beaches built from dredge material have begun to wash away during high water, rainstorms and heavy wave action. This has raised questions regarding former placement methods. These placement methods are under ongoing review by appropriate government agencies.

The portion of the channel that has required dredging on the upper river is only about 20% of the total river. Less than 5% requires annual dredging. However, 50% of that required dredging on the upper river occurs in the St. Paul District of the U.S. Army Corps of Engineers, mostly in Minnesota. Most dredging occurs below the confluence of fast moving tributary streams, such as the Chippewa River, and the main river. As the velocity of the tributary stream slows to match that of the main river, the sediment it has carried in suspension falls out creating shoaling.

Since 1974 most dredge material has been placed in adjacent upland sites. Adherence to State and Federal dredging regulations often caused the U.S. Army Corps of Engineers to double handle dredge material. Mechanical dredging costs have been stable or have declined as contractors have become more efficient and increased the quantity moved by this method.

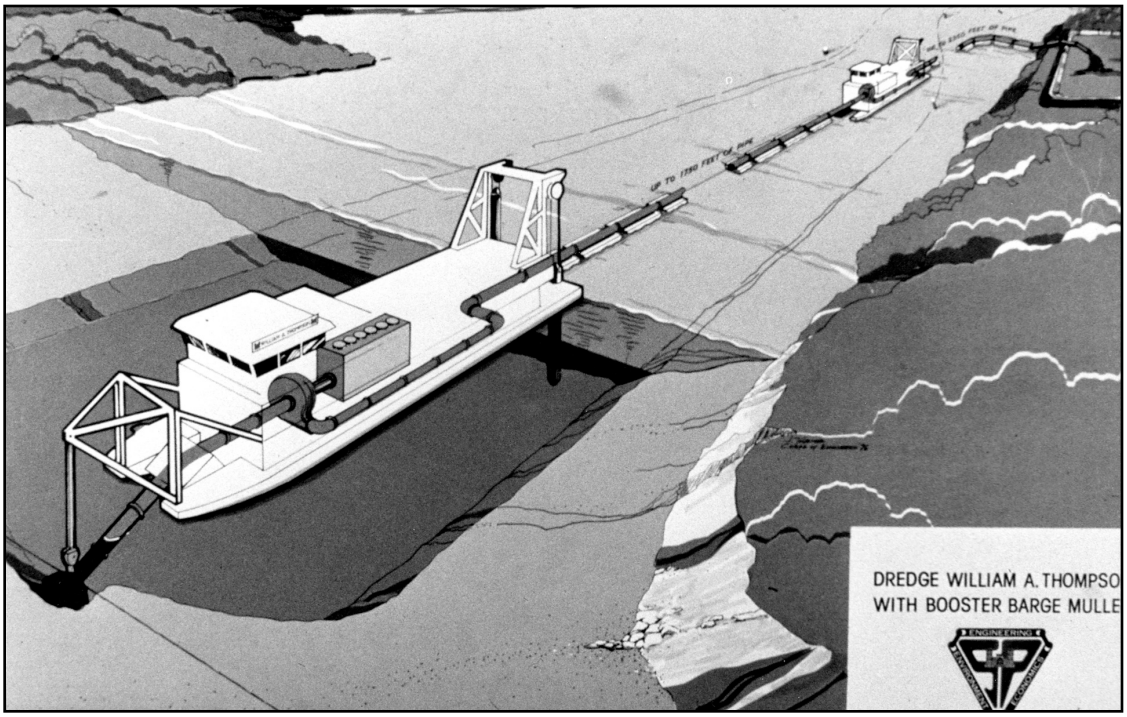


Figure 3.12 Hydraulic Dredging Process

Figure 3.13 Dredging Material Island

Figure 3.14 Dredging Material Beach

Figure 3.15 Dredge Material Beach

Hydraulic dredging costs have increased dramatically when measured per cubic yard. That's because job size has decreased and equipment capability has increased. In recent years, when looked at from an average cost per cubic yard perspective, the cost of mechanical vs. hydraulic is comparable. (See table below).
During the period 1992-1999, hydraulic methods with the Dredge Thompson averaged $ 5.00/CY and contract mechanical $5.30/CY. Because the Corps has an active program to reduce dredging requirements (dredge only where and when necessary), the cost per cubic yard generally will suffer. However, the overall cost for just the dredging part of channel maintenance has not changed that much. A good example is comparing the Thompson cost between 1998 and 1999. The overall cost was very similar because of the fixed costs associated with the plant, but the quantity dredged in 1999 was only a third of '98, so there is a big difference in the cost/CY. When we look at the overall cost of channel maintenance (meaning dredging, placement site excavation & maintenance, and channel modification work), costs have risen considerably. During the period 1981-1990, total channel maintenance averaged $6,100,000./ year (not adjusted for inflation). In recent years, it has averaged$10,000,000. Some of this cost is cyclic because it includes unloading placement sites, which will not be required every year.

Dollars and Cubic Yards in 1000's															
FY	**THOMPSON**			**DUBUQUE**			**HAUSER**			**CT MECH**			**CT HYD**		
	CY	$	$/CY	CY	$	$/CY	CY	$	$/CY	CY	$	$/CY	CY	$	$/CY
1992	547	2608	4.77	2	0	0.00	17	147	8.65	231	1380	5.97	1	0	0.00
1993	291	1616	5.55	16	87	5.44	54	334	6.19	140	1059	7.56	133	497	3.74
1994	300	1879	6.26	1	0	0.00	43	261	6.07	265	1458	5.50	159	293	1.84
1995	633	2766	4.37	1	0	0.00	63	257	4.08	418	2046	4.89	200	322	1.61
1996	654	2654	4.06	99	438	4.42	30	77	2.57	417	2049	4.91	1	0	0.00
1997	630	3026	4.80	5	10	2.00	8	35	4.38	423	1994	4.71	1	0	0.00
1998	453	1908	4.21	38	184	4.84	7	20	2.86	511	2701	5.29	197	939	4.77
1999	153	184512.06		39	184	4.72	6	58	9.67	217	1217	5.61	217	1033	4.76
AVG/Y	458	2288	5.00	25	113	4.49	29	149	5.21	328	1738	5.3	114	386	3.39

Note Page

4.1 Industry Organization

National Barge and Towing Industry 1998	
Companies	435
Towboats & tugs	5,173
Total Fleet Horsepower	8,525,347
Dry Cargo Barges	20,196
Dry Cargo Capacity tons	28.2 million
Liquid Cargo Barges	2,896
Liquid Cargo Capacity tons	7.8 million
Employees Afloat & Shore side	176,200
Source: U.S. Corps of Engineers Sparks Companies, Inc.	

Table 4.1

The river transportation industry includes line haul and harbor service towing companies, barge owners, terminals, shipyards, support services such as barge cleaning facilities, fleeting providers, and fuel and food suppliers. Table 4.1 shows the nationwide size of the industry's components in 1998. Table 4.2 compares revenues between the towing industry and the nation's railroads.

Rail-Water Revenue Comparisons		
MODE	REVENUE	REVENUE/TON-MILES
Barge	$2,675 billion	$ .0086
Rail	$26,350 Billion	$ .0287
Source: American Waterways Operators, Inc.		

Table 4.2

4.2 Industry Operations

The line haul towing companies operate towboats that move barge tows from point to point on the river system. Their activities include providing towing power to move tows of barges, which they or other companies might own. Line haul companies are often affiliated with major shippers.

Harbor service towing companies provide power for local Interpool and intrapool movements. Their major operations involve the moving of individual barges to or from full tows, which are generally made up of barges bound for different destinations. The harbor towboat operators take the single barges to their separate loading points and move the loaded barges back to the tow assembly areas.

Tow assembly areas (called fleets or fleeting areas), are both privately and publicly owned. The publicly owned fleets are usually the property of the local municipal government, which administers them through a port authority or an industrial development agency. Terminal companies, harbor towing companies or line haul companies rent them. Privately owned fleeting areas are operated or leased by terminal operators by line haul or harbor towing companies.

Shipyards provide not only construction service for new towboats and barges, but also repairs to damaged vessels. There are no shipyards involved in new vessel construction in Minnesota at present. There is, however, one vessel repair facility, which is part of the harbor service towing company operating in the Twin Cities. Twin City Shipyard, which manufactured river barges for a number of years, closed in 1983.

Barge cleaning is another important support service. Barges, which have been used to carry commodities such as coal, fertilizer or cement upstream, are cleaned so that they can be loaded with grain for the downstream movement. Barge cleaning is also important for tank barges, that carry liquid cargoes, including petroleum, vegetable oils, anhydrous ammonia and caustic soda.

Both fuel and food suppliers serve the towing industry in Minnesota's harbor areas.

4.3 Vessels

Several types of barges carry a wide variety of commodities on the shallow draft system. These include hopper barges, deck barges, and tanker barges, all with varying capacities of up to 3,000 tons. Figure 4.1 shows the different types and sizes of river vessels.

Hopper barges (either covered or open), carry dry bulk commodities. The jumbo hopper, which is used extensively in Minnesota for grain hauling, is 35 feet wide by 195 or 200 feet long. It has an operating loaded draft of 9 feet, an empty weight of 300 tons, and a maximum 1,500-ton cargo capacity. The jumbo hopper box barge has the same outside dimensions, but because both ends are boxed, the capacity of the barge at 9 feet of draft increased to 1,650 net tons. Approximately one half of the jumbo hopper barges now operating are of the box configuration. This has increased the average capacity of the jumbo hopper barge fleet to 1,575 tons at a nine-foot draft. Hopper barges used on other parts of the river system vary in size from 26 x 172 feet to 50 x 290 feet.

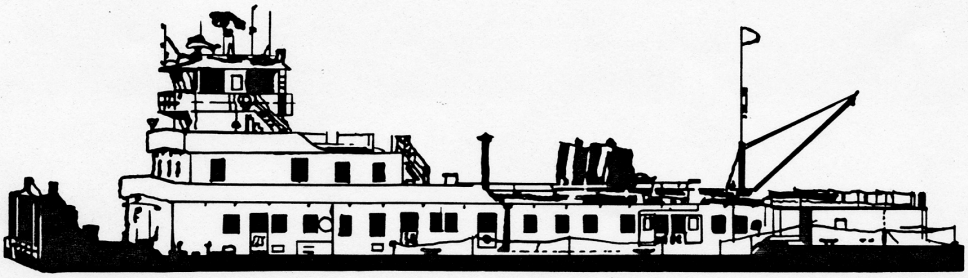
Tanker barges carry a wide variety of liquid cargoes into the state. Their capacities can hold up to 3,000 net tons, about 907 thousand gallons, depending on the type of liquid cargo.

Deck barges vary greatly in size throughout the river system. Most of those on the Minnesota portion of the river are the same size as jumbo hopper barges. They move sand, gravel and aggregates.

There are two basic categories (and many sizes) of towboats used to push the barges on the river system. The categories are: 1) switch or harbor boats (shown in figure 4.2), and 2) line haul boats (shown in figure 4.3). The switch boats, function similar to switch engines on the railroads. Line haul boats make the long intercity runs.

Towboats are generally expressed in engine sizes. Switch boats have 200 to 1,200 horsepower propulsion units while Upper Mississippi River line haul boats have up to 6,500 horsepower. On the portions of the river system, that have locks to negotiate, the line haul boats are generally 2,500 to 5,000 horsepower. These boats push tows of 15 barges with a total capacity of 23,625 tons.

On the Lower Mississippi River below St. Louis, where there are no locks, towboats are larger, with engine systems up to 10,000 horsepower. They push tows of up to 45 barges with over 70,000 tons of capacity. Tables 4.3 and Figure 4.4 show how their cargo capacity compare to other freight transportation modes, and compare fuel efficiencies as well.

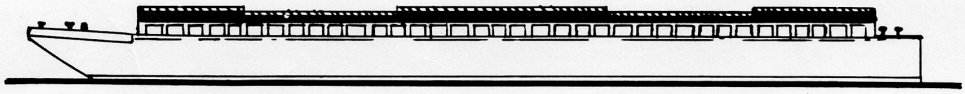


TOWBOATS

Length Feet	Breadth Feet	Draft Feet	Horsepower
117	30	7.6	1000 to 2000
142	34	8	2000 to 4000
160	40	8.6	4000 to 6000
190	50	8.6	6000 to 10000

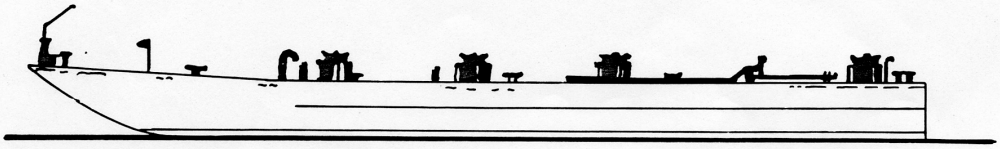
OPEN HOPPER AND DECK BARGES

Length Feet	Breadth Feet	Draft Feet	Capacity Tons
175	26	9	1000
195	35	9	1500
290	50	9	3000



COVERED DRY CARGO BARGES

Length Feet	Breadth Feet	Draft Feet	Capacity Tons
175	26	9	1000
195	35	9	1500



LIQUID CARGO (TANK) BARGES

Length Feet	Breadth Feet	Draft Feet	Capacity Tons	Capacity Gallons *
175	26	9	1000	302,000
195	35	9	1500	454,000
290	50	9	3000	907,200

* Based on an average of 7.2 barrels per ton and 42 gallons per barrel.

Figure 4.1 River Vessels

4.4 Terminals

Freight movement on the river would be impossible without terminals to transfer cargo between land and water transportation systems. Most river terminals handle one type of cargo such as grain, fertilizers, aggregates, petroleum products, or coal. Other terminals handle commodities ranging from large bulk cargoes to smaller shipments of finished goods. All terminals have specialized equipment for transferring commodities. Most of them also provide specialized inside and outside storage facilities.

Minnesota has 38 active river terminals. River port areas and terminal locations in Minnesota are shown on Maps 3.1 through3.3 in Chapter 3. Tables 4.4 through 4.6 show the geographic distribution of cargoes handled by and capacities for Minnesota's river terminals.

Grain

Ten river terminals handle grain, which accounted for 58 percent of the state's river freight tonnage in 1999. Grains produced in Minnesota and the Dakotas make up most of the cargo shipped out of state on the river system each year. Most grain transfer activity in Minnesota occurs in St. Paul, Savage and Winona. River terminals also account for the greatest share of the total grain export movement from Minnesota. River terminals are important for moving grain and other farm products.

Liquid Bulk

Liquid bulk terminals handle a variety of products including petroleum, molasses, liquid fertilizers, anhydrous ammonia, and caustic soda. In 1999, Minnesota's river terminals handled about 352,000 tons of liquid products other than petroleum. All of this product movement took place in double-hulled tank barges in order to prevent any spillage.

Ever since the Oil Pollution Act of 1990, petroleum movement by barge to and from Minnesota has reduced drastically. Shippers and carriers did not want to expose themselves to the increased liability limits described in the act. Prior to the act, petroleum movement by barge in Minnesota exceeded one million tons annually. The total river petroleum movement in 1999 was about 166,000 tons. Most of the petroleum produced by Minnesota's refineries is being moved by truck and pipeline.

