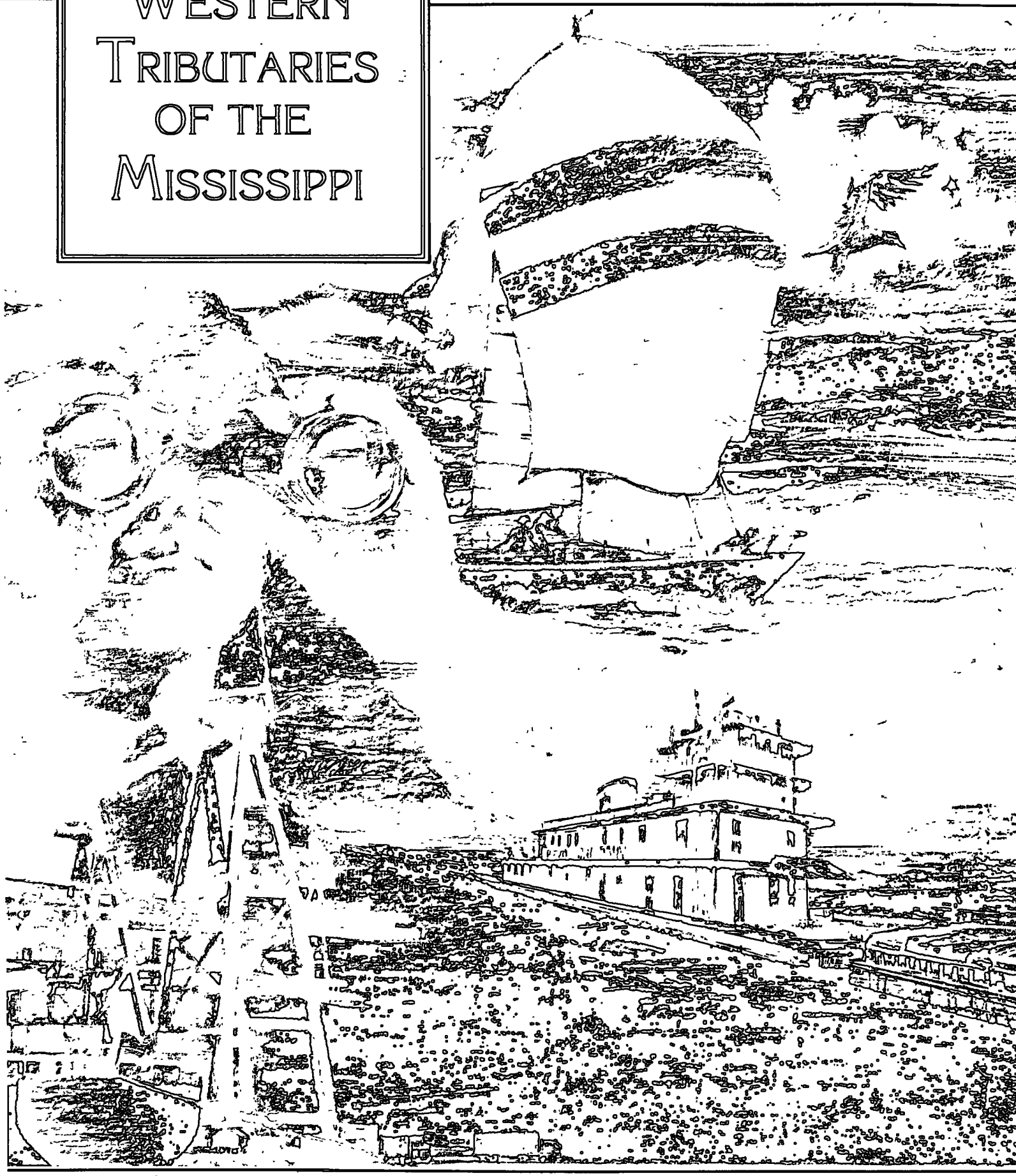
Western Tributaries of the Mississippi



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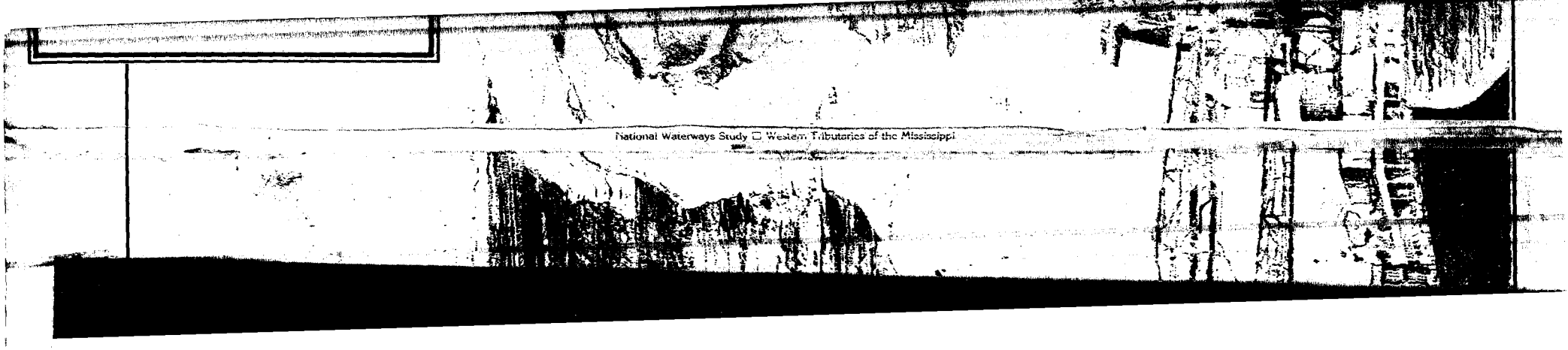
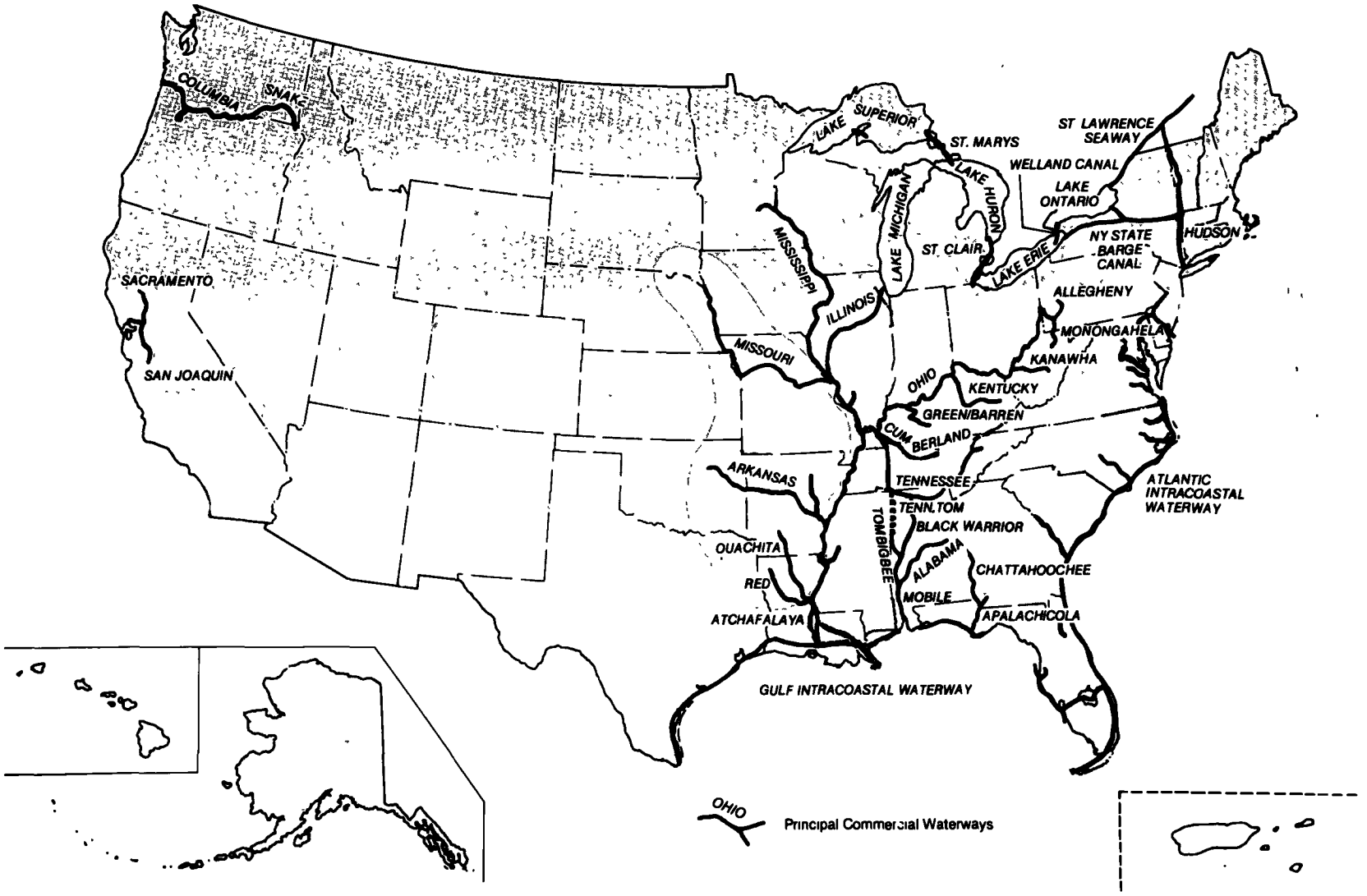


THE NATIONAL WATERWAYS
WESTERN TRIBUTARIES OF THE MISSISSIPPI RIVER



WESTERN TRIBUTARIES OF THE MISSISSIPPI

D. Clayton Brown

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National Waterways Study □ U.S. Army Engineer Water Resources Support Center □ Institute for Water Resources

AUTHORITY FOR THE NATIONAL WATERWAYS STUDY

The Congress authorized the National Waterways Study (NWS) and provided the instructions for its conduct in Section 158 of the Water Resources Development Act of 1976 (Public Law 94-587):

> The Secretary of the Army, acting through the Chief of Engineers, is authorized and directed to make a comprehensive study and report on the system of waterway improvements under his jurisdiction. The study shall include a review of the existing system and its capability for meeting the national needs including emergency and defense requirements and an appraisal of additional improvements necessary to optimize the system and its intermodal characteristics. The Secretary of the Army, acting through the Chief of Engineers, shall submit a report to Congress on this study within three years after funds are first appropriated and made available for the study, together with his recommendations. The Secretary of the Army, acting through the Chief of Engineers, shall upon request, from time to time, make available to the National Transportation Policy Study Commission established by Section 154 of Public Law 94-280, the information and data developed as a result of the study.

PREFACE

This pamphlet is one of a series on the history of navigation done as part of the National Waterways Study, authorized by Congress in Public Law 94-587. The National Waterways Study is an intensive review by the Corps of Engineers' Institute for Water Resources of past, present, and future needs and capabilities of the United States water transportation network. The Historical Division of the Office of the Chief of Engineers supervised the development of this pamphlet, which is designed to present a succinct overview of the subject area.

John T. Greenwood

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Chief, Historical Division

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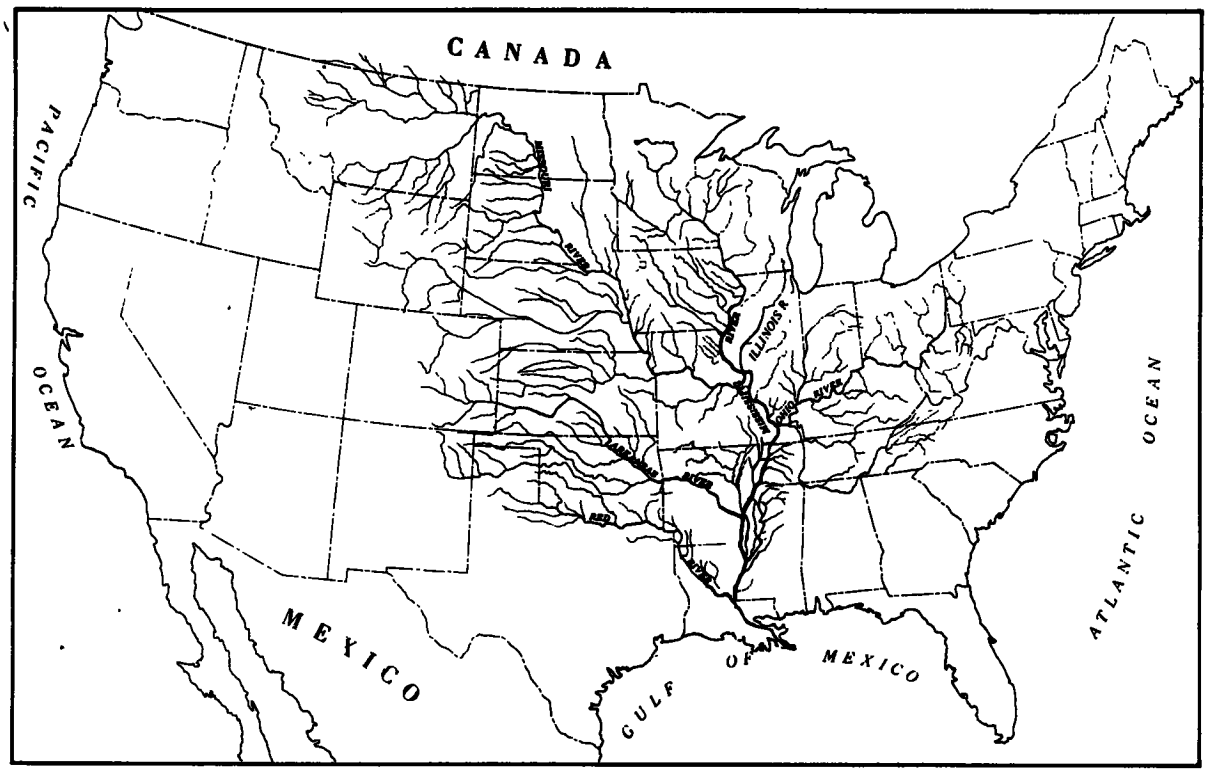
MISSISSIPPI RIVER WATERSHED



Chapter I

THE MISSOURI RIVER

From its source near Three Forks, Montana, at an elevation of 4,000 feet, the Missouri River flows northward, passing the Canyon Ferry Dam near Helena and turning eastward through a deep gorge called Gates of the Mountains. Early pioneers appropriately named the latter site because it creates an illusion that the rock opens to let the river through. After that point, the stream flows onto a plateau where large-scale wheat farming prevails; a single farmer may till thousands of acres. Approaching Fort Peck Dam in northeastern Montana, the Missouri is joined by the Yellowstone River, its biggest tributary. Through the rest of Montana and North Dakota, the Missouri passes over flat land where, in the past, it washed away its banks and even changed its course slightly, creating oxbow lakes. In North Dakota, where grain fields and pastures share the land, the river goes through Garrison Dam and passes alongside Bismarck, the state capital.

Through South Dakota the river flows south and southeast, passing the city of Pierre and providing water for the following reservoirs: Oake, Big Bend, Fort Randall and Gavins Point. Downstream, the Missouri forms part of the boundary line between South Dakota and Nebraska, Nebraska and Iowa, and Kansas and Missouri. In the past when the river changed course, it played havoc with state boundaries and perplexed county tax collectors. In 1950, for example, President Harry S. Truman signed a bill rectifying an old boundary between Kansas and Missouri.

At Kansas City, Missouri, the stream turns eastward, flowing past Jefferson City and emptying into the "father of waters" at Missouri Point, about fifteen miles north of St. Louis. Elevation at that junction is 400 feet. The total length of the Missouri River is 2,315 miles, only thirty-three miles shorter than the Mississippi. Admirers of the Missouri point out, however, that three rivers, the Red Rock, Beaverhead and Jefferson, form a continuous 249-mile river path to the source of the Missouri, and the combined length of that path and the Missouri is 2,564 miles, making it the longest in the United States.

Major Montana tributaries of the Missouri are the Marias, Milk, Musselshell and Yellowstone rivers. The Yellowstone in particular deposits a large amount of silt in the Missouri, which partly accounts for the latter's nickname, the Big Muddy. In North Dakota the Little Missouri River joins the main stem; the Cheyenne, White and James rivers join in South Dakota; the Niobrara and Platte rivers join in Nebraska; the Big Sioux and Little Sioux in Iowa; the Kansas River in Kansas; and the Osage River in the state of Missouri. Most of the water in the Missouri River originates as snow in the Rocky Mountains or the flat plains.

Much colorful history surrounded the Missouri River because it served as the pathway for mountain men, fur trappers and settlers into the Great Plains and upper Rockies. In 1673 Father Jacques Marquette, a Jesuit missionary, and Louis Jolliet, a Quebec-born geographer, were the first white men to see the river. Paddling their canoes southward on the Mississippi, they approached the confluence of the two giants; Marquette later described what he saw.

> As we were gently sailing down the still clear water, we heard a noise of a rapid into which we were about to fall. I have seen nothing more frightful, a mass of large trees entire with branches, real floating islands came from [the Missouri], so impetuous that we could not without great danger expose ourselves to pass across. The agitation was so great that the water was all muddy and could not get clear.[1]

French fur traders were the first to ply the waters of the Missouri, and they established the outpost of St. Louis in 1764. These traders had little impact on the river, but they did open the fur trade.

Exploration of the Missouri by the United States began with the Louisiana Purchase in 1803. President Thomas Jefferson unexpectedly received the opportunity to purchase the Louisiana Territory when French Emperor Napoleon I offered it for sale. Jefferson took advantage of the offer, and the United States acquired the whole Missouri River basin plus additional areas for $15,000,000. Jefferson quickly secured an appropriation from Congress to fund an expedition into the territory. He chose his private secretary, Captain Meriwether Lewis, to command the expedition. Lewis asked Lieutenant William Clark to join him as deputy commander. Their party left from the mouth of the Missouri River in May 1804 and returned to St. Louis in September 1806. The Lewis and Clark expedition, famous in the annals of American history, was the first official exploration of the stream.[2]

Lewis and Clark started their journey in a keelboat and two smaller vessels. They traveled up the Missouri, using a small sail as often as possible. Near the present city of Bismarck, they camped for the first winter with Mandan Indians. Along the way they made notes of their discoveries and observations and reported "new" animals such as the prairie dog, jackrabbit, pronghorn and mountain sheep, and grizzly bear.

