



**US Army Corps
of Engineers**

Lower Mississippi Valley
Division

Mississippi River
Commission



**MISSISSIPPI
RIVER
NAVIGATION**

HISTORY

No river has played a greater part in the development and expansion of America than the Mississippi. Since the first person viewed this mighty stream, it has been a vital factor in the physical and economic growth of this country. It has stood in the path of discoverers, challenging their ingenuity to cross it. It has fired the imaginations of explorers, luring them on to seek out its mysteries. And always it has stood in the minds of practical men as the key to westward expansion, an economic prize to be sought and held at all cost. As such, it has been fought over on the battlefield and used as a pawn in diplomatic exchanges.

Coursing in a buttonhook pattern out of tiny Lake Itasca in northern Minnesota, it twists and turns through the land of the Chippewa, 2,348 miles south through the heart of the United States. It sweeps past Minneapolis and St. Paul, growing larger as tributaries add their flows. It is joined by the Missouri north of St. Louis and receives the waters of the Ohio at Cairo, Ill. Here it becomes the Lower Mississippi, a river giant, unequaled among American waters. Flowing south, it touches romantic river towns—Memphis, Greenville, Vicksburg, Natchez, Baton Rouge, and New Orleans. Almost a thousand river miles south of Cairo, it pours its torrent into the Gulf of Mexico.

DISCOVERY

Columbus may have been the first European to view the Mississippi River. An "Admiral's Map" in the Royal Library at Madrid, said to have been engraved in 1507, shows the mouth of the river, then called "The River of Palms." But this is conjecture.

In 1541, Hernando DeSoto viewed the Mississippi at a point near or just below Memphis, Tenn. DeSoto died in April 1542, but his followers continued the explorations. The historian of the expedition, Garcilaso de la Vega, described the Mississippi as in a flood of great severity and of prolonged duration, beginning about March 10, 1543, and reaching its peak about 40 days later. The flooded areas were described as extending for 20 leagues on each side of the river.

One hundred and twenty years later, Joliet and Marquette explored the river, traveling from its upper reaches to a point near Arkansas City, Ark. Soon after, LaSalle descended the greater portion of its length to its mouth. In 1699, d'Iber-

ville entered the mouth of the river and at a point near Old River received a letter from an Indian chief previously left there by LaSalle.

EARLY NAVIGATION

Within a few years, French traders had settled along the Mississippi River and had penetrated the territory of the Natchez Indians.

In 1705, the first cargo was floated down the river from the Indian country around the Wabash, now the States of Indiana and Ohio. This was a load of 15,000 bear and deer hides brought downstream and out through Bayou Manchac, just below Baton Rouge, and Amite River, then through Lake Maurepas and Lake Pontchartrain to Biloxi, with final destination in France. This route is not now open, Bayou Manchac having been closed with construction of the Mississippi River levee system.



Fort Rosalie, the first permanent white settlement on the Mississippi River and now called Natchez, was built by the French in 1716. Bienville founded New Orleans in 1718, and four years later this city was made the capital of the region known as Louisiana.

The rapid growth of New Orleans, in its early days and even now, was due principally to its position near the mouth of the river. Navigation grew and developed with the settlement of the lower Mississippi Valley.

The canoes of the Indians soon proved inadequate for the needs of the settlers. The flatboats and rafts which succeeded them were one-way craft only. Loaded at an upstream point, they were floated downriver and their cargoes were unloaded, then they were dismantled and sold for

lumber. Built for one trip only, they were cheap and often poorly constructed, but carried large quantities of merchandise at a time when transportation was vital to the growing valley.

The keelboat was the first queen of the river trade. A two-way traveler, it was long and narrow with graceful lines, built to survive many trips. A keelboat could carry as much as 80 tons of freight. Floated downriver, it was "Cordelled" up the stream. This called for a crew of tough and hardy men, for cordelling was a process by which a crew on the bank towed the keelboat along against the current.

STEAMBOAT NAVIGATION

Invention of the steamboat in the early nineteenth century brought about a revolution in river commerce. The first steamboat to travel the Mississippi was the *New Orleans*. Built in Pittsburgh in 1811 at the cost of \$40,000, she was a side-wheeler 116 feet long and 371 tons. She was taken to New Orleans by Nicholas Roosevelt, a relative of the presidents. On her maiden voyage, the *New Orleans* was caught in a series of tremors known as the "New Madrid Earthquake," probably the worst nonvolcanic earth shock in American history. Nevertheless, she continued downriver on a nightmarish trip to become the first steamboat to travel the Mississippi, arriving in New Orleans Jan. 12, 1812. She was then placed in service between New Orleans and Natchez. Two years later she hit a stump and sank.