Figure 4.2 Switch Boat

Figure 4.3 Line Haul Towboat

Comparative Fuel Efficiency Freight Hauling Modes

Mode	BTU's/Ton Mile	Ton-Miles/Gallon
Barge	270	514
Rail	687	202
Truck	2,343	59

Table 4.4

Non-Grain Dry Bulk Terminals

Twenty-eight river terminals in Minnesota handle non-grain dry bulk product including fertilizers, salt, coal, clam shells, sand, gravel and cement. Fertilizer is a major dry bulk cargo handled by ten terminals. Fertilizer moves both upbound and downbound on Minnesota's rivers, and includes southern U.S. and Canadian products. Over half of the fertilizer used by Minnesota farmers comes into the state by barge. In 2000, over 1.3 million tons of fertilizer arrived by river barge.

Principal Commodities Shipped and Received in 1999 Minnesota's Active Terminal, River Locations by Commodities			
Commodity	**Mississippi**	**Minnesota**	**Total**
General Cargo	5	0	5
Coal & Coke	4	0	4
Aggregates, cement	7	2	9
Petroleum	2	0	2
Grain/ Ag Products	8	4	12
Fertilizers	9	1	10
Molasses/liquid bulk	7	0	7
Salt	6	3	9
Misc. Dry	7	0	7

Table 4.5

Terminals Which Handle Only One Type of Commodity Terminal River Location			
Commodity	**Mississippi**	**Minnesota**	**Total**
Coal and Coke	0	0	0
Grain	6	4	10
Sand, Gravel, Cement	4	0	4
Fertilizer Products	3	0	3
Petroleum Products	2	2	2
General Cargo	5	0	5

Table 4.6

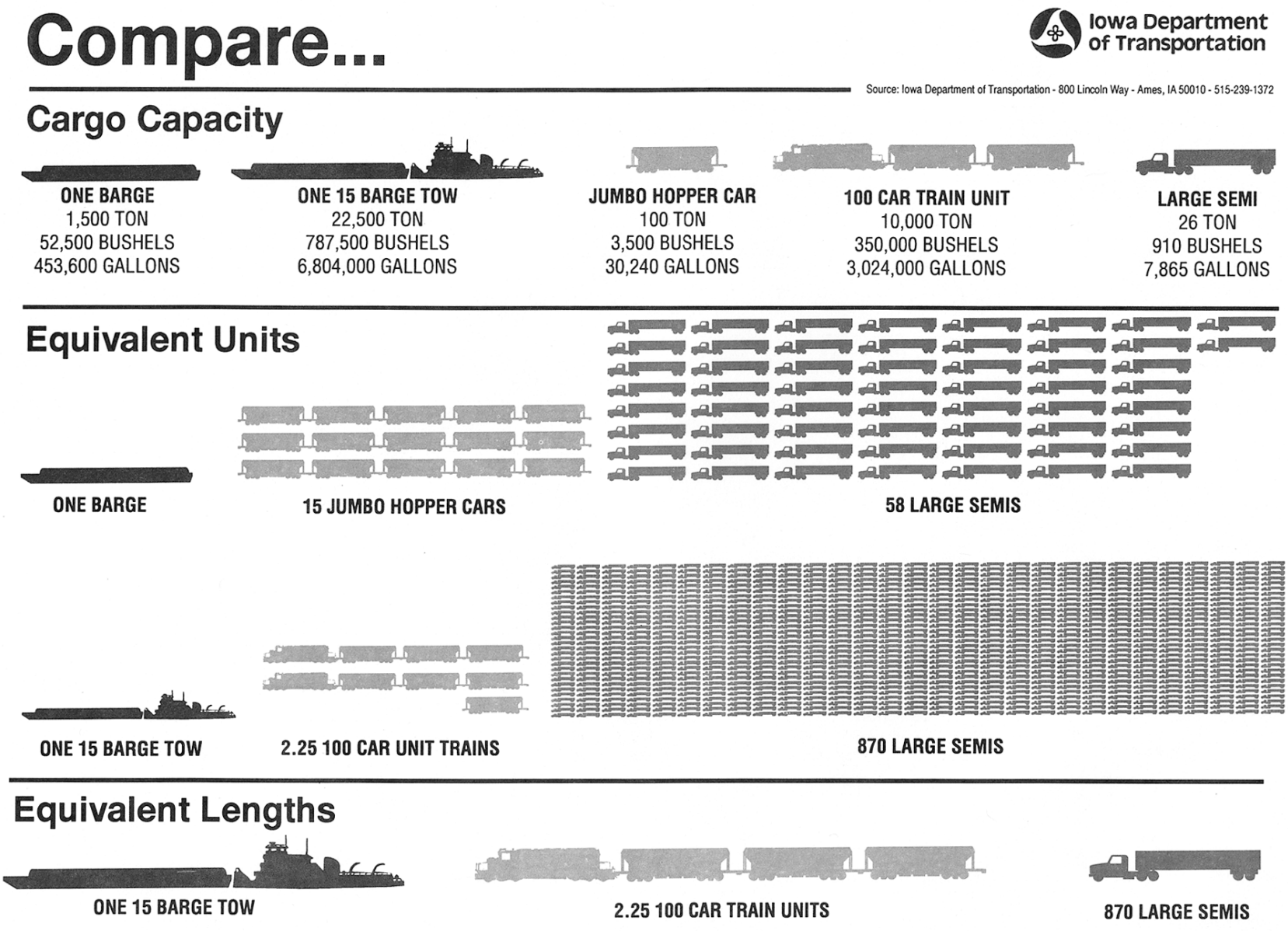
Minnesota's River Terminal Capacity (Short Tons)	
Grain and other farm and food products	26,581,000
Ores, minerals, sand, gravel and cement	12,814,000
Coal	33,654,000
Crude Petroleum	3,481,000
Chemicals including fertilizer	16,052,000
Petroleum products	32,591,000
General cargo	4,745,000
Scrap	1,927,000
Total	**131,845,000**

Table 4.7

General Cargo

Five river terminals in Minnesota handle general cargo products such as scrap iron, slag, and manufactured steel products, twine, paper, rolled steel and newsprint.
The Mid America Ports Study, conducted by the Maritime Administration and twenty-one states on the central river system, determined that Minnesota's river terminals have an annual cargo capacity of nearly 132 million tons.

River Transportation in Minnesota.



5.1 Historic Commodity Movement

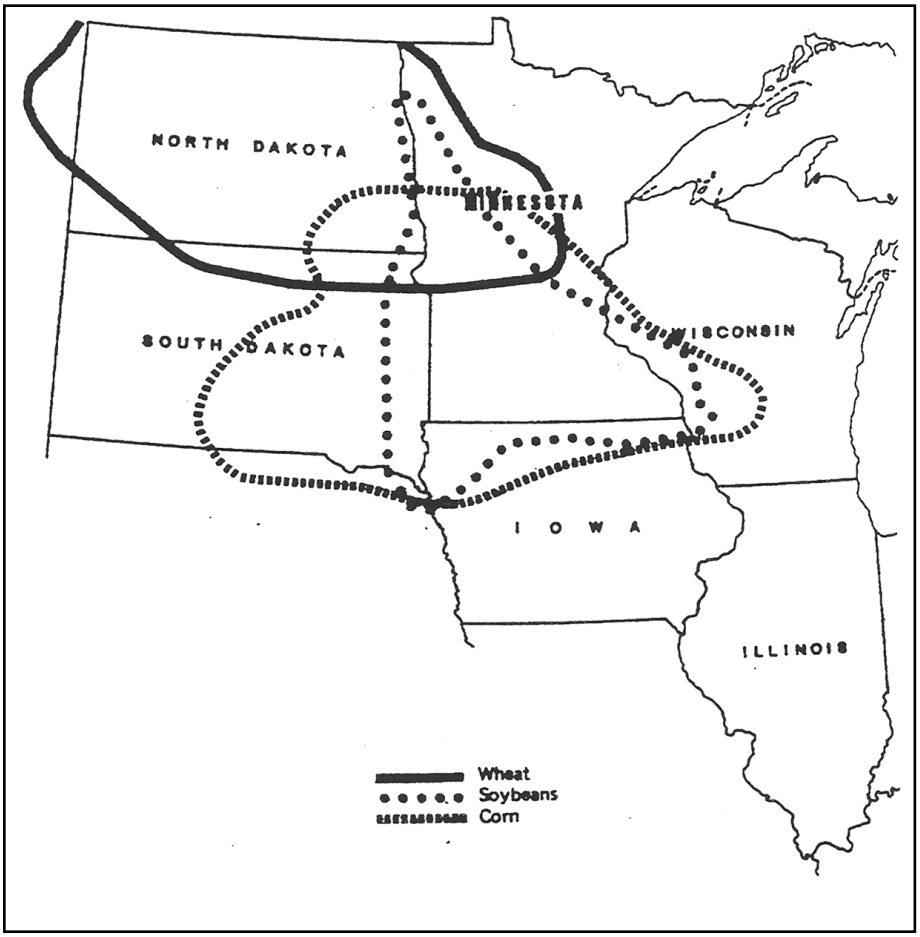
Since the mid 1930's, freight volumes on the nation's rivers have shown steady growth. (Ref. Table 3.1) Minnesota's growth pattern has been even stronger. There have been dips over the years due to national economic conditions, droughts, floods and even an embargo in 1980.

In 1940, according to the U.S. Army Corps of Engineers statistics, 2,125,264 net tons of freight moved through Lock and Dam 26 at Alton, Illinois, which was the beginning of the Upper Mississippi locking river system at that time. In 1999, lock 26 handled 77,580,836 net tons. That's an average annual increase of over 1.2 million tons per year over 60 years.

In 1940, River freight in Minnesota amounted to 975,000 net tons and grain shipments totaled 4,720 net tons. In 1999 Minnesota's river freight tonnage came to 17,734,166 net tons, and our grain tonnage 10,269,754 net tons. In 1940, Minnesota was a net importing state with coal and petroleum being the main imports. Very little was exported from the state. Today, Minnesota is a net exporting state via the river, and grain is the main commodity. In 1999, Minnesota received just less than 6 million tons of freight by river and exported just under 12 million tons of freight.

Minnesota's record year for grain movement by river occurred in 1983, when about 12.8 million tons were shipped. A drought that year in Illinois and Iowa factored into the total.

Grain movements demonstrate the large drawing area of the river. Although the river carries over 60% of the grain raised for export in Minnesota, that volume alone would not account for the State's total grain movement. The river draws grain shipments to Minnesota's terminals from both of the Dakotas, western Wisconsin and northern Iowa. Map 5.1 shows the upper river's agricultural production area. Map 5.2 shows the flow patterns of grain into the three major terminal areas and the split of rail and truck carriage to the terminals.



Map 5.1 Agricultural Production AreaFor Minnesota's River Terminals

In addition to the movement of grain, the river serves the Midwest agricultural area by carrying fertilizer, grain by-products and feed pellets. Although cargo levels in those commodities are not great, they, too, show steady growth over recent years.

A major element on Minnesota's river freight growth is grain. As is shown in Table 5.2, Minnesota's river terminals have accounted for an average of nearly 11% and as much as 15% of the total export grain volumes from all of the Gulf's Coast ports. Those numbers take on even more importance when the Gulf's share of the national grain export volume is considered. During the last 20 years, Gulf Coast export terminals have accounted for an average of nearly 65% of the national export grain movement. This means Minnesota's river grain shipments account for nearly 7% of the nation's total grain export.

River Freight Tonnage (1,000 of tons)*

Year	Mississippi River*	Minnesota**	% of Mississippi
1980	365,569	13,164	3.6
1985	378,852	14,448	3.8
1990	457,497	19,202	4.2
1991	445,149	15,386	3.5
1992	448,440	18,414	4.1
1993	451,731	11,612	2.6
1994	478,673	13,932	2.9
1995	479,421	14,462	3.0
1996	482,711	16,081	3.3
1997	488,876	15,485	3.2
1998	490,741	16,130	3.3
1999		17,734	
2000		17,304	

Source: U.S. Dept of Agriculture
** Source: Minnesota's River Terminals

Table 5.1

Grain (000's bushels)

Year	Minnesota's River Shipments	% Gulf Exports	Gulf Coast Exports*	%National Exports
1980	322,431	11.1	2,909,645	59
1985	242,897	10.8	2,249,634	64
1990	324,681	12.1	2,668,598	64
1991	280,405	10.4	2,696,209	70
1992	302,058	10.4	2,898,676	71
1993	162,503*	6.1	2,669,971	69
1994	234,256	10.2	2,294,238	67
1995	272,686	9.2	2,952,905	62
1996	330,344	11.4	2,879,599	67
1997	293,215	11.8	2,491,018	65
1998	303,958	12.4	2,443,183	69
1999	354,307	11.1	2,940,261	69
2000	325,521	11.2	2,895,922	70

Source: U.S. Dept of Agriculture
** Source: Minnesota's River Terminals
(Using 34.5 bushels of grain = 1 net ton
*Flood year
From 1990 forward, grain shipment data was received directly from River Elevator Terminals. Prior to 1990, grain figures were received from the Minneapolis Grain Exchange.

Table 5.2

Grain Movements to Minnesota's River Ports 1990-1999 (Via Truck and Rail)

The purpose of this chart is to show changes in the percentage of grain moving to the river ports by truck versus rail. It appears that as rail consolidates to 50, 75 and 100 car unit trains for long distance hauling, trucks are delivering an increasing percentage of grain to the River. This will put more wear and tear on truck routes to the river.

(The figures are shown in bushels)

Year	Truck	Railroad	Total	% By Truck
1990	247,252,000	140,509,000	387,710,000	64%
1991	241,348,000	99,761,000	341,109,000	71%
1992	242,348,000	130,496,000	373,022,000	65%
1993	178,506,000	95,806,000	274,312,000	65%
1994	148,633,000	54,111,000	202,744,000	73%
1995	300,727,000	-5,068,000	295,659,000	100%
1996	274,043,000	37,304,000	311,374,000	88%
1997	271,375,000	39,427,000	310,802,000	87%
1998	280,250,000	22,783,000	303,033,000	92%
1999	318,444,000	37,367,000	355,811,000	89%

* The Minneapolis Grain Exchange generated these figures

5.2 Commodity Forecasts

Over the last 25 years, a number of studies have been made which include forecasts of river freight tonnage. They included national, regional and local analysis ranging from major efforts like the National Waterways Study to individual port projections. Several have dealt with the entire Upper Mississippi River including the Mississippi Master Plan, the Mid America Ports Study, and National Waterway Study and the Corps of Engineers year round navigation study.

Currently and since 1993, the Corps of Engineers has been studying the infrastructure needs of the Upper Mississippi and Illinois Rivers. This has been a $50 million plus project involving environmental issues as well as the needs of the lock and dam system on both rivers. The difficulty of the study is that it is attempting to project traffic levels over the next fifty years.

As of this printing the Corps is expected to make a preliminary revised forecast by September 2001. This will be subject to public and federal government review before any legislative action is taken to fund any projects.

Following are exhibits, 32 and 33, which are the revised forecasts that are presently being reviewed by the Corps of Engineers. These show all of the commodity groups. In much of the study, the Corps has contracted with outside consultants to make commodity forecasts. The next two pages (exhibit 38 and 39) show the original aggregate forecast range and the revised estimates due to the slow grain markets of the past several years. All four pages were taken directly from the Corps of Engineers revised freight flow forecasts.