When spring came they resumed the trip up the river until impeded by the Great Falls in Montana. It took about three weeks for the party to transport the boats and cargo around the falls. After reaching the Missouri's headwaters, they continued westward and reached the Pacific Ocean on November 7, 1805. On the return trip the members of the expedition party retraced their steps, except for Lewis who made a reconnaissance of the Marias River while Clark descended the Yellowstone to its confluence with the Missouri. Their expedition had great significance for future explorers and travelers, and

throughout their notes they described the shifting Missouri River with its numerous sandbars and course changes.

The use of the Missouri River by fur traders also helped to open the way for settlement of the basin. A former seaman, Manuel Lisa, gained early fame for his skill at navigating the Big Muddy. Lisa raced Wilson P. Hunt up the river to get a monopoly of the Sioux fur trade; Lisa represented the Missouri Fur Company, Hunt represented Astor's American Fur Company. Lisa's difficulties with creditors gave Hunt a nineteen-day headstart from St. Charles, the starting point. Lisa finally left in a keelboat equipped with a deck, cabin, sails, and a hawser for towing the boat upriver by hand.

Fighting extreme odds, Lisa pushed his men relentlessly, forcing them at times to tow the boat at night. The wind helped when it was in the right direction because Lisa had a mast and topmast with a square mainsail and a topsail. Oars were also used. Through bad weather, hostile Indians, and some bad luck, Lisa and his crew overtook Hunt and reached the Sioux, traveling 1200 miles up the Missouri in sixty-one days. His record stood, driving a keelboat upstream at the rate of eighteen miles per day. Other keelboats appeared, and nearly all used sails in some respect, but it was only a short time until the golden era of steamboat navigation of the river started.[3]

In 1807 Robert Fulton demonstrated the use of steam with his boat, Clermont, on the Hudson River. In 1817 the steamer Zebulon Pike ascended the Mississippi to St. Louis. Interest in steamboat navigation of the Missouri arose immediately, but the idea appeared impossible because of the debris floating downstream--gigantic trees, brush, blocks of ice and even animal carcasses. Frequently the debris formed into "wing dams" or "rafts" blocking the river. Keelboat crewmen regarded steamboat travel an impossibility on the Missouri River.[4]

Colonel Elias Recter disagreed. In 1819 he started a steamboat company, purchased a vessel named Independence and left St. Louis with a cargo of flour, whiskey, sugar and various commodities. He reached Franklin, Missouri, and from there ascended the Chariton River to Chariton, Iowa. That same year the United States Army instructed General Henry W. Atkinson to lead an expedition up the river from St. Louis by steamboat for the purpose of establishing a military post at the mouth of the Yellowstone. Three of Atkinson's steamboats, Thomas Jefferson, R.M. Johnson, and Expedition encountered problems. The Jefferson hit a snag and sank at the mouth of the Osage River. The Johnson and Expedition were unfit for the river and had to turn back. But the Western Engineer trudged onward. Having been constructed expressly for the Missouri River, the Engineer was a sternwheeler and only drew nineteen inches unloaded.[5]

The Western Engineer went as far as one of Manuel Lisa's fur trading posts located about nine miles from Council Bluffs. It returned to St. Louis

the next year. From a military view, the expedition failed to reach its objective, but the exercise encouraged further steamboat navigation at least as far as the mouth of the Platte River. Navigation of the Missouri was slowly becoming a reality.

For a short time after the Western Engineer's voyage, keelboats remained the predominant means of navigating the Missouri. Beginning in 1830, however, the short-lived keelboat era came to an end with the construction of the Yellowstone, commissioned by the American Fur Company specifically for the Missouri River. It was a sidewheeler with one boiler and engine. Its overall length was 130 feet, and it had a 19-foot beam, but it drew 6 feet of water, too deep for the river. In April, 1831, the Yellowstone departed from St. Louis for the Yellowstone River, but only reached Fort Tecumseh near Pierre, South Dakota. On the return voyage it carried buffalo hides and furs back to St. Louis, making a successful and profitable trip. In 1833 the vessel made a round trip to Fort Union, located just east of the present North Dakota-Montana boundary. Such success prompted the company to build the Assiniboine in 1833, but it was destroyed by fire in 1835. The Yellowstone continued to ply the waters of the Big Muddy, encouraging the company to lease other steamers such as Clara, St. Peters, and Antelope.[6]

Navigating the Missouri River was a difficult task by steamboat. Captains always faced the possibility of running upon a snag, a tree stuck in the mud whose top was slightly below the water's surface, just enough to avoid detection. Snags commonly pierced the hull of boats and sent them to the bottom. Sandbars were another threat, and no captain could keep account of them since the silt and current were forever making new sandbars and washing existing ones away. The muddy water worsened the plight of the captain because it caused mud deposits in the boilers. Typically, at night, the vessel docked along the bank allowing the engine crew time to shut down the engine and clean the mud from the boiler.

Fuel, or the shortage of it, was another irritant. Wood was used from wherever it could be found. "The most serious problem with which the Missouri navigator had to deal," wrote one observer, "was that of procuring wood."[7] Crewmen gathered wood from the river banks, but green wood did not burn well and they preferred dry or seasoned wood. Abandoned trading posts were prized since they could easily be torn down and brought on board. As time passed some navigation companies maintained woodyards along the river, and some private entrepreneurs offered wood for sale. Danger of hostile Indians made woodyards perilous and some captains, such as John Labarge, would drag trees on board and then cut them for fuel.[8]

To maximize each day's mileage, captains would steam forward as long as daylight permitted. Night travel was too hazardous because of the treacherous snags and sandbars. Only when pressed for time would captains attempt to travel by moonlight. Early morning generally proved to be the best time for

travel since the prairie wind had not picked up. As the wind increased during the day, the boat's speed was correspondingly reduced, and, in cases of severe wind, the captain would dock along the shore and send the crew after wood. The Missouri had only a few rapids. Captains maneuvered their vessels around them by "warping," a procedure in which crewmen on land tied a line to a tree and winched the boat through the rapids with the use of steampower. Whirlpools rarely occurred, but they were quite dangerous. One steamboat, the Bishop, was lost in a whirlpool in 1867, and several others sustained damage from whirlpools.

Next to hostile Indians, boiler explosions were the most feared event in navigating the Missouri. Six explosions occurred in the history of steamboating on the river, a small number considering the state of the art at the time. In 1842 the Edna blew up, killing forty-two occupants. The loss of the Saluda in 1852 was the greatest disaster. It occurred when the captain, Francis F. Belt, delayed for several days by a strong wind and current, ordered the engineer to build more steam despite warnings from the engineer. Within a few minutes of the order, the boiler exploded and killed over one hundred persons, including most of the crew. So severe was the blast that the ship's bell landed intact on the river bank. An enterprising scavenger sold it to a church in Savannah, Missouri, where it was still in use in 1903.[9]

As travel on the Missouri River became safe with the removal of hostile Indians and the improvement of vessels, passenger traffic increased. Changes occurred in the business. A steamboat no longer served solely as a "freighter" but could now be a means of reasonably luxurious travel. Passengers enjoyed visiting the pilot house when conditions permitted, and they wanted a good table fare. To keep fresh meat on the tables, hunters were employed by captains to move ahead of the vessel by land and shoot game. The hunter would hang the animal carcass in a tree on the bank within view of the boat. The captain usually swung by close enough to grab the carcass with a pole or large hook. Hunters were generally adverturesome souls, preferring the dangerous life of the wilderness to a sedate life in more civilized areas. A large proportion were killed by Indians.

The outbreak of the Civil War retarded steamboat traffic on the lower Missouri since most of the vessels were used by the Union to transport men and material on the Mississippi. In 1862, for example, only four boats steamed from St. Louis to Fort Benton in central Montana. In 1863, however, gold was discovered in Montana, which naturally stimulated trade on the river. But guerrilla bands, usually sympathetic to the Confederacy, regularly attacked boats below Kansas City. They would storm aboard the vessel, rob all passengers, take any valuable tools and machinery from the ship, and sometimes murder Union soldiers or freed blacks.

Because of the gold discovery in Montana, traffic above Kansas City was heavy during the war. "The mighty metamorphosis which, in the space of five

years, came over the country at the headwaters of the Missouri," wrote one historian, "produced an equally marvelous change in the commercial business of that stream."[10] The river could take a passenger within one hundred miles of the mines. Prior to 1864 only six steamboat arrivals occurred at Fort Benton, but in 1866 and 1867 there were seventy arrivals. Profit motivated the navigation companies, of course. A typical voyage, if successful, could net from $17,000 to $40,000 profit.

Steamboat traffic on the Missouri continued after the Civil War, stimulated by settlement of the Missouri River basin and the war against the Indians by the United States government. Governmental rental of a steamboat was about $350 per day. A steamboat had, in 1876, taken General Custer's force up the Little Big Horn within fifteen miles of the site of his "last stand." Federal interest in the river itself also continued to grow. In 1872 and 1876 the Corps of Engineers conducted a survey of the Missouri, and Congress appropriated $20,000 for improvements of the upper river in 1876.[11] Engineers from the St. Paul office engaged in rock blasting and dredging on the river above Fort Buford, North Dakota, to improve navigation. They were partly successful, because twenty-five steamboats reached Fort Benton in 1877. Another forty-six vessels made the trip the following year.[12]

In 1881 Major Charles A. Suter, a Corps of Engineers officer, presented a study of the Missouri River that he had conducted over several years. His report spelled out how the meandering stream could be improved for navigation. Congress liked Suter's report and appropriated $850,000 for work to begin in 1882. Residents of the valley wanted to move faster and persuaded Congress to create a special body, the Missouri River Commission, to carry out work on the stream. They wanted a single, comprehensive organization designed to oversee improvements on the whole river and had pointed to the Mississippi River Commission as a model. Consequently, jurisdiction of the Missouri fell to the newly created body. Suter was appointed to the five-man board, however, where he served as president until the commission went out of operation eighteen years later. "The Commission," wrote one observer, "was the first agency to view the Missouri as an integrated whole."[13]

The question of jurisdiction began to haunt the Missouri River, a question that persists to this day. One writer described the lack of progress during the commission's lifespan as follows.

> For the next eighteen years the evolution of systematic improvement for navigation on the Missouri involved a good deal of study and a few specific bank stabilization projects. Since Congress required three of the five members of the Commission to be Corps of Engineers officers, the general approach to river work did not change drastically. Indeed, it was to call on the Corps for men and materials to carry out its proposed improvements. Yet in the long run the Commission's independent organization separated it from the top

levels of the Corps of Engineers and the officers directly involved in navigation projects. Thus, even though this agency took the first systematic look at the Missouri River, it had built-in shortcomings.[14]

In 1902 Congress abolished the commission and returned jurisdiction of the river's navigation back to the Secretary of War. Little happened. Congress appropriated little money and no concerted effort was made by vested interests to stir enthusiasm. Railroads were responsible for the lack of interest since freight could move faster and on a more reliable schedule by rail. Upstream navigation had stopped prior to 1900, and the lower stem of the river was used only for bulk items. "The Missouri River" reported one writer, "retreated to an insignificant feeder to the railroads or a carrier of low value, high bulk items like sand."[15]

In 1907 Congress appropriated $450,000 for maintenance of navigation on the Missouri River and ordered a survey of the possibility of a six-foot channel from St. Louis to Sioux City, Iowa. That same year the Corps of Engineers opened a new district, under the command of Captain Edward H. Schultz, at Kansas City. Schultz made a study of the river, showing what had to be done to build a six-foot navigation channel on the upper and lower parts of the river. In 1910 the Rivers and Harbors Act provided $1,000,000 toward a six-foot channel between Kansas City and St. Louis, and in 1912 it passed further legislation appropriating $800,000 for a channel.[16] Congress wanted the project finished in ten years, but as frequently happens, it refused to provide sufficient appropriations for the Corps of Engineers to maintain the ten-year schedule. The outbreak of World War I in 1914, for one thing, interrupted the normal progress of events. Attention shifted to Europe, leaving little money and effort for river improvements. Work on the six-foot channel ground to a halt.

Progress toward a navigable river was slow and appeared doomed for the time. During the 1920s, however, several critical developments occurred that stirred interest in navigation of the river. For one thing, World War I had demonstrated the lack of transportation in the United States and led many people to believe that water transportation was the answer. The Corps of Engineers also conducted its famous "308" studies of rivers which examined all aspects of river use, including flood control and navigation. In 1927 Congress ordered the Corps to make a study of a possible nine-foot channel from St. Louis to Kansas City, even though the six-foot channel was not complete. Major Gordon R. Young, District Engineer of the Kansas City District, held hearings on the subject of a nine-foot channel. Business and community interests had used their influence to get congressional action on the larger channel. In 1930 Young filed his report in which he thought commerce would increase if the still unfinished six-foot channel were made into a nine-foot channel. Young was rightly perplexed with Congress's expectations

because he was instructed to predict how much traffic would occur with the proposed larger channel when the smaller one was not completed.[17]

While Young was examining the feasibility of a nine-foot channel he was also making a large-scale comprehensive study of the Missouri River as instructed by the River and Harbor Act of 1927 and Flood Control Act of 1928. It was this study that combined the elements of flood control and navigation of the Missouri River. The massive study was finished in 1932. A year later the Public Works Administration began construction of Fort Peck Dam, located about 175 miles north of Bismarck, North Dakota. The purpose of the structure was to provide water for navigation in the lower portions of the river during dry months. It was completed by the Corps of Engineers in 1940.[18]

The 1930s proved to be a very important period for the Missouri River as well as several other large rivers in the United States. More than anything else, the concept of river basin planning and development took a great step forward through the administration of President Franklin D. Roosevelt. For a generation prior to the Depression, a nation-wide debate had raged over resource management, one that had both political and economic ramifications. Should rivers be fully developed, it was asked, so as to gain every possible use, or should their development be limited to primary use? And should the benefits of these rivers be reserved for private enterprise or distributed as widely as possible for public benefit? Hydroelectric dams could be built on many streams, but should the power generated at those dams be controlled by electric companies or sold directly to the public at the lowest possible cost. In the case of the Missouri, should the water be reserved upstream for irrigation or released to provide a flow for downstream navigation?

Nationally, the debate centered on the federal dam and nitrate plant on the Tennessee River at Muscle Shoals, Alabama. It was widely assumed that public development of the Tennessee would be as comprehensive as possible to include power production, fertilizer production, reforestation, soil conservation and land rehabilitation. In 1933 Congress created the Tennessee Valley Authority (TVA), which has become the best known example of multipurpose river development in the United States. The Roosevelt administration, expressing liberal ideology of the 1930s, sought to promote widespread or multipurpose development of several major river basins, including the Missouri. The Flood Control Act of 1936 gave the Corps of Engineers the primary, though not sole responsibility, for river development, and the measure incorporated the concept of multipurpose planning. For the Missouri, this approach to water development could mean a large-scale construction program if a comprehensive engineering plan and appropriate legislation were provided.

A sense of urgency drove the Roosevelt administration to move quickly with its plans of development because of the suffering experienced by the inhabitants of the Missouri River basin. As agricultural incomes in the

basin declined, so did the wages of persons employed by manufacturing companies. So great were the losses that many farmers left the land, causing a steady migration out of the basin. Loss of people to till the land had an alarming effect, causing many people to be deeply concerned over the nation's welfare. In the Missouri Valley the loss and hardship seemed senseless because of the natural resources in the region. In the eastern part of the valley, both agriculture and industry were generally stable due to the fertile soil and adequate precipitation and to the location of large cities. In the western areas, however, the soil was only good for pasture and some irrigated farming. Oil and copper were plentiful and some coal and phosphate industries were found there, but not enough to employ all the jobless. Along the Missouri River flooding was a perennial problem, a marked contrast to regular droughts in the western sections of the basin. To reverse the worsening economic conditions, development of the area's resources appeared to be the solution, and the river was viewed as one of the most important resources.

Prevention of flooding would protect urban areas, mostly in the lower parts of the Missouri River valley, and it would save both soil and crops lost each year to floods. Severe floods were recorded on the Missouri in 1844, 1881, 1903, 1908, 1909, 1915, 1927, 1935, 1942, 1943 and 1944.[19] In 1943, three floods occurred. The 1943 floods brought $65 million in damages, of which $40 million were in loss of crops. Levees had been constructed along the river's edge in the urban areas, but they had been built piecemeal with no overall plan and the flooding waters consequently easily overtook them. The famous 1927 flood of the Mississisppi Valley had proved that levees were inadequate as a means of protection. Reservoirs emerged after 1927 as a more effective means. Reservoirs also had the extra potential of providing water for hydroelectric power and the irrigation of farm land.

Hoping to find a way to alleviate the hardship of the rural poor, Roosevelt created the Mississippi Valley Committee (MVC) in 1934 and appointed Public Works Administration consultant Morris L. Cooke as chairman. He told Cooke to make a thorough and comprehensive study of the Mississippi Valley. Cooke believed strongly in multipurpose planning, and his report urged full development of the Mississippi and its tributaries for hydroelectric power, flood control, soil conservation, rural electrification, reforestation, water supply, irrigation, and other uses. Cooke's report did not have immediate success, partly because it advocated centralized planning and coordinated development of the entire valley, but the MVC report strongly set forth the principle of multipurpose planning and was significantly responsible for its inclusion in the Flood Control Act of 1936.[20]

The gradual move toward a centralized plan for the Missouri River valley took another step forward when, in 1943, the Corps of Engineers submitted to Congress a report on flood control of the river. Prompted by the severe floods of 1943, Congress had instructed the Corps to study the problem, and the job went to Colonel Lewis A. Pick, Division Engineer of the Missouri River

Division. Pick's report called for a series of levees from Sioux City to the mouth of the Missouri; for five multipurpose dams on the main stem of the river; five dams on the tributaries of the Republican River in Kansas and Nebraska; one dam on the Big Horn River; and another on the Yellowstone. The Flood Control Act of 1938 had already authorized eleven reservoir projects which were to be integrated with his proposed ones. Pick's plan was regarded as the first comprehensive flood control plan made for the Missouri River. Pick had also incorporated the following into his proposal: irrigation, navigation and hydroelectric power.[21]

Pick's proposal quickly became embroiled in Washington politics. To begin with, the Bureau of Reclamation (BOR) had been making a study of the Missouri River with the principal focus, however, on irrigation. The difference was quite significant. "The Reclamation Bureau's plan was in sharp conflict with the other," wrote one journalist, "for it emphasized what is the chief concern of the upper-valley people: irrigation of the dry Northern plains."[22] Directed by William G. Sloan, assistant regional director at Billings, Montana, the report was presented to Washington officialdom about six months after Pick's. Sloan's plan called for ninety multipurpose reservoirs, though smaller than the Corps reservoirs, and for sixteen hydroelectric plants. Power was incidental to both plans. The Corps of Engineers had, furthermore, filed a separate navigability study of the Missouri River that proposed a nine-foot channel from Sioux City to St. Louis.

