

Upon Their Shoulders

A history of the
Mississippi River Commission from
its inception through the advent of
the modern Mississippi River
and Tributaries Project



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Mississippi River Commission
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of the modern Mississippi River
and Tributaries Project

by

Charles A. Camillo and Matthew T. Percy

Mississippi River Commission
Vicksburg, Mississippi
2004

"The military engineers of the Commission have taken upon their shoulders the job of making the Mississippi over again--a job transcended in size by only the original job of creating it. They are building wing-dams here and there, to deflect the current; and dikes to confine it in narrower bounds; and other dikes to make it stay there; and for unnumbered miles along the Mississippi, they are felling the timber-front for fifty yards back, with the purpose of shaving the bank down to low-water mark with the slant of a house roof, and ballasting it with stones; and in many places they have protected the wasting shores with rows of piles. One who knows the Mississippi will promptly aver--not aloud, but to himself--that ten thousand River Commissions, with the mines of the world at their back, cannot tame that lawless stream, cannot curb it or confine it, cannot say to it, Go here, or Go there, and make it obey; cannot save a shore which it has sentenced; cannot bar its path with an obstruction which it will not tear down, dance over, and laugh at. But a discreet man will not put these things into spoken words; for the West Point engineers have not their superiors anywhere; they know all that can be known of their abstruse science; and so, since they conceive that they can fetter and handcuff that river and boss him, it is but wisdom for the unscientific man to keep still, lie low, and wait till they do it. Captain Eads, with his jetties, has done a work at the mouth of the Mississippi which seemed clearly impossible; so we do not feel full confidence now to prophesy against like impossibilities."

Mark Twain, *Life on the Mississippi*

Foreword

The Mississippi River Commission is honored to serve the people of the Mississippi Valley and the nation. The Mississippi River basin is the greatest living and working watershed, encompassing 41 percent of the United States and parts of Canada. Benefits produced from its navigation, flood control, recreation, and complex ecosystem positively impact the nation and the world.

Upon Their Shoulders is the story of complicated, intricate, and sometimes conflicting forces confronting the private, local, state, and Federal agencies charged with improving and managing this indispensable resource. The long-standing partnerships forged among the people of the Missouri, Ohio, and Mississippi River valleys help to balance many competing needs and deliver positive value to the nation.

The enduring challenge for the Commission and our partners is effective stewardship of this great resource for the millions of people who live, work, and play along this nationally significant ecosystem and commercial navigation system. We are grateful for the privilege to serve on the Mississippi River Commission.

Don T. Riley
Brigadier General, U.S. Army

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Member

R. D. James
Member

William Clifford Smith
Member

Nicholas A. Prah
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Authors' Preface

Prepared in commemoration of the 125th anniversary of the Mississippi River Commission (MRC), this study traces the social, political, economic, and administrative forces that guided the MRC from its inception through the advent of the modern Mississippi River and Tributaries Project (MR&T). Drawing to a close in 1941, this monograph represents the first of a planned two-part history of the MRC. The second study, already underway, will follow the history of the MRC from the Second World War to the present, assessing the Commission's efforts to implement and improve the MR&T project, to facilitate the growth of riverborne commerce, and to incorporate environmental sustainability into its flood-control and navigation improvements. Until that study is available, Norman R. Moore's *Improvement of the Lower Mississippi River and Tributaries, 1931-1972* may serve as a useful supplement to this book.

A few brief caveats are in order. First, the chapters grow progressively lengthier. While the early chapters trace the relatively straightforward motivations underlying the creation of the Mississippi River Commission, later chapters tackle the complex interplay between the evolution of MRC policy and the many forces affecting that development, including Congressional interference, fiscal constraints, and engineering disputes. Additionally, several of the later chapters break sharply from the institutional history of the MRC and focus on legislative history, particularly with regard to the 1879 act creating the MRC and the flood control acts of 1917 and 1928. These chapters shed light on legislative intent and on the political machinations behind the formulation of these landmark acts—arguably the most influential laws shaping the MRC and the development of navigation and flood-control improvements on the Mississippi River. Finally, the endnotes contain a wealth of ancillary information that, for one reason or another, disturbed the flow of the manuscript but warranted inclusion in the study.

Throughout the development of this history, we received generous support from many sources. We are grateful for the support of the current Members of the Mississippi River Commission; the drive of the MRC Secretary, Col. Richard B. Jenkins, in securing the necessary authorizations and approvals; and the patience of our supervisors, John S. Rickey, Chief of Public Affairs, Mississippi Valley Division (MVD), Bobbie J. Galford, Chief of Public Affairs, Engineer Research and Development Center (ERDC), and, from the St. Paul District, Col. Robert L. Ball, District Engineer, Lt. Col. Thomas E. O'Hara, Deputy District Engineer, Judith L.

DesHarnais, Deputy for Programs and Project Management, and Terry J. Birkenstock, Chief of Environmental and Economic Analysis Branch.

We are also particularly indebted to the late Michael C. Robinson, who as MRC historian gathered a splendid collection of primary and secondary source materials on the Mississippi River Commission and the U.S. Army Corps of Engineers on the Mississippi River. Pam Vedros, the deputy public affairs officer for MVD, carefully preserved the collection after Dr. Robinson passed away, and for that we are grateful. Sherrie Moran and Debra Williams of the MRC library and the entire library staff at the ERDC readily assisted us in our research. Heather Moore, Photo Historian, U.S. Senate Historical Office; Marilee P. Meyer, Archivist, Association of Graduates, United States Military Academy; Peter Nimrod, Mississippi Levee District; Robert Anderson, Chief of Public Affairs, Memphis District, endured our frequent requests for help and all contributed photographs and related information. Marilyn Holt, Publishing and Technology Transfer Branch, ERDC, performed the layout and design. John Rickey, Stephen Gambrell, and John Brooks of MVD reviewed the draft manuscript, and Bill K. Mullen professionally edited the final product.

Working for the world's premier engineering organization, we are fortunate to be in close contact with extraordinarily talented professionals, including civil engineers and historians. MVD engineers Larry Banks, Eddie Brooks and John Brooks, and St. Louis District engineers David Busse, Michael Dace, and Thomas Freeman, all contributed to our understanding of the inherent complexities of hydraulics and hydraulic engineering. Historians Martin Reuss, William Baldwin, and Kent Seig of the Corps of Engineers Historical Office carefully reviewed the draft manuscript. Their guidance and expertise, provided under a very tight suspense date, greatly improved the final product. Of course, any errors that remain are the fault of the authors.

Prologue

On a warm summer day in August 1879, seven men, each appointed by President Rutherford B. Hayes and confirmed by the U.S. Senate, gathered in Washington, D.C., to pore over surveys, examinations, and reports representing the best available hydraulic data on the Mississippi River. Six of the men were prominent civil engineers, the seventh a lawyer, constitutional scholar, and future American President. Of the engineers, three graduated from the United States Military Academy at West Point, the nation's preeminent engineering institution; two others from Harvard, the oldest and most prestigious university in the country. The remaining engineer was undoubtedly the most accomplished of all—a self-educated man, but one of international repute and the designer and builder of the boldest and most innovative bridge to span the Mississippi River—a man who opened the mouth of that river to oceangoing vessels despite the opposition of a powerful and widely respected expert on hydraulic engineering, the Chief of the U.S. Army Corps of Engineers. These seven men represented the original members of the Mississippi River Commission (MRC), an executive body established by Congress on June 28, 1879. Upon their shoulders rested the task of remaking the Mississippi River into a safe and reliable commercial artery while protecting adjacent lands from overflow. The job at hand was enormous—so enormous that no less an authority on the Mississippi River than Mark Twain believed the task was “transcended in size only by the original job of creating” the river.¹

One hundred twenty-five years later, the MRC has for the most part realized its ambitious assignment through the implementation of a comprehensive river management program. Developed in the wake of the great Mississippi River Flood of 1927, this program, called the Mississippi River and Tributaries (MR&T) project, employs a variety of river engineering techniques, including an extensive levee system for containing high water, floodways for removing excess flows from the main channel to the Gulf of Mexico, and riverbank protection and channel stabilization to facilitate navigation. Since its initiation, the MR&T program has brought an unprecedented degree of flood protection to the lower Mississippi Valley while facilitating navigation and promoting commerce on the nation's most vital commercial artery. Waterborne commerce on the Mississippi River increased from 30 million tons in 1940 to nearly 500 million tons today, and the project's flood-control features have prevented nearly \$300 billion in flood damages, placing the MR&T project among

the most successful and cost-efficient public works projects in American history.

But success did not come easy. Throughout its early years, the MRC struggled to develop and implement a workable strategy for improving the navigability of the notoriously unruly Mississippi River while effectively controlling its floodwaters.

The River

The task of improving the Mississippi River constituted what was probably the most difficult and complex engineering problem ever undertaken by the U. S. Government. The Mississippi River basin—exceeded in size only by that of the Amazon and the Congo rivers—drains 41 percent of the continental United States, including all or parts of 31 states and two Canadian provinces, covering a total of 1,245,000 square miles. From its headwaters at Lake Itasca, Minnesota, to the Gulf of Mexico, it extends approximately 2,340 miles. The Mississippi also ranks fifth in total volume, pouring an average of 612,000 cubic feet per second (cfs) of muddy water into the Gulf of Mexico. Yet, these numbers only begin to describe the enormity of the Mississippi River.²

In addition to its impressive magnitude, the Mississippi flows through one of the flattest regions of North America and, as a result, meanders considerably along its route to the sea. The alluvial valley through which it winds extends from Cape Girardeau, Missouri, to the Head of Passes, a



distance of about 600 miles; yet by river the distance is more than 1,000 miles. That additional mileage results from the numerous horseshoe-shaped bends formed over the centuries as the river carved its way through the fine silt, sand, gravel, and clay comprising the valley. At flood, the river picks up velocity, and its erosive force is magnified, particularly against its banks. The resulting action draws trees and large debris into the river where they become anchored to the bottom of the channel. These natural processes obstruct navigation at low water and also disrupt efforts to maintain levees and to secure a permanent channel.³

Also the Mississippi River is an alluvial, or sediment-carrying, river. As with the Yellow, the Tigris and Euphrates, the Missouri, the Ohio, and the Rio Grande, the Mississippi River carries huge quantities of silt and gravel in addition to great volumes of water. In fact, the Mississippi transports roughly 400 million tons of sedimentary matter downstream each year, with about 90 percent of it suspended in the water and the rest dragged along the bottom by the force of the river. As the velocity of the river undergoes subtle changes, the Mississippi alternately deposits this sediment or carries more at the expense of the banks. The river's channel is, as a result, irregular and constantly in flux, greatly complicating both navigation and flood-control efforts.⁴

The Mississippi River is also unusual in a number of respects, meaning that lessons learned on other well-known rivers do not often apply to the "Father of Waters." Compared to the other great rivers, for example, the Mississippi's normal sediment load is relatively light, averaging only about 550 to 600 parts per million by weight in ratio to water. In flood, the Mississippi's sediment load increases to no more than 2,600 parts per million, whereas the concentration of the Missouri in flood may exceed 20,000 parts per million and the Rio Grande 40,000 parts per million. The Yellow River in China carries vastly higher concentrations, with the weight of the suspended sediment often exceeding the weight of the water itself. Some of America's greatest nineteenth century hydraulic engineers garnered much of their knowledge about river control abroad and, upon returning to the United States, sought to apply their knowledge and experience to the Mississippi River, often with poor results.⁵

Additionally, the Mississippi River experiences enormous fluctuations in volume. Both the Delaware and the Hudson rivers experience tides between five and eight feet. In contrast, stages on the Mississippi vary as much as 54 feet between high and low water at Cairo, Illinois, and almost as much at other locations down the river. In terms of total discharge, the Delaware and the Hudson remain relatively constant, while the Mississippi varies from approximately 70,000 cfs to over 2,300,000 cfs in flood. These variations cause innumerable problems for engineers charged with

maintaining a navigable channel during the low-water season and preventing overflows during high-water season.⁶

As if the Mississippi's many natural complexities and paradoxes were not trouble enough, countless and interrelated social, political, and financial constraints further complicated the work of the MRC in its early efforts to tame the Mighty Mississippi.

The Levees

The French built the first levees on the Mississippi River in 1717 to protect the fledgling city of New Orleans from high water. The original structures were three feet high, 5,400 feet long, and 18 feet wide at the top. They doubled as roadways. The French, and later the Spanish, extended the modest levee systems up the river, but progress was slow with the bulk of the work left to the riparian landowners. After the American Revolution, additional settlers poured through the Cumberland Gap and across the Allegheny and Appalachian mountains into the Ohio and Mississippi valleys. The primary problem faced by the frontier population was the difficulty of getting their goods to market. The quickest, most convenient method was to ship produce down the Ohio and Mississippi rivers to Spanish-held New Orleans, but Spain did not favor an influx of Americans into Louisiana.

Soon after Thomas Jefferson became president, the United States learned that Spain planned to return Louisiana to France. Fearing that France might try to interfere with western American trade in the Port of New Orleans, Jefferson instructed special envoy James Monroe and American minister Robert Livingston to discuss with the French the possible purchase of the Port of New Orleans. Monroe and Livingston were astonished when Francois Barbé-Marbois, at Napoleon Bonaparte's order, offered the entire Louisiana Territory to the United States. Although they lacked constitutional authority, the American representatives agreed to buy all of the massive territory extending from Canada to the Gulf of Mexico and from the Mississippi River to the Rocky Mountains for a total of nearly 15 million dollars—an extraordinary bargain at about four cents an acre. A Treaty of Cession was signed on April 30, 1803, in Paris. By the single act of purchasing the Louisiana Territory, the United States of America doubled its size; greatly accelerated its march toward the Pacific coast; and acquired for itself virtually the entire Mississippi River Valley.

With the extension of political control over the Mississippi Valley, the U.S. government moved to facilitate trade and develop the region's rich economic potential through settlement. American frontiersmen proved accommodating, and the white population of the Mississippi River Delta grew threefold between 1800 and 1810. In keeping with their vigorous

nature, these settlers adopted aggressive flood-control tactics to protect their new settlements from inundation. Rather than settling those lands less susceptible to overflow, the new frontiersmen reclaimed lands well within the floodplain and constructed levees to protect them. They soon realized the difficult nature of the job, with the already exacting work of preparing the land for cultivation—including clearing, tilling, and planting—augmented by the need to construct levees. In addition to the original expense of their construction, the inadequate levee systems required continual maintenance, repair, and improvement. To that end, the riparian landowners of the lower Mississippi Valley committed ever-increasing resources to the task of protecting their lands from overflow. By 1812, cleared fields extended along the Mississippi to the northern boundary of Louisiana with the levees extending for 155 miles on the east bank and 185 miles on the west bank.⁷



The advantages of reclamation came at considerable risk. Drawing by J. O. Davidson in *Harper's Weekly*, March 5, 1884.

In the years following the War of 1812, high cotton prices and a general return to prosperity provided the impetuses for a “Great Migration” of southeastern farmers to the Gulf region. By the end of 1819, when a serious panic slowed the westward movement, 200,000 people had removed to the Gulf Plains. Mississippi and Alabama were quickly organized into states in 1817 and 1819 respectively; and cotton became the staple crop of the region, which produced half of the nation’s cotton by 1819. High European demand for cotton both ensured the short-term prosperity of the

lower Mississippi and focused the region's attention on the shipping lanes of New Orleans.⁸ Facilitated by the introduction of the steamship in large numbers, traffic on the Mississippi entered a boom period. In 1816, a total of \$8,052,540 of produce was shipped down the Mississippi with cotton constituting about 12 percent of that value.⁹ Over the next four years, commerce on the river doubled, and steamboats began to make larger shipments of cotton.



Memphis, Tennessee, circa 1850. The shallow draft keelboats and flatboats of the eighteenth century did not necessitate extensive river improvements; the steamboats of the nineteenth century did.

The construction of levees paralleled the growth of commerce. As the lower Mississippi Valley became more prosperous, the riparian owners grew increasingly anxious to protect their investments. While levees were costly, they were typically less expensive than alternative flood-control methods and could be completed piecemeal. Slave labor also enabled them to construct levees at a relatively low cost because much of the work could be done during the off-season. Through the mid-nineteenth century, riparian landholders assumed sole responsibility for the construction and maintenance of levees, but in 1849 Louisiana led a congressional fight to secure the transfer of swamp and overflowed lands to the states of the Mississippi Valley, culminating in the Swamp Land Grants of 1849 and 1850. Revenue raised from the sale of those lands paid for further levee improvements and encouraged the organization of levee districts throughout the lower valley. Over time, these districts acquired substantial authority, including the power of eminent domain, the power of taxation within

carefully defined limits, and corporate authority, but their efforts lacked coordination and proper financing.¹⁰

The Cycle

The year 1824 proved to be a turning point in the federal government's role in fostering internal improvements on the Mississippi River. That year, the United States Supreme Court ruled in the *Gibbons v. Ogden* decision that, under the "commerce clause" of the U. S. Constitution, the federal government had the power to regulate river navigation "so far as that navigation may be in any manner connected with commerce." Thus, empowered, the federal legislature acted decisively by quickly passing the General Survey Act and the first rivers and harbors legislation. Yet, the authorities under which Congress passed these unprecedented bills did not grant the prerogative to finance flood-control works constructed solely for the purpose of protecting private property from overflow. Such an endeavor remained a function of the individual states.¹¹

The Swamp Land Grants represented the first step toward the federalization of flood control on the Mississippi River, but further impetus materialized when Congress manifestly appropriated \$50,000 for comprehensive studies of the river in 1850. This action later culminated in the most significant contribution that the Army engineers made to hydraulic engineering in the nineteenth century—the *Report Upon the Physics and Hydraulics of the Mississippi River*.¹² Commonly referred to as the *Delta Survey*, the report was so thorough in analysis and so exhaustive in detail that it had one remarkable, but unfortunate result. As Marshall O. Leighton, the chief hydrographer with the U.S. Geological Survey, lamented in 1917, the American engineering community, instead of recognizing the unprecedented study for what it was—an extraordinary beginning to the subject of hydraulic engineering on the Mississippi River—accepted the report as "a finality." Significantly, that same engineering community, for both engineering and non-engineering reasons, fragmented into two camps drawn largely along the line separating the nation's military engineers and a rapidly growing civilian engineering profession. Because of this schism, both camps expended considerable energy attempting to prove or disprove elements of the *Delta Survey*, rather than expanding the field of knowledge it presented.¹³

The inability of the engineering profession to reach consensus unleashed a repetitive cycle that hampered the federal legislature in administering the development of a coherent policy for improving the Mississippi River. Few congressmen were engineers and, as legislators, they were forced to rely on expert advice. In the case of the Mississippi River,

REPORT
 UPON THE
 PHYSICS AND HYDRAULICS
 OF THE
 MISSISSIPPI RIVER;
 UPON THE
 PROTECTION OF THE ALLUVIAL REGION AGAINST OVERFLOW;
 AND UPON THE
 DEEPENING OF THE MOUTHS:
 BASED UPON
 SURVEYS AND INVESTIGATIONS
 MADE UNDER THE ACTS OF CONGRESS DIRECTING THE TOPOGRAPHICAL AND HYDROGRAPHICAL
 SURVEY OF THE DELTA OF THE MISSISSIPPI RIVER, WITH SUCH INVESTIGATIONS AS
 MIGHT LEAD TO DETERMINE THE MOST PRACTICABLE PLAN FOR SECURING
 IT FROM INUNDATION, AND THE BEST MODE OF DEEPENING
 THE CHANNELS AT THE MOUTHS OF THE RIVER.

SUBMITTED TO THE BUREAU OF TOPOGRAPHICAL ENGINEERS, WAR DEPARTMENT, 1861.

[REPRINTED WITH ADDITIONS.]

PREPARED BY
 CAPTAIN A. A. HUMPHREYS AND LIEUT. H. L. ABBOT,
 CORPS OF TOPOGRAPHICAL ENGINEERS, UNITED STATES ARMY.

"I approve much more your method of photographing, which proceeds upon actual observation, makes a collection of facts, and concludes no further than those facts will warrant."—DR. FRANKLIN TO ADAM SQUIBB.

WASHINGTON:
 GOVERNMENT PRINTING OFFICE
 1876.

Title page of the Humphreys and Abbot Report. It represented the most significant contribution that the Army engineers made to hydraulic engineering in the nineteenth century.

though, that advice was often conflicting, leaving many lawmakers confounded and ill disposed to move forward with bold legislation challenging the standing constitutional interpretation that prohibited the federalization of flood control. The resulting legislative and fiscal apathy stymied early federal efforts to improve the Mississippi River, leading lawmakers to legislate river improvements based on cost-efficiency and void of scientific knowledge.¹⁴ It was in this context of social, political, and financial constraints that the members of the MRC accepted their mission in 1879 to improve the Mississippi River.

This study will endeavor to tell the story of the MRC from its early origins through the advent of the modern Mississippi River and Tributaries Project, and in the process, give evidence to the realities just described. It is the story of the maturation of a young nation struggling to find its identity amid the internal contradictions so consistent in a governmental system of checks and balances; the story of progress, fleeting at times, successful at others; the story of profound enlightenment and misguided entrenchment; and the story of culpability and redemption. Above all else, it is the story of a dynamic and scientific commission, established to serve as the voice of Mississippi Valley interests, but hampered by the reality that it could not base its policies on science alone.



Chapter 1

The Riddle of the Passes

With the creation of the U.S. Army Corps of Engineers, the United States committed itself to a century-old French tradition of public works in which the army guided construction under the auspices of a rational, centralized state. Although the application of this tradition proved more problematic in the United States where the centralized authority was a democratically elected legislative body, Congress and the Corps of Engineers struck a relationship that was beneficial to both for much of the nineteenth century. By the time the General Survey Act was passed in 1824, the Corps of Engineers, along with the Department of the Treasury, the Coast and Geodetic Survey, and the Navy, had assumed responsibility for overseeing the implementation of congressional public works policy. It built canals, bridges, and public buildings and improved the nation's rivers and harbors, all under congressional direction and patronage. By the 1870s though, the relationship between Congress and its military engineers began to erode, and the precipitating incident was the congressional debate over the best method for opening the mouth of the Mississippi River to ocean-going vessels. That incident touched off a series of events culminating in the introduction of greater civilian oversight in the implementation of federal public works policy for the lower Mississippi River and ultimately in the creation of the Mississippi River Commission.¹⁵

Problems at the Mouth

The arrival of the first steamboat, the *New Orleans*, on the lower Mississippi in 1811 heralded a commercial revolution that transformed the Mississippi Valley and ushered in a golden age for the city of New Orleans. A little more than a decade later, 75 steamboats worked the Mississippi River Valley; by mid-century, there were 187. Operated by individuals or small syndicates, these vessels carried the surplus agricultural products of the West to New Orleans for distribution abroad. As such, the ocean commerce of New Orleans increased proportionally with river transportation. While the use of steam greatly increased the size of the oceangoing vessels, these larger ships found it more and more difficult to navigate the bars that choked the Mississippi River's several outlets to the sea. In 1837, navigators abandoned the badly shoaled Northwest Pass in favor of the deeper Southwest Pass, but by 1852, the depths at that pass proved inadequate as well, as 40 oceangoing vessels ran aground a sandbar

causing delays of up to eight weeks. Such delays increased freight rates from New Orleans, and the next year ships with cargoes valued at more than \$7 million were delayed at the mouth of the Mississippi River.¹⁶

The persistence of these conditions ensured that economic interests would increasingly turn elsewhere for their transportation needs. By mid-century, there were two viable alternatives to river transportation for the distribution of the



The Head of Passes circa 1870.

West's agricultural products. The Erie Canal, completed in 1825, was a successful venture backed by private interests. The canal lowered freight rates from \$100 to \$15 for the 363 miles between Buffalo and New York and created a more direct alternative to river travel for midwestern farmers. Within 20 years, the receipts for flour and wheat at Buffalo exceeded those of New Orleans for the first time, creating a profound sensation among New Orleans merchants who found it impossible to imagine that an artificial waterway could compete successfully against a natural one.¹⁷

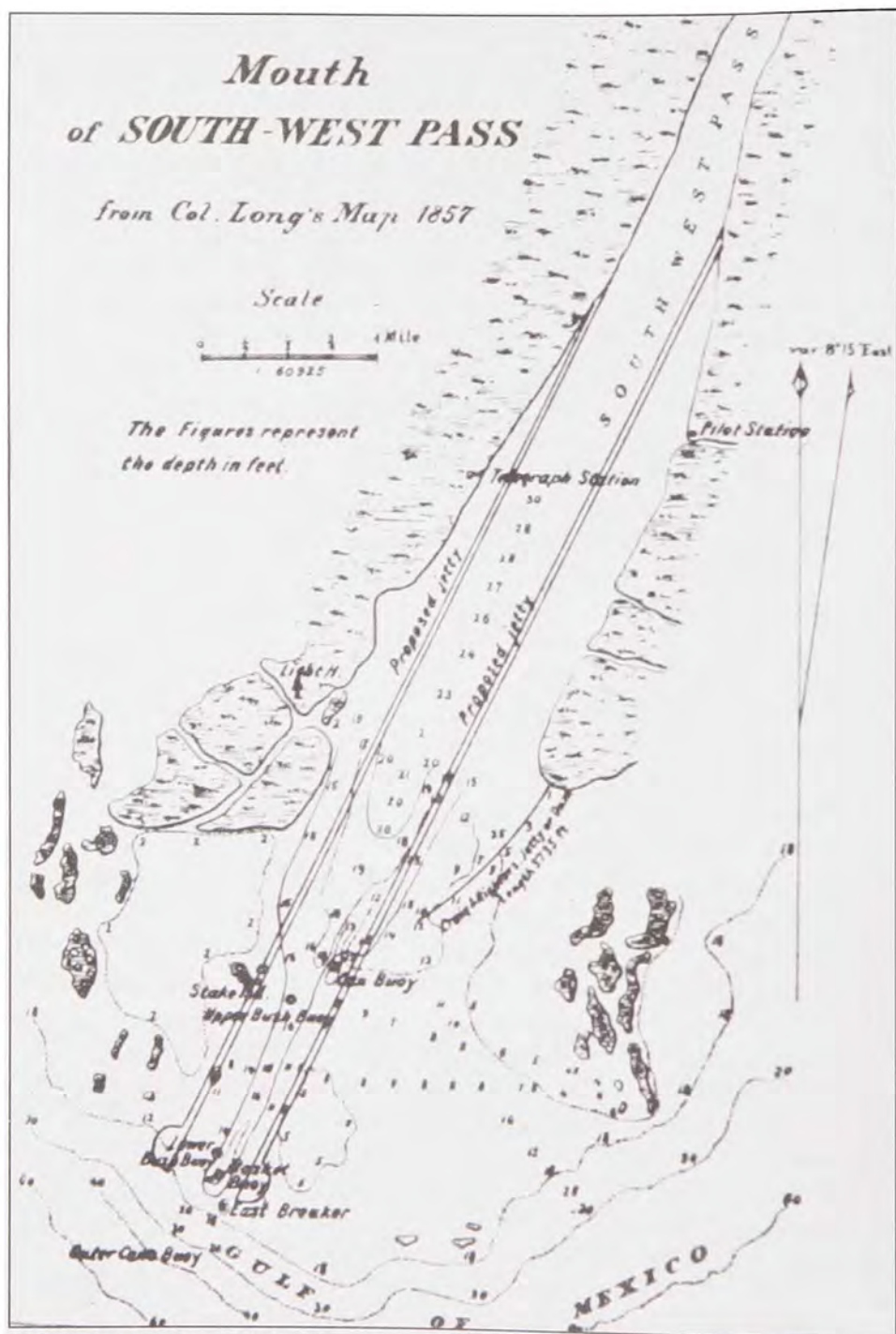
Railroads also began to challenge river transportation. In an effort to compete with New York's Erie Canal and to secure their share of commerce with the West, Philadelphia merchants helped finance the construction of the Pennsylvania Railroad. Together, these internal improvements assured that midwestern farmers would have three export routes available—south to New Orleans on the Mississippi River, east to Philadelphia on the Pennsylvania Railroad, and northeast to New York City on the Erie Canal.¹⁸

As early as 1845, fully half of the product of the Mississippi Valley found its way to Eastern markets via these latter two routes, and the rapid extension and improvement of the nation's railroad system threatened to further undermine river commerce. Cognizant of these trends, the city of

New Orleans petitioned Congress for aid in maintaining an open channel to the Gulf of Mexico, but to little effect. Congress instead appropriated money for dredging the mouth of the Mississippi River with "buckets," but that technology was still in its infancy and would not be sufficiently advanced to secure better-than-marginal results until the 1880s. More permanent solutions—including canals, wing dams, and jetties—were expensive, and attempts in Congress to secure financing for these works were, for a time, unsuccessful. Nevertheless, state and federal engineers continued to study the feasibility of these permanent improvements.¹⁹

The most prominent of these early studies was initiated in 1852, largely in response to the deteriorating situation at the Southwest Pass. Secretary of War Jefferson Davis, the future Confederate president, appointed an advisory board under the command of Navy Captain W. K. Latimer to make a thorough examination and study of the Mississippi outlets and to develop a contingency plan for maintaining an open channel. In addition to Latimer, three Army engineers comprised the board, the most notable of whom was Captain John Gross Barnard. In October 1852, the board recommended that Congress finance dredging efforts at the mouth of the Southwest Pass. In the event that dredging should prove inadequate to maintain an open channel there, the board advocated supplementing those efforts with the construction of a jetty system, which would concentrate the waters of the Mississippi River into a more narrow channel and help force mud and other debris out to sea. Should the jetty system fail, the board recommended, as a last resort, the construction of the Fort Saint Philip ship canal. Congress responded over the next two decades with occasional appropriations for dredging at the Southwest Pass, but these appropriations were sporadic and generally inadequate. In 1858, a civil engineer, R. Montaign, revived interest in the Fort Saint Philip Canal proposal, but the outbreak of the American Civil War suspended consideration.²⁰

The issue was revisited in 1869, when the Coast and Geodetic Survey concluded favorably on the prospects of a canal. This time, the New Orleans Chamber of Commerce rallied behind the canal. For decades, New Orleans politicians and merchants had at least tacitly supported the construction of the Fort Saint Philip Canal. Even before 1852, that city's reputation as a major port had suffered from its inability to maintain open access to the Gulf of Mexico. Though dredging had proved occasionally successful in maintaining deep water at the Southwest Pass, the process was an ongoing endeavor, requiring yearly appropriations from a Congress that had not proven itself a reliable patron. Over the years, New Orleans' businessmen began to distrust the continued good will of Congress and



Early jetty plan to improve the Southwest Pass submitted by Colonel Stephen H. Long in 1857.

started looking to more permanent solutions in its struggle to maintain an open channel. This group found all that it sought in the proposed Fort Saint Philip Canal, a plan that, according to the New Orleans *Times-Picayune*, “will involve but one appropriation, will be free from all experimental features, will be ever-lasting, and will be economical.” After 1869, they concentrated their efforts on winning congressional support for the canal.²¹

The efforts of the New Orleans Chamber of Commerce were supported by the city’s press, and together these interests spurred Congress to action. On December 14, 1870, Senator John Spafford Harris of Louisiana introduced a resolution instructing the Senate Committee on Commerce to investigate the “expediency” of constructing and maintaining the proposed Fort Saint Philip Canal. The Senate adopted the resolution that same day. Three months later, New Orleans Congressman Jacob H. Sypher submitted a resolution to the House requiring the secretary of war “to cause an examination and survey, with plans and estimates of cost, to be made by an officer of engineers, for a ship canal to connect the Mississippi River with the Gulf of Mexico.” This latter resolution was also adopted and the renowned Chief of the Corps of Engineers, Brigadier General Andrew A. Humphreys, directed Major Charles W. Howell to undertake the mandated survey. Anxious to avoid the summer heat in New Orleans, Howell waited until November to initiate the study, which was completed in March 1873. In his report, Howell concluded that “the project is feasible, and its execution presents no great difficulties.” Humphreys threw his weight behind the canal plan, but Congress initially balked at appropriating the estimated \$7.4 million needed for construction.²²

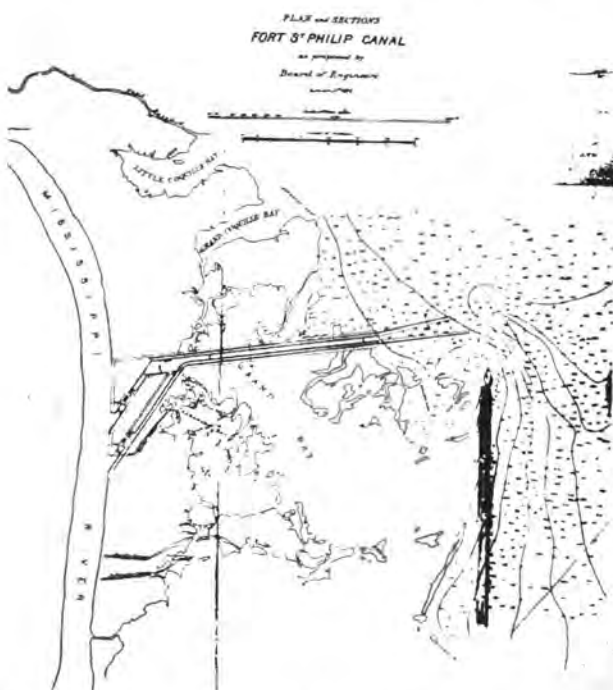


Brigadier General Andrew Atkinson Humphreys was the Chief of Engineers from 1866-1879. *Office of History, U.S. Army Corps of Engineers.*

Over the next year, however, the federal government grew more willing to focus its financial resources on the lower Mississippi River, prompted in part by the decline in river commerce in New Orleans and a financial panic.²³ On President Ulysses S. Grant’s initiative, Secretary of War William Belknap authorized the appointment of a board of Army engineers to study Captain Howell’s favorable report on the Fort Saint Philip Canal. This seven-member board met in New York City on July 25, 1873, and held several meetings over the next month. After looking at Howell’s plan and studying other canal plans, the board adjourned to meet in

New Orleans, where the members examined the site of the proposed canal. After five months, six of the seven board members concluded, "no extraordinary engineering difficulties in the construction and maintenance of the canal need be apprehended." The estimated cost of the slightly modified plan would be approximately \$10 million.²⁴

New Orleans greeted the news with unbridled enthusiasm, as it was clear that the project would be a major boon to the city. In addition to the prospect of increased ocean traffic, New Orleans had much to gain in the immediate future from the construction of a ship canal. Of course, most of the estimated \$10 million would be spent in the vicinity of the city, and there were residual benefits as well. The project would require the purchase of huge tracts of land for the construction of the six-to-eight-mile-long canal, and New Orleans' speculators were soon investing in Louisiana swampland. On June 23, 1874, the *New Orleans Republican* concluded that the issue of the Fort Saint Philip Canal was "settled by the report of the board." Advocates of the canal generally believed that the Army engineers' positive conclusions would quickly cement congressional support for the canal and result in decisive legislative action.²⁵



Proposed location for the Fort St. Philip Canal.

On June 23, 1874, the *New Orleans Republican* concluded that the issue of the Fort Saint Philip Canal was "settled by the report of the board." Advocates of the canal generally believed that the Army engineers' positive conclusions would quickly cement congressional support for the canal and result in decisive legislative action.²⁵

But these advocates—particularly those who had vested themselves in virtually worthless Louisiana swampland—were to be sorely disappointed. Colonel John G. Barnard, the president of the canal board and its most experienced member, drafted a minority report and, through a fellow Army officer, went public with his opposition. A member of the 1852 Latimer board, Barnard had not over the preceding 20 years changed his preference for a jetty system at the Southwest Pass. His minority report gave fuel to the canal's enemies in Congress and jeopardized the early passage of a ship canal bill.²⁶

In a futile attempt at spin control, General Humphreys, along with the majority members of the board and Major Howell, signed a lengthy rebuttal that rejected jetties as an alternative to the canal. This rejection was based largely on previous Corps of Engineers studies that had indicated the absence of a littoral current in the Gulf of Mexico sufficient in strength to carry away the river's accumulated sediment. Without such a current to move the river's sediment out to sea, a jetty system would only reposition the bar further out to sea, and the progress of the bar would demand a corresponding extension of the jetties. Additionally, Humphreys and the others suggested that the jetties, where they extended out into the Gulf, would be vulnerable to storm damage and were, therefore, impractical.²⁷

The rebuttal elicited a somewhat unprecedented second minority report from Barnard, and a surprisingly heated one at that. Emphasizing that "no adequate study" had yet determined even the precise location of the proposed canal, Barnard argued that it would be a "rash confidence" to assume that the Fort Saint Philip Canal could be finished before 1884, leaving New Orleans without an adequate channel to the sea for a full decade. His closing comments were:

It is said that 'the time will come' when the needs of commerce demand a canal; but I answer that the time will come when there will be the same cry for a navigable route unimpeded by locks—
AN OPEN RIVER MOUTH—which we now hear for a canal.²⁸

The supporters of the canal were undoubtedly dismayed at the steadfastness of Barnard's opposition to a report signed and championed by his esteemed supervisor, General Humphreys; however, this action was not altogether out-of-character for the 40-year veteran of the Corps of Engineers. During the course of his distinguished career, Barnard had earned a reputation as brilliant, yet obstinate and sometimes difficult, man owing in part to his inherited deafness that made social interaction somewhat difficult. Also, Barnard had been offered the post of Chief of Engineers in 1864, but had turned it down out of respect for his senior officer, Major General Richard Delafield. When



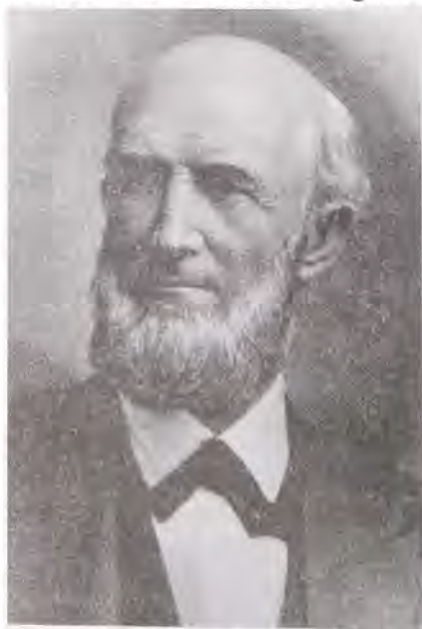
John Gross Barnard as a brigadier general.
Selected Civil War Photographs (Library of Congress)

Delafield retired in 1866, Humphreys was selected as the next Chief of Engineers, not Barnard, instigating a personal feud between the two officers. Lastly, and very importantly, Barnard did not stand alone in his dispute with Humphreys.²⁹

Captain Eads with His Jetties

Barnard was emboldened by the support and friendship of another prominent engineer, James B. Eads—a man who had walked on and explored the riverbed of the Mississippi and who would soon stake his international reputation on the feasibility of a jetty system for the mouth of the Mississippi River. Eads' greatest achievement had been the design and construction of a steel-arched bridge across the Mississippi River at St. Louis. Known as the "Eads Bridge," it has long been regarded as an engineering wonder. As the bridge neared completion though, Secretary of War Belknap instructed Humphreys to organize an engineer board to investigate the impact of the bridge on river navigation. The board quickly concluded that the structure lacked adequate clearance for steamboats and recommended that Eads construct a canal bypassing the bridge at his own expense. Eads and the city of St. Louis successfully appealed to President Grant, convincing him to overturn the board's recommendation, but the damage was done. Eads never forgave Humphreys for his interference, not that the Chief of Engineers was one to ask for such forgiveness. This incident initiated a long-running public feud between the two headstrong and egotistical engineers and set the stage "for one of the most significant experiments in the history of American river engineering."³⁰

Less than a month after Barnard issued his second minority report, Congressman William Henry Stone of St. Louis introduced a bill that would pay Eads up to \$5 million to construct jetties at one of the Mississippi's several outlets to the sea, a scheme that would, if successful, render the canal unnecessary. Stone had earlier favored the Fort Saint Philip Canal and had already introduced legislation to affect its construction. His sudden change of heart suggests that Eads' decision to intervene may have been a hasty one, conceived and brought to fruition in the



James Buchanan Eads, Member, Mississippi River Commission, 1879-1883.

weeks following Barnard's minority report and Humphreys' interference in the completion of the bridge. In fact, there may be reason to believe that Eads and Barnard planned the jetty proposal together, but the latter's capacity as an Army officer precluded the two men from conspiring in any official capacity. Whatever the case, Eads' unprecedented proposal sparked a debate that soon spread to Congress and eventually into the public arena, upsetting the once solid relationship between Congress and the Corps of Engineers.³¹

In the days and weeks that followed, the sides coalesced into two camps—Humphreys' "canalites" and Eads' "jettyites." The contest was Humphreys' to lose. As Chief of Engineers, he enjoyed considerable clout with Congress. The Corps of Engineers, the nation's preeminent engineering organization, had already concluded in favor of the Fort Saint Philip Canal, and for many congressmen, including George Washington McCrary, the powerful chairman of the House Committee on Railways and Canals, that was reason enough to support the plan. Also, New Orleans, the city that would benefit most from the proposed improvements, favored the canal plan while rejecting Eads' jetty proposal, which the *Times Picayune* called "impracticable," "full of doubt" and "fallacious in every respect." With 47 vessels blockaded at the Southwest Pass in the spring of 1874, that city's call for relief grew increasingly desperate. A front-page editorial in the *Times Picayune* read: "For pity and economy's sake, if not in the interests of the commerce of the Mississippi valley, give us the Fort Saint Philip Canal."³²

Eads, though, had more than a few close allies of his own in Congress.



Congressman George Washington McCrary of Iowa. As Chairman of the House Committee on Railways and Canals, he was one of the leading "canalites" in Congress. Brady-Handy Photograph Collection (Library of Congress)

Understanding that his plan would evoke the opposition of the Corps of Engineers, he offered an extraordinary inducement—*Congress would pay nothing if his jetty project failed!* Under the terms of his proposal, Eads and his associates would scour and maintain a depth of 28 feet at the Southwest Pass for a sum of \$10 million. The contract would withhold payment until a depth of 20 feet had been secured, at which point Eads would receive \$1 million, and afterward, \$1 million for each additional two feet, for a total of \$5 million when 28 feet had been obtained. The remaining \$5 million would be paid in annual installments of \$500,000,

conditional on the permanence of the channel over a 10-year period. For those legislators concerned with thrift, that was no small inducement. Though New Orleans rejected the jetty plan, Eads' adopted hometown of St. Louis threw its weight behind the proposal, and that city's leading newspaper, the *Republican*, became Eads' mouthpiece.³³

For seven weeks, the House Committee on Railways and Canals held hearings on the jetty bill, as well as a version of the Fort Saint Philip Canal bill. Advocates of both plans testified, including, of course, Humphreys and Eads. Despite the opposition of Chairman McCrary, the committee determined to report favorably upon the Eads' plan. On April 21, the committee placed the jetty bill before the whole House for consideration. That same day, the secretary of war sent a communication to the House accompanied by a report from Humphreys. That report concluded that Eads' jetties would only push the bars further out to sea, requiring additional, yearly appropriations of almost \$1 million to extend the system. Based on that revelation, Congress sent the bill back to committee for further consideration. Eads appeared once more before the committee and answered to Humphreys' objections, but this time, the committee elected to report two bills; the original in favor of Eads' jetties, endorsed by eight members of the committee; and a substitute in favor of the canal project, endorsed by Chairman McCrary and two others.³⁴

House debate on the two bills began on June 3, 1874, and the Corps of Engineers quickly came under fire. Seeking to justify the use of an "outsider" for a project of great national importance, congressional jetties enthusiasts endeavored to undermine the engineering agency's credibility. Barbour Lewis of Tennessee, a member of the Committee on Railways and Canals, led the assault. "Whatever progress has been made by the world," Lewis exclaimed, "those sleepy-headed, old foggy fossil officials of the army and navy... have told you that it was impossible and an absurdity." A fellow member of the originating committee, Illinois Congressman Stephen A. Hurlbut, hinted at scandal by suggesting that certain members of the Corps of Engineers were in collusion with New Orleans' speculators. Addressing the whole House, he charged that lands necessary for the construction of the Fort Saint Philip Canal had been purchased and "held by a close corporation of gentlemen in New Orleans, some of whom bear a very close relationship to eminent gentlemen in the military service."³⁵

Though many in Congress found the anti-Corps of Engineers rhetoric objectionable, the arguments struck a cord with some, swelling support for greater civilian involvement. Missouri Congressman Edwin O. Standard appealed to his fellow congressmen to create "opportunity for our civil engineers to compete in ... these great enterprises with the engineers of the Army." Undecided and unwilling to commit to either plan, Massachusetts'

Ebenezer R. Hoar agreed that civil engineers should participate in the process and recommended “further examination by competent commission consisting of eminent *civil* and military engineers.”³⁶

The jettyites had made a convincing case, but lacking the sanction of a government-appointed board, they were unable to secure majority support for their bill. On June 6, the House passed McCrary’s ship canal bill by a comfortable margin, but the Senate did not concur. In that body, the canalites had suffered a fatal defection. Joseph R. West, a senator from Louisiana and a ranking member of the Select Committee on Transportation, had once



Senator Joseph Rodman West of Louisiana.
Brady-Handy Photograph Collection
(Library of Congress)

been considered a “clamorous advocate” for the canal. Early in the debate, he had joined fellow Louisianans Professor Caleb G. Forshey and former Governor Paul O. Hébert in their efforts to win support for the Fort Saint Philip Canal, and in December 1873, he had introduced a bill to affect its construction. By early spring, though, West had changed his mind. In the face of considerable animosity, he offered the following explanation, which appeared in the New Orleans *Times Picayune*:

The effect of the recent hearing by the Senate Committee on Transportation, of Hébert, Forshey and Eads, is to cause the committee to view with some favor the plan of the latter. The report of the engineers on the Fort St. Phillip [sic.] canal does not warrant Congress in making any appropriations for the work until further examinations and surveys have been made, with estimates based upon their results. In the meantime Capt. Eads’ jetty project is urged upon the committee, and they hesitate about taking the responsibility for preventing him from entering into a work that Gen. Humphreys himself admits will prove almost a certain temporary success.³⁷

West won over the Senate Select Committee, which voted to adopt the jetty plan on June 1, 1874. When the House voted otherwise five days later, jettyites in both houses began plotting a new political course.³⁸

The Jetty Board

Understanding that many congressmen were unwilling to support a large-scale engineering project that had not been approved by a government-appointed board of experts, the jettyites set out to get that approval. Tradition dictated that military engineers be assigned that responsibility, but Humphreys and the Corps of Engineers were already committed to the canal plan. In an unprecedented move that foreshadowed the creation of the MRC, Senator West and the Select Committee on Transportation introduced an amendment to the rivers and harbors bill that authorized the creation of a second board of engineers, "to be composed of two from the Army, two from the Coast Survey, and three from civil life, to be appointed by the President." The Senate approved the measure and the bill, which had originated in the House, and it went to conference committee.³⁹

The bill was a product of the Senate Commerce Committee and three conferees were named from that committee—Zachariah Chandler of Michigan, William A. Buckingham of Connecticut, and George R. Dennis of Maryland. The House appointed Philetus Sawyer of Wisconsin, Richard C. Parsons of Ohio, and Erastus Wells of Missouri. While none of the conferees opposed the jetty board amendment, they shared a general consensus for thrift. To that end, the committee cut from three to one the number of civilian appointees, who would have to be paid unlike their military counterparts already under salary. Upon its return to the Senate on June 22, the revised measure fell immediately under the censure of jettyites. Louisiana's West and Missouri's two senators, Carl Schurz and Lewis V. Bogy—all advocates for a greater civilian voice in shaping policy—hurled insults at the Corps of Engineers and insisted on the restoration of the original number of civilian representatives on the board. Schurz was surprisingly forthright on the importance of the issue: "I tell you frankly that we want to have the civil engineering element in such strength on that commission that it can make its influence felt; and if we are to be denied that, we do not care to have any commission at all." After a half hour or so of one-sided debate, the Senate agreed to recommit the bill "with the understanding that the committee will bring in the number sufficient."⁴⁰

Later that same day, the Senate conferees returned from a hastily assembled meeting with their House counterparts. The compromise they reached restored the number of civilian appointees to three, but the number of Corps of Engineers appointees had also been increased—from two to three—at the expense of the Coast and Geodetic Survey. Deeming the compromise acceptable, the Senate, and later the House, approved the measure, which became law on June 23, 1874. Though the final bill had

been modified slightly as a palliative to Humphreys, the passage of the jetty board amendment represented the first of several political setbacks for the Corps of Engineers.

Within two weeks President Grant appointed the following engineers to the jetty board: Lieutenant Colonel Horatio G. Wright, Lieutenant Colonel Barton S. Alexander, and Major Cyrus B. Comstock, each of the Corps of Engineers; Henry Mitchell of the Coast and Geodetic Survey; and civilians T. E. Sickles, W. Milnor Roberts, and Henry D. Whitcomb. These men met in New York City on July 20, and shortly thereafter, set out for Africa and Europe to study the Suez Canal and engineering works at the mouths of the Rhone, the Danube, the Vistula, and the Rhine rivers. After returning to the United States in mid-November 1874, the board met for several weeks in New Orleans, where they examined the several outlets of the Mississippi River and the site for the proposed Fort Saint Philip ship canal.⁴¹

After completing its investigation, the board transmitted its report directly to the secretary of war, circumventing Humphreys altogether. To the surprise of no one, the majority concluded in favor of a jetty system, but their recommendation was for the South Pass, and not the Southwest Pass favored by Eads. Caught in a rather difficult position, Lieutenant Colonel Wright, the senior Corps of Engineers appointee, filed the only dissenting opinion, arguing that the risks involved in an "attempted improvement of any one of the natural outlets of the river do not justify the recommendation of the board." Instead, Wright favored the construction of the Fort Saint Philip ship canal.⁴²

Just as congressional jettyites had hoped, the report proved to be the undoing of the canalites. Sensing that political momentum had shifted, the canalites feared that continued opposition would only furnish Congress with an excuse for doing nothing. Intent on avoiding the fate of the Kilkenny cats—who succeeded only in devouring one another—New Orleans fell in line. With that, the Fort Saint Philip ship canal project died, and all that remained was for Congress to work out the particulars of a new jetty bill.⁴³

The House Committee on Commerce adopted Eads' recommendation to improve the Southwest Pass, rather



Horatio Gouverneur Wright as a major general. He later served as Chief of Engineers from 1879-1884. *Office of History, U.S. Army Corps of Engineers.*

than the South Pass favored by the jetty board. On February 8, 1875, the new jetty bill was introduced to the House for debate, which began 10 days later. While practically the whole House was now committed to the jetty plan, Virginia Congressman James H. Platt, Jr. raised one last point of contention. Generally distrustful of Eads, Platt argued, "this work should be placed in the hands of the men belonging to the Engineer Corps of the Army." This suggestion prompted another round of Corps-bashing, after which the bill was approved with only two dissenting votes and sent to the Senate for approval. Several days later, the Senate Commerce Committee introduced an amended version of the bill. Unwilling to refuse the advice of its own experts, the committee had altered the bill so that it applied to the South Pass. On March 3, 1875, President Grant signed the revised bill into law.⁴⁴

Eads and his associates began work at the South Pass in June 1875. Though progress was steady, success was hard earned. In addition to the technical difficulties associated with the work, financial woes hampered progress. By the provisions of the jetty act, the government would make no payments until Eads secured a 20-foot channel, and that first payment would cover only a small part of the expenses incurred in obtaining it. As a result, Eads and his associates assumed large debts in their efforts to maximize the size of the channel as quickly as possible. Additionally, working conditions were unpleasant—hot, muddy, and insect-infested—and the project was continually delayed by the inability to procure and maintain good laborers.⁴⁵

But Humphreys' continued interference and propagandizing was perhaps the greatest obstacle of all. The Chief of Engineers regarded the congressional decision to finance Eads' efforts at the South Pass as an attack on his agency as well as his legacy, and he went to great lengths to discredit the work being done there. Shortly after Congress approved the jetty plan, he published four essays, each of which sought to prove that the jetties would fail in their purpose. These essays were published as part of his official report to Congress and excerpts were later distributed throughout the country. Additionally, Humphreys refused to allow Eads early access to Corps of Engineers' soundings of the South Pass, soundings that proved that the channel was growing wider and deeper as a result of the jetty works. Without that evidence, Eads found it difficult to refute Captain Howell's contention that shoals were forming at the outer end of the jetties. This assertion created a panic among investors, and in March 1876, the value of jetty stock plummeted by as much as 50 percent. The general situation deteriorated such that, on May 23, 1876, Eads appealed directly to the secretary of war for his interference. As a result of that plea,

Humphreys and Howell were barred from any further connection with the jetty project, although Humphreys never retreated far from the scene.

In spite of these many difficulties, Eads and his associates forged ahead. At the beginning of operations, the South Pass had a depth of only 7.5 feet. After only two years, oceangoing vessels of the largest size were regularly entering the Mississippi through that pass. When the work was completed in July 1879, it had a minimum depth of 26 feet, a central depth of 30 feet, and a width of 200 feet. In defiance of the prophecies of the Chief of Engineers, Eads had succeeded in opening the South Pass to oceangoing vessels. In addition to the immediate benefits to the city of New Orleans and to the Mississippi River commerce more generally, Eads' success at the South Pass fostered the creation of the Mississippi River Commission.