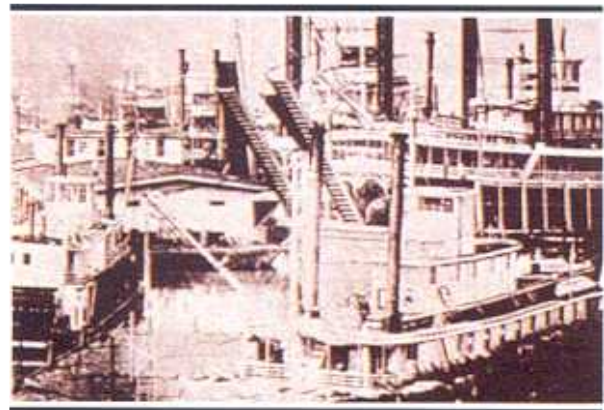


In December 1814, Capt. Henry M. Shreve brought a cargo of supplies for Gen. Andrew Jackson's army from Pittsburgh to New Orleans in his side-wheeler, the *Enterprise*. He climaxed

his trip by running the British batteries below New Orleans to deliver military supplies to Fort St. Philip. (While Robert Fulton is usually given credit for development of western steamboats, Shreve worked out structural and mechanical modifications without which the steamboat would have been useless in the west. Shreve was also instrumental in breaking the monopoly of Fulton on the Mississippi.)

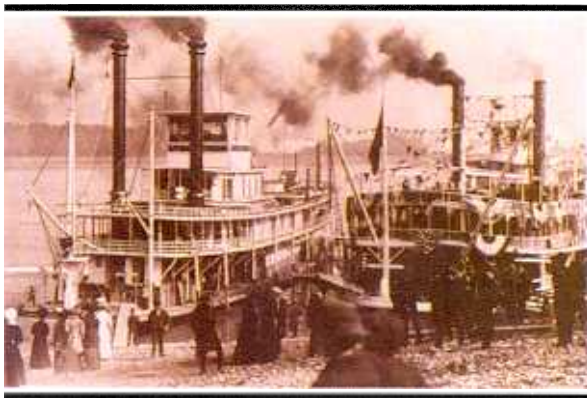


Although steamboats were in service between New Orleans and Natchez, they had not yet traveled far upriver. Shreve met this challenge with his *Washington*, built in 1816 at Wheeling, W. Va. It had a flat, shallow hull and a high-pressure engine. In 1817, the *Washington* made the round trip from Louisville to New Orleans and return in 41 days.



The golden era of the paddle-wheeler had begun. Where in 1814 only 21 steamboats arrived in New Orleans, in 1819 there were 191; in 1833 more than 1,200 steamboat cargoes were unloaded.

Some steamboats were operating on the Mississippi and Ohio, mostly between New Orleans and Louisville. In 1817 there were 14; in 1819, 31. But the appearance of the steamboat on the Mississippi River above the mouth of the Ohio was delayed for several years: In August of 1817, the *Zebulon M. Pike* made the trip up the river to St. Louis. Three years later, the *Western Engineer* made a trip from St. Louis up the Missouri River and later a part of the way up the Mississippi above St. Louis. In April 1823, the *Virginia* left St. Louis bound for scattered posts up the Mississippi. Twenty days and 683 miles later, the *Virginia* docked at Fort Snelling, Minn., at the confluence of the Minnesota and Mississippi Rivers, the first steamboat to make this trip.



By 1830, the steamboat age had come to the upper Mississippi, and by 1840, there was heavy river commerce between St. Louis and the head of navigation at St. Anthony's Falls (vicinity of St. Paul).

Not only could the steamboat haul freight, but it had comfortable accommodations for passengers. Even more important, it could travel upstream almost as easily as it traveled downstream. In the period preceding the Civil War, its decks carried cotton and other produce to market; it brought back the staples and the fineries available only from outside the region; and it brought visitors from afar and furnished transportation to other sections of the country. Steamboat travel was hazardous and irregular in the early years. Although it furnished faster, more dependable, and more useful transportation, it left much to be desired during its early period of development.