Two conflicting uses of the river were thus proposed. Pick's plan, since it emphasized flood control, suited those interests downstream, for they received the brunt of the flood waters, and they liked the proposed navigation channel because it was expected to stimulate industrial growth. Upper valley interests preferred use of the river for irrigation.

Each plan was identified with its vested interests and neither was willing to compromise. Originally, the popular and influential St. Louis Post-Dispatch backed the Pick Plan, but it came forth with a new idea that changed the focus of the arguments. In June, 1944, the Post-Dispatch published a full-page editorial calling for a single agency, with autonomous power, to be created by Congress for the purpose of coordinating the development and use of the Missouri River. The river itself had shown the need for a solution when a few months earlier in the spring it flooded again. In August, 1944, Montana Senator James E. Murray introduced a bill creating a Missouri River Authority (MVA). In September, President Roosevelt called for the creation of a Missouri Valley Authority. His request escalated the debate over the Pick and Sloan plans to a greater fight over federal-state jurisdiction over natural resources.[23]

A committee consisting of representatives of the Corps of Engineers and the Bureau of Reclamation quickly met at Omaha in October, 1944, and agreed on the following principles:

1. The Corps of Engineers should have the responsibility for determining reservoir capacities for flood control and navigation.

2. The Bureau of Reclamation should have the responsibility to determine reservoir capacities for irrigation, the probable extent of future irrigation, and the amount of stream depletion due to irrigation development.

3. Both agencies realize the importance of the fullest development of the potential hydroelectric power in the basin consistent with the other beneficial uses of water.[24]

Further technical details were to be worked out by the committee, but it was in agreement over principle. Known as the Pick-Sloan Plan, it went to the President who endorsed it. He urged Congress to pas the new plan, but added that it could best be administered by a Missouri Valley Authority. The Plan was authorized through the Flood Control Act of 1944, but the nine-foot navigation channel was omitted.

As interpreted by some observers and analysts, the Pick-Sloan Plan was an attempt to prevent the creation of an MVA.

> The resumption of this old and apparently irreconcilable feud between two vested governmental interests convinced many people that the time had come to cut the Gordian knot by advancing the M.V.A. idea. The idea would rescue the Missouri Valley from contending factions and place it under harmonious and scientific, but above all, under unified and non-political management. As the MVA idea took instant hold upon the imagination of the country, and won the ultimate endorsement of the President in a special message to Congress, a strange and wondrous thing occurred. The feudists, fearful of the MVA idea, lest it invade their bureaucratic precincts, began to murmur softly to each other, and now-marvelous to relate--a marriage has been arranged... This is a marriage of convenience, arranged not only to kill off MVA but to save the interests jealously guarded by two powerful Government agencies.[25]

Proposal of a central agency with autonomous powers to administer toe Missouri River basin set off a national debate. For one thing, the proposed MVA was the focal point of the controversy over the concept of the "little TVAs," an idea popular among liberals and intelligensia. The concept called for the full-scale development of several river basins, including other western tributaries of the Mississippi, the Arkansas and Red. For its proponents, the MVA offered a chance through federal auspices to develop America's resources for the public good. They pointed to the Tennessee Valley Authority (TVA) as an example

of the rejuvenation of a depressed area through such an agency. To a considerable extent, liberals hoped to resume, in 1945, the widespread federal development of resources that had occurred through the New Deal administration of President Roosevelt. By the same token, conservatives hoped to seize the initiative and slow government growth.[26] As the debate over the proposed MVA grew, Congress authorized the nine-foot navigation channel from Sioux City to the mouth of the Missouri with the Rivers and Harbors Act of 1945. Proponents of the MVA hoped to relieve the Corps of Engineers of the responsibility for navigation and give it to the autonomous MVA.

As proposed in 1945, construction plans of the MVA called for 102 dams, some with hydroelectric power generating plants connected to a grid transmitting power over the states of Montana, Wyoming, Nebraska and the Dakotas. A nine-foot navigation canal would exist from Sioux City to St. Louis. And irrigation would be made available to the upper basin farmers on a large scale. Total cost of the project was expected to reach $2 billion, the largest amount ever spent on a peacetime project. The economic progress stimulated by the MVA, its proponents alleged, would engender social improvement and rehabilitate the whole basin.[27]

Opponents disagreed. They saw the MVA as a federal monster encroaching upon the rights of individuals and prerogatives of the states. Such a large agency free of the usual restraints would, they insisted, become dictatorial, totalitarian and socialistic. "Every business firm, every farmer in the Missouri Valley would be at the mercy of the President's appointees," stated one citizen.[28] Some upper basin critics feared that the MVA board of directors, being autonomous, would grant better treatment to the lower basin inhabitants whose population and political power were greater.

In a more specific vein, vested interests felt threatened by the MVA. Power companies in the basin had joined together to fight the growth of public power. Rates paid by the rural electric cooperatives in the Missouri Basin were expected to drop to the level of those rates charged by the TVA, about a 50 percent drop. And the public generation of power would gradually drive the privately owned utilities out of business, according to the latter. Commonweal magazine reported that "water association" was a screen for those industries, such as the coal industry, against public power.[29] Commonweal also reported that political "bosses" in the basin cities disliked the proposal. Bosses depended too much on revenues from municipal power plants and did not want lower priced MVA power undermining them. And the corporate farm interests did not like the proviso in the MVA legislation restricting irrigation waters to family farms of 160 acres or less. The United States Chamber of Commerce thought an MVA would "carry its activities into almost every detail of community life."[30] According to that organization, the TVA competed with private enterprise

in manufacturing fertilizer, manufacturing laminated wood, processing fish, constructing and operating river terminals, operating drug stores, renting houses, and other business enterprises. MVA would allegedly engage in a similar activity and drive out much private enterprise in the Missouri River basin.

In regard to the navigation features of the MVA, the barge companies also opposed any "superstate" agency patterned after the TVA. They wanted the nine-foot channel constructed and operated by existing agencies, namely the Corps of Engineers. Roy Miller, lobbyist for twenty-one national and regional water organizations, testified before the Senate subcommittee of the Committee on Commerce: "marvelous progress has been made in the development of our rivers and harbors . . . we feel that the present agencies of the Federal Government to which Congress has delegated responsibility in the various fields and phases have done a . . . perfectly satisfactory job . . . ."[31] Chester C. Thompson, president of the American Waterways Operators, Inc., also urged retention of the Missouri River navigation plan under the Corps of Engineers. "This association is also opposed to the principle of regional authorities," and this association "is strongly opposed to taking away from the Corps of Engineers their authority over any of our navigable waterways."[32]

Not surprisingly, the Corps of Engineers opposed the MVA. Testifying before the Senate subcommittee, the Chief of Engineers, Lieutenant General Eugene Reybold, former Southwestern Division Engineer, pointed out that creation of an MVA would remove from the supervision of the Corps of Engineers a large amount of the kind of work it had done for 120 years in the Missouri River basin. Further testimony came from Colonel Delbert B. Freeman, District Engineer of the Omaha District, Corps of Engineers, and Pick's executive officer when the Pick plan was drafted. Freeman was called to explain only the engineering features of the Pick-Sloan Plan and carefully refrained from giving an opinion. He did say, however, that he liked the current legislation which gave responsibility for flood control and navigation on the Missouri to the Corps of Engineers.[33]

Congress refused to create the MVA, preferring instead to let the Corps of Engineers and the Bureau of Reclamation develop the Missouri River on a piecemeal basis. Still, there was a general conviction among Washington officials that some coordinating agency should be established so as to organize and coordinate the federal and state agencies involved with the river. The result was the Missouri Basin Interagency Committee (MBIC), consisting of representatives from the Corps of Engineers, Department of the Interior, Department of Agriculture, Department of Commerce, Federal Power Commission, Federal Security Agency, and the governors of Montana, North Dakota, South

Dakota, and Missouri. Representing the Corps of Engineers was Brigadier General Samuel D. Sturgis, Missouri River Division Engineer. Membership on the Committee fluctuated as personnel received new assignments or transferred to new jobs. The "interagency program" went beyond the Pick-Sloan Plan in theory because it recognized and included soil conservation, it looked upon the states as partners in the planning process, and it had some elements of city planning.[34]

As to be expected with the death of the proposed MVA, Congress appropriated money on a year-by-year basis for the projects. By 1951, the federal government had spent over $1,250,000,000 on the Missouri River plan and received the following: a start on the flood control works; three-quarters of the work on the nine-foot navigation channel between Kansas City and St. Louis; some channel stabilization; numerous dams and reservoirs; irrigation facilities, and further flood control works. Construction continued in the 1950s after a brief budget cutback due to the Korean War. Main-stem dams completed by 1967 were Canyon Ferry Dam (1954), Garrison Dam (1956), Oake (1963), Big Bend (1967), Fort Randall (1956), and Gavins Point (1956). A large part of the Missouri River basin development included work on the tributaries: Yellowtail Dam (1966), Keyhole Dam (1952), Bonny Dam (1951), Jamestown Dam (1953), Shadehill Dam (1951), Harlan County Dam (1952), Tuttle Creek Dam (1962), and Pomme de Terre Dam (1962).

Progress on the navigation channel was slow, even though Congress had settled the question of jurisdiction over the Missouri by leaving it to the Corps of Engineers. Progress was slow because the river fought back. A severe flood in 1951, brought on by rains in some spots as much as fourteen inches in seventy-two hours, destroyed much of the pilings and revetments already built on the river. The worst section of the river was between Sioux City and Omaha. Flooding, bank erosion and silt had taken their toll even prior to the 1951 flood. So severe was the problem that one Corps officer testified in 1955 before the House Committee on Appropriations that there had been "an increase in the amount of wild river" above Omaha.[35] According to Corps personnel, work on the navigation channel was also slow because of inadequate funding by Congress.

The question of funding was related, of course, to the expectations of industrial development and savings in transportation wrought by the navigation channel once completed. A thorough study of the benefits expected from navigation was made by the Missouri Basin Survey Commission in 1952-1953. Its estimate of the savings was about one-third of the savings expected by the Corps of Engineers, and it concluded that "It is therefore questionable if navigation should be continued as an objective of basin development."[36] Another study of the probable savings by the House Subcommittee on Appropriations, as reported by one

historian, showed that the Corps had raised the expectations of river traffic from 4 to 5 million tons per year and had advanced the date at which the traffic would reach that point from 2010 to 1980. Still, the Corps stuck to its estimates. Members of Congress were naturally confused, and those whose states or districts stood to gain little or nothing by the Missouri River canal were reluctant to vote appropriations for the navigation project.[37]

Table 1

Missouri River Tonnages

Year	Sand, gravel, and crushed rock	Waterway improvement material	Commercial	Total
		SIOUX CITY-OMAHA		
1958	0	823,887	2,076	825,963
1959	0	1,030,801	653	1,031,454
1960	0	906,592	1,023	907,615
1961	0	764,568	0	764,568
		OMAHA-KANSAS CITY		
1958	204,190	1,543,762	201,979	1,949,931
1959	324,345	1,380,151	310,880	2,015,376
1960	411,250	1,321,946	622,825	2,356,021
1961	257,865	847,754	634,425	1,740,044
		KANSAS CITY-MOUTH		
1958	944,935	1,040,220	596,116	2,581,271
1959	1,254,610	1,857,744	842,812	3,955,166
1960	1,050,863	1,542,624	1,440,985	4,034,472
1961	1,121,625	1,653,755	1,566,821	4,342,221

Source: U.S. Congress, Senate, Subcommittee of the Committee on Appropriations, Hearings, Public Works Appropriations, 1964, on H.R. 9140, Civil Functions, Department of the Army, 88th Congress, 1st Session, pt. 1, p. 1321.

Quite naturally, the barge industry supported the rapid completion of the navigation project. Commercial traffic on the river was growing in the mid-1950s, from 52,285 tons in 1952 to 287,000 tons in 1954. By 1962 the estimated commercial tonnage was 2,250,000, but most of the traffic was below Omaha because the channel above that city was only four feet deep. Larger engines on the tugboats were greatly responsible for the increase, for the barge companies were starting to use tugs with four engines capable of developing 3,600 horsepower. Thus, larger barges that could more adequately combat the river's current were increasing the economic justification of the project.[38]

Throughout the 1960s and 1970s commercial traffic on the river continued to increase. The 1976 the annual commercial tonnage was 3,105,877, about 10 percent higher than in 1971, which had been a record year. There was confidence in the waterway as seen by an increase in construction of industrial plants, docks and shipping terminals by private companies.

Table 2

Missouri River Commodities

Farm Products (Corn, Wheat, Sorghum, Grains and Soybeans)	1,171,566 tons
Metallic Ores	1,121
Coal Products	3,080
Nonmetallic Minerals (Salt and Phosphate Rock)	184,863
Food and Kindred Products (Tallow, Flour, Molasses, Soybean Oil, and Animal Feeds)	715,376
Pulp, Paper and Newsprint	2,818
Chemicals and Related Products (Benzene, Paints, Fertilizer)	486,184
Petroleum Products (Gasoline, Fuel Oil, Tar, and Solvents)	172,584
Stone, Clay, Cement, and Lime	165,080
Primary Metal Products (Iron and Steel Sheets, Bars, Plates)	186,697
Machinery	8,711
Waste and Scrap Iron Materials	7,797
Total	3,105,877 tons

Source: U.S. Congress, Senate, Committee on Appropriations, Hearings, Public Works for Water and Power Development and Energy Research Appropriations, Fiscal Year 1978, 95th Congress, 1st Session, pt. 1, p. 1142.

By 1978 the channel was 95 percent complete. It had 8.5 feet of depth from Sioux City to the Mississippi River during the "navigation season," March through November. Silt "building" persisted, however, requiring constant dredging of the river and explaining the inability to achieve a guaranteed depth of nine feet. Private and municipal interests continued to build port facilities along the river, and as these facilities improved and the general economy of the river basin improved, barge traffic on the Missouri was expected to grow.[39]

Completion of the Missouri River navigation system was slow owing to the magnitude of the project and the disagreement over the use of the river. Navigation constituted a major part of the river's history, serving as an avenue to open the upper trans-Mississippi West to trade and settlement. Not until the last quarter of the twentieth century, however, was the rampaging Missouri made a dependable means of navigation. Old ports such as Sioux City, Omaha, St. Joseph and Kansas City were, one observer wrote, "experiencing a rebirth of the river navigation activity which presaged their importance during the frontier and settlement period of the 1800's."[40]

Chapter II

THE ARKANSAS RIVER

The first white men to see the Arkansas River were those in the expeditions of Francisco Vásquez de Coronado and Hernando de Soto. Coronado encountered the river in western Kansas in 1541 during his search for the "seven cities of gold." De Soto reached the river about 1,000 miles downstream. In 1816 the pirate Jean Lafitte came up the Arkansas using an assumed name and traveling under the pretense that he was a prospector. He was, however, on a mission for the Spanish government which had anticipated a rebellion among the American inhabitants in what would become the western part of the Arkansas Territory. Traveling with Lafitte was Major Arsene Lacarriere Latour, a French mapmaker whose job was to chart the area, then part of Texas, for the Spanish Crown.[1]

But the early history of the Arkansas River belonged to the Indians, a varied group of tribes living along its shores from the mouth to its origin high in the Rocky Mountains. The word Arkansas came from a tribe of Indians who were first recorded by Father Jacques Marquette. He phoneticized the name Arkansea. La Salle called it Acansa. Father Louis Hennepin, one of La Salle's Jesuit priests, wrote a book describing the Arkansas River valley. He referred to the native inhabitants of the land of the Akansa. Current spelling of the word appeared for the first time on the maps of Jean Baptiste Bénard, Sieur de La Harpe, who traveled in the valley in 1718-1722. Zebulon Pike, the first American to penetrate the upper stretches of the river when in 1806 he made his famous trip into the western United States, wrote the name as Arkansaw, and Congress used the word Arkansaw when it created the territory in 1819.[2]

Like the Missouri, the Arkansas River begins as a small mountain trickle of melting snow in the Rocky Mountains. From 11,500 feet, above Leadville in central Colorado, it drops about 5,000 feet in the first 125 miles and passes through Royal Gorge just west of Canon City. The river has cut through the rock, creating a gorge four and one-half miles long with walls over 1,000 feet high. From there the river flows onto the plains of eastern Colorado near Pueblo. Going east across Kansas, it enters northeastern Oklahoma and passes through central Arkansas until it reaches the Mississippi River near Dumas, Arkansas. Major cities along its path are Wichita, Tulsa, Fort Smith and Little Rock. Its longer tributaries are the Canadian, Cimarron and Neosho rivers, all in Oklahoma. Altogether, the Arkansas drains an area of about 160,000 square miles. Along the lower portions of the river are the rich alluvial soils of the greater Mississippi Delta, some of the world's finest farmland.[3]

Navigation of the Arkansas began soon after Robert Fulton's development of the commercial steamboat. In 1820 the Comet, the first steamer on the river, reached Arkansas Post, some sixty miles from the mouth of the river. The Maid of Orleans also reached the same place that year. Two years later the Eagle reached the small village of Little Rock. As was the case with the Missouri River, early navigation of the Arkansas was by keelboats and flatboats, accounting for about 90 percent of the traffic. Usually a keelboat could make the roundtrip from Little Rock to the Mississippi River in two or three weeks. One keelboat made the trip in nine days.[4]

As steamboat technology improved, the number of steamers on the Arkansas River increased. From 1840 to the late 1870s, steamboat navigation reached its peak. In 1850, as many as 115 trips to Little Rock were made by eighteen vessels; smaller craft were going as far as Fort Smith, Arkansas, and Fort Gibson, Oklahoma.

Indian trade lured steamboats up the Arkansas River. Fort Smith had been the head of navigation, but in 1827 three vessels, Velocipede, Scioto and Catawba, reached Fort Gibson farther upstream. The Highland Laddie in 1827 made a complete trip from New Orleans to Fort Gibson. By 1831, boats were coming to the Three Forks, near Fort Gibson, on a routine basis. "The heyday of this river traffic," wrote historian William Settle, "was the 1840's and 1850's when 22 landings between Fort Smith and Fort Gibson could be counted."[5]

An unpleasant chapter of American Indian history, the famous Indian removal, or "Trail of Tears", of the 1830s, was associated with the Arkansas River. "This grim time in United States history," one writer said, "produced tragedies equal to the concentration camp slaughters in World War II."[6] In 1830 Congress passed the Indian Removal Act forcing the Five Civilized Tribes, the Creek, Seminole, Chickasaw, Choctaw and Cherokee, to leave their homelands in the southeastern states. During that decade, the United States Army moved the Indians into Oklahoma Territory; most traveled by land, but a good portion went by steamboat up the Arkansas River.