Chapter 2

From Jetties to Levees

Certainly, the origins of the Mississippi River Commission can be found in the success of the Eads' jetties and a desire among some in Congress to provide greater civilian oversight in managing the river, but not exclusively so. The political developments that facilitated the creation of the MRC were also rooted in the long-running political debate over responsibility for flood control along the Mississippi River, a debate older than the nation itself. More than 160 years separated the establishment of the earliest European settlements in the Mississippi Valley and the creation of the MRC in 1879. Throughout that period, the population of the valley grew, with many new arrivals settling in close proximity to the Mississippi River where alluvial lands were extraordinarily fertile and the river provided reliable and inexpensive transportation. But these advantages came at considerable risk. For many thousands of years, frequent overflows of the Mississippi River deposited rich soil throughout the alluvial valley. The first Europeans soon learned that these overflows continued and that

at intervals the floods could be highly destructive. Still, they showed no inclination to surrender these rich alluvial lands to the river. Beginning with the earliest settlements, pioneers struggled mightily to protect themselves from the floodwaters of the Mississippi River, but their insufficiently financed and uncoordinated efforts met with little success. As such, the years preceding the creation of the MRC clearly evidenced the need for central planning and intervention.



"An incident of the Mississippi floods." Sketch by Charles Upham. 1882.

The Federal Role Increases

The first step toward the federalization of flood control on the Mississippi River was reflected in the passage of the Swamp Land

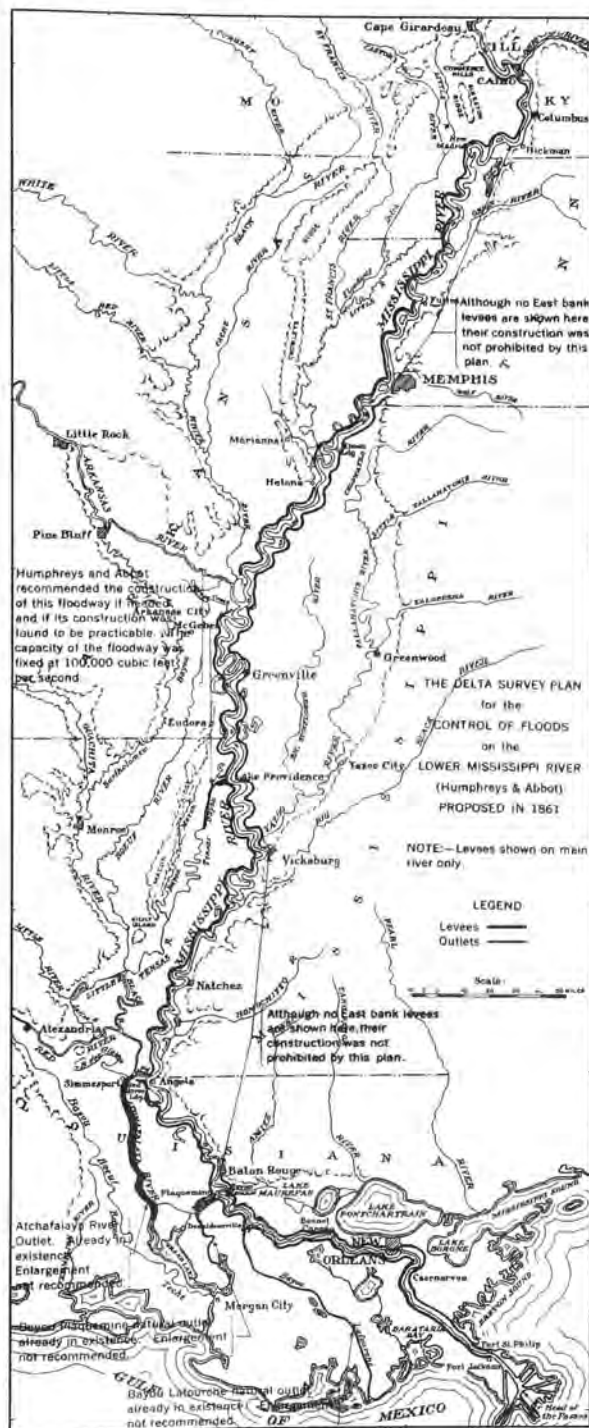
Grants of 1849 and 1850. Approved in the wake of two devastating floods, these acts provided aid to the people of the Mississippi Valley in the form of land grants, which transferred unsold swamplands to the states of the alluvial valley with the stipulation that funds from the sale of these lands be used for building levees and drains required for reclamation purposes. However, by transferring federally owned swamplands to the states to finance levee construction, the federal government essentially kept the onus of flood control on local authorities.⁴⁶

At about the same time, though, Congress affirmed its growing commitment to the Mississippi River problem by appropriating \$50,000 for a survey geared toward the preparation of plans for navigation improvements and flood control. The Secretary of War, Charles M. Conrad, split the appropriation between the military and civilian engineering communities, unintentionally ensuring the development of competing plans. Lieutenant Colonel Stephen H. Long and Andrew Humphreys, then only an Army captain, spearheaded the military effort, although the latter officer performed much of the work. Charles Ellet, Jr., a prominent civil engineer educated at the *Ecole Polytechnique* in Paris, France, initiated the civilian effort.⁴⁷

Completed in 1852, Ellet's report posited an extraordinary, but concise, examination void of extensive analysis of the river's regimen and lacking the precise observations and measurements necessary to support his conclusions. Despite its brevity, the report evidenced Ellet's advanced understanding of the Mississippi River problem. He concluded that the federal government should assume responsibility for improving the Mississippi River for both navigation and flood-control purposes and recommended a comprehensive approach to accomplish just that. Ellet's plan, which incorporated various engineering techniques working together to both accommodate and control the river, included the improvement of the existing levee system, with special emphasis on the levees below the mouth of Red River; the prevention of cutoffs along the excessive bends in the river; the construction of headwater reservoirs on the upper Mississippi River and on its main tributaries; the enlargement of natural river outlets through Bayou Plaquemine and the Atchafalaya River; and the creation of an artificial outlet from the river to Lake Borgne. Both in



Charles Ellet, Jr. *Office of History, U.S. Army Corps of Engineers.*



The plan for controlling floods on the Mississippi River advanced by Humphreys and Abbot in the *Delta Survey* in 1861.

its recommendation for the federalization of improvements along the Mississippi and its support for a comprehensive flood-control plan; Ellet's report represented a valuable contribution to the treatment and understanding of the river. At the same time, though, he openly conceded that his report did not dwell upon "microscopic examination," leaving many of his conclusions open to criticism.⁴⁸

Such criticism materialized nearly a decade later when Humphreys completed the second and far more influential study. Humphreys and his assistant, Lieutenant Henry L. Abbot, completed their investigation in 1861 after nearly 11 years of exhaustive research. The 500-page study, titled *Report Upon the Physics and Hydraulics of the Mississippi River*, contained the "microscopic examinations" lacking in Ellet's study and, therefore, represented the most thorough analysis of the Mississippi River ever completed up to that time. The Humphreys and Abbot report, also known as the *Delta Survey*, dismissed many of Ellet's

unsubstantiated hydraulic theories as flawed and erroneous. Of equal severity, it dispelled several of Ellet's conclusions on flood control as either too expensive or too dangerous to be attempted, particularly with respect to artificial outlets and headwater reservoirs. Instead, the report recommended an approach based almost exclusively on levees supported by a few natural outlets to prevent overflow. In contrast to Ellet's assertion that a plan based extensively on levees was impractical, the Humphreys and Abbot report argued that a general levee system "may be relied upon for protecting the alluvial bottomlands liable to inundation below Cape Girardeau." Due to its unprecedented thoroughness, Humphreys' and Abbot's report won the respect of engineers around the world, and both in terms of the data gathered and the conclusions rendered, the study influenced the development of river policy well into the twentieth century. Following the Civil War, Humphreys, bolstered by the international acclaim he received as the primary author of the study, became Chief of the Army Corps of Engineers, a position he used as a bully pulpit in defense of his conclusions.⁴⁹ As the merits of these influential studies were debated among the engineering community, the construction of levees along the Mississippi River advanced at an unprecedented rate.

The 1850s were a relatively prosperous period for the Mississippi Valley. With the fiscal impetus of the Swamp Land Grants, the planters of the lower valley were better prepared than ever to fund levee construction. By mid-decade, most of the levees along the lower Mississippi were in place, averaging about four feet in height. But the progress made during this period remained haphazard, uneven, and, according to Humphreys and Abbot, "quite inadequate." As late as 1857 and 1858, sizable gaps existed in the system, and the completed levees were mostly of insufficient size, gauge, and cross section.⁵⁰

Severe floods in 1858 and 1859 exposed these inadequacies and destroyed much of the progress of the previous decade. In 1858, flood levels in the lower Mississippi Valley were, according to Humphreys and Abbot, "second to none of which we have records." High water inundated the city of Cairo, washed away miles of levees along the St. Francis front, and deeply flooded the Yazoo, Tensas, and Atchafalaya basins. Below Red River Landing, two major crevasses at Bell and Lafourche left the fertile country between the Mississippi River and Bayou Lafourche submerged for weeks. Few of the much needed levee repairs could be made before the spring of 1859, when a second flood struck the valley. Though not as severe as the previous year, the flood of 1859 was of unprecedented duration, with the river near the high-water mark for 80 consecutive days at Memphis. The strain proved too much for the fledgling levee system, and

at least 32 separate crevasses formed, leaving much of the lower Mississippi Valley inundated.⁵¹

The floods of 1858 and 1859 proved conclusively that the levees had to be built higher and stronger. The people of the lower Mississippi Valley had already expended \$40 million for the construction of the failed levee line. Nearing the end of their resources, they turned to the federal government with very strong appeals for aid. By 1861, both houses of Congress were considering the problem, but the country soon found itself occupied with more pressing matters. Another deluge arrived in April 1861, but this one did not subside with the passing of the spring rains. On the morning of April 12, 1861, Confederate forces under the command of General P. G. T. Beauregard fired upon Fort Sumter, plunging the nation headlong into Civil War.⁵²

Due to the naturally corrosive effects of flowing water, levees had to be constantly maintained and repaired. Necessarily preoccupied, the people of the lower Mississippi Valley abandoned their flood-control efforts altogether, and the levees quickly fell into disrepair. General neglect of the levees throughout the war years resulted in untold damage to the system, as whole sections washed away or collapsed. A major flood in 1862 expedited the process of deterioration, but the most devastating damage to the levee system resulted from military operations in 1863 and 1864. To break the Confederate stronghold at Vicksburg and flood rebel supply routes, the Union army destroyed many levees, including the Yazoo and Hushpuckena levee—the finest in the delta.⁵³

With the destruction of the levee system nearly complete by the summer of 1865, the states of the lower Mississippi Valley began to evaluate their predicament. Four years of war had done much to destroy the prosperity of the region. In 1860 the state of Mississippi had been among the wealthiest in the U. S.; following the war it ranked among the poorest. Louisiana, Arkansas, Tennessee, and Missouri were similarly impoverished. Property values throughout the region tumbled in the years after the war and, as a result, so did tax revenues. In 1860, farm property in Arkansas, Mississippi, and Louisiana was valued at \$607,385,474; ten years later that value had fallen to \$213,885,602, a loss in value of almost \$400 million. Certainly, the job of repairing the dilapidated levee system represented a daunting task in the best of times. With conditions as they were, "the prospect of an enforced abandonment of the whole delta country grew . . . more certain."⁵⁴

The Warren Commission

In the face of nearly insurmountable difficulties, local planters stepped up pressure for federal aid. The South in 1865 “presented a bleak landscape of destruction and desolation. Burned-out plantations, fields growing up in weeds, and railroads without tracks, bridges or rolling stock marked the trail of the conquering Union armies.” With congressional attention necessarily diverted by the difficult and expensive task of rebuilding the southern infrastructure, the riparian landowners turned increasingly to state-sponsored levee organizations for help. In the decade following the war, the various states of the lower Mississippi created levee boards with the authorization to levy assessments upon all of the property within the alluvial area. Based on these revenues, the levee boards issued bonds and began to repair and reconstruct the levee system of the lower valley. But costs were high and progress slow. By the end of the first post-war decade, the war-weary states of the lower Mississippi Valley proved unequal to the task of protecting the delta from inundation.⁵⁵

A great flood in 1874 exploited the still weakened levee system and again wreaked havoc on the lower valley. The resultant suffering and devastation forced the federal government to redirect its attention to the flood problems of the delta. That year, Congress approved legislation creating a commission of engineers “to investigate and report a permanent plan for the reclamation of the alluvial basin of the Mississippi River subject to inundation.” President Grant appointed General Gouverneur K. Warren, the hero of Little Round Top at the Battle of Gettysburg, as commission chairman and appropriated \$25,000 for the study.⁵⁶



Major General Gouverneur K. Warren.
Office of History, U.S. Army Corps of Engineers.

Joining Warren on the commission were Army engineers Major Henry L. Abbot and Captain William H. H. Benyaurd. The civilian engineers were Jackson E. Sickels and Paul Hébert. After considerable analysis of the flood problem in the delta, the Warren Commission, naturally relying heavily on data contained in the *Report upon the Physics and Hydraulics of the Mississippi River*, dismissed man-made reservoirs, diversions of tributaries, cutoffs and artificial outlets as impractical methods of flood control. Paralleling Humphreys' and Abbot's

recommendations in 1861, the commission plan called for improving the general system of levees for the entire alluvial valley, including tributaries, with the levees being supplemented by existing natural river outlets represented by the Atchafalaya River and Bayous Lafourche and Plaquemine.⁵⁷

More importantly, the Warren Commission boldly emphasized the need for greater federal financial and legislative commitment to control floods on the Mississippi River:

It is a common and apt figure of speech to personify the Mississippi; and to speak of the conflict waged to protect the country against the inroads of a terrible enemy, and yet the army of defense has always been content to remain a simple aggregation of independent companies, with here and there a battalion under the command of a board of officers. That victory has not more frequently perched upon their banners is surely not surprising.⁵⁸

To implement a general levee system, the Warren Commission, also known as the Levee Commission, recommended dividing the alluvial valley into six districts flanking the river, each managed by a properly empowered chief engineer. The overall supervision and control of the project would rest with a board of engineers, which consisted of a president and the chief engineers, and would report to the "supreme authority from which it derives its legal existence." Not wishing to exceed the scope of its task—to report upon an engineering problem—the commission left the matter of what constituted the supreme authority to the discretion of Congress. Nonetheless, the commissioners warned that under existing circumstances the "alluvial region can never be securely protected against overflow" without Federal assistance.⁵⁹

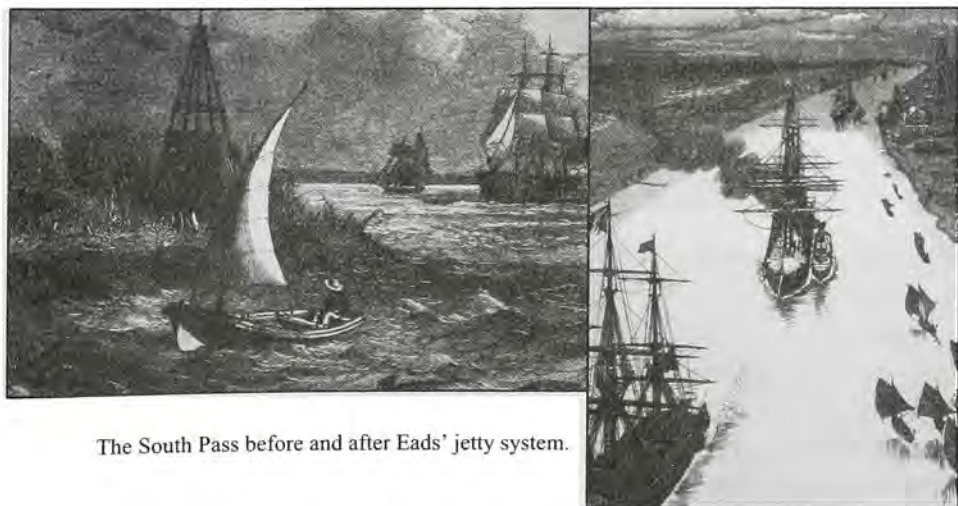
Not surprisingly, the report stimulated the growth of favorable public sentiment and encouraged flood-control advocates in Congress. Led by Louisiana Congressmen Randall L. Gibson, these advocates convinced House Speaker Michael C. Kerr of Indiana to authorize the creation of a House standing committee on Mississippi levees. Beginning with its inception on December 10, 1875, this committee became the battering ram for flood-control interests in Congress. The creation of the Mississippi River Commission in 1879 was among the committee's most significant achievements.⁶⁰

Chapter 3

The Creation of the Mississippi River Commission

The success of the South Pass jetties had a tremendous impact on the Corps of Engineers in terms of its relationship with both the Mississippi River and Congress. Though the Mississippi had always played a vital role in the commerce of the valley, both business and agricultural interests hoped to see that role expand. Certainly, the opening of the South Pass to oceangoing vessels was an important step in that direction; but in many ways it represented only a first step. There were a host of other problems that complicated navigation on the Mississippi River and hampered the growth of river borne commerce. Tree snags, sandbars, and uncharted shoals made navigation difficult and even hazardous for all but the smallest vessels. Eads' success at the South Pass focused attention on the navigation problems of the main channel to a greater degree than ever before.

The success of the South Pass jetties also shaped the development of river-management policy for the Mississippi River. Eads' success had proven that—under the right circumstances—jetties could direct the river to scour out and deepen its own channel. Before long, prominent civilian and military engineers became convinced that the Mississippi's own energies could be directed to the task of deepening the channel and improving navigation along the whole length of the river. Eads himself was the leading proponent of this idea, proposing to “set the river to work in the bottom of its bed, as we did at the jetties, and, while deepening it for the bene-



The South Pass before and after Eads' jetty system.

fit of commerce lower its haughty crest forever." In this way, Eads' jetties encouraged supporters of a federally backed levee system. Flood-control advocates in Congress quickly seized upon the idea that a properly constructed levee system could promote navigation improvements while offering increased flood protection.⁶¹

Eads' success at the South Pass also represented a major political defeat for the Corps of Engineers and its enigmatic leader, General Humphreys, and this setback eventually cost the Corps a measure of its autonomy on the Mississippi River. When the time came to focus its energies on improving the main channel of the Mississippi River, Congress relied heavily on its own recent precedents, particularly with regard to the 1874 jetty board and the increased reliance on civilian engineers.

The Humphreys and Eads Debate Continues

Nearly 11 months after commencing work on his jetty project, Eads had succeeded in deepening the South Pass from 7.5 feet to 20 feet. While that depth remained well below that of ultimate success, Eads and his supporters correctly pointed out that their efforts were working. In the summer of 1876, the members of the House Commerce Committee agreed and invited Eads to appear before them to hear his views on improving the navigability of the river from Cairo to the Gulf. Eads assured the committee that it was entirely possible to deepen the channel by 10-11 feet by extending his jetty scheme, in modified form, the length of the lower Mississippi River, thereby improving navigation during the low-water season and protecting the entire alluvial valley from floods during the high-water season. To accomplish this, Eads proposed to realign the channel through several artificial cutoffs to increase the velocity of the river, then to confine the increased discharge in a channel of uniform width through the application of a comprehensive, outlet free, levee system located directly on the banks.⁶²

While Eads' early success at the South Pass sparked favorable congressional interest toward applying his jetty system upstream, his advocacy of cutoffs generated isolated, but intense, opposition. In light of this, the House Commerce Committee took no immediate action on Eads' plan, instead choosing to await the final completion of the South Pass project. Eads' appearance before the committee, however, precipitated a third phase of the Humphreys and Eads debate. Humphreys, still harboring resentment toward Eads over his public defeats concerning the St. Louis bridge and the South Pass jetties, issued his unqualified endorsement of the \$46 million Warren Commission plan, which he argued consisted of levees supplemented by natural outlets "abstracting from the river, and conducting by separate channels to the Gulf, such a volume of the flood discharge

as shall be sufficient to bring down the flood-level to a height easily under control by the levees." Eads, on the other, hand aggressively fostered support for his plan to improve the Mississippi River and to check the influence of the Army engineers through public addresses, essays, and reviews throughout the valley. Eads vigorously attacked the Warren Commission report as an outlet plan, favoring instead his own plan based on the concentration and conservation of the river volume in which "the levees can be ultimately dispensed with." An intriguing factor in Eads' bitterness toward the Warren Commission may also be understood in the context that Gouverneur Warren was a member of the engineer board appointed by Humphreys to study the impacts of the Eads' bridge. Warren, a decades-long friend of Humphreys, had suggested that an entirely less expensive and more sufficient bridge could have been constructed across the Mississippi at St. Louis years before the Eads' bridge "had not the authors of the present project stood in the way."⁶³

As the next round of the debate unfolded, Eads played to his strengths—his indomitable spirit, his towering reputation, and his proposal to make levees ultimately unnecessary—and won support in Congress. By the spring of 1878, Eads' supporters in the House began drafting bills providing for an independent commission of five engineers to be appointed by the president. The Congressmen most responsible for drafting the bills disliked and distrusted the Corps of Engineers and envisioned their creation as a vehicle for the implementation of Eads' ideas on the Mississippi River. In fact, the *St. Louis Republican* reported, "The bill is based on the well grounded opinion that Capt. Eads will be selected president of the commission." Humphreys clearly understood that motivation. In a letter to Congressman Edward W. Robertson of Louisiana, the Chair of the House Committee on Levees and Mississippi River Improvements, Humphreys vigorously protested against entrusting the improvement of the Mississippi River to Eads and concluded, "It is hoped that sufficient has been said to show that there is no reason for transferring to other hands the charge of the survey of the river now going on under the Engineers' Department for the improvement of low-water navigation." Recognizing that he still enjoyed the support of a large number of congressmen sympathetic to the Corps of Engineers, Humphreys attempted to circumvent the creation of an independent commission by establishing his own engineering board to consider the effects of a permanent system of levees on the lower Mississippi River on navigation and flood control. This board submitted its report on January 25, 1879, but it came too late. Nine days earlier, Congressman Robertson formally introduced a bill to create a "Mississippi River Improvement Commission."⁶⁴

A New Coalition

Eads may have been instrumental in garnering support for the creation of the Mississippi River Commission, but the House Committee on Levees performed the heavy lifting. The concept of a federally subsidized flood-control program still provoked considerable opposition, and flood-control advocates had long fought an uphill battle in their attempts to secure appropriations for levee construction and repair along the lower Mississippi River. Unable to overcome this legal quandary in the past, flood-control advocates now sought to circumvent it. Eads' success at the South Pass was largely responsible for this new approach. According to Ohio Congressman James A. Garfield, the future United States President, Eads' jetty system was "a great and striking success in the management of the mouths of that river." However, the project's significance did not end there. As Garfield suggested, "all our calculations and indeed all our theories concerning the improvement and management of other portions of that river need to be reconsidered in view of the new light that the jetty system will throw upon the question."⁶⁴

Eads's South Pass project certainly did much to convince skeptics that levees could play an important role in improving navigation along the lower Mississippi River. In the eyes of most flood-control advocates, the once tenuous link between levees and navigation had been strengthened considerably. Flood-control advocates now sought to apply the lessons learned from contracting the low-water channel via jetties to the high-water channel by confining potential overflows between a fully developed and comprehensive levee system. Furthermore, flood-control advocates recognized the \$1 million appropriation, contained in the 1878 Rivers and Harbors Act for the purpose of improving navigation on the Mississippi River, as a reflection of growing support in Congress for navigation improvements. Together with Eads's successful use of jetties to improve the South Pass, it also convinced flood-control advocates to ally themselves with navigation interests and to renew their efforts to secure appropriations for levee construction and repair along the Mississippi River. In the years ahead, advocates of a federal flood-control program for the river increasingly sought to justify levee appropriations based on their benefits to navigation, and not flood control.⁶⁵

The House Committee on Levees was instrumental in fostering and promoting the coalition between navigation and flood-control interests. In a formal report to the House on May 3, 1878, that committee characterized "the questions of river improvement and the protection of the alluvial lands as intimately and inseparably connected." The report went on to say that, "In the past these have been rival interests, notwithstanding nature

made them interdependent. At present however all parties in interest admit that levees are necessary aids to the improvement of navigation."⁶⁶ This "fortunate adjustment of rival interests" generated the support necessary for facilitating the introduction and passage of congressional legislation for the improvement of the lower Mississippi River.

The congressional coalition between flood-control and navigation interests grew stronger in the ensuing months and, by 1879, there existed a general consensus for the creation of a commission with federal oversight authority for the lower Mississippi River. The coalition was one sided, however. Flood-control advocates needed the support of navigation interests, but the reverse was not true in every case. As such, there was little consensus in Congress over the nature of this proposed commission. On January 16, 1879, Congressman Robertson introduced a bill to create a "Mississippi River Improvement Commission." In addition to its responsibility to affect improvements for the promotion of navigation, the commission was ordered to "take into consideration such plans and estimates . . . for the protection of the alluvial lands of the Mississippi Delta from overflow." The debate that followed did much to define the parameters of this proposed commission.⁶⁷

Robertson's proposal met with considerable resistance from two groups in Congress—those who favored improvements for navigation but not flood control, and those who opposed federal expenditures in both

areas. The latter group was vocal, but relatively few in number. Characteristically, they were Republicans from Northeastern states who, despite their adherence to the traditional Whig and later Republican platforms, believed that their states had little or nothing to gain from hefty expenditures for the improvement of the Mississippi River. The former group was much more numerous and, as a result, represented a substantial threat to the passage of federal flood-control legislation. Those who took this position were typically Republicans from Midwestern states who would benefit directly from navigation improvements to the Mississippi River, but not necessarily from the construction of additional flood-control works along the lower



Congressman Edward White Robertson of Louisiana. He was Chairman of the House Committee on Levees and Mississippi River Improvements from 1877-1880.

valley. Congressman William A. J. Sparks of Illinois articulated the views of this group:

We can and ought to draw upon the National Treasury to improve the navigation of the Mississippi River, for the work is national and is warranted by the Constitution, and ought to be done. We cannot and should not draw upon the Treasury to protect 'adjacent alluvial lands,' for such work would be local. The lands are the property of private citizens and within the sole control and under the jurisdiction of the States in which they are located, and there is no warrant of national authority for the expenditure of money for any such purpose.⁶⁸

Though proponents of the original bill included members from both parties and every section of the country, the bill's most ardent supporters were Southern Democrats. Prompted largely by the passionate desire to reinvigorate a lagging economy still reeling from the effects of the Civil War, these Southern Democrats broke from their party's antebellum stance against federal involvement in internal improvements. In fact, not a single representative from Louisiana, Mississippi, Arkansas, Missouri, or Tennessee—states with large Democratic majorities in the House—opposed the bill.⁶⁹

The ensuing debate between the two opposition groups and proponents of the bill focused on constitutional and sectional issues as well as issues of precedent. Section 4 of the bill, which authorized the commission to erect flood-control works, was a source of much of the initial opposition. Opponents quickly pointed out that the U.S. Constitution did not grant

Congress the authority to construct flood-control works. Proponents, on the other hand, went to great lengths to prove otherwise and to establish the bill's legality, particularly in regards to Section 4.

Democratic Congressman James R. Chalmers of Vicksburg took up this task with considerable zeal, indicating a number of legal justifications. He turned first to the "commerce clause" of the constitution. The congressional power to regulate interstate commerce was, he argued, wholly sufficient to justify the construction of levee works that benefited navigation, and there



Congressman James Ronald Chalmers of Mississippi. *Brady-Handy Photograph Collection* (Library of Congress)

were numerous precedents to support this contention. Chalmers next cited the congressional authority to establish post offices and post roads. In the past, that authority had been extended to justify the construction of turnpikes, railroads, bridges, and telegraph lines. Certainly, the construction of levees along the Mississippi River—"the greatest natural post-route in the Union"—was no different, as they would enable the residents of the alluvial valley to receive their mail on dry land. Lastly, Chalmers found justification in Congress's authority to provide for the common defense and general welfare. The federal responsibility to protect its citizenry should, he argued, extend to those who are helpless against the great floods. In short, proponents held that any or all of these were sufficient to justify the legality of a federal flood-control program for the lower Mississippi River.⁷⁰

Sectional issues were raised with respect to Sections 10 and 11 of the bill. Those two sections authorized appropriations in the amount of \$3,871,574 for the purpose of "closing such crevasses and raising and strengthening the levees along the Mississippi River." Proponents here sought to associate the repair and improvement of Mississippi River levees with the general reconstruction of the post-Civil War South. Democratic Congressman E. John Ellis of New Orleans directed his appeal to "those from the northern section of the Union."⁷¹

False Partisans have told them [the people of the South] you cared nothing for the South or her interests; that the two great political parties cared but for her political alliance and strength as an element of their own strength. Now you will show that these representations are false. Uniting upon this great measure, the two great parties will give earnest token that they eagerly long for the rehabilitation of the South and a restoration of her prosperity.⁷²

Similarly, Congressman Robertson argued that the Mississippi River, "a natural bond between the North and the South," should be improved in the interest of better relations between the two regions. Opponents here accused Southern flood-control advocates of promoting sectional animosity. At least one northern newspaper found this tactic objectionable as well and accused Robertson and his colleagues of arraigning anyone who opposed the bill as "a mean and malignant enemy of the South and its people."⁷³

The last issue raised was one of precedent. Proponents argued that for many years Congress had been subsidizing internal improvements that were national in character, including railroads and turnpikes. Citing the construction of the Union Pacific Railroad, Ellis argued that "where a work of internal improvement is either national in its character, national in

its extent, or national in its influence, Congress may with perfect propriety lend it aid." According to Ellis, the Mississippi River problem was no less national in scope than the transcontinental railroad or a national turnpike and, as such, no less deserving of federal subsidies.⁷⁴

Partisan Wrangling

Partisan politics certainly played a role in the debate. With the election of 1876, the Democratic Party had seized control of the House of Representatives, while Republicans retained control of the Senate and the presidency. Although the Robertson bill appealed primarily to regional rather than partisan interests, the two were closely related in the post-Reconstruction era. Throughout this period, the Republican and Democratic parties were evenly matched but not evenly dispersed. The upper and middle classes of the Northeast and Midwest were generally Republican, while the South was largely Democratic. Under those conditions, flood-control proponents were unable to rely on the party apparatus to increase support for the bill outside of the South. As a result, support fell largely along party, as well as regional, lines. The Democrats enjoyed a comfortable majority in the House, and on February 5, 1879, the Robertson bill was approved by a sizeable margin.⁷⁵

The next day, the Robertson bill was referred to the Republican-dominated Senate. Deliberations did not begin in the Upper House until March 3, the final day of the last session of the 45th Congress. Judging from the apparent mood of the Senate, this was no accident. Senator Blanche K. Bruce, a Republican from Mississippi and a member of the Mississippi Levee Board, introduced the Robertson bill in the face of substantial opposition. After only a brief period of debate, Republican Zachariah Chandler of Michigan offered a motion to table the bill. While this motion was easily defeated, it did not bode well for the quick passage of the Robertson bill. Opponents came forward with a number of substantive amendments, and supporters were unable to bring the bill to a final vote before the end of the day. The session ended, and the bill met its inglorious end. But the plan for a federal river commission did not die.⁷⁶

Fortunately for the Mississippi Valley, the congressional elections of 1878 did much to further the interests of flood-control advocates. That year, the Democratic Party strengthened its majority in the House and, more importantly, seized control of the Senate. Proponents of flood control realized that prospects for the approval of a Mississippi River Improvement Commission, or a variation thereof, would improve substantially when the new Congress met in March 1879. With that in mind, several congressmen produced replacement bills during the interim period, all of which were referred to the House Committee on Levees for consideration.

On May 10, 1879, Louisiana Congressman Randall Lee Gibson introduced a compromise bill to provide for the appointment of a "Mississippi River Commission." The most obvious difference between this bill and its predecessor was the shortened title; the House committee dropped the word "improvement" from the title of the proposed commission. The committee members may simply have been motivated by thrift, or perhaps the word "improvement" smacked of reclamation, a term that raised the ire of fiscal conservatives in both parties. More substantively, the new bill included a far less intrusive flood-control statement. The Robertson bill had included three lengthy sections



Congressman Randall Lee Gibson of Louisiana. He was a U.S. Representative from 1875-1882 and a U.S. Senator from 1883-1892. *U.S. Senate Historical Office*

that dealt extensively with flood-control issues, calling for the commission to take into consideration plans "for the protection of the alluvial lands of the Mississippi Delta from overflow." In the new bill, two of those three sections were stricken entirely. References to flood control in the one remaining section were reduced significantly, requiring only that the commission take into consideration such plans as to "prevent destructive floods." The new bill also dropped all appropriations for the closing of crevasses and the strengthening of levees along the Mississippi River and cut the commission's proposed first-year budget by 30 percent. As a whole, these changes were designed to assuage opponents of the original bill, particularly those in the Senate. The House, which had already passed a more extensive version of this bill in the previous Congress, approved Gibson's bill without debate on June 2.⁷⁷

Upon receiving the House bill, the Senate Select Committee on the Improvement of the Mississippi River and its Tributaries debated the composition of the proposed commission. In the House version, the commission consisted of three appointees from the Corps of Engineers and two from civil life. Eads' supporters in the Senate pushed for the equal representation of military and civilian engineers on the commission and favored allowing the commission president to be selected from the civilian engineers. Corps of Engineers sympathizers, on the other hand, insisted that the military members of the commission outnumber those of the civilians. Minnesota Senator Samuel J.R. McMillan reflected the growing sentiment of the Senate committee when he declared, "while I concede the

engineering ability of Mr. Eads I do not believe that the survey authorized by this bill should be under the control of influences outside the Engineer Corps of the Army."⁷⁸

After debating and reviewing the bill, the Senate committee reported it along with a single amendment that increased the size of the commission from five persons to seven and balanced its representation by adding an additional civilian member and one from the Coast and Geodetic Survey. It also left the presidency of the commission to a military officer. Democratic Senator L. Q. C. Lamar of Mississippi introduced the bill along with the amendment to the whole Senate on June 14. This time the bill faced minimal opposition. Not only was it less obtrusive than its predecessor, but the Democratic Party was now the majority party in the Senate. On June 18th, the Senate approved the amended bill by a vote 47 to 4, and several days later the House concurred with the Senate version, voting for the measure 166 to 11. Finally, on June 28, President Ruther B. Hayes, over the strenuous objection of General Humphreys, signed the bill creating the Mississippi River Commission.⁷⁹ An embittered Humphreys, having failed in his protests and suffered a third embarrassing defeat to Eads, retired from the Corps of Engineers two days after the creation of the MRC.

The creation of the MRC represented a culmination of the efforts of both flood-control and navigation interests. Certainly, this wedding of interests did not fail to provoke suspicion among those opposed to a federal flood-control program for the Mississippi River. During the course of debate, advocates had made numerous concessions to broaden support for the bill. While virtually all of these concessions were designed to weaken the flood-control elements of the bill, it was clear to most that the intent of the bill's supporters never wavered. Congressman Robertson, chairman of House Committee on Levees, was a staunch advocate of federal flood control; all 11 members of the House Committee on Levees supported the bill in its original form; and Southern support for the original bill had been nearly unanimous. Their willingness to compromise, together with the steadfastness with which Southerners and most Democrats favored federal flood-control legislation, led some to view the MRC as a Trojan horse for flood-control interests.⁸⁰



Senator L.Q.C. Lamar of Mississippi. U.S. Senate Historical Office.

Accusations to this effect were made in Congress and in at least one prominent Northern newspaper. Indiana Congressman John H. Baker accused the bill's supporters of perpetrating a deception on the American people.

No, gentlemen, you do not want to pass this bill for the purpose of obtaining information so that you can improve the navigation of the Mississippi River. It is but the entering-wedge of a scheme to dike and dam that river so that, at the expense of Uncle Sam, the swamplands may be made productive.⁸¹

A *New York Times* editorial argued that “promoters put forward the modest notion of a commission—a commission to inquire into and report upon methods for improving the navigation of the river . . . with the view of having the commission made up to suit their purposes.” According to the editorial, these promoters favored an extensive federal flood-control program for the Mississippi River and were only secondarily interested in navigation improvements. In the ensuing months, the appointment of the first seven members of the Commission would at first lend credence to these accusations, but the evolution of MRC policy would later expose the accusations as unwarranted.⁸²

Chapter 4

First Steps

The newly created Mississippi River Commission enjoyed extensive authority and jurisdiction over the entire Mississippi River in terms of executing surveys and developing plans of improvement for navigation and flood control. Section 3 of the Mississippi River Commission Act of 1879 authorized the MRC to direct and complete surveys of the Mississippi River from its headwaters near Lake Itasca, Minnesota, to the Head of Passes near its mouth and to make further surveys and examinations, as it deemed necessary, of the entire river and its tributaries. Section 4 instructed the MRC to develop plans to “correct, permanently locate, and deepen the channel and protect the banks of the Mississippi River; improve and give safety and ease to navigation thereof, prevent destructive floods; promote and facilitate commerce, trade, and the postal service...” Furthermore that same section instructed the MRC to “report in full upon the practicability, feasibility, and probable cost of the various plans known as the jetty system, the levee system, and the outlet system.” The act also authorized the president of the United States to appoint the seven commissioners—three Corps of Engineers officers, one representative from the Coast and Geodetic Survey, and three civilians, two of whom had to be civil engineers. Each appointee needed the advice and consent of the Senate for confirmation of their posts.⁸³

Through this power of appointment, President Hayes naturally played a prominent role in shaping the early character of the MRC and it was his inclination to support internal improvements in the South. There are at least two explanations for this, particularly for the lower Mississippi Valley. Hayes came into office as a result of one of the most fiercely contested presidential elections up to that time. During Reconstruction, the Republican Party depended upon African-American support for its majority position in the South. After 1868 though, President Andrew Johnson’s liberal pardon policy for ex-Confederates and a successful terrorist campaign directed at Southern blacks



Rutherford B. Hayes, 19th President of the United States, 1877-1881.

did much to erode this majority position. By 1876 the Democratic Party had regained control of most of the South, with the exception of Louisiana, South Carolina, and Florida, while the Republican Party maintained only tenuous control. Following the election, two sets of returns arrived from each of the three Southern states still controlled by the Republicans. Both parties claimed victory, forcing Congress to appoint a special commission to decide the issue. In the end, the election commission awarded all of the contested electoral votes to Hayes, handing him the presidency. To assuage Southern resentment, the new Republican president entered into an agreement with the Democratic leadership. Known as the Compromise of 1877, this agreement pledged Hayes to support, among other things, internal improvements for the South.⁸⁴

Hayes also hoped to build a Republican Party in the South that could command the respect and support of white Southern conservatives. As another part of the Compromise of 1877, he made a number of friendly overtures to Southern interests in the hope of converting them to the Republican Party. Hayes restored "home rule" to Southern whites; he appointed David M. Key, a Southern Democrat and ex-Confederate officer to his cabinet; and, most important, he supported improvements along the Mississippi River as an appeal to former Whigs, whose party had earlier supported a similar scheme. In his third annual address of December 1, 1879, he stated, "a comprehensive improvement of the Mississippi and its tributaries is a matter of transcendent importance."

The "Seven"

Hayes' interest in Mississippi River improvements grew as a result of his association with Eads, a leading advocate of a comprehensive levee system. As early as 1876, Eads had lobbied the House Committee on Commerce on the practicality of improving navigation and flood protection on the lower Mississippi River through the implementation of a federally subsidized levee program. His success in opening the South Pass to oceangoing ships swayed Hayes into his corner and earned Eads the president's trust and admiration. Upon the creation of the MRC, Hayes had hoped to appoint Eads as its president, but Congress had failed to pass the necessary amendment to the originating legislation. Despite this, Eads' appointment to the MRC, buttressed by his supporters in Congress, placed him in a powerful position to influence federal policy for the improvement and management of the Mississippi River.⁸⁵



Benjamin Morgan Harrod, Member, Mississippi River Commission, 1879-1904. Prior to serving on the Commission, he was Chief Engineer for the State Board of Engineers for Louisiana.

In addition to Eads, Hayes appointed Benjamin Morgan Harrod, a Harvard educated civil engineer from New Orleans and an ex-Confederate artillery officer. Harrod had accumulated extensive experience in the area of levee construction and drainage improvement by serving as the chief engineer of the State Board of Engineers of Louisiana. In a politically driven move, Hayes also designated Benjamin Harrison, the future 23rd president of the United States, as the last of the three civilian members. Earlier in 1879, Harrison had been defeated in his bid to become a U.S. senator from Indiana, and, as such, Hayes's action may be interpreted as a palliative to the popular Republican. Whatever the motive, Harrison's appointment represented a fateful moment in the history of the MRC. A

practicing attorney, Harrison had little or no engineering experience but concerned himself increasingly with the legality of the MRC's actions, particularly in regard to the constitutionality of federal involvement in flood control.⁸⁶

President Hayes selected Henry Mitchell as the representative from the Coast and Geodetic Survey. Mitchell, also a Harvard graduate, had joined the Coast and Geodetic Survey in 1850 and served in that capacity until the Civil War, when he was reassigned to the Union Army's engineering corps. Following the war, he published extensively, establishing himself as one of the nation's most competent authorities on questions pertaining to hydrology. Significantly, Professor Mitchell, as he was known to the other members of the MRC, served on President Grant's 1874 jetty board that reported favorably on Eads' proposed



Henry Mitchell, Member, Mississippi River Commission, 1879-1888.

jetty system and recommended its application to the mouth of the Mississippi River.⁸⁷

For the military engineer slots, Hayes appointed Brevet Major General Quincy A. Gillmore to serve as the first president of the MRC. A native of Ohio, Gillmore graduated from West Point in 1849 at the top his class. During the Civil War he used his knowledge of engineering and artillery to destroy several Confederate fortifications, the most notable being Fort Pulaski near Savannah, Georgia. Gillmore's rapid reduction of this fort, thought impregnable by many engineers, and his similar successes at Fort Wagner and Fort Sumter, earned him a reputation as a bold and skilled combat engineer. Following the war, Brigadier General Richard Delafield, the Chief of Engineers, gave Gillmore his first substantial experience with public works by appointing him as the chief engineer responsible for all river and harbor improvements along the Atlantic coast south of New York.⁸⁸

Hayes' second military appointee was Brevet Brigadier General Cyrus B. Comstock, who like Mitchell, was a member of the 1874 jetty board. Comstock also served on the 1878 engineer board created by General Humphreys to examine the impacts of a permanent levee system on navigation and flood protection. Comstock, who graduated first in the West Point class of 1855, served during the Civil War as the chief engineer for the Army of the Potomac, and later the Army of the Tennessee, where he earned the brevet rank of brigadier general. He participated in several historic battles, including Fredericksburg, Chancellorsville, and Grant's siege of Vicksburg, serving the general's aide-de-camp. Following the war, he served as an aide to Humphreys, becoming heavily involved in surveys and river improvements. As superintendent of the geodetic surveys of northern and northwestern lakes, he supervised the soundings, initially suppressed by Humphreys, at Eads' South Pass jetty project. Comstock's open-mindedness in advocating Eads' jetties against Humphrey's public support of the Fort Saint Philip Canal, along with his studies of the suspension and movement of sediment in the Mississippi River, made him an ideal candidate for the MRC.⁸⁹

Brevet Brigadier General Charles R. Suter represented the final military appointee. An 1862 graduate from West Point, Suter had served as an assistant engineer on a survey of the upper Mississippi River and then later directed a reconnaissance of the river from Cairo to New Orleans, making him a well-qualified candidate. Along with Comstock, he served on the 1878 engineer board created by Humphreys. Additionally, Suter had a history with Eads, though an unpleasant one. Humphreys had appointed Suter to the board of engineers that unsuccessfully recommended that Eads construct an 800-foot canal bypassing the east abutment of the bridge at

St. Louis bearing his name. Despite that episode, Suter and Eads successfully demonstrated an ability to move beyond their differences, with Suter later supporting many of Eads' more contentious positions.⁹⁰

Each of these appointments, save Harrison, evidenced Hayes's support of comprehensive improvements for the lower Mississippi and, perhaps more precisely, a comprehensive levee system. The concept of a federal flood-control program for the South, however, remained distasteful to many, and Hayes' several appointments did not go without criticism. On the day that Hayes signed the commissions of the seven members of the MRC, a *New York Times* editorial lambasted the Commission as a "gigantic scheme of jobbery" and accused Louisiana and Mississippi Democrats of attempting to perpetrate a scam on those "who deemed investigation a fair and friendly proceeding." These "innocent people" would soon learn the error of their ways, as the MRC was "so composed that the essential guarantee of thoroughness is absent. It is a commission, in short, apparently predisposed to favor the levees and jetties which the South calls for."⁹¹

The MRC first met in the nation's capital on August 19, 1879, and quickly decided to locate its permanent headquarters in St. Louis to be in close contact with the people of the Mississippi River Valley. It also established two committees to help shape the extent and character of the work necessary to comply with the provisions of originating legislation. Gillmore, using his powers as president, appointed Harrison, Harrod and Mitchell to the Committee on Statistics to determine what statistical data was needed by the Commission and how to obtain such information. He then appointed Comstock, Suter, Mitchell and Harrod to the Committee on Surveys and Observations to recommend a path forward for the MRC. The following day, the committees delivered their recommendations. The Committee on Statistics expressed the need for detailed information on crevasses and topography below the mouth of the Red River. The Committee on Surveys and Observations recommended strict standards for conducting surveys and mapping, and a resurvey of the entire Mississippi River, complete with permanent benchmarks, 20 new river gauges



Brevet Brigadier General Charles Russell Suter, Member, Mississippi River Commission, 1879-1896.

between Cairo and New Orleans, primary and secondary triangulation to locate the river, and precise leveling to determine the flood storage capacity of surrounding bottomlands.⁹²

The MRC members adopted the committee reports and then moved to create a new committee, the Committee on Surveys and Examinations. Gillmore retained the original members of the former committee and appointed Eads as a fifth member. The MRC also authorized the new committee to direct the MRC Secretary to employ and purchase the necessary personnel and equipment to carry out the resolutions adopted in the regard to the general survey of the river. Over the next several years, the MRC hired several associate engineers and surveyors to conduct surveys and lead triangulation and leveling parties. Among those employed in various capacities by the MRC were Arthur Hider, J.B. Johnson, William Starling, Arthur O. Wilson, George Y. Wisner, John A. Ockerson, and William G. Price. These civil engineers had established themselves as leaders in their fields and earned distinguished reputations, but two went on to receive even higher accolades. After 19 years as an assistant engineer, Ockerson became a full member of the MRC in 1898. Price became the foremost authority in his day on discharge measurements, inventing and patenting a current meter bearing his name.⁹³

The MRC adjourned from its Washington, D.C., meeting on August 21, 1879, agreeing to meet again in St. Louis on November 20 to conduct a visual inspection of existing conditions of the river, to examine the ongoing, but sporadic, works of improvement by the Corps of Engineers, and to discuss the progress of the triangulation and leveling parties hired by the Commission. On November 21, the MRC began a three-week inspection trip of the Mississippi River between St. Louis to the Head of Passes. Eads was notably absent from that trip, a harbinger of things to come. Boosted by the success and acclaim of his jetty project at the South Pass, Eads found his professional services much in demand, both at home and abroad. These activities, along with his failing health and perhaps his disillusionment at not being able to dominate the Commission, saw Eads miss 82 of the first 100 sessions of the MRC.⁹⁴

The Eads and Comstock Debate

On January 15, 1880, the MRC, with Eads in attendance, convened in St. Louis and moved directly into discussions on the basic principles for improving the river. The dialogue over the next 10 days was marked by a display of divergent views. Owing to the uncertain nature of hydraulic engineering in the 1880s, it was not abnormal for the members to exhibit wide differences of opinion. But, because Congress established the MRC as an executive body, only a simple majority vote of its members was

necessary for the passage of any resolution. With conflicting theories held by several members, the democratic process of majority rule almost guaranteed the evolution of compromise, and sometimes inconsistent, policy.⁹⁵

While the members held disparate views on a number of topics, all agreed that the navigation problems on the river necessitated a plan of improvement based on contracting the channel and protecting riverbanks from erosion and caving. They correctly realized that the instability and caving of the banks at certain locations allowed the river to widen its channel. As the river widened, it shallowed correspondingly. During periods of low flow, the decrease in current velocity caused suspended sediment to fall out of the river, forming sandbars and shoals that hampered navigation and created numerous side channels. The members shared the belief that contracting the flow into a single and narrow channel would increase the velocity of the current and scour a deeper riverbed, thereby securing an adequate depth for navigational purposes. Despite this consensus, two schools of thought emerged on how best to rectify the problem—one championed by Eads, the other by Comstock.

Eads naturally sought to employ his scheme to improve navigation and alleviate flooding through the implementation of a levee system directly on the banks. He believed that the “intimate and direct” relationship between the velocity of the current and the amount of sediment suspended in the river proved that the river possessed a natural tendency to self-regulate its



Caving bank on the Mississippi River.

current in order to accommodate the vast quantities of sediment pouring into the channel from its tributaries. The excessively wide and shallow reaches of the river, Eads contended, disturbed the regularity of the current causing further bank erosion and sandbar formation. Therefore, a uniformity of channel width and depth would alleviate those problems. This is not to suggest, however, that Eads opposed contracting the low-water channel. He viewed the levee system as a necessary adjunct to the contraction of the low-water channel. This was based on the theory that the confinement of floods would periodically flush out the channel, removing bars and preventing new obstructions from forming. By advocating the establishment of a uniformity of width and depth for the low-water channel and a comparative uniformity of the high-water channel, Eads' plan reflected his desire to improve conditions at all stages.⁹⁶

Eads believed that protecting the banks from erosion and confining the high-water channel would create a uniformity of width, while forcing the river to self-regulate its flow by digging the riverbed deeper. Significantly, Eads carefully noted that by "riverbed," he meant "the channel between the high water banks." As a result of the expected bed scour across the entire cross section of the river, he predicted that a uniform depth of a least 20 feet would be secured year-round. In addition to improving navigation conditions, a uniformity of depth and width would increase the capacity of the channel to carry floodwaters to the point that "levees will be useless and inundations practically unknown." In its simplest form, Eads' plan of improvement called for stabilizing and protecting the riverbanks from erosion, closing all gaps and crevasses in the existing levee system, and closing all outlets and side channels. The closing of crevasses and outlets, though, became the primary point of contention for the second school of thought championed by Comstock.⁹⁷

For the sake of clarity, outlets fall into two categories—artificial and natural outlets—a distinction often omitted in historical analyses of MRC policy. Artificial outlets are man-made low spots in the high-water banks of the river, usually regulated by either masonry weirs, earth weirs or gated spillways, and are designed to allow floodwaters to escape from the main channel into lateral pathways to the Gulf. Natural outlets fall into two classifications: all-stage outlets and natural low spots in riverbanks. Rivers and large bayous capable of diverting flows from the main channel at any given stage, including periods of low flow, are considered all-stage outlets or distributary streams, with Atchafalaya River representing the most prominent all-stage outlet in 1880. Gaps and crevasses in the levee system exemplify the other form of natural outlets, which allow floodwaters to escape the main channel into the surrounding bottomlands; sometimes never to return, sometimes returning to the channel farther downstream.⁹⁸

Eads believed that closing all crevasses and natural outlets would increase the volume and subsequent scouring capacity of the river, while leaving them open would allow water to escape from the channel, thereby decreasing the velocity of the current and creating troublesome sediment deposits. To support his theories he pointed to favorable channel conditions in the 1850s "when the levee system was in its most perfect condition." Before the levees deteriorated in the 1860s as a result of floods and damages inflicted during the war, Eads argued that they effectively increased the volume of floods, creating a uniformity of width and depth, accelerating the scouring effects of the river on its bed, and leading to a deeper channel. As the levees deteriorated, Eads contended that crevasses interrupted the continuity of the levee system, allowing water to escape and resulting in shoals, sandbars, and a rising of the bed.⁹⁹

Whereas Eads' plan represented a high-water solution to the navigation and flood problems on the river, Comstock envisioned implementing a plan to improve low-water navigation conditions only. He did not agree entirely with Eads' theories on the relationship between velocity and suspension of sediment, believing that they omitted several factors influencing the relationship between discharge and slope, and Comstock expressed this disagreement by voting against all of the resolutions offered by Eads to that effect. Comstock, in contrast to Eads' plan, believed it was only

necessary to contract the low-water channel at locations where the river exceeded 3,000 feet; reaches not exceeding this dimension, he contended, already possessed adequate depths for navigation even during periods of low water. By contracting the low-water channel to 3,000 feet and holding it to this width, he contended that the river would erode its bed and, with the occasional need of dredging, provide a minimum depth of 10 feet during periods of low flow.¹⁰⁰

In this respect, Comstock's plan was less ambitious than that proposed by Eads. This had nothing to do with economics or lack of vision; instead it reflected Comstock's view of the limited value of levees as a means of improving navigation. Comstock clearly recognized the importance of levees as



Brevet Brigadier General Cyrus Ballou Comstock, Member, Mississippi River Commission, 1879-1895. He served as president of the Commission from 1882-1884 and 1888-1895.

a measure of flood protection, but in regard to navigation he believed that "their influence is only exerted at the higher stages of the river, when there is already ample depth of water..." With this in mind, closing the gaps in the levee system had no impact on the low-water channel. As for outlets, he unsuccessfully sought to limit their closure to instances where potential bars would obstruct navigation.¹⁰¹

Both schools of thought had their advocates within the MRC. Harrod, a solid proponent of levees and flood protection by nature of his background as the chief engineer for the Louisiana State Board of Engineers, either voted with Eads or offered resolutions in support of Eads' levee plan. Suter, to a lesser extent, did the same. Harrison, though, reflecting his deep-seated convictions against federal involvement in flood control, voted more often than not in support of Comstock's levee-less navigation improvement plan.