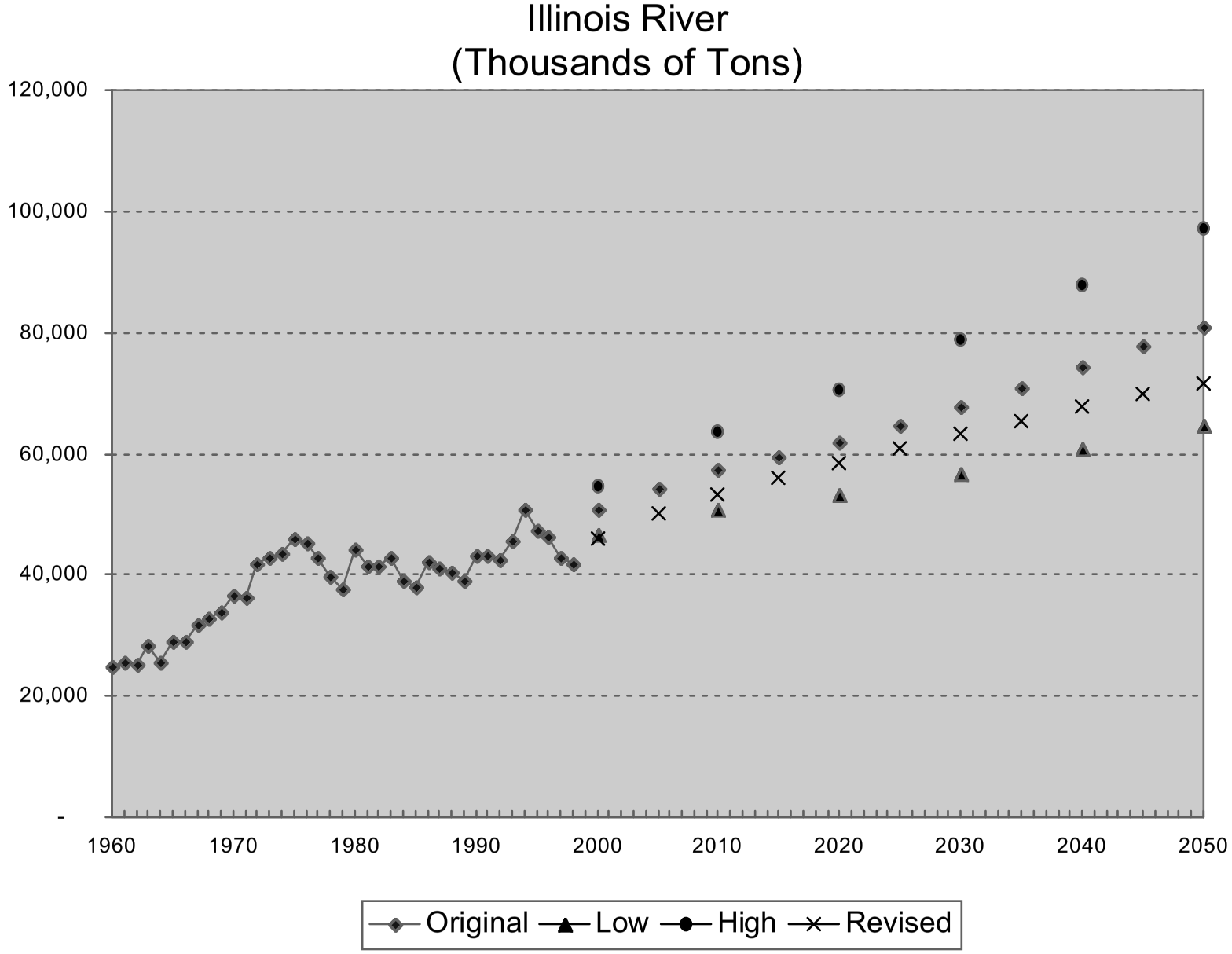
(The next four pages will show Corps of Engineers' exhibits 32, 33 38 and 39)

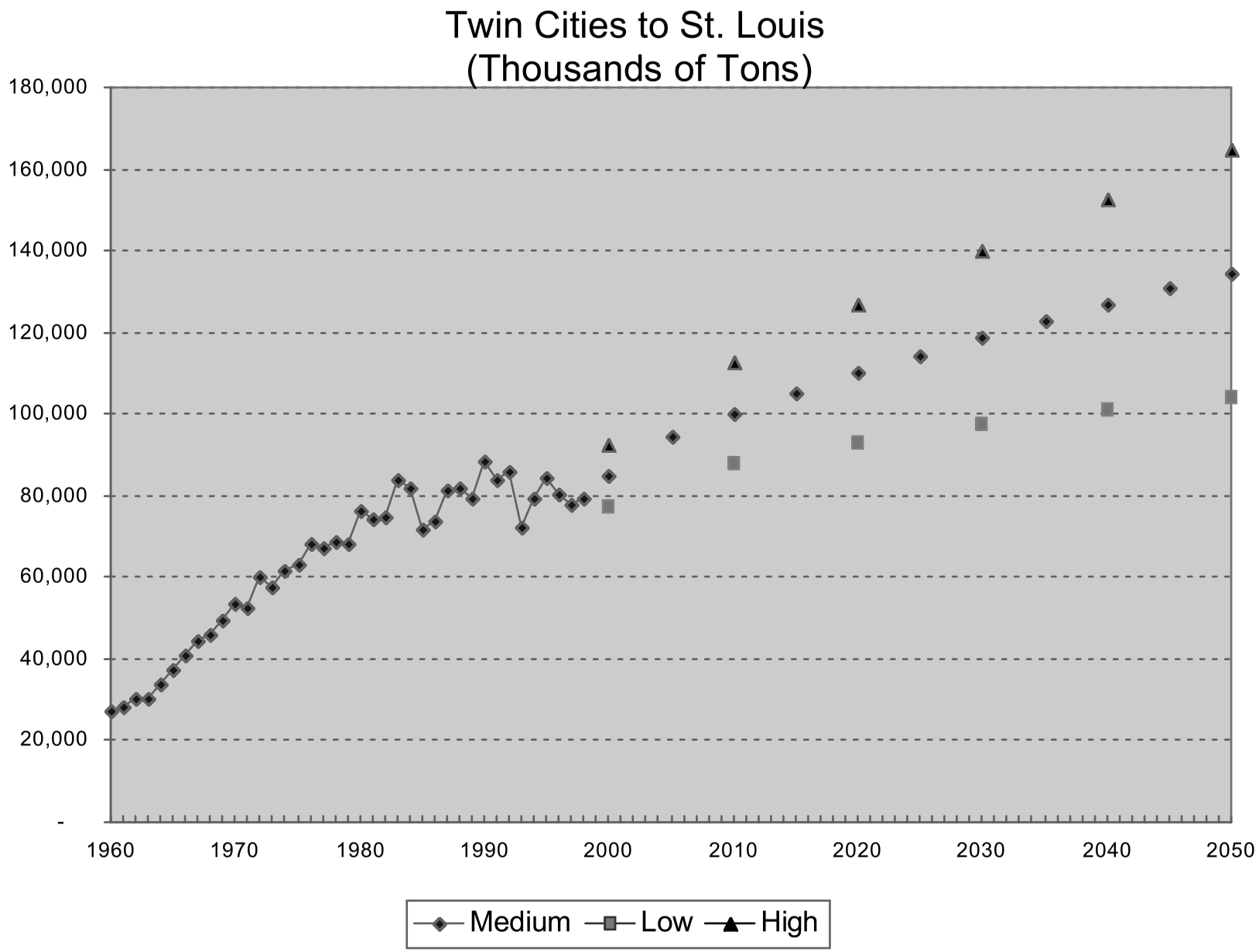
Exhibit 33
Waterway Traffic Forecasts: Illinois Waterway

Year	Corn	Soybeans	Wheat	Agricultural Chemicals	Prepared Animal Feed	Coal and Coke	Industrial Chemicals	Petroleum Products	Construction Materials	Iron and Steel	Other	Total Forecast
						Thousands of Tons						
91-93 avg	11,960	3,890	288	1,620	1,939	7,800	3,990	5,526	2,134	2,233	2,882	44,263
2000	12,092	4,610	510	1,379	1,951	7,000	4,167	6,008	2,234	2,582	3,335	45,867
2005	15,172	4,770	550	1,377	2,057	6,900	4,514	6,293	2,371	2,709	3,571	50,284
2010	17,073	4,708	584	1,372	2,138	7,000	4,854	6,481	2,506	2,853	3,768	53,337
2015	18,506	4,968	619	1,371	2,236	7,000	5,181	6,597	2,615	3,018	3,940	56,052
2020	19,677	5,191	654	1,370	2,331	7,100	5,494	6,698	2,712	3,188	4,112	58,527
2025	20,668	5,386	689	1,368	2,423	7,200	5,807	6,791	2,810	3,363	4,289	60,794
2030	21,525	5,560	726	1,367	2,512	7,400	6,273	6,842	3,019	3,503	4,497	63,224
2035	22,282	5,717	764	1,366	2,599	7,500	6,739	6,865	3,241	3,647	4,706	65,426
2040	22,959	5,859	803	1,366	2,683	7,700	7,205	6,864	3,481	3,793	4,928	67,641
2045	23,571	5,990	842	1,363	2,765	7,900	7,672	6,838	3,740	3,942	5,151	69,774
2050	24,130	6,111	881	1,363	2,845	8,000	8,138	6,789	4,018	4,092	5,363	71,730
						Percent of Total Traffic						
91-93 avg	27.02%	8.79%	0.65%	3.66%	4.38%	17.62%	9.01%	12.48%	4.82%	5.04%	6.51%	100.00%
2000	26.36%	10.05%	1.11%	3.01%	4.25%	15.26%	9.09%	13.10%	4.87%	5.63%	7.27%	100.00%
2005	30.17%	9.49%	1.09%	2.74%	4.09%	13.72%	8.98%	12.52%	4.72%	5.39%	7.10%	100.00%
2010	32.01%	8.83%	1.10%	2.57%	4.01%	13.12%	9.10%	12.15%	4.70%	5.35%	7.06%	100.00%
2015	33.02%	8.86%	1.10%	2.45%	3.99%	12.49%	9.24%	11.77%	4.67%	5.38%	7.03%	100.00%
2020	33.62%	8.87%	1.12%	2.34%	3.98%	12.13%	9.39%	11.44%	4.63%	5.45%	7.03%	100.00%
2025	34.00%	8.86%	1.13%	2.25%	3.99%	11.84%	9.55%	11.17%	4.62%	5.53%	7.05%	100.00%
2030	34.05%	8.79%	1.15%	2.16%	3.97%	11.70%	9.92%	10.82%	4.78%	5.54%	7.11%	100.00%
2035	34.06%	8.74%	1.17%	2.09%	3.97%	11.46%	10.30%	10.49%	4.95%	5.57%	7.19%	100.00%
2040	33.94%	8.66%	1.19%	2.02%	3.97%	11.38%	10.65%	10.15%	5.15%	5.61%	7.29%	100.00%
2045	33.78%	8.58%	1.21%	1.95%	3.96%	11.32%	10.99%	9.80%	5.36%	5.65%	7.38%	100.00%
2050	33.64%	8.52%	1.23%	1.90%	3.97%	11.15%	11.34%	9.47%	5.60%	5.70%	7.48%	100.00%
						Average Annual Percentage Change						
2000	0.16%	2.46%	7.37%	-1.99%	-0.47%	-1.34%	0.55%	1.05%	0.57%	1.83%	1.84%	1.84%
2005	4.64%	0.69%	1.54%	-0.03%	1.01%	-0.29%	1.61%	0.93%	1.20%	0.96%	1.38%	1.38%
2010	2.39%	-0.26%	1.21%	-0.07%	0.75%	0.29%	1.46%	0.59%	1.11%	1.04%	1.08%	1.08%
2015	1.63%	1.08%	1.16%	-0.01%	0.87%	0.00%	1.31%	0.35%	0.86%	1.13%	0.90%	0.90%
2020	1.23%	0.88%	1.10%	-0.01%	0.80%	0.28%	1.18%	0.31%	0.73%	1.10%	0.86%	0.86%
2025	0.99%	0.74%	1.07%	-0.03%	0.74%	0.28%	1.11%	0.28%	0.71%	1.07%	0.85%	0.85%
2030	0.82%	0.64%	1.05%	-0.01%	0.70%	0.55%	1.56%	0.15%	1.45%	0.82%	0.95%	0.95%
2035	0.69%	0.56%	1.03%	-0.01%	0.66%	0.27%	1.44%	0.07%	1.43%	0.81%	0.91%	0.91%
2040	0.60%	0.49%	1.00%	0.00%	0.62%	0.53%	1.35%	-0.01%	1.44%	0.79%	0.92%	0.92%
2045	0.53%	0.44%	0.96%	-0.04%	0.58%	0.51%	1.26%	-0.07%	1.45%	0.77%	0.89%	0.89%
2050	0.47%	0.40%	0.91%	0.00%	0.55%	0.25%	1.19%	-0.14%	1.44%	0.75%	0.81%	0.81%