In 1832 the Walter Scott left Vicksburg with about 1,000 Indians and went to Arkansas Post where they were transferred to another vessel to continue the journey up the Arkansas River. Newspapers reported several steamboats loaded with Indians passing Little Rock. One boat, the Monmouth, traveling at night, collided with the Trenton. The former was cut in two and sank fast, killing about 300 Indians. Other accounts described how sick Indians were forced to lie on deck in bad weather for lack of space.[7]

Like the Missouri, the Arkansas River presented difficulties for riverboat captains. Shallow water was the worst; above Little Rock travel was possible only during high water. Silt was another hindrance. Though not as quick to form new sandbars as the Missouri, the Arkansas was, nonetheless, known for sandbars that appeared overnight and caused steamboats to run aground. Most of the silt came from tributaries in Oklahoma, especially the Canadian River. Another irritating problem, snags, were also found in the Arkansas. Steamboats regularly sank because of partially or fully concealed trees in the water. Bank erosion and constant meandering of the channel were other characteristics of the Arkansas River similar to the Missouri. For these reasons, navigation on the Arkansas was risky and sporadic except during high water. In 1872, the Arkansas Gazette named 117 steamboats that had sunk from snagging, collision or boiler explosions. Congress had appropriated some funds for snag removal as early as 1832, but snag clearance was irregular owing to the uncertainty of appropriations.[8]

In 1869 the Corps of Engineers commissioned the S. Thayer to remove snags, and, in 1881, the snagboat Wichita went as far as Pawnee Agency, about sixty-five miles north of Tulsa. Low water kept the Wichita at Pawnee Agency for three months. Only when high water came could it return. This incident discouraged snag removal in the upper portions of the Arkansas. To help with snag removal and other barriers, the Corps of Engineers opened an office in Little Rock in 1881, but it was closed within a few years because of the lack of interest in river navigation.[9]

Railroad construction had by the latter nineteenth century nearly ended commercial navigation on the Arkansas River. Inhabitants of the river valley worried more about flooding; the Arkansas was known for its devastating floods. It meandered during floods, cutting new channels at its will. Like the Missouri, the Arkansas eroded its banks and swallowed up valuable farm land. A record flood occurred at Little Rock in 1833. Other instances of severe flooding occurred in 1844, 1876, and 1877. The "June rise" was an accepted part of life near the river.

Early in the twentieth century an event important in the history of the Arkansas River occurred, the admission of Oklahoma as a state in 1907. Prior to that time, most of the impetus for improving the river came from Little Rock and it was rather limited. But new business interests in the Sooner state were anxious to put their new state on a par with other states, that is, they wanted to develop Oklahoma industrially as fast as possible. Navigation held great promise in their opinion because the lower-priced water freight rates were expected to lure new industries into Oklahoma. A brief success by some Muskogee businessmen with one steamboat, the Mary D, in 1906 renewed interest in navigation. Their savings in freight rates prompted them to buy a

second boat, the City of Muskogee, which they launched in 1908 and operated for several years.

So impressed were these operators that they had held the Trans Mississippi Commercial Congress in Muskogee in 1907. The group sent a message to Congress urging it to improve the river for navigation between Fort Smith and Muskogee. They managed to get the new state legislature to do the same. The Tulsa Commercial Club, later the city's Chamber of Commerce, established a Deep Water Committee for the expressed purpose of making the Arkansas a navigable stream. Realizing that cooperation was vital, the sponsors from the two cities agreed that navigation should extend to Tulsa.[10]

World War I kept local interests in Arkansas and Oklahoma from pushing the project, but an important event in river development occurred in 1916, one that had meaning for both the Missouri and the Arkansas. Congress authorized and began construction of the large hydroelectric plant on the Tennessee River at Muscle Shoals, Alabama. That project, as explained earlier, served as a precedent for other river projects. In 1920 Congress passed the Federal Water Power Act, creating the Federal Power Commission and establishing some procedures to help in the orderly development of waterways. In 1923 further legislation instructed the Corps of Engineers to prepare a cost-estimate survey of America's rivers that had potential use for hydro-power, navigation and irrigation. The Flood Control Act of 1924 provided for surveys of the Arkansas and two tributaries, the Canadian and Verdigris. The project at Muscle Shoals and the Water Power Act had little direct impact on the Arkansas River, but they had national ramifications since they were the springboard for federal development of water resources.[11]

Other events of the 1920s were more significant for the Arkansas River. To begin with, the famous flood of 1927 occurred. Of all the states caught in the disaster, Arkansas was the hardest hit--half the state was underwater. Water was three feet deep in Little Rock; Arkansas City was in ten feet of water. Losses in the state were $43 million, not including damage to three railroads. It was this overwhelming disaster, which affected thirty-one states, that made flood control a top priority in the Mississippi Valley. In response to the flood, Congress appropriated funds for studies of the Mississippi Valley, including the Arkansas River. Levee repairs had to be made, but the conviction grew that flood control was possible only through a system of reservoirs. Impounded water also had the potential advantage of providing a means for generating electricity.[12]

In response to the 1927 flood, Congress ordered another survey of the Arkansas River basin in 1928. Under the direction of a Corps of Engineers employee, George Shepherd, a field crew from the Memphis

District began work in January 1929 by surveying the Canadian and Cimarron rivers. Throughout their study the shortage of water in the Arkansas was a problem, indicating that in particularly dry years the stream was too low to handle traffic. In early 1929 Major Francis B. Wilby of the Memphis District conducted a public hearing in Tulsa at which citizens presented their views on proposed canalization and flood control measures of the Arkansas River. Participants from Oklahoma stressed navigation on the grounds that use of a canal would bring substantial savings in freight rates. Those from Kansas, however, were more concerned about flood control of tributaries such as the Verdigris and Neosho rivers.

In July 1935 the Corps' comprehensive study of the Arkansas River and its tributaries that had been underway since 1928 was transmitted to Congress. It was commonly known as the Arkansas 308 report. A thorough study, it identified the sites for potential dams on the Arkansas and its tributaries and reported that a navigation channel as far north as Tulsa was feasible, but not economically justifiable. A nine-foot channel to Catoosa, Oklahoma, was estimated to cost $192 million. Annual operating costs were estimated at $18.7 million, but annual estimated savings in freight came only to $10.2 million making navigation economically unjustified.[13]

The future held promise for the navigation proponents, however, because the Flood Control Act of 1936 expanded the criteria by which water projects were to be measured for benefit-cost ratios. That measure implemented the concept of multipurpose use in river basin planning, one of the most important concepts applied to resource management. For the proposed canal, the effect was to enhance the chances for approval.

The act of 1936 authorized six flood-control reservoirs in the upper Arkansas Basin: Caddoa (now John Martin), Optima, Fort Supply, Great Salt Plains, Hulah and Conchas. Some levee and bank control works were also authorized. A devastating flood in 1937 on the Ohio River reminded Congress of the urgency to control America's rampaging rivers, and the Chief of Engineers recommended that another seven reservoirs in the Arkansas Basin be approved so as to reduce flooding in the lower Mississippi Valley. His recommendations were approved in the Flood Control Act of 1938. The newly authorized reservoirs were Canton, Mannford, Oologah, Tenkiller Ferry, Wister, Blue Mountain and Nimrod. Congress authorized $21 million for the additional reservoirs. Local agitation for these projects helped persuade Congress to approve them, but, during the Depression, there was also a natural tendency to inaugurate public works for the sake of relief and employment, and President Franklin D. Roosevelt believed strongly in river basin development. The combination of these circumstances was responsible for the approval of the reservoirs. Navigation projects, however, were not approved.[14]

Among the significant events in the history of the Arkansas River was the creation of the Tulsa District, Corps of Engineers, in 1939. Oklahoma interests led by Newton Graham had quietly campaigned for a District office since 1934 when they visited Washington to lobby for approval of projects on the river. As Congress authorized flood control projects in the upper Arkansas Basin, the need for a major office somewhere in the area was apparent. Creation of the Tulsa District also improved the chances for congressional approval of the canal because promoters such as Graham could more easily present their case. The new District would naturally be inclined to show interest in the project.

In 1939 the Corps of Engineers created the Arkansas River Survey Board to make a study of the river. The board's report became the basic document for the navigation project when it was approved in 1946.

The elections of 1942 were also to prove quite important in the history of the Arkansas River. Two men elected to public office that year were Senator John L. McClellan from Arkansas and Oklahoma Governor Robert S. Kerr. McClellan had served in the House of Representatives. During his first year as senator he introduced Senate bill 1519 providing for the construction and operation of flood control and navigation improvements in the basins of the Arkansas and White rivers. President Roosevelt described McClellan's plan as "an important forward step in the effectuation of the policy of multipurpose development of our great river basins and the prudent conservation of our vast public resources."[15] The bill failed, but McClellan continued to fight for water development in his state. Indicative of his interest in the subject were his ten years service as president of the National Rivers and Harbors Congress and his term as president of the Mississippi Valley Flood Control Association.

Governor Robert S. Kerr had been an oil producer. His interests had centered on oil and Democratic politics; he co-founded Kerr-McGee Oil Industries and had served on the Democratic National Committee. Water resource development had not interested him, although he was a strong believer in economic development. Born near Ada, Oklahoma, in 1896, he went to the East Central Oklahoma Normal School and set up law practice in his hometown. In 1926 he started a drilling business which marked his entry into the oil industry. He served as governor for two terms, 1943-1946, and he was elected to the United States Senate in 1948. He was a close friend of another freshman senator, later majority leader, and then President, Lyndon B. Johnson of Texas. Kerr became chairman of the Senate Public Works Subcommittee for Flood Control and Rivers and Harbors and was an ex-officio member of the Appropriations Committee for related projects. He occupied a particularly strong position to fight for the Arkansas canal. Throughout his

political life Kerr espoused resource development and used the slogan "Land, Wood and Water."[16]

Kerr's interest in water began rather dramatically soon after he became governor. In May 1943 two storms swept across Oklahoma and dumped large amounts of rain. Near McAlester, twenty to twenty-four inches of rain fell in the first storm. Two days later the second storm hit and left an even greater amount. Twenty inches were recorded south of Tulsa. The Arkansas River crested at record levels at Fort Smith and lower points. At Fort Smith, where the crest was highest, the discharge flow measured 850,000 cubic feet per second (cfs), considerably more volume than the 660,000 cfs measured there in the famous 1927 flood.

The 1943 Arkansas flood was devastating. Twenty-six lives were lost and damage was estimated at $50 million. Flood waters inundated some 1,448,400 acres and ruined homes and farms. "The human factor makes it impossible ever to state in dollars," wrote one observer, "the true extent of damages from a natural disaster of this sort."[17] As the newly elected governor of Oklahoma, Kerr toured the flooded area by aircraft, and from that moment Kerr was a devotee of flood control and canalization of the Arkansas River. In stirring political leaders to stronger action, and in convincing the public that large-scale steps had to be taken to prevent future disasters, the 1943 flood was a significant event in the history of the Arkansas River.

In May 1945 the Corps of Engineers held public hearings at Tulsa and Little Rock on the proposed canal. The hearings dealt with the survey report begun in 1939 and completed in 1945. At Tulsa, Graham supported the report because it recommended canalization. Railroad representatives presented statements against the canal on the grounds that its cost was unwarranted because of the availability of rail service. The railroads did not, however, oppose flood control. With the close of the hearings, the survey report was forwarded to the Board of Engineers for Rivers and Harbors, an arm of the Corps of Engineers.

To some extent the question of navigation became more complex because of the growing popularity of the "little TVAs." That concept, which simultaneously was embroiled in the fight over the Missouri River, applied to the Arkansas when public power proponents wanted to develop the river primarily for hydropower. Several bills were introduced in Congress calling for an Arkansas River Authority, but Congress voted them down for the same reasons it voted down the proposed Missouri Valley Authority. The latter received more attention, and its fate determined the outcome of the other "little TVAs."

When the survey report reached Washington, D.C., it met opposition. The Board of Engineers for Rivers and Harbors felt that flood control was

justified, but concluded that the costs of constructing a canal were unjustifiable. It recommended that the "multiple purpose plan of improvement be adopted as a basis for the future development of the water resources of the Arkansas Valley, that the part of the plan involving flood control features be constructed to supplement existing projects and that construction of the navigation features be deferred until there is more definite assurance that the benefits will justify the expenditures."[18] In other words, the board disapproved immediate canalization.

The final decision belonged to Congress. The Oklahoma congressional delegation generally supported the project, although Representative A. S. Mike Monroney tried to persuade the House not to approve it. He emphasized the marginal benefit-cost ratio and the board's opposition. Monroney offered an amendment to eliminate the Arkansas River project from the 1946 Rivers and Harbors bill, but it was voted down. The senate also approved the canal, and when President Harry S. Truman signed the bill in 1946, the Arkansas River navigation project was approved.

Despite approval of the navigation project in 1946, congressional appropriations to begin construction were another matter. Corps projects are normally delayed after authorization and some are never started. Construction on the Arkansas canal was delayed until 1957 for many reasons: disagreement over the merit of the project, opposition from landowners, federal budgetary considerations and partisan politics in Washington. Within the Corps, serious reservations also remained over the wisdom of building the canal because of the narrow economic feasibility ratio.

In 1950 Congress created the Arkansas-White-Red Basin Interagency Committee (AWRBIAC), similar to the Missouri River Basin Committee. It had representatives from the following departments and agencies: Army, Interior, Agriculture, Commerce, Labor, the Public Health Service and Federal Power Commission. Congress established AWRBIAC to provide information for making future recommendations in the respective river basins and asked for a finished report in 1952.[19]

In the state of Arkansas, the canal proponents' frustration was compounded by the "Tulsa first" policy, the practice of directing attention and money first to those projects in the Tulsa District. Perhaps to some extent this practice reflected the strength of Oklahoma political figures, but technical questions were important. The overriding difficulty in designing the waterway was the large amount of sediment that flowed down the Arkansas River, which engineers put at 100 million tons per year. Since the earliest studies of the proposed canal it had been widely recognized that "silt traps" or dams would have to be built to stop the sand. Most of the silt came from the Canadian, North Canadian and Cimarron rivers in Oklahoma. Silt also came from other tributaries

of the Arkansas--Verdigris, Deep Ford, Poteau and Illinois--but the Canadian and Cimarron were the chief sources. For this reason the Tulsa District had proposed construction of Eufaula and Keystone reservoirs. The Dardanelle Lock and Dam, one of the largest single projects of the waterway, could not be operated until these two upstream lakes were finished. There was a natural inclination, therefore, to give priority to the Tulsa District.[20]

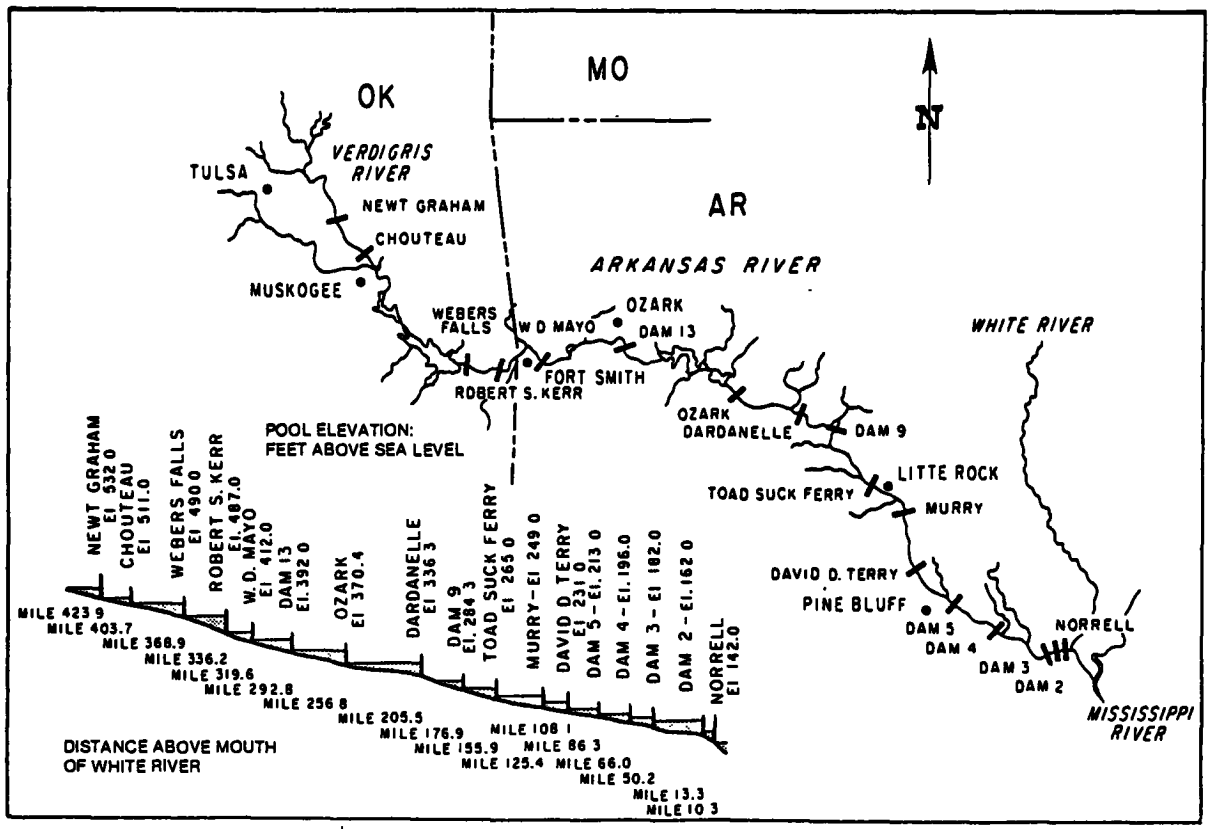
Still, sponsors in Arkansas had conducted a similar battle for funding. They strove for funds for Dardanelle Lock and Dam, bank stabilization and removal of a sharp bend in the river at Morrilton. Senator Mc Clellan cooperated with Kerr in the congressional battle for funds, but neither had been able to get a congressional or executive commitment to a billion-dollar project, especially one with a narrow benefit-cost ratio. In 1956, when the Budget Bureau approved $3 million for Oologah, it omitted funds for Keystone, Eufaula and Dardanelle. Knowing the total cost for completion of the canal would reach beyond $1 billion, it was questionable if Congress would appropriate funds for the reservoirs.