Gillmore and Mitchell, on the other hand, vacillated between the camps and ultimately played instrumental roles in shaping a compromise between the two. Mitchell favored closing gaps and crevasses but shared Comstock's apprehension of levees as a means of improving low-water navigation. In an attempt to limit the perception of levees as vital instruments in that regard, Mitchell posited a resolution stating that "in the judgment of the Commission" levees in times of flood would prove somewhat beneficial in improving conditions in the low-water channel after the floodwaters receded, "but must rank among the least potent of the appliances thus far proposed." Eads, Harrod, Suter and Gillmore, however, voted the measure down, but the MRC president followed up with two compromise resolutions. In deference to Eads' plan, the first resolution stated "outlets of any kind" were not applicable on the river "either to the permanent improvement of its navigation, or to the ultimate prevention of destructive floods." The other resolution contained elements that catered to both Eads and Comstock by recognizing the value of levees in increasing volume and deepening the bed, but minimizing their overall importance by describing levees as "desirable, though not necessary" and



Brevet Major General Quincy Adams Gillmore, Member, Mississippi River Commission, 1879-1888. He served as president of the Commission from 1879-1882 and 1884-1888.

“pertinent, though perhaps not important” in improving navigation. The first resolution passed unanimously, with Comstock choosing to abstain. The second passed with only Eads registering a “no” vote.¹⁰²

Eads, cognizant that the important features of his plan—closing crevasses and outlets—remained in tact, eventually backed away somewhat from his attempt to secure language validating the importance of levees in fostering navigation and offered a compromise resolution of his own. While still expounding the necessity of closing crevasses and outlets, Eads gave up ground on the levee issue:

While it is not claimed that levees in themselves are absolutely necessary to securing an adequate navigation channel, it is believed that the repair and maintenance of the extensive lines already existing will materially hasten the development of the channel, which will be permanently located and deepened by the more important channel works, believed to be absolutely necessary to perfect the channel.

This compromise resolution did not go far enough to win over Comstock, Harrison, and Mitchell, but Gillmore supported the measure and pushed it through, temporarily resolving the matter in Eads' favor.¹⁰³

Plans of Improvement

Realizing the impossibility of fulfilling their obligation to develop a comprehensive river improvement plan after only six months of surveys and observations, the MRC members decided to exercise their authority under Section 5 of the originating legislation. That provision allowed the MRC to prepare and submit preliminary plans for “immediate works” to be eventually incorporated into the general system of improvement recommended once the necessary surveys were completed. In this way, the first MRC report reflected its vision for improving the river more than it represented a detailed plan of improvement.

In this report, the MRC indicated the preliminary nature of its analysis by conveying that, with the surveys and examinations of the river ongoing, the Commission was not prepared to submit a comprehensive report detailing the specifics involved in implementing a general system of improvements for the entire length of the Mississippi River. Despite this, the MRC indicated its unanimity for adopting the method of contracting the river “as the principal agent in securing the needed improvement in its navigation” and explained briefly Eads' theory on the relationship between current velocity and sediment suspension. Prior to fully describing the recommended system of contraction, however, the MRC felt compelled to discuss the “practicability, feasibility, and probable cost” of the various

systems of improvement embraced in the organic act creating the Commission.¹⁰⁴

The report examined the outlet system first. The MRC acknowledged that many engineers and experts, drawing upon observations of an immediate reduction in flood heights following a levee crevasse, advocated the use of both natural and artificial outlets as a method to lower flood heights. "This method would undoubtedly be effective," the report contended, "if the flood-waters of the Mississippi were not highly charged with sedimentary matters, which are held in suspension by the current." Clearly, the report reflected Eads' contentions that the river needed to maintain a higher velocity to transport suspended sediment; that dispersing water through outlets decreased the volume and velocity of the river below the point of dispersion; and that the loss of velocity minimized the ability of the current to suspend sediment, resulting in sediment deposits in the main channel below the outlet that harmed navigation. Those sediment deposits eventually enlarged into bars and a divided channel, once again leading to a split in the velocity of the river and causing sediment problems that extended further and further downstream.

Such a cycle of obstruction formation and decreased water flow posed a threat to navigation interests for obvious reasons, but the MRC also delved into the impact of dispersion on flood heights by expressing the conviction that, while outlets immediately lowered flood stages, the resultant accumulation of sediment actually raised the riverbed, decreased the cross section of the river, and robbed the channel of its ability to carry more water. Based on Eads' theory that concentrating floodwaters would allow the river to scour its bed deeper, eventually rendering levees useless, the MRC argued that all of the ramifications of dispersion would, in the end, necessitate higher levees. Reiterating at this point, the report concluded, "that no surer method of ultimately raising the flood surface of the river can be adopted than making lateral outlets for the escape of its flood waters."¹⁰⁵

Despite its firm stance against dispersion, the MRC stopped short of advocating the closure of all outlets. The Atchafalaya River represented a particularly complex problem to which the MRC was ill prepared to advance judgment. Because most of the other major tributary streams, with the exception of Cypress Creek and Bayou Lafourche, had been closed off by levees or deteriorated to the point of natural closure, the Atchafalaya River represented the most prominent remaining natural all-stage outlet for the Mississippi River by 1880, and the early MRC struggled with its treatment. It was not the first to do so, however, as efforts to reengineer the Atchafalaya River predated the MRC by nearly 50 years.



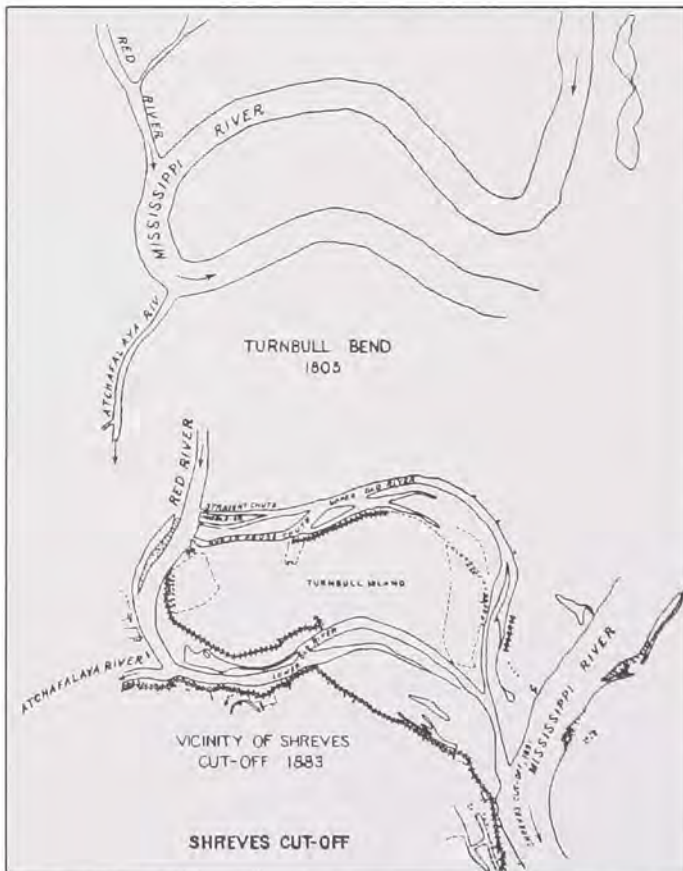
Tree snags, uncharted shoals, and other obstructions made navigation treacherous. The average lifespan of a steamer on the Mississippi River in the 1880s was only 18 months.

By the early 1800s, the Atchafalaya was also on its own path to natural closure, its mouth having been clogged by a raft of tree snags, driftwood, and other debris. This raft subsequently decreased the volume of water entering the Atchafalaya, and the river became smaller and smaller. At the beginning of the nineteenth century, the entrance to the Atchafalaya River was located directly on a large bend in the Mississippi River. The Red River entered the Mississippi River at the north end of the bend, known as Turnbull Bend, while the head of the Atchafalaya River, fed by the combined waters of the Mississippi and Red rivers, was situated at the south end. Conditions on the lower reaches of the Red River led to shoaling and to the formation of a large sandbar in the Mississippi River just below the junction of the two rivers. This sandbar severely hampered navigation through the bend. At the same time, the entrance to the Atchafalaya River became obstructed with a series of rafts formed by the accumulation of trees, limbs, and other debris.¹⁰⁶

In 1831, Henry Shreve, a famous civilian engineer, inventor of an improved snagboat, and head of the Corps of Engineers' Office of Western Improvements, executed an artificial cutoff across the neck of Turnbull Bend with the aim of shortening the Mississippi River, eliminating shoaling or silting at the mouth of the Red River, and increasing the volume of flow into the Atchafalaya to eliminate the raft. Shreve's Cutoff essentially transformed Turnbull Bend into Turnbull Island, with the two approaches

to the bend becoming the upper Old River and the lower Old River. The cutoff checked the growth of the raft, but did not eliminate it. Shreve's actions also played havoc on the dynamics of the three rivers and their relationship to one another. The lower Old River began to silt shut, with the Red feeding into the Mississippi through the upper Old River channel. This decreased the volume of flow into the Atchafalaya River and it continued to deteriorate. Furthermore, the new regimen of the Mississippi River unleashed by the cutoff promoted a tendency for the river to slowly meander eastward, away from its Old River link with the Atchafalaya.¹⁰⁷

Just prior to the Civil War, the State of Louisiana began removing the Atchafalaya raft to promote commerce on the river. With the raft cleared by 1860, the Atchafalaya reclaimed its status as the principal distributary stream of the Mississippi River. With the increase in the carrying capacity of the Atchafalaya and the slow eastward shift of the Mississippi, the Red River soon became the primary source of water for the Atchafalaya River and only spilled over into the Mississippi via the rapidly silting Old River



The relationship of the Mississippi, Red, and Atchafalaya Rivers before and after Shreve's cutoff.

during periods of flood. As such, the Old River became the focal point for plans of improvement. Navigation interests favored dredging Old River channel to keep the commercial link among the three rivers open, but some experts feared the Atchafalaya, being a shorter route to the Gulf, might someday capture the entire flow of the Mississippi River through the Old River. Followers of Eads' theories wanted the Old River channel closed, thereby eliminating the Atchafalaya as an outlet and the Red River as a tributary; yet many flood-control advocates opposed any such move, preferring instead to maintain the Old River as a functional outlet for Mississippi floodwaters.¹⁰⁸

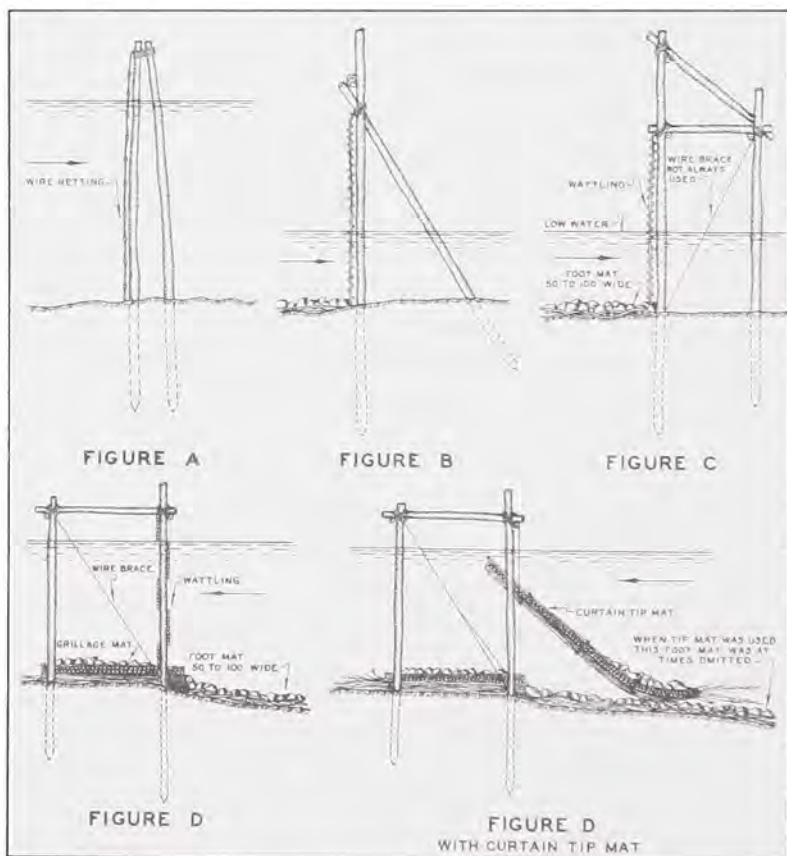
Wishing to learn more about the ramifications of tampering with the Old River, the MRC held back from proposing the closure of the Atchafalaya River as an outlet, instead choosing to await the results of ongoing investigations. Nonetheless, the MRC report indicated that, because the theory of dispersion was "diametrically opposed" to the contraction methods favored by the Commission, a system of outlets was impracticable. Holding this view, the MRC provided no cost estimate for the proposed system of improvement.¹⁰⁹

The preliminary report then moved into a discussion of the levee system. Not surprisingly, it again reflected Eads' influence, incorporating his theory that levees, by concentrating floodwaters and increasing the erosive power of the current, enlarged the carrying capacity of the river, possibly to the point where levees would no longer be needed to prevent floods. Because levees historically had been constructed for the sole purpose of protecting adjacent lands from inundation, the MRC, perhaps leery of getting trapped in a constitutional morass, felt compelled to point out that the prospect of relying on levees as a means of improving low-water navigation had never been officially proposed to Congress. To support the contention that levees, indeed, favorably impacted navigation, the report once again incorporated another of Eads' resolutions by conveying that when the levee system was in its "most perfect condition" during the 1850s, the channel was better suited for navigation than it was in 1880 following 25 years of crevasses and neglect.

The report stopped short of fully advocating the levee system as the solution to navigation problems; instead conveying Gillmore's compromise resolution referring to the levee system as a desirable, but unnecessary, auxiliary component to the low-water channel contraction. The MRC generally considered levees advantageous in that they prevented "destruction to life and property by overflow," gave "safety and ease to navigation," and promoted "commerce and trade." Even so, the members held them as an unnecessary adjunct to the low-water channel, because the plan of improvement recommended actually did not demand levees.

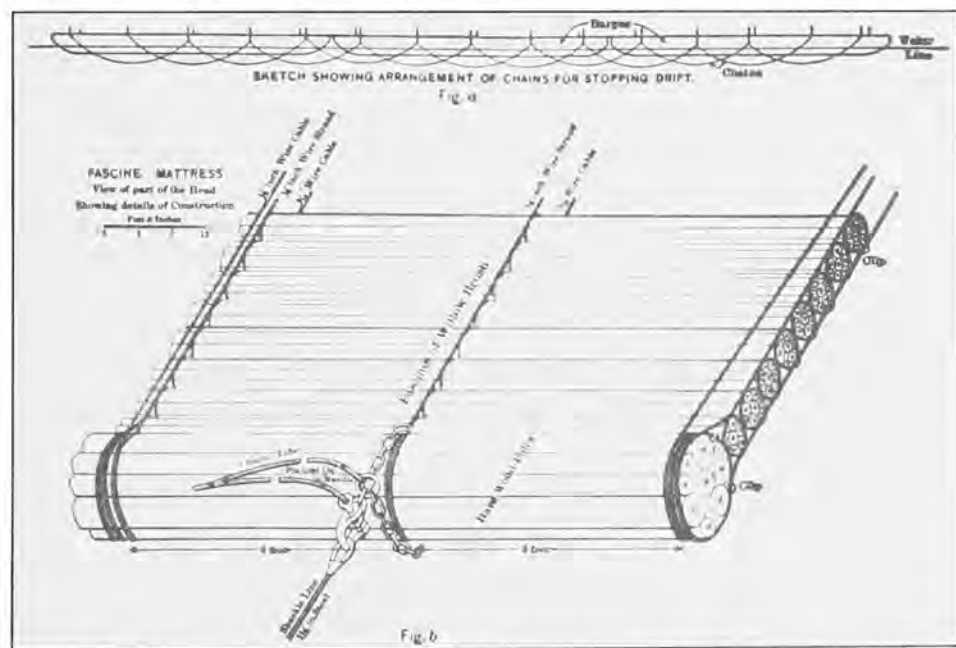
Nevertheless, the MRC report posited a cost estimate of \$2,020,000, spread over two years, for closing all gaps and crevasses and bringing them up to their former height. Even then, the MRC provided the disclaimer that closing gaps and restoring fractured levees to their former height would not prevent destructive floods.¹¹⁰

Having reported on the practicability and feasibility of both the outlet and the levee systems, the MRC proceeded to recommend the only unanimously agreed upon plan of improvement—contracting the channel where it was too wide and protecting the banks from caving to prevent the river from widening again. To that end, the MRC adopted an experimental plan designed to increase the velocity of the current in the 3,000-foot wide low-water channel in order to scour the riverbed deeper, a plan the members “presumed to be the plan referred to in the [originating] act as the ‘jetty system.’” At the same time, the plan also called for measures to decrease the velocity of the current on the margins of the channel to build up new banks and shorelines.



Contraction works used by the MRC in the Plum Point Reach between 1881 and 1884.

The first step necessitated the closure of all side channels and chutes to increase the volume of flow during periods of low water. These were to be closed by brush or stone dams, with a preference for the former, as they were less expensive. The second step called for the construction of a series of perpendicular contraction works extending from the existing banks of the river and ending at the outer limits of the proposed channel width. According to the MRC theory, these lightweight permeable structures would sufficiently check the current to induce a deposit of silt, eventually burying the structure and creating silting basins that would grow into a new riverbank. If properly protected from erosion and caving, the new riverbank would confine flows to the low-water channel and increase the depth of the channel through riverbed scour. The MRC proposed to begin this work at six reaches of particularly difficult navigation along the lower Mississippi River, and estimated the cost of the program at \$5,333,000 for the first year, including \$1,010,000 for closing existing gaps in the levee system as a means of improving navigation.¹¹¹



Sketch of a fascine mattress revetment used by the MRC to protect the riverbank.

Despite efforts by Eads, Gillmore, and Mitchell to seek consensus by offering resolutions to satisfy individual convictions, all of which were embodied in the final report, two members—Comstock and Harrison—withheld their signatures and filed a minority report. Based on the highly technical nature of that report, Comstock was the likely author, with Harrison concurring out of convenience, given his stated opposition to

federal involvement with levee issues and flood control. The two dissenters expressed support for contracting the low-water channel, which indicated that they shared the majority view of levees as essential measure of flood protection and agreed "that outlets in general should not be used." They did not concur, however, on many other important issues.¹¹²

First, the two did not share the majority view of the value of closing the gaps in levees as means of improving low-water navigation. In a direct rebuke of Eads' theory, Comstock and Harrison contended, "Contraction must be effected by works in the bed of the river, and not by levees on top of its banks, out of contact with the low-water river."¹¹³ In this way, they argued that low-water contraction works and bank revetment benefited levees, but not the converse. Instead, they believed closing the gaps in levees only assisted in preventing destructive floods. They also questioned whether bringing the channel to a uniform depth and width would ultimately reduce the risk of flood.

Comstock and Harrison also dissented on the cutoff issue. As part of the recommended plan of improvement, the majority report supported measures to fix and maintain the channel at its existing location, thereby prohibiting any attempts to straighten and shorten the river through cutting off its numerous bends. As with the MRC, though, contemporary opinion regarding cutoffs was divided. Some navigation proponents favored cutoffs as a way to shorten the traveling distance for waterborne vessels; others believed the river would compensate for its loss in length by creating new bends elsewhere. Likewise, some flood-control advocates believed cutoffs benefited flood protection efforts by allowing floodwaters to discharge more quickly to the Gulf; others argued that cutoffs would only exacerbate the problem downriver by piling up floodwaters below. Still others, reflecting the evolving science on the subject, changed their stance over the years.

Evidence of the latter is found in Eads' actions between 1876 and 1880. In 1876, he advocated judiciously cutting off several bends to lower flood heights, but two years later backtracked in a lecture on his plan before the St. Louis Merchant's Exchange, stating, "No cut-offs nor straightening of the river was suggested, nor would any be needed." Eads, having signed onto the majority report, apparently abandoned the cutoff concept permanently. Comstock and Harrison, on the other hand, found merit in the argument that cutoffs lowered flood heights, but appreciated concerns that the river might attempt to regain its length by creating new bends. To this end, their minority report indicated that they were "not prepared to absolutely reject" cutoffs as a method of lowering flood heights if the banks immediately above and below the cutoff site were properly revetted to keep the river from creating new bends.¹¹⁴

Whether the minority report hindered the adoption of Eads' levee-based flood-control program is unclear. The MRC unquestionably saw the value of levees in protecting adjacent property from overflow, but the discussion of the levee system took place separately from the discussion on the recommended plan for improving navigation through river regulation. As a result, the MRC only halfheartedly supported an incomplete flood-control plan that, by its own admission would not protect against more devastating floods. But the flood-control issue was far from dead. Immediately after issuing the preliminary report, the MRC established the Committee on Outlets and Levees, which included Harrod and Suter, to examine the topics further.

While the Committee on Outlets and Levees conducted its analysis, the MRC completed its mission to recommend a plan of improvement for the entire Mississippi River by filing two reports covering the Mississippi River above Cairo. The first report on the upper Mississippi River dealt exclusively with that segment above the mouth of the Illinois River, where the Corps of Engineers was already implementing stone and brush contraction works. The MRC endorsed these efforts, stating "the system of works now in progress... with the modification which experience will suggest, is adequate for the improvement of navigation and should be pushed rapidly to completion." The next MRC report focused on the Mississippi River between the mouths of the Missouri and Ohio rivers. This stretch of the river, too, was under an existing regimen of improvement based on bank revetment and contraction by permeable dikes. Because the ongoing work reflected an identical method of improvement advanced by the MRC, the Commission adopted the existing project. "The success of Captain Ernst's [officer in charge] works thus far," the MRC concluded, "justifies in our opinion, the methods he has employed and we are of the opinion that it should be pushed toward completion under liberal appropriations." Significantly, the MRC only advanced navigation improvement plans for the upper Mississippi River and made no attempt to recommend measures of flood protection. Flood-control advocates along the entire river would have to wait for the findings of the MRC Committee on Outlets and Levees to see which flood protection measures the Commission would recommend for adoption.¹¹⁵

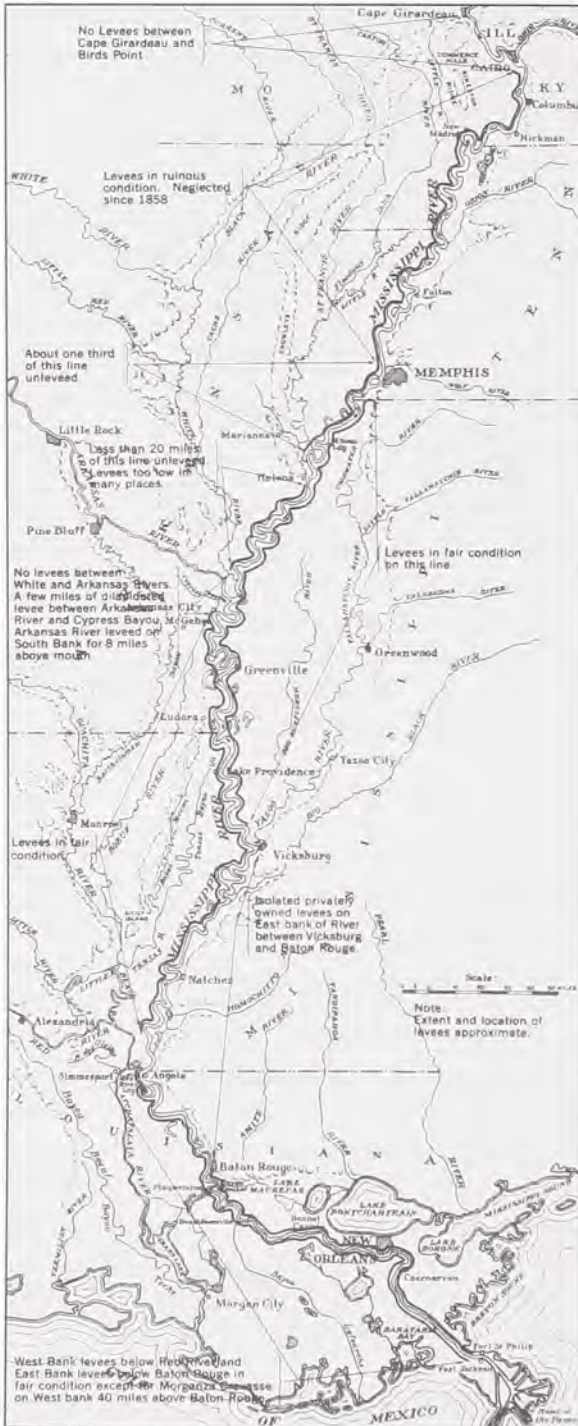
Chapter 5

Myths and Realities of Levees-Only

The Mississippi River Commission traditionally has drawn sharp criticism for blindly and hastily adopting a “levees-only” flood-control policy in 1880; an approach that committed the agency to the use of levees exclusively in its efforts to protect the lower valley from the ravages of Mississippi River floodwaters.¹¹⁶ The greater truth is more complex. The history of the Commission’s first two decades gives overwhelming evidence to that greater truth and illuminates the long-standing need for a reassessment of its flood-control policies. If the MRC was guilty of anything in the 1880s, that guilt lay not in developing a ruinous flood-control plan, but in the Commission’s failure to secure congressional support to move beyond navigation improvements and advance meaningful federal flood-control plans. The resulting program was not so much a “levees-only” approach, as it was a policy initially geared toward restraining average floods to benefit navigation; a policy of “restraint in the interest of navigation” that would allow immense floods to continually ravage surrounding lands.

Levees-Only versus Levees-Only

From a historical perspective, “levees-only” was both an engineering technique and an attitude. By definition it was confinement—confinement with a view toward enlarging the carrying capacity of the channel and protecting adjacent lands from destructive floods. The policy set forth by the MRC in 1880 fell well short of a so-called “levees-only” policy in several ways. The majority of its members certainly advocated connecting the existing levee system by closing gaps and crevasses as a means of improving navigation, but while admitting that levees protected lands from overflow, the MRC did not recommend raising levees above their existing height. By its own admission, those existing heights would not provide for the “absolute protection of destructive floods.” On this topic, the MRC tasked its internal Committee on Outlets and Levees to study the advisability of raising levees higher. The MRC also generally opposed artificial outlets as injurious to navigation, but deferred action on closing the Atchafalaya and other natural outlets, namely the rapidly deteriorating Bayou Lafourche and Cypress Creek, at the head of the Tensas and Boeuf basins, pending further examination of its Committee on Outlets and Levees. While the MRC eventually consented to the closure of Bayou Lafourche in 1904 and Cypress Creek in 1920, the Atchafalaya remained



The levee system in 1886.

as a vital natural outlet. In this manner, many viewed that initial MRC policy in the same vein as the *Report upon the Physics and Hydraulics of the Mississippi River* and the Warren Commission — as “levees-only,” supplemented by a great natural outlet.¹¹⁷

Late in 1880, the MRC also examined the potential role of reservoirs in larger scheme of improving the river. The MRC quickly dismissed the flood-control capabilities of structural reservoirs on the tributaries of the river — stating, “it would be hopeless to look for any appreciable mitigation of the violence of floods from this or any other system of reservoirs yet proposed” — before discussing in some length and detail the influences of reservoirs on low-water navigation. This indictment of structural reservoirs for flood-control purposes, though, sheds light on an important but rarely discussed component of the MRC’s flood-control policy—the use of backwater storage.¹¹⁸

Prior to the construction of the levee system, the backwater areas were no different than most

lands comprising the alluvial valley. They flooded when the river overflowed its banks; although having a lower elevation, they were inundated at a comparably deeper depth for a comparatively longer time period. As levees on the Mississippi River were extended up the river, it was necessary to leave gaps to accommodate the inflow of tributary streams and rivers. The resultant confinement of floodwaters protected lands upriver from the backwater areas by preventing overbank flows from inundating the backwater areas from above. But depending on the height of the confined floodwaters and the discharge of tributary rivers, Mississippi River floods backed up through the gaps in the levees into the mouths of the tributary rivers, blocking the outflow of the streams and causing waters to back up (hence, the reference to backwater). This caused more acreage in the backwater areas to be flooded than before and at greater depths. In this regard, the backwater areas functioned as natural tributary reservoirs in a relatively flat region where structural reservoirs were deemed difficult, if not impossible, to construct at that time. By recognizing this and by not trying to redeem the backwater areas from floods, the MRC effectively advocated a nonstructural approach to storing tributary discharges during floods.¹¹⁹

These examples underscore the popular misconceptions of the MRC's initial recommendations and highlight the difficulty in labeling those recommendations "levees-only." From a structural engineering standpoint, the MRC policy reflected a conservative "levees-only" approach—levees only in that levees represented the only structural approach, in lieu of man-made outlets and reservoirs; conservative in that the levees were only envisioned to protect against frequent and moderate floods, but not less frequent destructive floods. As a nonstructural engineering technique though, the MRC plan in many respects resembled the comprehensive plan advanced by Ellet in 1852. Both recognized the need to improve the existing levee system; both provided for outlets to accommodate excess discharge; both took a stance against cutoffs; and both recognized the importance of storing tributary flows, although neither the MRC's backwater storage or Ellet's reservoirs offered significant relief from flooding.

In this light, the historical application of "levees-only" as a criticism of the MRC can only be used properly in the context of the evolution of an attitude—an unyielding, perhaps dogmatic, belief that levees were the only necessary structural means to prevent all destructive floods, despite advancements in hydraulic knowledge over time that shed light on the feasibility and practicality of alternative structural methods as adjuncts to the levee system. The true force behind the gradual evolution of this attitude did not rest upon inept engineering practices; rather it was shaped by

social, political and economic realities—a complex combination of forces that favored the adoption of a short-term solution to a long-term problem.

Restraint in the Interest of Navigation

The original members of the MRC, with the exception of Harrison for non-engineering reasons, undoubtedly advocated levees over alternative structural approaches to flood control. This became more evident in light of the Commission's stance that "the permanent maintenance of connected levee system of sufficient strength to inspire confidence in its efficiency" to the point "that overflow need no longer be seriously apprehended would act as a prompt and powerful stimulant in rapidly developing a largely increased trade and commerce" for the region. Despite this clearly expressed conviction, the MRC posited only a conservative and incomplete flood-control program designed to protect against more frequent floods, while still allowing less frequent but more severe floods to inundate the valley.¹²⁰

There are several factors underlying the MRC's maturation of such a plan. First, a majority of its members may have believed, as Eads did, that the scouring influence of the levees on the bed of the river during floods might have increased the capacity of the channel to carry floodwaters to the point that levees would be unnecessary in the future to control flooding. This belief found encouragement in the fall of 1881 when the MRC completed a study of the Mississippi's riverbed after conducting 83 borings, many of which exceeded 200 feet in depth. In the *Report upon the Physics and Hydraulics of the Mississippi River*, Humphreys and Abbot theorized that the bed of the Mississippi River consisted of layers of tenacious blue clay that would resist almost indefinitely the corrosive actions of the current. The MRC, however, found no evidence of a clay bed at any point along the lower Mississippi River and concluded that from an engineering point of view, "this conclusion . . . is extremely important, and removes one of the greatest of the difficulties which it had been apprehended would interfere with the thorough and complete improvement of the river."¹²¹

Second, the MRC was clearly cognizant of the lingering constitutional debate over the federalization of flood control, which had manifested itself during the partisan wrangling throughout the political process of creating the MRC and continued to stir debate in Congress and elsewhere. In fact, federal lawmakers had long refused to support authorizations for levee work in the delta, even in the face of recommendations by its own authorized experts, including Ellet, Humphreys, and the Warren Commission, all of whom had advocated large federal expenditures for the protection of adjacent lands from overflow.¹²²

Harrison, of course, shared the view that such expenditures were inappropriate, and his position drew unwanted attention in the spring of 1880 as flood-control advocates in Congress moved to silence him. On April 5,



Benjamin Harrison, Member, Mississippi River Commission, 1879-1881. He later served as the 23rd President of the United States from 1889-1893.

1880, Congressman Randall Gibson of Louisiana introduced a bill to reorganize the MRC by reducing its membership to six with only two civilian appointees, both of whom were required to be civil engineers. Harrison, the only member who was not an engineer, rightly interpreted this as an attempt to facilitate his removal, and he enlisted the support of his powerful friends in the House. His allies, led by Congressmen James Garfield of Ohio and Thomas Browne of Indiana, prevented the bill's passage. Even so, Harrison resigned from the MRC less than a year later, ostensibly to make a run for the U.S. Senate. Following his resignation, Hayes appointed Judge Robert Stewart Taylor to fill the vacancy. A close associate of Eads, Taylor would prove more amenable to the implementation of a comprehensive levee system.¹²³



Judge Robert Stewart Taylor, Member, Mississippi River Commission, 1881-1914.

While flood-control advocates in Congress sought to silence Harrison and win consensus within the MRC, opponents of federal flood control attacked the Commission for its efforts at levee improvements. Despite language contained in the originating legislation specifying the MRC's responsibilities to develop plans to "prevent destructive floods," a powerful congressional bloc successfully adopted a provider in the 1881 MRC appropriation prohibiting the Commission from using federal funds to repair or construct "levees for the purpose of preventing injury to lands by overflow or for any other

purpose whatever, except as a means of deepening or improving the channel." This provider, contained in every MRC appropriation until 1890, effectively excluded flood control from the general plan of improvement for the Mississippi River and limited the jurisdiction of the MRC to the bed and banks of the river.¹²⁴

With this provider, Congress also sent a clear message to the MRC and the people of the Mississippi Valley—congressional support for large federal expenditures for flood control remained as apathetic as it was during the days of Ellet and Humphreys. The restriction, and the reality it conveyed—that the MRC was not free to develop policy based on science—certainly had an impact on the Commission's decision-making processes. The first MRC report following the legislation shied away from discussing the necessity of levees as a means to prevent destructive floods, "The importance to be attached to that object is a matter wholly within the discretion of Congress, and not suitable to be discussed here." The MRC clearly had abandoned the concept of flood control for the time being.¹²⁵

Floods in 1881 and 1882, though, prompted the MRC to reevaluate its stance. The strain on the levees resulting from repeated flooding had nearly exhausted the financial resources of local authorities. On August 15, 1882, delegates from various levee districts in Arkansas, Louisiana, and Mississippi attended the 64th session of the MRC to plead for federal assistance. Most prominent among them was William Alexander Percy, an ex-Confederate colonel who helped to reorganize Mississippi levee districts following the Civil War. Aware "that the Commission looked especially to the interests of navigation," Percy expressed the importance of the levees to the people of the valley and pressed the MRC to do what it could to protect their lands. He and the other delegates then furnished the MRC with estimates for the cubic yards of earth needed to repair the levees and the financial resources the levee districts could put forth toward completing the work. This sum represented only \$430,000 of an estimated \$1.66 million needed to fund the repairs.¹²⁶

Senator L. Q. C. Lamar of Mississippi, the Senate sponsor of the bill that created the MRC, also attended the session, and he reminded the members of their navigation priorities and warned them that any levee work "should first be built where obstructions to navigation are greatest." Even so, the MRC moved to satisfy Percy's plea. Three days later, Harrod offered a resolution calling for the MRC to allot \$1.3 million for closing existing gaps and crevasses in the levee system, bringing "them all to former grade in conjunction with the assistance rendered by the States." In direct contrast to a "levees-only" philosophy, Harrod also suggested "leaving a sufficient opening for the natural drainage and also for accidental overflow."¹²⁷



Flood of 1882; overflowed areas in the alluvial valley.

The MRC unanimously adopted Harrod's resolution and adjourned from its meeting, only to be called back into session by Gillmore ten days later. Gillmore informed his fellow members that Secretary of War Robert T. Lincoln (the only surviving son of President Abraham Lincoln) questioned whether the resolution met the provisions of the law requiring "that levees shall only be built with a view to benefiting navigation and deepening the channel." Harrod then offered another resolution indicating that, in the judgment of the MRC, "the repairing and building of levees" as posted in the resolution, "should be done as a part of the plan of the Commission to afford ease and safety to the navigation and commerce" of the river "and the plans proposed ...were made in pursuance" of those objectives. The resolution passed with Comstock in opposition. Later, Judge Taylor forwarded another resolution tasking the MRC Committee on Outlets and Levees to determine "whether or not in their opinion it is

practicable to adopt and carry out a plan in the construction of levees as part of the general system of channel improvement."¹²⁸

In November 1882, Harrod, Suter and Mitchell issued the report of the MRC Committee on Outlets and Levees. Regarding outlets, the committee reiterated an earlier recommendation for closing all-stage outlets only where "they are directly connected with the improvement and maintenance of navigation." Instead of closing the Atchafalaya River, they proposed to keep it open by constructing a low-sill, brush dam across Old River to check the enlargement of the outlet. As for Taylor's September resolution, the committee recommended a levee plan "where such structures may be required for the improvement of navigation, by the adoption of a standard of elevation sufficient to confine all ordinary floods." While this standard elevation, known as the 1882 grade, "would produce the maximum effect in channel improvement at the minimum cost," the committee members warned that the higher levees "would not be of sufficient height to protect the adjacent lands from overflow during great floods."¹²⁹

While the MRC continued to agonize over the level of flood protection to be provided by levees, the recommendation from the Committee on Outlets and Levees formed the basis of the Commission's incomplete flood-control plan for the next decade: restraint of ordinary floods by levees in the interest of navigation.¹³⁰ From time to time, the MRC successfully convinced the federal legislature to raise the standard height governing levees, but it was not able to prompt Congress into recognizing flood control as a logical component of the general plan of improvement for the river. To that end, no matter what policy the MRC advocated, flood control was to remain secondary in importance to navigation improvements. The policy of "restraint in the interest of navigation," therefore, was an incomplete policy shaped by legislative apathy and internal disagreements within the MRC—a policy that fell short of adequately meeting the needs of the people along the valley.

It also fell short of the "levees-only" policy championed by Eads. The MRC's refusal to close all of the major all-stage outlets stymied Eads' plan to increase the carrying capacity of the



Samuel Wragg Ferguson, Member, Mississippi River Commission, 1883-1890. A former Chief Engineer for the Mississippi Levee District, Ferguson replaced Eads on the Commission. *Mississippi Levee Board*.

channel through erosion of its bed. Suffering from poor health and busily pursuing other interests, an increasingly disinterested Eads, believing that the MRC plan was not "levees-only" enough to do the job, resigned from the Commission in the spring of 1883 and then publicly admonished its remaining members. In a letter to Louisiana Governor Samuel D. McEnery, Eads warned landowners along the lower valley "not to lose sight of the facts" and complained, "the improvement contemplated by Congress, has reference solely to THE NAVIGATION OF THE RIVER, and not to the protection of its alluvial lands..."¹³¹

But that would change by the late 1890s. Hampered by fiscal, legal, and political constraints, the MRC initiated a slow retreat into a true "levees-only" policy, having backed into that approach with the assistance of the federal legislature and lower valley interests. While its reliance on the Atchafalaya River as an outlet and the backwater areas as natural reservoirs continued, the MRC adopted a stubborn defense of levees as the only structural solution to flood control, while abandoning the scientific debate over alternative solutions that characterized the Commission's early years. A changing of the guard within the MRC facilitated this process.

Chapter 6

Early Struggles

James Eads' abrupt departure from the Mississippi River Commission did not diminish the support for his view that a comprehensive levee system would contribute to the deepening of the channel and, ultimately, a lowering of the floodplain. The MRC majority held that theory as the principle premise of the policy of restraint in the interest of navigation. The river, though, refused to cooperate. To the MRC's considerable dismay, gauge readings from floods in 1882, 1883, and 1884 seemed to indicate that flood heights on the river were rising, challenging Eads' theory. Still, there was little consensus among its members over how best to interpret these readings. Comstock and Mitchell blamed levee construction for the rise in the flood surface. Gillmore and the rest of the MRC attributed the rise to the closing of outlets and discussed plans to delay any work at the largest Mississippi River outlets—the Atchafalaya River, Cypress Creek, and Bayou Lafourche. Whatever the cause, these higher readings did not lead the MRC to reevaluate its policy of restraint in the interest of navigation. Instead, the members, with the exception of Comstock and Mitchell, generally agreed that the problem would be ameliorated over time as the river gradually deepened its bed. For the interim, the majority



Levee crevasse at Bonnet Carré, Louisiana.

recommended raising the levees along the lower portions of the river to a provisional 1882 grade, which would accommodate a comparable discharge of the 1882 flood with a three-foot safety margin.¹³²

As the members of the MRC struggled to develop and implement policy based on scientific principles, they found themselves severely handicapped by fiscal and political constraints. Appropriations averaged only \$1.9 million a year through 1899—as Congress refused to appropriate monies on a scale appropriate to the task—and the congressional coalition of flood-control and navigation interests collapsed, isolating the MRC while increasing its reliance on a comparatively small group of flood-control advocates in Congress. Almost without exception, those flood-control advocates opposed costly alternative flood-control methods and insisted on the immediate improvement of the levee system. The MRC could ill afford to alienate its strongest allies and found itself slowly gravitating toward a compatible solution. Through these early struggles, the MRC gradually awakened to the reality that it could not and did not function independently. It relied upon outside forces for its funding and jurisdiction; therefore it could not enact its policies on science alone.

Breakdown of the Coalition

Congressional flood-control advocates enjoyed considerable success in the five years after the creation of House Committee on Levees in 1875. Together with navigation interests, they secured the establishment of the MRC and oversaw its endorsement of the levee system. They next sought to initiate a comprehensive and federally subsidized levee program for the lower Mississippi River, but their hopes for the early inauguration of such a program were soon dashed. Shortly after the MRC's establishment in 1879, the congressional coalition responsible for its creation began to weaken. From its inception, this alliance between flood-control and navigation interests was tenuous and strained, and by the spring of 1880 the two interests were moving apart. As the coalition deteriorated, so did the broad-based support necessary for implementing an extensive federal navigation and flood-control program for the lower Mississippi River.

More than any other factor, a debate over House rules revisions drove a wedge between flood-control and navigation interests. In early 1880, the House Committee on Levees sought to increase its control over the spending apparatus in Congress by acquiring the authority to introduce appropriation measures for both the MRC and improvements along the Mississippi River directly to the House. According to precedent, only two House committees enjoyed that privilege—the Committee on Appropriations and the Committee on Commerce, although the latter exercised its authority only with regard to the annual rivers and harbors bill. Under

contemporary rules, either committee could “strangle a bill, however important it may be, and prevent its consideration, although a majority of the House might be anxious to pass it.”¹³³

In early January 1880, an opportunity for change presented itself. The Committee on Rules had been assigned the task of modernizing the tangled mass of House rules. After months of preparation, the committee presented its proposed revisions to the House. Included among these revisions were several changes of adverse significance for the House Committee on Levees and, consequently, the MRC. As Speaker of the House, chair of the House Rules Committee, and former chair of the Committee on Appropriations, Samuel J. Randall played a leading role in the formation of this resolution, which reflected a greater fiscal conservatism than had the earlier



Congressman Samuel Jackson Randall of Pennsylvania. He served as Speaker of the House from 1875-1880. *Brady-Handy Photograph Collection (Library of Congress)*

House rules. Significantly, the resolution required all appropriation bills to be directed to the Committee on Appropriations for approval before they were presented to the whole House. This change was directed especially at the Committee on Commerce, which had won the right to present river and harbor bills directly to the House in 1816. By 1866, that right was firmly established, and between that year and 1879, the Committee on Commerce reported 14 annual bills for the improvement of rivers and harbors.¹³⁴

Over that same 14-year period, the Committee on Commerce had developed a degree of notoriety for employing logrolling tactics to facilitate the passage of these river and harbor bills. Typically, they were introduced under a suspension of the rules and without debate, and members of Congress would be required to vote without having the opportunity to amend or to make changes to the bill. Not surprisingly, charges of pork barrel often accompanied these bills, and properly so. While the river and harbor bills included appropriations for improvements to the nation's major waterways—including the Mississippi River—they also included questionable allocations for improvements to minor creeks, streams, and “frog ponds.” Speaker Randall was among those who believed that “the amounts appropriated heretofore have been in excess of the public requirements,” and that the “Committee on Appropriations should say practically how much money should be appropriated in a given year for

rivers and harbors." The proposed revisions to the House rules were designed to do just that.¹³⁵

The revisions adversely affected the House Committee on Levees as well. Rule 10 of the proposed revisions, which set the number of congressmen appointed to each committee, reduced the number of congressmen on the Committee on Levees from 13 to 11, signifying a decline in the relative importance of the committee. Rule 11, which specified the jurisdiction of each committee, was left undefined for the House Committee on Levees. The Committee on Rules had been unable to agree as to what should constitute the scope, power, and duties of Committee on Levees and had left that decision to the discretion of the whole House.¹³⁶

This provided flood-control advocates with an opportunity to expand the authority of the House Committee on Levees, and they endeavored to do so. During the ensuing debate, the leading members of that committee offered three crucial amendments. The first would have restored the number of congressmen on the committee to 13; the second would have extended the jurisdiction of the committee to include the tributaries of the Mississippi River; the third, and most significant amendment, would have granted the committee the privilege of presenting its appropriation measures directly to the House. After very little debate, though, all three of these amendments failed, and the House Committee on Levees secured only a narrow jurisdiction over "the levees of the Mississippi River."¹³⁷

Under the final House rule changes adopted in 1880, the Commerce



Congressman John Henninger Reagan of Texas. He served as the Chairman of the House Committee on Commerce from 1877-1886, before being elected a U.S. Senator. *Brady-Handy Photograph Collection (Library of Congress)*

Committee maintained control over appropriations for the MRC. Under its own bylaws, the Commission was responsible for developing plans both for improving navigation and for securing the river's banks from overflows, but the Commerce Committee was concerned exclusively with navigation issues and generally opposed appropriations for flood-control works.¹³⁸ Furthermore, the powerful chairman of that committee, John H. Reagan of Texas, did not champion levee building along the lower Mississippi River. While not opposed to Mississippi River improvements, *per se*, Reagan catered to broader interests and was unable to give adequate time and

care to the consideration of the Mississippi River and its tributaries. The annual rivers and harbors bills were controversial and required considerable energy to maneuver through Congress. Chiefly, the members of that committee were motivated to spread the wealth as thinly as possible, in order both to maximize the number of congressmen who would have an interest in the passage of the bill and to minimize the final appropriation. If the appropriations for the annual rivers and harbors bill were too large, it would provoke undue opposition; if too few districts were represented, there would be insufficient support for passage. As such, large appropriations for the lower Mississippi River were an anathema in that they would threaten the passage of the entire bill.

As a result of this, Reagan became a proponent of the less expensive artificial outlet system for the lower Mississippi River. Just as Robertson and Gibson of the House Committee on Levees turned to Eads's technical expertise for vindication of their views, Reagan looked to Captain John Cowden. The nation's leading advocate of the outlet system, Cowden insisted that dispersion was far superior to confinement by levees. In a report addressed to Reagan and printed by the House Commerce Committee, Cowden compared his plan with Eads' levee-based plan:

Levees, by all experience, raise the water and overflow the country, require fifty millions to start with, and no definite time for completion. Outlets, as demonstrated, do lower the water, and require \$250,000 for a satisfactory practical test, and some ten millions to carry out the whole plan for river improvement and the reclamation of its now unproductive and comparatively worthless forty million acres of lowlands in about three years time.¹³⁹

By aligning itself with reclamation advocates and dismissing outlets in 1880, the MRC found itself at odds with the chair of the congressional committee responsible for its appropriations, and the chief contention between the two was among the most fundamental of policy issues. Together, these many factors handicapped the MRC's ability to secure the appropriations necessary to implement its new policies. The defeat of the House Committee on Levees in its effort to secure greater control over its funding and to extend its jurisdiction, therefore, was a setback for the MRC, as future appropriations for that organization would be scrutinized by others than those most friendly to the needs of the lower Mississippi Valley.

Fiscal and Legal Constraints

In its preliminary report in 1880, the MRC proposed to begin contraction and revetment work at six reaches of particularly difficult navigation along the lower Mississippi River. Each of these reaches—New Madrid, Plum Point, Memphis, Helena, Choctaw Bend, and Lake Providence—suffered from excessive channel widths, shallow depths, and shifting bars and were considered excellent locations for testing the proposed contraction works. The MRC also made plans to close all breaks in the existing system of levees between Cairo and New Orleans. Their report estimated the cost of such a program at \$5,333,000 for the first year, including \$1,010,00 for closing existing gaps in the levee system. While requesting that amount, the House Committee on Levees, the Chief of Engineers, and two leading members of the MRC intimated that the bare minimum necessary to begin work was \$1.8 million. Following lengthy deliberations, the Commerce Committee presented its annual rivers and harbors bill to the House in February 1881. It included an appropriation of only \$1 million for the MRC, or just more than half of the minimum appropriation requested.¹⁴⁰

Even this relatively small appropriation was placed in jeopardy, as negative attention quickly focused on the special appropriation for the MRC. Significantly, two of the original members of the congressional coalition responsible for the creation of the MRC were among the most prominent of those who opposed the appropriation, providing further evidence of the growing schism between navigation and flood-control interests. Massachusetts Congressman George D. Robinson, a member of the House Committee on Levees in the 45th Congress, believed that a large appropriation for the MRC was premature. He reminded his colleagues that during the debate over the bill to create the MRC, “it was then said that Congress was not or would not be called upon to expend any money by that bill, nor would it be called upon for that purpose until the ‘plan’ proposed by that commission should be brought back for consideration by Congress and fully decided upon after debate.” According to Robinson, these conditions had not been met. The “plan” proposed by the MRC was preliminary only, and even then the Commission was not unanimous in its support, with two of its members having filed a minority report. Additionally, Congress typically passed rivers and harbors bills under a suspension of rules that limited debate. As a result, Robinson proposed “this great question come in here by a separate bill and let the plan be considered in this House *pro* and *con*.” Congressman Joseph R. Hawley had also advocated the creation of the MRC but expressed dismay with the “little, brief, imperfect, and practically useless report” offered by the Commission as justification of its new policy. Asserting that the MRC had failed to distin-

guish properly between the two classes of improvements—those for navigation and those for flood control—Hawley concluded, “I am not willing to vote even \$100,000 with this meager scrap of information before me.”¹⁴¹

Opponents also attacked the MRC preliminary recommendation to repair the levee system and incorporate it into the general plan of improvement, based mostly on concerns that the costs of such a program would be excessive. Republican Congressman Benjamin F. Marsh of Illinois objected to the commitment of federal funds for the construction and repair of Mississippi levees. Citing the “coincidence between an appropriation of \$1,000,000 in this bill and the \$1,010,000 proposed in the plan... [for] filling up levee gaps,” he sought assurances that the MRC appropriation in the rivers and harbors bill would not be used for levee works constructed to protect private property from overflow. Likewise, Congressman Robinson feared that Congress, by authorizing this initial appropriation, would be sanctioning a flood-control policy that might ultimately require “an appropriation of \$50,000,000 or more.” Another opponent, Congressman James H. Blount of Georgia, agreed that the cost of such a program would be excessive and related a conversation that he had recently had with a member of the MRC. According to Blount, one MRC member had informed him that their plan “in the course of ten years would cover at least an expenditure of one hundred millions of dollars.” That same unnamed member added insult to injury by suggesting that the MRC “did not consider the matter [of MRC policy] was under the control of Congress at all.”¹⁴²

In the face of growing opposition, the MRC’s supporters in Congress found themselves on the defensive. Confronted with the prospect of losing the entire MRC appropriation, Robertson and Gibson proposed a compromise. In exchange for passing the appropriation recommended by the Committee on Commerce, Robertson offered to restrict the MRC in its use of the allocation so that “not one dollar of it shall be applied to building a levee.” The opposition accepted Robertson’s concession and began drafting providers to achieve that propose. Several days later, the House adopted a version proposed by Robinson. It read in part, “that no portion of the sum hereby appropriated shall be used in the repair or construction of levees for the purpose of preventing injury to lands by overflow or for any other purpose whatever, except as a means of deepening or improving the channel of said river.” On February 17, the House passed the 1881 rivers and harbors bill by a comfortable margin.¹⁴³

Senate debate began the next day and continued for two weeks. Once again, the MRC appropriation attracted unwanted attention. Senator John A. Logan of Illinois opposed the appropriation, arguing that the provider

adopted in the House fell short of its purpose. The final clause, "except as a means of deepening or improving the channel of said river," left the entire matter to the discretion of the Commission, in that the MRC could construct levees as a means of deepening or improving the channel. With barely half of the senators in attendance, Logan's proposal to strike that clause from the provider failed. The bill was approved moments later with only 32 favorable votes. On March 3, the final day of his presidency, Hayes signed into law the 1881 rivers and harbors bill, which included only a \$1 million appropriation for the MRC.¹⁴⁴

While that appropriation helped to validate the permanency of the MRC and to give evidence that, at some level at least, financial support would continue, few among the flood-control advocates in Congress could consider it a success. First, the \$1 million appropriation was too small, representing less than one-fifth the sum requested by the MRC and ensuring that financial constraints would play an important role in restricting MRC's activities over the next year. More important, Congress had established a precedent of under-appropriating the MRC, a practice that would continue for the rest of the decade, plaguing the MRC's efforts to regulate the lower Mississippi River. Second, by acquiescing to the provider, Congress placed additional restrictions on the development of MRC policy, and not just for the following year. That provider, in slightly modified form, appeared in every MRC appropriation up to 1890.