Exhibit 33
Waterway Traffic Forecasts: Illinois Waterway

Year	Corn	Soybeans	Wheat	Agricultural Chemicals	Prepared Animal Feed	Coal and Coke	Industrial Chemicals	Petroleum Products	Construction Materials	Iron and Steel	Other	Total Forecast
						Thousands of Tons						
91-93 avg	27,611	8,637	1,567	4,567	3,480	9,200	3,356	5,917	5,884	2,421	7,665	80,306
2000	27,553	10,526	2,892	3,998	3,545	9,700	3,440	5,972	5,628	2,831	9,016	85,101
2005	34,572	10,893	3,122	4,002	3,736	9,900	3,717	5,983	5,888	2,957	9,717	94,486
2010	38,902	10,752	3,315	4,008	3,884	9,900	3,989	5,976	6,144	3,100	10,238	100,209
2015	42,168	11,345	3,512	4,014	4,063	9,600	4,252	5,952	6,350	3,265	10,685	105,207
2020	44,837	11,854	3,709	4,018	4,235	9,900	4,503	5,927	6,531	3,435	11,174	110,123
2025	47,093	12,300	3,911	4,021	4,402	10,100	4,754	5,902	6,719	3,610	11,673	114,485
2030	49,048	12,697	4,120	4,027	4,564	10,300	5,129	5,878	7,100	3,749	12,236	118,848
2035	50,772	13,054	4,337	4,031	4,721	10,600	5,504	5,826	7,507	3,892	12,841	123,086
2040	52,314	13,380	4,557	4,034	4,875	10,800	5,879	5,746	7,943	4,038	13,455	127,021
2045	53,709	13,678	4,780	4,039	5,024	11,100	6,254	5,637	8,409	4,187	14,086	130,904
2050	54,983	13,954	5,002	4,041	5,168	11,400	6,629	5,502	8,908	4,336	14,704	134,627
						Percent of Total Traffic						
91-93 avg	34.38%	10.76%	1.95%	5.69%	4.33%	11.46%	4.18%	7.37%	7.33%	3.01%	9.55%	100.00%
2000	32.38%	12.37%	3.40%	4.70%	4.17%	11.40%	4.04%	7.02%	6.61%	3.33%	10.59%	100.00%
2005	36.59%	11.53%	3.30%	4.24%	3.95%	10.48%	3.93%	6.33%	6.23%	3.13%	10.28%	100.00%
2010	38.82%	10.73%	3.31%	4.00%	3.88%	9.88%	3.98%	5.96%	6.13%	3.09%	10.22%	100.00%
2015	40.08%	10.78%	3.34%	3.82%	3.86%	9.12%	4.04%	5.66%	6.04%	3.10%	10.16%	100.00%
2020	40.72%	10.76%	3.37%	3.65%	3.85%	8.99%	4.09%	5.38%	5.93%	3.12%	10.15%	100.00%
2025	41.14%	10.74%	3.42%	3.51%	3.85%	8.82%	4.15%	5.16%	5.87%	3.15%	10.20%	100.00%
2030	41.27%	10.68%	3.47%	3.39%	3.84%	8.67%	4.32%	4.95%	5.97%	3.15%	10.30%	100.00%
2035	41.25%	10.61%	3.52%	3.27%	3.84%	8.61%	4.47%	4.73%	6.10%	3.16%	10.43%	100.00%
2040	41.19%	10.53%	3.59%	3.18%	3.84%	8.50%	4.63%	4.52%	6.25%	3.18%	10.59%	100.00%
2045	41.03%	10.45%	3.65%	3.09%	3.84%	8.48%	4.78%	4.31%	6.42%	3.20%	10.76%	100.00%
2050	40.84%	10.36%	3.72%	3.00%	3.84%	8.47%	4.92%	4.09%	6.62%	3.22%	10.92%	100.00%
						Average Annual Percentage Change						
2000	-0.03%	2.87%	7.96%	-1.65%	-0.31%	0.66%	0.31%	0.12%	-0.55%	1.97%	2.05%	2.05%
2005	4.64%	0.69%	1.54%	0.02%	1.01%	0.41%	1.56%	0.04%	0.91%	0.87%	1.51%	1.51%
2010	2.39%	-0.26%	1.21%	0.03%	0.75%	0.00%	1.43%	-0.02%	0.85%	0.95%	1.05%	1.05%
2015	1.63%	1.08%	1.16%	0.03%	0.87%	-0.61%	1.28%	-0.08%	0.66%	1.04%	0.86%	0.86%
2020	1.23%	0.88%	1.10%	0.02%	0.80%	0.62%	1.15%	-0.09%	0.56%	1.02%	0.90%	0.90%
2025	0.99%	0.74%	1.07%	0.01%	0.74%	0.40%	1.09%	-0.08%	0.57%	1.00%	0.88%	0.88%
2030	0.82%	0.64%	1.05%	0.03%	0.70%	0.39%	1.53%	-0.08%	1.11%	0.76%	0.95%	0.95%
2035	0.69%	0.56%	1.03%	0.02%	0.66%	0.58%	1.42%	-0.18%	1.12%	0.75%	0.97%	0.97%
2040	0.60%	0.49%	1.00%	0.01%	0.62%	0.37%	1.33%	-0.28%	1.14%	0.74%	0.94%	0.94%
2045	0.53%	0.44%	0.96%	0.02%	0.58%	0.55%	1.24%	-0.38%	1.15%	0.73%	0.92%	0.92%
2050	0.47%	0.40%	0.91%	0.01%	0.55%	0.53%	1.17%	-0.49%	1.16%	0.70%	0.86%	0.86%


Illinois River
(Thousands of Tons)
120,000
100,000
80,000
60,000
40,000
20,000
-
1960
1970
1980
1990
2000
2010
2020
2030
2040
2050
Original
Low
High
Revised


Twin Cities to St. Louis
(Thousands of Tons)
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
-
1960
1970
1980
1990
2000
2010
2020
2030
2040
2050
Medium
Low
High

Note Page

6.1 Passenger Traffic

In the middle of the 19th century, riverboats provided the fastest and most comfortable, if not the safest, means of travel in the rapidly growing Midwest. With the completion of the vast midwestern rail system, that situation changed dramatically. By 1910 passenger boats on the river system had become mostly providers of entertainment. Today the movement of passengers is increasing again as a vacation and entertainment function.

In recent years, large cruise boats, such as the Delta Queen, have increased the number of visits they make to the City of St. Paul, In 2000, The Delta Queen, the Mississippi Queen and the American Queen made a combined total of ten visits to St. Paul. The city estimates that each visit generated an immediate economic benefit to the community of $500,000.

Although such large cruise boats carry excursion passengers long distances, most of the upper river passenger activity is limited to day excursions. River excursion boats in Minnesota are based in Minneapolis, St. Paul, Red Wing, Lake City and Winona on the Mississippi and in Stillwater and Taylors Falls on the St. Croix. Some of Minnesota's larger inland lakes and the Duluth harbor also support excursion boats of various sizes. Interest on the Great Lakes is also increasing.

Local river excursion boats carry nearly a quarter of a million passengers each season in Minnesota. The Padelford Packet Boat Company in St. Paul alone accounts for over 100,000 passengers annually. At least half of them come from outside the metropolitan area, which creates additional economic benefit to the community.

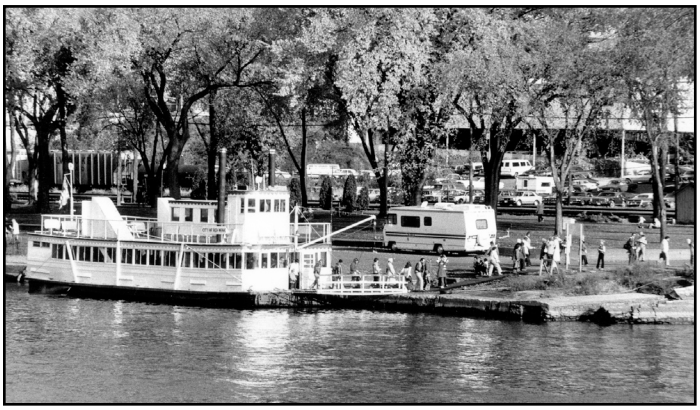


Figure 6.1 Short Term Tour Boat

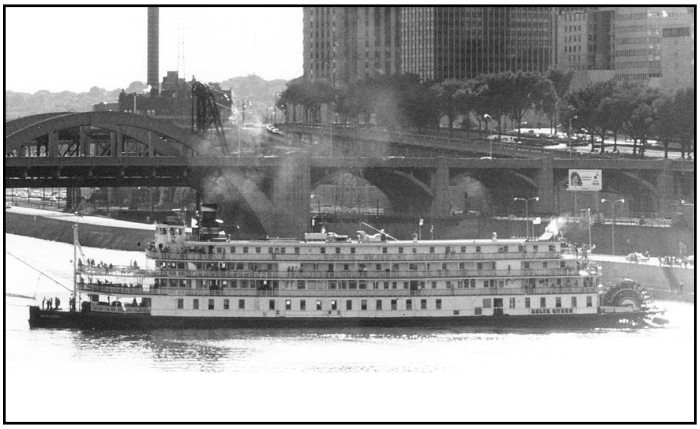


Figure 6.2 Long Term Tour Boat

The U.S. Coast Guard Marine Safety Detachment in St. Paul has certified 29 vessels to carry passengers from Minnesota ports on the Mississippi and St. Croix Rivers. Those vessels provide accommodations for short trips as well as overnight movements. The majority of the trips are the short "scenic tour" half-day runs. Table 6.1 lists the vessels, which operate from Minnesota River port cities. In addition, there are 20 other for-hire passenger boats operation out of Wisconsin and Iowa cities in the St. Paul Corps of Engineers District. Figures 6.1 and 6.2 show typical short and long-term tour boats.

The U.S. Coast Guard is responsible for the safety of passenger vessels on navigable waters of the United States. Ships for hire as passenger boats on those waters must pass rigid inspections. Others, which operate on inland lakes, are not required to get Coast Guard certification but must comply with similar state regulation. Others, which are hired as boats without crews and are manned by the renter, are not subject to Coast Guard registration. Fishing boats for rent fall into the latter category.

A number of river passenger boats offer special entertainment packages such as dining and dancing as well as a river tour. One boat, the University of Minnesota Showboat, has served as a floating theater since 1958; it recently burned during remodeling, but is expected to be back on the river or replaced within the next two years. Passenger boat activity is expanding throughout the region. One relatively new feature is a day and dinner cruise boat operated by Treasure Island Casino near Red Wing, although gambling is not offered on the boat, as it is in Iowa, Illinois and other downriver states.

Minnesota Based Passenger Vessels

VESSEL	CAPACITY	HOME PORT & RIVER
Mississippi Brass Belle	49	Rice, Mn/Mississippi
Anson Northrop	350	Minneapolis/Mississippi
Betsy Northrop	360	Minneapolis/Mississippi
Jonathan Padelford	308	St. Paul/Mississippi
Harriet Bishop	486	St. Paul/Mississippi
Summer Breeze	25	St. Paul/Mississippi
Magnolia Blossom	112	St. Paul/Mississippi
Cruise Aweigh	49	St. Paul/Mississippi
Taylors Falls Princess	250	Taylors Falls/St. Croix
Taylors Falls Queen	150	Taylors Falls/St. Croix
Andiamo	109	Stillwater/St. Croix
Andiamo Showboat	150	Stillwater/St. Croix
Empress Andiamo	500	Stillwater/St. Croix
Jubilee	150	Stillwater/St. Croix
Avalon	600	Stillwater/St. Croix
Lady Chateau	125	Stillwater/St. Croix
Afton Princess	150	Afton/St. Croix
Sweet Afton	49	Afton/St. Croix
Maggie	32	Red Wing/ Mississippi
Spirit of the Water	150	Red Wing/ Mississippi

* Information supplied by the U.S. Coast Guard, Marine Safety Detachment, St. Paul, Minn.

Table 6.1

6.2 Recreational Activities

Recreational activity on Minnesota's rivers involves a great many people, many types of boats, a number of commercial activities and numerous public and private boat launching facilities. The season for recreational boating, except for that associated with fishing and hunting, runs generally from mid-April through the first part of October. A few hardy sailors venture out earlier and stay later but the majority of the activity occurs during the warmer weather.

Types of recreational boats used on the river range from non-motorized canoes and fishing and hunting boats through sailboats, powered runabouts, houseboats and very large yachts. In addition, the river carries such unusual vessels as oar powered racing shells, high powered racing boats, jet skis and airboats. On any warm day all might be seen on parts of the river. Figures 6.3 and 6.4 show some of the types of recreational boats that use the river.

Boaters, hunters and fishermen on Minnesota's commercially navigable rivers have access to many private and public launching sites, picnic

Figure 6.3 Recreational Boats

Figure 6.4 Recreational Boats

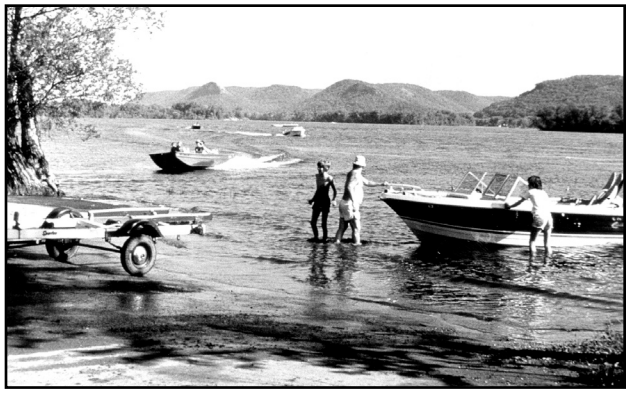


Figure 6.5 Small Boat Launching Ramp

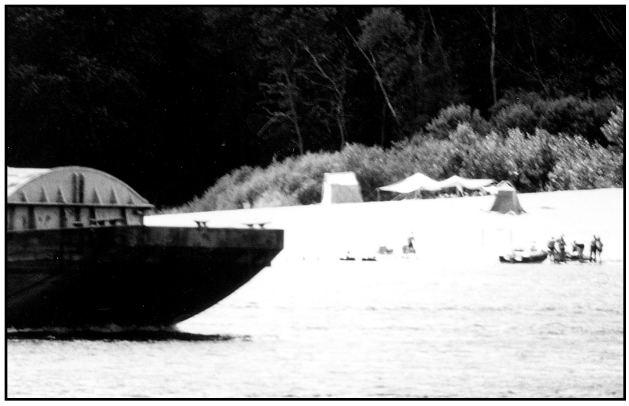


Figure 6.6 Dredged Material Beach

Figure 6.7 Dredged Material Beach

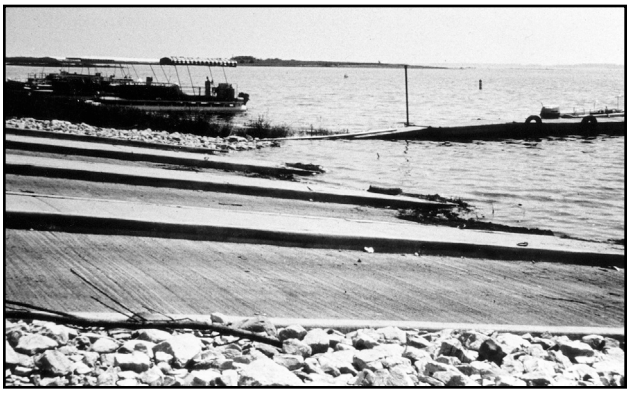


Figure 6.8 Improved Boat Launching Ramp

and camping beaches, hunting areas and park facilities. Recreational use of the upper river amounts to over 12 million visitor-days per year and pumps $ 6.6 billion a year into the economy.

There are 52 boat-launching ramps open to the public on the navigable portions of the Minnesota, St. Croix and Mississippi rivers within Minnesota. Twelve are operated by Minnesota DNR, 14 by local governments, five are managed cooperatively by local governments and DNR, 11 are operated by private enterprise, seven by the U.S. Fish and Wildlife Service, two by the Corps of Engineers and one by Minnesota DOT. There are and additional 59 boat launching ramps on the Wisconsin side of the St. Croix and Mississippi rivers.

Boat launching ramps on the river range from simple sand access points with limited parking space to sophisticated concrete or bituminous ramps with sizeable parking facilities. Figure 6.5 shows one of the many kinds of public launching ramps in use on the river.

Other public recreational facilities used by boaters on Minnesota's navigable rivers include the many state, county and municipal park grounds and the wild river beaches. Boater and non-boaters use these parks for camping, picnicking, swimming, hunting and fishing, use these parks and beaches. Facilities available at the sites range from simple, unimproved beaches to very complete areas with docks, plumbing and lights.

Figures 6.6 and 6.7 show typical unimproved beach sites and types and densities of use. Most of these sites are the product of Corps of Engineers dredged material disposal.

Figure 6.8 shows a more improved launching ramp site used by boaters.

Although some of the larger recreational boats are moved around quite a bit and make use of the many launching ramps, most of them are kept in marinas. Marinas are an important recreational feature on rivers. There are 29 public and private marinas on Minnesota's portion of the navigable river system, along with another 16 on the Wisconsin side of the river.

Marinas range in size from those with as few as 6 boat slips to facilities with as many as 600 slips. Services available to boaters also

cover a wide range from simple storage (both winter and summer) to fuel and food supply to large restaurants.

Figures 6.9, 6.10 and 6.11 show some kinds of marinas found in Minnesota.