The Congressional delegations of Oklahoma and Arkansas sought to counter the Budget Bureau. Statements on behalf of the canal came from congressmen in other states, indicating a carefully arranged display of support. The lobbying paid off because Congress provided funds in 1956 for three reservoirs in the Arkansas River Valley: Keystone, $1,500,000; Eufaula, $1,250,000; and Dardanelle, $650,000.

Once Congress gave the "green light," construction progressed smoothly, although in 1964 President Lyndon B. Johnson scared the canal boosters when he cut $40 million from the canal's budget. After some haggling with the congressional delegations from Arkansas and Oklahoma, he reinstated the cut. Major portions of the navigation improvements were already operational as work continued on the locks and dams. Oologah was finished in 1963, Eufaula in 1965 and Keystone in 1968. The gigantic Dardanelle Lock and Dam was operational in 1969. Other locks and dams soon followed. On December 30, 1970, the Arkansas River navigation project, later called the McClellan-Kerr Waterway, was declared operational. Three weeks later, January 21, 1971, the first cargo, 650 tons of newsprint, arrived at Catoosa. The idea, begun a half-century earlier, of making the Arkansas River navigable, had been fulfilled.

The Arkansas River has a unique spot in river development. Before the final stages of construction were finished, plans had been made to conduct a full-scale impact study of the waterway. Congress and the Corps of Engineers both felt that since the waterway had received so much funding, more than any prior civil project, its results should be examined. For after all, the canal had been justified from the beginning on a variety of anticipated economic benefits, particularly savings in freight rates and the development of new industries. Other benefits such

PROFILE OF ARKANSAS RIVER NAVIGATION POOLS



Note: Sites of locks and dams are shown by a name or number.

as flood control and hydroelectric power were expected, but the real question was over industrial growth because power production and flood control could have been achieved without navigation. In March, 1969, the Deputy Chief of Engineers, Major General Frederick J. Clarke, announced before the Arkansas Basin Development Association the Corps' intention "to use the project as the best laboratory we have ever had for the clinical observation of a major project through all states of its development . . . to learn many lessons from its performance . . . to determine where we are going in the field of water resources development, and how we are going to get there."[21]

The machinery for conducting the study was available via the Institute for Water Resources (IWR), a branch of the Corps of Engineers created by Congress in 1969. In 1971 the Institute began examining the navigation system, conducting the largest, single impact study of a civil project. By 1980 raw data was still flowing into IWR, but considerable work had been completed, enough to point toward several developments.

Some benefits were easy to identify. In 1977 IWR reported that electrical energy generated from eight dams in the system rose from 1.2 billion kilowatt-hours (kwh) in 1972 to 3.2 billion kwh in 1974. The energy was reported to be equivalent to almost 8 million tons of coal or approximately 30 million barrels of oil. Recreation visitation was steady, ranging from 13 million visitors in 1972 to almost 16 million in 1975. Water storage allocated in reservoirs of the navigation system amounted to 125,000 acre-feet, and 67,000 acre-feet had been contracted for municipal and industrial use. In 1975, 5,157,000 tons had been shipped on the canal and cumulative savings from flood prevention by that same year were $319,305,000.

Benefits from hydroelectric plants, water supply, and recreation were not, however, the reason why proponents fought for the canal. And flood control was desired, but that benefit was achievable without navigation. Proponents such as Newt Graham opposed power production unless it was needed to make a project economically justifiable. Navigation and the anticipated growth of industry were at the heart of the push to develop the Arkansas River basin, and a fair assessment of the impact of the canal must be measured in those terms.

Savings in freight rates was the first reason for constructing the canal. For iron and steel, the Southwestern Division (SWD), Corps of Engineers, reported a 44 percent reduction in railroad rates because of barge competition--from $21 per ton to $11.77 per ton on shipments between Chicago and Muskogee, Oklahoma. SWD reported that "water compelled freight rates have resulted in large savings by farmers in moving their grain to market." That claim was based on a newspaper article referring to a grain elevator operator on the canal who could pay farmers

"at least 10 cents a bushel more for their commodities than railroad and truck line elevators because of a freight rate savings."[22] From 1968 through 1974 tonnage moved on the canal increased each year except for 1973, when high water restricted tugboat operations. In 1968 tonnage was 1,238,800; by 1974 it had climbed to 6,000,400. But the last leg of the canal extending to Catoosa was not open until 1971. Commodities transported were petroleum, grains, chemicals and fertilizers, ore and minerals, iron and steel, coal and coke.

In 1977 SWD studied industrial development in the river basin and discovered that "manufacturing activity had grown in the areas of Arkansas and Oklahoma contiguous to the waterway since its completion." Access to water transportation was important to 21 percent of the companies surveyed, and low transportation cost was a factor for 37 percent of the same companies. Availability and cost of labor were the principal considerations for 51 percent. About 8 percent of the firms listed the canal as the primary reason for relocation.[23]

Those manufacturers whose location was influenced by the waterway were metal fabricators and publishers of printed materials whose raw materials are heavy and costly to ship. For this group, located mostly in Tulsa, Little Rock, and Fort Smith, the availability of labor, nearby sources of raw materials and relatively inexpensive land costs were the principal considerations that lured them into the area. Availability of the waterway was, nonetheless, a significant factor.

From 1969 through 1975, 374 manufacturing plants located or expanded in Arkansas. Little Rock accounted for 152 firms, Fort Smith for 81, Conway for 31; other significant concentrations were also along the canal. Most of the corporations replied to SWD that availability of labor and its lower cost were the first considerations in locating or expanding. The waterway was a factor for over 25 percent of the companies and low transportation rates influenced 35 percent to come to Arkansas.[24]

A similar story was true in Oklahoma, except that fewer corporations chose the Sooner state. A total of 123 manufacturers located in the seven counties bordering the canal, and 94 were in Tulsa. Again, the abundant source of labor and its comparable low cost were the principal reasons for relocating or expanding. "Access to water transportation was of significance to some 12 percent of the firms," SWD reported, "and principally for future planning purposes."[25]

The Southwestern Division also studied the impact of the McClellan-Kerr Waterway on agriculture. It was less discernible. Agriculture in the two-state area has been changing rather dramatically since World War II, shifting primarily from cotton to a variety of crops such as feed grains and soybeans. Poultry production has become a mainstay in Arkansas. Tenants and sharecroppers have often been replaced by corporations.

Since 1971, when the last portion of the canal was opened, agriculture in the United States has undergone still more changes induced by national and international factors: energy costs, changes in diet, extensive capitalization requirements, and global political events such as American-Soviet detente. Like all regions, the Arkansas River basin experienced these same developments and to attribute changes in the area solely to the canal would be a mistake. "The agricultural trends of a region," according to one study, "must largely reflect trends at the national and international levels."[26] Still, some impact could be expected: nonagricultural competition for land and changing commodity prices owing to lower transportation costs.

The SWD study pointed out that cotton acreage had dropped significantly between 1969 and 1971, while soybean acreage increased. Near the canal, soybean increases were highest in Oklahoma. Rice acreage increased in Arkansas. Both are international commodities, and since the canal "opened" international markets to rice and soybean producers, a connection between the increased acreage and the waterway seems evident. Soybean production around the area of Wagoner County, Oklahoma, increased more rapidly than in the United States as a whole. A possible reason was the location of the Wagoner Elevator, owned by the Guthrie Cotton Oil Company, on the canal. The elevator buys, stores, and sells soybeans and wheat. Storage capacity is 1 million bushels. SWD reported that the "Wagoner Elevator, with its access to barge traffic, typically offers 10 to 20 cents per bushel more than elevators in nearby Muskogee."[27] Thus farmers benefit directly from the waterway.

Wheat production and prices were not affected as much, due to the greater competition of wheat production in the United States and throughout the world. Wheat moves down the canal to New Orleans, but prices are lower there than in Houston, offsetting any advantage the Wagoner Elevator can offer to wheat farmers. The New Orleans market is quite competitive since it sits at the end of the Mississippi and is tied to some of America's major wheat producing states. It would be wrong to link crop diversification, long a principal need of the South, wholly to the waterway because the historical forces responsible for diversification were in operation prior to World War II. But the canal, nonetheless, encouraged diversification and provided benefits in some respects. In that sense, a claim to the waterway's impact could be made.[28]

However difficult it may be to assess the waterway's impact on shipping, industry and agriculture, the study of social change is even more difficult. In 1977 IWR published the findings of the Department of Sociology at the University of Missouri on the demographic impact of the McClellan-Kerr waterway. It was the most thorough study of the canal's impact on population conducted thus far. A summary of their findings and recommendations follows.

It was discovered that the earlier outward migration from the Arkansas River basin, which constituted a serious loss of skilled persons and reduced the possibility of cultural-social regeneration, had reversed, but the welcome changes could not be wholly attributed to the canal. For one thing, the immigration started before the navigation system became operable. "In the 1960's, McClellan-Kerr Ozark counties, in total, had a rate of net immigration (6.5 percent), well above that of the state's total (-0.8 percent) and the bistate Ozark region (4.8 percent)." The net immigration for the waterway area in 1970-1975 was 7.3 percent, but for the whole Ozark area it was 9.7 percent. Young whites left the non-metropolitan areas during 1960-1970, but they showed a return during the 1970-1975 period. "Migration was found to have been largely to small cities and towns, with some suburb migration in a few places, and some settlement of elderly in rural areas."[29]

Few of the migrants surveyed in the study had negative attitudes toward the canal, and about 70 percent reported that jobs and recreation were its greatest assets. Few migrants planned to leave the area. Migrants were better educated and a larger portion were white-collar workers than nonmigrants. Those persons displaced by the reservoirs and other aspects of the navigation system were forgotten by the general public. Half of the displaced persons interviewed thought the land settlement was fair, but partial, nonetheless, to large landowners. Many of the relocatees had lived on subsistence or marginal incomes (up to $5,000 per year). "The attitudes of the relocatees reflected numbness and resignation, the desire to forget that the relocation had ever happened, and the recognition that some have to suffer for the good of many."[30] It was apparent that the waterway affected the size, distribution, and composition of the population, and the principal reasons were the job opportunities, recreational benefits, and displacement produced by the waterway.

In its report, the University of Missouri concluded that the McClellan-Kerr project had drawn people to the Arkansas River basin, and the "composition of the population is changing in favor of higher educational, occupational, and income levels as migrants move to the area. This has resulted in greater economic diversity, availability of labor, and in many cases, improved roads, etc. . . . ."[31] Most of the arrivals had moved into non-metropolitan areas, principally the lake areas and retirement villages alongside the waterway. But unresolved issues remained.

Population increase, while bringing cultural diversity, also brought urbanization and congestion, for as people left the city to escape the crowded conditions and ills associated with urban life, they "found that they have merely transferred the problems. Unless steps are taken to minimize the adverse effects" the report continued, "the area may end up as a string of small cities surrounded by empty countryside."[32]

Parallel to this development was the pattern of employment, that is, the newly arrived and also more skilled workers took the new jobs while the original population continued in low paying jobs or remained unemployed. The new wealth camouflaged the existing poverty. For the sociologists the most obvious "loss" occurred among blacks and other minorities because they had fewer required skills and were among the last to receive jobs at the new plants. It was also recommended that steps be taken to prevent haphazard development, that all parties, federal, state and local, strive to achieve integrated economic growth. "A serious attempt should be made to produce a regional approach to single out and appropriately weigh factors operating in the McClellan-Kerr area . . . ."[33]

Closely related to the impact upon industry, agriculture and migration was an important feature of social behavior, recreation. In the original benefit-cost studies, the recreational impact was not overlooked, but it was greatly underestimated. "Instead of being an incidental product of water resource development," wrote IWR economist George Antle, "recreation (which includes fishing and hunting) has turned into a major category of benefits and is the reason for a substantial new industry in the project area."[34] By 1977 the number of visitors to the various reservoirs of the navigation system approached 30 million per year. Most came from nearby areas.

Parallel to the growth of recreation was the appearance of service industries, ranging from bait shops to housing developments alongside lakes. The multiplier effect of the reservoirs was phenomenal in this respect and too large to measure. Such has generally been the case with reservoirs throughout the region whether constructed and operated by the Corps, state or municipal governments. Poverty-stricken areas were frequently transformed into booming hamlets filled with weekend boaters, permanent retirees and a host of other users.

A comparison of the Missouri and Arkansas rivers demonstrates a great deal of similarity. Both provided an opportunity for the expansion of trade and settlement of the West if they could be made navigable, but their topographic characteristics limited such use. Starting soon after the turn of this century, the federal government, through the Corps of Engineers, took steps to develop the streams for navigation, and in each case the final completion of the projects came only after a long struggle against political and engineering odds. The Arkansas has provided the best opportunity to study river navigation, and the impact studies made thus far by the Institute for Water Resources have shown some economic improvement wrought by the canal. But questions remain, and these two tributaries will undoubtedly be studied further in an effort to answer them.

Chapter III

THE RED RIVER

The third western tributary of the Mississippi, the Red River, has a history similar to the Missouri and Arkansas except that it has not been developed for navigation. Authorization exists for a waterway between Shreveport and the mouth of the Red, about fifty miles northwest of Baton Rouge, Louisiana, but only limited work had been done on the project by 1982. The Corps of Engineers reported that the waterway was 20 percent complete at that time. For the most part, the Red has the same drawback to navigation, lack of water, that the Arkansas had, except to a greater degree. And like the Missouri and Arkansas rivers, the Red is fully capable of producing disastrous floods, but the water level is usually too low for navigation especially above Shreveport.

The Red River rises in extreme eastern New Mexico and the Texas panhandle. Its main headstream, Prairie Dog Town Fork, flows eastward, passing south of Amarillo and forming part of the Oklahoma-Texas boundary before joining with the Salt Fork to form the Red River proper. The North Fork joins the Red a few miles downstream. From there it flows eastward to Fulton, Arkansas, south to Shreveport, and then southeast past Alexandria, Louisiana. Its distributaries are the Mississippi River, which it reaches about 45 miles above Baton Rouge, and the Atchafalaya River. Tributaries of the Red include the Pease, Wichita, Washita, Kiamichi, Sulfur, and Ouachita (Black) rivers.[1]

The upper course of the Red River swings in great bends through rolling plains of red clay from which it derives its color and name. Above Lake Texoma, near the midpoint of its course, it flows in shallow, shifting channels on a sandy flat several hundred yards wide, bordered by bluffs. Downstream, it meanders through a floodplain ten to twenty miles wide, flanked by small lakes occupying parts of former channels. Flowing an average of 3,128,000 acre-feet annually at Lake Texoma near Denison, Texas, the river's volume increases markedly in the humid coastal plain, exceeding 23,450,000 acre-feet at Alexandria.

Use of the river is limited not only for navigation but also for irrigation owing to the large salt content of the water plus the heavy deposits of gypsum. Municipal use of the water is severely limited because if its large mineral content.

Early explorers and fur traders navigated the Red River as a means of reaching the Arkansas River valley. In 1541 the Coronado expedition explored the upper reaches of the Prairie Dog Town Fork in the Palo Duro Canyon located in the Texas panhandle. In 1542, the De Soto

expedition, commanded after De Soto's death by Luis de Moscoso, crossed the river in Louisiana. In 1690 Domingo Terán de los Ríos went up the river to the Caddo Indian settlements near Texarkana. Fur traders plyed the stream to make contact with Indians. They traded with the Taovaya Indians during the eighteenth century in present-day Montague County in Texas.[2] The first permanent European settlement in Louisiana was made by the French at Natchitoches, on the Red River, in 1714.

In 1769 the Spanish government named Athanase de Mézières lieutenant governor of the Natchitoches District with jurisdication over the Red River valley. His purpose was to suppress the illegal traffic of stolen horses by Taovaya Indians. He tried to arrange a settlement with them, but it was never carried out. And in 1792 the Spanish discussed the possibility of erecting a mission on the river, but that also failed to work out.

The Red River played a part in eighteenth- and nineteenth-century international affairs. During the 1700s, it was generally regarded as the dividing line between New France and New Spain. The Spanish officially proclaimed it as part of the northern boundary of Texas in 1805, but the United States disputed this claim until 1819, when the Adams-Onis Treaty signed by Spain and the U.S. recognized the Red River between 94° W and 100° W as the boundary between the territories of the two nations.

After the United States purchased the Louisiana Territory in 1803, several American expeditions went up the river. In 1804-1805, William Dunbar explored the river as far north as the mouth of the Washita, and, in 1805, Dr. John Sibley provided the United States with a description of the river valley and of the land beyond as far west as Santa Fe. In 1806 the United States Army instructed a Captain Sparks with a detachment of seventeen soldiers to explore the Red River all the way to its source. His orders read, "to the top of the mountains," which were thought to be three hundred miles away. Sparks soon met a Spanish officer with a large number of troops and was forced back. That same year Captain Zebulon Pike thought he had discovered the source of the Red River during the course of his western travels.

As late as 1852 not much was known about the upper reaches of the Red. That year Captain R. B. Marcy described the terrain of the upper river, writing: "The only information we had upon the subject was derived from Indians and semi-civilized Indian traders, and was, of course, very unreliable, indefinite and unsatisfactory; in a word the country embraced within the basin of the Upper Red River has always been to us a 'terra incognita.' Several enterprising and experienced travelers had at different periods attempted the examination of this river, but, as yet, none had succeeded in reaching its source."[3]

On the lower portions of the river, however, settlement had occured. Alexandria, Louisiana, was incorporated in 1818, and Shreveport in 1839. When Texas was a Spanish territory, settlers had occupied land along the

stream at Jonesborough, or Pecan Point, near Clarksville, Texas, so that by 1836, when Texas declared its independence, northeast Texas was settled. The new Republic of Texas recognized the Red River as its northern boundary, and trading posts were established at the mouth of Cache Creek at Preston Bend in present-day Grayson County. In 1853 a ferry crossing was established in Grayson County and used by the Butterfield Overland Mail Company.

The first explorers found an obstacle on the Red River that greatly hindered navigation, the great raft. Neither the Missouri nor the Arkansas had anything comparable to the raft, a massive jam of logs, trees, driftwood and debris that was 100 miles long. One estimate by the Corps of Engineers in 1833 placed the raft at 130 miles in length.[4] In 1719, for example, a French explorer, the Sieur de la Harpe, had to skirt around the raft by traveling overland and using sloughs. The raft grew longer with each heavy rain or flood that washed debris downstream. "The Raft virtually blocked the main channel of the river," wrote one historian, "and ultimately the head of the Raft extended several miles above the Arkansas-Louisiana state line."[5] Whenever the river flooded, the raft blocked or slowed the current and forced the water to escape into bayous and lakes, making the main channel of the river hard to detect.