The smaller than anticipated appropriation for 1881 also forced the MRC to scale back its plans for the year. Of the six trouble spots selected for improvement in the preliminary report, the MRC decided to limit its work to the two most treacherous reaches: Plum Point and Lake Providence. Preparatory work began in those two regions while the Commission continued its analysis of the lower valley. By the fall of 1881, the MRC completed its estimate for the projected cost of the recommended works along the length of the Mississippi River from Cairo to the Gulf. It approached the staggering figure of \$33 million, dashing forever more conservative estimates.¹⁴⁵

By the spring of 1882, the entire alluvial area from Cape Girardeau to the Gulf of Mexico was inundated by what was perhaps the most destructive flood in the history of the Mississippi Valley in terms of acres inundated. The non-federally constructed levees protecting the valley failed or were overtopped at 284 different locations, reflecting their complete inadequacy. The rising water, which began in November 1881, also interrupted the early progress at Plum Point and Lake Providence. Throughout the spring and into the summer, the MRC made little progress at either site, concentrating its limited resources on revetment works in an effort "to avert undesirable changes in the channel." The great expense of this work



Plum Point, Tennessee, during the 1882 flood.

quickly exhausted the MRC's limited financial resources, and all work was suspended until more money could be secured.¹⁴⁶

In the midst of the great flood of 1882, MRC President Gillmore drafted a letter to Congress requesting a larger appropriation for the closing of gaps in the levee system of the lower Mississippi Valley. The extraordinary floods of the fall and spring had resulted in "numerous and extensive breaks," and earlier estimates would not cover the cost of these additional repairs. In its preliminary report of the previous year, the MRC had estimated the cost of closing all gaps at \$2,020,000, to be distributed evenly over two years. As a result of the damage caused by the 1882 flood, Gillmore believed that those estimates would have to be doubled, resulting in a request for an additional \$1,010,000 for 1882. Together with an earlier request for \$4,123,000, the MRC sought a total of \$5,133,000 for the fiscal year beginning in 1882, or more than five times its 1881 appropriation.¹⁴⁷

Given the circumstances, there was reason to hope that Congress would meet this request. The widespread devastation of the 1882 flood had focused the nation's attention on the needs of the Mississippi Valley and prompted a groundswell of support for federal aid. Additionally, the MRC enjoyed support from an unlikely source—President Chester Arthur, who proved to be a leading advocate for the Mississippi Valley. In a message to the Senate on April 18, Arthur expressed his support:

The immense losses and widespread suffering of the people dwelling near the river induce me to urge upon Congress the pro-

priety of not only making an appropriation to close the gaps in the levees occasioned by the recent floods, as recommended by the commission, but that Congress should inaugurate measures for the permanent improvement of the navigation of the river and security of the valley. It may be that such a system of improvement would as it progressed require the appropriation of twenty or thirty millions of dollars. Even such an expenditure, extending as it must over several years, cannot be regarded as extravagant in view of the immense interest involved.¹⁴⁸

Earlier that same day, the Senate began debate on a bill that would appropriate \$5 million for the Mississippi River under the direction of the MRC. Introduced by Senator William Pitt Kellogg of Louisiana, this bill included the same restrictive provider that accompanied the MRC's appropriation in the 1881 rivers and harbors bill. Benjamin Harrison, by that time a senator from Indiana, spoke at considerable length in defense of this provider, drawing carefully the distinction among the three general systems of improvement—the levee system, the outlet system, and the jetty system. According to Harrison, only the “jetty system has for its prime object an increased low-water depth in the channel of the river.” As a one-time member of the MRC, Harrison's words carried significant weight and helped defeat several Southern senators in their attempts to remove all restrictions for levee construction. The Senate approved the bill on April 25 and forwarded it to the House for immediate consideration.¹⁴⁹

To the frustration of many, House Speaker J. Warren Keifer of Ohio chose not to act upon the bill. Keifer was a strong partisan and a Stalwart, a wing of the Republican Party that traditionally frowned upon such legislation. Nevertheless, the House Committee on Commerce circumvented the unpopular Speaker and incorporated the MRC's emergency request for appropriation into the 1882 rivers and harbors bill. After more than four months of hearings during which members of the MRC shared the concerns of lower valley levee districts, the committee unanimously resolved “that liberal appropriations should be made this year to carry out . . . improvement[s]” along the lower Mississippi River. When introduced to the House in mid-June, however, the 1882 rivers and harbors bill included an appropriation of \$4,123,000 for the MRC, nearly 20 percent less than the amount approved by the Senate two months earlier.¹⁵⁰

In addition to the smaller appropriation, the provider accompanying earlier appropriations for the MRC had been modified. While the general restriction against constructing or repairing levees “for the sole and exclusive purpose of reclaiming lands or preventing injury to lands by overflows” remained, it had been altered slightly and amended. A second provider read “that the Commission is authorized to repair and build levees

if in their judgment it should be done as part of their plan to afford ease and safety to the navigation and commerce of the river." These changes were clearly intended to give the MRC greater latitude to initiate the repair and construction of levees along the Mississippi River in the wake of the 1882 flood.¹⁵¹

As in the previous year, the bill faced stiff opposition in the House, and the new chair of the House Commerce Committee, California Congressman Horace Page, was forced to defend the largest-ever rivers and harbors bill, totaling more than \$17 million. Just over half of that sum, or \$8,705,000, went to the Mississippi River and its tributaries. Not surprisingly, those portions of the bill provoked considerable opposition, much of which was directed specifically at the MRC. In the House, Indiana's Thomas Browne sought nothing less than the destruction of the MRC. Admitting, "mine is a radical amendment," Browne proposed to leave the whole MRC appropriation entirely to the discretion of the secretary of war, instead of requiring the adoption of the MRC program. The Indiana congressman opposed the restraint in the interest of navigation policy favored by the MRC and hoped that, by destroying the influence of the Commission, logic would prevail and the policy would be abandoned. Iowa's William P. Hepburn opposed the relaxation of restrictions on levee construction and offered an amendment to prevent the MRC from spending money on levee works. Indiana Congressman William S. Holman proposed a lengthy amendment that would have authorized John Cowden to begin construction of an outlet below the city of New Orleans. Each of these amendments failed, however, and the House passed the bill in mid-June 1882.¹⁵²

The Senate, which had already supported a larger appropriation for the MRC, added 150 amendments to the bill before approving it, swelling the appropriation to almost \$20 million. This amended version passed the Senate on July 15, and the bill was sent to a conference committee. After a week of difficult negotiations, that committee approved a final draft. It included



Chester A. Arthur, 21st President of the United States, 1881-1885. *Library of Congress.*

appropriations totaling \$18,700,000, with more than \$4 million of that for the MRC.

The unprecedented expenditure of the 1882 rivers and harbors bill drew sharp criticism. A New York *Times* editorial attacked the bill as “a monstrous offspring of Congressional recklessness and cowardice,” a bill that is “full of jobs, small and great, which are calculated simply to squander the public money.” That same paper called for President Arthur “to place himself on the side of economy and public decency by vetoing it.” Newspapers from all over the country voiced similar sentiments. With an avalanche of public opinion behind him, Arthur vetoed the bill on August 1. In a letter to Congress, he explained that the bill included appropriations that “greatly exceed in amount the needs of the country for the present fiscal year.” He suggested that Congress enact only half of the aggregate amount provided for in the bill. Despite the popularity of Arthur’s action, Congress quickly overrode the veto.¹⁵³

The \$4,123,000 appropriation of 1882 invigorated the MRC and renewed hope that adequate funding would be forthcoming. It also relieved the Commission of the responsibility for directly prosecuting river improvement works. In its preliminary report of 1880, the MRC recommended, “the duties of the Commission should be limited to the preparation of plans, their modification when necessary, the advisory supervision of the work, and the completion of surveys and observations.” The 1882 act facilitated that change by placing the responsibility for executing the works on the Corps of Engineers, which would act under the supervision and initiative authority of the MRC. To ease the administration of the change, the MRC divided the lower river into four districts, each supervised by a Corps of Engineers officer, who reported directly to the MRC. These districts included the First MRC District, spanning 220 river miles from Cairo to the foot of Island No. 40 (headquarters, Cairo); the Second MRC District, covering 180 river miles from Island No. 40 to the mouth of the White River (headquarters, Memphis); the Third MRC District, extending 220 river miles from the White River to Warrenton, Mississippi (headquarters, Vicksburg); and the Fourth MRC District, covering 484 river miles from Warrenton to the Head of Passes (headquarters, New Orleans).¹⁵⁴

In addition to continuing work at Plum Point and Lake Providence, the Commission planned to begin work at Memphis and New Madrid and to initiate surveys at Helena and Choctaw. The MRC also allotted \$1.3 million—fully one-quarter of its budget—to close existing breaks and gaps in the levee system. Yet the Commission faced numerous unforeseen difficulties that increased the cost of the work. Extremely cold weather throughout December and January hampered progress, cutting off stone

supplies from the Ohio and upper Mississippi rivers. At both Plum Point and Lake Providence, large amounts of mattress revetment, which were afloat in place, but not sunk for lack of stone, were lost. As the weather warmed, the river began to rise rapidly and “finally culminated in a flood nearly as great as that of 1882.” Under those conditions, the engineers suspended much of the revetment work. Work on the levees proceeded, “though under very great disadvantages,” and with mixed results. As a matter of consequence, emergency levee work involved continuous vigilance and frequent repairs, making it expensive but not of immense long-term value.¹⁵⁵



Mattress revetment is placed afloat prior to sinking under the weight of large stones.

Other difficulties contributed to spiraling costs, as well. As floodwaters receded, low-lying areas remained saturated. As a result, the spring season proved “unusually sickly, and labor was scarce and inefficient.” In addition to the scarcity of labor, the MRC had difficulty in securing an adequate and timely supply of the materials used for the construction of revetment works. Local supplies were quickly exhausted, forcing the Commission to look elsewhere—often up to 70 miles from location—to secure materials and resulting in higher than anticipated transportation costs.

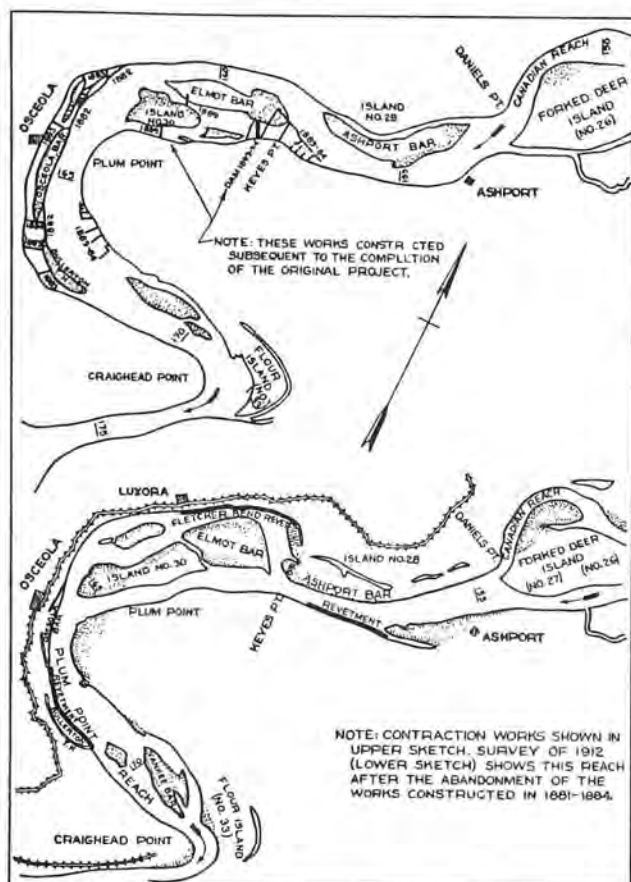
Additionally, two years of high water had proved that the lightweight materials used originally in the construction of mats and screens were inadequate and “generally too weak for the work imposed upon them.”

The work required heavier construction, with a proportionate increase in cost. To add further stability to these heavier structures, the MRC began driving columns of long wooden poles along the line of proposed banks. These pilings were then lashed together for additional support, and willow mats were attached to the structure for the purpose of trapping sediment and creating new banks. More often than not, these structures—like their lightweight predecessors—were undermined by the current and washed away. Throughout the 1880s and well into the next decade, the MRC continued with its efforts to create more stable contraction works, but met with continually higher costs and little success.¹⁵⁶

Of even greater consequence, the MRC's efforts at river contraction prompted a marked increase in bank erosion and caving, and losses up and down the river were such that the MRC members spent substantial funds on revetment operations to stabilize the channel. Despite ongoing experimentation with their placement and design, the revetment works, too, were vulnerable to the highly erosive conditions of the Mississippi River. For this reason, bank revetment operations became unpredictable, increasingly costly and a source of considerable consternation for the MRC. In its 1883 annual report, the MRC lamented that the emergency appropriation of \$1 million for revetment repairs "came too late" and that "much more satisfactory results might have been secured had the appropriation for these works been more liberal." By late that year, the MRC had nearly exhausted its resources and began to look to Congress for additional appropriations.¹⁵⁷

As the MRC soon discovered, though, sentiment in Congress had turned against large appropriations for rivers and harbors bills. In the November elections, House Republicans lost in droves, and the excesses associated with the 1882 rivers and harbors bill played no small part in this turnover. The new House had 200 Democrats to 119 Republicans, and the majority Democrats initiated a period of reform. In the 16 years from 1866 to 1882, Congress passed 14 rivers and harbors bills. During the next 27 years, rivers and harbors bills would be enacted biennially and the tendency of these bills to increase in size would also be arrested.¹⁵⁸ Congress failed altogether to pass an MRC appropriation in 1885, resulting—just as in 1883—in the deterioration and loss of critical segments of revetment.

In 1886 Congress approved a \$2 million appropriation for the MRC but included a legislative provider that significantly restricted the Commission's ability to implement and secure its navigation improvements. The provider allowed that "no works of bank protection or revetment shall be executed ... until after it shall be found that the completion of permeable contracting works and uniform width of the high-water channel will not secure the desired stability of the river banks."¹⁵⁹ Struggling with the



Contraction works at the Plum Point Reach, 1881-1884.

repercussions of this new restriction, the MRC complained to Secretary of War Lincoln that the improving conditions at the Plum Point and Lake Providence reaches could never have been attained, nor could they be sustained, through contraction works alone. Without necessary revetment work, much progress would be lost, there and elsewhere. In defense of their efforts to replace failed revetment, the Commissioners identified the successive floods of the early 1880s as the culprit, but added that even these losses — and the subsequent cost of repairs —

could have been prevented had Congress appropriated the initially requested funds.¹⁶⁰

As with the 1881 provider that disallowed levee construction, the 1886 provider usurped the MRC's ability to develop and implement policy based on scientific principle. Money, of course, was a prime factor in Congress' meddlesome behavior, but the restriction also reflected a distortion of Eads' confinement theory.¹⁶¹ Louisiana Congressman Randall Gibson, who had introduced the bill to create the MRC, attempted to justify the federal legislature's actions to the MRC by arguing that Congress believed "the contraction of the river by levees is the proper method of procedure." While it was not the intent of the lawmakers to dictate the methods of improving the river, Gibson explained:

...it was now felt that the Commission was getting away from its plan, and was constructing works of great cost outside of that plan; works which were subject to great injury and loss, and not effective in producing the results sought for. Congress desired to

put a stop to this, and hence, these prohibitions in regard to works of bank protection or bank revetment. It was intended that that kind of work should cease. It was intended to absolutely prohibit the continuation of bank revetment in Lake Providence and Plum Point reaches; for, why construct new works requiring large sums of money when less expensive methods would do? It was decided to make the trial, taking the risks of the works being taken away.¹⁶²

Although Congress removed the restriction on bank revetment two years later, the damage was done. The next appropriation did not become available until August, toward the end of the working season. Because of the absence of a bill in 1885 and the provider in the 1886 appropriation, the MRC had lost four working seasons, and much of the revetment work accomplished up to 1884, which the MRC had left incomplete or in need of repair, had since been destroyed. Additionally, the absence of appropriations in 1887 hampered other components of the Commission's operations. In its report of that year, the MRC disclosed "that no work has been done in the districts below Cairo, beyond what was necessary for care and preservation of property." Following another inadequate appropriation in 1888, the MRC protested, "the Commission are seriously embarrassed this season by the condition of the plant at their disposal. The long period of inactivity consequent on failures of appropriations . . . caused the plant to deteriorate very rapidly and extensive repairs are needed to place it again in proper condition for use."¹⁶³

In 1889, Congress yet again failed to pass an appropriation for the MRC, prompting the following reaction from Comstock, who had since replaced Gillmore as MRC president:

The failure of this bill at the last session of Congress again leaves the Commission in a very embarrassing situation. Much of the work now projected must be left in an unfinished and, hence, dangerous condition, while much work of great importance and which could be done this season to great advantage, must necessarily be neglected for lack of funds to carry it on. . . . Congress at its last session also omitted to provide for the expenses of the Commission. . . . [which] is therefore again left without funds to pay the salaries of its civilian members or even the necessary expenses of travel and inspection. As the responsibility for the proper application and disbursement of large sums of money and the carrying out of extensive and important plans of improvement rests upon them, the embarrassment entailed by the impossibility of inspecting the work or of meeting for consultation or action, seems sufficiently

obvious, and it is hoped that Congress will give this matter early attention.¹⁶⁴

By the close of the decade, irregular and inadequate appropriations and a tendency by Congress to dictate policy—and often-conflicting policy at that—had effectively paralyzed the MRC. Opportunities had been lost, expensive equipment had deteriorated, and the confidence which characterized the early MRC had disappeared. In its place was a quiet resolve to work within the financial and legal restrictions placed upon it.

Chapter 7

The Road to Levees Only

The formation of the Mississippi River Commission certainly marked the beginning of a new era in levee development. For decades, local interests had struggled to promote a unified levee system. They organized levee districts and, empowered by state laws, constructed levees under the strictest of financial constraints. Such efforts lacked centralized coordination and mostly failed, because, as noted by James P. Kemper, a longtime student of the Mississippi River, "floodwaters will not respect political boundaries." With the creation of the MRC, the federal government now appeared as an active agent on the river capable of transcending regional issues that had long hampered the development of a more effective system. Following the passage of the 1882 rivers and harbors legislation, the MRC began coordinating local efforts, setting standards and specifications for levee construction, and allocating federal funds to the cash-strapped levee districts. The levee districts, in turn, provided rights of way for federally sponsored levee work.¹⁶⁵



Tying the ends of a levee to prevent further collapse.

That relationship worked well in the beginning but increasingly fell victim to financial, legal, and jurisdictional restrictions imposed by Congress throughout the 1880s. Checked by these restraints, the MRC and its local partners made only marginal progress in those years toward the implementation of their grand scheme for the Mississippi River. In its annual report of 1888, the MRC reported that levee heights were inadequate and that substantial resources would be necessary to bring the levees to standard. These resources were not forthcoming and little progress was made before the severe flood of 1890, which proved to be a landmark event for the MRC, prompted congressional action. In response to the resulting devastation and public outcry, lawmakers increased appropriations for the Commission and removed some legal impediments to levee construction. With a freer hand and more adequate funding, the MRC began to pursue more vigorously thereafter its navigation and flood-control policies for the lower Mississippi River.

Shifting Currents

Originating in the Ohio basin, the 1890 flood was augmented by heavy rainfall in the central valley and in the basin of the White River. By February, floodwaters had reached dangerous levels throughout the lower Mississippi River, and the MRC began diverting its remaining resources to hold the levees. These efforts effectively limited the number of levee crevasses to 53, a comparatively better performance of the levee system than the 284 crevasses experienced during the 1882 flood. The maximum discharge of the 1890 flood, however, was not as great as that of 1882, yet "the river was higher than ever before" below the Arkansas River all the way to New Orleans, with the sole exception of Vicksburg. As in the mid-1880s, these higher readings did not lead the MRC members to reevaluate their overall strategy. Instead, they saw the decline in the number of levee crevasses as a measure of success, solidifying their faith in the levee system. As the Commission explained in its 1890 annual report, "the lesson taught by the flood is the same as that of other great floods, namely, the necessity of raising and strengthening the levees." In early May, Congress passed a joint resolution appropriating \$1 million in emergency money for the lower Mississippi River with the understanding that this sum would be taken out of the appropriation for the lower river in the rivers and harbors bill then under consideration in the Rivers and Harbors Committee, a standing committee established for the specified purpose of handling those bills. As evidenced by the 1890 rivers and harbors bill, this new committee proved to be no friendlier to the alluvial valley than its predecessor, the House Commerce Committee.¹⁶⁶

When introduced to the House, that bill appropriated only \$2 million for the MRC and included the same restrictive provider that accompanied earlier legislation. As promised, the members of the House quickly adopted an amendment changing the appropriation to \$1 million in compensation for the emergency money appropriated in the spring. Flood-control advocates, who had always opposed restrictions of any sort on levee construction, moved to strike the provider from the bill, but they lacked the necessary support. The whole House approved the measure largely as it was introduced and forwarded it to the Senate for consideration.¹⁶⁷

Uncharacteristically, Senate flood-control advocates took a leading role in promoting the interests of the MRC in 1890. After sitting on the bill for more than two months, the Senate quickly adopted a substitute amendment for the MRC appropriation. Introduced by William P. Frye, the long-time chair of the Senate Commerce Committee, the amendment increased the appropriation from \$1 million to \$3.5 million. Additionally, the amendment did not include the standard provider, though it did require that funds be spent "in such a manner [as] . . . shall best promote the interests of commerce and navigation." Frye's amendment survived the conference committee and was sent to the House for approval on September 6, 1890. Although the change in language was certainly open to interpretation, Indiana Congressman William S. Holman objected to the removal of the standard provider claiming, "the language of the bill is revolutionized" to the effect that "the construction of levees, instead of being made subordinate, is now to be one of the primary objects of this legislation." Over his objections, the House adopted the compromise bill, and it became law on September 19, 1890.¹⁶⁸

In its final form, the 1890 Rivers and Harbors Act was a landmark piece of legislation that contributed to the rapid expansion of levee construction under the MRC and marked the true genesis of the Commission's unwavering defense of levees as the only necessary structural means to prevent destructive floods on the lower Mississippi River, despite any new favorable revelations toward alternative structural methods as auxiliary aids to the levee system. The MRC embraced the new act, commenting in its annual report that the language "makes several changes in the legislation under which the Commission has been acting, the most important of which is the removal of restrictions as to the building of levees."¹⁶⁹

Three new members also contributed to the shift in policy. Lieutenant Colonel Oswald H. Ernst, long involved with the improvement of the middle Mississippi River, had replaced Gillmore in 1888, allowing Comstock to ascend to the MRC presidency. Henry Flad, a close associate of Eads, replaced Samuel Ferguson five months prior to the passage of the



Lieutenant Colonel Oswald H. Ernst, Member, Mississippi River Commission, 1888-1894. He also served as president of the Commission from 1903-1906.

1890 rivers and harbors bill. Henry L. Whiting, considered one of the leading topographers of his day, joined the MRC as the lone representative from the Coast and Geodetic Survey just two months after Flad. With the restriction against levees removed, even Comstock, who along with Mitchell had agued against the effectiveness of levees as aids to navigation, could no longer object to raising and strengthening levees. The MRC, in turn, unanimously and promptly allotted \$1.45 million for the construction of levees.¹⁷⁰

In spite of the several benefits associated with the 1890 rivers and harbors bill, 1891 proved to be a difficult year for the MRC. A serious flood struck the lower Mississippi Valley in

the spring. Though not as great as the previous year's high water, this flood caused five large crevasses of an aggregate length of approximately one mile. By fall, the wild fluctuations of the river posed a problem of the opposite nature. Water levels dropped sharply, causing serious hardship to navigation. The MRC reported that large shipments of grain and other perishables that had already found markets in Europe were held up in the grain elevators in St. Louis and elsewhere, unable to proceed down the shallow river. In view of the serious loss of trade that resulted from low-water conditions, the MRC began to reconsider its policy for improving navigation along the lower river. In November, the Commission showed its willingness to experiment with dredging on a large scale by creating the Committee on Dredges to examine the feasibility of constructing and operating dredges to remove bars during low-



Henry Laurens Whiting, Member, Mississippi River Commission, 1890-1897.



Henry Flad, Member, Mississippi River Commission, 1890-1898.

water conditions. To fulfill this task, Comstock appointed Suter and Henry Flad to the committee.¹⁷¹

A civil engineer by training, Flad had long before earned the respect of his colleagues. Born and educated in Germany, he served as a combat engineer for the Parliamentary Army during the German Republican Revolution in 1848. After the uprising was crushed, Flad, having received a death sentence for his role in the revolution, fled to Switzerland and eventually settled in the United States, near St. Louis. During the American Civil War, he enlisted in the Union Army as a private and quickly rose to the rank of colonel. After the war, he

returned to St. Louis and became a close associate of James Eads. As an assistant engineer to Eads, Flad helped to construct the famous Eads Bridge and was the designing force behind many of its boldest and awe-inspiring features. He would soon demonstrate similar engineering genius in the field of dredge design.¹⁷²

While the Committee on Dredges commenced with its investigation, the high cost of fighting the river at both high and low stages exhausted the financial resources of the MRC, and by June 1892, it was reporting that "demand for funds . . . has become more or less pressing." Relief would soon be forthcoming, as Congress had been working on a rivers and harbors bill since April. For several months, the federal legislature had been grappling with an issue of long-standing importance to the MRC. A severe lack of funding had plagued the MRC throughout its first decade, but the problem was not merely one of enough money. The MRC had also suffered from an inability to plan ahead, for it never knew how much money would be made available for the following year; nor could it make contracts for work beyond the next year. As a government agency, the MRC was forbidden by law from entering into a contractual obligation beyond the limit of its immediate resources. As Mississippi Congressman Thomas C. Catchings explained to the House, "the result has been that at least for one half of the time there has been a total suspension or cessation of . . . works," during which the necessary labor was disbanded and the plant lay idle and unproductive. When contracts were entered into, they were made for one year only and at higher than average prices, as the con-

tractors were unwilling to make contracts "except at prices sufficiently high to compensate for the labor and annoyance and risk involved."¹⁷³

For the first time, those drafting the rivers and harbors bill included a provision in the final legislation that allowed the secretary of war to make multiyear contracts for the completion of specific projects. To facilitate that, Congress appropriated \$2 million to the MRC for the first year, while authorizing the secretary of war to make additional contracts for Commission operations not exceeding \$2,675,000 per year for three years. That appropriation allowed the MRC to proceed in its work with the relative assurance that adequate resources would be forthcoming. Also, as predicted, the MRC was able to secure better prices from local contractors, and the cost of levee work fell from 21 cents per cubic yard of earth to nine cents.¹⁷⁴

With this greater assurance, the MRC successfully applied a more systematic approach to navigation improvements and levee construction along the lower Mississippi River. Together with local and state levee boards, the MRC made considerable progress throughout the mid-1890s. In its annual report of 1895, the members predicted that by the summer of 1896 "all these [levee] lines will be continuous and very nearly if not absolutely of standard grade and dimension." As a testament to the MRC's contributions, the report included a chart that compared federal expenditures on levee construction in Missouri, Arkansas, Mississippi, and Louisiana with local and state contributions in those same states. This chart evidenced that, between July 1, 1892 and June 30, 1896, federal contributions outstripped state and local contributions. For the first time since its inception, the MRC was fulfilling the dreams of flood-control advocates and many of its creators by presiding over the construction of a federally subsidized levee system for the lower Mississippi River.¹⁷⁵

But all was not well with the MRC. Its members freely admitted what Comstock and Mitchell had argued all along—that the levee works already completed had contributed to an increase in volume and that "accompanying this increase in volume is, of course, an increase in flood height." In the past, the majority, with the exception of Comstock and Mitchell, held firmly to Eads' initial contention that the greater volume would increase the scouring power of the current and contribute to an enlargement of the river channel. Nonetheless, by the mid-1890s, the MRC members were more careful to qualify that assertion. They conceded that "to what extent such lowering will take place and when, are questions not yet answered by experience, and upon which opinions differ." While admitting that the exact correlation between the volume and size of the channel was still unknown, the MRC members held that "the results of levees in excluding overflow from the rich lands on either side of the river... are more definite,

and sufficiently so to justify the claim of the success of the levee system."¹⁷⁶

Additionally, by the mid-1890s the MRC admitted that its attempts to improve the navigability of the lower Mississippi River through bank revetment and contraction works had generally not fulfilled expectations. These methods were more successfully applied on the middle Mississippi where the river dynamics were much different. The moderate success of the Commission's endeavors on the lower river simply did not justify the high cost of the work, prompting the members to acknowledge, "the problem of bank protection has been found extremely difficult."

By the end of the decade, the Commission had adopted changes in the structure and texture of the mattresses in order to achieve a greater degree of flexibility without a corresponding diminution of thickness and strength. While these improvements had generally proven successful, they were also very expensive. The MRC estimated that these new mattresses cost about \$30 per running foot of bank protected or approximately two and a half times earlier estimates. At that price, the completion of such work along the 600-mile stretch of river from Cairo to Vicksburg could cost as much as \$63 million. The MRC also had difficulty securing materials for these massive structures, which required five times as much material as the earliest mattresses. Under these conditions, the MRC estimated that it could reasonably expect to acquire materials adequate only for about 15 miles of work per year.¹⁷⁷

Meanwhile, Suter and Flad delivered the findings of the Committee on Dredges to the Commission. They reported unfavorably on various schemes to provide temporary relief from low-water shoaling and proclaimed dredging as the only method of improvement that promised any reasonable chance of success. To this end, they recommended the construction of an experimental, self-propelled dredge, equipped with 400 horsepower pumping ability and capable of moving up to 45,000 cubic yards of sediment per day. As a result of this report, the MRC authorized the construction of the experimental dredge, but for reasons of cost-efficiency, limited its design to the non self-propelled type.¹⁷⁸

Flad personally supervised the construction of the experimental vessel, which quickly proved the value of dredging as a temporary expedient for improving low-water navigation, prompting the MRC to construct or acquire several more dredges. In the following years, Flad and Thomas Middleton, an assistant engineer with the MRC, pioneered the design and construction of the MRC dredging fleet and its attending plant. In 1895 the MRC overhauled the experimental dredge and renamed it *Alpha*. The MRC also constructed the cutterhead dredge *Beta* and the dustpan dredge *Gamma*, which were placed into operation in 1896 and 1897, respectively.



The dredge *Alpha*.

Flad and Middleton at first designed the *Beta* as a cutterhead dredge, but later had it converted into a dustpan dredge—a type of vessel specifically designed for dredging on the Mississippi River. The following year, these dredges were accompanied in the fleet by the *Delta*, *Epsilon*, *Zeta*, leading the Commission to establish the MRC Dredging District, located first in St. Louis, and then later in Memphis.¹⁷⁹

The many difficulties associated with contracting the river and protecting its banks, together with the newfound promise of dredging, forced the MRC to undertake a fundamental policy shift, which the members communicated in their annual report of 1896:

The practical results contemplated by the Act organizing the Commission...can be attained with greater economy and probability of success, and in less time by the dredging of obstructing bars in low water and the maintenance, in cooperation with the State and local authorities, of an effective levee system.¹⁸⁰

Given that dramatic shift in policy, the MRC allotted no money for either bank revetment or channel improvement for the fiscal year ending June 30, 1897, except such funds as were necessary to continue experimental work at Plum Point and Lake Providence. To maintain and improve the river's navigability, the MRC turned almost exclusively to dredging, and by 1896 that work consumed fully 30 percent of the MRC's annual budget. The temporary abandonment of expensive contraction and revetment works allowed the MRC, which had become increasingly

convinced that a properly constructed and maintained levee system was absolutely necessary for the long-term improvement of the river, to concentrate ever-greater percentages of its resources toward levee construction. A major flood in the spring of 1897 would shake—but not destroy—that confidence.¹⁸¹

The Nelson Report

Through the early 1890s, the MRC and local levee districts made considerable progress in repairing and strengthening the levee system. By 1896, the members of the MRC generally believed that the levees “were just as good as the Commission and the people could possibly make them.” That system was put to the test, however, and found lacking in the spring of 1897. The high water of that year produced some of the highest flood levels ever recorded below Cairo. While the volume of the flood probably did not approach that of 1882, the now substantial levee system constricted floodwaters such that Helena, Arkansas, recorded flood levels at more than 3.5 feet above the previous high mark. In testimony to Congress, Commission member Robert Taylor concluded that the “flood was, in a general way, the greatest of record” and reiterated the MRC’s oft-repeated mantra on the inadequacy of the levees. “I think,” he testified, “they were not high enough, nor strong enough.” The destruction wrought by the 1897 flood created a crisis for the various levee districts, all of which had assumed enormous debt to pay for the extensive levee program and repeated flood fights, and were not well positioned to finance further expensive repairs.¹⁸²

The 1897 flood convinced Congress to reassess the value and the direction of its flood-control program. In late spring, Congress authorized the Senate Commerce Committee to begin an investigation of various flood-control methods and to draw conclusions as to the probable effectiveness of these methods in alleviating the flood problems of the lower Mississippi River. Among the methods to be considered were reforestation, reservoirs, the outlet system, and the levee system. The Commerce Committee was also authorized to evaluate the effectiveness of the MRC and to make conclusions as to its continued existence.¹⁸³

As was the common practice, the Commerce Committee delegated these responsibilities to a special Senate subcommittee charged with holding hearings and initiating studies. This seven-member subcommittee included Knute Nelson of Minnesota, Stephen B. Elkins of West Virginia, George W. McBride of Oregon, Jacob H. Gallinger of New Hampshire, George V. Vest of Missouri, James H. Berry of Arkansas, and Donelson Caffery of Louisiana. Given the scientific and technical nature of the investigation, the committee relied very heavily on expert opinion. Of



Colonel George Lewis Gillespie, President, Mississippi River Commission, 1895-1901. After leaving the Commission he was promoted to brigadier general and served as Chief of Engineers from 1901-1904.

course, the Corps of Engineers and the MRC employed many of the nation's top hydraulic engineers in one capacity or another, and the Senate panel relied overwhelmingly on these sources for information.

Additionally, the MRC continued to evolve, and the advice it offered up in 1897 was shaped by its new membership. Colonel George L. Gillespie, who had earned the Congressional Medal of Honor during the Civil War and later served as supervising engineer during the construction of the Statue of Liberty, assumed the presidency of the MRC in 1895, following Comstock's retirement. Lieutenant Colonel Amos Stickney, the former Fourth MRC District Engineer and primary developer of the MRC's stance regarding the Atchafalaya River, and Major Thomas J. Handbury, the

former officer in charge of improving the middle Mississippi River, had replaced Suter and Ernst, respectively. Henry L. Marindin, who as a young lieutenant led a surveying party of Eads' work at the South Pass, filled the slot reserved for the representative from the Coast and Geodetic Survey. Rounding out the MRC were holdovers Benjamin Harrod, Robert Taylor and Henry Flad.

With legislative inconsistencies and financial inadequacies paving the way, the MRC was now an organization wholly committed to a true "levees only" policy. Of the "old guard," only Harrod and Taylor remained—and both were staunch champions of the levee system. Flad, whom Eads had mentored, joined them in advocating such a system. The remaining members of the MRC also supported that approach, just as their predecessors had on a more tempered level, but that early "levees-



Lieutenant Colonel Amos Stickney, Member, Mississippi River Commission, 1894-1903. He served as president of the Commission from 1901-1903.

only” structural approach had been supplanted by a more dangerous “levees-only” attitude that vehemently opposed to further study of alternative methods of flood control and stubbornly refused even to consider new proposals.

More important, perhaps, than the addition of any of these members was the loss of Comstock. Since the inception of the MRC, Comstock had served as its conscience—its voice of reason—not concurring with the majority decision in seven of the first eight MRC reports. Each of his minority reports centered on the MRC’s stance toward levees. In 1880, he played an important role in diluting Eads’ levee plan by favoring the closure of outlets only where they posed a threat to

navigation and refusing to dismiss the effects of cutoffs in lowering flood stages. He also dismissed the value of the levee system as an aid to low-water navigation, countering Eads’ theory that the confinement of floods greatly impacted the low-water channel when the floodwaters receded. During the fiscal crises of the 1880s, he argued that the supposed

navigation benefits of the levee system did not justify the costs involved in their maintenance and contended that the funds could be better spent on more important improvement works elsewhere. While a proponent of levees for flood-control purposes, he recognized that, by the nature of confinement, levees caused flood heights to rise. When the MRC proposed raising the levees higher, he warned that the higher levees increased the danger in the event of a crevasse. Later, when the majority proposed raising levees below Red River by three feet, he challenged their findings and indicated that the levees would have to be raised by an alarming six feet to accommodate the increased flow.¹⁸⁴



Major Thomas H. Handbury, Member, Mississippi River Commission, 1896-1902.



Henry L. Marindin, Member, Mississippi River Commission, 1897-1904.

Following Comstock's retirement, the MRC grew more doctrinaire, and the Senate's heavy reliance on its advice undoubtedly biased the subcommittee's findings in favor of a staunch levee policy. Beginning in February 1898, the subcommittee took the Commission's flagship vessel, the *Mississippi*, in the company of the MRC from Cairo to the Gulf. In its 1898 annual report, the MRC suggested that "the subcommittee was afforded every facility for observation and for taking such testimony at different points as they desired," but under the circumstances, it is unlikely that the senators had ready access to dissenting opinions. Additionally, the Nelson Committee admitted in its final report that it had "derived much valuable information" from William Starling's pamphlet on "The Floods of the Mississippi River." Starling, the chief engineer of the Lower Yazoo Levee District and a leading levee proponent, testified before the subcommittee and advocated the enlargement of the present levee system by a grade of six feet—improvements he believed would afford nearly complete protection for the lower Mississippi River.¹⁸⁵

On December 15, 1898, the Nelson subcommittee submitted its lengthy report. As to the various methods of flood control, the report dis-



Senator Knute Nelson of Minnesota was chairman of the subcommittee of the Senate Commerce Committee organized to study flood control on the lower Mississippi River. *U.S. Senate Historical Office.*

missed the utility of reservoirs, outlets, and reforestation, as had nearly every other report dealing with the improvement of the lower river up to that time. In reference to reforestation as a flood control measure, the report concluded that, "nothing in the evidence . . . discloses the fact that the destruction of timber at or near the headwaters of these river systems tends to cause or promote the floods referred to." Likewise, the report determined that the "cost of constructing and maintaining a system of reservoirs in this basin would be enormous" and could not be justified. "Neither," the report continued, "can your committee discover from the evidence, or through other sources, any material relief from the outlet system."¹⁸⁶

After dismissing the alternatives, the Nelson subcommittee reported in favor of the levee system. The report concluded:

From all the evidence taken and considered by your committee it is evident that the basins and bottoms along the Mississippi River

exposed to the floods of the river can only be protected and preserved from such floods by an ample and complete system of levees from Cairo to head of the Passes.¹⁸⁷

The report also concluded that the burden of completing the levee system was too great for local and state authorities and recommended that the federal government "continue, as it has since 1882, to aid in the great task of controlling and repressing the floods in the river." In stark contrast to the circumstances of 30 years later, the 1897 flood actually strengthened congressional support for the MRC, with the Nelson Report serving as a ringing endorsement of the Commission's emerging "levees-only" philosophy. As historian Robert Harrison stated, "The time was ripe for stocktaking, for a serious appraisal of the levee program, but none was made." In fact, in the 30 years after the Nelson Report, the MRC would commit ever-greater resources toward strengthening and enlarging the levees to the delight and relief of cash-strapped levee districts.¹⁸⁸

In the aftermath of the Nelson Report, the MRC estimated that \$18,300,000 would prove sufficient to complete the levee system from Cairo to the Gulf of Mexico. In fact, the MRC seemed more certain than ever that an adequate levee system would cure all that ailed the river by concluding in its 1898 annual report, "The important fact that the floodwaters of the Mississippi River may be permanently controlled by a system of levees that can be constructed within a limit of expense warranted by the advantages to be gained seems to have been fairly demonstrated by the flood of 1897."¹⁸⁹

Congress responded with unusual generosity. In addition to the \$3 million already appropriated for 1897, Congress authorized an additional \$2 million as an emergency fund, giving the MRC \$5 million for levee construction and repairs and for other channel work. Over the next year, the MRC oversaw extensive repairs to the levee system, and the whole line was strengthened with favorable results. The spring rains of 1898 brought high water to the lower valley, but the flood "caused no breaks in the levees." For the first time since the commencement of a continuous levee line along the lower river, a flood reaching the height of 50 feet at Cairo was safely discharged to the Gulf without a single break in the levees.¹⁹⁰

In 1903, however, another great flood breached the levees. Once again, the MRC concluded, "the past flood showed more clearly than has any previous one, both the importance and the practicability of a complete and efficient levee system." The MRC reported all crevasses in the line resulted from the "unfinished nature of the levees as regards both grade and section." As such, the Commission began placing a heavier emphasis on the need for more money. In its report to Congress, the MRC explained that insufficient financing slowed progress and left the system in an



The steamer *Mississippi I* pushes the non self-propelled dredge *Beta* upriver in 1899. The *Mississippi I* served as the flagship of the MRC and carried the members of the Commission on their inspection trips from 1882 to 1919. Its successors include the steamer *Mississippi II* (1920-1926), the steamer *Mississippi III* (1927-1961), the motor vessel *Mississippi IV* (1961-1993), and the motor vessel *Mississippi V*, commissioned in 1993.

incomplete and vulnerable state. "If the flood damages of 1903 may be approximated at \$5,000,000, the previous expenditure of that sum in permanent work would have largely if not entirely prevented them. Every year's delay in completion incurs the risk of similar loss."¹⁹¹

The 1903 flood was significant for another reason as well. The high water of that year wrought considerable havoc throughout the lower valley, but the older levees proved particularly vulnerable to collapse, since many of them had been defectively and improperly constructed. As Starling had concluded as early as 1890, "The difficulty has not been to make the levees high enough to hold extreme flood heights, but strong enough to withstand a long-continued strain." After the 1903 flood, the MRC focused ever more energy on making the levees strong enough as well as high enough to withstand future floods.¹⁹²

As the levees of the lower Mississippi River grew larger, the problem of caving banks rapidly returned to the forefront, replacing levee strength as the most serious problem facing the MRC. The levee system below, at, and just above the water level was particularly vulnerable during periods of high water and rapid current. Under these adverse conditions, improperly constructed or poorly located sections of the levee sometimes failed, falling away into the river and leaving the remaining structure greatly weakened and vulnerable to collapse. As the size of the levees increased throughout the lower valley, the problem of maintaining their integrity grew more troublesome, and repairs became increasingly difficult and expensive. Furthermore, legislative interference in the 1880s and prohibi-

tive cost escalations in the 1890s had hampered the development of revetment operations¹⁹³

In spite of these difficulties, the extensive damage caused by caving banks required that some serious action be taken. During the 11-year period after 1900, losses totaled more than 20 percent (27 million cubic yards) of the 125 million cubic yards of earth placed in the levees by the federal, state, and local interests.

Thomas G. Dabney, the chief engineer of the Yazoo-Mississippi Delta Levee District, proposed that Congress make available \$10 million per year, which would allow for the completion of the entire project in one decade. He dismissed the great difficulty of securing sufficient quantities of materials, particularly the willow used in the mattresses. "It will not," he believed, "require a great strain upon the ingenuity of the Engineers in charge of the work to enable them to utilize the branches of the myriads of forest trees that grow on the ground adjacent to the river banks in many localities."¹⁹⁴



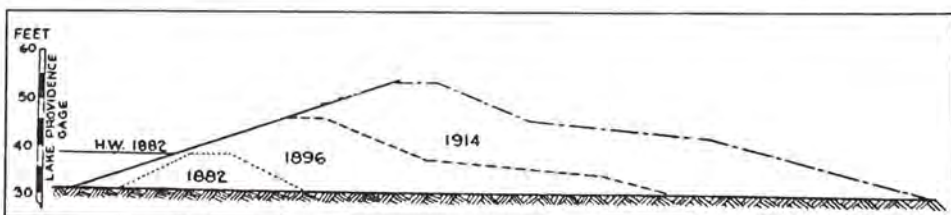
Thomas G. Dabney, Chief Engineer, Yazoo-Mississippi Delta Levee District.

No great floods struck the lower valley between 1903 and 1912, and throughout that period the MRC placed ever-greater emphasis on the need to secure threatened levees with revetment works. The absence of serious high-water events created the illusion of security and the MRC considered the possibility of diverting resources from levee construction to bank revetment. Such a diversion might be possible, the Commission surmised in 1906, once levee construction had advanced to the point that it insured a measure of protection from ordinary floods. Through 1911, the MRC made repeated requests for more money and always justified these requests on "the urgent necessity for further revetments for the preservation of the levee system." But before much progress could be made to secure these funds, two great and very destructive floods struck, exposing the illusion of security for exactly what it was. The successive record-breaking floods of 1912 and 1913, in turn, precipitated a crisis in the reclamation program of the Mississippi Valley.¹⁹⁵

In response, President Woodrow Wilson directed the MRC to submit a report on flood control for the lower Mississippi River, complete with discussions on the various alternative methods of protecting lands from

overflow. The ensuing report, authored by MRC President Colonel Curtis McDonald Townsend, considered six methods of flood control: reforestation, reservoirs, cutoffs, outlets, floodways, and levees. As was the case with previous MRC studies, the report either condemned or dispelled the various alternatives to levees. It dismissed reforestation and cutoffs as foolhardy and dangerous, respectively. It also rejected floodways by arguing that a channel capable of accommodating the excess flows of the Mississippi River would have to be as large as the river itself. With regard to reservoirs, Townsend and the MRC stated that the method of flood control showed promise, particularly in mountainous areas, where smaller dams could be constructed in valleys to impound runoff. Such a method was employable in the lower Mississippi Valley, but the enormous costs associated with constructing the extensive reservoir system needed to control floods was "disproportionate to the benefits which it would confer." The report also conceded that artificial outlets afforded slight reductions in flood stages, but the MRC contended that the relief provided was only local in nature. Furthermore, to control floods within the outlet, it would be necessary to flank the outlet channel with levees. For these and other more traditional reasons, the MRC dismissed the use of artificial outlets to control floods.¹⁹⁶

While extolling certain virtues of reservoirs and outlets, the Townsend report, by recommending the construction of an adequate levee system to a new and higher grade, was unmistakably a declaration in favor of the MRC's emerging "levees-only" philosophy. Yet another opportunity to appraise the flood-control program had been wasted. Instead the MRC eventually established a new grade and section for levees, basing the new 1914 levee grade on the height of the 1912 flood, if confined to the channel, with an additional three feet as a safety margin. The requirement to increase levee heights, though, initiated another problem. The great expense incurred as a result of the regular inundation of the valley, combined with the cost of building and maintaining an increasingly higher levee system, was becoming prohibitive. Since 1882 alone, local interests had expended in excess of \$91 million on levee construction to protect their property from the ravages of the river. With the establishment of the 1914 levee grade, they were expected to contribute more. Based on this



The evolution of levees grades and section from 1882-1914.

reality, landowners in the lower Mississippi Valley, out of complete self-preservation, launched a massive propaganda campaign directed at obtaining greater federal commitment.¹⁹⁷

Chapter 8

Legislative Affirmation

As Europe moved inexorably toward war in 1914, Mississippi Valley congressmen stepped up their decades-long struggle to secure federal flood-control legislation for the lower Mississippi River. Their latest effort, the Ransdell-Humphreys bill, authorized approximately \$10 million a year “for controlling the floods and for the general improvement of the Mississippi River.” Although Congress had been contributing funds for levee construction since the early 1880s, this bill represented a significant break with the past. Traditionally, constitutional scruples had compelled generations of flood-control advocates to conceal their motives under the guise of navigation improvements. This proposed legislation dropped all pretenses and, for the first time, called on Congress to appropriate funds for the express purpose of preventing floods. More important, the bill authorized the federal government to assume—for the first time—primary responsibility for financing flood-control improvements along the lower Mississippi River, with state and local interests paying one-fourth of the cost of levee construction. Finally, the proposed bill authorized continuing appropriations at a rate sufficient to bring the levee system to completion within several years. While the Ransdell-Humphreys bill enjoyed the solid



Hickman, Kentucky, during the 1912 flood.

support of the Democratic Party, it faced considerable opposition from fiscal conservatives and strict constitutionalists. Additionally, Progressives in Congress clamored for the adoption of a more comprehensive approach to flood control and for the abandonment of the emerging "levees-only" policy on the lower Mississippi River. After 1914, though, concerns over the war in Europe and a growing frustration with both the frequency and the severity of the floods striking the lower valley created opportunities for such legislation.¹⁹⁸

The war in Europe began in 1914. As the material requirements of the Western Front outstripped their war-torn economies, the Allies turned increasingly to the United States for war materials and foodstuffs, placing heavy demands on the American transportation network. Railroad companies, in particular, found themselves ill prepared to handle the increased traffic. The rail system was complete, but major American rail companies were in poor financial health. The Interstate Commerce Commission (ICC) strictly regulated railroad freight rates, and, between 1900 and 1915, they remained virtually unchanged at about 0.75 cents per ton-mile. These fiscal restrictions stymied the industry's efforts to modernize and upgrade service. By 1916, war orders from France and England surpassed \$3 billion, but poor planning and the concentration of one-way traffic to the East Coast resulted in delays and inefficiencies.¹⁹⁹

These conditions paralleled, and to a certain extent fed, a burgeoning movement to revitalize river commerce. The glory days of the steamboats passed with the Civil War, which witnessed the devastation of much of the river fleet. Additionally, competing railroads expedited the demise of waterborne traffic by purchasing, and then shutting down, many of the surviving packet lines along the Mississippi River and elsewhere. By 1916, inland waterways accounted for less than 19 percent of the total intercity freight traffic in the United States. Railroads accounted for 77 percent. Abuses in the railroad industry together with the gross underutilization of waterway resources contributed to a revival of interest in river transportation, culminating in the establishment of dozens of waterways improvement associations. Among the major organizations were the National Rivers and Harbors Congress, the National Drainage Congress, the Western Waterways Association, the Atlantic Deeper Waterways Association, the Ohio Valley Improvement Association, and the Columbia River Improvement Association. Each of these lobbied Congress, agitating for innumerable projects, some practical, some absurd. The tremendous political pressure that these associations brought to bear, together with the developing rail crisis and the growing likelihood of U.S. involvement in the European war, virtually assured congressional action of some sort.²⁰⁰

Three devastating Mississippi River floods, in 1912, 1913, and 1916, increased the probability that this action would take the form of flood-control legislation. The first of these overflows, beginning March 1912, developed into a protracted flood extending through May. Helena, Arkansas, for example, was at flood stage for 62 days in 1912. The high water caused a total of 15 crevasses between Cairo and New Orleans and an estimated \$41 million in property damage. The second flood, in April 1913, occurred before repairs were completed and resulted in an additional 45 crevasses of an aggregate length of more than five miles. The 1916 flood, though of lesser severity than the previous two, reached record heights between Arkansas City and Vicksburg, Mississippi, cresting at 50.7 feet on the Greenville gauge. Significantly, these three floods precipitated a crisis in the reclamation program of the Mississippi Valley. The tremendous expense incurred as a result of the regular inundation of the valley, combined with the cost of building and maintaining the levee system, was becoming prohibitive. Out of necessity, landowners in the lower Mississippi Valley increased their demands for greater federal commitment.²⁰¹

Competing Bills

At the height of the ruinous 1912 overflow, a conference of lower valley legislators, including representatives and senators from Louisiana, Arkansas, and Mississippi, met in the Senate office of Murphy J. Foster of Louisiana to organize a coordinated plan of emergency relief and to discuss long-term plans for the repair and completion of damaged levees. After conferring with the War Department, the legislators endorsed a bill that provided for \$300,000 in emergency funds for the relief of flood victims numbering in the tens of thousands and for the protection of Mississippi River levees. They also made plans to obtain an additional appropriation of \$1,500,000, which would be spent for the repair of damaged levees immediately after the floods subsided, but did not stop there. That conference, and several more to follow, produced a consensus among its members for greater federal control of the Mississippi River levee system.²⁰²

To that end, levee advocates staged a great convention in Memphis, where leading bankers, editors, planters, lawyers, and manufacturers pledged themselves to an extensive propaganda campaign. They created the Mississippi River Levee Association (MRLA) and financed its development into one of the most powerful lobbying organizations in the country. Prominent New Orleans businessman A.S. Caldwell became its president and John A. Fox its chief publicity agent. Relying on funds raised throughout the lower valley, Fox initiated a massive letter-writing

campaign; delivered lectures across the country; distributed photos, motion pictures, maps, and charts; and solicited support from mayors, governors, and state legislatures. The MRLA also sent delegates to Washington to lobby for federal aid and spent more than \$50,000 in its publication program to educate both the public and Congress as to the peculiar needs of the lower valley. Their bulletin, "Protection from Overflow, and Reclamation of Thirty Thousand Square Miles of Alluvial Lands of the Lower Mississippi River—A National Work," received particularly wide circulation.²⁰³

This campaign coincided with success at the polls, both in 1912 and 1914. Southern Democrats, particularly those from the delta states of Louisiana and Mississippi, had struggled for more than 70 years to secure federally subsidized flood control for the lower Mississippi River. The establishment of the Mississippi River Commission in 1879 represented an important milestone, but the political legacy of the Civil War, and Southern secession, left the Democratic Party without the leverage necessary to follow through and affect substantive change in federal policy on flood control. From the Civil War up to 1912, the Democrats failed to rally enough support nationally to secure both houses of Congress and the presidency at the same time, excepting only the depression years of 1893-95. Divisions within the Republican Party created opportunities for Democrats in 1912, and the general elections of that year placed Democrat Woodrow Wilson in the White House and a solid Democratic majority on Capitol Hill. As part of the reform platform adopted earlier that year at the convention in Baltimore, Democrats reaffirmed their commitment to flood control: "we hold that the control of the Mississippi River is a national problem." When the new Congress convened in the spring of 1913, valley Democrats moved ahead with their agenda for the Mississippi River.²⁰⁴

Two Democrats in particular, Senator Joseph E. Ransdell of Louisiana and Congressman Benjamin G. Humphreys of Mississippi, led the way. Ranked among the leading waterways advocates in the United States, Ransdell had been instrumental in creating the National Rivers and Harbors Congress in 1901 and served as its president after 1906. A member of the House of Representatives since 1899, he served on the influential Rivers and Harbors



Senator Joseph Eugene Randall of Louisiana. *U.S. Senate Historical Office.*

Committee until the spring of 1913, when he took his place in the Senate. Humphreys, a native of Greenville, Mississippi—located directly on the banks of the river—was practically a flood-control advocate by birthright. Together, they set out to change federal policy on flood control. On May 29, 1912, with the high water of that year slowly subsiding, they introduced separate bills calling for the federal government to complete the levee system at federal expense, but no action was taken on either bill. After Ransdell joined the Senate, he and Humphreys coordinated their efforts, and early in the 63rd Congress they introduced legislation calling for an appropriation of more than \$60 million to finance the completion of the levee system. The Ransdell-Humphreys flood-control bill, as it became known, was referred to the appropriate committees in each house, the House Rivers and Harbors Committee and the Senate Committee on Commerce.²⁰⁵

In committee, two additional waterways bills—the annual rivers and harbors bill and the Newlands Waterways bill—joined the proposed flood-control legislation. Appropriations for the improvement of the Mississippi River and its tributaries were generally consolidated with appropriations for the nation's other navigable rivers, lakes, and harbors into a single biennial, or sometimes annual, rivers and harbors bill. While these omnibus bills included appropriations for necessary improvements to the nation's major waterways, including the Mississippi River, they also contained questionable allocations for improvements to minor creeks and streams. For that reason the bills were controversial. Since 1881, valley Democrats had relied on these bills to subsidize levee construction along the lower Mississippi River. While the Ransdell-Humphreys bill called for special appropriations for flood control and levee construction, its sponsors were as of yet undecided on whether to pursue an independent course or to incorporate the flood-control bill into the rivers and harbors appropriations bill for 1914, as some members of the House Rivers and Harbors Committee were predisposed to do. Either way, valley Democrats had reason to be optimistic. The previous Congress had passed one of the largest rivers and harbors bills ever, at more than \$43 million, and with sizeable majorities in each house, their party now controlled both the Rivers and Harbors Committee and the Senate Commerce Committee.²⁰⁶

The Newlands Waterways bill, sponsored and endorsed by the Progressive faction in Congress, represented a comprehensive alternative to traditional river management. The Progressives of the early twentieth century promoted an increased awareness that the nation's natural resources were being depleted at an alarming rate. With Gifford Pinchot at the fore, a growing conservationist movement sought to manage the environment to ensure the most efficient use of those resources. Senator



Senator Francis Griffith Newlands of Nevada. *U.S. Senate Historical Office.*

Francis G. Newlands of Nevada was among the leading conservationists in Congress. A lifelong Progressive, he struggled tirelessly to bring about the adoption of a more comprehensive national waterways policy. Having served on President Theodore Roosevelt's Inland Waterways Commission of 1907, Newlands long dreamed of creating a great waterways commission that would be responsible for coordinating the nation's river policy, conserving the purity of the nation's water resources, draining the nation's 77 million acres of swampland, and controlling floods in every part of the nation, including the Mississippi

River. To facilitate such a program, he called for the creation of an interdepartmental commission on river regulation and for an appropriation of \$600 million over 10 years for waterways improvements throughout the country. While Newlands never opposed the construction of levees along the lower Mississippi River, he did express profound dissatisfaction with the emerging MRC's "levees-only" policy, favoring, instead, a more varied approach that would include reservoirs and outlets, as well as levees. As such, the Newlands bill represented an immediate challenge both to the Ransdell-Humphreys flood-control bill and to the MRC.²⁰⁷

In the wake of the record-breaking floods of 1912 and 1913, Progressives and Mississippi Valley Democrats fought a pitched battle to determine the direction of waterways policy in the United States. Advocates of the two rival schemes debated their relative merits on Capitol Hill, in the nation's newspapers, and at waterways conventions around the country. In the beginning, the Newlands bill enjoyed the advantage. First, it authorized large appropriations for waterways improvements in nearly every state in the country, whereas appropriations in the Ransdell-Humphreys bill would benefit only the lower Mississippi Valley. Second, it proposed a more general plan of improvement that endorsed a comprehensive system of flood control—including levees, reservoirs, and outlets, while valley Democrats advocated continued reliance on levees, an increasingly controversial position after the failure of the levee system in 1912 and, again, in 1913. Finally, it enjoyed the support of President Woodrow Wilson who, as a fellow Progressive, sympathized with the conservationist elements of the Newlands bill. Of his own volition, Wilson brought together an interde-

partmental committee representing the Departments of War, Interior, Agriculture, and Commerce to study the bill. By the end of January 1914 that committee had unanimously endorsed the basic principles of the waterways bill. To make matters worse for the Ransdell-Humphreys bill, lower valley Democrats soon received word that, regardless of their preference, the House Rivers and Harbors Committee had refused to append their flood-control bill to its annual rivers and harbors bill.²⁰⁸

These several developments proved decisive in shaping public opinion, even in the Mississippi Valley. Soon, even legislators from that region were wavering in their support of the Ransdell-Humphreys bill. Their central objection to the Newlands bill had always been that it was too generous and could never secure congressional approval. Recent developments, though, suggested otherwise, and they began to reconsider their position. In the last week of January 1914 flood-control advocates Ransdell, Humphreys, and New Orleans businessman Robert H. Downman met with Newlands and leading waterways conservationist George H. Maxwell in an effort to "get together" on a suitable plan of levee protection for the Mississippi River. Democratic Congressman and Senator-elect Robert "Cousin Bob" Broussard of Louisiana also attended the conference and, as both a progressive and a native of Louisiana, he assumed the role of mediator. Personally, Broussard favored the Newlands plan, but he also understood that federal funding for Mississippi River levees was vitally important to his home state of Louisiana. After six days of negotiations, the two factions reached an agreement.