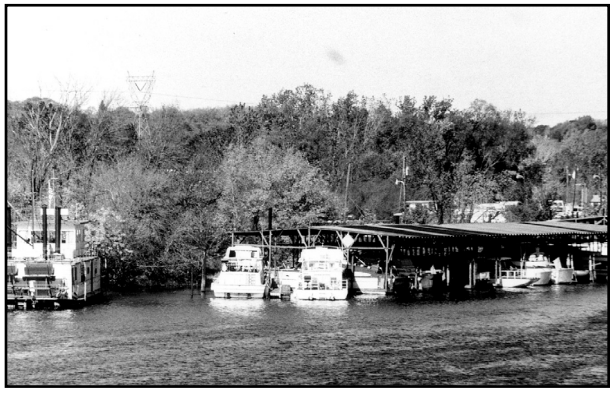


Figure 6.9 Marina

Fishing and hunting are major recreational uses of the river. Along with canoeing, they are the more basic forms of recreational water activity. The Minnesota and Wisconsin DNRs and the U.S. Fish and Wildlife Service provide huge upland and backwater areas for all three activities in their refuge and park areas. The U. S. Corps of Engineers, through its pool maintenance activities, provides hundreds of thousands of fishable water acres.

Public and private river bottomlands provide over 185 thousand acres of hunting area, which give hunters opportunities to pursue upland birds, small game and deer. Hunters spend over 350 thousand person days each year in the river bottom forests. In addition, duck hunters spend over 275 thousand person days in the open water and backwater areas of the rivers. Much of the hunting activity involves small boats.

Figure 6.10 Marina

Recreational fishing on the river continues to attract many local residents and non-residents alike. The fishery currently provides opportunities to catch and harvest numerous fish species including: bluegill, crappie, largemouth and small mouth bass, white bass, walleye, sauger, northern pike, channel and flathead catfish and sheep head. Markets for commercially harvested fish from the river, while much reduced since the 1960's due to contamination concerns and an increase in large-scale aquaculture, are relatively stable and still provide a few anglers the opportunity to commercially harvest carp, buffalo, suckers, sheep head and catfish.

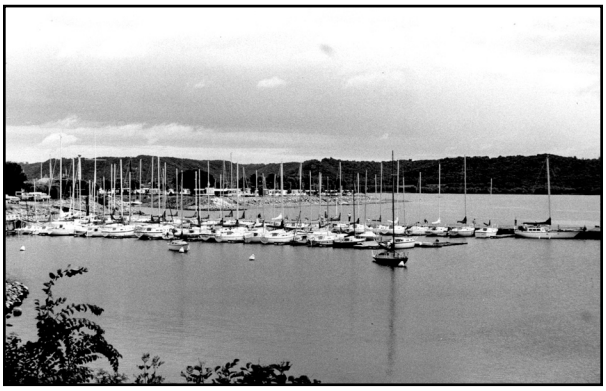
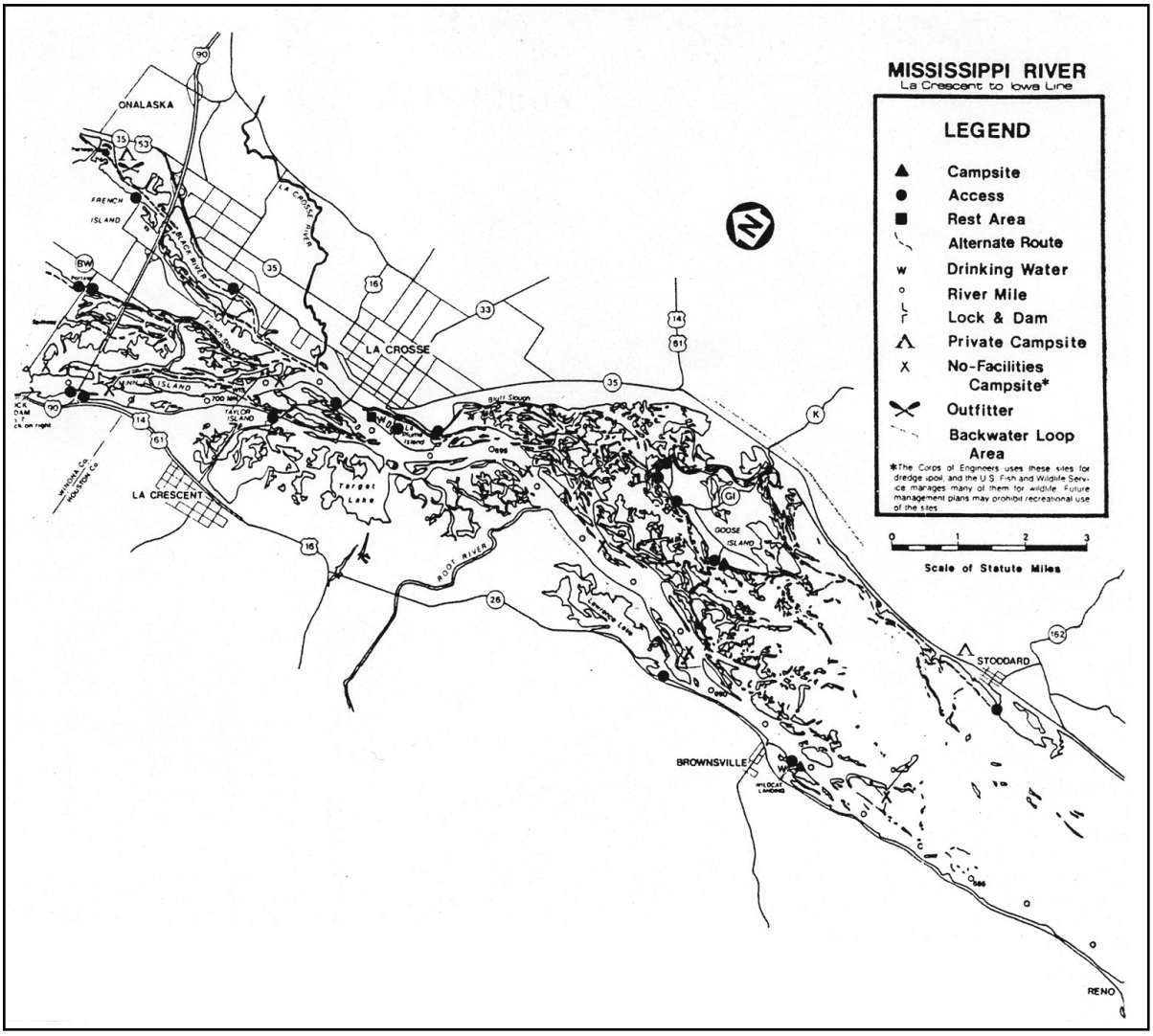


Figure 6.11 Marina

A relatively strong economy combined with an increasing population and a growing market for large, fast boats has created user conflicts among and between anglers and recreational boating enthusiasts. Some of these larger crafts are also having a negative impact on ravine habitat and associated aquatic life. Reservoir aging and deterioration and loss of backwater habitat continue to concern resource management agencies. Efforts to restore large-scale hydrologic patterns, for which the health of this river system is dependent upon, are being planned and implemented. Small-scale backwater rehabilitation projects are also attempting to slow down the rate of habitat loss. Management agencies are increasingly being asked to focus more attention on developing stricter regulations concerning fish and wildlife harvest and recreational use. Exotic species of mussels, plants and fish, some of which have been introduced via commercial and recreational traffic, are threatening native populations and reducing biological diversity.

Canoeists also have a variety of environments open to them on the Minnesota, St. Croix and Mississippi Rivers. They can follow the wide main channel or explore great backwater areas with tree-lined channels. Map 6.1 shows a portion of a canoe route map published by the Minnesota DNR.



Map 6.1 Lower Mississippi Canoe Routes

Recreational boating on the commercially navigable rivers in Minnesota is one of the heaviest uses of this multi-use resource. All of the recreational craft, from the largest powerboat down to the smallest canoes, use the locks to move from pool to pool. As shown in Table 6.2, recreational lockage has outnumbered commercial lockage every year since 1985. In 1999 over 52% of the total (or 32,825 of 62,672) was non-commercial lockage in the St. Paul District (from Upper St. Anthony Falls Lock to Guttenberg, Iowa). Such heavy use has caused congestion on high use days. That has lead the Corps to set locking hours so that more small boats can use the locks without long waits. Another congestion reducing factor is the continuing increase in small boats per lockage. In 1999 the average number of small boats per lockage was 4. Table 6.3 shows the trend in that area since 1979. Figure 6.12 shows heavy weekend use of a lock by recreational boats and demonstrates the increasing density.

All forecasts of recreational boat usage of the river system in Minnesota call for a continued increase in both their number and the time spent on the water. That, coupled with the forecasts for increased commercial tonnage has generated concern for potential problems in the future. Current programs such as set locking hours and increased numbers of boats per lockage might have to be expanded and other plans developed. Since 1985 there have been more recreational lockage in the St. Paul District than commercial lockage. The average number of recreational boats per lockage has also increased from 2.57 to 3.99 during the same period.

Lockage
St. Paul District, Corps of Engineer

Year	Commercial & % Of total	Non Commercial & % of total	Total
1980	34,292 (53%)	30,626 (47%)	64,918
1985	27,645 (45%)	33,157 (55%)	60,802
1990	32,228 (47%)	36,841 (53%)	69,099
1991	28,930 (45%)	35,827 (55%)	64,757
1992	30,682 (47%)	34,105 (53%	64,787
1993	19,188 (44%)	24,353 (56%)	43,541
1994	22,631(36%)	39,597 (64%)	62,228
1995	25,883 (41%)	36,549 (59%)	62,432
1996	27,519 (45%)	33,490 (55%)	61,009
1997	25,384 (44%)	32,102 (56%)	57,486
1998	27,988 (45%)	34,652 (55%)	62,640
1999	29,837 (48%)	32,835 (52%)	62,672
2000	26,556 (43%)	35,065 (57%)	61,621

* Flood year

Table 6.2

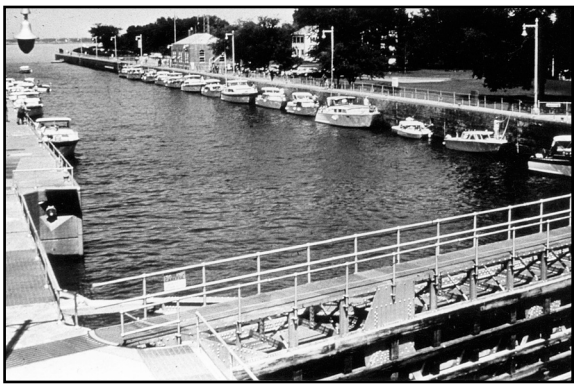


Figure 6.12 Recreational Boats in Lock

Recreational Lockage Density
St. Paul District Corps of Engineers

Year	Lockage	Vessels	Density
1980	28,445	69,430	2.44
1985	31,105	80,025	2.57
1990	34,431	120,944	3.51
1991	33,875	118,721	3.50
1992	32,245	119,174	3.70
1993	22,652	61,806	2.73
1994	36,855	123,717	3.36
1995	33,850	122,343	3.61
1996	30,881	114,429	3.71
1997	29,662	118,347	3.99
1998	32,120	126,602	3.94
1999	30,424	121,523	3.99
2000	31,332	111,367	3.55

* Flood Year

Table 6.3

6.3 Commercial Enterprises

There are a number of shore side businesses, which depend on the rivers and river users. Some of them function as part of other river operations. For example, many of the bait sales-boat rental operations also have boat-launching ramps. Some of the larger marinas often have restaurants on the premises. That kind of operation and free standing boat and sporting goods shops, cafes and boat rental operations make up the retail portion of the river system's commercial enterprise population.

Recreational boat building and repair is an important though small industry on the river. Much of the repair work and even some basic construction is done by the individual boat owner; but there are several commercial facilities, which provide those services.

There are two seaplane facilities on Minnesota's portion of the river system and one on the Wisconsin side. Added to those public bases are many individual aircraft owners who base their planes on the river near their homes. An aircraft pontoon manufacturer also has a facility on the Mississippi River in the Twin Cities area.

Other businesses which use the river and harvest its bounty are trapping, commercial fishing and clamming. None of these commercial activities generates the same level of activity that their sporting counterparts do but they are important uses of the river.

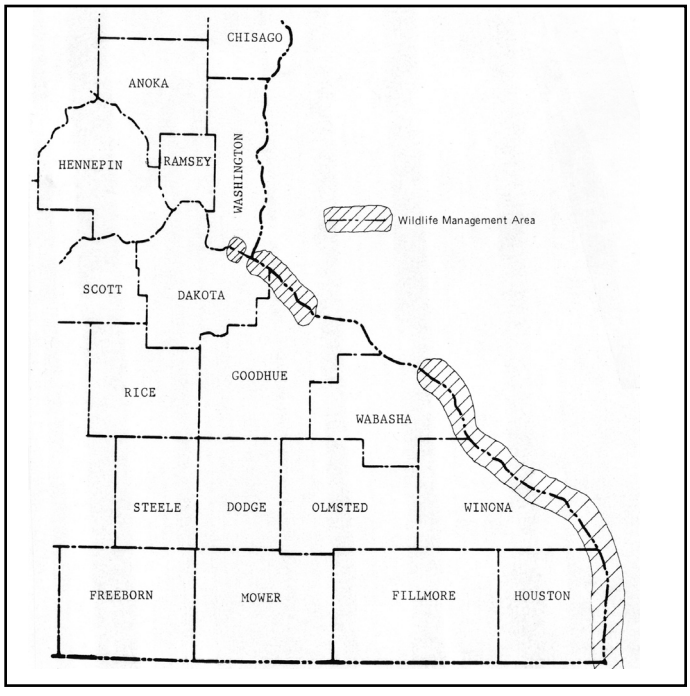
Trapping on the river is generally confined to the backwaters and tributary streams. The Departments of Natural Resources from both states and the Upper Mississippi River National Wildlife & Fish Refuge carefully control harvests of raccoon, muskrat, milk and beaver. The value of furs harvested on the navigable portion of the Mississippi River is currently estimated at about
$30,000 annually. Expanding the information to include the navigable portions of the St. Croix and Minnesota rivers may double the estimate.

Commercial clamming on the rivers was once a major industry. Mussels in the river don't have the same food value as salt-water clams, and have been harvested primarily for their shells. In the early part of the 20th century, millions of mussels were harvested from the river for the pearl button industry, but that activity died out with the development of plastic buttons in mid-century. The mussel harvest increased in the Mississippi River again late in the century, downstream of Minnesota, with mussel shells being crushed for use in the cultured pearl industry in the Orient.

The arrival of zebra mussels from Europe in the 1990's has decimated native mussel populations in Minnesota and throughout the Upper Mississippi River System. Zebra mussels attach themselves to native mussels (and any other hard surface) and reproduce so rapidly they literally choke the native mussels to death. Only the upstream portions of the navigable river system in Minnesota seem relatively free of zebra mussels and may be used as refuges to ensure the survival of many of the river's native mussel species.

Commercial fishermen harvest a wide variety of rough fish from the upper river. Catches of carp, sucker, sheep head and other varieties are processed here or shipped live to Metropolitan markets in the East and South. The average annual value of commercially caught fish on the upper river is about $1.2 million, with about 60% of that from the St. Paul District of the Corps. This kind of fishing, which is carefully controlled by the Departments of Natural Resources in both states, occurs both on the sides of the main channel in the backwaters areas.