So tightly jammed were the logs that brush and vines grew on the raft and gave the appearance of a "jungle of growing brush." Breaks occurred in the raft, though they generally filled with more debris. In 1831, one steamboat, the Enterprise, reached the mouth of the Kiamichi in southeastern Oklahoma after maneuvering its way through the bayous and cutoffs created by the logjam. In 1832 the Corps of Engineers hired Henry Hiller Shreve to clear the raft in order to make the river navigable.[6]

Shreve had invented the snagboat and used it on the Mississippi and Ohio. He began his job on the raft with four steamboats and 159 laborers. At first they tried to saw the logs and drag them out of the river, but that did not work. Shreve then tried blasting the raft away with explosives. His best weapon, however, was the snag boat. He tore the logs apart, a slow process, but one that made progress. Federal monies ran out and he had to stop, but not before seventy-one miles had been cleared. Without maintenance, however, the raft grew at the rate of 1½ miles per year. Shreve resumed work and managed to clear the raft for a 110 miles. Again he had to stop for lack of funds.

Obtaining appropriations for clearing the raft was a political fight because the anti-slavery crusade had already begun to divide the states. Northern congressmen were slow to vote for money destined to help a slave state. Some steamboats went up the Red River through

Shreve's path, but without continuous maintenance, the raft closed again. For a brief period in 1838 Shreve cleared a path through the whole raft, opening the river to trade, but only for a few months until the jam returned. During the 1840s little was done about the raft, but in 1847 a meeting of the Great Raft Convention was held at Clarksville, Texas. Most of the river traffic stopped at Shreveport, but Texans had shipped cotton down the stream whenever possible and badly wanted the river opened. Delegates from Texas, Louisiana and Arkansas agreed to share the cost of log removal with the federal government, and work resumed. By 1852, over $500,000 had been spent on the raft, but it was still there. "The Great Raft is a monster," wrote one newspaper editor, "and it cannot be destroyed by just nibbling at its toes."[7]

Navigation of the river below Natchitoches still occurred, however, keeping New Orleans accessible to cotton grown in central Louisiana. During the Civil War traffic on the lower river increased, especially the cattle trade since the Confederate government bought Texas beef to feed its armies. Cattle were taken down the river by boat whenever possible; frequently they were driven overland.

The real wealth of the Red River valley was cotton, the highly prized item in short supply since the war started. So valuable was the "White Gold" that it brought $1.90 per pound in Boston by 1864. During the previous year, the Union had launched a campaign to capture cotton and slaves in the southern portion of the valley. On April 12, 1863, Major General Nathaniel P. Banks had advanced up Bayou Teche with 16,000 Union troops and had driven back 4,000 Confederates commanded by Major General Richard Taylor. Taylor withdrew to Alexandria, leaving Banks to gather cotton. With the aid of gunboats on the river, Banks then occupied Alexandria. Taylor, again driven back, went to Natchitoches. Banks then turned east and crossed the Mississippi.[8]

In 1864 Banks returned and again went up Bayou Teche with the aid of gunboats. From there Banks moved in a northwesterly direction, but Taylor gained reinforcements and defeated Banks at Sabine Crossroads. Banks retreated to Pleasant Hill, while the Confederates blocked the upper Red River with a sunken steamboat. They harassed the Union gunboats, forcing both the Union army and the flotilla back to Alexandria. The Union quickly came back with 11,000 troops and advanced on Shreveport. After several encounters with the Confederates, the Union commander retreated to Little Rock. That ended the Red River Campaign which disrupted the flow of cotton and cattle on the river.

Progress in clearing the river for navigation was slow. In 1872 the raft was approximately thirty-two miles long and the flow of water into the bayous below Shreveport were threatening to close the main channel. With new appropriations, the Corps of Engineers used modern

explosives to clear the river in 1873. Open passage of the stream, however, caused the water level to drop in the bayous west of Shreveport, especially in Big Cypress Bayou used by cotton shippers in Jefferson, Texas. "The clearing of the main channel," according to one report, "caused these bayous to drop, and the east Texas commercial traffic was forced to shift to the railroads which were entering the area."[9]

When, in 1876, the Texas and Pacific Railroad finished its first line through the valley, the river lost its importance as a carrier of goods and commodities. "The river was all too unreliable," wrote one observer. "At first, when hunting and trapping for furs and hides was the only commerce, the problem was slight. Later, however, when planters came, it was a long waiting period for them to get the proceeds from the sale of their cotton in New Orleans, after transporting it by ox wagon to the river ports of Jonesboro or Jefferson. Accordingly, the dream of a railroad coming into Texas was the constant hope of the planter and merchant on this frontier."[10]

One of the most important developments in the history of the Red River was the construction of a dam at Denison, Texas. It represented a little-known but important part of the ideological struggle over resource management in the Southwest. A multi-purpose structure, it serves several purposes: flood control, power production and recreation. The driving force behind the dam was the need for electricity in the rural areas around the proposed site.

In the early 1920s local citizen groups started to campaign for a flood-control and hydroelectric dam on the Red River. There was some interest in navigation, but it amounted to little owing to the shallowness of water in the upper river. In 1930 a spokesman for the local sponsors told the Committee on Flood Control of the U.S. House of Representatives: "The greatest benefit that comes out of impounded water is . . . the 'juice' . . . you can light up that whole country and turn every barn into a factory by giving the farmers the power . . . we will milk the cows, run the refrigerators, rock the cradles, fry the eggs and bake cakes with electricity."[11]

Sam Rayburn, in whose district the site of the proposed dam was located, sponsored the project in Congress. He, too, saw the river as a source of electric energy that could be used by the area's farmers. Rural electrification was important to Rayburn; in 1936 he co-sponsored with Senator George Norris, the "father of TVA," the bill establishing the Rural Electrification Administration (REA). Congress authorized the Denison Dam through the Flood Control Act of 1938. Two years later Rayburn became Speaker of the House. The Corps of Engineers began construction in 1940, and even created a special district, the Denison District, to build it. Construction continued during the

war in spite of stiff opposition, mostly from power companies, and the plant went into operation in 1944.[12]

During World War II as the Corps proceeded with construction, the Denison Dam became embroiled in a controversy over the future development of America's major river basins. In 1942, a few years prior to the Pick-Sloan plan, Rayburn saw the need to integrate the power generated at the dam with that of other dams in the Southwest and with that produced by the privately owned electric companies in the area. The proposal was unorthodox since he wanted the two parties, public and private power, to cooperate instead of fight. Power companies stiffly opposed his plan.

Rayburn sharply disagreed with those wanting to make the dam part of a "little TVA," specifically the Arkansas Valley Authority (AVA). Sponsors of the latter, such as Clyde T. Ellis of the National Rural Electric Cooperative Association (NRECA), lobbied Congress for the AVA. At the same time, a similar battle raged over those dams associated with the McClellan-Kerr Waterway on the Arkansas River. There were four points of view: the utility industry sought total control of the energy by the electric companies; the NRECA pushed the proposed AVA; the sponsors of a canal on the Arkansas River favored the use of rivers solely for navigation; and Rayburn urged cooperation among suppliers of electricity. Rayburn thought the proposed AVA was inappropriate due to the general improvement of living standards in the Red River valley since the 1930s, but he wanted to promote the supply of electricity. To achieve the most efficient use of the river, he wanted to "mix" or integrate the energy generated at Denison with that generated by the electric companies. But sole use of the river for navigation did not interest him.[13]

Resolution of these differences came through the medium of Washington politics. The first question dealt with the matter of public or private control of the power generated at Denison Dam. Rayburn used his political muscle as Speaker of the House to persuade Roosevelt to put the dam in the Department of the Interior and under the jurisdiction of Harold Ickes, a proponent of public power. But this executive action was only temporary, and Rayburn flexed his muscles again. Through a bitter struggle over the postwar future of power development, at least that connected with federal dams, the Speaker managed to have the Denison Dam permanently placed in the Department of the Interior. Ickes promptly created the Southwestern Power Administration (SPA) and put the dam and several others, such as the Norfolk Dam on the White River, under its authority. Ickes named Douglas G. Wright, who had been the administrator of the Grand River Dam on the Verdigris River, as head of SPA.

Navigation was not a consideration because the flow of water at Denison was too low to warrant it. Some steamboats had reached Denison in the past, but only during high water.[14] The real question was control over the power generated at the dam. Rayburn had now reserved it for public bodies, mostly rural electric cooperatives, but the supply of electricity produced at Denison and the other SPA dams was insufficient for year-round use. Working closely with Wright, Rayburn persuaded the power companies operating in the area, such as Texas Power and Light, to enter into contractual agreements to exchange energy with SPA. Known as integration, the plan called for SPA to exchange its "dump power" at high water for the steam-generated power of the electric companies. Opposition was stiff from both the companies and the liberal ideologists not wanting to cooperate with the electrical industry. Rayburn prevailed, beating off the private interests trying to kill SPA. He managed to win appropriations from Congress to develop the SPA power grid on a piecemeal basis. In 1947, Texas Power and Light Company entered into a power exchange arrangement with SPA. Other companies followed suit, and by 1952 opposition to SPA had ended. Today, SPA supplies power to REA co-ops, municipalities, defense industry installations and private utilities.

Considerable significance was attached to the Denison Dam because it was part of the nationwide debate over river basin use. Proponents of the "little TVAs" saw the Red River in the same light as the Missouri and Arkansas, a chance to recreate the TVA and activate a large-scale federal program aimed at socio-economic rehabilitation. Attention focused on the proposed Missouri Valley Authority while the fight raged over the Red River. Rayburn's ideological stance prevailed: he wanted cooperation with private enterprise. "We have two schools of thought on this question," he told a correspondent; "one group thinks there should be no public power at all, and the other thinks there should be no private power. I do not subscribe to either, I think that there is a field for both of them."[15]

Throughout the 1920s and 1930s, the Denison Dam had been the focal point of attention on the Red River. Completion of the dam in 1945 shifted attention back to navigation. Since 1925, when it was founded at Shreveport, the Red River Valley Improvement Association, later renamed the Red River Valley Association (RRVA), had lobbied for federal construction of a waterway on the river. Its object and purpose was to promote "the organization of district associations and unification of interests of all citizens of the Red River Valley, for the purpose of soliciting aid from the United States Government in the interests of flood control, bank protection, drainage and navigation . . . and the agricultural and industrial development of the entire territory embraced within the membershiop of this association."[16] As was the case with the Texas interests at Denison, flood

control was important to the Louisiana sponsors, but the primary objective of the Louisiana interests was navigation, not power.

The RRVA generally represented businessmen and political leaders in the lower valley from cities such as Shreveport, Alexandria and Natchitoches. In 1937 Thomas Q. Ashburn, president of the Inland Waterways Association, addressed the group at its annual meeting. In his opinion, congressional approval of a navigation project looked promising.[17] The outbreak of World War II and the preoccupation with the Denison Dam, however, precluded any immediate consideration by Congress of a Red River navigation project. The political pressure persisted, however, and in 1946 Congress authorized a major navigation project, the Overton-Red River Waterway. It was named after Louisiana Senator John H. Overton, a long-time proponent of the waterway.[18]

As specified in the authorization, the project would be a "9 by 100-foot navigation channel from the Mississippi River via Old River and Red River for about thirty-one miles, and then a new land cut generally following existing streams along the right bank of the Red River flood plain to Shreveport. The total length of the project was about 205 miles and included nine locks, a pumping plant, and numerous control features."[19] The nine locks were each to be twelve feet deep, fifty-six feet wide, and 650 feet long. Total cost was estimated at $88 million with $10 million to be borne by local interests.[20]

Sponsors of the Overton-Red River project immediately encountered resistance from the White House. In April 1947 the Bureau of the Budget informed the Secretary of War that "the project should be considered of low priority."[21] Several factors were responsible for the decision to delay funding. To begin with, there was some question over the benefit-cost ratio of the project, estimated at 1.28:1.00 in the Corps of Engineers' report. The anticipated $3.2 million savings in transport costs, based on prospective annual commerce of 1.1 million tons of freight on the canal, was dependent on maximum use of the river by carriers. An additional $300,000 of anticipated benefits from the drainage of low-lying adjoining areas assumed the production of crops on the drained land. For Harold D. Smith, Director of the Bureau of the Budget, these projections were not convincing. President Harry S. Truman and many political and business leaders were more concerned about employment, and in the Budget Director's opinion the construction of the canal "should not be considered in accord with the program of the President at this time."[22]

The Overton-Red River Waterway received low priority for the next ten years. The Korean War placed an even greater demand on federal funds, and President Truman generally refused to approve navigation projects throughout the United States for budgetary reasons.[23] With the election

of President Dwight D. Eisenhower in 1952, navigation projects continued to receive low priority. Eisenhower and the Democratic sponsors of the Red River canal were at political odds with one another. In 1956 Congress provided $175,000 for the resumption of the Corps' studies of the project.

In 1955 the proponents of the project had tried to stir enthusiasm for the waterway by taking steps to provide for the required local funding. The Louisiana state legislature created the Overton-Red River Waterway Planning Commission, consisting of two representatives from each of the eight parishes affected by the river. The legislature also passed a proposed amendment to the state constitution that would enable the commission to levy taxes, issue bonds and expropriate property in the state for the construction and maintenance of the project. Voter approval of the amendment was to be determined in the 1956 general election. Hoping to engender as much public support as possible, the RRVA released public relations materials advocating approval of the amendment. The association claimed that the waterway would bring a great savings in cheap transportation, thereby drawing manufacturing interests into the valley. Much fertile land would also be drained for cultivation. The anticipated industrial and agricultural development would spur the backward economy of the area and bring about an economic revival of the lower valley.[24]

Some opposition to the amendment erupted. Land owners in the eight parishes adjacent to the river thought the project would take away too much land. They opposed the proposed taxes and were convinced, furthermore, that state funds were more desperately needed for bridges, not new streams. Exemplifying this attitude was the American Farm Bureau Federation.[25] State Representative George Long opposed the amendment on the grounds that the Corps of Engineers had not adequately answered all questions about costs. No great debate raged over the amendment, but the opposition to it was known. On election day voters turned the waterway down, 191,715 to 156,973.[26] The eight parishes along the river approved it, but voter dissatisfaction was quite strong in the rest of the state. This defeat was decisive because Congress would not fund a project not endorsed by Louisiana citizens. Roy Matthias, executive director of the RRVA, explained the loss by saying the proposal was lost "in a welter of amendments"--there were forty-five amendments on the ballot.[27]

The Corps of Engineers could not afford to pursue the project further. In 1959, one Assistant Chief of Civil Works, A.H. McRae, told the Subcommittee of the House Committee on Appropriations: "Nothing is being done on the Overton Waterway at this time. The referendum of the people of Louisiana for the purpose of furnishing required cooperation was defeated 2 years ago, and the project is gone at the present time. There is no movement that I know of now to revive it."[28]

To spark interest in the project, well-known political representatives sponsored resolutions in Congress to show federal interest. Senators Allen J. Ellender and Russell B. Long of Louisiana persuaded the Senate to pass a resolution in September 1959 requesting the Board of Engineers for Rivers and Harbors to review and investigate the feasibility of navigation and other aspects of a comprehensive improvement of the Red River below Denison Dam. Texas Congressman Wright Patman and Louisiana Congressman Harold B. McSween managed to get a similar resolution through the House in February 1960.[29]

Acting on these resolutions, representatives from the Office of the Chief of Engineers and from the Southwestern Division, the Lower Mississippi Valley Division, the Tulsa District and the New Orleans District of the Corps of Engineers met in New Orleans October 25-26, 1962, to determine how to fulfill the wishes of Congress in regard to the Red River. The New Orleans District undertook to produce, by the end of fiscal year 1965, a new study of the Red River and to include the feasibility of a waterway below Shreveport.[30]

It was fully expected that the Corps would recommend a waterway. Optimism grew among the waterway's sponsors, and the RRVA hoped to see navigation of the river by 1970.[31] To show Congress what it perceived to be renewed public interest in the navigation project, the state legislature, in June 1963, created the Red River Waterway District with the authority to levy taxes in the eight parishes that would be served by the waterway. Again, the proposal had to have voter approval, but this time only voters in those parishes contiguous to the river were allowed to vote on the proposal. The referendum was scheduled for November 1963.

Almost no opposition emerged. If anything, the public appeared more supportive of the project than ever before. The usual business interests such as the Shreveport Chamber of Commerce endorsed it, and the American Farm Bureau Federation also endorsed it. No environmental opposition developed. Expected cost of a waterway below Shreveport with six locks and dams was about $500 million.[32] On election day the voters gave overwhelming approval to the amendment by a count of 34,042 to 5,493. The consequence was twofold: (1) Congress would be likely to provide funding with this show of public support, and (2) the state had the authority to levy taxes to provide the share of costs to be borne by local interests.

Following the directives of the Senate and House Public Works Committees, the New Orleans District proceeded with a renewed study of the Red River basin. In 1964, the District filed a comprehensive report on the feasibility of a navigation channel from Shreveport to the Mississippi. Authorization still existed for the old Overton-Red River Waterway, which included the first thirty-one miles of the river. The

new report stated that a navigable channel could be constructed by using the first thirty-one miles of the river and by following the main stem of the Red River to Shreveport. The District believed that five locks and dams would have to be built to make the river navigable. By the old Overton-Red River Waterway plan, the project would have been entirely a "land-cut" from Mile 31 to Shreveport. Hence, the major difference in the two studies was the use of the river itself in the latter plan so as to reduce costs.

The benefit-cost ratio solely for navigation in the 1964 project report was 1.5:1.00. The estimated cost solely for navigation was $239,409,000, which included bank stabilization features--a necessary component of navigation. The benefit-cost ratio with bank stabilization was 1.3:1.00. It was not until 1968, however, that Congress acted on the study and passed a new authorization for the Red River Waterway.[33]

Despite congressional authorization of the project in 1968, funding came slowly. No construction occurred that year, although a contract was awarded for construction of stone dikes at Mile 26.4, which was part of the old Overton-Red River Waterway on the first thirty-one miles of the river.[34] About 74,100 tons of stone were put in place by January 29, 1969. In 1969, although construction did not start, the New Orleans District did some real estate work on the stretch from Shreveport to Old River. The Chief of Engineers could only say that "planning for construction of project will be started when funds become available."[35] In the meantime, the Red River Waterway District had assured the Corps that it would supply the non-federal share of costs.