Referred to as the "Broussard plan," the compromise endorsed the Newlands bill, with one important revision designed to mitigate the concerns of Mississippi Valley legislators. While the original Newlands bill would have granted the proposed waterway commission authority to transfer appropriations from one river to another as needed, the compromise called for a fixed and unchangeable appropriation of \$10 million a year for 10 years for the lower Mississippi River, a total appropriation well in excess of that proposed by the Ransdell-Humphreys bill. Additionally, the Broussard plan contemplated getting from the Rivers and Harbors Committee as large an



Congressman Robert Foligny Broussard of Louisiana. He was a U.S. Representative from 1897-1914 and a U.S. Senator from 1915-1918. *U.S. Senate Historical Office*

appropriation for the Mississippi River as possible at the present session of Congress. In exchange for these concessions, lower valley Democrats would not attempt to push passage of the Ransdell-Humphreys bill while the new Newlands bill ran its course. However, all did not go as planned.²⁰⁹

To the dismay of waterway advocates in Congress and elsewhere, the 1914 rivers and harbors bill fell prey to a small group of reform-minded Republicans intent on curbing the excesses associated with rivers and harbors legislation. A Republican filibuster in the Senate led by Theodore E. Burton, a highly-regarded former chair of the House Committee on Rivers and Harbors and a fiscal conservative, thwarted an effort to approve a \$54 million rivers and harbors bill in late July. By the time Congress returned to the bill in early September, conditions were even less favorable for such legislation. The outbreak of the war in Europe in August 1914 led to a sharp drop-off in U.S. tariff revenues, resulting in a projected budget deficit of \$100 million. In the face of financial difficulties and approaching midterm elections, Wilson abandoned his support for both the 1914 rivers and harbors bill and the Newlands bill, calling instead for the strictest economy in all appropriations. Left to fend for themselves and disinclined to compromise, valley Democrats pushed ahead, but unsuccessfully. Throughout a continuous session of more than 30 hours, Burton and Republican Senator William Kenyon of Iowa maintained a filibuster against the bill. News that reinforcements were on the way compelled valley Democrats to capitulate and to take what they could get. On September 20, the story in the *New York Times* ran with the headline "Democrats Routed in Pork Bill Fight." The compromise bill adopted two weeks later authorized a lump sum appropriation of only \$20 million, less than 40 percent of the original proposal.²¹⁰

Still reeling from the setback, flood-control advocates prepared a show of force. Congress recessed at the end of October, and between sessions both the MRLA and Ransdell's National Rivers and Harbors Congress marshaled their considerable resources and staged a convention in Washington. Delegates arrived in early December in special trains from Memphis and other Southern cities, and an Associated Press dispatch from Washington reported that "the white ribbons of the Mississippi River Levee Association are more frequent than stars and stripes here today." Among the most prominent of those in attendance were Secretary of State William Jennings Bryan, Secretary of War Lindley M. Garrison, Speaker of the House James Beauchamp "Champ" Clark of Missouri, MRLA President A. S. Caldwell, and powerful machine-boss Martin Behrman, mayor of New Orleans and a vice president of the Rivers and Harbors Congress. Bryan opened the congress with a stirring speech for federal

flood control, and a long line of advocates followed him to the podium. This impressive gathering did much to shape public opinion and to garner legislative support for federal flood control, and in late-December the House approved a \$30 million rivers and harbors appropriation, scarcely three months on the heels of the last appropriation. A month later the Senate Commerce Committee increased that appropriation to more than \$38 million, but as in the previous year, the bill ran into trouble on the floor of the Senate. In February and March 1915, Republican senators filibustered again, this time reducing the appropriation to \$25 million.²¹¹

In spite of sizeable Democratic majorities in both houses of Congress and the backing of powerful and well-organized lobbying agencies, flood-control and waterways improvement advocates alike saw their best efforts defeated two years running by a conservative minority in an atmosphere generally hostile to rivers and harbors legislation. Partly as a result of that hostility, Mayor Behrman of New Orleans and others initiated a campaign to separate Mississippi River appropriations from omnibus rivers and harbors bills. While the Ransdell-Humphreys bill languished away in committee, proponents of federal flood control began mapping out a new strategy along those lines.²¹²

Second Efforts

In the winter of 1915-1916, flood-control advocates in Congress conspired with the popular Speaker of the House, Champ Clark, to create a new standing committee on flood control. The House of Representatives had acquiesced in 1911 to the abolishment of the House Committee on Levees after more than eight years without a break in the levee system of the lower Mississippi River. Two major floods in 1912 and 1913 and the failure of the levee system on both occasions indicated that this decision had been premature. Clark, whose congressional district bordered the Mississippi River and was subject to overflow, endorsed the adoption of a federal program for flood control for the lower valley. The failure of the Rivers and Harbors Committee to give adequate consideration to the Ransdell-Humphreys bill also figured in the



Congressman James Beauchamp "Champ" Clark of Missouri. He served as a U.S. Representative from 1893-1920 and was Speaker of the House from 1911-1918. (*Library of Congress*)

Speaker's decision to create a new committee. According to Clark, the Rivers and Harbors Committee "had so much work to do—it was not any lack of intention, but it is occupied with legitimate duties and it had a very shadowy kind of jurisdiction over this [flood control] question—that it had not the time to attend to it." Opponents of the resolution objected to the fact that the chair of the House Rivers and Harbors Committee, Democrat Stephen M. Sparkman of Florida, had not been notified of the decision until the previous day, after the resolution had already been considered and approved by the Committee on Rules. At least four members of the Rivers and Harbors Committee spoke in protest, but to no avail. With news arriving daily of yet another record-breaking flood along the lower Mississippi River, the House adopted the resolution on February 3, 1916.²¹³

The establishment of the House Flood Control Committee represented a tremendous advance for flood-control interests. In the past, bills for the improvement of the Mississippi River struggled among a morass of competing projects to find a place in the annual or biennial rivers and harbors bills. Additionally, the controversial nature of these bills dictated their careful handling. As such, large appropriations for the lower Mississippi River were an anathema in that they threatened the passage of these omnibus bills. In the newly created House Flood Control Committee, however, the Mississippi River would receive priority treatment and adequate consideration in a committee friendly to its purpose. To the surprise of no one, the Speaker appointed Congressman Humphreys, co-sponsor of the Ransdell-Humphreys Bill, as chair of the new committee.²¹⁴

The House Flood Control Committee wasted little time, with hearings on the Mississippi River flood problem beginning early the next month. Among the 38 witnesses to testify before Humphreys' committee were Senator Ransdell; former Mississippi Senator LeRoy Percy; the president of the Mississippi Levee District, Walter Sillers; MRLA President, A. S. Caldwell; Mayor Behrman; and several members of the MRC, including its president, Colonel Townsend. Almost without exception, the testimony defended levees as the sole reliable method to control floods and favored more generous federal contributions for the completion of the



Senator Le Roy Percy of Mississippi was one of the leading flood control advocates in the Mississippi Delta. *U.S. Senate Historical Office.*

lower Mississippi River levee system. Both Townsend and Percy placed the total cost of completion in the area of \$50 million, and the committee completed testimony on the Mississippi River on April 4, 1916. In an effort to placate Newlands and broaden support for the bill, the committee next heard testimony on the Sacramento River, a California river with tributaries originating near Lake Tahoe. Both Newlands and his associate, George Maxwell, testified as to the flood-control problems there.²¹⁵

Later that month, the Flood Control Committee reported the Ransdell-Humphreys bill without amendment. In addition to a large appropriation for the Mississippi River, the bill proposed \$5 million for the Sacramento River. Throughout early May, flood-control advocates defended their bill against charges of illegality and pork barreling, but as the New Orleans press later indicated, "the opposition had more sound and fury than actual support and votes." The creation of a new standing committee on flood control had foiled their efforts to bury the Ransdell-Humphreys bill in committee, ruining their only practical chance of defeating the bill in the House. Once it reached the floor for a vote, few in that body could justify their opposition in an election year, as all three major political parties were committed to the premise that the lower Mississippi was a national project worthy of federal aid. The bill's enemies did successfully increase the local contribution requirement from one-fourth to one-third. On May 16, 1916, the House passed the bill by the wide-margin of 180 to 53.²¹⁶

Although his co-sponsor had secured a convincing victory in the House, Ransdell anticipated stiff opposition in the Senate. Newlands' influence would be directly felt there, and election-year politics would weigh less heavily in the Senate, with only a third of its membership up for reelection. Following House action on the bill, the Senate temporarily set it aside at the request of Newlands, who had received no indication that Ransdell and his supporters were interested any longer in compromise. When the bill was introduced two weeks later, Newlands moved to refer it to the Committee on Interstate Commerce, which he chaired, rather than the Committee on Commerce. A prominent member of the Commerce Committee himself, Ransdell strenuously objected, arguing such a move "would be tantamount to killing the bill." After a short period of debate, the Senate voted 41 to 16 to refer it to the Commerce Committee, which was known to have a safe majority favoring the pending bill and to be under friendly leadership. In addition to his responsibilities as president pro tempore of the Senate, Arkansas Democrat James P. Clarke served as chair of that committee, and his sympathies toward the bill were well known.²¹⁷

As they continued their lobbying efforts on behalf of the Ransdell-Humphreys flood-control bill, lower valley Democrats drew encourage-



Senator James Paul Clarke of Arkansas. *U.S. Senate Historical Office.*

ment from an unexpected source—the U.S. Supreme Court. Early into preparations for the Democratic National Convention in June 1916, they received news that substantially bolstered the bill's chances in the Senate. In the case of *John F. Cubbins v. The Mississippi River Commission*, the Supreme Court ruled in favor of the MRC, concluding that the MRC was not liable for damage resulting from broken levees because the work of levee building along the lower Mississippi River was one of preservation, not of reclamation. Had an adverse decision been rendered in the case, the legal basis for federal flood control would have been swept away. The issue was

never much in doubt, though, as the MRC enjoyed the good fortune of a friendly court. Chief Justice Edward Douglas White was a native Louisianan and a vigorous partisan. Assessing the importance of the June 5 ruling, Humphreys maintained that their agenda had been immeasurably strengthened, as “the decision thoroughly disposes of the chief arguments presented by the opponents of the flood prevention bill.”²¹⁸

One week later, the 1916 Democratic National Convention got underway in St. Louis. Inspired by the slogan “He kept us out of war,” an enthusiastic crowd nominated Woodrow Wilson to a second term. The Democratic platform contained a plank on rivers and harbors legislation and flood control, at Ransdell's insistence. Their business completed, lower valley Democrats returned to Washington anxious to renew the struggle for federal flood control, but, once again, their efforts were frustrated.²¹⁹

As in the previous two years, the political climate turned hostile when conservative Republicans filibustered the annual rivers and harbors legislation at the end of May 1916. More certain of their prospects this time, Ransdell and other valley Democrats held their ground, refusing to compromise. A long fight ensued, and Senator Clarke, as chair of the Commerce Committee, felt obliged to delay consideration of the flood-control bill until after the struggle, which continued through July. The rivers and harbors bill eventually passed, but too much time was lost. Ransdell and his allies were forced to carry their fight over into the second and final session of the 64th Congress, scheduled to begin in early December.²²⁰

That delay proved costly. Three weeks after leaving Washington for his home in Little Rock, Arkansas, the 62-year-old Clarke suffered a massive stroke and died in the care of his family. His passing stripped flood-control interests of one of their most powerful and well-placed allies. A month later, Democrats suffered a setback at the polls. The November elections returned Wilson to office, but only narrowly, and Republicans made gains in both houses of Congress. In the House, Democrats squandered a 25-seat majority and were forced to negotiate with several independent representatives-elect for majority status in the upcoming 65th Congress. These negotiations continued into late February with little indication as to the outcome. With the future uncertain, the Democratic leadership redoubled its efforts to secure passage of the Ransdell-Humphreys bill before the close of the 64th Congress in early March.²²¹

Over the coming months, Newlands assumed the role of spoiler, partly out of frustration. As time ran out on the last session, Ransdell had agreed to a compromise along the lines of the 1914 Broussard plan, but during the congressional recess Humphreys rejected the arrangement. The flood-control bill had already passed the House, and Humphreys hoped to avoid a vote on an amended version. As the second session opened, Newlands threatened a filibuster and demanded that the Ransdell-Humphreys bill be made the subject of Senate hearings, aware that scheduling and gathering testimony would further delay action on the bill. The short session opened in December with the Senate hopper badly jammed, and hearings began on the 19th of that month. Both Humphreys and Newlands testified, with the latter contributing over two hundred pages of testimony. After four days of hearings, Democratic Senator James K. Vardaman of Mississippi assumed Ransdell's responsibilities and reported the bill to the Senate. Ransdell spent the day in his hotel room, sick with "indisposition" and, in all probability, frustration.²²²

Through early February, Ransdell and his allies struggled in vain to bring their bill to the Senate's consideration. With U.S.-German relations deteriorating and the nation's rail network dangerously overloaded and backed up, Ransdell underscored the importance of waterways improvements: "There is great congestion of traffic throughout the Union, and every agency of transportation should be fostered and encouraged to the utmost. The time is short. The emergency is acute." The Louisiana senator moved to take up the bill on February 9, but Newlands blocked its consideration, insisting on the priority of railroad legislation. As the 64th Congress moved into its final weeks, flood-control advocates grew increasingly uneasy. Two obstacles remained—overcoming Newlands' opposition to the flood-control bill and securing its consideration in the Senate.²²³

With the threat of a filibuster, Newlands represented a formidable challenge to the Ransdell-Humphreys bill, and flood-control advocates made one last effort to mollify him. Unwilling to weigh down the flood-control bill with Newlands' proposals, Humphreys instead amended the proposed 1917 rivers and harbors bill to include provisions for the creation of an interdepartmental cabinet commission, but the Nevada senator was dissatisfied, expressing concern that the House might later reject his amendment, as it had in previous years. In a personal letter to Wilson dated February 11, 1917, he concluded that his "only recourse is to fight all piecemeal legislation until the adoption of a general scheme of legislation is forced." True to his word, Newlands continued his opposition to the flood-control measure, but thereafter with less vigor, and the threat of a filibuster was alleviated somewhat. Ransdell turned next to securing Senate consideration for his bill, a challenge that he pursued with reckless disregard for his own standing in the Democratic Party.²²⁴

In the last weeks and days of the 64th Congress, the rapid deterioration of U.S.-German relations largely determined the fate of the Ransdell-Humphreys bill. Germany announced a return to unrestricted submarine warfare at the end of January, and Wilson severed diplomatic relations between the two countries. Several weeks later, a dozen or so diehard noninterventionists including Progressive Senators Robert La Follette and George W. Norris began a filibuster against the administration's emergency revenue bill, seeking to force an extra congressional session so that



Woodrow Wilson, 28th President of the United States, 1913-1921. *National Photo Company Collection (Library of Congress)*

their views would continue to be heard as the crisis with Germany unfolded. According to the New Orleans *Times-Picayune*, this filibuster "threw into the air all plans for the remaining eight working days of the session, threatening essential pending legislation and foreshadowing opposition to any request President Wilson may make for authority to deal with the international crisis after Congress adjourns."²²⁵

The schism between Senate Republicans and the Democratic leadership created an opportunity for the flood-control bill, which Ransdell was quick to seize. Working behind the scenes, he drafted a proviso that would guarantee action on the measure and took it to the leadership of both parties. Senate

Republicans were anxious to displace the revenue bill to an extra session and proved amenable to the idea. The Democratic leadership, eager to secure consideration of the administration's emergency revenue bill, could not risk a break with their Southern element at such a critical juncture, and Ransdell forced the issue by threatening to launch a filibuster of his own. Although his actions invited the condemnation of the party leadership, they eventually acceded to his demands. Approaching midnight on Saturday, February 24, the Senate approved a unanimous-consent agreement that set aside five hours on the following Monday afternoon for the consideration of the Ransdell-Humphreys bill, with the revenue bill to follow two days later.²²⁶

Still uncertain as to the success of their efforts to appease Newlands, valley Democrats remained apprehensive as the 64th Congress moved into its final week. Ransdell had cajoled the Senate into a unanimous-consent agreement, but as the friendly *Times-Picayune* admitted, it would be "an easy matter for Senator Newlands or any other opponent of the measure to use up the five hours during which the debate may be considered in speaking against the measure." With Humphreys and a handful of Southern representatives present in the Senate chamber, Ransdell opened debate at 3 p.m. on Monday afternoon. The bill's advocates consumed at least two hours presenting their case, still without any indication of Newlands' intentions. Well into the allocated five hours, the Nevada senator gained control of the floor. To the considerable relief of anxious Southerners, he admitted to "no disposition to obstruct this bill," instead making one last effort to attach his commission amendment to the pending measure. That effort fell just two votes shy of success. Senator Joseph Robinson of Arkansas, who was in the chair, spurred along the proceedings and, with fewer than five minutes remaining, called a vote. By a margin of 39 to 16, the Senate approved the Ransdell-Humphreys flood-control bill. Thirty Democrats, including Newlands, supported the legislation, with just five in opposition. As the New Orleans press indicated, Ransdell's "splendid generalship" deserved much of the credit for the Senate victory, but the struggle was not over.²²⁷

While Wilson's progressive sympathies were well known, flood-control advocates had not anticipated opposition from that direction. The president soon gave cause for concern. On the afternoon of February 28, Democratic Senator John Sharp Williams of Mississippi approached him for permission to arrange for a small bill-signing ceremony on the following day. Wilson demurred and asked if Newlands' interdepartmental commission had been added to the bill. On being advised that it had not, he asked for a copy of the bill and dismissed Williams, who rushed off to notify the other interested senators of his conversation with the president.

Together, they hurried to the War Department to confer with Secretary Newton D. Baker, where they learned little more than that the cabinet head shared their concerns. Rumors spread of an impending veto, touching off a stir in New Orleans. The following morning, March 1, 1917, the *Times-Picayune* read: "THREATENED VETO OF FLOOD CONTROL MEASURE CAUSE OF ALARM: Failure to Include Proposal for Commission May Kill the Bill."²²⁸

Fortunately for the bill's advocates, several factors worked to head off a presidential veto. On February 24, the United States learned through British intelligence of a telegram from the German foreign secretary, Alfred Zimmerman, to the German ambassador in Mexico. The cable proposed that, in the event of U.S. entry into the European conflict, a military alliance be formed between Germany and Mexico, with Mexico promised the return of Texas, Arizona, and New Mexico after the war. Withholding news of this development, Wilson asked a joint session of Congress for authority both to arm American merchant ships and to "employ any other instrumentalities or methods that may be necessary and adequate to protect our ships and our people in their legitimate and peaceful pursuits on the seas." While there was little opposition in either house to giving the president authority to arm the merchant fleet, La Follette and the other extreme noninterventionists strongly opposed granting Wilson any blanket authority to wage war and pledged themselves to continued resistance. In the



The *R.M.S. Lusitania* was sunk by a German submarine on May 7, 1915, killing 1198 people, including 128 Americans. The incident sparked a popular anti-German sentiment in the United States—a sentiment hastened by word of the Zimmerman note. *George Grantham Collection (Library of Congress)*.

face of stiff partisan opposition, the president could ill-afford to alienate loyal Democrats, particularly with war looming on the horizon, and the timing of the Zimmerman note was such that it may have influenced Wilson's final decision on the flood-control bill.²²⁹

Additionally, the transportation crisis continued to worsen, further highlighting the need for reliable alternatives to rail transport. In his address to the nation on February 27, Wilson blamed the German blockade "for the tying up our shipping in our own ports because of the unwillingness of our ship owners to risk their vessels at sea without insurance or adequate protection, and [for] the very serious congestion of our commerce which has resulted—a congestion which is growing rapidly more and more serious every day." As shipping continued to back up, railroads hauling war materials to the East Coast found it increasingly difficult to unload their contents, and many of the desperately needed rail cars were being used for storage purposes, further exacerbating the shortage.²³⁰

According to the *Times-Picayune*, Secretary of War Baker may also have played a role in convincing the president to sign the flood-control bill. Among Wilson's most trusted advisors and confidants, Baker was a Progressive and a Southerner, the child of Confederate parents. His responsibilities as secretary of war brought him into frequent contact with the Corps of Engineers and the MRC, and he turned a sympathetic ear to their needs. After conferring with Mississippi Valley senators, Baker carried their case to Wilson. While nothing is known of their conversation, Wilson's favorable decision came shortly thereafter.²³¹

As Louisianians read of the threatened veto on the afternoon of March 1, 1917, Wilson met with Humphreys, Ransdell, and several other legislators in his private office at the White House for the bill-signing ceremony. Using one commemorative pen for his first name and another for his last, Wilson affixed his signature to the flood-control bill. As he signed, Wilson remarked, "This is a very necessary piece of legislation." Ransdell, of course, agreed wholeheartedly, later calling his flood-control measure "one of the greatest pieces of constructive legislation ever enacted by Congress." Clearly the Ransdell-Humphreys Act represented a tremendous victory for flood-control interests, but, for most of the country, its signing was overshadowed by more sensational news. On the previous day, Wilson had turned over the Zimmerman note to the Associated Press, which broke the story on the morning of March 1st. Caught up in the war hysteria that swept the nation, the *New York Times* failed even to mention the bill's passage, an oversight that proved somewhat indicative of the problems that lay ahead for the First Federal Flood Control Act.²³²

On March 4, the 64th Congress recessed without approving essential appropriation bills, leaving Wilson with little choice but to call a special

session. That call came after German submarines sank without warning and with heavy loss of life three American merchant vessels, including, somewhat ironically, the *City of Memphis*. Wilson went before the newly convened Congress on April 2 with his solemn call for a declaration of war. In spite of the opposition of Progressives like La Follette and Norris, a resolution was quickly passed, and the United States found itself at war with Germany. Whereas the prospect of armed conflict with Germany had facilitated the passage of the Ransdell-Humphreys bill, the advent of war hampered its full implementation, both during and after the war.²³³

Chapter 9

Missed Opportunities

The last two decades of the nineteenth century marked a restrictive period in the history of the Mississippi River Commission. Created with broad authorities over the entire Mississippi River, the MRC soon found its supervisory jurisdiction limited through the congressional appropriation of 1886. The MRC maintained its responsibility for conducting surveys and maturing plans of improvement for the entire length of the river, but the Commission's supervisory duties over those improvements extended only from the Head of Passes to Cairo. Likewise, Congress initially restricted the scope of the plan for improving the lower river by limiting the expenditure of funds for levee repair and construction to navigational purposes only. This levee restriction, lifted in 1890, essentially eliminated flood control from the general system of improvement for more than 10 years. By contrast, the first three decades of the twentieth century ushered in a period of expansion for the MRC. In 1906 Congress enlarged the jurisdiction of the MRC by authorizing it to construct levees from Cairo to Cape Girardeau at the head of the St. Francis basin. Six years later, the 1913 rivers and harbors bill extended the MRC's jurisdiction even farther, authorizing it to fund and coordinate levee construction as far upriver as



Mules and wagons are used to construct levees in the St. Francis Levee District in 1909.

Rock Island, Illinois. Combined with the legislative affirmation of the levee system in the form of the Ransdell-Humphreys Act, this growth northward culminated in the establishment of the Northern MRC District, headquartered in St. Louis. What transpired in the midst of this period of MRC expansion and beyond can be only described as an era of entrenchment and missed opportunities, followed by an unparalleled disaster.²³⁴

Old Questions Resurface

In the aftermath of the 1912 flood, MRC President Townsend, delivered a passionate defense of the levee system. The recent high-water stages, he contended, were not an indictment against current policies, rather they “simply attained the height which Gen. Comstock and Maj. Starling predicted the flood of 1882 would have attained if the river had then been confined.” Townsend concluded that the flood “cleared the atmosphere of certain false theories and we can now resume operation with a definite knowledge of the problem before us.” In his view, the recent setbacks on the Mississippi River were similar to the growing pains experienced during the implementation of levee systems on European rivers. Townsend, therefore, argued that levees had stood the test of time and “no other method of relief from floods has been successfully applied to large streams.”²³⁵

Reflecting the further entrenchment of the MRC toward a “levees-only” policy, Townsend chided the proponents of alternative methods of flood control, particularly with regard to reservoirs and outlets:

Originality is a very desirable quality in an engineer, but there is danger of confusing originality and ignorance. When a proposition with which he is unfamiliar is presented to him it is his duty to follow the instructions placed at some railway crossings, to stop, look, and listen. He should investigate what has been done in the past, and seek to discover if there is no precedent for his action...To adopt a project, even though popular, that has been tried, found



Colonel Curtis McDonald Townsend, Member, Mississippi River Commission, 1911-1920. He served as president of the Commission from 1912-1920.

wanting, and rejected by his forefathers, is not progress, but retrogression.²³⁶

Despite these assurances from Townsend, New Orleans interests remained alarmed that the 1912 flood reached a record stage of 21 feet on the Carrollton gauge. They had lost faith in the promise that levees alone would spare them from inundation. Convinced that ongoing levee construction and gap closings upriver were to blame, they continued to push for the construction of emergency spillways as supplements to the levee system.

These interests found an unlikely ally in Judge Robert Taylor, a close associate of the late James Eads and, by 1912, a 31-year veteran of the MRC. Like his famous protégé, Taylor had long championed the development of a levee system for the Mississippi River, but he now openly challenged the basis for the MRC's traditional stance against spillways. Spillways, he contended, "are not to be condemned merely because they may be called outlets." Taylor did not argue against the long-standing MRC contention that outlets reduced the velocity of the river and produced deposits of sediment, but he suggested "no harm would come to the channel from the abstraction of the small amount of water which such waste weirs...would take out" during large floods. While he remained concerned over the potential costs of constructing and maintaining any spillway, Taylor identified Bonnet Carré as the sole location where he believed one could be constructed to relieve flood stages at New Orleans.²³⁷

The MRC relented on the issue the following year and directed Major Clarke S. Smith, the MRC secretary, to conduct a study into the feasibility of constructing a spillway near New Orleans to relieve pressure on that city's levees. Smith investigated six sites: Bonnet Carré, Kenner, and Lake Borgne on the east bank of the river; Willow Bend, Waggaman, and Jesuit's Bend on the west bank. Coming as no surprise to spillway advocates in New Orleans, Smith's report concluded that a flood stage exceeding 21 feet on the Carrollton gauge, indeed, threatened the security of New Orleans' commercial and business interests. Smith suggested as a solution the construction of a 6,000-foot long spillway capable of diverting 230,000 cfs from the main channel, but—citing fears of interrupting the continuity of the existing levee line and the threat of backwater flooding to New Orleans—surmised that a suitable location for a spillway could not be found.²³⁸

The MRC received Smith's report on October 8, 1914, and it fell under the review of John A. Ockerson. An assistant engineer with the MRC since its inception and a member since 1898, Ockerson had assumed the mantle as the leading "levees-only" advocate on the MRC when, in a paper presented to his fellow members the previous year, he unabashedly

condemned "reservoir enthusiasts, who predict disaster unless flood heights are materially reduced rather than being controlled and guided safely to the sea," for creating a dangerous atmosphere of fear in the city of New Orleans. Ockerson saw the recent call for spillways as a potential threat to the completion of the existing levee system. In his review of Major Smith's report, Ockerson argued, "no difficulties have been encountered in levee construction suggesting that flood control by means of levees is impractical." On November 19, he offered a stinging resolution condemning the use of spillways and outlets as dangerous to the integrity of the levee system, while affording only a limited reduction in flood heights at great expense, in terms of cost and maintenance. With Taylor having retired in March, the resolution passed unanimously.²³⁹



John Augustus Ockerson, Member,
Mississippi River Commission, 1898-1924.

Taylor's last-minute change of heart toward outlets, though, reflected the development of a mild voice of reason not seen in a member of the MRC since General Cyrus Comstock. In this manner, the reopening of the spillway debate within the MRC emulated the continual fragmentation of the federal legislature and the engineering community regarding the ongoing debate over the future course of flood-control policy in the nation. While a stalemate had developed in Congress over the competing Ransdell-Humphreys bill and the more comprehensive Newlands bill, the engineering community established a special committee through the American Society of Civil Engineers (ASCE) to investigate and report upon the causes of floods and various methods of flood prevention. By selecting eminently qualified engineers from all spectrums of the profession to sit on the committee, the engineering community hoped to finally "lift the matter of river improvement above the field of speculation and controversy and make advancement toward adequate achievement," not only for the Mississippi River, but all rivers in the nation subject to repeated flooding.²⁴⁰

The ASCE organized the special committee in 1915. Its designated members represented various local, state, and federal agencies tackling flood-control problems across the nation. Townsend and Ockerson represented the military and civilian engineering influences of the MRC, with

Townsend selected to serve as committee chairman. Joining them were prominent engineers John A. Bense, a former State Engineer for New York who oversaw the construction of the New York State Barge Canal; Morris Knowles, a consulting engineer with the Miami Conservancy District; Thomas Dabney, the long-time chief engineer of the Yazoo-Mississippi Levee District; Joseph B. Lippincott, a former topographer with the U.S. Geological Survey and former supervisory engineer with the U.S. Reclamation Service; Francis L. Sellew, district engineer of the Massachusetts Public Works Department; Daniel W. Mead, an internationally-recognized expert on hydraulic and hydroelectric engineering and a future president of the ASCE; Arthur T. Safford, another prominent hydraulic engineer and the author of *A Treatise on Hydraulics*, published in 1914; and Carl E. Grunsky, a consulting engineer with the State of California and the co-developer of the Sacramento River flood-control plan based heavily on diversions and spillways.²⁴¹

On January 19, 1916, the committee presented its findings at the annual meeting of the ASCE. The committee first discussed the deficiency of existing data on the nation's rivers, indicating that much of it had been gathered for purposes other than flood control. That information, therefore, was predisposed to address low-water conditions, rather than flood conditions. As for existing data pertaining to flood control, the committee found the information gathered by various engineering bodies inconsistent at best. The MRC, for example, focused its attention on influences on the flat, alluvial portion of the Mississippi River. Conversely, the California Debris Commission and the Pittsburgh Flood Commission concentrated on conditions impacted by the more mountainous areas surrounding the Sacramento, Allegheny, and Monongahela rivers. The Miami Conservancy District, too, had gathered information, but on a river flowing entirely within one state. Recognizing that each river has natural laws and characteristics influenced by conditions peculiar to that stream, the committee concluded, "No method [of flood control] can be devised that will be susceptible to universal application."²⁴²

Despite this assertion, the committee delved into a discussion of the various methods of flood control and their influences on various types of streams and rivers. They dismissed reforestation as beneficial only in terms of preventing hillside erosion, finding no justifiable use of the method in controlling floods. Regarding reservoirs, the committee concluded that detaining flows from headwater streams to reduce flood heights on larger rivers was a workable solution, particularly when employed in mountainous regions, where valleys void of valuable farmland could be utilized as impoundment areas. On the other hand, reservoir construction would prove more costly—not to mention objectionable from

the landowner standpoint—in areas which predominantly comprised valuable and tillable land. In this instance, the committee advocated the use of temporary detention basins to act in the same manner as traditional backwater areas, serving as overflow storage areas during flood years, while remaining farmable in non-flood years.²⁴³ As to cutoffs and outlets, the committee recommended their use only in streams not sensitive to severe bank erosion and riverbed scour. On rivers carrying large amounts of sediment and susceptible to excessive bank caving, however, the committee warned of the potential dangers to the regimen of such rivers through the execution of cutoffs and the implementation of outlets. Without completely condemning these methods, the committee suggested that “great care should be exercised in their employment, always bearing in mind that the best conditions on alluvial streams follow its confinement to a single channel.” Not unsurprisingly, the committee unhesitatingly extolled the virtues of levees, particularly on the lower reaches of long, alluvial streams, such as the Mississippi and Colorado rivers. In these instances, the committee concurred that levees “afford the only sure means of flood control.”²⁴⁴

The committee ended the report by reiterating its view on the inadequacy of existing information on those methods of flood control under discussion and highlighted the pressing need for further study:

Your Committee believes that it can perform no greater service to the Profession than to call attention to the paucity of the data existing in reference to flood control and to the damage which may result from river regulation legislation, either by the Nation or the States, calling for definite projects which are not predicated on full and thorough investigation.²⁴⁵

If the intent of the special committee was to unite the engineering community by rising above speculation and controversy, it failed. As with previous formal discussions on flood-control methods, some hailed the committee report; others condemned it. Each method had its share of advocates and detractors and, through the ensuing discussion of the committee's report, only one commonality emerged from within the engineering community—the obvious need for further intensive examination and experimentation.

The National Laboratory Debate

The report of the special committee forcibly emphasized the lack of detailed hydraulic engineering data concerning floods and flood control. By the beginning of the twentieth century, many hydraulic engineers suspected that the distinct peculiarities exerted by nature on different drainage

systems prevented the universal application of most theories. Likewise, they recognized that the misapplication of any theory through experimentation might severely harm the regimen of a river so complex and majestic as the Mississippi River. Therein lay the problem. Detailed observations and record keeping represented the most reliable system of examination, but comprehensive observations and records on American rivers only dated back for decades, in comparison to centuries on foreign rivers. Such a void highlighted the need for experimentation. While most methods of flood control had unwavering proponents, many engineers remained hesitant to support them decisively for fear of unleashing irreversible, harmful effects on the river. As a result, the concept of constructing a national hydraulic laboratory to conduct experiments in tandem with actual observations began to germinate. By the 1920s, that support had blossomed into a full-fledged movement.

The concept actually originated in Germany in 1898, when Professor Hubert Engels of the Technical College at Dresden constructed the first river laboratory in the university basement. By 1913, Engels had replaced that original laboratory with an improved and larger complex. In short order, hydraulic laboratories spread across Europe, culminating in the establishment of several national laboratories.²⁴⁶ The extent of European experiments with hydraulic models sparked an interest among American scientists for the establishment of national hydraulic laboratory within the United States. The principal advocate was John R. Freeman, a prominent civil engineer from Providence, Rhode Island. Freeman had traveled to Europe and was impressed by the rapid extension of hydraulic laboratories and the results they produced. Fearing the nation was falling behind the Europeans in the field of hydraulic research, Freeman launched a campaign within the United States for the establishment of a national hydraulics laboratory.²⁴⁷

Freeman used his position as president of the ASCE to push the movement forward. Along with many other civilian engineers within the ASCE and other professional engineering societies, Freeman saw the MRC's so-called "levees-only" policy as reliance on faulty observations of the past rather than scientific fact. In his presidential address to the ASCE, he pointed out that



John R. Freeman. *Waterways Experiment Station*

73 years after Humphreys and Abbot began their study of the physics and hydraulics of the Mississippi River and 43 years after the Congress established the MRC, the nation still had not solved the problems relating to flood control and navigation on the river. He contrasted the large expenditures made toward improving the lower Mississippi River through experimental designs with the lack of progress in preventing bank erosion and channel shifting. Freeman went on to emphasize that the hydraulic laboratory would assist in identifying workable solutions to problems and eliminate costly field experiments destined to fail, thereby allowing effective structures to be built more quickly and less expensively.²⁴⁸

Freeman found a congressional proponent for his movement in Louisiana Senator Joseph Ransdell. In the fall of 1922, Ransdell's Senate Commerce Committee produced a joint resolution calling for the establishment of a national hydraulic laboratory in Washington, D.C., to conduct research, experiments, and scientific studies associated with the problems involved in river hydraulics. The resolution stipulated that the president was to decide under which Federal bureau the laboratory's jurisdiction would fall. The committee held hearings in September 1922. In referencing a flood that he witnessed earlier that year on the Mississippi River, Freeman testified, "I was never more intensely aroused in my life than I was then, by seeing the fearful conditions down there, and that is why I am here today with these plans."

Many prominent engineers, including L.W. Wallace, executive secretary of the 42,000-strong American Engineering Council, Elwood Mead, Commissioner of Reclamation, and N.C. Grover, chief hydraulic engineer for the U.S. Geological Survey, shared Freeman's enthusiasm. All three testified that the American engineering community shared a unanimous sentiment in favor of a hydraulic laboratory. "It is our belief, in light of information obtained from the leading hydraulic engineers of the United States," Wallace stated, "that there is a real need for such a laboratory." But perhaps the most impressive and compelling testimony came in the form of a letter from Secretary of Commerce Herbert Hoover, a respected engineer and future president of the United States. Hoover discussed the great advancements in the design of ships, tanks, and aircraft attained through model experiments. While admitting that such accomplishments were not as complex as those involved in hydraulic engineering, Hoover believed the investigation of river control through model experiments offered the "promise of important results." Hoover concluded his letter by stating, "it seems the better part of wisdom" to establish a hydraulic laboratory which "may yield results of such far-reaching importance."²⁴⁹

The only dissenting opinion during the testimony came from John Ockerson. Up until his testimony, both the Corps of Engineers and the



Major General Lansing Hoskins Beach, Chief of Engineers from 1920-1924. As a colonel, he served as a member of the Mississippi River Commission from 1913-1920.

MRC had been largely silent on the subject, at least officially. Behind the scenes opinions had been being gathered since the inception of the bill. After introducing the bill to the Senate Commerce Committee, Ransdell wrote a letter to Secretary of War John W. Meeks, asking him which agency he believed should administer a national hydraulics laboratory. Meeks forwarded the letter to Major General Lansing H. Beach, Chief of Engineers and former MRC member from 1913-1920. Beach, in turn, solicited the opinions of his colleagues on the issue.

Some within the Corps of Engineers, most notably retired Brigadier General Henry Jervey and Major L.E. Lyon, the Philadelphia District Engi-

neer, saw a great benefit in having such a laboratory and applying its findings to the improvement of the nation's rivers. Lyon, in fact, had overseen the construction of a fixed-bed hydraulic model of the lower Delaware River in 1921 to study tidal characteristics. But others, including some members of the MRC, were critical of hydraulic modeling. In a letter to Beach, Colonel Townsend, the former MRC president, argued that crucial variables, such as the volume of discharge and the character of a riverbed, could not be accurately replicated in a hydraulic model. As such, he argued that actual observations and measurements produced more accurate information. MRC member Colonel George M. Hoffman shared this sentiment and concurred with Townsend that it would be impossible to depict actual conditions of a sediment-bearing stream in a laboratory setting. Hoffman also questioned the enormous costs involved in establishing a laboratory to produce potentially inaccurate data that might supplant more reliable information obtained through actual observation. The latter views, to be sure, had a great impact on Beach's response to Meeks, "if a hydraulic laboratory should be established, it should administered by the Corps of Engineers." Despite this, Beach strongly emphasized his opinion that the proposed hydraulic laboratory "would have no value whatever in solving flood control."²⁵⁰

Beach selected Ockerson to represent both the Corps of Engineers and the MRC at the Senate committee hearings. Ockerson's employment as an assistant engineer with the MRC dated back to the Commission's estab-

lishment, but as an inspector on the Eads' jetties survey, his affiliation with the Mississippi River even predated that of the Commission. More important, the tall and dignified Swedish-born engineer was a respected and distinguished civil engineer and former president of the ASCE. Ockerson began his testimony by emphasizing the Commission's efforts spanning the past 43 years in accumulating data on the physical dynamics of the Mississippi River at all stages while working "in nature's own laboratory, the river itself." He continued by explaining that the current condition of any riverbed resulted from a lengthy period of constant changes in stage and volume, passing through many cycles of moderate, average, and extreme high and low water. A mastery and understanding of these many cycles was necessary before any logical conclusions could be made as to the present condition of a river. To move forward without such knowledge could lead to inaccurate conclusions. In Ockerson's view, the MRC already had this knowledge; the MRC in 1922 represented the most experienced Commission in nearly three decades. In addition to Ockerson, its members included such notables as Charles West, a member since 1910 whose association with the Mississippi Levee District dated back to 1884; Colonel Charles Potter, the current MRC president; and Lieutenant Colonel Gustave Lukesh. The latter two officers had formerly served as MRC secretary and district engineer for the St. Louis Engineer District. Together, the seven members of the MRC in 1922 had nearly 125 years of combined experience on the Mississippi River. Even this figure did not take into account the vast experience of the numerous assistant engineers employed by the Commission. Ockerson, therefore, could not conceive of any benefit resulting from hydraulic laboratory experiments "that would materially modify the plans that are now underway."²⁵¹

The hearings on the joint resolution ended in September 1922. Further hearings on the resolution were held in June 1923 and May 1924 and, again, the testimony given was generally sympathetic to the idea of a national hydraulic laboratory. Although the bill was favorably reported in May 1924, the full Senate took no action on the measure. Ockerson's testimony had won the day, temporarily derailing



Charles Hunter West, Member, Mississippi River Commission, 1910-1933. Prior to serving on the Commission, he was Chief Engineer of the Mississippi Levee District. *Mississippi Levee Board.*

Freeman's dream and wasting a splendid opportunity to advance the level of knowledge as recommended by the ASCE special committee in 1915.

Outlets and Spillways

With the closure of the rapidly deteriorating Bayou Lafourche in 1904, the Atchafalaya River and Cypress Creek remained as the only natural outlets on the Mississippi River. With regard to the Atchafalaya, the MRC continued to agonize over whether to keep the outlet open or close it off by entirely separating it, along with the Red River, from the Mississippi. As to Cypress Creek, the MRC in developing its policy of restraint in the interest of navigation insisted on leaving sufficient openings in the levee system for natural drainage and accidental overflow. For this reason, levee construction along the Mississippi and Arkansas Rivers ended at the head of Cypress Creek, leaving a seven-mile gap in the levee system known as the Cypress Creek gap. Historically, the gap functioned as a natural outlet for Mississippi River overflows into the Boeuf and Tensas basins when stages reached anywhere from 47-50 feet on the Arkansas City gauge. Under the existing configuration of the Red, Mississippi, and Atchafalaya rivers, a portion of the overflows found their way to the Gulf via the Atchafalaya and some returned to the Mississippi via the Red River.²⁵²

The MRC's policy of restraint in the interest of navigation, however, had since been supplanted by a much more doctrinaire policy of "levees-only." This gave Tensas basin landowners, who had long clamored for closing the gap, hope that the MRC would finally consent to its closure. In April 1915, the Tensas Basin Levee District in Louisiana entered into a mutual agreement with the Red Fork, Desha, and Chicot Levee Districts, which soon consolidated into the Southeast Arkansas Levee District. Together, these levee districts raised \$80,000 and petitioned the MRC to close gap. Despite its recent entrenchment in favor of a "levees-only" policy, the MRC proved reluctant to consent to the closure, fearing such an action would exacerbate existing drainage problems in the vicinity.²⁵³

Flooding in 1916, though, set new high-water marks from Sunflower Landing to Natchez. On the Arkansas City gauge, the river reached 56.5 feet, 1.6 feet higher than the previous high-water mark in 1912, sending overflows in excess of 330,000 cfs coursing through the Tensas basin. Together with breaks in the Arkansas River levees, Mississippi overflows inundated more than 2,000 square miles of land in that same basin. In the aftermath of the event, Frank Kerr, the Chief State Engineer of Louisiana, sent the MRC detailed plans for closing the gap that included bringing levees on the Arkansas River to full grade and section. Upon receiving the plans, MRC member Colonel James G. Warren moved that the matter be forwarded to the Commission's Committee on Levees. In July, Charles

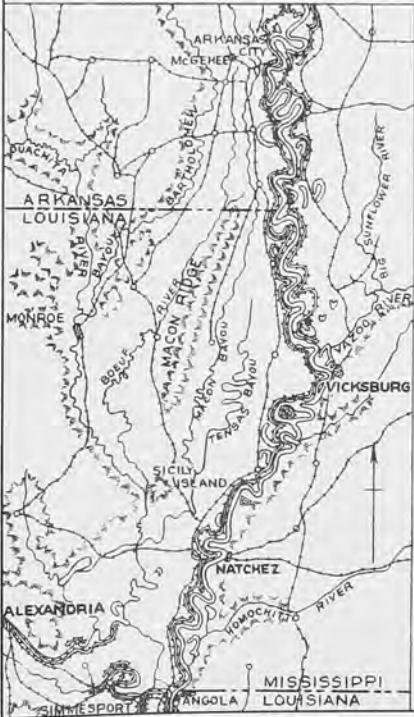
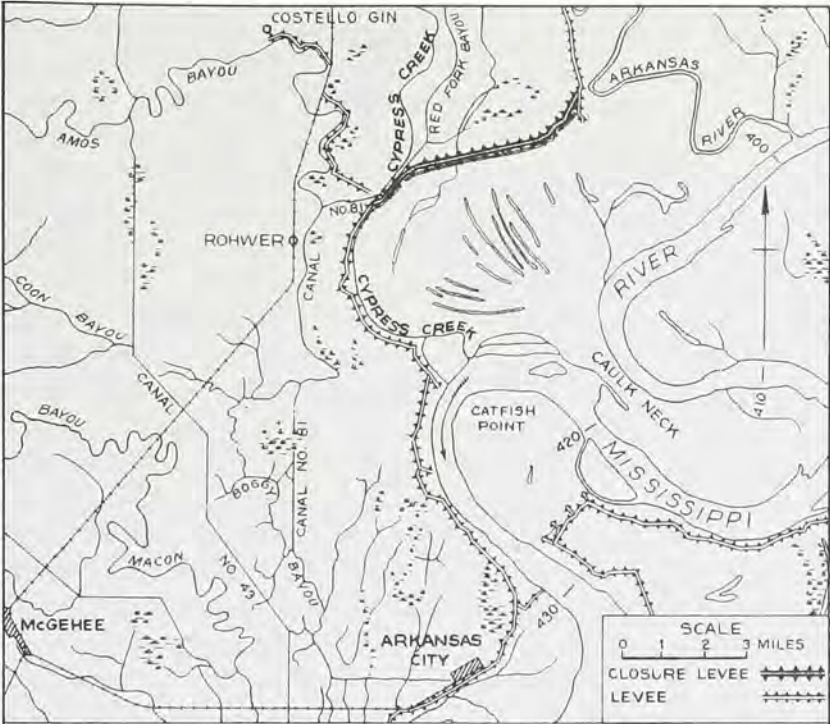
West, chairman of that committee, returned a favorable recommendation on Kerr's plan on the condition that the Arkansas River levees, indeed, were brought up to the proper grade and section.²⁵⁴

By the end of 1919, the local levee districts had succeeded in closing all but 670 feet of the Cypress Creek gap at their own expense. However, the MRC, still fearing that the local drainage problems had not been properly addressed, objected to the continuation of work. The following spring, a moderate flood reached 54 feet on the Arkansas City gauge, prompting the Mississippi River to overflow the gap and inundate nearly 687 square miles of land. Under intense pressure, the MRC relented, giving its consent to the complete closure of the gap after receiving assurances that a drainage canal would be constructed first.²⁵⁵



Colonel James Goold Warren, Member, Mississippi River Commission, 1906-

The final closure of the Cypress Creek gap in 1921 marked the culmination of the "levees-only" process. While much work remained by way of bringing Mississippi River levees to the proper grade and section, the MRC and lower valley interests had succeeded in closing the St. Francis, White, Yazoo, and Tensas fronts. The closure of Cypress Creek, therefore, denied the Mississippi River its final natural overflow outlet, with the sole exception of the Atchafalaya, the fate of which remained unsettled in 1921. On the latter issue, the members of the MRC were divided. Ockerson, the staunchest of levee advocates on the MRC, favored divorcing the Atchafalaya from the Mississippi, thereby closing the only remaining natural outlet. New Orleans interests, already distressed by the closure of Cypress Creek, opposed this concept despite Ockerson's acknowledgement of the necessity to improve the levee protecting that city. Colonel Charles Potter, on the other hand, did not support any plan contemplating the closure of Old River. Potter, who replaced Townsend as MRC president in 1920, contended that the sill constructed in the 1880s had successfully checked the enlargement of the outlet, as predicted. He believed that success also checked the prospect of the outlet capturing the Mississippi River. With the relationship of the rivers stabilized, Potter feared that tinkering with the delicate balance "may prove a dangerous experiment."²⁵⁶

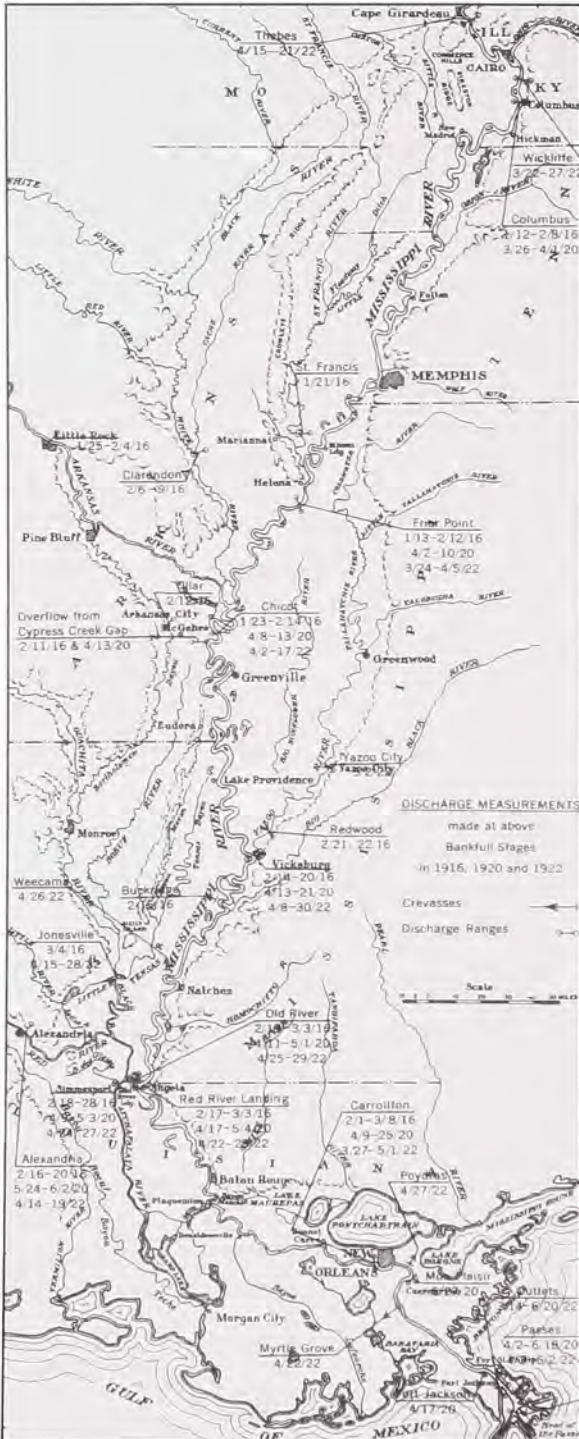


THE CYPRESS CREEK CLOSURE
(COMPLETED IN 1921)

THE CYPRESS CREEK CLOSURE IS SHOWN IN DETAIL IN THE LOCATION MAP ABOVE. PRIOR TO THIS CLOSURE THE WEST BANK MISSISSIPPI LEVEE FOLLOWED THE WEST BANK OF CYPRESS CREEK AND THE EAST BANK OF AMOS BAYOU TO COSTELLO GIN.