Other commercial fishing activity on the upper river includes such diverse operations as pond raising of fish for sale, minnow trapping in the open water, pod raising of minnows and turtle trapping. Minnesota has long been a major supplier of turtle meat to the nation's soup making industry.



Map 6.2 Upper Mississippi Wildlife Management Areas

6.4 Wildlife Management

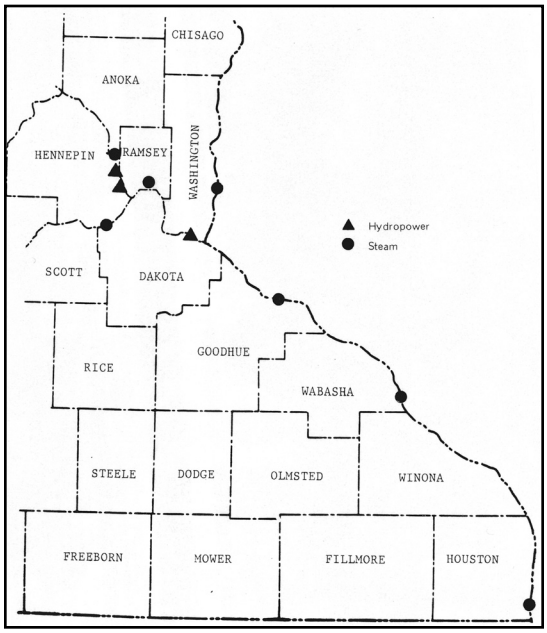
In addition to the responsibility for controlling hunting and fishing harvests, the state and federal conservation agencies are also responsible for thousands of acres of fish and wildlife management areas. The types of wildlife management areas vary greatly from those where hunting, fishing and camping are encouraged to those where species protection (i.e. waterfowl closed areas) prohibits certain human activities.

Map 6.2 shows the location of wildlife management areas on the upper river.

6.5 Other Non-Navigation River Users

One of the earliest non-navigation commercial users of the river was the milling industry. The electricity generators have taken its place as a waterpower user. Minnesota currently has three plants on the navigable portion of the Mississippi that uses water flow as a power source for electricity generation. One of them, the St. Anthony Falls plant, is among the nation's oldest. In the 1920's the Ford Motor Company cooperated with the Corps of Engineers at Lock and Dam 1 below the Ford Parkway Bridge between Minneapolis and St. Paul in paying for the power generation plant as the dam was built. It still supplies all the electrical power needed for the Ford assembly plant and Lock 1 with power left over which is sold to Xcel Energy. Xcel Energy uses river water to cool its turbine water at Becker, Monticello, Minneapolis, St. Paul, Black Dog, Prairie Island and Stillwater power plants in Minnesota.

Map 6.3 shows the locations of the state's river oriented power plants. In addition to using river water for cooling their turbines, many of these plants relied on barge delivered coal for power generation into the mid 1980's. After that period, with the switch to low sulfur coal from Montana and Wyoming, coal is now delivered directly to the power plants by rail.



Map 6.3 Electricity Generating Plants

Municipal water supplies represent the largest consumptive use of river water. The City of Minneapolis takes all of its water from the Mississippi River and the City of St. Paul relies on the River for about 75% of its water needs. These two major cities are joined by a host of smaller river towns in such use.

Use of river water for municipal water supplies is facilitated by the navigation pool system. Without the reliable water levels created by the dams, most of the cities, which rely on river water, would need back-up supplies during dry seasons.

Irrigation, an important consumptive use in other areas on the national river system, is not a significant use of river water in Minnesota. Much of this area's irrigation water supply comes from deep wells.

Sewage disposal systems use river water in their treatment process and use the river to carry treated effluent away. Most of the cities on the river use this process for at least part of their disposal needs.

The shallow draft navigation system is regulated by federal, state and local laws, which are administered by many agencies. Jurisdictions are spread over a wide range of actors including municipalities, counties, states and regional entities as well as the federal government. Those jurisdictions are generally divided between control of shore land activities such as terminals or fleeting areas and control of actual navigation functions. Federal agencies have control over the navigation system structures and channels and vessel operations. State and local units control shore land and much of the in-water development. Over the years there have been a number of federal and local laws passed which have set up parameters under which the various agencies operate. The agencies with major river involvement are described below. Although all of the states on the Upper Mississippi have agency functions in waterway matters that are similar to those in Minnesota, only Minnesota's are discussed in this report.

7.1 Federal Agencies

U.S. Army Corps of Engineers
The Corps of Engineers has the responsibility for the ongoing operations and maintenance of the navigation system. That includes locks, dams, channels and special river structures such as levees. They are also responsible for planning and construction of new system elements. Their responsibility extends beyond the navigable portion of the river system in the areas of flood control, natural resource management and regulation of discharge and fill activities.

The Corps of Engineers also has jurisdiction over permits for certain structural activities in the river system such as the construction of fleeting anchorages. The St. Paul District Corps of Engineers has responsibility for the navigable and the non-navigable portions of the St. Croix and Minnesota Rivers, as well as the Mississippi and its other tributaries downstream to Guttenberg, Iowa.

The Corps is co-chair of the River Resources Forum, which is a multi-state multi-agency group responsible for the prioritization of Corps maintenance and environmental management projects. The states include Minnesota, Iowa and Wisconsin. The Corps also holds membership in a number of other committees and commissions involved with river concerns.

U.S. Department of Agriculture (USDA)
The Department of Agriculture administers land and crop management programs through a number of agencies. Most important to commercial navigation are those agency actions, which affect crop volumes or help stabilize the land. Most active of the Department's agencies, in the area of soil stabilization, are the Soil Conservation Service and the Forest Service. Soil stabilization reduces sedimentation in the rivers, which, in turn, helps to reduce dredging frequency. Other Department of Agriculture actions which have significant impacts on the river transportation system are their crop production and marketing programs which create new and expanded cargoes. The department's Office of Transportation funds transportation studies affecting commercial navigation as well as monitoring agricultural transportation needs. The Department also regulates the different cargo preference acts and controls the grain purchases and sales of the Commodity Credit Corporation. In addition, USDA grain inspectors insure the cleanliness of barges used for hauling grain. In all, the Department of Agriculture has a strong interest in and involvement with the river transportation system.

U.S. Department of Transportation (DOT)
Two agencies of the U.S.DOT., the Maritime Administration and the U.S. Coast Guard are directly involved with commercial navigation. The Maritime Administration has a number of responsibilities in navigation matters, ranging from vessel constriction and operation subsidy to vessel research and planning for part and market development. The impacts of their programs on commercial navigation are significant.

The Coast Guard is the policeman and the lifesaver on America's waterways. The Coast Guard sets up and maintains aids to navigation such as channel buoys and marker lights. In addition to their navigation operations and safety control, they have two other functions through the Captain of the Port and Officer in Charge of Marine Inspection Offices. These functions are directed primarily toward commercial vessel and port safety. They also respond to and investigate oil and other hazardous material spills into parts of the upper river.

U.S. Department of Commerce
The Department of Commerce is charged with the responsibility to enhance and expand U.S. export markets. As they develop and implement programs through their different agencies such as the International Trade Administration, new and expanded cargo movement service needs are created.

Surface Transportation Board (STB)
The STB regulates interstate transportation carriers including the railroad and trucking industries, and some inland water carriers. The agency has regulatory jurisdiction over such transportation concerns as carrier certification, corporate acquisitions and mergers, and the provision of reasonable rates and service to the public. Only a small part of the freight carried by the river navigation industry is regulated by the STB.

U.S. Environmental Protection Agency
This agency was created to coordinate government action to help assure the protection of the environment by controlling pollution on a systemic basis. It conducts a variety of research and monitoring activities related to that goal. Its major influence on commercial navigation results from its involvement with the Clean Water Act provisions, which affect the river.

U.S. Department of the Interior
This agency has the responsibility for policy development, program management, and project construction to protect fish and wildlife habitat and preserve historic sites. Its activities, which are directly related to the river include functions of the Fish and Wildlife Service, and the National Park Service. In Minnesota, the Fish and Wildlife Service is a major contributor to river development plans and manages over 33,500 acres within the Upper Mississippi River National Wildlife & Fish Refuge.

The National Park Service has a major role in policy and plans development on the St. Croix River and has a partnership role on the Mississippi in the Twin Cities metropolitan area through the creation of the Mississippi National River and Recreational Area (MNRRA). MNRRA supports the State Critical Area Program, administered by the Minnesota Department of Natural Resources. River cities in the Twin Cities metropolitan area have developed "Critical Area Plans" in response to 1976 Minnesota legislation which required the plans and designated the metropolitan Mississippi River corridor as a critical area. The act recognized the need for municipal response to issues related to commercial and industrial shore land development and the protection of historic, cultural, and natural ravine amenities. Twelve cities on the navigable portion of the Mississippi River, including St. Paul and Minneapolis, have critical area plans.

U.S. Department of Energy
The Federal Energy Regulatory Commission (FERC) of the Department of Energy was established in the Department's organization act of 1977. FERC regulates hydroelectric power projects on the river as well as monitors the movements of energy production materials and energy.

7.2 Minnesota Agencies

Minnesota Department of Transportation (Mn/DOT)
Mn/DOT was created in 1976 to promote the continued development of a safe and effective transportation system for people and goods. Part of that charge is the responsibility to help ensure the continued effectiveness of the state's waterway systems.

The department's Ports & Waterways Section represents the department and the state on plan development, issue analysis and policy development for water transportation and related programs. Mn/DOT is an active participant in and member of the River Resources Forum (RRF) and the Governors' Liaison Committee to the Corps of Engineers Navigation Study. Mn/DOT is also an

advisor to the Upper Mississippi River Basin Association (UMRBA) and the American Association of State Highway and Transportation Officials, Standing Committee on Water Transportation, as well as several industry organizations.

Minnesota Department of Natural Resources (MDNR)
MDNR has a part of the state's permitting authority for the placement of structures in, and the filling or, excavation of, the state's waters. The agency is also involved in the development and planning of river oriented projects including the construction and maintenance of navigation system elements and river terminal development. The DNR has permitting authority for certain Corps of Engineers' channel maintenance functions. They also fund and manage many recreation areas, boat launching ramps and wildlife habitat areas along the river.
The DNR is also a member of the RRF and represents the state on the UMRBA.

Minnesota Department of Agriculture (MDOA)
The Minnesota Department of Agriculture's main influence on the river results from their efforts in crop production and marketing programs.

Minnesota Department of Trade and Economic Development (DTED)
This Department also participates in market development programs, which have an impact on cargo levels on the river system.

Minnesota Environmental Quality Board (EQB)
The EQB is the principal state forum for consideration of environmental issues. The board coordinates by its seven member agencies; the Departments of Agriculture, Energy and Economic Development, Health, Natural Resources, Transportation and the Pollution Control and State Planning Agencies make reviewing of issues. Through its project review process it has considerable influence on river system development.

Minnesota Pollution Control Agency (MPCA)
The PCA administers the 401 Certification Permit and the State Disposal System Permit processes required by the Clean Water Act. The PCA also participates in the review process for river channel dredging and dredged material disposal. The PCA is also a member of the RRF.

Minnesota Historical Society (MHS)
The MHS reviews development proposals in the river valleys to determine if they will have an impact on historical sites. That function involves them with commercial navigation activities.

7.3 Regional Agencies, Quasi-Governmental Associations, and Commissions

Upper Mississippi River Basin Association (UMRBA)
The Upper Mississippi River Basin Association provides a regional interstate forum to facilitate discussion and cooperative action on water resource issues of common concern to the states along the upper river: Minnesota, Wisconsin, Iowa, Illinois, and Missouri. In addition to the member states, there are five federal agencies that are advisory members. Since its formulation in 1982, the association has addressed a wide range of issues including: commercial navigation capacity, channel maintenance, water quality, inter basin diversions, sediment and erosion, hazardous spills, habitat restoration, invasive species, floodplain management, wetland protection, hydropower licensing, and drought planning.

The Mississippi River Coordinating Commission (MRCC)
The Commission was created by Congress in 1988 when it established the Mississippi National River and Recreational Area, which extends downstream from above the river's confluence with the Rum River to below its confluence with the St. Croix River. The Commission created a plan to manage future development on that stretch of the river.

The Minnesota-Wisconsin Boundary Area Commission

This non-regulatory organization operates under an interstate compact to assist the two sponsoring states and their local subdivisions in coordinating water project planning efforts and water use in their area of concern, specifically on the St. Croix and Mississippi Rivers.

The Metropolitan Council

In the Twin Cities metropolitan area the regional government-planning agency is the Metropolitan Council. The Council has oversight responsibility for, among other things, land use and transportation system development. The Council's major impact on river transportation comes from their involvement in land development and municipal critical area plans. Currently the Metropolitan Council is chairing the Surface Water Use Management Plan (SWUMP) for the Twin Cities area of the Mississippi and Minnesota Rivers. The purpose is to develop a coordinated use of the river as it affects both public and private interests.

Other Organizations

There are a number of other local and regional interest groups, which have influence on the river use through their efforts in environmental areas. Included are:

The Isaak Walton League
The Wilderness Society
The Sierra Club
The Upper Mississippi River Conservation Committee
Minnesota's Environmentally Concerned Citizens Association
The Lower Minnesota River Watershed District
Friends of the Mississippi River
Mississippi Corridor Community Alliance
American Heritage River Initiative
American Rivers
Citizens for a Better Environment
Mississippi River Revival
1000 Friends of Minnesota

In addition, there are towing industry groups and economic advocates for the commercial use of the Upper Mississippi River. Included are:

Upper Mississippi Waterway Association (UMWA)
River Resources Alliance
Propeller Club
American Waterways Operators, Inc.
National Waterways Conference
Inland Rivers Ports and Terminals, Inc.
MARC 2000
American Association of Port Authorities (AAPA)
Midwest Agri Dealers Association
Minnesota Agri Growth Council
Minnesota Corn Growers Association
Minnesota Corn Research & Promotion Council
Minnesota Freight Stakeholders Coalition
Minnesota Grain & Feed Association
Minnesota Rivers Coalition of Labor and Industry

These industry organizations provide a number of vital services for the towing industry and in some cases, the deep draft navigation interests. Included in their activities is information dissemination, assistance and advice to government rule makes and a wide variety of business services to their members. Memberships in these groups consist of terminal, vessel, marina and towing operators, harbor service organizations, shippers, Port Authorities and others with connections to water transportation, such as insurance providers and surveyors. Unlike the other groups discussed in this "other organizations" section, these organizations rely solely on membership for support.

7.4 Municipalities

Five of Minnesota's river cities have either port authorities or industrial development agencies, which are responsible for river shoreline development. They are: St. Paul, Winona, Bloomington, Red Wing and Minneapolis. Each of these cities has adopted a riverfront development plan which addresses commercial navigation needs including new or expanded terminals and barge-towboat service requirements.

Other river cities in the Twin Cities Metropolitan area have developed "Critical Area Plans" in response to 1976 Minnesota legislation which required the plans and designated the metropolitan Mississippi River corridor as a critical area. The act recognized the need for municipal response to issues related to commercial and industrial shore land development and the protection of historic, cultural and natural ravine amenities. Twelve cities on the navigable portion of the Mississippi, including St. Paul and Minneapolis, have critical area plans.