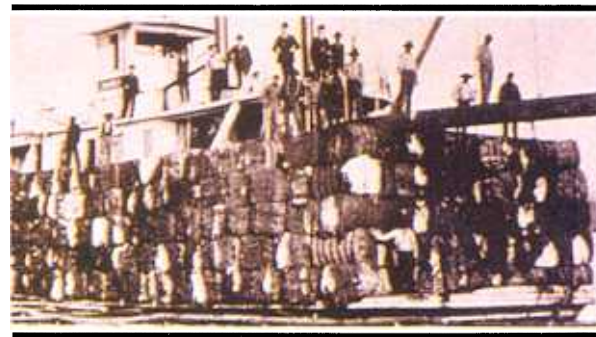
Before the invention of the steamboat, a trip from Louisville to New Orleans often required 4 months. In 1820, the trip was made by steamboat in 20 days. By 1838, the same trip was being made in 6 days.

In 1814, the *Orleans* made the 268-mile trip from New Orleans to Natchez in 6 days 6 hours 40 minutes. In 1880, the *Robert E. Lee* made the trip in 17 hours 11 minutes.

These boats were by no means small by Mississippi River standards. The *Lee* was 300 ft long and 1,467 tons, while the *Natchez* was 301.5 ft long and 1,547 tons. They were both longer than the *Sprague*, the largest paddle-wheel towboat ever built, and one had greater tonnage.



The famous race between the *Robert E. Lee* and the *Natchez* was made in July 1870 from New Orleans to St. Louis, 1,278 river miles. This was won by the *Lee* with a time of 3 days 18 hours 14 minutes.



The packet boat brought a phenomenal increase in traffic. In 1834, there were 230 packets; by 1849, there were about 1,000, approximating a total of 250,000 tons. The packet continued to be the principal means of transportation in the Mississippi River Valley until the latter part of the nineteenth century; then, more and more of the commerce began to be diverted to the expanding railroads. River commerce seemed to have died almost completely.

In 1907, the *Sprague* set a world's all-time record for towing—60 barges of coal, weighing 67,307 tons, covering an area of 6-1/2 acres, and measuring 925 feet by 312 feet.



The *St. Louis* arrived in New Orleans in 1931 with 28,200 bales of cotton on eight barges and three other barges of grain and merchandise. This is supposed to be the largest cotton tow that ever traveled the Mississippi River. The steamboat era was ending due to the introduction of modern, diesel-driven vessels with greater towing power some 30 years earlier.

FEDERAL PARTICIPATION IN WATERWAYS DEVELOPMENT

In 1820 Congress began addressing the navigational needs of the nation's interior by authorizing a reconnaissance of the Mississippi and Ohio rivers. It was made by Captains H. Young and W. T. Poussin, and Lt. S. Tuttle of the Engineer Corps of the Army. Fieldwork, begun in 1821, extended from Louisville to the mouth of the Ohio River and from St. Louis to New Orleans on the Mississippi. Also, in 1821, two Engineer officers, Brig. Gen. Simon Barnard and Maj. Joseph G. Totten, were detailed to make a thorough investigation of the Mississippi and Ohio Rivers. Their report, submitted the following year, contained observations on the physical characteristics of the rivers and gave considerable attention to the formation and removal of snags. Legislation was enacted in 1824 directing the removal of snags and other obstructions from the channels of the rivers.

In 1831, a bold attempt was made to improve navigation conditions at the mouth of the Red River by an artificial cutoff, proposed by Capt. Henry M. Shreve. A second cutoff was made at Raccourci Bend, several miles below, by Louisiana in 1848.

Improvements at the Mouth

Improvement of the mouth of the Mississippi River for seagoing navigation was first undertaken by Congress in 1837, with an appropriation made for an accurate survey of the passes and bars at the river's mouth. This survey was conducted by Capt. A. Talcott, Corps of Engineers, and finished in 1838. He recommended a plan for deepening the bars by dredging, but a lack of necessary funds prevented substantial progress on his project.

By 1850, the growing river commerce, together with increasing destruction caused by floods, was creating demand for Federal participation in navigation improvements and flood protection.



In 1850, the Secretary of War, conforming to an Act of Congress, directed Charles Ellet Jr., an engineer, to make surveys and reports on the Mississippi and Ohio Rivers with a view to the preparation of adequate plans for flood prevention and navigation improvement. His report was most complete, and it exercised considerable influence on later thought.