THE CLOSURE LEVEE NECESSITATED THE CONSTRUCTION OF DRAINAGE CANAL NUMBER 81.

THE SMALL MAP SHOWS THE NATURAL DRAINAGE LINES BY WHICH THE FLOOD WATERS OF THE MISSISSIPPI REACHED THE RED RIVER THROUGH CYPRESS CREEK GAP, PRIOR TO ITS CLOSURE.



Levee crevasses during the floods of 1916, 1920, and 1922.

New Orleans interests hailed Potter's conclusions, especially so during a severe flood in 1922. That flood came in two waves. The first followed heavy rains along the middle Mississippi and Ohio rivers; the second followed intense rains along the lower Missouri, upper Mississippi, Arkansas, and Red rivers. The discharge of the 1922 flood measured considerably less than the estimated peak flow of 1912 and the measured peak flow of 1916, however, the high water of 1922 quickly surpassed all previous record stages below the mouth of the White River. Yet despite the severity of the flood, only two major levees crevassed; the first at Wecama, Louisiana, opposite Natchez; the second at Poydras, Louisiana, 12 miles downriver from New Orleans.²⁵⁷

For obvious reasons, the 1922 flood alarmed New Orleans interests. They correctly attributed the increase in flood stages to the closure of Cypress Creek and demanded immediate attention. Although more than four feet separated the flood crest from the top of the levee

protecting the city, residents of New Orleans believed that the Poydras crevasse lowered flood heights to the point of sparing them from calamity. Consequently, they pleaded desperately for the construction of a spillway downstream of New Orleans to insure the water forced upon them by the closure of the levee system upriver did not inundate their city. In short order, several plans emanated from the civilian engineering community. John Klorer, the New Orleans city engineer, revitalized Charles Ellet's 1852 plan for an artificial outlet from the Mississippi into Lake Borgne. John Freeman, the principal advocate for establishing a national hydraulic laboratory, posited his own plan designed to draw flows out of the Mississippi above New Orleans through the enlargement of the Atchafalaya.²⁵⁸

The alarming relationship between the discharge and stage of the 1922 flood on the heels of the final closure of the Cypress creek gap should have sparked a reexamination of Commission policy. The MRC, though, remained entrenched, and once again Ockerson emerged as the Commission's point man. He argued that the devastation of the 1922 flood had been "grossly exaggerated," by those same fear mongers who had hyped the threat in 1913. In fact, Ockerson viewed the flood as a success story; while less than 13 percent of the system had been raised and strengthened to the 1914 grade and section, the leveed channel safely passed the flood for a distance of 700 miles before the first crevasse at Wecama. That crevasse, Ockerson contended, resulted from the inadequacy of the levee, which he estimated required 180 percent more earth to be brought up to proper specifications. From Red River Landing downstream to Poydras, he pointed out that the levee system, again, successfully confined the flood for another 215 miles. The Poydras crevasse, which he contended resulted from inadequate bank protection and not "any defect in the levee itself," only lowered flood stages at New Orleans by 1.6 feet, leaving nearly 2.5 feet as the margin of safety between the height of the flood and the top of the levee. In further defense of the levee system, Ockerson boasted that despite the two crevasses the system protected more than 20,000 square miles of the delta from overflow in defiance of the record-breaking stages.²⁵⁹

Ockerson's unwavering support of the levee system did nothing to mitigate the distress of New Orleans interests. In 1924, the Louisiana state legislature authorized the Orleans Levee District to design a spillway below New Orleans to protect the integrity of the levees lining the city front. The resulting plan necessitated lowering 11 miles of levees at Pointe-a-la-Hatchie, approximately 50 miles below New Orleans. The state lawmakers, however, conditioned their approval of the project on the ability of the Orleans Levee District to gain the consent of both the Board of

State Engineers and the MRC. On January 26, 1925, the levee district submitted its plan to the state board. The Board of State Engineers reviewed the plans and soon fragmented over differences of opinions on the subject. Some believed that the spillway would reduce flood heights by as much as two feet; others, while still advocating the necessity of spillways, believed Pointe-a-la-Hatchie was too far downriver to have any impact. While the members of the board did not agree on the potential impacts of the spillway, they did agree that its construction and implementation would provide "an opportunity to procure valuable data for future reference."²⁶⁰

This statement reflected a matter of considerable importance. New Orleans interests hoped the data gathered through the Pointe-a-la-Hatchie spillway experiment would ultimately lead to a more systematic employment of spillways to protect southern Louisiana. This hope manifested itself through the efforts of Louisiana Congressman Riley J. Wilson, who was busily preparing a bill seeking authorization of a federal survey to determine the feasibility and cost of controlling Mississippi River floods between Old River and the Head of Passes through controlled spillways.²⁶¹

The Louisiana Board of State Engineers approved the plan on February 10, two weeks prior to the next session of the MRC. On February 25, Gervis Lombard, the assistant state engineer for the board, and Marcel Garsaud, chief engineer for the Orleans Levee District, appeared before the MRC to plead their case. Lombard took the lead, explaining that the actions of the State of Louisiana were not intended to circumvent the authority of the MRC and that the law passed by the state legislature necessitated the Commission's approval before commencing with construction. He also informed the MRC that the proposed spillway would benefit the levee system near New Orleans and that all parties impacted by the plan agreed to the necessity of its construction. Colonel Potter, reflecting on the irony of the people near Pointe-a-la-Hatchie agreeing to lower their own levee to benefit people upstream, commented, "It is not very long ago that levees were guarded with shot guns down in that country." Lombard answered, "In times of stress people do lose their heads." For this very reason he indicated that if the MRC consented to the construction of the spillway, the board would push for the authority to operate the spillway to be vested in the MRC as a disinterested party.²⁶²

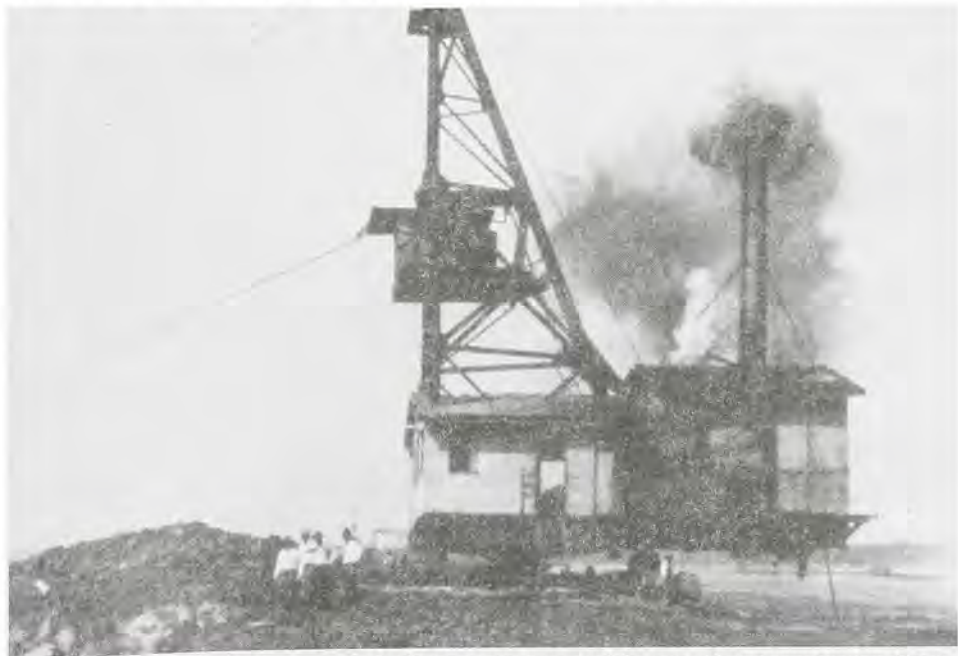
The members of the MRC were under intense pressure to approve the plan. In addition to Lombard's plea, Wilson's bill was gaining momentum in the House and had a reasonable chance of being enacted into law. The MRC majority, however, remained convinced that the spillway would not achieve the desired results. Others, though, believed the spillway afforded an opportunity to study and observe the effects of controlled river regula-

tion on flood heights. Lieutenant Colonel Lukesh, drafted a compromise resolution approving the spillway that reiterated the majority's belief that it would be ineffective, but authorized the state's plan to modify the 11-mile stretch of levees in order to reconcile those members who wished to study it effects. On February 26, his resolution passed.²⁶³

The State of Louisiana completed the Pointe-a-la-Hatchie spillway the following year at a cost of nearly \$500,000. Shortly after its completion, President Calvin Coolidge signed Congressman Wilson's bill authorizing a study to determine the feasibility and costs of controlling Mississippi River floods south of Old River by means of spillways and levees. Of great significance, the bill directed the Corps of Engineers, not the MRC, to control the study, signaling at least to some extent the federal legislature's apprehension toward the MRC's levee policy. The Corps of Engineers, in turn, established a spillway board to conduct the survey. As the spillway board commenced its investigation in the fall of 1926, heavy rains drenched a large portion of the Mississippi drainage basin. The board's analysis would come too late.²⁶⁴

Before the Storms

Following the passage of the Ransdell-Humphreys Act, the MRC proceeded with its levee plan virtually unmolested, and significant progress was made in its attempt to protect the Mississippi River from Rock Island

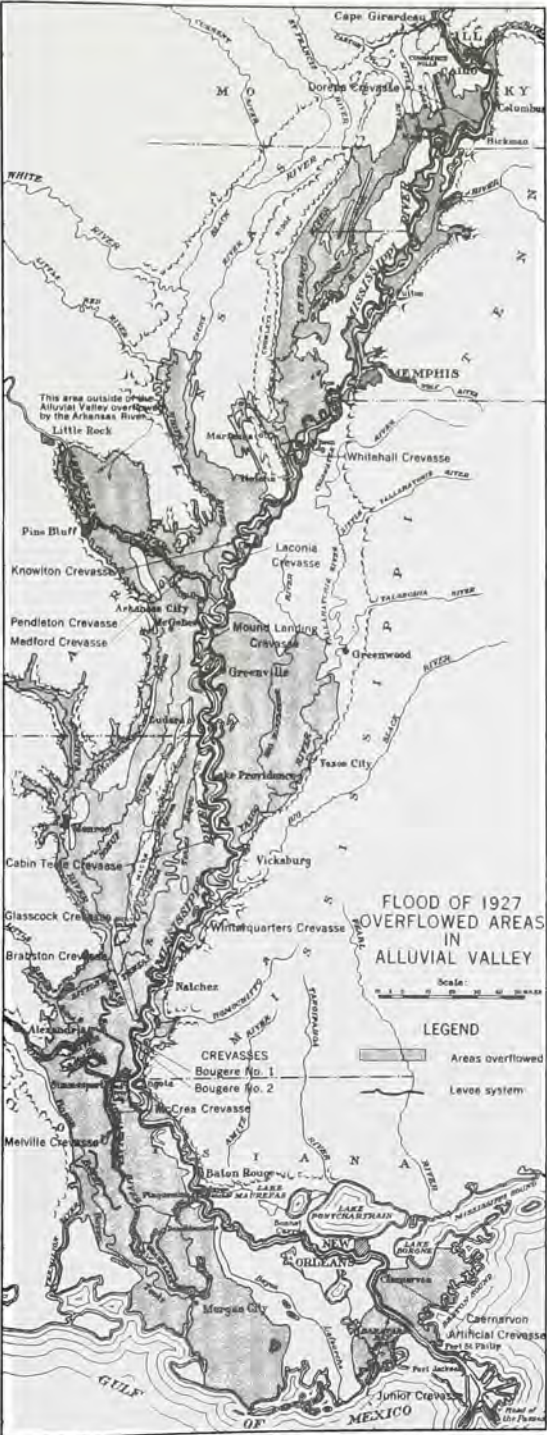


Tower machines and other technological advancements increased the rate of levee construction during the 1920s.

to the Head of Passes from floods. The 1917 Act had authorized unprecedented sums to finance the completion of the levee system, but with the U.S. entry into World War I, progress was slow. Congress extended the period for spending the authorized sums from five to seven years and, as a result of inflated wartime prices, the volume of work fell short of expectations. In 1923, Congress passed a second flood control act, and it provided \$60 million for levee construction over a 10-year period. Technological improvements also facilitated levee construction. The earlier levees were built with wheelbarrows, but by the 1920s, the MRC had developed high capacity levee machines that had an average capacity of 300 cubic yards per hour. By 1926, the MRC had a total of 26 government-owned levee machines in use.²⁶⁵

The two flood control acts, together with several technological advances, brought the MRC's levee system to near completion. The levees of the Yazoo basin, for example, had reached enormous proportions by 1926. In 1882, the levees along that front were about eight feet high and contained about 31,500 cubic yards per mile. At the close of 1926, the Yazoo levees were 22 feet high and contained 421,000 cubic yards per mile. Public confidence in the levee system increased, even near New Orleans where the newly constructed Pointe-a-la-Hatchie spillway was now in operation. Many delta landowners began to believe that the MRC had achieved adequate flood protection for the lower Mississippi River. The MRC generally agreed, and concluded as much in its annual report of October 8, 1926.²⁶⁶

The timing for such optimistic sentiment, though, could not have been worse. A vicious weather pattern stalled over most of the Mississippi River drainage basin in the fall of 1926, swelling the river and its tributaries. The rain saturated surrounding lands to the point where any additional precipitation immediately turned into runoff. Heavy rains continued from December through early spring. In early January 1927, the first of three waves of floodwaters approached the lower Mississippi Valley. By late April, nearly 23,000 square miles of the Mississippi River Delta were under water. Throughout the flood, up to 500 people had lost their lives with 600,000 more seeking shelter in refugee camps. Such devastation finally and necessarily forced the abandonment of "levees-only," while galvanizing political, engineering, and social support for a comprehensive flood-control project.



Areas inundated during the Great 1927 Flood.

Chapter 10

The Act

On Wednesday, April 20, 1927, two private vessels, the *Cincinnati* and the *Cape Girardeau*, steamed down the swollen Mississippi River carrying 500 Chicago politicians and businessmen en route to New Orleans. The bombastic and reportedly corrupt mayor of Chicago, William “Big Bill” Thompson, sponsored the trip in celebration of federal legislation authorizing the construction of a nine-foot waterway from Lake Michigan to the Gulf of Mexico, but the great Mississippi River flood of 1927 turned his victory gala into “an errand of mercy.” A newspaperman from the Chicago *Daily Tribune* described scenes of “wreckage and ruin” and of entire towns that had disappeared under the muddy waters of the Mississippi, leaving only “roofs and chimneys of houses above the raging river.” That night, the *Cape Girardeau* took on 60 refugees at Tomato Islands, Arkansas, and fed, clothed, and sheltered them. Among the unfortunates were “seven mothers nursing babies at their breasts” and “28 [children] under 10” years of age. Stirred to action, Mayor Thompson fashioned plans for a great flood-control conference to be held in Chicago and kicked off a campaign calling for the federal government to assume



Arkansas City, Arkansas, during the 1927 flood. Inset: Young flood victims find shelter and a meal at a Red Cross refuge camp.

full financial responsibility for flood control on the Mississippi River. Thirteen months later, Coolidge signed into law the landmark 1928 Flood Control Act.²⁶⁷

Traditionally, historians and other chroniclers have treated the 1928 Flood Control Act as a product of Southern machinations, contending that the broad outlines of the act were forged outside of Washington by the Tri-State Flood Control Committee, a lobbying group composed of prominent Southerners who represented the financial and political interests of Louisiana, Mississippi, and Arkansas. "What they settled upon," one recent study concludes, "would more closely resemble what actually became law than would the initial proposals later made by Coolidge, the House, or the Senate." Placed in the political context of the period, though, the 1928 act is more properly understood as the outgrowth of a Republican-dominated Congress and a fiscally conservative White House that fostered little interest in the political intrigues of the lower Mississippi Valley.²⁶⁸

When the time came to legislate on flood control for the Mississippi River, leadership came from Illinois rather than Louisiana or, more generally, from the upper Mississippi Valley rather than the lower. President Coolidge also involved himself in the legislative processes, and his conservative influence precipitated a crisis within the GOP, pitching the Republican chair of the House Flood Control Committee, Frank R. Reid of Illinois, and his comprehensive vision for the lower valley against the administration and its tight fiscal policy. On a second front, the Chief of Engineers, the stubborn and pugnacious Major General Edgar Jadwin, used the great flood as a pretense for challenging the independent authority of the rival Mississippi River Commission. Here, too, Coolidge intervened, lending his support and encouragement to the Chief of Engineers rather than the more independent-minded MRC. For the better part of a year, this contentious environment shaped the legislative proceedings, and neither delta interests nor the MRC would be satisfied with the outcome.

Thompson's Army

The 1927 flood so devastated the Mississippi Valley that Herbert Hoover, then Secretary of Commerce, called it "the greatest peace-time calamity in the history of the country."²⁶⁹ The origins of this flood can be traced as far back as the second week of August 1926, when heavy rains fell over the Great Plain states of Kansas and Oklahoma. The downpour continued intermittently through the end of the year, saturating the soil in the middle drainage of the Mississippi and leaving the main river and its tributaries at relatively high stages in a season when levels were normally low. Additionally, the Cumberland River, a major tributary of the lower Ohio River, experienced a record-breaking flood beginning in December

1926 and continuing through January. This combination of factors, together with heavy rains in both the Ohio and Missouri valleys in the spring of 1927, produced substantially higher flood volumes than ever recorded on the Mississippi River. Some contemporary engineers measured the flow at more than 3,000,000 cfs at the confluence of the Arkansas and Mississippi Rivers, compared to 2,250,000 cfs in the Mississippi flood of 1882, among that century's greatest.²⁷⁰ Confined within the MRC's levee system, these flood volumes produced record-breaking gauge readings throughout the lower valley, with flood levels receding only after multiple breaks occurred in the main-line levees.²⁷¹ The first of these came in the North Alexander levee district in Illinois on April 8, 1927.²⁷² By the end of May, there were 17 breaks on the Mississippi River and more than 200 on the tributary levees, overflowing an estimated 11 million acres of land from Cairo to Natchez, Mississippi, on the west bank and from the mouth of the Arkansas River to Vicksburg on the east bank.²⁷³ Large sections of Louisiana remained under water through July.²⁷⁴

As the great flood ravaged the lower valley in the spring of 1927, its citizens turned to Washington for leadership and money but found little of either. Having recessed in early spring, Congress could do nothing until December unless called into special session by the president, but Coolidge refused to take that step, preferring instead to allow private agencies to pay the cost of direct relief. Distant and aloof, Coolidge declined even a visit to the devastated regions and, on June 6, 1927, took his annual summer vacation in the Black Hills of South Dakota, far from the tragic scene playing itself out in the Mississippi River Delta.²⁷⁵

The stubbornness with which Coolidge refused the lower valley's entreaties did not portend well for the region in its push for federal flood control. By all early indications, Coolidge was not friendly to its needs, and the people of the delta increasingly sensed that. A late-August dispatch from New Orleans reported Louisiana's growing anxiety, "Reviewing the record of the Federal Administration during the flood, many people of the State [Louisiana] are apprehensive lest President Coolidge and his advisors fail to advocate adequate action when Congress convenes." Throughout the flood crisis, the President pursued a policy of restricting appropriations for flood control because he did not want to "throw his budget out of line." His influence would be instrumental in shaping the legislative processes for federal flood control, but the same could not be said for Louisiana and the rest of the lower Mississippi Valley.²⁷⁶

In the past, Louisiana had piloted the struggle in Congress for federal flood control on the Mississippi River, but by 1927 that state had backed a loser, spending considerable political capital on the realization of a federally subsidized levee system. The flood devastated the lower valley and



Floodwaters breach a levee near Grand Tower, Illinois, during the 1927 flood. *National Photo Company Collection (Library of Congress)*

discredited that system. Louisiana was slow to recover, both economically and politically.²⁷⁷ With much of Louisiana still under water in the spring of 1927, Illinois lawmakers seized the initiative in the struggle for federal flood control and kept it. Their motives were clear. Positioned at the confluence of the Wabash, Ohio, and Mississippi rivers, Illinois shouldered serious flood-control problems of its own. The expansion of the MRC's jurisdiction over levee construction from Cairo to Rock Island, though, was less than decades old, and in 1927 the first of the main stem Mississippi levee breaks occurred in Illinois, followed a week later by four additional breaks. The resulting deluge covered 220,000 acres of some of the most productive agricultural land in the state. Damages throughout Illinois approached \$20 million. Even before the flood, interest in the Mississippi River had reached unprecedented levels, particularly in Chicago. In January 1927, Congress authorized the construction of a deep waterway from the "Second City" to New Orleans that promised increased trade for both cities. The realization of the Lakes-to-the-Gulf scheme fed Chicago's growing aspirations and fueled its interest in Mississippi River improvements.²⁷⁸

The contemporary political environment made it possible for Illinois to play the leading role to which it aspired. The Republican Party dominated national politics in the 1920s, firmly controlling of the White House and

both congressional houses. Furthermore, Illinois—the Land of Lincoln—voted Republican, and with its large population, and attendant electoral votes, it played a prominent role in national politics. To balance the ticket in 1924, Coolidge selected Charles G. Dawes of Illinois for the vice-presidency. Both Dawes and former Illinois Governor Frank O. Lowden would receive serious consideration for the Republican presidential nomination in 1928.²⁷⁹

The state's national prominence extended into Congress as well; particularly on the committee level where the real fight for federal flood control would be waged. In the House, Illinois controlled the two committees that would matter most in the pending struggle—Flood Control and Appropriations. Congressman Frank R. Reid of the 11th Illinois District near Chicago chaired the House Flood Control Committee. A graduate of the University of Chicago and the Chicago College of Law, Reid gained national prominence in 1925 as chief civilian counsel for Brigadier General William “Billy” Mitchell at the latter's Army court-martial, where the spirited Illinois attorney took obvious pleasure in sparring with military authorities. Congressman Martin Madden, the gray-haired “watchdog of the treasury” and chair of the Appropriations Committee, represented Illinois' First District, which included the south side of Chicago and most of the city's sizeable minority population. In the Senate, the powerful



Congressman Frank R. Reid of Illinois (standing) is shown here as the attorney of Col. Billy Mitchell during the Army officer's well publicized court martial. As Chairman of the House Committee on Flood Control from 1925-1930, Reid helped to shape the 1928 Flood Control Act. *National Photo Company Collection (Library of Congress)*

Commerce Committee presided over flood-control issues. Its chair was Republican Party Whip Wesley L. Jones of Washington, but Jones, too, had strong ties to Illinois. Born in Bethany, Illinois, he graduated from Southern Illinois College in Enfield, and was admitted to the Illinois Bar in 1886. For several years, Jones practiced law in Decatur, Illinois, where he became active in the Republican Party there before relocating to Washington State. All of these factors allowed Illinois politicians to secure placement of five Illinois civilians to the MRC beginning in 1923.²⁸⁰

Illinois also had the charismatic "Big Bill" Thompson, the three-time Republican mayor of Chicago. Among America's most notorious urban demagogues and a supposed personal friend of Al Capone, Thompson was a new convert to the cause of Mississippi River development, but after witnessing firsthand the overwhelming devastation visited upon the lower valley, he told a gathering of Louisiana business interests that "Chicago is ready to join hands with New Orleans" to secure adequate flood control for the Mississippi River, entirely at federal expense. He also called for a "united demand on our part made in such a way as will convince Washington." Later in the visit, discussions between Thompson and New Orleans Mayor Arthur J. O'Keefe generated the idea of a flood control conference to be held in Chicago. After returning to Illinois, Thompson met with Madden and Reid and secured their support for the endeavor.²⁸¹

The mayor next sought the support of the president. "Very anxious" to have Coolidge address the convention, Thompson offered to select a date for the conference that would "accommodate" the president as he passed through Chicago "enroute [sic.] to a western point [the Black Hills] where he will spend his vacation." Coolidge refused, fearing the ramifications of a popular flood-control convention on public sympathies and on his budget. Instead, he turned to Secretary of War Dwight Davis for political containment. The Mississippi Flood Control Association (MFCA), a Memphis-based advocacy group representing levee boards and landowners in the valley, had planned a tour of the flooded regions for interested senators and congressmen for late-May. Secretary Davis enlisted White House support in petitioning prominent legislators, particularly members of the presiding committees, to snub the Chicago Convention in favor of the Mississippi River tour. "This trip will," according to Davis, "minimize [the] effect of [the] Chicago meeting which may be harmful." Subsequent White House overtures convinced five members of the Senate Commerce Committee, including its chair, Wesley Jones, and nine members of the House Flood Control Committee to skip the Chicago conference in favor of the tour.²⁸²

Despite the veiled enmity of the White House, the Chicago Flood Control Conference opened with a flourish on June 2, 1927. Entirely in



Calvin Coolidge, 30th President of the United States, 1923-1929, at his desk in the Oval Office. *National Photo Company Collection (Library of Congress)*

keeping with his flamboyant nature, Thompson held center stage, presiding over the three-day conference. Joining him in the grand ballroom of the Hotel Sherman were an estimated 2,000 flood-control delegates, including congressmen, senators, governors, mayors, engineers, and businessmen, as well as the Chicago Police Department Band. As the ranking White House representative at the conference, Secretary Davis declared, "the control of the Mississippi river is a national problem." Chief of Engineers General Jadwin, Speaker of the House Nicholas Longworth of Con-

necticut, and Senate Majority Leader James Watson of Indiana, all concurred, and the lower valley took notice. Although Coolidge remained tightlipped, a *Times-Picayune* editorial concluded that Davis' speech "should resolve any lingering doubt regarding the President's position on flood control." As the conference adjourned, Mayor Thompson stood foremost among the nation's flood-control advocates. Considered by most a resounding success, the three-day gathering focused national attention on the lower valley's flood devastation, created a powerful new lobby in the form of a permanent executive committee, and—just as Coolidge had feared—increased the already mounting pressure on Congress to facilitate adequate and comprehensive flood-control legislation. It also assured that Chicago, rather than New Orleans, would direct the struggle.²⁸³

In early May 1927, Davis had directed the MRC to prepare flood-control plans for the Mississippi River, but competing plans were soon being formulated. Although Congress had vested sole responsibility for the development of flood-control policy for that river with the MRC in 1879, Jadwin, with the tacit support of the president, set about drafting his own independent report, claiming that the Rivers and Harbors Act of January 21, 1927 conferred upon the Corps of Engineers the right to "make plans on practically all of the rivers of the United States for flood-control problems." Somewhat predictably, the Jadwin report came to reflect the fiscal conservatism so closely associated with the Coolidge administration.²⁸⁴

As the Corps of Engineers searched for solutions to the flood problems of the lower valley, Congressman Reid initiated his own investigation. At the height of the flood crisis, he spent more than a week touring the lower valley, talking to valley residents, and experiencing the devastation firsthand. Five months later, he took a second trip, traveling more than 1,500

miles to New Orleans, much of it by boat, gathering information on the flood problems of the lower valley in preparation for congressional hearings. He returned from those trips firmly convinced that "the government alone could prevent returns of such disasters." As chair of the House Flood Control Committee, Reid was well placed to affect a change in policy, and anxious to begin work. Even so, there would be no emergency session, and throughout much of the summer Reid resigned himself to the long wait until Congress convened and the competing plans were made available. In late September, though, a letter arrived from Mayor Thompson proposing "that the Executive Committee of that [Chicago] conference appear before the House [Flood Control] Committee in November to outline its views." Thompson was a difficult man to refuse. Although Reid had already declined many such requests, he needed no further impetus. He polled members of the committee and, upon securing their consent, scheduled preliminary hearings to begin in Washington on November 7, 1927.²⁸⁵

Always the showman, Mayor Thompson set out to reproduce the enthusiasm of the Chicago Conference and to take it on the road to Washington. On the eve of the congressional hearings, he and 800 of his followers gathered at Chicago's Illinois Central Station for a festive departure to the nation's capital. Accompanied by an Italian string trio and a police quartet replete with megaphones, the mayor led the crowd in a rousing rendition of his favorite campaign song, "America First, Last and Always." The singing quartet "made the station reverberate," according to witnesses, and the celebration continued upon arrival in Washington the next day. After a short walk from the train station, the mayor greeted his entourage in the ballroom of the Mayflower Hotel, "where he sat enthroned in a bower of flowers and banners." Following the brief festivities, the mayor and his flood-control delegates proceeded to the Capitol, where hearings would soon be underway.²⁸⁶

The celebratory antics of "Thompson's Army" opened the hearings on a positive note, but the gravity of the valley's flood crisis quickly tempered the mood. As the featured speaker at the first session, the Chicago mayor pressed the members of the House Flood Control Committee on the desperate conditions in the lower valley and on the importance of preventing a recurrence. Each in turn, the members of his contingent followed him to the podium, testifying to their own experiences with the 1927 flood and to their hopes for legislative reform. Illinois was particularly well represented at the first session, with at least 27 witnesses from that state taking the stand. By late November, the hours upon hours of gathered testimony spoke to a single purpose—that of federally funded flood control for the lower valley.²⁸⁷

Certainly, no individual deserved more credit for unifying the flood-control movement than Bill Thompson, and the accolades piled up as the hearings progressed. Not given to exaggeration, Reid declared in his opening statement that “no man has done more for the cause of flood control than William Hale Thompson, mayor of the city of Chicago.” The Democratic mayor of New Orleans, Arthur O’Keefe, compared Big Bill to two other prominent Republicans: Abraham Lincoln and Teddy Roosevelt; and the *New York Times* sardonically proclaimed Thompson the “Master of the Mississippi.” But, with the flood-control hearings underway, the Chicago mayor’s role was already being recast. While he never retreated entirely from the scene, the hearings brought about a change of the guard, with Reid quietly extending his authority throughout the first session. By early December, he had supplanted Thompson as the movement’s point man.²⁸⁸

A Clash of Titans

Meanwhile, the president sat idly by while the national debate on flood control raged, still refusing to make public his position. At a midsummer news conference, he had declared “that a careful survey was being made of the flood area by three or four engineering bodies and that until their report on facts was made it would be impossible to suggest legislation.” In the months that followed, Coolidge repeated that excuse so frequently that lower valley interests finally ceased their inquiries and curtailed their lobbying efforts “for fear of alienating the administration’s affections.” Instead, they turned to Secretary of Commerce Herbert Hoover, believing that he spoke for the administration. In him, the residents of the lower valley found reassurance. A true waterways advocate, Hoover advocated large appropriations for the lower valley and emerged sympathetic on the issue of local contributions: “In the face of their great losses and their present destitution I do not see how the people along the river can contribute much more than the maintenance of the central works after they have been once constructed.” As the lower valley would soon



President Coolidge and Secretary of Commerce Herbert Hoover. *National Photo Company Collection* (Library of Congress)

discover, though, Hoover did not speak for Coolidge or the Corps of Engineers.²⁸⁹

The president broke his self-imposed silence on flood control in his State of the Union address to Congress on December 6, 1927, and touched off a firestorm. Addressing the issue in only a general way, he made his views clear on local contribution. The Mississippi Valley should, Coolidge asserted, "pay enough so that those requesting improvements will be charged with some responsibility for their cost, and the neighborhood where works are constructed have a pecuniary interest in preventing waste and extravagance and securing a wise and economical expenditure of public funds." Flood-control and waterways advocates alike reacted with shock. Secretary Hoover's assurances "had lulled the fears of most people" and "were such as to furnish reasonable grounds for the belief that he spoke for the President and that the President thought the Federal Government should pay for spillways." Disappointing to nearly everyone, Coolidge's recommendations created divisions within his own party and served to unify opposition against him, particularly in the Mississippi Valley and in the House Flood Control Committee.²⁹⁰

Although relatively quiet on the issue for more than six months, Coolidge had been working behind the scenes since May to secure a Mississippi River flood-control plan that would not upset his budget. He collaborated in this effort with the dependable and staunchly conservative General Jadwin. Conveniently, Jadwin's aspirations fell generally in line with the president's desire for political containment, and the two men were in lock step throughout the planning process. As Chief of Engineers, he favored a more linear and centralized chain of command. To Jadwin, the predominantly civilian MRC represented an unacceptable anomaly. In the conspicuous failure of the MRC's vaunted levee system in 1927, Jadwin saw an opportunity to widen the scope of his own authority at that agency's expense. Moving slowly at first, he soon had 150 Army engineers working on a rival plan for Mississippi River flood control.²⁹¹

As that work progressed, Jadwin joined forces with the president and the secretary of war to keep outside interference to a minimum. Civilian engi-



Major General Edgar Jadwin was the Chief of Engineers from 1926-1929.

neers, in particular, were kept at arms length, despite multiple requests from Thompson, Ransdell, and others that they be allowed greater input. One prominent civilian engineer, John F. Stevens, president of the ASCE, petitioned Coolidge to "appoint a [civilian] committee from the Society to cooperate with the Army engineers," even meeting with both Davis and Jadwin directly on June 15, 1927. Coolidge denied Steven's request largely at the insistence of the Chief of Engineers, who argued that any civilian advisory committee would "hamper and delay the gathering of statistical data." After a short period of consultation, the administration concluded "that it would be better not to complicate the situation by the appointment of an outside committee" and to "let the matter drift along for the present." Summer turned into fall, and the planning process moved forward, still largely without substantive civilian input.²⁹²

By late September, the MRC had completed its report and forwarded a copy to the Chief of Engineers. The Commission plan called for larger levees throughout its existing jurisdiction, with four feet of freeboard, or leeway between the expected crest elevation and the top of the levee, from Rock Island to Cape Girardeau, and five feet of freeboard from that latter point to New Orleans. The plan also provided for additional protection of Cairo by raising the levees protecting that city to 70.4 feet. Abandoning its former "levees-only" policy, the MRC plan also reflected the earlier recommendations of the congressionally appointed Corps of Engineers spillway board, by providing for a controlled spillway through Cypress Creek in the Boeuf and Tensas basins capable diverting 600,000 cfs from the Mississippi River into the Red River backwater area and eventually to the Gulf, through a second controlled floodway in the Atchafalaya basin capable of diverting an additional 900,000 cfs from the Mississippi River. Again following the recommendations of the spillway board, the MRC plan provided for dual spillways to protect New Orleans—one above the city at Bonne Carré and one below at Caernarvon. Lastly the report called for additional detailed surveys and estimates, concluding that much more information would be necessary before settling on any permanent plan. This latter provision of the plan was made at the insistence of Colonel Potter, the MRC president. Potter opposed the controlled floodway through the Cypress Creek, arguing, "good engineering should dictate against" it. The MRC president believed a reservoir scheme in the White and Arkansas basins was worthy of further examination before committing to such a floodway. The Commission majority, however, favored the floodway, but with Potter threatening to file a minority report, they compromised by requesting additional investigations.²⁹³

The cost of the initial MRC plan was estimated at \$872 million, including \$91 million for damages and land rights acquisition. Over the

next two months, Jadwin twice sent the report back to the MRC, first reminding its members that they had already "had 48 years in which to meet the study and that a report which recommended only further study would not meet their obligation" and, later, suggesting that the estimated cost of the plan would be "a little too much of a shock" and that they should "work toward a lower figure." After multiple revisions, the MRC produced a dual plan containing a more comprehensive project at an estimated cost of \$684 million (not including \$91 for damages and rights) and a preliminary recommended plan at estimated cost of only \$407 million.²⁹⁴

But Jadwin had already concluded to suppress the MRC report altogether. In lieu of it, he presented his own recently completed plan to Coolidge on December 4, 1927, two days before the president's State of the Union address. Although his report was obviously based on that of the MRC, the Chief of Engineers made adjustments to bring it in line with his own ambitions and with the president's tight fiscal policy. First, the engineering aspects of the plan were reworked to cut costs. The Jadwin report provided for an enlarged levee system from Cape Girardeau to the Gulf, though not as large as that advocated by the MRC; a single spillway above New Orleans, rather than the two recommended by the Commission; and an overbank floodway through the Missouri boot heel opposite Cairo, in place of more expensive levee improvements. Jadwin's plan also provided for floodways through the Boeuf, Tensas, and Atchafalaya basins, but his proposed floodways were governed by fuseplug levees, or uncontrolled spillways, instead of the safer and more reliable concrete spillway system advocated by the MRC. Furthermore Jadwin's proposed floodways were larger, requiring the inundation of more land when placed into operation. The more populated and agriculturally rich Pointe Coupee Parish, for example, was protected under the MRC plan, but not so under the Chief of Engineers' plan.²⁹⁵

Relying on his own engineers and the recommendations of the recently completed report by the reservoir board, Jadwin also refused to recommend the construction of tributary reservoirs, which cost much more than levees on the main stem of the river but provided no additional flood protection. Lastly, Jadwin required the lower valley to pay a relatively higher percentage of the overall cost of the program, calling for local contributions of 20 percent on all flood-control work and recommending that local interests furnish all rights of way and flowage rights. According to Jadwin's estimates, the plan would cost \$296 million, which represented a savings of considerably more than \$100 million over the MRC's preliminary plan.²⁹⁶

In a controversial move, Jadwin also sought to consolidate his control over the Mississippi River, calling for a "reorganization" of the MRC that

would terminate its status as an executive agency and place it under the direct authority of the Chief of Engineers. The 1879 act creating the MRC—as evidenced by its official title, *An act to provide for the appointment of a "Mississippi River Commission" for the improvement of said river from the Head of the Passes near its mouth to its headwaters*—granted the Commission broad statutory authority over the entire Mississippi River. Section 3 of the act authorized the MRC to direct and complete surveys of the river from Lake Itasca to the Head of Passes. It was Section 4, however, that truly empowered the MRC by establishing its mandate to consider and develop plans to improve the river, protect its banks, facilitate navigation, prevent destructive floods, and promote commerce.²⁹⁷

While no law ever rescinded the Commission's authority over the entire Mississippi River, Congress limited the reach of the MRC by only funding improvement works on certain segments of the river. This amounted to a restriction of jurisdiction through appropriation. Simply put, the MRC's statutory responsibilities for the entire river from its headwaters to the Head of Passes remained in tact, but Congress did not fund the Commission's efforts on the entire river. The piecemeal extension of the MRC's jurisdiction did not limit that of the Corps of Engineers, signaling Congress' clear intent to have dual engineering organizations managing the complexities of the Mississippi River.²⁹⁸

Such intent did not escape the attention of Jadwin. The failure of the Commission's levee system in 1927, though, afforded him the opportunity to supplant the MRC on the Mississippi River. After explaining that he had only veto power over the MRC, but not initiative control, he recommended that the president of the Commission report directly to the Chief of Engineers, who would plan and direct all work on the Mississippi River. As a small token of compromise, he added, "The commission as at present constituted can be continued as an advisory, but not as an executive, commission."²⁹⁹

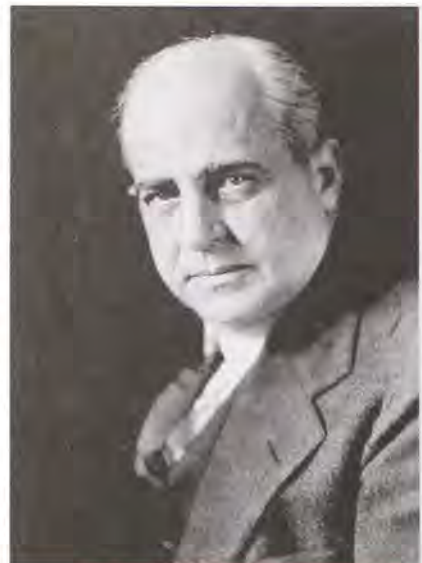
In the brash manner exhibited consistently throughout his term as Chief of Engineers, Jadwin then revealed his true intention—to erase what he viewed as an aberration in the Corps of Engineers' chain of command—by recommending the enactment of legislation:

Amending sections 3 and 4 of the act of June 28, 1879, constituting the Mississippi River Commission; to provide that it shall be the duty of said commission to advise on all questions relating to the improvement of navigation on the Mississippi River and the prevention of destructive floods which may be referred to the commission by the president of the commission or higher authority.³⁰⁰

In other words, Jadwin had the authority to approve or disapprove the Commission's plans, but not the power to direct changes. Because his plan contemplated a \$300 million project and the Corps of Engineers already managed more than \$80 million a year on work similar to that proposed under his plan, he argued that his agency, with one central leader, represented the logical choice to implement the project, not a commission divided into smaller committees.³⁰¹ Apparently Coolidge agreed. After just four days of review, he transmitted the 300-page Jadwin report to Congress with his full endorsement.

Critics lost little time in assailing practically every element of the Jadwin Plan, both for what it advocated and for what it failed to advocate. Lower valley Democrats criticized the engineering elements of the plan, particularly the proposed use of fuseplug levees and the heavy reliance on floodways. Reputable experts, including nationally-renown civilian engineer James P. Kemper, denounced fuseplug levees as unpredictable and dangerous, insisting that there would be no way of determining in advance the size of the crevasse that would form and, therefore, no way of estimating, much less regulating, the quantity of water that would pass through it. The floodways were equally problematic, in that, relative to the MRC proposal, the Jadwin Plan proposed to divert 50 percent more water from the Mississippi River into the two primary floodways—the Tensas and Atchafalaya basins—with a corresponding increase in collateral damage.³⁰²

Waterways advocates condemned the Jadwin Plan for attempting to “handle a serious national problem without presenting the river problem in its entirety.” Their leading agitator, Democratic Senator Harry Hawes of Missouri, characterized the plan as a “most murderous engineering thing” and lamented, “the entire Mississippi Valley has been deceived.” He also charged that the attempt to change the status of the MRC was an effort by military engineers “to secure more power and lessen civilian participation in the flood-control program.” Jadwin's recommendations to subjugate the MRC did not go unnoticed by Congress. Throughout the congressional hearings Senator Hawes continually questioned the legitimacy of Jadwin's report in addressing the subject of administration,



Senator Harry Bartow Hawes of Missouri.
U.S. Senate Historical Office.

which he viewed as "totally disassociated from the matter of engineering." He saw in Jadwin's administrative proposal a poorly disguised effort to strip the MRC of its initiative power and reduce civilian participation in the execution of the flood-control program.³⁰³

Jadwin, in defending his stance on the importance of giving the Chief of Engineers direct authority over the MRC, brazenly revealed his deep-seated assessment of the relevance of that commission. "It is not quite so important as to whether you have a commission or do not have a commission," he testified, "I think it is important that we should be able to tell them what to do." In this light, he referred to the demotion of the MRC to an advisory body under the direct supervision of the Chief of Engineers as "sound organization." Jadwin was not alone in his view of what constituted sound organization. Secretary of War Dwight Davis, a firm believer in the linear organization structure, testified that a demotion of the MRC to advisory status represented the most efficient method of administration. In addition, retired Major General Harry Taylor, Jadwin's predecessor as Chief of Engineers, testified that he not only supported Jadwin's proposal to subjugate the MRC, but he went further in recommending "the abolition of the Mississippi River Commission" altogether. Taylor based his argument on the view that if the Chief of Engineers needed expertise or consultation he could always consult with or hire engineers from outside as he saw fit, prompting Mississippi Senator Hubert D. Stephens to remark later in the hearings, "I very seriously doubt if General Jadwin or the Chief of

Engineers, whoever he may be, were given authority, that the occasion would ever arise in his mind where outside assistance would be called for."³⁰⁴

Current and former members of the MRC, more precisely Charles West, Colonel Charles Potter, and retired Brigadier General William H. Bixby, defended the Commission's status as an executive body and favored the preservation of all MRC activities. In the hearings before the House Committee, Chairman Reid asked West if he believed that the MRC should be stripped of its executive status and transformed into an advisory body. An adroit southern gentleman from Greenville and a former chief engineer with the Mississippi Levee Board, West replied



Colonel Charles L. Potter, President, Mississippi River Commission, 1920-1928.

modestly that his "opinion ought not to have any weight" upon the question. When pressed further, he demurred, but indicated that the information and experience acquired by the MRC over the years proved valuable in diagnosing problems and initiating works of improvement in "this great mammoth problem" on the Mississippi River.³⁰⁵

Colonel Potter also sought to protect the independent status of the MRC. In his testimony before both the House and Senate committees, Potter indicated that he considered Jadwin's proposal a "calamity" and "the first step toward the abolishment of the Commission." Ironically, Potter, too, favored a centralized chain of command in that he was not a proponent of independent bureaus of government; however, he viewed the MRC as an acceptable anomaly—one that should be preserved because of the experience and information obtained by the MRC since its creation. Furthermore, he believed that the greatest attribute of the MRC involved the ability of its members to meet face-to-face with the people of the valley and to hear their concerns. If the MRC were transformed into an advisory body, he feared those same people would view the members as powerless to help them, prompting them to bypass the MRC by going directly to Washington, D.C., with their concerns—"bad policy" in Potter's judgment.³⁰⁶

Bixby's testimony, though, may have provided the most crucial defense of the MRC. He had graduated first in his class from West Point in 1873 and went on to enjoy a stellar career with the Corps of Engineers. He served as MRC president for from 1908 until 1910, at which time he was appointed Chief of Engineers. After serving in that capacity for three years he retired, only to be called back to service during the First World War to serve as the Western Division Engineer and as acting MRC president. As MRC president and Chief of Engineers, he had experience from both sides of the executive nature of the Commission and the veto power of the Chief of Engineers, making him an ideal witness in reference to the question of the future status of the MRC. When asked by Tennessee Senator Lawrence D. Tyson to divulge his view on the matter, the



Brigadier General William Herbert Bixby, President, Mississippi River Commission, 1908-1910, Acting President, 1917-1918. He also served as Chief of Engineers from 1910-1913.