Regulatory and review authorities for the cities, which have grown from the development of their land use and critical area plans, are added to those of the state and federal agencies.

7.5 Major Legislation

Several federal and state laws have significant influence on the river navigation system and the towing industry's operation and development. Those with the greatest impact are: the National Environmental Policy Act of 1969, the Federal Water Pollution Control Act of 1972, the Endangered Species Act of 1973, the Clean Water Act of 1977, the Water Resources Act of 1978 (Public Law 95-502), and the Water Resources Development Act of 1986 (Public Law 99-662), the Mississippi National River and Recreational Area Act (Public Law 100-696) in 1988, and the Pollution Control Act of 1990, at the federal level; and the Environmental Policy Act of 1970, the Critical Areas Act of 1976, and the Minnesota Port Development Assistance Program of 1991, at the state level.

National Environmental Policy Act of 1969
Passage of the National Environmental Policy Act (NEPA) marked the beginning of a determined federal effort to clean up the nation's environment. Basic NEPA impacts on waterways projects, result from the laws requiring Environmental Impact Statements and lesser levels of analysis of environmental concerns which have now become integral parts of all water development planning. Later environmental policies, both federal and state, incorporate and build on NEPA directives.

Federal Water Pollution Control Act of 1972
This Act expanded on the NEPA provisions from 1969. Together they laid the groundwork for major changes in development, system maintenance and use of the nation's waterways.

Endangered Species Act of 1973
This act, which is intended to provide protection for all endangered species, has had the greatest impact on Upper Mississippi River navigation through its influence on system development. Several channel projects, some routine maintenance, and terminal or other system facility development actions have been delayed, modified or stopped in response to actions taken under the authorities in this act.

Clean Water Act of 1977
The Clean Water Act, specifically Section 404, controls such water related activities as the Corps of Engineers' dredging and dredged material disposal functions. It describes acceptable and unacceptable disposal methods and regulates material handling. With the passage of this act the Corps' historic standard dredging procedures were dramatically changed.

Water Resources Act of 1978
The major impacts on the river system and on commercial navigation which resulted from this legislation include the authorization for the replacement of Lock and Dam 26 and the initiation of the nation's first federal users fee on the shallow draft navigation system.

Water Resources Development Act of 1986
This act, Public Law 99-662, expands on a number of existing federal functions, implements some new programs and creates new local cost sharing requirements for many waterway projects. The law has an impact on all water related activities on both the river and deep water systems, including such things as navigation, wildlife and irrigation projects.

Of particular concern for river navigation has been the institution of a new ceiling on towboat fuel taxes, provision for cost sharing on new navigation facility construction and the formation of a Waterways User's Board. The fuel tax on commercial riverboats rose from 10 cents per gallon level dictated by public law 95-502, to 20 cents per gallon in 1995. Under the new law any new navigation facility will be funded by a combination of federal and non-federal money. The non-federal share of most navigation projects is intended to come from the trust fund built by fuel tax contributions. The third major change (and a positive one for the barge industry) caused by PL 99-662 was the establishment of an eleven-member board which is charged with advising the Corps of Engineers on navigation project prioritization. The board is made up of shippers and towing industry representatives from the different sections of the national navigable river system.

Mississippi National River and Recreational Area Act of 1988
This act established the Mississippi River Coordinating Commission and charged it with development of a management plan to be implemented in partnership with state and local governments. This plan will establish guidelines for continuation of existing uses and future development in the MNRRA corridor.

Pollution Control Act 0f 1990
This act was established as a result of the Exxon Valdez oil spill in Alaska. The act increased the liability of companies moving petroleum and hazardous materials by water, whether on the high seas or the Inland water system. In 1993 Koch Refining stopped operating its double skin tank barges in the Twin Cities because of this act. This shifted some of the petroleum movement to trucks, which now exposed the local roadways to more heavy, hazardous freight movement and increased the risk of accident.

Minnesota Environmental Policy Act of 1970
This act gave the Environmental Quality Board authority to require an environmental assessment before permits can be issued for any type of shore land or in-water developments. The approval process, according to the act, must include extensive public review and comment.

Minnesota Critical Areas Act of 1976
This legislation requires all cities on the river system in the Twin Cities Metropolitan Area to prepare plans for use of the river within their boundaries. Extensive public review of the individual plans is necessary before the Environmental Quality Board can approve them.

Minnesota Port Development Assistance Program (PDAP) 1991
The purpose of this act was to make state funds available to help rehabilitate Minnesota's public port facilities. To date the Minnesota Legislature has appropriated $9.5 million in bond and general funds that have assisted five of Minnesota's public commercial port terminals in fifteen individual projects.

All of these recent laws, and earlier legislation, have been responsible for major changes in river maintenance techniques and in the permit process for both ongoing maintenance and new developments.

Minnesota is located at great distances from most of the nation's import-export ports and its major markets and industrial production areas. In many instances the state is looked on as a market or supplier of last resort because of those distances. Our geographic remoteness also adds greatly to the costs of moving our products and production needs. In response to our problems of location and the higher transport costs, we in Minnesota must be very careful to ensure that we find the lowest rates possible for the movement of our freight. That is especially important in the agricultural and agri-business communities, which contribute so much to the state's economy. Commercial navigation on the river does much to fill that need for transportation economy. Not only does river transportation provide low cost service, but also it serves as a strong competitive influence on the other modes, such as the railroads, helping to keep their rates low to the shipping public.

As was described in Chapter 1, Mn/DOT has a legislative direction to help ensure the continued effectiveness of river transportation. That involves the department in a number of areas including plan and policy development, issue resolution and intergovernmental-interagency actions.

In this chapter, actions, proposals and concerns which have or could have an impact on river freight movement in Minnesota will be discussed. In each discussion there will be background information, a description of Mn/DOT's current or historic action in the area and proposed future action by Mn/DOT.

These discussions and proposals for action represent the basis for Mn/DOT policy in water transportation matters. As new issues arise, department response will be formed in reference to past action on similar issues. Also as new issues arise, this portion of the plan will be expanded and updated to reflect changes in private or public processes.

There are, of course, a considerable number of conflicts and problems that are not discussed here. Some of them involve Mn/DOT, but not at a policy level. They are considered part of the normal day-to-day functioning of the department.

8.1 National Issues

Inland Waterways Users Fees

Background
The 95th Congress of the United States passed Public Law 95-502 which authorized the replacement of Lock and Dam 26 at Alton, Illinois, mandated the development of a water management plan for the Upper Mississippi River system, and established the first federal tax on commercial river navigation in the country's history. The tax, which went into effect on October 1, 1980, began at 4 cents per gallon of propulsion fuel used by commercial vessels, with biennial increases in 2-cent increments to a total of 10 cents per gallons in October 1985.

In 1986 the Congress passed and the President signed the Omnibus Water Resources Development Act. That act increased the existing inland waterways tax by an additional 10 cents per gallon by 1995, beginning with a 1-cent increase in 1990.

Prior to the passage of the 1986 bill there were extensive discussions regarding the level of cost recovery for which the commercial navigation industry should be responsible. Passage of the act has not necessarily established the final level of tax. That raises concern regarding future increases in taxes.

Any new waterways tax program must include evaluation of several different issues. For example, equity among modes must be addressed when considering users' fees, as should the potential for regional economic discrimination resulting from waterways fees.

In 1993 federal budget proposals called for taxes on all fuels. The tax on diesel fuel, which is used by most transportation modes, amounted to 4.3 cents per gallon. Although that would have a significant impact on transportation costs, there is no apparent inequity in its impacts on the different modes. Later, this tax was rescinded for the trucking industry but still remains in effect for the railroad and barge industries.

INLAND WATERWAY OPERATORS FEDERAL FUEL TAXES

A. Inland Waterway Revenue Act 1978
PL 95-502, Title II, Section 4042

Effective Date	Fuel Tax/Gallon
9-30-1980	4 cents
10-1-1981	6 cents
9-30-1983	8 cents
9-30-1984	10 cents

B. Inland Waterways Tax 1986
PL 99-662, Title XIV, Section 1404

Effective Date	Fuel Tax/Gallon
1-1-1990	11 cents
1-1-1991	13 cents
1-1-1992	15 cents
1-1-1993	17 cents
1-1-1994	19 cents
1-1-1995	20 cents

C. Transportation Fuel Tax- Effective Date 10-1-1993
4.3 cents/gallon (Federal Deficit Retirement)

D. Leaking Underground Storage Tank Trust Fund (LUST)
0.1cents/gallon (not been collected since 1997 as the fund is adequate)

Total Federal Fuel Tax Collected As Of January 1,1997
24.3 cents/gallon

Specific Concerns

Equity—Because of Minnesota's position at the head of the Mississippi River system, river shipments must pass through the most operationally costly segments of the system. For that reason and because of the long movement lengths caused by that lead of navigation position, attention must be paid to the question of equity. There are certain types of taxes which have inherent inequities for regions located near navigation headwaters and distant from import-export terminals.

A lockage fee, for example, would add excessive costs to Minnesota shipments which traverse the full lock and dam system. That lock and dam system provides benefits to downstream users as well as those at the upper end.

Any other type of fee which reflects recovery of costs for specific segments would also add inequitable additional costs to Minnesota, based shipments.

Allocation of costs—There is a number of beneficiaries of the navigation system besides commercial navigation. Included are recreational boaters, users of municipal water supplies, sportsmen, electricity users, the national defense posture, and others. They must be identified and the value of their benefits must be deducted from full costs before any charge is made to commercial navigation. For example, over the last 15 years the use of locks in the St. Paul district for pleasure boats, has greatly exceeded lock operations for commercial vessels each year. Currently, the commercial operator on the Mississippi River System is the only group paying a user fee.

Mn/DOT's Action Proposal
Mn/DOT has made extensive analysis of user fee impact potentials on the state's economy. This analysis has included evaluation of each legislative and administrative tax proposal and comments to the state's Congressional Delegation regarding each major user fee bill. In addition, Mn/DOT provides user fee related informational to the Congressional Delegation and other decision makers at all levels.

Mn/DOT will continue to review and comment on national or state waterways tax proposals and to provide the results of these reviewals as well as other user fee data to the legislative decision makers.

Mn/DOT's position on user's fees includes:
- Acceptance of the concept of users/fees in accordance with such taxes on highway and airport users;
- Opposition to any form of segmented fee;
- Insistence on modal and regional equity should new or increased taxes be imposed;
- Insistence on uniformity in application of a new tax;
- Insistence on a full allocation of costs, among different users;
- Acknowledgement of the need for recognition of timeliness in any new tax application, to take into account current towing industry and agricultural community economic conditions;
- Insistence on an examination of the economic impacts on the state and its different economic sectors from any new tax.

If a tax is to be levied, Mn/DOT supports a per gallon fuel tax or ton-mile tax as the only acceptable types of fee should a new or greater tax be levied on the inland waterway system. Such a tax must be applied uniformly to all beneficiaries of the waterway system in recognition of the importance and interdependence of each segment of the system. Application should be similar to that of the highway gas taxes.

The Aging System

Background
Congress authorized the extension of the 9-foot channel to St. Paul in 1930. All of the locks on the upper river except two at St. Anthony Falls in Minneapolis, and those at Lock and Dam 26 and 27 were built between then and 1950. Lock and Dam 27 was built in 1953 and the Upper and Lower St. Anthony Falls locks and dams were completed in 1963. Lock and Dam 26 was replaced in 1990.

The majority of the upper river navigation facilities are over 50 years of age, which is the anticipated effective life of a lock. In fact most of the Upper Mississippi River locks are over 60 years of age. The aging locks suffer from accelerating physical deterioration. In spite of the U.S. Army Corps of Engineers' excellent maintenance program, locks often require short-term closure to allow for needed repairs.

All but three of the 29 locks are 600 feet or less in length and were built to accommodate 6-8 barge tows. Today, 15 barge tows are the norm on the river. The 600-foot locks slow the efficiency of the larger tow size by requiring the tow to be split in half. This extends each lock passage for the larger tows from hour to now two hours.

The Corps has an ongoing rehabilitation program which will arrest the deterioration process through needed reconstruction of the lock components. There are several problems associated with implementation of the Corps' program. Budget restrictions are the major impediment, with environmental opposition becoming more significant. Environmental interests express concern over possible impacts from increased river traffic. Rehabilitation and lengthening of the existing locks increases the efficiency of the system. Traffic increases occur only in response to expanded markets, not system improvements.

The Corps is just completing a feasibility study of the Illinois and Upper Mississippi Rivers. This study will determine the need for improvements to and expansion of the system. There are

arguments against the study, mainly from the environmental community. Their concerns center on a perception that improvements will generate an artificial increase in cargo volumes. One half of the feasibility study budget is being used to identify environmental impacts due to any alterations of the physical system.

Mn/DOT Action
Mn/DOT has been a strong supporter of the Corps' rehabilitation program and will continue to support it. Mn/DOT is also in strong support of the Corps feasibility study, as it will help keep Minnesota competitive in U.S. & world markets.

8.2 Local Issues

Channel Maintenance

Background
U.S. Army Corps of Engineers' regulations authorize the St. Paul District of the Corps to maintain a 9-foot navigation channel on the Upper Mississippi River. The authorization allows for advance maintenance dredging of 2 to 4 feet, which provides for a total dredging depth of 11 to 13 feet. The authorized 9-foot depth is not necessarily suitable for equipment with 9 feet of draft. Vessels with 9 feet of draft can normally operate in the channels because the natural depths and the depths resulting from advanced maintenance dredging exceed 9 feet.

Following the passage of PL 95-502, the Lock and Dam 26 legislation, Representative Johnson (D-Ca.), Chairman of the Public Works and Transportation Committee, defined what the Congress intended a 9 foot channel to be. His definition called for a channel that was deep enough for the safe and efficient operation of vessels with 9 feet of draft with allowances for such things as trim, squat, and wave action.

It has been Mn/DOT's and Minnesota's position that a 9-foot channel is as described in Mr. Johnson's discussion.

In 1980, a coalition of state and federal agencies under the joint leadership of the Corps of Engineers and the U.S. Fish and Wildlife Service completed the Great River Environmental Action Team study (Great 1) for the St. Paul Corps District Of the Upper River. A major part of the GREAT 1 study was the Channel Maintenance Plan (CMP). The St. Paul District of the Corps of Engineers has been using the CMP as a guide for their channel maintenance activities. A multi-state, multi-agency River Resources Forum for compliance with the CMP reviews their proposed work schedules.

One goal of the CMP is to reduce the amount of dredged material removed from the river each year. To accomplish that goal, guidelines to dredging depths and channel widths were recommended by the plan. With the adoption of the CMP recommendations, the Corps instituted an adjustable depth-dredging program. The Corps dredges only deep enough to maintain the 9-foot channel authorized by the Chief of Engineers. Their practice is to dredge deep enough to allow for expected silt deposition over a period of time and, thereby, minimize frequency and volume of required dredging. For example, in an area which has historically experienced rapid shoaling, the Corps will cut the channel depth to as much as 13 feet. This may reduce the frequency of new dredging by providing accommodation for as much as three feet of sediment deposit. Under the new guidelines, their dredging may be limited to 11 feet at specific locations, which allows for only about a foot of new sediment before dredging is required again.