Also in 1850, Congress appropriated \$50,000 for the preparation of a topographic and hydrographic survey of the delta of the Mississippi and for investigations to determine the most practicable plans for flood control and navigation improvements at the mouth of the river. But it was not until 1861 that Capt. A. A. Humphreys and Henry L. Abbott, of the Corps of Engineers, were able to complete their field investigations and submit their now-famous "Report Upon the Physics and Hydraulics of the Mississippi River; Upon the Protection of the Alluvial Region Against Overflow; and Upon the Deepening of the Mouths." While this report dealt primarily with flood control, it did consider the navigation problem in considerable detail and was a great step

forward in the development of river engineering in the United States.

Jetty System

Meanwhile, the problem of keeping the river's mouth open to oceangoing traffic was one of serious growing concern to the Nation. Congress appropriated \$75,000 in 1852 for improving the channel at the mouth of the river by contract.



It was not until 1867 that dredging operations were resumed at the mouth of the Mississippi River, but still the vexing problem was not solved. No significant progress had been made by 1873 when Capt. James B. Eads, a famous construction engineer, advocated a system of parallel jetties. He offered to open the mouth of the river by making a jetty-guaranteed channel 28 feet deep between Southwest Pass and the Gulf at his own risk. If he succeeded, his fee would be \$10,000,000.

After much debate, in 1875 Eads was directed to begin his work, in South rather than Southwest Pass. He faced a difficult task, complicated by the existence of yellow fever and unfavorable financial arrangements; however, he pushed the project to completion. On July 8, 1879, a 30-foot channel was officially declared to exist at the mouth of the Mississippi.

Levee System Advocated

The importance of the Mississippi River to the Nation had, by now, become firmly established. Congress had shown an increasing interest in flood control and navigation problems on the Mississippi, and legislation designed to improve this mighty stream for the use of the Nation was

rapidly taking form. In 1874, Congress had authorized certain surveys of transportation routes to the seaboard. Among these was reconnaissance of the Mississippi River from Cairo to New Orleans, made under the direction of Maj. Charles R. Suter, an officer of the Corps of Engineers.



Five years later, a board of Engineer officers concluded that a complete levee system would aid commerce during periods of high water only. Their conclusion is noteworthy for considering flood control and navigation improvements as part of the same problem.

Mississippi River Commission

In that same year, 1879, on June 28, the Mississippi River Commission was created by Act of Congress as an executive body reporting to the Secretary of War. The Commission is composed of seven men nominated by the President of the United States and confirmed by the Senate.

Since the enactment of the Flood Control Act of May 15, 1928, the Commission has served as an advisory and consulting—rather than executive—body responsible to the Chief of Engineers, U.S. Army. The general duties of the Commission include the recommendation of policy and work programs, the study of and reporting upon the necessity for modifications or additions to the flood control and navigation project, recommendation upon any matters authorized by law, making inspection trips, and holding public hearings. The work of the Commission is directed by the President of the Commission, acting as its executive officer, and carried out by U.S. Army Engineer Districts at St. Louis, Memphis, Vicksburg, and New Orleans.

Lower Mississippi Valley Division

The President of the Commission also serves as Division Engineer, U.S. Army Engineer Division, Lower Mississippi Valley, headquartered in Vicksburg. The jurisdiction of this Division extends from about Hannibal, Mo., to the Gulf of Mexico. Work within the Division is carried out by the Engineer Districts listed above.



Improvements for Navigation

In 1896, Congress authorized a navigation channel 9 feet deep and 250 feet wide at low water between Cairo and Head of Passes. In 1928, the width was increased to 300 feet, and in 1944, the authorized channel depth from Cairo to Baton Rouge was increased to 12 feet at low water, with the authorized width remaining at 300 feet. (The 12-foot channel is to be obtained by a program of bank stabilization and maintained by dredging. Progress is being made on developing this channel, and a 9-foot depth is now being maintained.)

Early improvements of the Mississippi River above Cairo consisted mostly of removal of snags and closure of sloughs to confine low-water flows to the main channel.



Then in 1907, Congress adopted a project depth of 6 feet between the Missouri River just above St. Louis and Minneapolis, to be obtained by dredging and the construction of wing dams to contract the low-water channel.

As development of inland navigation continued, it became apparent that a depth of 6 feet on the upper Mississippi would not allow it to keep pace with the growing traffic on the 9-foot channels of the lower Mississippi and the Ohio. In 1930, following a careful study of the merits of improvement of the river, Congress authorized construction of a 9-foot channel between Minneapolis and the mouth of the Illinois River, just above St. Louis, providing for the construction of locks and dams. The act was modified in 1932 to provide for some modifications to the improvement plan. Since that time, additional modifications have been made to the basic project.