78-year old Bixby, citing his aforementioned experience testified, "I do not think you can improve" the current relationship between the MRC and the Chief of Engineers "at the present time."³⁰⁷

The Jones-Reid Bill

Almost without exception, critics saved their most vitriolic attacks for the Jadwin Plan's local contribution requirements. The *New York Times* reported "rumblings of discontent in Congress among the representatives of the flood area with the program presented by President Coolidge," predicting "a determined fight to overthrow his power and to make the federal government assume responsibility." Arkansas Governor John E. Marteneau, speaking as chair of the Tri-State Flood Control Committee, called the plan "economically impracticable," insisting that "local communities cannot meet the additional financial requirements made upon them." Chairman Reid concurred, calling the traditional requirement for local contributions "the primary cause for the failure of the protective works, and permitted weak levees." Despite widespread opposition to the Jadwin Plan, the administration did not waiver in its support, and both sides squared off for a fight that would match a small, but resolute, group of administration Republicans against a broad spectrum of interests, both in and out of Congress.³⁰⁸

By early December, the ongoing House flood-control hearings became the arena for attacks on the administration plan and, increasingly, on Jadwin, personally. The embattled Chief of Engineers appeared before the committee twice, and his testimony had the effect of mobilizing opposition against the plan. From the outset, Reid accused Jadwin of acting illegally in the production of an independent flood-control report while suppressing the MRC plan—a plan that Reid substantially preferred. Pompous and aloof, Jadwin defended his actions by criticizing the MRC, which had "showed its defects in the preparation of the flood-control plans just completed." Later, when prodded as to the extent of Coolidge's influence in shaping the report's recommendation in favor of substantial local contributions, Jadwin stonewalled in defense of the administration to the vexation of Reid and his allies. With frustration mounting on all sides, the schism between Reid and the administration grew, nudging the Flood Control Committee chair and his allies onto an independent legislative path.³⁰⁹

The several months of hearings convinced Reid and his allies on the House Flood Control Committee to abandon altogether the tradition of local contributions and to increase civilian input in the development of any plan. They also made the controversial decision to delay the adoption of any permanent flood-control plan until the completion of more detailed

and comprehensive investigations. Consequently, the Flood Control Committee bill, as introduced to the House on February 16, 1928, differed radically from the administration proposal while resembling, somewhat, the MRC proposal. The Reid bill, as it became known, authorized an expenditure of \$473 million with no local contribution requirements and rejected the Jadwin Plan in its entirety, proposing instead the creation of a seven-member Mississippi Valley Flood Control Commission that would be sanctioned to work on all major tributaries and generally tasked with implementing "such levees, controlled and regulated spillways, floodways, storage basins and reservoirs as in the judgment of the committee may be necessary to hold the flood crests." This new commission would include both civilian and military engineers, to be appointed by the president.³¹⁰

Coolidge, of course, denounced the proposal, which he regarded as a threat to his budget. The next day, administration sources told the *New York Times* that "the President is aware that, with flood relief and other emergency measures still to be considered, there is danger of not only wiping out plans for a tax reduction but the possibility of encountering a deficit." Unless Congress cut back on its own accord, "the President will have to exercise the veto power in order to prevent a deficit." Despite the rhetoric, Coolidge hoped to avoid a showdown. He had at his disposal a more effective means of dealing with unfriendly legislation. The House Rules Committee controlled the scheduling of legislation in that body, and its chair, Republican Bertrand H. Snell of New York, remained friendly to the administration. In cooperation with Coolidge, Snell refused to put the Reid bill on the House calendar, and a deadlock ensued. The administration then turned its attention to Senate Commerce Committee, where work was underway on a compromise measure.³¹¹

The Commerce Committee met for the first time on January 23, 1928, several months into the House hearings, but its members had not been idle. In fact, Senate waterways advocates had already won a considerable victory in their efforts to secure legislation for the lower valley. As the new Congress opened, Western Progressive senators, together with a number of Mississippi Valley senators, "quietly got together and agreed on a slate to fill the [Senate Commerce Committee] vacancies." No challenge to the plan developed. Five hand-picked senators—including Harry Hawes of Missouri—applied for the positions, and the party caucuses approved them. "Not until the Senate ratified the nominations," according to the *New York Times*, "did the Administration group awake to the fact that the maximum flood-control group had taken over every vacant seat." The maneuver gave waterways advocates a substantial majority on the 19-member committee.³¹²

Washington insiders counted Senate Commerce Committee Chair Wesley L. Jones as one of only four committee members predisposed to favor the administration's flood-control plan. The Republican whip maintained strong ties with the administration and had ranked among Coolidge's most outspoken defenders on the issue of a special session. Jones also concurred with the president on the controversial issue of local contributions, believing that the benefits of the proposed flood-control works were "too great and too direct to private holders and local communities, municipalities and states for them to expect to be relieved of all the financial burden." But the senator was no lackey. Described as a conciliator and consensus builder rather than a legislative innovator, Jones worked throughout the legislative process to reconcile the divergent views of the major antagonists, Reid and Coolidge. The senator's own change of heart helped facilitate his role in the debate. After weeks of hearings and under considerable pressure from fellow committee members, he came "to take a much more liberal view" on local contributions, clearing the way for a Senate compromise measure.³¹³



Senator Wesley Livsey Jones of Washington. *U.S. Senate Historical Office.*

Pressure from within his own party soon obliged Coolidge to compromise as well. Since Congress had convened in early December, Madden and other Republican leaders had consistently expressed doubts as to their ability to defeat legislation requiring the federal government to shoulder the entire burden of flood control—the forces arrayed against them were too numerous. Additionally, party leaders wanted to avoid the political fallout of an unpopular veto, particularly in an election year, and they pressured Coolidge to make concessions. The final push came from Mayor Thompson who reappeared in Washington to facilitate the search for common ground and to apply his particular brand of persuasion. On February 24, he lunched with Coolidge at the White House, where they discussed the possibility of compromise. The mayor left that meeting convinced that the president "wants to do the right thing for the valley in relieving its sufferings and will be generous."³¹⁴

Later that same afternoon, Coolidge "surprised leaders and members of Congress" by conceding publicly on the issue of local contributions, albeit hesitantly and with little conviction. And there were conditions. Coolidge insisted that all work done without financial assistance from

local communities be confined to the area flooded in 1927. He also wanted to appoint an economic commission to investigate the ability of lower valley states to meet proportional payments. According to his proposal, the flooded territory would pay nothing in the first year, and future payments would depend on the commission's findings, with local contributions adjusted accordingly. In this way, the Coolidge hoped to avoid "set[ting] a precedent of having the government pay the entire cost of flood prevention work." Outside of the administration's inner circle, though, there existed little support for such a commission. Within several days, developments on Capitol Hill altered the course of debate on local contributions, and Coolidge's "concession" served only to highlight his intransigence.³¹⁵

Back in Congress, attention quickly turned to the Jones bill. As originally drafted, it authorized \$325 million for flood-control works and reduced local contributions to the approximately \$15 million already pledged for levee work. Local interests would also be required to provide the rights of way for main-line levees, but the federal government would purchase the approximately four million acres of land necessary for the construction of floodways. In deference to the president, the Jones bill adopted the main engineering features of the Jadwin report, but provided for the establishment of a three-man engineering board that would continue studying the engineering problems of the lower river and advise on possible changes to the plan. Known as the Special Board, it would consist of the Chief of Engineers, the president of the MRC, and a civilian to be named by the Coolidge. Believing that "its provisions are not far from his own views," Coolidge looked upon the bill with "considerable favor" and, thinking that he had gained the upper hand in his struggle to restrict flood-control appropriations, acknowledged once again his plans for a moderate tax cut in 1928.³¹⁶

Subsequent to reporting the bill, though, Jones encountered unexpected opposition from fellow committee member Harry Hawes. The Missouri senator had been out of Washington when the commerce committee considered the Jones bill. Upon his return, he insisted that it be recommitted and overhauled. His persistence ultimately won out, and Hawes made excellent use of the opportunity. Under his direction, the committee's waterways advocates worked behind closed doors for two weeks to abolish local contribution requirements, broaden the scope of the legislation, and increase civilian participation on the proposed engineering board. To varying degrees, they succeeded on all counts, and the revisions strengthened the waterways elements of the bill and increased its patronage in both houses. According to the *New York Times*, though, the revised Jones bill was "far less acceptable to the Coolidge Administration" than the original measure.³¹⁷



Congressman Joseph T. Robinson of Arkansas. He served as a U.S. Representative from 1903-1912 and a U.S. Senator from 1913-1938. *U.S. Senate Historical Office.*

Even as the administration began voicing its dissatisfaction, plans were underway to bring the bill to the floor for consideration. Senate leaders, growing increasingly anxious to pass a flood-control bill before Congress adjourned in late May, cleared the docket and scheduled floor time for March 29, 1928. While it was expected that days, if not weeks, would be required to gain approval in that body, leaders from both parties “demanded quick action and got it.” At the allotted time, Jones took a few minutes to outline the bill. As he finished, Senate Minority Leader Joseph Robinson of Arkansas, put aside his own speech and suggested a roll call. The Republican leadership gave its consent, and the Senate approved the

Jones bill by a unanimous vote, 70-0, after fewer than 90 minutes of discussion—so swiftly that some senators with long prepared addresses “sat dazed at the sudden action.”³¹⁸

The unprecedented show of support for the Jones bill won over converts in the House and in the House Flood Control Committee, and Reid’s willfulness contributed to the exodus. Though poised to move forward with his own bill, Reid further alienated the administration with the submission of a committee report that sharply criticized the actions of both Jadwin and Secretary Davis, both of whom had, according to the report, acted illegally in suppressing the MRC report. Coming just one day after the unanimous vote in the Senate, the committee report convinced some House members to throw over their support to the Jones bill, particularly lower valley Democrats who were anxious to avoid antagonizing Coolidge and reluctant to delay any longer much needed flood-control legislation. The ranking Democrat and future chair of the House Flood Control Committee, Riley Wilson of Louisiana, led the defection, explaining that “as rewritten, the Jones bill contains the principle points for which we have been contending” and that “we will use our influence in an effort to bring that [Senate] measure before the House.”³¹⁹

The flight of interested Democrats effectively killed the House bill, but Reid put aside his personal feelings and resigned himself to working with the Jones bill in committee. After only two days, the House Flood Control Committee reported the measure, now referred to as the Jones-Reid bill,

with a half-dozen minor amendments designed to broaden its scope. Congressman James A. Frear of Wisconsin, an administration Republican and a steadfast fiscal conservative, stood as the lone voice of dissent in committee but would speak with the authority of the administration when the bill moved to the House floor. Primary elections in Illinois requiring Reid's attention delayed consideration in the House by a full week, though, and Coolidge seized the opportunity to arrest the bill's progress and make his voice heard.³²⁰

With the latest developments on Capitol Hill driving him nearly to distraction, Coolidge called "Madden from his sick bed" and urged him "to exert his influence" to bring the bill in under \$350 million, making it clear to the Appropriations chair and other leading Republicans that he would "not approve measures that would cause a deficit and destroy his constructive economic policies." The president also sought the council of his trusted ally, General Jadwin. In an internal memorandum dated April 6, he asked the Chief of Engineers to provide a written, "but not too long," critique of the Jones-Reid bill, which was "the most radical and dangerous bill that has had the countenance of the Congress since I have been President."³²¹

Jadwin needed fewer than 24 hours to complete a 13-page response that disparaged virtually every element of the revised measure. Armed with that critique, Coolidge stoked the press with accounts of waste and abuse, and newspapers across the country began running stories on the "pork-barrel" flood-control legislation under consideration in Congress. The well-regarded *Engineering News-Record* deprecated the "precipitate" way in which the Senate had approved the Jones bill, while applauding the president's efforts to slow the legislative processes and avoid "too hasty action by the House." Similarly, a *New York Times* editorial ascribed the unanimous vote in the Senate "to the fact that everything which everybody wanted had been put into the bill and everything to which anybody objected had been taken out."³²²

As Coolidge turned up the heat, Madden scrambled to appease the unhappy president, doing what he could to bring Reid and his "Mississippi bloc" in line with the administration. Though in failing health, the Appropriations chair met frequently with House leaders from both parties, lobbying on behalf of the administration and appealing to Reid in particular to soften his position. As would soon become evident, Madden's strenuous efforts met with success.³²³

The House took up the Jones-Reid bill on April 17, 1928, with the threat of veto looming over the proceedings. Representatives Madden, Frear, and Majority Leader John Q. Tilson of Connecticut initiated an assault on the bill, but Reid countered with two conciliatory amendments.

The first reduced the size of the proposed engineering board from five to three, with the two recent additions dropped from the ranks. The second co-opted an idea from Mississippi Democrat and another future chair of the House Flood Control Committee, William M. Whittington, to allow the land within the proposed floodways to remain in private hands. Rather than spend federal money to purchase those lands outright, the government would pay the property owners one-time indemnities—called flowage rights—against future damage, based on the assumption that the large floodways in the Tensas and Atchafalaya basins would be put into use no more than once or twice a decade. Both amendments were adopted, and with Mayor Thompson watching from the gallery, the House approved the Jones-Reid bill by more than a two-thirds majority on 24 April 1928. Initial sentiment on Capitol Hill opposed any further compromise with the administration. Support in both houses had been “veto-proof,” and political factors worked against any hostile executive action.³²⁴

With time running out on the first session of the 70th Congress, flood-control advocates moved quickly to secure Senate approval of the House amendments and avoid the necessity of a formal conference on the bill, but Coolidge trumped their efforts. On April 26, he met with Senator Jones to express his continued dissatisfaction with the flood-control bill. The following morning, the Commerce Committee chair received a memorandum prepared by Jadwin outlining specific objections to the measure. Surrendering to White House demands, Jones asked the Senate to disagree with the House amendments and to appoint conferees. According to the *Times-Picayune*, he acted “without having secured the consent of the committee,” and “much resentment was aroused” among the bill’s advocates. As well as providing Coolidge with an additional opportunity to modify the flood-control bill, the necessity of a conference committee delayed final action on the bill and, with valuable time lost in the last month of the session, diminished the prospects of an override in the event of a presidential veto. The next day, a stunned Washington received news that the popular House Appropriations chair, Martin Madden, had died of a heart attack while at work in his congressional office. Negotiations were delayed an additional five days as Reid and his Illinois colleagues escorted Madden’s body back to Chicago.³²⁵

The conference committee met late the following week under a cloud of “doubt and gloom,” and Coolidge moved forward with his efforts to revise the bill, leaning heavily on Jones and Republican House Manager Roy Fitzgerald of Ohio to effect the necessary changes. The managers conceded to Coolidge on several points, agreeing to restrict the membership of the proposed Special Board, to three; to require executive approval for projects adopted by the Special Board; and to remove all legal obsta-

cles to the implementation of Jadwin's much-dreaded fuseplug levees. They refused calls for more substantive local contribution, though, and held firm to their demand that the federal government pay flowage rights to landowners before undertaking the construction of any floodways or spillways. By May 2, the committee had reached "the absolute limit" to which it was willing to go to meet the president's objections. Senate Minority Leader Robinson called personally on Coolidge to acquaint him with the proposed modifications. Robinson left that meeting with "the impression that the President will accept the conference bill," and the committee adjourned the next day, having adopted no "further alterations of a fundamental character." Reid and Jones moved forward with plans to introduce the committee report to their respective Houses.³²⁶

After conferring with the Jadwin, though, Coolidge modified his position, setting the stage for a final assault on the bill. Despite his well documented meeting with Robinson, the president complained publicly just two days later that the conferees had "hurried through an agreement without consulting him" and that "little [had] been done to meet his views." Confounded by the administration's renewed attacks on the bill, flood-control advocates disagreed on how best to proceed. The fiery Hawes began tout-ing a new bill in which the MRC would be made "an independent agency with complete authority to proceed with the project." House and Senate Republican leaders made plans to follow any final breakdown in negotiations with a resolution that would carry an immediate appropriation of \$150 million to begin work.³²⁷

With fewer than three weeks remaining in the session, though, the majority of interested legislators resigned themselves to still further concessions, and the managers scheduled an early-morning meeting at the White House for May 7, 1928. With Jadwin in attendance, the managers conceded to Coolidge on two of the three remaining points of contention. The first completed the emasculation of the proposed Special Board by restricting its tenure to the early planning stages only. The second limited federal liability in the proposed floodways to lands "which are not now overflowed or damaged." Reid's implacable position on the issue of local contributions left no room for maneuver on that final point, and the meeting adjourned, with Coolidge satisfied that the bill was "the best that can be obtained from Congress." Both Houses gave their approval to the amended conference report two days later. Ransdell arranged for the president to sign the bill in the presence of interested senators and representatives, but no such ceremony took place. Coolidge interrupted his lunch on May 15, 1928, to sign the Jones-Reid bill into law.³²⁸

Hailed by Reid as the "greatest piece of constructive legislation ever enacted by Congress," the 1928 Flood Control Act adopted a comprehen-

sive flood-control program for the lower valley that authorized \$325 million for the construction of two large floodways, the more contemporary term for outlets, in the Tensas and Atchafalaya basins, a smaller parallel floodway at New Madrid, and a single spillway to protect the city of New Orleans. Louisiana would be the largest-single beneficiary of the new law, and, according to the *Times-Picayune*, Mayor O'Keefe of New Orleans promptly dispatched four telegrams of congratulation, one each going to President Coolidge, Senator Jones, Congressman Reid, and Mayor Thompson of Chicago. The latter two also accepted invitations to join festivities in Louisiana, arriving in the usual style aboard a special train bearing 200 fellow Chicagoans. Police brass bands and cheering crowds numbering in the thousands greeted the men as they arrived in New Orleans, and the city held a banquet in Reid's honor.³²⁹

The large crowds and celebrations, however, masked an underlying sense of frustration and disappointment in the lower valley, as the 1928 Flood Control Act did not represent even a modest realization of their early hopes and aspirations. Congressman Reid rightly characterized the 1928 Act as a constructive measure, but it was not one in which delta interests played a prominent role. In the wake of the 1927 flood disaster, the Democratic leadership had advocated the adoption of a comprehensive flood-control plan to include tributary improvements, an extensive system of reservoirs, and federal expenditures in the neighborhood of \$100 million a year. Many Southerners had also called for expanded civilian participation in the development and implementation of any plan. Coolidge, though, had ignored their appeals and Jadwin's fuseplug levees, massive floodways, meager compensation for use of private land, and an enfeebled engineering board characterized the final law instead.³³⁰

The 1928 act proved controversial in its origins, in its creation, and in its aftermath. The adoption of the Jadwin Plan was to be tempered by the creation of the Special Board. Flood-control advocates placed tremendous faith in that board, which they hoped would mitigate Jadwin's influence when it came to administering the 1928 act. In keeping with his general dislike of the Corps of Engineers, Senator Hawes had lobbied for a predominantly civilian board that might escape the domination of the Chief of Engineers. But his efforts had failed. Hope remained in Colonel Potter—the one man who could defend the more comprehensive and palatable MRC plan. Although Potter had already reached the mandatory age of retirement, the MRC's supporters in Congress had retained him as president because of his extensive experience in dealing with flood control on the Mississippi River. A provision in the 1928 act made him eligible to remain as president indefinitely while acting as the MRC representative on the Special Board designed to reconcile the differences between the

Jadwin Plan and the MRC plan. This "lame duck" status emboldened Potter, as evidenced by his staunch defense of the MRC and his harsh critique of the Jadwin Plan during the congressional hearings.³³¹

The board, though, would not escape the reach of the Chief of Engineers or the administration. On June 10, 1928, Coolidge used a recess appoint to replace Potter as MRC president in direct defiance of the spirit of the provision establishing the Special Board. A strong case can be made that his replacement, Brigadier General Thomas H. Jackson, was a well-qualified candidate for the position, considering his extensive experience with comprehensive flood-control planning. In 1907, Jackson, while serving as a member of the California Debris Commission, formulated a comprehensive plan to improve navigation and flood control on the Sacramento River. That plan, adopted by Congress in 1910 and subsequently known as the Jackson Plan, relied heavily on the construction of diversion channels and controlling weirs to semi-regulated discharge from the river into the diversion channels. But the manner in which he was selected—through recess appointment—cast suspicion as to whether he was the right man for the job or merely Jadwin's handpicked candidate selected more for his loyalty than his credentials.³³²



Brigadier General Thomas Herbert Jackson, President, Mississippi River Commission, 1928-1932.

Certainly, there were many who questioned Jackson's qualifications for the job. In the eyes of some, the immense size of the project, along with the complexities unique to the Mississippi River, necessitated the selection of a seasoned officer having solid exposure to the river. Jackson had less than three weeks experience on the Mississippi prior to his selection as MRC president. Furthermore, he was promoted to brigadier general despite being next to last on a list of 16 senior colonels within the Corps of Engineers, bypassing Colonel Edward H. Schulz, the most senior colonel awaiting promotion and former member of the MRC. As such, Jackson's selection raised eyebrows across the Mississippi River Delta. Nevertheless, it was he who was to lead the MRC in prosecuting perhaps the largest civil works project in the history of the nation.³³³

Coolidge also selected Carlton W. Sturdevant to fill the lone civilian post on the board. A former Army officer himself and an eminent New York consulting engineer from civilian life, Sturdevant was not well acquainted with river hydraulics. Predictably, Jadwin dominated the board. Congress had rightly anticipated major revisions to the 1928 Act, but the board would not drive those changes. A mere 60 days after it had been organized, the Special Board finished its work, concluding to the dismay, if not disgust, of lower valley interests that “the adopted project [Jadwin Plan] is, all things considered, the best comprehensive plan that can be formulated.”³³⁴

A Question of Authority

Historians typically separate the history of the MRC into two phases—one prior to and one subsequent to the 1928 Flood Control Act, with the act itself representing an interregnum or a lapse in the continuity of the independent status and broad authority of the MRC. In that regard, the 1928 act is commonly interpreted to represent a permanent demotion of the MRC, having stripped it of its initiative authority and subjugating it to the Chief of Engineers. Through passing the act, however, Congress did not contemplate denying the MRC of its ability to plan and direct operations on the Mississippi River. To the contrary, the federal legislature initially aimed only to end the divided authority it had imposed on the



Weaving willow mattress revetment. MRC operations such as these did not curtail operations of the Corps of Engineers.

Mississippi River in order to streamline the execution of the newly adopted flood-control project, while intending to allow the MRC to continue operating under the authorities it prescribed in 1879. Changes to the MRC's status came not so much from the 1928 act as it did from circumstance and its new supervisor in implementing the legislation—General Jadwin.

Had Congress adopted Jadwin's plan as proposed, the MRC, without question, would have fallen under the Chief of Engineers as an advisory commission. The authorities set forth in Sections 3 and 4 of the act of 1879 empowered the MRC; without them it would have been stripped of all meaningful authority. Congress, however, did not adopt the Jadwin plan in its entirety. On the contrary, Section 1 of the 1928 act adopted the project for flood control "in accordance with the engineering plan set forth" in Jadwin's report. Significantly, several members of Congress—Senator Hawes in particular—believed that the report went beyond engineering matters by addressing the issue of administration, which Hawes viewed as "totally disassociated from the matter of engineering." By adopting the engineering aspects of the plan, Congress did not necessarily embrace the administrative or economic features of the plan.³³⁵

On the surface, Section 8 of the 1928 act appeared to endorse Jadwin's appeal to subjugate the MRC by providing for the Commission to prosecute the project under the direction of the secretary of war and the supervision of the Chief of Engineers. During the hearings, proponents of the Jadwin report made compelling arguments in regard to the necessity of ending the divided authorities on the lower Mississippi River when it came to implementing the flood-control project. Undoubtedly, Congress recognized the immensity of the project and intended to have a single agency responsible for its implementation. With two competing organizations advocating different plans, Congress concluded one or the other ought to have the final decision-making authority. In this particular instance, Congress chose the Corps of Engineers over the MRC. A close examination of Section 8, however, reveals that Congress intended for the MRC to be subjugated to the Chief of Engineers only in terms of implementing the Jadwin Plan. Much in the same way that it used Section 4 of the 1928 act to rebuke Jadwin's proposals involving the purchase of land rights in certain areas only, Congress, to some extent, worded Section 8 with the intention of blocking Jadwin's administrative proposals:

The project herein authorized shall be prosecuted by the Mississippi River Commission under the direction of the Secretary of War and supervision of the Chief of Engineers and subject to provisions of the Act. It shall perform such functions and through such agencies as they shall designate after consultation and dis-

cussion with the president of the commission. For all other purposes the existing laws governing the constitution and activities of the commission shall remain unchanged.³³⁶

Per that language, the "project herein authorized" represented the only aspect of the MRC's role to be placed under the supervision of the Chief of Engineers. Nowhere in the act did Congress state the MRC was to become an advisory body; the legislation merely gave the Chief of Engineers more control over the MRC in implementing the Jadwin Plan. To be sure, the "existing laws governing the constitution and activities" of the MRC were spelled out clearly in the Sections 3 and 4 of the 1879 act and subsequent provisions in river, harbor, and flood-control legislation. These, Congress left in tact. In view of Jadwin's desire to rewrite the 1879 act and strip the MRC of initiative authority—he used the words "constituted" and "constituting" on two separate occasions in recommending changes to the MRC—the inclusion of this proviso signified that Congress intended to retain the statutory authorities and subsequent assignments of the MRC over the entire Mississippi River.

This interpretation is buoyed by the reality that Congress saw the Jadwin Plan as a 10-year project only. Additional evidence of congressional intent, therefore, is located in Section 6 of the 1928 act:

Funds appropriated under the authority of Section 1 of the Act may be expended for the prosecution of such works for the control of floods of the Mississippi River as have heretofore been authorized and are not included in the present project, including levee work on the Mississippi River between Rock Island, Illinois, and Cape Girardeau, Missouri, and on the outlets and tributaries of the Mississippi River between Rock Island and Head of Passes in so far as such outlets or tributaries are affected by the backwaters of the Mississippi.³³⁷

Section 6 gave the MRC the "green light" to proceed with work, previously authorized by the Rivers and Harbors Acts of 1916 and 1922 and the Flood Control Acts of 1917 and 1923, falling outside the realm of the newly adopted flood-control act. In other words, the dual engineering organizations on the Mississippi River—the MRC and the Corps of Engineers—were to continue operating as they traditionally had. To exemplify this point, MRC activities on the upper Mississippi River did not cease after the 1927 flood or the passage of the 1928 act. The MRC continued its supervision of levee work under the authority of Section 6 on the upper Mississippi River and Illinois River through 1961.³³⁸

As is often the case, the intent of Congress in passing laws is sometimes lost in the aftermath of the legislative process. In many instances,



The MRC continued its administration of levee work on the upper Mississippi River, between Gape Girardeau and Rock Island until 1961.

compromise legislation, such as the 1928 Flood Control Act, results in ambiguities and internal contradictions, rendering it nearly impossible to determine a clear intent. On matters of great importance, the intent is usually addressed through future executive, legislative, or judicial action. On smaller matters, circumstances typically dictate how a provision of a law is interpreted or applied. Considering the large number of ambiguities in the 1928 act, one thing remained certain—Jadwin now believed he had the power, whether temporary or not, to enforce his will on the MRC. One strong impediment remained in Potter, who would not likely have sat idly by while Jadwin used the ambiguities of the act to reconstitute the MRC into an advisory body. Such a scenario, however, was never allowed to unfold.

President Coolidge's recess appoint of Colonel Jackson to replace Potter as MRC president not only had ramifications in the outcome of the Special Board's recommendations, but may also have affected the future of the MRC for years to come. After only three weeks on the job, most, if not all, spent with the Special Board and away from the daily operations of the MRC, Jackson saw fit to summarily change the organizational structure of the Commission, solidifying it as an advisory board more closely aligned with the Corps of Engineers' linear chain of command. On July 7, 1928, Jackson, following direct verbal instructions from Jadwin, formally recommended the abolishment of the Northern MRC District and the transfer of its operations to the Corps of Engineers Districts in Rock Island and St. Louis. This recommendation came in spite of the provision found in Section 6 of the 1928 act instructing the MRC to continue levee operations on tributaries and the upper Mississippi River. As a result, all employees

of the Northern MRC District were furloughed and rehired the next day by the two Corps of Engineers districts. Five days later, again following explicit instructions from Jadwin, Jackson similarly recommended the merging of the First, Second, Third and Fourth MRC districts with the existing Corps of Engineers offices in the lower Mississippi Valley. Over the objections of the venerable West, the MRC districts ceased their independent operations.³³⁹

These actions may have stripped the MRC of its districts and an independent staff, both of which were now under the supervision of the Corps of Engineers, but the real blow to its ability to plan and direct future operations on the river was yet to come. While Jadwin evidently disregarded the proviso of Section 8 of the 1928 act indicating that "the existing laws governing the constitution and activities shall remained unchanged," he did not miss the opportunity to focus his attention on another line in the same section of the law. Section 8 also provided that the MRC "shall perform such functions and through such agencies as they shall designate after consultation and discussion with the president of the commission." Using this language to his advantage, he ordered the new MRC president to develop a statement depicting the functions and duties of the Commission. In his reply to Jadwin's oral instructions, Jackson wrote, "I have tried to bring out the fact that the duties of the Commission should be limited to consideration and recommendation." After indicating that the wording in his statement "may not seem entirely satisfactory in meeting the conditions of section 8," he described his view on how the MRC should function in the future: "In performance of all duties assigned to it," the MRC, "shall act only as a consulting and advisory body; its action being limited to consideration and recommendation."³⁴⁰

On November 14, 1928, Jackson, Jadwin, and Secretary Davis signed the document designating the functions of the MRC in executing the Jadwin Plan. Within two months of his term as MRC president, Jackson, with the help of the Chief of Engineers, had ceded much of the Commission's independent power and authority despite congressional intent to preserve it. One year later, circumstances dictated a geographical reorganization of the Corps of Engineers, resulting in the abolishment of the expansive Western Division in favor of smaller divisions centered on watersheds. This effort divided the Mississippi River into two divisions, with the Lower Mississippi Valley Division having district offices in Memphis, Vicksburg, and New Orleans. As a part of this process, the MRC president would also serve as the commanding officer of the Lower Mississippi Valley Division, headquartered in Vicksburg, further blurring the line dividing the Corps of Engineers from the MRC.³⁴¹

It was in this context that the MRC settled into its seemingly temporary role as an advisory body, supported by a staff employed by the Corps of Engineers. As the proposed 10-year Jadwin Plan unfolded and a more comprehensive project emerged, that new status grew more rigid and developed as an accepted practice, particularly more so as members of the MRC cycled in and out of the Commission. With the MRC bound by the geographical limitations of the project and closely tied to the Lower Mississippi Valley Division, the inaccurate, but perfectly understandable, perception grew of the MRC as a body charged only with responsibilities and authorities pertaining to the alluvial valley of the river.³⁴²

Chapter 11

The Jadwin Plan Unravels

On a frigid morning in early December 1929, key staff members of the Mississippi River Commission, along with their families and all of their personal possessions, set out from St. Louis on a flotilla of quaterboats and stern-wheel towboats. Their destination: Vicksburg, Mississippi. Only two months prior to the embarkation, the Chief of Engineers ordered the MRC to relocate its headquarters from St. Louis to Vicksburg so it could more closely monitor its newly adopted project on the lower Mississippi River and be in closer contact with the people affected by the project. As the flotilla pulled away from the St. Louis riverfront, bitter cold temperatures prompted most of the travelers to stay indoors. Even then they could not escape the transgressions of winter as ice on the frozen river often delayed their voyage. Many onboard believed they were heading to the warmer temperatures of the South and looked forward to their arrival in Vicksburg, but when they did arrive, they only discovered more of the same—frigid temperatures, an icy river, and a town dusted in snow.³⁴³

This discovery foreshadowed what was to confront the MRC. The disastrous 1927 flood, the 1928 Act's adoption of the Jadwin Plan, and the



The MRC flotilla arrives in Vicksburg and steams into the Yazoo Canal on December 23, 1929.

relocation to Vicksburg certainly charted a new course for the MRC, but its members were badly mistaken if they believed the Special Board's wholesale endorsement of the Jadwin Plan had finally settled the issue of flood protection for the alluvial valley. For decades the MRC had been chastised for its sole reliance on levees; and yet, even following the horrific devastation of the 1927 flood, engineers, politicians, landowners, levee boards, and flood-control associations still failed to reach a consensus on the best approach to prevent a similar catastrophe. The Jadwin Plan may have become law, but every conceivable method of flood control—be it floodways, reservoirs, controlled spillways, fuseplug levees, cutoffs—still had supporters and detractors.³⁴⁴

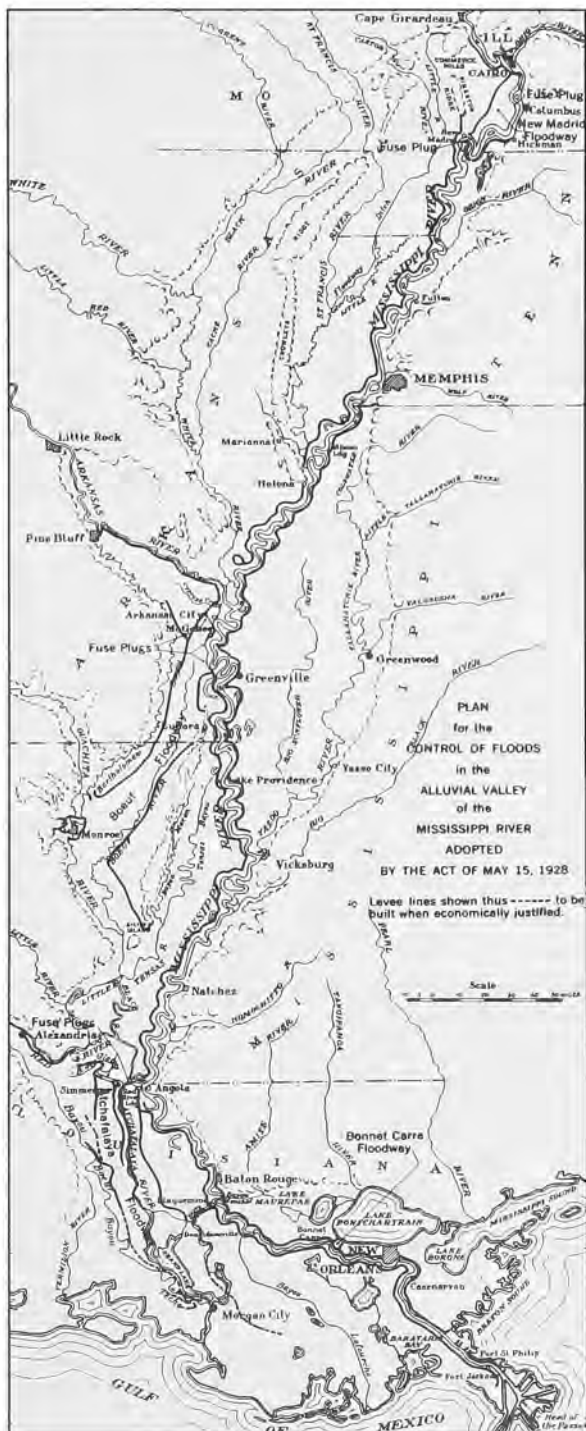
Against this backdrop the MRC began prosecuting the Jadwin Plan. Charged not only with implementing the plan, the MRC also held the mandate to make inspection trips and conduct public hearings to listen to the concerns of lower valley interests impacted by the project. Within months the Commission was caught in the middle of a simmering controversy between the engineering aspects of the plan and the reality of implementing them. The arrogant Jadwin had once boasted, "Neither the plan nor any feature of it has yet been punctured by criticism, nor can it be, because, previous to its submission, it was subjected to every vital engineering test"³⁴⁵ Engineering tests were one thing; the test of public opinion, though, was quite another matter. Opponents to the plan not only disliked its engineering features, but also its economic features. Simply put, many residents within the alluvial valley were unprepared for the reality of outlets and dispersion—a reality that assured privately owned land, once equally protected by levees, would now be subject to overflow to benefit landowners elsewhere. By the end of 1932, the opponents of the plan had succeeded in derailing some of its major components and, while the Jadwin Plan had not been changed dramatically, it was evident that it was obsolete in the eyes of many within the valley.

Principle Features of the Adopted Plan

Jadwin designed his flood-control plan to withstand a "superflood" or the maximum flood thought probable—one exceeding the 1927 flood by nearly 25 percent. He based the "superflood," also referred to as project flood, on a prediction of the maximum rainfall and possible conjunction of run-off into the main river from its tributaries. If confined to the main channel, the project flood had a discharge of 2,250,000 to 2,400,000 cfs at Cairo, a discharge of 2,850,000 million cfs at Arkansas City, and a discharge of 3,000,000 cfs at Red River Landing, Louisiana. These locations represented important gauging stations along the lower Mississippi River—each impacted by additional flows from tributaries below the

proceeding gauge. In this way, the project divided the river into three parts: the northern, middle and southern sections, with each of the aforementioned gauges at, or near, the head of each section.

The northern section of the project stretched from Cape Girardeau to the mouth of the Arkansas River. Between Cape Girardeau and Cairo, levees would be raised and strengthened to the new 1928 grade, one foot above the project flood flow line. The stretch of the river from Cairo to New Madrid, Missouri, however, called for more drastic measures because the existing levees confined the river in times of flood to a narrow channel less than three miles wide. This often created a bottleneck, causing floodwaters to pile-up and threaten Cairo's 15,000 inhabitants with inundation. To alleviate this problem, Jadwin called for a diversion channel, known as the Birds Point-New Madrid Floodway, to be created by building a setback levee five miles west of the existing levee. It also proposed to significantly lower 11 miles of the

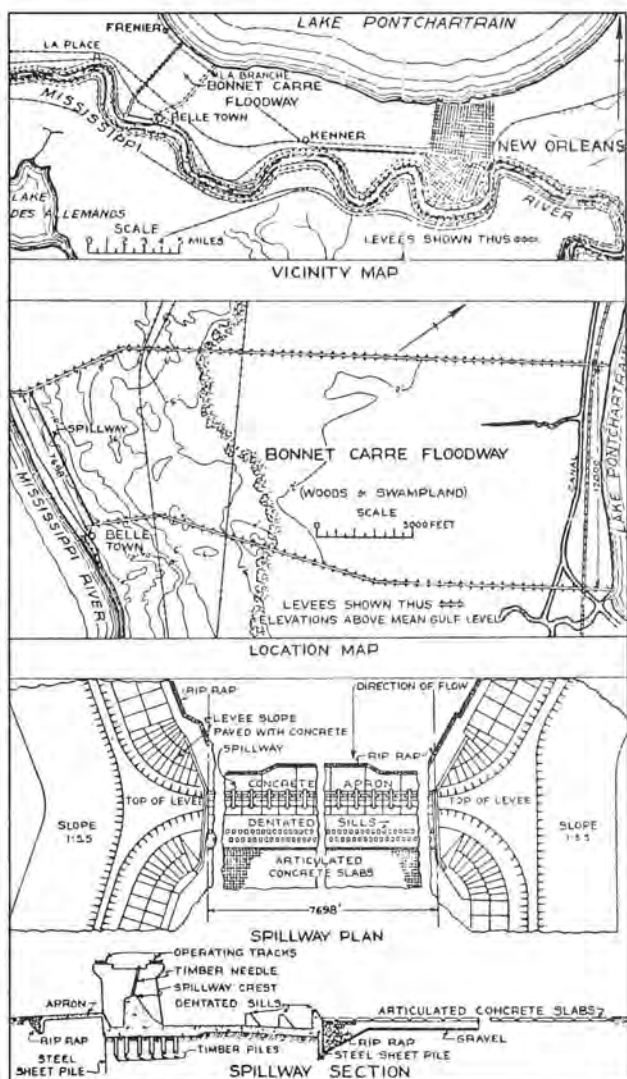


Engineering features of the Jadwin Plan.

levees on the west side of the river by 3.5 feet to correspond with a stage of 55 feet on the Cairo gauge. This 11-mile section of the levee represented the dreaded fuseplug levee so bitterly opposed by residents of the lower valley. The existing levee, along its fuseplug section, would confine more frequent, but less severe floods. However, during larger, more severe floods the fuseplug levee was designed to be overtopped and eventually fail when the river exceeded 55 feet on the Cairo gauge, turning the lowlands between the setback levee and the existing levee into a diversion channel that emptied back into the main river 70 river miles downstream. Under project flood conditions, the Birds Point-New Madrid Floodway would divert 550,000 cfs from the main river, thereby holding flood heights on the Cairo gauge at or below 60 feet. From New Madrid on south to the mouth of the Arkansas River, the Jadwin Plan again contemplated confining the river between higher and stronger levees of the 1928 grade. Additional setback levees were provided on this stretch of the river in order to widen the high-water channel; although, such action did not constitute the creation of more diversion channels.³⁴⁶

The middle section of the project extended from the mouth of the Arkansas River to Old River. The plan called for higher and stronger levees on both sides of the river constructed to the 1928 grade as the first line of defense against more frequent, but less severe floods. The only exception to this rule was a 30-mile stretch of levee extending from the former Cypress Creek gap to a point in Arkansas nearly five miles west of Greenville. The project called for this segment of levee to remain at its existing height in order to function as a fuseplug entrance into a 1.32 million-acre floodway, known as the Boeuf Floodway, during extraordinary floods. Historically, Cypress Creek had served as a natural outlet for dispersing overflows on the Mississippi River until the Tensas Basin and Southeast Arkansas levee districts extended the main river levees across the outlet in 1921. Because Cypress Creek represented the last major outlet to be closed on the river, Jadwin envisioned returning the Boeuf and Tensas basins into a natural outlet to divert flows in excess of 1,950,000 cfs in the vicinity of Arkansas City—an equivalent of 60.5 feet on the Arkansas City gauge, or more than 10 feet higher than the point of overflow prior to its closure. Under project flood conditions, the 9.5-mile wide floodway, flanked by 80 miles of protection levee on the west and 100 miles on the east, would divert 900,000 cfs through the Boeuf basin to the Red River backwater area in Louisiana and eventually to the Gulf via the Atchafalaya basin, thereby maximizing the storage capacity of the backwater area and relieving pressure on the main-line levees for some distance upstream of the fuseplug entrance and keeping flood heights at or below 62.5 feet on the Arkansas City gauge.³⁴⁷

The southern section of the project covered the area from Old River to the Gulf. Here, too, the plan provided for stronger and higher levees as far south as Bonnet Carré as the first line of defense against smaller floods, but the real backbone of the project in the southern section centered on a heavy reliance on diverting excess flows under project flood conditions. Of the 3,000,000 cfs expected at Red River Landing under the maximum flood deemed probable, the plan called for one-half to be diverted to the Atchafalaya River, and two parallel and leveed floodways flanking the river, and the other one-half to continue down the main channel of the Mississippi River. The levees on the south bank of the Red River were to be strengthened and raised to prevent water from entering the basin at any point other than the fuseplug sections at the heads of the floodways. In other words, the fuseplugs for the parallel floodways were adjacent to the Red River backwater area and were intended to breach when the combined waters of the Mississippi River and Red Rivers, along with water from the Boeuf Floodway, exceeded the capacity of the backwater area, typically at flood heights corresponding to 57.5 feet on the Angola gauge. Diverted flows through the Atchafalaya basin were to escape to the gulf through a dredged outlet at Berwick Bay. In concept, the Atchafalaya River itself would carry 500,000 cfs of the diverted floodwater; the floodway west of the



Sketch of the Bonnet Carré Floodway

river would take another 600,000 cfs; and the one to the east would take the remaining 400,000 cfs. Of the 1,500,000 cfs continuing down the main river, the plan envisioned a controlled spillway structure at Bonnet Carré—one capable of diverting 250,000 cfs through Lake Pontchartrain when the Carrollton gauge approached 20 feet. Jadwin saw this spillway as a necessary form of protection for New Orleans, because it was deemed imprudent and too dangerous to raise the levees protecting that city any higher.³⁴⁸

The Growth of Opposition

The Special Board's rubber-stamp endorsement of the Jadwin Plan left many lower valley interests gravely disappointed. They had pleaded with Coolidge not to implement the board's recommendations, but the president, just three months shy of obtaining "lame duck" status, ignored their appeals. On August 14, he instructed Jadwin to proceed with the implementation of his flood-control plan, but specifically delayed any decision pertaining to the acquisition of land rights for constructing the floodways. Shortly after the 1928 elections, which boosted Herbert Hoover to the presidency, Coolidge approved the site for the Bonnet Carré Floodway and authorized Jadwin to purchase the necessary land and flowage rights for that element of the plan. Three weeks later he did the same for the Birds Point-New Madrid Floodway. Lastly, in two separate orders in January 1929, Coolidge authorized the acquisition of rights of way and construction of the protection levees within the Boeuf and Atchafalaya. Provisions for the purchase of flowage rights in the Boeuf and Atchafalaya Floodways were conspicuously absent in the final two communiqués. With their appeals ignored, the same lower valley interests who wildly celebrated the passage of the 1928 Flood Control Act now harbored a bitter sense of betrayal not only toward the Special Board, but also toward Coolidge and Jadwin.³⁴⁹

Opposition to the Jadwin Plan grew steadily, particularly in Louisiana and more precisely in the areas falling inside the Boeuf and Atchafalaya floodways. The Bonnet Carré and Birds Point-New Madrid floodways certainly had their number of detractors, but the real and cohesive opposition to the plan festered in the Boeuf and Atchafalaya basins. Many of the nearly 50,000 people living within the proposed Boeuf Floodway opposed the overflow of their lands largely as a result of a recent spike in the property values brought about by success of oil wells in the region. They believed that the Jadwin Plan constituted the reopening of Cypress Creek, even though the level of protection had not been reduced. Because the MRC had permitted the closing of Cypress Creek in 1921, they contended that the federal government then should pay compensation for reopening

it. The 50,000 living in the Atchafalaya Floodway were split on the issue. Some favored a quick resolution of the issue so as to afford immediate protection, but most living in the more densely populated and agriculturally rich Pointe Coupee Parish, and to a lesser extent, those in the lower reaches of the floodway, remained bitterly opposed to the plan. An editorial in the *New Orleans Times-Picayune* captured these bitter feelings by depicting the plan as "an outrage on nine parishes in Louisiana and two counties in Arkansas." The rallying point for this harsh criticism centered on two related issues: compensation for flowage rights and the use of fuse-plug levees.³⁵⁰

While lower valley interests lacked a consensus on how to move forward from an engineering standpoint, they were solidly united behind the question of just federal compensation. Initially they had hoped the Special Board would shed light on a stark contradiction found in the 1928 Flood Control Act and the Jadwin Plan. Section 4 of the act provided for the federal government to purchase "flowage rights for additional destructive floodwaters" resulting from "diversions from the main channel of the Mississippi River." The Jadwin Plan, on the other hand, only made provision for the purchase of flowage rights for lands falling within the Birds Point-New Madrid and the Bonnet Carré floodways. The plan contained no such provisions for the Boeuf and Atchafalaya floodways under the reasoning that the lands within them were to receive the same level of protection under the adopted project as before. The Special Board, however, concentrated only on the engineering aspects of the plan and did not weigh in on the subject of compensation. Naturally, those living within the Boeuf and Atchafalaya floodways believed Section 4 pertained to them, but with the conspicuous absence of authorization to do so from Coolidge, it soon became clear that the government intended not to compensate them.³⁵¹

The issue of compensation was tied indirectly to a principal engineering feature of the Jadwin Plan—fuseplug levees. The Special Board's endorsement of Jadwin's fuseplug levees over the MRC's controlled spillways only hastened the argument for compensation. Residents living within the floodways surely favored controlled spillways over fuseplug levees because the latter concept was an untried theory considered dangerous by opponents to their use. While dreading inundation no matter what the source, they found some comfort in the regulation of floodwater guaranteed through the operation of controlled spillways. Conversely, they believed fuseplug levees only promised uncertainty. George C. Schoenberger, the chief state engineer for Louisiana, sent a letter to Senator Ransdell explaining this uncertainty:

The sudden blowing out of the fuse-plug section and the release of this water with its immense kinetic energy, is bound to result in damages and contingencies which have not been considered or provided for. The exact spot at which the fuse-plug levee will blow out is, of course, unknown—it may near the center, or near one of the guide levees—at any rate the water along the guide levees for the first three or four miles from the river will rise very rapidly, and will cause a very rapid settlement of the embankment, which might cause a failure of the guide levees and thereby inundate the entire basin.³⁵²

Schoenberger conceded that he was not as concerned with the potential loss of life as much as he was with the amount of destruction to private property under such unpredictable circumstances. While he remained committed to the position espoused by the Louisiana Board of State Engineers—that reservoirs on the Arkansas River and other tributaries were better suited to alleviate the problem in the Boeuf basin—Schoenberger contended, “If water must be diverted down the Boeuf basin, then the land within the floodway area should be bought by the government at a fair price.”³⁵³

From the start, congressional members from the lower Mississippi Valley region had advocated a truly comprehensive flood-control plan supported by large federal expenditures. When it became evident that the flood-control act was flawed in its application of compensation, pressure mounted from their constituents to delay and change the project. Many found hope in the new president. Coolidge and Jadwin may have been the main architects of the project, but it would be implemented by the MRC under Hoover’s watch. Although his administration represented a continuation of the previous one, as far as party affiliation and fiscal conservatism, Hoover, unlike his seemingly unsympathetic predecessor, was actively involved in the 1927 flood, winning the respect of many southerners. On May 9, 1929, a congressional delegation representing the lower Mississippi Valley, led primarily by Southern Democrats, presented a briefing to Hoover requesting a presidential and congressional interpretation and review of the 1928 Flood Control Act. The delegation stressed that Congress’ intent under Section 4 of the act was “to assure compensation for flowage rights over land embraced within all spillways and floodways and for damage where injury is done to property.” They argued that Section 1 placed the responsibility of approval or rejection of particular elements of the plan squarely on the shoulders of the president. Furthermore, the delegation insisted that Coolidge issued his instructions to Jadwin to proceed with the acquisition of rights of way for levees, but not flowage rights, without having before him “a full and complete report” on



Herbert Hoover (left) in Natchez, Mississippi, during the 1927 flood.

the MRC and the Jadwin plans. Therefore, Coolidge did not have the opportunity "to pass upon the question of compensation for flowage rights under both plans in the Boeuf and Atchafalaya Basins." With this in mind, the delegation suggested that if Hoover did not reach the same interpretation, he then should call for a temporary cessation of work on the project to allow Congress to revisit and clarify the issue through a legislative amendment.³⁵⁴

Hoover sent the brief, along with a supplemental support statement, to Secretary of War James W. Good. On May 27, Good forwarded the documents to Attorney General William D. Mitchell asking for his opinion as to whether the adopted project was subject to change at the behest of the president or whether it was fixed by law. He also asked Mitchell if the existing law required the federal government to purchase flowage rights in the Atchafalaya and Boeuf floodways. The attorney general responded a little more than three weeks later and expressed his view that the project was fixed by law and could only be changed by Congress. As to Good's question pertaining to the legality involved in purchasing flowage rights in

the Atchafalaya and Boeuf floodways, Mitchell demurred, citing existing litigation in federal court.³⁵⁵

The Kincaid Case

Mitchell's reference to existing litigation centered on a number of lawsuits brought before the federal courts. Having failed the test of public opinion, the Jadwin Plan now faced several legal tests. The most prominent suit commenced on June 15, 1929, two days before bids for the construction of protection levees within the Boeuf Floodway were to be received. On this date, R. Foster Kincaid, an owner of 160 acres toward the lower end of the proposed Boeuf Floodway, filed a lawsuit in the Federal Court of Western Louisiana against the United States, the secretary of war, the Corps of Engineers, and the members of the MRC in an effort to halt the receiving of bids and the awarding of contracts for construction. The suit alleged that the planned floodway through the Boeuf basin subjected Kincaid's land to additional destructive floods. His lawyers argued that Kincaid's land was valued at \$9,000, but the federal government, by advertising and receiving bids for construction of the protection levees, had "cast a cloud upon" the title of the land, thereby impairing Kincaid's ability to sell or to borrow money against it. As such, the proposal to initiate work in the basin without condemnation proceedings was tantamount to the taking of his land "without due process of law and without just compensation."³⁵⁶

A similar application for an injunction to stop the awarding of contracts in the Birds Point-New Madrid Floodway had been denied in late May by Judge Charles B. Davis of the Federal Court in Missouri. The defendants desired another decision along those lines and asked the court to dismiss the case. In pressing for the dismissal, the government contended that none of the residents within the proposed floodway were eligible for compensation as provided in the flood-control act because they would not be subject to additional floodwaters. The Jadwin Plan, they argued, did not lower the level of protection for the basin in any way. The fuseplug levee remained at the same height as before the plan's inception—it had not been lowered, nor would it be under the adopted project. With this in mind, they disputed the notion that the awarding of contracts represented the taking of Kincaid's land.³⁵⁷

On August 29, Judge Benjamin C. Dawkins rendered his opinion that Kincaid's case had merit and would not be dismissed. Further hearings were scheduled for the fall. The testimony from the Corps of Engineers' witnesses embodied the same reasoning contained within the Jadwin Plan. They testified that in every major flood, with the exception of 1922, overflows from the Mississippi River had always coursed down the Boeuf

River. As a result, Cypress Creek had acted historically as a natural opening to a natural outlet until the main river levees were extended across it in 1920. While the Jadwin Plan envisioned returning the Boeuf basin into a natural outlet to divert flows, it would not do so by lowering the level of protection. In addition, the raising and strengthening of the main Mississippi River levees afforded a higher level of protection to the Boeuf basin than ever before. The area within the floodway, therefore, would not be subject to additional floodwaters. This line of reasoning, while technically accurate, collapsed under cross-examination. The witness from the Corps of Engineers were correct—the higher and stronger main stem levees, along with the maintained height of the fuseplug levee, provided a level of protection to 60.5 feet at the head of Cypress Creek; therefore, no protection was being taken away as a result of the plan. Under cross-examination, though, this logic was destroyed when the engineers were forced to concede that, while only 450,000 cfs coursed through the basin during the 1927 flood, under the Jadwin Plan the fuseplug levee, if breeched as designed, would allow at least twice that amount, inundating parts of the basin with more than 20 feet of water.³⁵⁸

In mid-December, Dawkins handed down his decision in favor of Kincaid by issuing an injunction restraining the Corps of Engineers and the MRC from proceeding with any work on the floodway until the federal government acquired the land or flowage rights through either purchase or condemnation. In explaining his decision, Dawkins ruled, "It will not be assumed that Congress intended to violate the Fifth Amendment to the Constitution by taking private property without just compensation." Jubilation sprang forth across the lower Mississippi Valley. An editorial in the *Engineering News-Record* called Dawkins' ruling, "a common sense decision". Long opposed to many aspects of the Jadwin Plan, in particular to the issue of compensation for floodway residents, the editors admonished Jadwin, Coolidge, and the Army engineers testifying in the case:

The outcome is surprising only in view of the fact that a former Chief of Engineers deliberately planned to utilize the land for a flood control channel without compensation, that a former President issued an order to this very end, and that the government witness at the trial in Monroe strained their integrity to show that destructive flooding would not occur, until after cross examination they admitted the contrary.³⁵⁹

Naturally, the government appealed the decision by taking the case to the Fifth Circuit Court of Appeals. On May 31, 1931, the three-member circuit court upheld Dawkins' ruling by concluding that Kincaid "was entitled to the relief granted by that decree." Federal attorneys then took

the case to the U.S. Supreme Court, where, on February 23, 1932, the injunction was dismissed. But even then the issue was not dead. The Supreme Court ruled that the enactment of the 1928 act involved the "intentional, additional, occasional flooding of the complainant's land" and constituted its taking the moment "the Government begins to carry out the project authorized." While the Supreme Court ruled that the Fifth Amendment to the Constitution did not entitle Kincaid, or any others, to be paid in advance, he could file for compensation under other existing laws.³⁶⁰

The impacts of the decision extended beyond the immediate issue of just compensation for those living within the Boeuf Floodway—it also impacted residents within the Atchafalaya Floodway. The added costs of compensation would push the cost of the Jadwin Plan upward in the vicinity of those initially recommended in the MRC plan. Such costs had sunk the MRC plan with the aid of fiscal conservatives in the Coolidge administration during the more prosperous "Roaring Twenties." Now with the country slipping into the Great Depression, the cost of the Jadwin Plan was sure to escalate. To this end, the Corps of Engineers developed the stance that if the guide levees within the floodways were not constructed, then the federal government held no liability toward compensation for flowage rights. Nearly three years had been wasted and the floodway question remained unresolved.³⁶¹

A Potential Solution

Since the passage of the 1928 act, the MRC had succeeded in repairing and strengthening 90 miles of the weakest and lowest levee sections in the river and had constructed a total of 170 miles of levees to the higher and stronger grade provided for in the Jadwin Plan. Less than a year later, the Mississippi River experienced a significant flood. The 1929 flood began in early March and lasted almost three months, surpassing or equaling the high-water marks of the devastating 1922 flood at Arkansas City and Vicksburg and coming within a foot of the high-water marks at Cairo and Memphis. The flood created some harrowing moments, particularly at Greenville, where the river was only one foot lower than the levee protecting the town of 18,000 people. This time, though, all main river levees held and disaster was averted, largely because of sufficient funds and advancements in levee construction.³⁶²

The euphoria of the Corps of Engineers and the MRC over the success of the levees was soon tempered by Judge Dawkins' August opinion that Kincaid's case in the Boeuf Floodway issue had merit. Six months later, Dawkins issued his injunction preventing any further work on the floodway until it paid flowage rights or acquired the land through condemna-



Protecting the riverside slope of a levee during the 1929 flood.

tion. The MRC's efforts on the river may have prevented another catastrophe on the lower Mississippi River, but without the floodways through the Boeuf and Atchafalaya basins, large holes existed in the Jadwin Plan. No one within the Corps of Engineers or the MRC believed the larger and stronger levees alone would hold back another flood of the 1927 caliber in the reach between the Arkansas and Red rivers.