With the initial implementation of the adjustable depth-dredging program there was a substantial reduction in the amount of material handled by the Corps and a decrease in dredging operations. However, since the first year of the program there has been a substantial increase in unexpected shoaling. Since even frequent sounding efforts cannot effectively detect rapid shoaling caused by heavy rains, the channel is less reliable than before the acceptance of the GREAT recommendations for reduced depth dredging.

Even though the frequency of tow groundings on the Upper Mississippi is small compared to the number of trips, which are made, it is an item of major concern. There are a number of possible

causes for groundings including pilot error, misplaced navigation aids, and unanticipated loss of channel depth. The last becomes increasingly more significant in situations such as sudden heavy rains, which can cause the channel to lose its reliability. Flooding also results in more sediment deposition that must be dredged.

Besides the possibility of groundings, reductions in channel depth also cause concern because of the potential for other types of negative impact on vessel operations. The Corps of Engineers, at its Waterways Experiment Station (WES) in Vicksburg, Mississippi, has determined that changes in under keel water depth and channel widths have undesirable effects on vessel performance. With loss of under keel water depth the vessels must work harder to maintain forward speed. With reductions in channel width and depth tow boats lose some of their ability to maneuver. Loss of channel dimension creates both an economic impact and a safety problem for vessel operations.

Mn/DOT Action Proposal
Mn/DOT has been concerned with channel depth impacts for some time, and actions in this area include:
- Participation in the River Resources Forum;
- Completion of potential impact studies;
- Continuation of efforts to generate additional studies;
- Monitoring dredging and grounding occurrences.

Mn/DOT will continue its involvement with this issue and will continue to support efforts of other agencies to establish the most effective dredging program. The continuation of an efficient economical water transportation system requires constant attention to dredging requirements.

Barge Fleeting

Background
A full 15-barge tow will usually be made up of individual barges destined for or coming from separate terminals. The line haul towboats cannot make individual barge deliveries, which creates the need for areas where switch boats can make up or break up the full tow. These areas are referred to as fleets and they equate to rail marshalling yards.

Minnesota has a limited and dwindling number of fleeting areas and spaces. Every forecast of need indicates a future shortage if more spaces are not made available in the primary use areas. The major portion of the anticipated shortage will occur in St. Paul, with lesser shortages occurring in Red Wing and Winona and on the Minnesota River at Savage.

At the same time that forecasts for increases in fleeting area needs are being made, many river communities are limiting each riverbank use through zoning. Environmental controls at the state and national levels are further narrowing fleeting growth potential.

Many communities are currently drafting redevelopment plans for their waterfronts. These plans quite often call for the elimination or relocation of existing fleeting areas. Both actions pose problems. With relocation, the question of economy of added travel distance becomes increasingly important, especially if a lockage is involved.

The Surface Water Use Management Plan committee (SWUMP), chaired by the Metropolitan Council, is giving considerable attention to fleeting needs in the St. Paul area.

Mn/DOT Action
The department recognizes the importance of fleeting to the continued effectiveness of the water transportation system. Mn/DOT has historically been involved in fleeting needs studies, has taken positions supporting the need for growth of fleets to meet forecasted needs, and has participated in public evaluation of individual fleet proposals.

State Statutes have made Mn/DOT the responsible government unit for environmental analysis of fleet proposals in the absence of an established port authority.

Mn/DOT will continue these activities and continue to support efforts to retain current fleets and to expand the existing system to respond to future requirements.

Mn/DOT as a member of the Surface Water Use Management Plan committee will continue its efforts to incorporate an acceptance of the need for growth in fleets as part of the Twin Cities area plan.

Land Use

Background

In Minnesota, especially in Pool 2 above the Hastings Lock, there are a great number of individual political units responsible for land use and development on the banks of the rivers. Many of these cities, counties, and townships have developed or are developing ordinances which would restrict further expansion of commercial river transportation. Some communities have land use controls which specifically prohibit terminal, harbor service facility, or fleeting area development on their shores.

Added to the local regulations on shoreline development are the myriad state and federal controls. A considerable portion of the Upper Mississippi River is devoted to wildlife management areas, parklands, and other environmentally sensitive land uses. Much of the land used for these purposes is not available for commercial navigation uses, although some fleeting is permitted in specific areas. With the recent formation of new committees, commissions, and government agency groups charged with studies of river development there are certain to be additional rules and regulations in the near future.

Some proposals for expansion of river freight facilities such as terminals and fleets require significant geographic dispersal. Increasing distances between facilities increases costs and creates an additional financial burden on the system's users. For example, an hour of additional operation time can increase fuel use by as much as 100 gallons. That would add substantially to the costs of moving a barge load of grain to export.

Every study of the upper river has demonstrated the need for increases in harbor facilities and terminal space for certain types of freight. Reductions in freight levels in the last few years have caused questions about the reliability of those forecasts. There is a change evident in the pattern of commodity movements which should answer those questions. An increase in agricultural products and production needs has developed and there is growth in other commodity movements. It is reasonable to expect a continuation of this growth trend and to expect traffic volumes to approach or exceed study forecast freight levels. In fact, the last 2 years have shown traffic volumes at forecast levels. Volumes at or higher than forcast levels would generate a need for expansion of the existing facilities.

Mn/DOT Action

Mn/DOT has participated in the studies, which have demonstrated the need for system expansion. The department has given testimony on a number of occasions supporting the continued effectiveness of the waterway system through the assurance of adequate facility capacity.

Mn/DOT will continue to participate in other study and planning efforts to ensure that the system maintains its efficiency and cost effectiveness. The department will help river communities to be aware of the system's needs and the negative impacts on the state's overall economy, and especially the agricultural economy, that could result from poorly planned and implemented land use regulation.

Harbor Improvement Assistance Program

Background

Many port areas and terminals on Minnesota's commercially navigable waterways are in need of repair, access improvement, equipment replacement in order to ensure effective response to growing demands and improve safety of operations. Many of these needed changes have been deferred because of adverse economic conditions.

Currently, there is a demonstrated need in excess of $30 million for these program needs. That amount will increase with added needs and inflationary trends.

MN/DOT has had in place since 1976 a rail service improvement program which responds to similar needs of the rail transportation industry. In 1991, the Legislature approved a harbor improvement assistance program modeled generally after the rail program.

The harbor improvement program will provide loans, grants or combinations of loans and grants to municipalities, port authorities, and other political entities for needed improvements to public port facilities. Eligible projects will include such things as dock repair, storage area improvement, rail and road access upgrading, equipment repair or replacement, and some capital improvements.

To date through 2001, the Minnesota Legislature has appropriated $9.5 million to the program and four ports. Duluth, St. Paul, Red Wing and Winona have used $9.4million in fifteen rehabilitation projects that will improve the handling of products through each of their facilities.

Mn/DOT Action Proposal
Mn/DOT has supported the authorization of the program by the legislature. Mn/DOT administers and implements the ongoing program. Each Port recommends needed projects with an estimated budget and Mn/DOT selects projects from these needs list to fund. Mn/DOT's Ports and Waterways Section then administers and inspects the project through completion.

Boating Safety

Every year the number of recreational boats using the commercially navigable portions of Minnesota's river system increases. Over the last several years, recreational boats have accounted for more than half of the locking operations at the twelve locks and dams in the state. At Lock and Dam 2 in 2000, recreational lockage represented 59% of the total operations. Aerial surveys made by the Minnesota-Wisconsin Boundary Area Commission and the Minnesota DNR show boat densities in some places that are far in access of accepted safety norms.

With continuing growth in small boat use there are increasing numbers of accidents. In a very few instances these accidents involve towboats and barge tows. Even though the towboat involvement numbers are small, they are significant.

Accident investigations show that half of the small boat accidents involve excessive use of alcohol. There are state laws which treat boating while intoxicated (BWI) the same as driving a car while under the influence. These laws have strong support at all levels of government, and police enforcement efforts and procedures are being strengthened.

The major causes of non-alcohol related recreational boating accidents are inexperience and carelessness. Accidents caused by these two factors can be substantially reduced through new and expanded safety training programs. In 1975, the Minnesota DNR began implementing a new state law which required 13-17 year olds to go through a training program before they could operate boats with power units larger than 24 horsepower. Since 1975 the DNR has trained 89,000 teenagers. In 1991, the legislature revised the law so that training for that age group is required for operation of any powered watercraft.

The towing industry also has an ongoing safety education program, which is directed toward safe boating in and near the commercial navigation channels. Nationally the industry trade organizations produce and distribute pamphlets and videotapes to high schools, marinas, and boating organizations. On the Upper Mississippi River, the towing industry holds regular safety seminars, publishes pamphlets, and distributes videotapes on a local level.

The U.S. Coast Guard and the Coast Guard Auxiliary are also very much involved in safety training as is the Corps of Engineers.

Mn/DOT Actions

The Department has cooperated with the Corps and the industry in the development and distribution of safety pamphlets. Mn/DOT is also a regular participant in safety seminars. Mn/DOT will continue to support and participate in the safety education programs of the industry and the various government units and agencies. Mn/DOT also supports the extension of enforcement efforts controlling boating while intoxicated. Mn/DOT will also support the efforts of the DNR and others to determine effective ways to reduce recreational boat congestion which contribute to potential safety problems on certain sections of the river.

8.3 Zebra Mussels

Background

In the mid-1980's the zebra mussel, a native of Northern Europe, appeared in the Great Lakes. It apparently came into the Great Lakes in the ballast water of salt-water vessels. Since the mid 80's pleasure boats have carried it into the Illinois Waterway. From there all types of vessels into the Mississippi River System have introduced it. Zebra mussels have been found as far north as the lower St. Croix River.

Although, this is not primarily a transportation issue, its spread has great importance to the State of Minnesota and to Mn/DOT because of its link to commercial navigation. Barges appear to be the primary carrier of these creatures through out the Upper Mississippi River.

The zebra mussel is a threat to the native clam populations many of which represent the last concentrations of their species. They also can have a severe impact on water related and water using industries.

Mn/DOT Actions

Mn/DOT will continue to work with the towing industry and the natural resources agencies in their efforts to retard the expansion of the zebra mussel's range. Mn/DOT will continue to work with the U.S. Fish and Wildlife Service in its program of establishing recreational boat cleaning stations.

8.4 Minnesota Legislation

The importance of the commercial waterway navigation system to Minnesota was discussed by the Minnesota House and Senate during the 2001 legislative session. The following Resolution was passed by the Minnesota Legislature and signed by the Governor on May 17, 2001. This legislation is significant in that the Legislature and Governor recognize collectively the need to have a strong waterway transportation system in Minnesota.

H.F No. 208, 2nd Engrossment: 82nd Legislative Session (2001-2002) Posted on May 10, 2001

A resolution
urging authorization of funding for improvement and
rehabilitation of waterways.

WHEREAS, waterway transportation is the most efficient means of transporting bulk commodities, transports more tons per gallon of fuel than either rail or truck while causing fewer accidents, less noise pollution, and fewer fatalities and traffic delays, provides a positive quality of life to the citizens of Minnesota, and is the most environmentally sound mode of transportation available; and

WHEREAS, because of its geographic location, Minnesota is disadvantaged by the distance commodities must travel when transported between Minnesota and domestic and international markets; and

WHEREAS, farm products, petroleum, coal, aggregates, fertilizer, salt, iron ore, metal products, and other bulk commodities needed by agriculture, industry, and the public sector are essential components of commerce and vital to the continued health of our national, local, and state economies; and

WHEREAS, the inland waterway lock and dam system provides recreational and eco-tourism opportunities to Minnesota, a reliable water source of 25 billion gallons per year for residential and industrial use in the Twin Cities area, and a cooling source for power plants which provide over 4,800 Minnesota jobs; and

WHEREAS, our transportation infrastructure enables agricultural products and other exported commodities to compete successfully in international markets and leads toward a favorable balance of trade for our national economy; and

WHEREAS, our waterway transportation infrastructure shares the public waters with the natural environment; and

WHEREAS, the natural environment provides public benefits such as recreation, tourism, domestic and industrial water supply, and scientific and educational opportunities which are also important elements to Minnesota's economy; and

WHEREAS, the Upper Mississippi River is a natural resource of statewide, regional, national, and international importance due to its status as one of the largest floodplain areas in the world, its importance as a migratory corridor for 40 percent of all North American Waterfowl and the sanctuary it provides to more than 200 species of threatened, endangered, or rare plants

and animals; and

WHEREAS, the Great Lakes Seaway serves Minnesota by moving its bulk products to domestic and foreign destinations, amounting to over 65 million tons annually, including 43 million tons of Minnesota iron ore to steel mills in Michigan, Indiana, Ohio, and Pennsylvania; and

WHEREAS, although dredging and maintenance of the seaway system is financed by the users, financing of the new Sault Ste. Marie Lock (owned and operated by United States Army Corps of Engineers) will be shared by the federal government and the eight seaway states on a prorated tonnage basis, requiring an estimated $18 million from the state to be paid over a 50-year period; and

WHEREAS, the inland waterway system moves 17 million tons of bulk commodities annually between Minnesota and the eastern seaboard and Gulf states, including approximately 10 million tons of agricultural products exported through gulf ports; and

WHEREAS, dredging and maintenance costs of the inland waterway are paid out of federal funds, and financing of capital improvements to the inland waterway system is 50 percent from federal funds and 50 percent from the Inland Waterways Trust Fund, funded by a 20 cent per gallon fuel tax paid by waterway shippers; and

WHEREAS, the river industry has been taxed on fuel since 1980, and since the Inland Waterways Trust Fund was instituted in 1986, the Upper Mississippi River basin has contributed 40 percent of the funds and received only 15 percent return for capital improvements, making the Upper Midwest a tax donor region to the Ohio River valley and others; and

WHEREAS, the Port Development Assistance Program is the vehicle to rehabilitate Minnesota's public ports on the Mississippi River and Lake Superior; and

WHEREAS, this program updates and improves the operation and efficiency of the ports to keep them viable and competitive; and

WHEREAS, the 1996, 1998, and 2000 Minnesota legislatures appropriated funds for this program, and the 2001 legislature will be requested to appropriate an additional $3 million to this program; NOW, THEREFORE,

BE IT RESOLVED that the Minnesota Legislature supports Minnesota's pro rata participation in financing new construction at the Sault Ste. Marie Lock.

BE IT FURTHER RESOLVED that the Legislature formally recognizes the Upper Mississippi River as a river of statewide significance for natural, navigational, and recreational benefits.

BE IT FURTHER RESOLVED that the Legislature recognizes the critical habitat restoration and rehabilitation needs on the Upper Mississippi River.

BE IT FURTHER RESOLVED that the Legislature recognizes the importance of inland waterway transportation to Minnesota agriculture and to the economy of the state, the region, and the

nation and urges Congress to authorize funding to improve transportation efficiency and restore the ecological values of the Upper Mississippi River System.

BE IT FURTHER RESOLVED that the Legislature supports the continued funding of the Port Development Assistance Program in recognition of the essential and fundamental contribution the Great Lakes and inland waterway transportation systems make to Minnesota's economy and to sustainable environmental programs.

BE IT FURTHER RESOLVED that the Secretary of State of the State of Minnesota is directed to prepare copies of this memorial and transmit them to the President and the Secretary of the United States Senate, the Speaker and the Clerk of the United States House of Representatives, the chair of the Senate Committee on Commerce, Science, and Transportation, the chair of the House Committee on Transportation and Infrastructure, and Minnesota's Senators and Representatives in Congress.