Under the plan of improvement, 36 locks and 29 dams were constructed. There are no locks and dams below St. Louis.

After the mouths of the Mississippi River had been opened and maintained in a navigable state, Congress authorized in 1945 the development of a navigation channel for oceangoing traffic in the lower reaches of the river. The depths and widths of the channel between Baton Rouge and the Gulf of Mexico are:

Baton Rouge to New Orleans—40 by 500 feet
Port of New Orleans—35 by 1,500 feet, with portion
40 by 500 feet
New Orleans to Head of Passes—40 by 1,000 feet
In Southwest Pass—40 by 800 feet
In Southwest Pass Bar Channel—40 by 600 feet
In South Pass—30 by 450 feet
In South Pass Bar Channel—30 by 600 feet
Mississippi River-Gulf Outlet—36 by 500 feet
Mississippi River-Gulf Outlet Bar Channel—38 by
600 feet

RIVER COMMERCE

During World War II, Mississippi River transportation assumed an even more important role than ever before. The principal commerce on the lower Mississippi River consisted of the upstream movement of gasoline, oil, sulphur, and other products and materials vital to the war effort. In addition, 3,943 Army and Navy craft and other vessels for use in the war—destroyer escorts, fleet submarines, landing craft, freighters, tankers, and oceangoing tugs—moved from inland shipyards down the Mississippi to the sea.

Without question the Nation's principal river, the Mississippi, is the main stem of a network of inland navigable waterways maintained by the U.S. Army Corps of Engineers, which form a system of about 12,350 miles in length, not including the connecting Gulf Intracoastal Waterway (of around 1,300 miles) and its connecting inland and Gulf Coast streams. This giant waterways system includes the Ohio, Missouri, Illinois, Arkansas, and Tennessee Rivers, among others. It extends into the agricultural midwest and the industrial east, making Memphis, Vicksburg, and New Orleans close neighbors of Pittsburgh, Kansas City, and Chicago.

The port of New Orleans is the number one grain port in the world and the number one port in the United States.

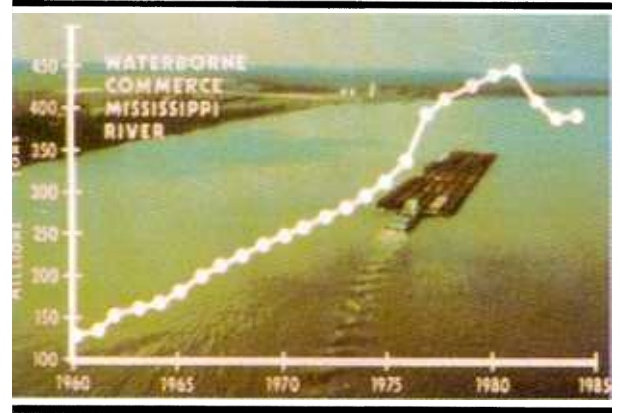
Contributions to Development

The rapid growth in river traffic may be traced to many interdependent factors. One of the most important is the great improvement in the towboats and barges themselves. Carefully conducted research projects and much prototype experimentation have accounted for significant developments in transportation methods. Modern steel barges have a capacity of three or four times that of one packet boat. The average modern steam or diesel towboat may push as many as twenty 1,000-ton steel barges at one time.

Integrated tows, developed several years ago, are becoming more and more numerous on the Mississippi. Made up of a bowpiece, a number of square-end barges, and a towboat, the entire unit is lashed together to form one streamlined vessel. The integrated tows vary in size; but one of the largest is nearly 1,200 feet long—longer than the largest ocean liner afloat. This tow often carries 200,000 barrels (35,000 tons) of petroleum products.

Towboats have become larger and much higher powered. For example, in the recent past the average towboat had about 500 horsepower.

Today, the average is about 3,000 horsepower, with some towboats operating with more than 10,500 horsepower. Powered by three marine diesel engines—each rated at 3,500 horsepower—the new boats measure 190 by 54 by 12-1/2 feet. They are driven by three 10-foot-diameter five-bladed stainless steel propellers, housed in Kort nozzles. These boats are working the fast-flowing, lock-free lower Mississippi River where tows of 40 or more barges with total carrying capacity of 50,000 to 60,000 tons of cargo consisting primarily of steel, ores, grain, petroleum products, and chemicals can be handled.