In 1971 Congress provided $600,000 for initiation of preconstruction planning, but that was held in budgetary reserve for one year. The real step forward came in 1973 when Congress appropriated $2,225,000 to begin construction of the locks and dams on the stream above Mile 31. That year the New Orleans District awarded two contracts for stone trench-fill revetments, one at Choctaw Bayou Bend and another at Kraft, Louisiana, Mile 197.9. By June 1974, the New Orleans District reported the project as 1 percent complete above Mile 31 and 26 percent complete below that point.[36]

Beginning in 1977, work progressed smoothly on Lock and Dam No. 1 at Marksville, Louisiana, river mile 42.6 to 51.1, and on bank stabilization at various points along the Red River. Contracts for access roads to the other locks and dams were awarded in 1979, but no construction on them started. By March, 1982, some real progress had been made on the Waterway: Lock and Dam No. 1 was 65 percent completed and most of the required revetments on Old River were built. In 1982, however, the Office of Management and Budget, implementing President Ronald Reagan's budget, severely cut the funds available for the project. For that year total funds alloted were $34,500,000, down from $88,743,000 the previous year.

Table 3

Red River Water Project
Funding History[37]

Total thru FY 70	$ 0
FY 71	600,000
FY 72	313,000
FY 73	2,225,000
FY 74	5,305,000
FY 75	10,000,000
FY 76	19,450,000
FY 77	15,410,000
FY 78	28,435,000
FY 79	51,220,000
FY 80	66,850,000
FY 81	88,743,000
FY 82	34,500,000

For fiscal year 1983, the Office of Management and Budget recommended $30,000,000 in order to finish construction of Lock and Dam No. 1. Further funding is not expected in the immediate future.[38]

The 1968 study by the New Orleans District summarized the potential impact of the waterway in the following words:

> The proposed navigation element will enhance the project area's ability to attract industry and traffic since it will not only afford access by water to the midcontinent river ports but also allow access to the deep water ports of Baton Rouge and New Orleans which are transshipping points for world trade. The proposed comprehensive bank stabilization works will enhance the areas adjacent to the river as

prospective sites for industry by providing security against erosion of the land. The stabilization of the channel and riverbanks will afford benefits to the Mississippi River and Tributaries project by providing added safety for levees and other improvements, decrease in the cost of maintaining existing work, and reduction in the sediment which would be carried into the Atchafalaya system.

The improvements would result in some loss in tax revenue, particularly in the case of the areas proposed for parks and recreation access areas. However, any loss will be more than compensated by expected increased revenue from commercial expansion associated with the supplying of the needs of the recreational activity and the industrial expansion likely to be induced by the navigation element.[39]

By January, 1982, the New Orleans District had computed the annual economic benefits as follows.[40]

Benefit	Total Annual Estimate at Project Interest Rate (3½%)
Flood Control	$ 380,000
Bank Stabilization	14,990,000
Navigation	41,000,000
Fish & Wildlife	120,000
Recreation	4,310,000
Area Redevelopment	9,900,000
Reduced Cost of Municipal and Industrial Water and Irrigation	40,000
Total Annual Benefits	$70,740,000

Future development of the waterway depends, of course, on funding and fiscal policies. With the project slightly over 20 percent complete, it appears unlikely that the waterway will receive further congressional appropriations as long as the federal government maintains a conservative fiscal policy.

Chapter IV

CONCLUSIONS

Examination of the western tributaries of the Mississippi River--the Missouri, the Arkansas, and the Red--demonstrates a similar pattern of development for all three. Their histories were remarkably alike; the main difference was the extent to which they had been made navigable or otherwise developed.

After the period of initial exploration of the trans-Mississippi West, explorers, mountain men and fur traders used these rivers to lead Americans into the West. For the Missouri River, the rich fur trade of the Plains Indians led fur traders to use any means available to navigate the stream. Keelboats were used first on these rivers, a practice repeated, of course, on nearly all American rivers. The wealth available with a successful trip by keelboat helped the early fur traders to face the dangers of floods, snags, sandbars and Indians as they ventured up and down the "Big Muddy."

With the commercial feasibility of the steamboat demonstrated by Robert Fulton in 1807, use of the rivers began on a larger and more sophisticated scale. Freight service was always first, but as the steamers became more comfortable and the river valleys were secured from Indians and outlaws, passenger service grew, and the steamboat era, about 1835 to 1860, began. As settlers and other people rushed into the river valleys, navigation became even more desirable since it was viewed as the principal means of contact with the eastern seaboard. Traffic was heaviest on the Missouri River in this respect--the upper regions of the Arkansas lay in Indian territory and the Red River was blocked by the Great Raft. Of the three rivers, undoubtedly the Missouri had the greatest use during the nineteenth century.

Topographic conditions impeded navigation on all three, and generally the same conditions existed in all three. To begin with, they carried a large amount of sand, or silt, which kept each river from developing a permanent deep channel. Silt built up into sandbars or reefs that blocked steamboats. Snags were common to all three, and the Red River had the "Great Raft," the 100-mile-long logjam. Most serious of all the hindrances to navigation was the shortage of water, that is, the absence of a dependable flow of water sufficient enough to allow steamboat travel. In this respect the Red River was the worst and explains why it has been the last to be developed for navigation.

Man-made factors, particularly the railroad, however, spelled the doom of the steamboat era. After the Civil War, the construction of railroads into the river valleys enabled farmers, planters and merchants

to ship their produce to market at less risk. The uncertainty of a river voyage gave way to the reliable locomotive. Again, the Missouri Valley experienced the first influx of railroads, though steamboat traffic continued sporadically.

In the nineteenth century only minimal effort and funds were devoted by the federal government to keeping the rivers open. Congress did authorize the removal of the raft on the Red River. Large-scale development of the streams for navigation and other purposes, however, has been a twentieth-century development, and these rivers were embroiled in a nationwide debate over resource management. Each river was viewed as the means to an improved standard of living in its basin. A national debate arose over the Missouri in the controversy over the Missouri Valley Authority (MVA), a proposal for a separate agency to administer the use of the river along the lines of the Tennessee Valley Authority. Congress never created the MVA and left the piecemeal development of navigation to the Corps of Engineers. As funds were made available, work was done to make the Missouri navigable. By the close of the 1970s, the river was navigable to Sioux City, Iowa, from March through November.

Navigation of the Arkansas began later, but construction moved faster once it started. The Oklahoma-Arkansas sponsors of the Arkansas waterway had considerable power in the federal government and were able to obtain funding on a regular basis. By 1971 the McClellan-Kerr Waterway was finished, but it, too, had been involved in an ideological dispute over the use of rivers. Proponents of public power wanted to focus development on the generation of electrical energy and frequently introduced in Congress measures to create an Arkansas Valley Authority (AVA). The ideology behind the AVA was the same as that of the MVA, but political opposition kept the "little TVAs" plan from passing and thereby made the Arkansas River primarily a navigation project.

Probably the greatest success of the public power group came with the Red River, and since it was the smallest of the three streams, the real impact of the power development on the Red was limited. Creation of the Southwestern Power Administration (SPA) was not an endorsement of the "little TVAs" concept, but of use of the river for power production on a cooperative basis with private electric companies operating in the area. The SPA administered the sale of power from dams other than the Denison Dam, but the latter was the focus of the debate over use of the Red River. Navigation of the stream remains to be developed fully. Not until 1973 were funds made available to start construction, and by 1982 the project was only 20 percent complete. In March 1981, the administration of President Ronald Reagan substantially cut funding for the Red River waterway.

A major question over the use of the rivers for navigation was the anticipated impact of water transportation on economic growth. One of the three western tributaries, the Arkansas, has a unique position in this regard because the Institute for Water Resources (IWR) has been conducting an impact study of the canal for several years. By 1981 not all the results were in, but it appeared that the canal, thus far, has contributed to the economic diversification of the Arkansas River valley. The traditional out-migration of the valley's inhabitants has reversed and general economic improvement has been evident. Other signs of the canal's impact have been noticed. IWR economists are cautious to make claims about the waterway, but it appears that navigation has been responsible for some economic growth even if the direct connection is not visible.

In the last quarter of the twentieth century, the three western tributaries of the Mississippi will again become "avenues of commerce," assuming the completion of the Red River Waterway. As the domestic and foreign trade of the United States grows, these canals will likely prove beneficial and useful to the nation's economy.

NOTES

Chapter 1

1. Stanley Vestal, The Missouri (New York: Farrar & Rinehart, Inc., 1945), p. 11.

2. For a full account of the Lewis and Clark expedition see Bernard De Voto, ed., The Journals of Lewis and Clark (Boston: Houghton, Mifflin, 1953).

3. Vestal, The Missouri, pp. 18-33.

4. Rex Bundy and Edith Thompson Hall, "The Missouri and the Yellowstone," in Water Trails West, Donald Duke, ed. (New York: Aron Books, 1978), p. 16.

5. Ibid., p. 117; William H. Goetzmann, Exploration and Empire: The Explorer and the Scientist in the Winning of the American West (New York: Vintage Books, Random House, 1973), p. 58.

6. Duke, ed., Water Trails West, pp. 117-19.

7. Hiram Martin Chittenden, History of Early Steamboat Navigation on the Missouri River, Life and Adventures of Joseph La Barge, 2 vols. (1903; reprint ed., Minneapolis: Ross and Haines, 1962), 1:117.

8. Ibid., p. 118.

9. Ibid., p. 125.

10. Ibid., p. 272.

11. Raymond H. Merritt, Creativity, Conflict and Controversy: A History of the St. Paul District, U.S. Army Corps of Engineers (St. Paul: U.S. Army Engineer District, St. Paul, 1978), p. 243.

12. Annual Report of the Chief of Engineers to the Secretary of War for the Year 1879, pt. 2, p. 1095.

13. Robert L. Branyon, Taming the Mighty Missouri: A History of the Kansas City District, Corps of Engineers, 1907-1971 (Kansas City: U.S. Army Engineer District, Kansas City, 1974), p. 5.

14. Ibid., p. II.

15. Ibid., p. 5.

16. Ibid., p. 9.

17. Ibid., p. 15.

18. Ellis L. Armstrong, Michael Robinson and Suellen M. Hoy, eds., History of Public Works in the United States, 1776-1976 (Chicago: American Public Works Association, 1976), p. 266.

19. Rufus Terral, The Missouri Valley, Land of Drought, Flood and Promise (New Haven: Yale University Press, 1947), p. 85.

20. Jean Christie, "The Mississippi Valley Committee: Conservation and Planning in the New Deal," The Historian, XXXII (May, 1970): 449-469.

21. Joseph K. Howard, "Golden River," Harpers, CXC (May, 1945): 513.

22. Ibid., p. 514.

23. Congressional Record, 78th Cong., 2d sess. (1944), Vol 90, pt. 6, p. 8479.

24. C. Frank Keyser, Missouri Valley Authority, Background and Analysis of Proposal (S.555, 79th Congress), Legislative Reference Service Bulletin No. 42 (Washington, D.C.: Library of Congress, 1946), p. 19.

25. Ibid., p. 22.

26. For an example of the debate engendered by the MVA see ibid., pp. 29-35.

27. Robert Lasch, "Why An MVA?" Atlantic Monthly, CLXXV (May, 1945): 72-76.

28. Quote in Keyser, Missouri Valley Authority, Bulletin No. 42, p. 91.

29. Edward Skillin, Jr., "Missouri Valley Authority: America's Single Greatest Peacetime Project," Commonweal, XLII (August 24, 1945): 448.

30. Keyser, Missouri Valley Authority, Bulletin No. 42, p. 39.

31. U.S., Congress, Senate, Subcommittee of the Committee on Commerce, Hearings to Establish a Missouri Valley Authority, S.555, 79th Cong., 1st sess., pt. 6, April 23, 1945, p. 359.

32. Ibid., pt. 5, pp. 301-302, 337.

33. Ibid., p. 337.

34. Richard G. Baumhoff, The Dammed Missouri Valley: One Sixth of our Nation (New York: Alfred A. Knopf, 1951), pp. 172-173.

35. Henry C. Hart, The Dark Missouri (Madison: University of Wisconsin Press, 1957), p. 137.

36. Ibid., p. 138.

37. Ibid., pp. 137-139.

38. Ibid., p. 140-141.

39. U.S., Army, Corps of Engineers, FY 1978 Annual Report of the Chief of Engineers on Civil Works Activities, Vol. 2 (Washington, D.C.: Government Printing Office, 1978), pp. 20-22.

40. Missouri Basin Interagency Committee, Comprehensive Framework Study, Missouri River Basin, Vol. 2 (Washington, D.C.: Government Printing Office, 1969), p. 56.

Chapter 2

1. Bill Burchardt, "The Arkansas River and the Red," in Donald Duke, ed., Water Trails West (New York: Aron Books, 1978), p. 37.

2. Clyde Brion Davis, The Arkansas (New York: Farrar and Rinehart, Inc., 1940), pp. 7-8.

3. R. Kay Greenwell and Anthony Huxley, Standard Encyclopedia of the World's Rivers and Lakes (New York, 1965), pp. 38-39.

4. U.S., Army, Corps of Engineers, The Arkansas: Renaissance of a River, pamphlet (Little Rock: U.S. Army Engineer District, Little Rock, 1971), p. 1; Davis, The Arkansas, p. 290.

5. William A. Settle, The Dawning, A New Day for the Southwest (Tulsa: U.S. Army Engineer District, Tulsa, 1975), p. 13.

6. Burchardt, "The Arkansas River and the Red," p. 48.

7. Ibid., p. 49.

8. Ibid., p. 46.

9. Settle, The Dawning, p. 14.

10. Ibid., pp. 18-19.

11. Armstrong, Robinson, and Hoy, eds., History of Public Works, pp. 249-250.

12. U.S., Army, Corps of Engineers, The Arkansas, p. 10.

13. Settle, The Dawning, p. 28.

14. Ibid., p. 33-34.

15. Roosevelt to McClellan, January 14, 1944, John L. McClellan Papers, File 46, Drawer E, Ouachita Baptist University, Arkadelphia, Arkansas.

16. Ann Hodges Morgan, Robert S. Kerr: The Senate Years (Norman: Oklahoma University Press, 1977).

17. Settle, The Dawning, p. 44.

18. Institute for Water Resources, A River, a Region and a Research Problem, IWR Report 71-6 (Washington: Government Printing Office, 1971), p. A-13.

19. Irving K. Fox and Isabel Picken, The Upstream-Downstream Controversy in the Arkansas-White-Red Basins Survey (University, Alabama: University of Alabama Press, 1960), pp. 5-7.

20. Floyd Clay, A History of the Little Rock District, U.S. Army Corps of Engineers (Little Rock: U.S. Army Engineer District, Little Rock, 1971), p. 70.

21. Quoted in George Antle, "The McClellan-Kerr Arkansas River Basin Navigation System - Who Takes Care of Economic Development and Environmental Quality?" paper presented at IWR Research Symposium, Gatlinburg, Tennessee, May, 1980, p. 5.

22. U.S., Army, Corps of Engineers, Southwestern Division, Recent Developments in the McClellan-Kerr Arkansas River Navigation System Area, IWR Research Report 77-R1 (April, 1977), p. 59.

23. Ibid., pp. 65-67.

24. Ibid., p. 68.

25. Ibid., p. 70.

26. Ibid., p. 77.

27. Ibid., pp. 80-81.

28. Ibid., pp. 78, 81.

29. Rex R. Campbell, et al., Population Change, Migration and Displacement Along the McClellan-Kerr Arkansas River Navigation System, IWR Contract Report 77-5 (December, 1977), pp. 2-3.

30. Ibid., p. 6.

31. Ibid., p. 54.

32. Ibid., p. 55.

33. Ibid., p. 57.

34. Antle, "The McClellan-Kerr Arkansas River Basin Navigation System," p. 7.

Chapter 3

1. Report of the Chief of Engineers, United States Army, 1950, Vol. 1, p. 927; Walter P. Webb, ed., The Handbook of Texas, Vol. 2 (Austin: Texas State Historical Association, 1952), p. 449.

2. Webb, Handbook of Texas, p. 450.

3. William Homer Tyre, "The Congressional History of Federal Improvement on the East Texas Rivers, 1828-1890," unpublished master's thesis, University of Texas, Austin, 1924, p. 22.

4. Harry Sinclair Drago, Red River Valley: The Mainstream of Frontier History from the Louisiana Bayous to the Texas Panhandle (New York: Clarkson N. Potter, 1962), p. 97.

5. Settle, The Dawning, p. 15.

6. Drago, Red River Valley, p. 98.

7. Ibid., p. 102.

8. Ludwell H. Johnson, Red River Campaign: Politics and Cotton in the Civil War (Baltimore: Johns Hopkins Press, 1958).

9. Gulf South Research Institute, Red River Waterway Louisiana, Texas, Arkansas and Oklahoma, Environmental Analysis, Design Memorandum, No. 15, typescript (January, 1975), p. 120.

10. Eugene Bowers and Evelyn Oppenheimer, Red River Dust (Waco: Waco Books, 1968), p. 118.

11. Quoted in D. Clayton Brown, "Sam Rayburn and the Development of Public Power in the Southwest," Southwestern Historical Quarterly, LXXIII (October, 1974): 140.

12. Ibid., p. 141.

13. Ibid., pp. 149-150.

14. One writer claims the river was navigable to Denison in 1909, but steamboats could reach that point only during high water. Navigation to Denison was negligible. See Gulf South Research Institute, Red River Waterway, p. 120.

15. Brown, "Sam Rayburn and the Development of Public Power," p. 149.

16. Articles of Incorporation, Red River Valley Improvement Association, July 9, 1927, Louisiana State University-Shreveport, Archives, file of the Red River Valley Association.

17. Shreveport Journal, August 11, 1937.

18. Shreveport Times, February 22, 1946.

19. U.S., Army, Corps of Engineers, New Orleans District, "Red River Below Denison Dam, Comprehensive Basin Study, Louisiana, Arkansas, Oklahoma and Texas, Plan of Survey, Summary," typescript, February 15, 1963, p. II-1, New Orleans District Library. Hereafter cited as New Orleans District, "Red River Basin Study".

20. Shreveport Times, June 7, 1956.

21. U.S., Congress, House, Red River, La., Ark., Okla., and Tex., Letter from the Secretary of War, H. Doc. 320, 80th Cong., 1st sess., 1947, p. vi.

22. Ibid., pp. x, 9.

23. U.S., Congress, House, Committee on Appropriations, Public Works Appropriations for 1957, Hearings before the Subcommittee of the Committee on Appropriations, 84th Cong., 2d sess., 1956, p. 552.

24. Alexandria (Louisiana) Daily Town Talk, October 31, 1956.

25. Shreveport Times, June 6, 1956.

26. Ibid., November 11, 1956.

27. Ibid.

28. U.S., Congress, House, Committee on Appropriations, Public Works Appropriations for 1960, Hearings before the Subcommittee of the Committee on Appropriations, 86th Cong., 1st sess. (Washington, 1959), pt. 1, p. 302.