Waterborne commerce on the Mississippi has risen from 30 million tons in 1940 to approximately 400 million short tons in 1984. This heavy commercial traffic includes grains, coal and coke, petroleum products, sand and gravel, salt, sulphur and chemicals, among others.

THE MISSISSIPPI RIVER SYSTEM

The importance of maintaining a safe navigation channel assumes great significance when the role of the Mississippi River as the main stem of the vast inland waterways system is taken into account. With completion of the Ohio River canalization in 1929, the Upper Mississippi River canalization in 1940, and enlargement of the Intra-coastal Waterway in 1943, a vast network of waterways for barge traffic was provided.

The 12-foot-deep Intracoastal Waterway system extends from New Orleans westward to the Mexican border, connecting the Mississippi River through Algiers and Harvey Locks with the important coastal harbors of Morgan City and Lake Charles, La., and Beaumont, Port Arthur, Galves-

ton, Houston, Freeport, Corpus Christi, and Brownsville, Tex. Eastward from New Orleans through the Industrial Lock, the 12-foot depth of the Intracoastal Waterway extends 400 miles to Apalachee Bay, Fla., joining the Lower Mississippi with the seaports of Gulfport, Miss., Mobile, Ala., and to Birmingham, near Birmingham, through the Tombigbee-Black Warrior system.



An alternate connection from the Mississippi River to the Gulf Intracoastal Waterway is provided by an improved 12- by 125-foot channel from Port Allen to Morgan City. At Port Allen, opposite Baton Rouge, a navigation lock 1,200 feet long and 84 feet wide provides passage through the west bank levee system to the Intracoastal Waterway.

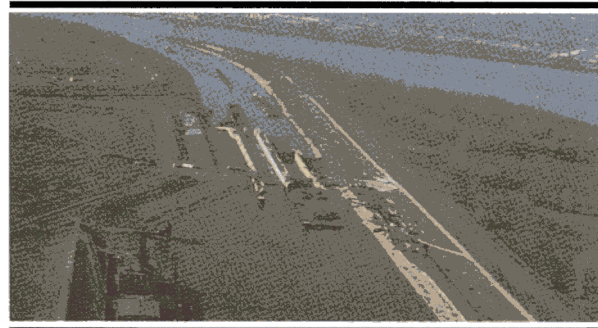
The Atchafalaya River project provides barge transportation with a 12- by 125-foot channel connecting the Mississippi by a 75- by 1,200-foot lock in Old River with the Gulf Intracoastal Waterway at Morgan City. This year-round route is 175 miles shorter for barge transportation moving from the Texas and West Louisiana areas to the upper Mississippi and Ohio Rivers.

The Mississippi River-Gulf Outlet, completed in June 1965, is a dredged channel from New Orleans southeast to the Gulf of Mexico. The 76-mile waterway is shorter and easier to navigate than the Mississippi River and is free of floating debris and swift currents common to the river.

From Cairo to Pittsburgh, 980 miles, a depth of 9 feet is available through the system of locks and dams on the Ohio River.

The 9-foot depth extends 90 miles up the Monongahela and 72 miles up the Allegheny from their confluence at Pittsburgh. From its junction with the Ohio River, the Kanawha has a 9-foot depth for 90 miles. Six-foot navigation extends up the Cumberland River to Nashville, and on the Tennessee River the 9-foot-deep system extends to Knoxville.

North from Cairo, there is an 858-mile, 9-foot-deep channel to St. Paul-Minneapolis through a regulated channel and a system of locks and dams.



The rich coal- and grain-producing regions of southern Illinois will be reached soon by another artery in the Mississippi River system as the Kaskaskia River navigation project becomes fully operational.

The Great Lakes and the Mississippi are joined by the 9-foot-deep Illinois Waterway, extending from Chicago to Grafton, Ill.



On the Missouri River, which flows into the Mississippi just above St. Louis, a 9-foot depth is authorized from the Mississippi to Sioux City, Iowa. A channel is maintained to a 7-foot depth to Kansas City, Mo., and 6.5-foot depth as far as Omaha, Nebr.

The Red River Waterway, now under construction, and the Ouachita-Black rivers navigation systems connect with the Atchafalaya River project and the Mississippi River to extend 9-foot navigation northward along the Red River to northwest Louisiana and eastern Texas and via the Ouachita-Black rivers through eastern Louisiana and southern Arkansas.