29. New Orleans District, "Red River Basin Study," p. I-1.

30. Ibid.

31. Shreveport Journal, April 15, 1963.

32. Ibid., June 3, 1964, October 2, 1964. Later, the New Orleans District eliminated one lock and dam.

33. Interview, Terral Broussard, Engineering Division, New Orleans District, February 17, 1982.

34. U.S., Army, Corps of Engineers, Annual Report of the Chief of Engineers on Civil Works Activities, 1968, Vol. 2, (Washington, D.C.: Government Printing Office, 1970), p. 419.

35. Annual Report of the Chief of Engineers on Civil Works Activities, 1969, Vol. 2 (Washington, D.C.: Government Printing Office, 1971), p. 400.

36. Annual Report of the Chief of Engineers on Civil Works Activities, 1974, Vol. 2 (Washington, D.C.: Government Printing Office, 1976), pp. 11-20 to 11-22.

37. U.S., Army, Corps of Engineers, Engineering Division, New Orleans District, "Fact Sheet, August, 1981".

38. Interview, Terral Broussard, February 17, 1982.

39. U.S., Congress, House, Red River Below Denison Dam, Louisiana, Arkansas, Oklahoma and Texas, H. Doc. 304, 90th Cong., 2d sess., 1968, p. 405.

40. Frederic Chatry, Chief of Engineering Division, New Orleans District, to author, January 21, 1982.

CHRONOLOGY

1541 - Francisco Vásquez de Coronado explored the upper Arkansas and Red River basins; Hernando de Soto journeyed up a portion of the lower Arkansas River on a separate expedition.

1673 - Father Jacques Marquette and Louis Jolliet reached the Missouri River.

1690 - Domingo Terán de los Ríos traveled up the Red River to the present site of Texarkana.

1803 - United States acquired the Louisiana Territory.

1804 - The Lewis and Clark expedition traveled up the Missouri River
1805 to western Montana en route to the Pacific Ocean. William Dunbar ascended the Red River as far as the Washita.

1807 - Robert Fulton commercialized the steamboat.

1811 - Manuel Lisa and Wilson P. Hunt conducted a 1200-mile keelboat race to Sioux Indian Territory.

1816 - Jean Lafitte traveled up the Arkansas on a mission for the Spanish government.

1817 - The steamboat Zebulon Pike reached St. Louis on the Mississippi.

1819 - Elias Rector took the Independence from St. Louis to Chariton, Iowa. U.S. Army Major Stephen Long took another steamer, the Western Engineer, up the Missouri close to Council Bluffs.

1819 - The Red River became part of the boundary of the United States under the terms of the Adams-Onís Treaty with Spain.

1820 - The Comet became the first steamboat to operate on the Arkansas River.

1827 - The steamboats Velocipede, Scioto, and Catawba ascended the Arkansas River to Fort Gibson, Oklahoma.

1831 - The Yellowstone steamed up the Missouri to Pierre, South Dakota.

1831 - The steamboat Enterprise ascended the Red River to the mouth of the Kiamichi River.

1832 - The Trenton sank on the Arkansas River, killing 311 Indians who were being removed to Oklahoma by the United States government.

1842 - The Edna exploded on the Missouri River, killing forty-two crewmen and passengers.

1852 - The Saluda exploded on the Missouri, killing over 100 persons.

1863 - Union Army units commanded by Nathaniel P. Banks launched the Red River Campaign.

1863 - Gold was discovered in Montana, increasing traffic on the Missouri River.

1869 - United States Corps of Engineers commissioned the S. Thayer to remove snags on the Arkansas River.

1873 - The great raft on the Red River was removed.

1876 - Corps of Engineers conducted a survey of the Missouri; Congress appropriated $20,000 for improvements on the upper river.

1876. The Texas and Pacific Railroad built its first line through the Red River valley.

1882 - Congress appropriated $850,000 for Missouri River improvements based on the survey report of Major Charles A. Suter. Congress created the Missouri River Commission and gave it jurisdiction over the river.

1902 - Congress abolished the Missouri River Commission and returned jurisdiction to the Secretary of War.

1906 - Muskogee business interests put the Mary D into operation on the Arkansas River.

1907 - Congress ordered a survey of the Missouri to evaluate the possibility of constructing a six-foot channel from St. Louis to Sioux City, Iowa.

1910 - Congress authorized the dredging of a six-foot channel in the Missouri River between Kansas City and St. Louis.

1924 - Flood Control Act provided for a survey of the Arkansas River and two tributaries, the Canadian and Verdigris.

1925 - Red River Valley Improvement Association founded.

1927 - The "Flood of 1927" put half the state of Arkansas underwater.

1930 - Corps of Engineers filed a survey report on Missouri River and recommended a nine-foot channel.

1933 - Public Works Administration began construction of Fort Peck Dam.

1935 - Corps of Engineers transmitted a comprehensive study of the Arkansas River to Congress.

1938 - Congress authorized the Denison Dam on the Red River.

1943 - The Arkansas River flood of 1943 produced a greater discharge than the 1927 flood.

1943 - Colonel Lewis A. Pick filed his study of the Missouri River, commonly known as the Pick Plan.

1944 - Denison Dam went into operation.

1944 - William G. Sloan of the Bureau of Reclamation filed his study of the Missouri River, commonly known as the Sloan Plan. The two Missouri River plans were put together as the Pick-Sloan Plan, and features of each plan were authorized by the Flood Control Act of 1944. In September, President Franklin D. Roosevelt called for the creation of a Missouri Valley Authority.

1945 - Congress authorized a nine-foot channel from Sioux City to the mouth of Missouri.

1946 - Congress authorized the Arkansas waterway and a navigation channel on the Red River from Shreveport to the Mississippi River.

1950 - Congress created the Arkansas-White-Red Basin Interagency Committee.

1956 - Louisiana voters defeated the proposed Red River Waterway District.

1956 - Congress funded the construction of three reservoirs as part of the Arkansas waterway: Keystone, Eufaula and Dardanelle.

1962 - Tonnage on the Missouri River reached 2,250,000.

1964 - New Orleans District, Corps of Engineers, filed a new comprehensive study of the Red River basin. Louisiana voters approved the creation of the Red River Waterway Commission.

1968 - Congress authorized the Red River Waterway.

1970 - The Arkansas River Navigation project was declared operational.

1971 - The Arkansas River Navigation project was officially dedicated on June 5 by President Nixon as the McClellan-Kerr Waterway.

1973 - Construction started on Lock and Dam No. 1 of the Red River Waterway.

1976 - Tonnage on the Missouri River reached another record, 3,105,877.

BIBLIOGRAPHY

Books

Baumhoff, Richard G. The Dammed Missouri Valley: One Sixth of our Nation. New York: Alfred A. Knopf, 1951.

Bowers, Eugene and Oppenheimer, Evelyn. Red River Dust. Waco: Waco Books, 1968.

Chittenden, Hiram Martin. History of Early Steamboat Navigation on the Missouri River, Life and Adventures of Joseph La Barge. 2 vols. 1903; reprint ed., Minneapolis: Ross and Haines, 1962.

Davis, Clyde Brion. The Arkansas. New York: Farrar and Rinehart, Inc., 1940.

Drago, Harry Sinclair. Red River Valley: The Mainstream of Frontier History from the Louisiana Bayous to the Texas Panhandle. New York: Clarkson N. Potter, 1962.

Duke, Donald, ed., Water Trails West. New York: Aron Books, 1978.

Fox, Irving and Picken, Isabel. The Upstream-Downstream Controversy in the Arkansas-White-Red Basins Survey. University: University of Alabama Press, 1960.

Hart, Henry C. The Dark Missouri. Madison: University of Wisconsin Press, 1957.

Hunter, Louis C. Steamboats on the Western Rivers. An Economic and Technological History. 1949; reprint ed., New York: Octagon Books, 1969.

Johnson, Ludwell H. Red River Campaign: Politics and Cotton in the Civil War. Baltimore: Johns Hopkins Press, 1958.

Morgan, Ann Hodges. Robert S. Kerr, the Senate Years. Norman: Oklahoma University Press, 1977.

Terral, Rufus. The Missouri Valley, Land of Drought, Flood and Promise. New Haven: Yale University Press, 1947.

Vestal, Stanley. The Missouri. New York: Farrar & Rinehart, Inc., 1945.

Webb, Walter P., ed. Handbook of Texas. Vol. 2. Austin: Texas State Historical Association, 1952.

Articles

Brown, D. Clayton. "Sam Rayburn and the Development of Public Power in the Southwest." Southwestern Historical Quarterly, LXXIII (October, 1974): 140-154.

Christie, Jean. "The Mississippi Valley Committee: Conservation and Planning in the New Deal." The Historian, XXXII (May, 1970): 449-469.

Howard, Joseph K. "Golden River." Harper's, CXC (May, 1945): 511-523.

Lasch, Robert. "Why an MVA?" Atlantic Monthly, CLXXV (May, 1945): 72-76.

Skillin, Edward. "Missouri Valley Authority: America's Single Greatest Peacetime Project." Commonweal, XLII (August 24, 1945): 446-449.

Government Publications and Reports

Branyan, Robert L. Taming the Mighty Missouri: A History of the Kansas City District, Corps of Engineers, 1907-1971. Kansas City: U.S. Army Engineer District, Kansas City, 1974.

Clay, Floyd. A History of the Little Rock District, U.S. Army Corps of Engineers. Little Rock: U.S. Army Engineer District, Little Rock, 1971.

Cowdrey, Albert E. Land's End: A History of the New Orleans District, U.S. Army Corps of Engineers, and Its Lifelong Battle with the Lower Mississippi and Other Rivers Wending Their Way to the Sea. New Orleans: U.S. Army Engineer District, New Orleans, 1977.

Gulf South Research Institute. Red River Waterway; Louisiana, Texas, Arkansas and Oklahoma; Environmental Analysis, Design Memorandum No. 15. Typescript (January, 1975). New Orleans District Library.

Institute for Water Resources. A River, a Region and a Research Problem. IWR Report 71-6. Washington, D.C.: Government Printing Office, 1971.

Keyser, C. Frank. Missouri Valley Authority, Background and Analysis (S. 555, 79th Congress). Legislative Reference Service Bulletin No. 42. Washington, D.C.: Library of Congress, 1946.

Merritt, Raymond. Creativity, Conflict and Controversy: A History of the St. Paul District, U.S. Army Corps of Engineers. St. Paul: U.S. Army Engineer District, St. Paul, 1978.

Missouri Basin Interagency Committee. Comprehensive Framework Study, Missouri River Basin. Vol. 2. Washington, D.C.: Government Printing Office, 1969.

Settle, William A. The Dawning, A New Day for the Southwest. Tulsa: U.S. Army Engineer District, Tulsa, 1975.

U.S. Army. Corps of Engineers. Annual Reports of the Chief of Engineers on Civil Works Activities. Washington, D.C.: Government Printing Office, 1968-1978.

U.S. Army. Corps of Engineers, Engineering Division, New Orleans District. "Fact Sheet." August, 1981.

U.S. Army. Corps of Engineers, New Orleans District. "Red River Below Denison Dam, Comprehensive Basin Study, Louisiana, Arkansas, Oklahoma and Texas, Plan of Study, Summary." Typescript (February 15, 1963). New Orleans District Library.

Papers

Angle, George. "The McClellan-Kerr Arkansas River Basin Navigation System - Who Takes Care of Economic Development and Environmental Quality?" Paper presented at IWR Research Symposium, Gatlinburg, Tennessee, May, 1980.

Interviews

Broussard, Terral. Engineering Division, New Orleans District. Telephone interview with the author, February 17, 1982.

Shelton, Cecil. Engineering Division, New Orleans District. Telephone interview with the author, February 1982.

Archival Material

Shreveport, Louisiana. Louisiana State University Archives. Records of the Red River Valley Association.

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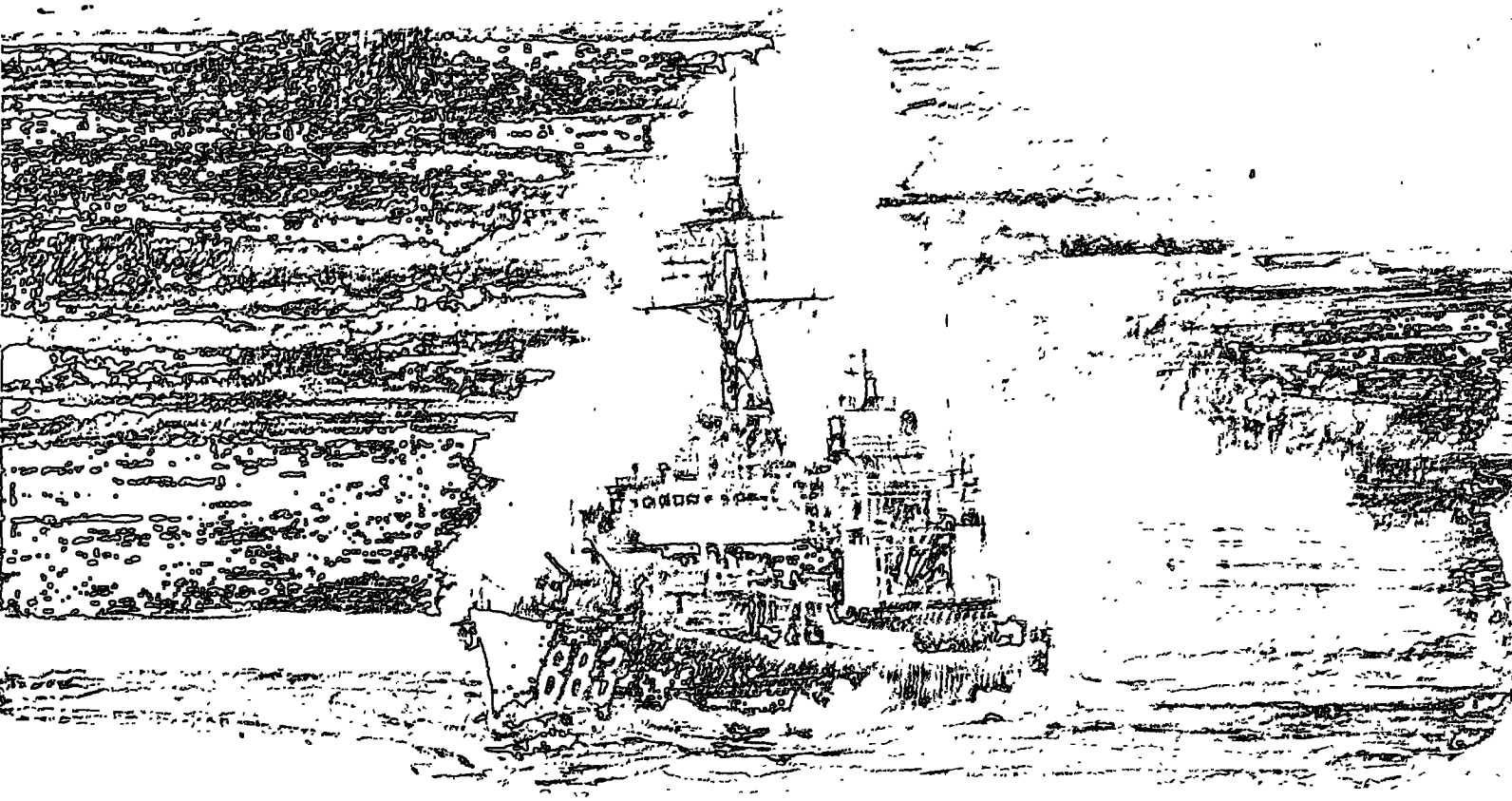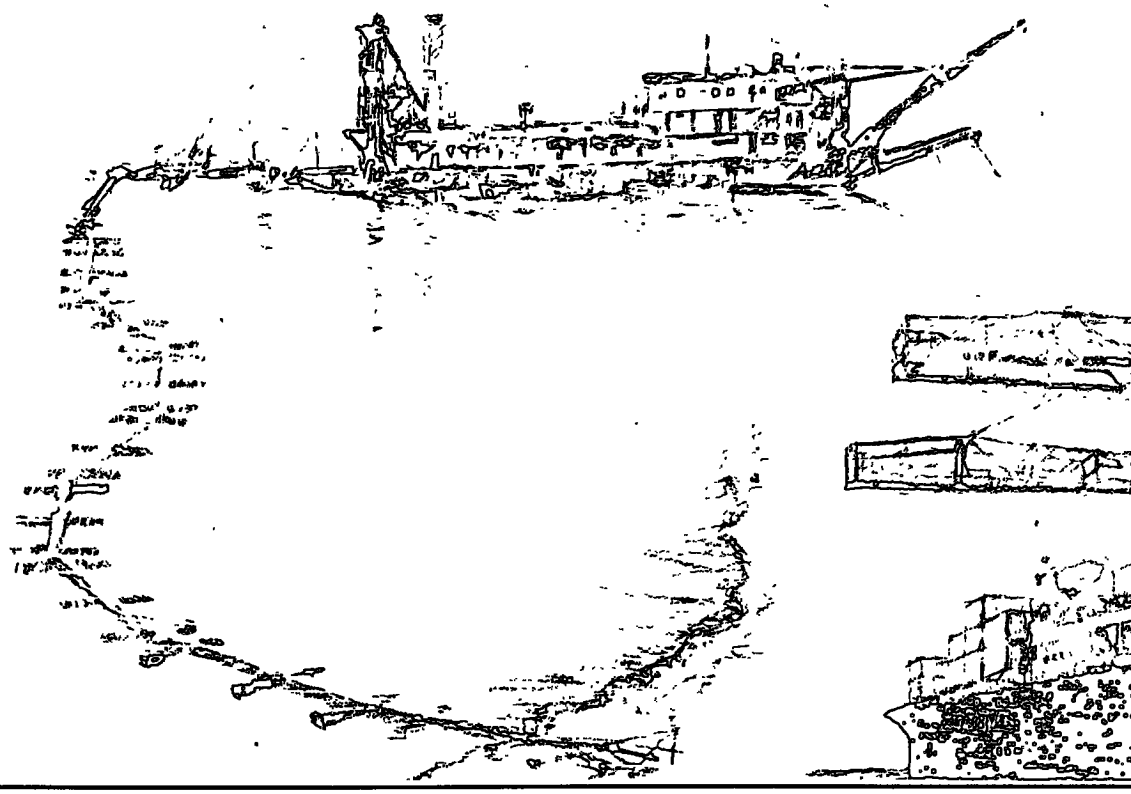
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