Ongoing efforts at the Bird's Point-New Madrid and Bonnet Carré floodways, combined with levee construction and bank revetment, would help alleviate problems north of the Arkansas River and south of Old River. By the time Dawkins rendered his decision, the MRC had already completed the necessary studies for constructing the Birds Point-New Madrid Floodway setback levee and drainage ditch, and actual construction began a few months later. The MRC also had immediately addressed the problems associated with the design and construction of the Bonnet Carré Floodway. Construction of the spillway protection levees had commenced shortly after Kincaid filed suit. By August, the MRC began constructing the 350-foot bay spillway structure, which was completed in February of 1931. But, with the Boeuf and Atchafalaya floodways stalled, the ominous and threatening gaps in the project left the Corps of Engineers and the MRC exposed to embarrassment. While the Jadwin Plan

envisioned excess floodwaters escaping through the natural floodways in the Boeuf and Atchafalaya basins, no guide levees had been constructed to confine the overflow, indicating that a large flood would unleash a torrent of unrestricted water down the Boeuf and Tensas basins, sowing the same havoc and devastation experienced before the project.³⁶³

In the meantime, southern politicians, engineering groups, flood-control associations, and levee boards, continued to apply relentless pressure on Hoover to scrap the existing flood-control project. The president, having in mind Attorney General Mitchell's determination that the project could not be changed by executive order and cognizant of the far-reaching implications of the ruling in the Kincaid case, finally capitulated to their demands by announcing his intention to review and delay "the undertaking of new work on that portion of the Mississippi flood control covering the so-called floodway from the Arkansas to the Gulf."³⁶⁴

Momentum clearly was shifting toward opponents of the Jadwin Plan, much more so in light of Jadwin's retirement as Chief of Engineers just prior to Dawkins' ruling. The new Chief of Engineers, Major General Lytle Brown, possessed more political savvy and flexibility than his confrontational and obstinate predecessor. Brown particularly generated great excitement among lower valley interests when he hinted that changes to the Jadwin Plan might be in order by describing the plan as a "piece of emergency work" developed hastily to protect the citizens of the lower valley as quickly as possible. Moreover, Brown, recognizing that "very little effort has been made by those responsible for the work toward inquiry as to how the general plans might be changed," encouraged a reevaluation of the existing flood-control plan. While Brown understood that a widespread hostility toward altering the Jadwin Plan existed among many within the Corps of Engineers and certain blocs within Congress—hostility which discouraged inquiries into potential modifications of the plan—he lamented that no suggestion from a responsible authority had been made proposing the elimination or modification of contested elements of the project. In this way he issued a challenge to the Corps of Engineers and the MRC to explore and develop new answers to the flood-control question.³⁶⁵



Major General Lytle Brown, Chief of Engineers, 1929-1933. *Office of History, U.S. Army Corps of Engineers.*

It was in this context that a new plan based partially on an old idea emerged—the use of man-made cutoffs. Neither the Jadwin Plan nor the MRC plan advocated the use of cutoffs. The Jadwin plan simply reiterated many of the old criticisms against cutoffs, in terms of increased velocities and excessive erosion, and warned that cutoffs were “too dangerous and threatening to warrant adoption.” Jadwin, though, did not dismiss cutoffs outright. He stated his belief that a system of cutoffs beginning at the lower reaches of the river and progressing upstream “might be desirable” if the riverbanks were completely protected by revetment, but he pointed out that this was not yet the case on the Mississippi River. In light of the uncertainty involved, he found it “advisable to adhere to the present policy of preserving the river generally in its present form.”³⁶⁶

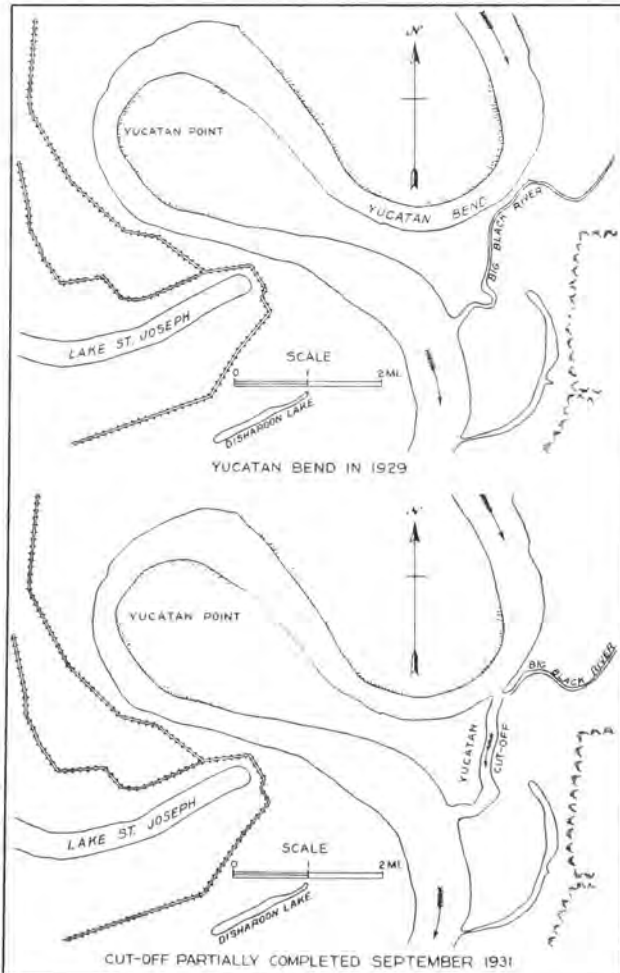
The MRC plan represented a continuation of its 1880 initial stance on the prevention of cutoffs, formulated on the doctrines of Ellet, Humphreys, and Abbot. Prior to settlement of the lower Mississippi Valley cutoffs occurred in the river at a rate 13 to 15 in the course of a century, with 15 recorded cutoffs occurring between 1722 and 1884, and probably many more going unrecorded. Following a violent cutoff in 1884 at King’s Point, near Waterproof, Louisiana, the MRC reaffirmed its stance and successfully prevented any further cutoffs from occurring since that time. Owing to its experience with cutoffs, the MRC’s 1927 flood-control plan not only set forth the same arguments found in the Jadwin Plan, but also went beyond Jadwin in one sense. Whereas Jadwin, left some room for cutoffs, the MRC indicated it could not subscribe to any plan involving cutoffs. Furthermore, the MRC recapitulated its long-time view that its first duty to navigation and flood control was to prevent cutoffs.³⁶⁷

The strengthening call for the use of cutoffs came from the civilian engineering community. John F. Coleman and William E. Elam, both respected civil engineers, led the charge. Coleman voiced his support of incorporating cutoffs into the flood-control program on the lower Mississippi, but did so with some apprehension, indicating that any such program should be carried out “gradually” and “with caution.” Elam, on the other hand was more adamant. In 1928, he published an article in *Engineering News-Record* explaining how cutoffs would lower flood heights by the speeding floods more rapidly to Gulf of Mexico. Brilliant in the theory, Elam’s study, which eventually evolved into the book *Speeding Floods to the Sea*, lacked the details on how to properly implement a comprehensive cutoff program. Therein lay the primary problem facing the proponents of cutoffs. While advocating their use to lower flood heights, they failed to set forth a sound and convincing plan on how to implement them. Numerous plans, theories and hypotheses were posited, but all were either vague or lacking in details. None contained the specific steps and proper proce-

dures on how to execute a program or control the river in its aftermath. The MRC's prevention of cutoffs had much to do with this, as no reliable data had been collected in over a generation.³⁶⁸

Nature provided the first clue in addressing the dilemma in the winter of 1929-1930 when a natural cutoff occurred on the Mississippi River at Yucatan Point. The cutoff did not take place in a typical manner whereby the current in upper and lower approaches to the bend eroded the neck to the point of a breakthrough. In this instance, the Big Black River traversed the neck of Yucatan Point and entered the Mississippi River just below the bend. The erosion of the upper approach to the bend, coupled with erosion from the Big Black River, threatened to permit the Mississippi River to break through the neck and transform the Big Black River into the main channel of the Mississippi River two miles above the point where the two rivers merged.³⁶⁹

For nearly 50 years the MRC had monitored the rapid erosion of the bend and tried to prevent the cutoff. In 1882, the MRC recorded the distance between the Mississippi and Big Black rivers at the bend at just over 11,000 feet, or roughly two miles. Yet, bank caving continued at an annual average of 235 feet, so that by 1924 the distance between the two rivers at the neck of Yucatan Point was only 920 feet. As evidenced by this rapid rate of erosion, attempts to prevent the cutoff were failing, prompting some within the MRC, most notably John Ockerson, to favor allowing the cutoff to occur. In early



The natural cutoff at Yucatan Point (1929-1931)

December 1929, General Thomas Jackson, the new MRC president, visited the Yucatan Point to gain first hand observations of the development. He concluded that the cutoff, if allowed to occur, would develop slowly and would not present a threat to levees in the vicinity. Armed with this information, he decided to allow nature to act and ordered a cessation of all attempts to prevent the cutoff, effectively ending the Commission's policy on the prevention of natural cutoffs.

The ensuing event developed slowly and afforded the MRC its first opportunity in a generation to study the progress of a cutoff and to make detailed observations on its impact to the river. As the cutoff unfolded, the MRC witnessed no immediate or violent changes to the regimen of the river. Jackson's decision to allow the cutoff, however, did not result in a significant change in the Commission's stance on the prevention of cutoffs. The Yucatan cutoff was sure to transpire regardless of his decision—it was but a matter of when. The absence of cataclysmic changes to the river in the months following the cutoff undoubtedly encouraged Jackson to learn more, but he remained cautious in touting cutoffs, especially as a potential means of flood control.³⁷⁰

If the Yucatan cutoff provided the first clues in answering the question of how to implement a cutoff program on the Mississippi River, then Colonel Harley B. Ferguson provided the specific details and process. Ferguson, a veteran of the Spanish-American War and First World War, made engineering history in 1911 with the raising of the *U.S.S. Maine* in Havana Harbor. He was serving as the Division Engineer for the South Atlantic Division and as a member of the Board of Engineers for Rivers and Harbors when the Yucatan cutoff occurred. Within 10 months of the Yucatan incident, he devised a scheme to reduce flood heights on the lower Mississippi River by increasing the carrying capacity of the channel through a comprehensive program of channel rectification and stabilization based largely on artificial cutoffs and corrective dredging.³⁷¹

On November 22, 1930, Ferguson sent a memorandum containing his plan to the Board of Engineers for Rivers



Colonel Harley Bascom Ferguson, Division Engineer, South Atlantic Division. He was later promoted to brigadier general and served as president of the Mississippi River Commission from 1932-1939.

and Harbors. He explained that the most critical stretch of the lower Mississippi River was found between the mouths of the Arkansas and Red rivers. As evidence, he pointed to the delays in constructing the Boeuf Floodway resulting from legal claims for losses and damages by the residents in the area. While these circumstances had created a void in the Jadwin Plan, Ferguson contended that the Boeuf Floodway might not be necessary if the MRC increased the capacity of the river to carry excess floodwaters. To do so, he insisted it was necessary to establish complete control of the middle section of the river by enlarging the restrictive cross section and improving channel alignment at Vicksburg and Natchez through corrective dredging; deepening Old River by the revetment of both banks at each of the three branches forming it; and increasing the carrying capacity of the Atchafalaya River.³⁷² Together these measures would allow the simultaneous implementation of a program of cutoffs and revetment, whereby, in the same fashion as the Eads' South Pass jetty system, the river itself would erode its bed deeper and increase the carrying capacity of the river. In some respects, Ferguson's plan was an upriver extension of Eads' early vision for the river, only via different means. Like Ferguson, Eads sought to increase the carrying capacity of the river and lower the flood line. Unlike Ferguson, Eads ultimately proposed to accomplish this through levees, not cutoffs and corrective dredging.³⁷³

Ferguson's plan involved a four-step process. First he proposed to make a cutoff just above Natchez at Giles Bend. Next he wanted to hasten the completion of the Yucatan cutoff, by enlarging it through repetitive dredging. The third step involved making a cutoff across the neck of Glasscock Point, located about 14 miles south of Natchez. Taken together, these measures would shorten the river by 33 miles. Ferguson estimated the energy released by shortening the river, combined with the enlarged channel at Vicksburg and Natchez, would exert enough force to scour the river deeper and improve its carrying capacity south of Vicksburg. In this regard, Ferguson placed a heavy emphasis on preparation. Controlling the river at Vicksburg, Natchez and Old River represented only the first phase of preparation. He also insisted on preparation before facilitating any cutoff, much in the same manner as General Comstock—the only true cutoff advocate among the original members of the MRC—had indicated in his 1880 minority report. In this phase of preparation, Ferguson discussed the importance of protecting the riverbanks above and below a proposed cutoff through the placement of revetment and dikes. Furthermore, he believed it was necessary to lower the riverbed below the cutoff by at least three feet before initiating it, and to keep that same channel open by dredging afterward. Above all other preparations, he insisted that cutoffs should be made at the lower end of a particular reach of the river first, with subsequent

cutoffs being made upstream. Failure to execute any of the provisions, he contended, might result in harming the regimen of the river and other unintended consequences. Once the work at the three cutoffs was completed and the channel properly prepared to flush sediment downstream, Ferguson proposed the fourth step of his plan: initiating a series of cutoffs through the Greenville Bends.³⁷⁴

The Greenville Bends were a series of five large loops in the river beginning just below Arkansas City and ending just below Greenville. A straight line distance between the head of the first bend and the toe of the last bend measured only 15 miles, but because of the great meandering bends in between, it was 50 miles by river. The gradual lengthening of the bends—the river had lengthened seven miles in the bends since 1880—threatened to undermine levees on both banks of the river, necessitating costly and extensive revetment. The continual lengthening process forced the MRC to constantly extend revetment operations upstream to prevent the river from flanking levees and towns. The bends also reduced the slope or velocity of the river. As a result, the river pooled in the bends during periods of flood, causing floodwaters to pile up in the vicinity of Arkansas City. For these reasons the Greenville Bends represented the most tortuous segment of the river in terms of extreme sinuosity.³⁷⁵

Ferguson's program involved much more than cutting off bends. The cutoffs obviously were the most glamorous and eye-catching detail of the program, but he adamantly stressed that the cutoffs were an incidental part



The Greenville Bends in the early 1930s.

of a larger channel rectification program, sharing equal importance with corrective dredging, bed lowering, increased cross section, and channel realignment. In explaining his plan, Ferguson, again reflecting Eads' views, remarked that the Mississippi River "knows only one physical law, and that is that with a certain depth and a certain slope it will move itself out. Where it has sufficient depth it undoubtedly keeps clean." The process of corrective dredging that he championed was designed to assist the river in doing just that—keeping it clear of sediment. Corrective dredging, though, was distinctly different than the accepted method of maintenance dredging practiced on the Mississippi River. Ferguson saw maintenance dredging as a repetitive process for treating the symptoms of sediment accumulation, not the causes. Corrective dredging, therefore, represented an action taken to accomplish a favorable and natural hydraulic condition to prevent the deposit of sediment. This included cutting back protrusions in bank lines, making deep cuts in the desired channel locations, and depositing dredged material in the form of sand dikes to guide the flow of the river into the excavated channels or to close secondary chutes.³⁷⁶

Fittingly, Ferguson held a practical dredge-man's view of the Mississippi River problem. "The river itself is the main dredge," he wrote, "The channel from Natchez to Old River is the pipeline." The question remained on how to keep the pipeline open. He contended it was necessary to train the river to maintain itself and carry the sediment downstream. The Natchez ledge, the Vicksburg restriction, and the large bends at Glasscock, Giles, and Yucatan all acted as obstructions, causing the river in some areas to lose velocity, deposit sediment, and clog the pipeline. By enlarging the channel at Vicksburg and Natchez through corrective dredging and eliminating excessive curvature through cutoffs, Ferguson speculated he could open up the pipeline by producing a deeper, unobstructed, more direct, and more efficient channel, thereby increasing its capacity to carry excess flows and allowing floods to be passed downstream more rapidly and at a lower stage. With the pipeline clear and capable of carrying more water and sediment, Ferguson believed it was possible to execute a series of cutoffs upstream at the Greenville Bends.³⁷⁷

Ferguson estimated the cost of his proposed program at \$40 million. By comparison, he estimated the cost of implementing the Jadwin Plan on the same stretch of the river at \$50 million, not including the indefinite cost of claims for damages by residents in the Boeuf and Tensas basins. Despite the hefty price tag, Ferguson made a compelling argument that, in the end, his program would result in substantial savings over the existing project. The MRC could cease spending considerable resources in placing and replacing revetment on troublesome bends.

Ferguson was also confident in every detail of his plan. By shortening the river, realigning its channel, and lowering the riverbed by three feet, he estimated flood heights at the Greenville Bends would lower by 2.5 feet. Furthermore, he reiterated his belief that, by improving the carrying capacity of the river, the elimination of the Boeuf Floodway from the Jadwin Plan remained a distinct possibility. The rate of progress in implementing the program constituted the only uncertain factor of the plan in Ferguson's mind, but he believed a trial period of four years would suffice in determining the rate at which his program, in its entirety, could be completed.³⁷⁸

Not surprisingly, the plan impressed the Major General Brown. The bold and innovative approach represented exactly the type of exploration he had challenged the Corps of Engineers and the MRC to produce upon assuming command. Toward the end of 1930, Brown ordered General Jackson to conduct a series of experiments to determine the effects, if any, of artificial cutoffs on lowering flood heights and on their impacts to the river. Brown's overriding motivation for ordering the experiments rested in his desire to eliminate the necessity of the Boeuf Floodway.³⁷⁹

A Newfound Knowledge

The relentless opposition to the Jadwin Plan by lower Mississippi Valley interests did not represent the only factor leading to the eventual demise of the plan as enacted into law in 1928. Oddly enough, an element from within the plan itself—the establishment of a hydraulic laboratory—also played an instrumental role. The scientific discoveries produced by the laboratory, known as the Waterways Experiment Station (WES), removed much of the mystery surrounding hydraulics on the river, leading to a new confidence among river engineers and the gradual development of a new body of knowledge. This newfound knowledge helped to discredit long-standing scientific doctrines; some contained within the Jadwin Plan, itself. The discoveries emanating from WES, combined with strong leadership and the emergence of a new attitude among the members of the MRC and Jadwin's successors as Chief of Engineers, led to the inauguration, development and implementation of new plans for flood control on the lower Mississippi River that successfully transformed the Jadwin Plan into a truly comprehensive river improvement program.

The establishment of a national hydraulics laboratory had been the topic of a fierce debate in the early 1920s, culminating in hearings before Joseph Ransdell's Senate Commerce Committee. During those hearings, proponents of a laboratory led by John Freeman conveyed the unanimous support of the American engineering community for the establishment of such a laboratory. The Corps of Engineers and the MRC, though, relying



The Illinois River backwater model was the first outdoor model constructed at the Waterways Experiment Station.

on MRC Commissioner John Ockerson's testimony, successfully blocked Freeman's proposal. Then the 1927 flood struck the lower Mississippi Valley. The effects of the devastating flood stiffened Freeman's resolve to see his dream to fruition. Buttressed by Hoover's earlier support for a national hydraulics laboratory and the well-publicized failure of the MRC's prized levee system, Freeman had the opening he so desperately needed to approach Ransdell a second time. He again found the senator amenable to the issue and convinced him to introduce a new measure. With the Corps of Engineers and the MRC being unreceptive to the idea, the new bill called for the establishment of a hydraulics laboratory under the Bureau of Standards in Washington, D.C. The measure passed the Senate and was reported to the House of Representatives, where hearings were scheduled before the Committee on Rivers and Harbors.

Similar to the 1922 and 1924 Senate hearings, the testimony heard before the House committee offered near unanimous support for the establishment of a national hydraulics laboratory and near unanimous support for its establishment under the Bureau of Standards. Once again, the most impressive testimony in favor of the laboratory came from Hoover, then still serving as secretary of commerce. In a memorandum incorporated into the official record, Hoover stressed that the hydraulic laboratory would be "directly and immediately" useful in addressing the problems arising from the new flood-control program on the lower Mississippi River. Furthermore, he indicated the laboratory would not be limited only to studying the

problems on the Mississippi but could be used by several agencies other than the Corps of Engineers to solve numerous problems on bodies of water from around the country. For this very important reason, Hoover, insisted the laboratory should be built in Washington, D.C., under the Bureau of Standards.³⁸⁰

Scheduled to appear before the committee to represent the Army was none other than General Jadwin, the Chief of Engineers since 1926. The concept of a hydraulics laboratory was not foreign to him. In his flood-control plan for the Mississippi River, Jadwin, in breaking from the views of his predecessors, recommended that he be authorized to establish a hydraulics laboratory under the supervision of the secretary of war, who in turn, would be authorized to allocate funds from river, harbor, and flood-control appropriations to pay the necessary expenses involved in the research and publication of scientific studies produced by the laboratory. This is not to insinuate that Jadwin was a solid proponent of such a laboratory. Like many others within the Corps of Engineers and the MRC, he believed actual hands-on observations supplied the best data on the flow and characteristics of large rivers like the Mississippi and that this experience was preferable to experiments with small-scale models. While not a staunch ally of the hydraulics laboratory movement, Jadwin knew it was but a matter of time before such a laboratory became a reality. He astutely recognized Hoover's role as secretary of commerce in extending that departments' control over areas not previously under its jurisdiction and feared Hoover's support for the establishment of the laboratory under the Bureau of Standards as another step in that direction. Jadwin certainly held reservations about the merits of a hydraulics laboratory, but his domineering personality would not allow one to be established under another agency where he could not control the timing and methods of experimentation.³⁸¹

Jadwin testified before the House Committee on Rivers and Harbors on May 15, 1928. Ironically, this was the exact date the Flood Control Act of 1928 was signed into law. During his testimony, he acknowledged the new flood-control program would give rise to new investigations needing laboratory experiments to verify practical observations, but he insisted that the laboratory needed to be established on the Mississippi River and under the auspices of the Corps of Engineers, not in Washington, D.C., under the control of another agency. To properly address the unique aspects of the Mississippi River, it was essential for the hydraulic experiments to incorporate specific types of alluvium and sediment characteristic of the valley. Furthermore, in order for the laboratory to test its "theoretical conclusions" against the practical observations of those actually working on the river, the laboratory needed to be in immediate contact with the field forces exe-

cuting the work. To hammer the issue home, he chided the idea of establishing the laboratory in Washington, D.C., "It is an error to think that a few barrels of sand can be shipped from the Mississippi Valley to a laboratory in Washington and made to represent actual conditions."³⁸²

Jadwin's testimony initiated debate among the members of the Committee on Rivers and Harbors. Unable to reach a consensus, the committee deferred any action until the next session of Congress. The committee met again in 1929 but adjourned on February 28 without taking action on the issue. The further delay on the motion gave Jadwin the opportunity to act on his own. He believed the passage of the Flood Control Act of 1928 and its subsequent adoption of his flood-control plan containing a recommendation for the establishment of a hydraulics laboratory gave him implicit authorization to move forward. In fact, he had testified to this before the House Committee on Rivers and Harbors. On June 18, 1929, unsure as to the outcome of future congressional deliberations and perhaps cognizant of Hoover's ascendancy to the presidency, Jadwin directed MRC president Jackson, to establish a hydraulics laboratory on the Mississippi River near Memphis.³⁸³

Jackson, in turn, instructed Lt. Colonel Francis B. Wilby, the Memphis District Engineer, to take the necessary steps to fulfill Jadwin's order. By November, Wilby had all but completed his assignment when he received



Lieutenant Herbert D. Vogel was the first laboratory director of the Waterways Experiment Station. He also served as a member of the Mississippi River Commission from 1952-1954.

a telegram from Major General Lytle Brown, Jadwin's successor as Chief of Engineers, instructing him to suspend all construction on the laboratory pending its possible relocation to Vicksburg. Weeks earlier, Brown directed the MRC to relocate its headquarters from St. Louis to Vicksburg. By a verbal order issued on November 16, Brown also transferred the new hydraulics laboratory to Vicksburg to aid the MRC in implementing the Jadwin Plan. He placed the operation of the facility under the supervision of the MRC president—an arrangement lasting until 1949—and assigned Lieutenant Herbert D. Vogel as laboratory director, a position designated as assistant to the president of the MRC.³⁸⁴

The newly created hydraulic laboratory undoubtedly played an important part in the implementation of the adopted flood-control project. Within its first year of operation, WES conducted sediment and reservoir studies, followed by investigations to determine the extent of backwater flooding from the Mississippi River on the Illinois and Yazoo rivers. These experiments were followed by tests to determine the extent of potential erosion at the Bonnet Carré spillway and the impacts of filling and emptying the Birds Point-New Madrid Floodway.³⁸⁵ It was the laboratory's investigation of Ferguson's channel rectification program, however, that had the most immediate and dramatic impact on the Jadwin Plan.

WES technicians constructed an indoor model of the Greenville Bends. The model, built to a horizontal scale of 1:4,800, replicated 98 miles of the river from the mouth of the Arkansas River to just below Lake Lee, approximately 20 river miles south of Greenville. The first results stemming from the experiments were mixed; some observations were encouraging, other discouraging. The tests indicated that an isolated cutoff across Tarpley Neck, just above Greenville, lowered flood heights upstream of the cutoff by as much as 2.2 feet, with the influence of lower flood stages being felt for a distance of 45 miles. After a temporary increase in stage elevations, which quickly evaporated, the experiment did not demonstrate a sustained increase or a noticeable decrease in flood heights downstream. Tests depicting multiple cutoffs at the Greenville Bends developed the same conclusions, with two exceptions. First, the benefits upstream ranged to a point as far as 100 miles above the cutoff. Second, any combination of three or more cutoffs, particularly combinations involving a cutoff at Ashbrook Neck, resulted in extreme or dangerous conditions from the standpoints of bank erosion and navigation. By demonstrating that cutoffs did not result in a prolonged period of induced flooding downstream, the WES experiments contradicted the theories posited by Ellet, Humphreys, Abbot, and others. Conversely though, it contradicted Ferguson's



Indoor model of the Greenville Bends.

theory that a series of cutoffs would lower flood heights throughout the reach.³⁸⁶

It did not take long to discover why. In constructing the model, WES personnel constructed the riverbed and riverbanks by molding moist sand to elevations corresponding with actual configurations. The entire model then was coated in cement mortar; therefore, it was incapable of simulating riverbed erosion. The experiments incorporated the use of artificial sediment to determine sediment transportation and deposition, but this was not tantamount to simulating bed erosion. Because the basic tenet of Ferguson's plan called for the energy released through cutoffs to scour the riverbed deeper, thereby increasing the river's carrying capacity, the results of the experiment were destined to contradict Ferguson's estimations. Subsequent model studies capable of simulating bed erosion indicated a maximum lowering of flood stages by nearly 10 feet at the head of the Greenville Bends.³⁸⁷

Reconsiderations

In the meantime, President Hoover's intention to review and delay "the so-called floodway from the Arkansas to the Gulf" manifested itself in a note to Secretary of War Patrick J. Hurley, dated December 31, 1929. The note authorized a restudy of the controversial aspects of the Jadwin Plan with a view toward possible modifications. More precisely, Hoover wanted to determine the possibility of protecting against a flood similar in size to the 1927 flood, rather than the adopted "superflood;" abandoning the Boeuf Floodway by strengthening and raising levees below the mouth of the Arkansas River; reducing the size of the Atchafalaya Floodway; and incorporating reservoirs on the Arkansas, Red and White rivers.³⁸⁸

Shortly after receiving Hoover's note, Major General Brown was called to testify before the House Committee on Flood Control. Members of the committee, particularly Chairman Frank Reid of Illinois, Riley Wilson of Louisiana, Willis Sears of Nebraska, William Whittington of Mississippi, and William Driver of Arkansas, seemed particularly interested in determining Brown's enthusiasm for possibly changing the Jadwin Plan. With recent judicial setbacks in mind, Brown did not believe the safety of the valley could be secured without using the Atchafalaya and Boeuf floodways. The Jadwin Plan, therefore, could not be implemented if the government had to pay for flowage rights and rights of way for levees and Congress did not provide the necessary funds. While calling the Jadwin Plan "sound," Brown hinted changes to it might be necessary, particularly in regard to the incorporation of reservoirs. "The thing that General Jadwin did not have and that we are going to study and exhaust if we can," he testified, "is the question of reservoirs."³⁸⁹

To the members of the House committee, the issue of reservoirs was directly tied to the question of initiative. The Corps of Engineers Reservoir Board, established by Jadwin after the 1927 flood, had developed a comprehensive plan based on 11 reservoirs scattered throughout the Arkansas and White rivers, but recommended they not be built because of their excessive cost. This same plan had since been largely incorporated into a plan recently completed by the Louisiana Board of State Engineers. Congressman Sears questioned why the Corps of Engineers had not come to Congress with the Reservoir Board's report to request authorization and to allow the legislature to decide if the costs were too extreme. Brown responded by arguing that it was the legislature's role to initiate projects; if Congress told the Corps of Engineers what to do, then the Corps of Engineers would do it. Willis promptly lamented, "We want this thing done. I have known engineers here who have been absolutely hostile to reservoirs." Brown responded adamantly, "I am not going to be hostile to reservoirs or anything else." He tried to calm any fear to the contrary by testifying that it was his duty to recommend ways to convert the Jadwin plan—which he had earlier called "a piece of emergency work,"—into the best and safest permanent plan possible. Brown later gave the committee his assurance that the question of reservoirs in the Arkansas and White River basins would be included in his report.³⁹⁰

Despite his ominous warning that "it is not a foregone conclusion yet that the plan will be modified to any great extent," Brown's testimony impressed opponents of the Jadwin Plan, Congressman Driver, for example, commented, "I am convinced that General Brown with his Corps of Engineers is making a thorough investigation and that every aspect that could possibly enter into this equation is being considered by him . . . I am expecting great things to result in consequence." Lower Mississippi Valley interests certainly were optimistic that Brown's anticipated report would address either the Louisiana Board of State Engineers' reservoir plan or some systematic reservoir approach and, along with them, the possibility of outright eliminating the Boeuf Floodway and its dreaded fuseplug levee system. In short order, though, those same lower valley interests would be gravely disappointed.³⁹¹

On March 4, 1931, Secretary of War Hurley forwarded the Corps of Engineers' long awaited restudy to Congress. Spanning over 1,500 pages contained in two volumes, the report addressed the topics suggested by Hoover in his 1929 note to Hurley by applying the discharge of the 1927 flood and the Jadwin Plan's "superflood" to the four generally accepted methods of flood control: levees, outlets, reservoirs, and increased channel capacity. The report quickly discounted higher levees as excessive and unsafe. Citing the inability of the levees to confine floodwaters to the main

channel during the 1927 flood, the report concluded that the use of floodways in the Jadwin Plan were "a virtue of necessity." Simply put, the excess of waters of every great flood in history had coursed through the natural overflow outlets provided by the Boeuf and Atchafalaya basins and would continue to do so in the future. The report recognized the strong public opposition to the floodways, but noted, "There has been a very earnest effort made to avoid any floodway through the Boeuf, but it has failed." The Louisiana Board of State Engineers' plan for reservoirs in the Arkansas and White basins might eliminate the necessity of the Boeuf Floodway in a repeat of the 1927 flood, but not any flood exceeding it. As for the Atchafalaya Floodway, its inclusion in the project could only be avoided by a "general application of a system of reservoirs to the entire watershed of the Mississippi," but such a system could not be justified on the grounds of flood control only.³⁹²

In developing the report, Brown solicited input from the Division Engineer of the Lower Mississippi Valley Division (LMVD), the MRC, and the Board of Engineers for Rivers and Harbors. As LMVD Division Engineer, Jackson recommended no changes to the project and advised it be pushed to completion as rapidly as possible, with the exception of protection levees flanking the contested floodways. As MRC president, Jackson and the remainder of the Commission recommended the same, but limited their approval to the engineering features of the plan, leaving in tact the MRC's opposition to the compensation issue. Likewise the Board of Engineers for Rivers and Harbors approved the continuation of the adopted project, but recommended the initiation of Ferguson's experimental program to increase the channel capacity of the river. In the end, Brown, too, recommended a continuation of the adopted plan. He placed the reservoir question on hold, pending further information from ongoing Corps of Engineers' studies. He also backed Jadwin's call for fuseplug levees over gated spillways, although he left open the possibility of using concrete weirs. More importantly, though, he also asked Congress to state the project more definitely and with flexibility. This represented a significant, but often forgotten, legacy of the 1931 restudy of the Jadwin Plan. Perhaps the most crucial facet of flexibility involved the protection against floods using a combination of not only levees and outlets, but also increased discharge capacity of the Mississippi River.³⁹³

Needless to say, the report shocked the Louisiana Board of State Engineers and other opponents to the Jadwin Plan. To them, the report simply reaffirmed the Jadwin Plan much in the same way that the Special Board had in 1928. Brown's opinion on the reservoir question, however, should have come as no surprise to the Louisiana Board of State Engineers. Shortly after appearing before the House Committee on Flood Control in

January, he expressed his view that the board's plan to eliminate the Boeuf Floodway through the use of reservoirs on the Arkansas and White rivers, merely served to shift opposition to the flood-control project away from the floodway. Brown reasoned that, "obvious objections would be quite as strong" in the areas to be inundated by the reservoirs as "any of those brought forward against the floodway in the Boeuf basin." In fairness to Brown, the report went beyond the actions of the Special Board by positing a plea for flexibility—flexibility for further study and experimentation on the reservoir question, but more precisely on Colonel Ferguson's channel rectification plan endorsed by the Board of Engineers for Rivers and Harbors; flexibility Brown did not feel that the 1928 act bestowed upon him. This request for further examination is exactly what the MRC had recommended in its initial 1927 report only to be castigated by Jadwin and yet nearly four years later, Jadwin's successor was asking for the very same thing.³⁹⁴

Brown would get this authorization the following year. In January 1932, he again found himself testifying before the House Committee on Flood Control. He informed the committee that the Corps of Engineers was still preparing reports examining the feasibility of tributary reservoirs. While the reports were not due until later in the year, Brown indicated he



Outdoor model of the Greenville Bends.

was convinced that it remained impractical to prevent floods through tributary reservoirs. To the Chief of Engineers, the real lingering question pertained to the exact point on the Mississippi, between the Arkansas and Red rivers, where dispersion of floodwaters was to take place. The Jadwin Plan's Boeuf Floodway represented one location, but Brown also discussed a second possible dispersion route through the Tensas basin. In discussing this second option, he repeated his suggestion from the 1931 restudy that Colonel Ferguson's plan be investigated further. By straightening the system of bends between the Arkansas and Red rivers, especially the Greenville Bends, and increasing the channel capacity to carry more water, he informed the committee that experiments at WES indicated a possibility of lowering flood heights by 10 feet at the mouth of the Arkansas River. Such a dramatic effect might allow the location of the fuseplug levee to be shifted farther downstream, permitting dispersion through a smaller and narrower floodway.³⁹⁵

Ferguson's bold theory intrigued Brown, but it remained a dangerous and complex proposition. He informed the committee that he was not willing to attempt it without further examining the true practicality of it:

It is a serious question, tampering with those bends, that when the decision is made on it you have to be sure that you are right. For instance, this one bend right here, just above Greenville, called Leland Neck, or the one above called Tarpley Neck, if the cut-off is made intentionally or is allowed to occur naturally you might have a disaster below; you might cut out the levees that are existing there and flood all this territory over here and cause damage that would go into the millions of dollars. We are not allowing them to cut off right now; we are spending money right now to prevent those bends from being cut off, and I would not allow them to be cut off or do anything to be involved in their cutting off unless I was prepared to take care of the results that would come from the cutting off. I do not know what the exact effects would be; I would like time to study it. I would like to put some people on there to study it that are not so much involved in the execution of the project. I would like to use the hydraulic laboratory to its fullest extent, and to submit a report to Congress, and have congressional authority for making those investigations and for congressional direction to make the report. It would be done thoroughly and the case would be fully covered.³⁹⁶

Brown was not asking solely for more investigations at WES. He wanted to move forward, to go beyond model investigations. "The best that the laboratory can do is to give indications," Brown testified before

the committee, "You can not rely absolutely on an experiment made on a very small scale to tell everything that is going to happen." In other words, he wanted to apply what had been already been learned at WES to the Mississippi River or, as former MRC member John Ockerson had once proclaimed, "in nature's own laboratory, the river itself." By asking for congressional direction, Brown clearly did not believe he had the authority to move ahead with actual experiments on the river.³⁹⁷

On January 28, 1932, Brown received direction to proceed. Riley Wilson, now chairman of the House Committee on Flood Control, offered a resolution allowing the Chief of Engineers to examine and review the Jadwin Plan "with a view toward determining if changes or modifications should be made." Congressman Frank Reid, still a member of the committee despite no longer serving as its chairman, wanted to ensure that Brown had the authority to move forward with the investigation. Not wishing to see a repeat of the 1931 restudy, Reid asked Wilson, "Mr. Chairman, does this take in the question of whether dredging may be done . . . ?" Wilson replied, "Yes; I went over that question directly with him [Brown]."³⁹⁸

The committee adopted the resolution unanimously. Armed with it, Brown established a three-member Mississippi River Engineering Review Board to reexamine and report upon the Jadwin Plan. The board consisted of Colonel George Spalding, a member of the MRC and the Division Engineer for the Upper Mississippi Valley Division, Anson Marston, the dean of engineering at Iowa State University and well-respected civil engineer, and Colonel Harley Ferguson. Brown directed the board to study "the practicability and desirability" of increasing the discharge capacity of the river by means of cutoffs and corrective dredging. As one of its first actions, the board conferred with MRC president Jackson to garner his recommendations for potentially modifying the existing flood-control project on the lower Mississippi River. Oddly enough, Jackson made no indication he favored implementing a cutoff program to improve the river.³⁹⁹

Clearly Jackson, an unwavering floodway advocate by virtue of his experience with the California Debris Commission, did not see cutoffs or corrective dredging as effective means of flood control. Less than two months after receiving the Chief of Engineers' directive to conduct a series of experiments on cutoffs at WES, Jackson publicly expressed his opinion that cutoffs and dredging served "no useful purpose in a flood-control plan" and "there is little prospect of them playing a more important role in the future" of flood control. He viewed all effects on the lowering flood heights after a cutoff as either too temporary or too isolated. Similarly he saw the results of dredging as too temporary and ineffective in sustaining

an increase in the carrying capacity of the channel. Based on these observations, it is evident Jackson advocated the school of thought that cutoffs had the potential to “cause serious injury to the channel, bank and levees immediately below” the cutoff.⁴⁰⁰

In 1932, Jackson’s cautious views on cutoffs and corrective dredging became irrelevant. The Chief of Engineers favored an investigation into the feasibility of implementing a comprehensive program of cutoffs, channel improvements and bank protection. He wanted an able and willing engineer to carry out such a mission, and he knew just where to find one—Colonel Harley Ferguson. Brown would later describe Ferguson as:

the first and only responsible man who ever brought to the Chief of Engineers the serious proposition to make artificial cutoffs on the Mississippi River. Whatever credit is due for a courageous effort to lower flood heights on the confined waters of the Mississippi is due to Maj.-Gen. Harley B. Ferguson. There are many who project an idea where danger is involved but there are few with the courage to give it effect and to assume the responsibility.⁴⁰¹

Brown promoted Ferguson to brigadier general and assigned him to the post of MRC president. Ferguson took command on June 15, bringing with him Gerard Matthes, a civil engineer from the Norfolk Engineer District who had helped him in conceptualizing the channel rectification program. Soon the two men discovered that many within the MRC shared Jackson’s cautious, if not outright prejudiced, views against cutoffs.



Gerard Matthes was appointed as Chief Engineer of the Mississippi River Commission by Ferguson. Matthes later became the first civilian director of the Waterways Experiment Station from 1942-1945.

Ferguson, a whimsical, but strong leader with combat experience, showed little trouble in overcoming these prejudices. He immediately ordered Lieutenant Vogel to conduct a comprehensive study to determine the effects of an entire series of cutoffs and channel rectification throughout the length of the lower Mississippi between the mouths of the Arkansas and Red rivers. Ferguson was confident the results of the WES experiments would validate his theory that cutoffs and channel rectification would increase the carrying capacity of the river. He did not wait for the conclusion of the models tests before proceeding with the implementation of his program. Two

days after becoming MRC president, Ferguson called together key players within the Commission to discuss the first steps in implementing his plan. At the meeting, he pulled out a map and drew a line across the neck of Diamond Point, located approximately 10 miles south of Vicksburg. This line represented the location of the first artificial cutoff to be attempted on the Mississippi River in nearly a century.⁴⁰²

Captain Paul W. Thompson, Vogel's former assistant and the WES director from 1937-1939, later described Ferguson as "impatient of experimental results which failed to fit his own instinctive conclusions—but a man of moral courage unsurpassed . . . a man whose instinctive conclusions were so often and so uncannily right—especially when the stakes were high." By the close of 1932, the MRC had made considerable progress in implementing the Jadwin Plan, flawed as it was. The Bonnet Carré and Birds Point-New Madrid floodways were essentially complete and nearly 65 percent of project levees has been raised and strengthened to the 1928 grade. Yet, the planned Boeuf and Atchafalaya floodways remained virtually untouched. The Supreme Court's ruling had settled the nagging issue of compensation, at least legally, but the Great Depression had raised another daunting specter. With the unsettled economic problems facing the nation, many interested parties questioned whether the government could afford not only compensating residents in the floodways, but the cost of the Jadwin Plan, itself. Indeed, the stakes were high.⁴⁰³

Chapter 12

Advent of the Modern Project

On January 8, 1933, the steamer *Control* departed the Vicksburg river-front carrying a large party of engineers from the Mississippi River Commission and the Vicksburg and New Orleans Engineer Districts. The weather was rainy, but unusually warm for early January, even in Mississippi, causing a dense fog to rise above the river. At approximately 9:30 a.m. the *Control* docked, allowing General Harley B. Ferguson to disembark and inspect a narrow plug of earth separating two dredged channels across the neck of Diamond Point. The water upstream of the dynamite-rigged plug ran nearly five feet higher than the water below it. At exactly 10 a.m. on that Sunday morning, Ferguson gave the order to detonate the explosives. The ensuing blast scattered clumps of earth and clay through the air and sent shock waves rippling through the water. Workers with shovels feverishly began picking away at what was left of the plug until water slowly trickled through a small opening shortly after 11 a.m. Within hours the onlookers, largely oblivious to the falling rain, watched in awe as a torrent of water rushed through a 60-foot gap in the former plug in a magnificent display of force.⁴⁰⁴ The Diamond Point cutoff had become a reality.



General Ferguson, arms folded, inspects operations at the Diamond Point cutoff.

The execution of the cutoff not only inaugurated a new era in river engineering on the Mississippi River, but it also hastened extensive reconsideration of the increasingly unpopular Jadwin Plan. Not since James B. Eads and his South Pass jetties had one engineer's vision had such a profound impact on the river as Harley B. Ferguson and his channel rectification program. The further success of that program permitted the MRC to develop and propose sweeping changes to the Jadwin Plan that proved more palatable to those affected by the existing project. Those modifications, along with the skillful ability of lower valley politicians to manage dissent in the Mississippi River Delta and secure the enactment of the Commission's recommendations into law, allowed the MRC to reassert its influence on the river. By 1941, the Jadwin Plan had been transcended by a truly comprehensive navigation and flood-control program based on dramatically increased expenditures, a revised project flood, higher levees, fewer and smaller floodways with fewer fuseplugs, reservoirs, tributary improvements, backwater protection, and more extensive channel and bank stabilization measures.

Implementing the Ferguson Plan

The details of Ferguson's plan had changed somewhat from his 1930 memorandum, owing largely to a refinement of knowledge on the subject and changing conditions on the river. The basic tenets of his plan, however, remained unaltered. It still called for improving the carrying capacity of the Atchafalaya River, eliminating restrictions in the Mississippi River at Natchez and Vicksburg, preparing the river below Greenville to carry more water through cutoffs and corrective dredging, and then straightening the tortuous Greenville Bends. Ferguson selected Diamond Point as the first cutoff to be made under his program to expedite the development of the natural Yucatan Point cutoff. Preparations commenced with corrective dredging efforts aimed at providing a favorable entrance into the cutoff past the Racetrack Towhead, just above Diamond Point, by alleviating conditions leading to a divided channel.⁴⁰⁵

At Diamond Point two cutterhead dredges, following a path created by tower draglines, excavated a pilot channel across the neck of the point. The dredge *George W. Catt* worked toward the center of the neck from the upstream end of the cut and the dredge *Raymond* worked toward the center from the lower end, until only a narrow plug of earth remained to separate the two dredged channels. This method of creating an artificial cutoff was known as the pilot cut technique. Unlike artificial cutoff methods adopted in Europe, where a new channel was cut to full dimensions on dry land and the cutoff formed by deflecting the river into the new channel, the pilot cut technique allowed the river to adjust to its new slope prior to the full

Anatomy of a Cutoff



An earth plug is all that separates the two pilot channels. Note the difference in the water elevations of the upstream and downstream pilot channels.



Dynamite removes the plug and opens the cutoff.



Fifteen minutes after opening the cutoff.



One hour after opening the cutoff.

development of the cutoff. Ferguson based this technique on the developments at the natural Yucatan cutoff in 1929-1930. Slow to develop, that event did not result in violent changes to the river—an observation that did not escape Ferguson's attention. The Yucatan incident showed that a longer cutoff channel a mile or more in length was much more preferable than a shorter cutoff channel across a narrow neck because the longer channel developed slowly, allowing the river to gradually adjust to its new slope. The cutoff channel across Diamond Point devised by Ferguson was more than a mile long.⁴⁰⁶

Ferguson's entire program depended heavily on dredging. Consequently, the decade of the 1930s marked an era of great advancement in dredge design. Turn-of-the-century dustpan dredges, such as the *Iota*, *Kappa*, *Flad* and *Harrod*, were second-generation dredges only capable of dredging 1,500 to 2,000 cubic yards per hour. The Corps of Engineers placed two modernized dustpan dredges, the *Ockerson* and *Potter*, in service in 1932. These new dredges had 40 percent more horsepower than their side-wheel predecessors and were equipped with more powerful pumps capable of dredging up to 3,000 cubic yards per hour. The dustpans *Jadwin* and *Burgess* followed two years later with an even greater rate of dredging reaching up to

4,000 cubic yards per hour. The strength of the modernized dredges, though, was found in their ability to perform maintenance dredging and, despite the advancements, the dustpans proved inferior to cutterhead dredges in the art of making pilot cuts and executing channel realignments. Cutterhead dredges, equipped with powerful revolving blades, demonstrated a more suitable knack for excavating heavy and compacted riverbed materials necessary for corrective dredging efforts.⁴⁰⁷

Despite the emphasis on dredging, Ferguson envisioned the Mississippi River performing most of the heavy work toward excavating the new channel and silting in the old channel, much as it had done at the Yucatan cutoff. That cutoff also revealed that a mild curvature of the river was necessary to preserve the channel and to keep revetment efforts at a minimum. To this end, Ferguson did not contemplate straightening the river excessively, instead he aimed to shorten and realign it in a manner consistent with its natural meandering tendencies. All of these elements of Ferguson's program set by the precedent of the Yucatan cutoff remained unchanged throughout the implementation of the plan whenever conditions on the river allowed.⁴⁰⁸

On January 8, 1933, Ferguson ordered the opening of the pilot cut across Diamond Point. As expected, the new channel developed slowly with no cataclysmic results. Encouraged by this, he turned his attention southward toward Natchez. The plan called for removing a natural rock ledge extending across the entire river that often acted as a dam, causing water to pile up. This damming effect was worsened by the constriction of the river between the bluff on the east bank and the levee protecting the west bank town of Vidalia, Louisiana. Below Natchez, the plan called for closing the upper entrance of the chute forming Natchez Island and executing a series of dredged cuts in the riverbed below the island to widen the channel and realign the thalweg, or deepest part of the channel. Corrective dredging in the vicinity of Natchez commenced in the summer of 1932 with a view toward alleviating these problems. By the spring of 1933, Ferguson initiated further cutoffs at Glasscock Point and Giles Bend, situated immediately below and above Natchez.⁴⁰⁹

With control of the river on the way to being established at Vicksburg, Natchez, and Old River, Ferguson intended to focus his continuing efforts on the reach of the river above Vicksburg and below the Greenville Bends, by executing additional cutoffs at Worthington Point, Willow Point, and Marshall Point. Cutoffs at these locations were integral components of his plan to prepare the channel to handle the change in flow expected when Greenville Bends were to be straightened in the following years. Nature, though, forced Ferguson to deviate from his plan. During the high-water season of 1933, the Mississippi River broke through a permeable dike built

to prevent a cutoff at Leland Neck at the extreme lower end of the Greenville Bends. The river had threatened to break through the neck for decades. In 1882, the MRC recorded the distance across the narrowest part of the neck at 5,500 feet. By 1903 erosion of the bend had reduced the distance to 3,500 feet, prompting the MRC to construct a 6,250-foot-long protective dike along the axis of the neck. Heavy scouring to the dike during the high-water seasons from 1904 to 1907 precipitated the MRC to extend the dike by nearly half a mile, but by 1910 the distance across the neck had shrunk to 2,600 feet. Furthermore, the floods of 1922, 1927, and 1929 began scouring an elongated trench across the neck, leading the MRC to connect the existing dike with a mile-long permeable dike. It was this dike that the Mississippi River broke through in June of 1933, further scouring the trench into a potential cutoff channel.⁴¹⁰

Although the breakthrough did not develop into a new channel, it certainly placed Ferguson and the MRC in a bind. Ferguson's program actually provided for a cutoff across Leland Neck as part of rectifying the Greenville Bends, but this part of the plan was still at least two years away from commencing. The river below the bends had not yet been fully prepared to accept the changes in flow expected upon their straightening. On the other hand, Ferguson and the MRC realized that, with water on the upstream side of the neck being 3.5 feet higher than the water surface on the downstream side, a future flood might result in a fully uncontrolled cutoff unless extraordinary preventive action was taken. Even with such preventative measures, though, there was no guarantee of deterring a natural cutoff. Faced with these prospects, the MRC decided to proceed with straightening the Greenville Bends ahead of schedule by incorporating the potential natural cutoff into the program.⁴¹¹

Ferguson, as a result, delayed operations on the reach below until later in the year. But upon addressing the situation at the Greenville Bends, he soon discovered another problem. His plan for the bends called for a cutoff at Leland Neck, followed by cutoffs immediately upstream at Tarpley Neck and Ashbrook Point. To establish the most favorable alignment of the new channel, he envisioned dredging a pilot channel closer to the base of Leland Neck. The location of the first cutoff, therefore, essentially fixed the locations of the cutoffs upriver. Nature, though, had chosen a different location for the Leland Neck cutoff than Ferguson had selected, forcing him to adjust the locations of future cutoffs at the Greenville Bends and accelerate their completion.⁴¹²

By the 1935 high-water season, Ferguson had made substantial progress in implementing his channel rectification program. Cutoffs at Butte la Rose and Bayou Chene and corrective dredging efforts at Fause Point and Long Lake in the Atchafalaya basin had resulted in dramatic



The Greenville Bends after the Ashbrook, Tarpley, and Leland cutoffs.

improvements toward producing a continuous main channel from Alabama Bayou to Grand Lake. On the Mississippi River, eight artificial cutoffs, along with the natural cutoff at Yucatan Point, had shortened the river from Greenville to Old River by 78 miles. Corrective dredging in the reaches between the cutoffs also significantly widened and realigned the channel, allowing the kinetic energy of the river to dig its bed deeper. While none of the cutoffs on the Mississippi River had fully developed by the 1935 high-water season, they produced immediate results during a flood that spring. The flood was lengthy in duration, but only moderate in height. At Arkansas City, the peak flow of the flood surpassed that of the 1932 flood, yet the crest elevation of the more recent flood was nearly two feet lower than the crest of the flood three years earlier. In other words, the river carried more water at a lower height. Subsequent tests conducted at WES compared the channel of the Mississippi River, as it existed in 1929 with that of 1935. Simulating a recreation of the 1927 flood confined between the 1928 grade levees, the experiments revealed a hefty increase in the carrying capacity of the river since 1929, with flood stages for the same flow registering anywhere from two to five feet lower from the mouth of the Arkansas River to Natchez. Furthermore, the tests showed that the increased carrying capacity of the main channel lowered flood heights in the White and Yazoo backwater areas by an average of two feet and the Red River backwater area by nearly 10 feet.⁴¹³

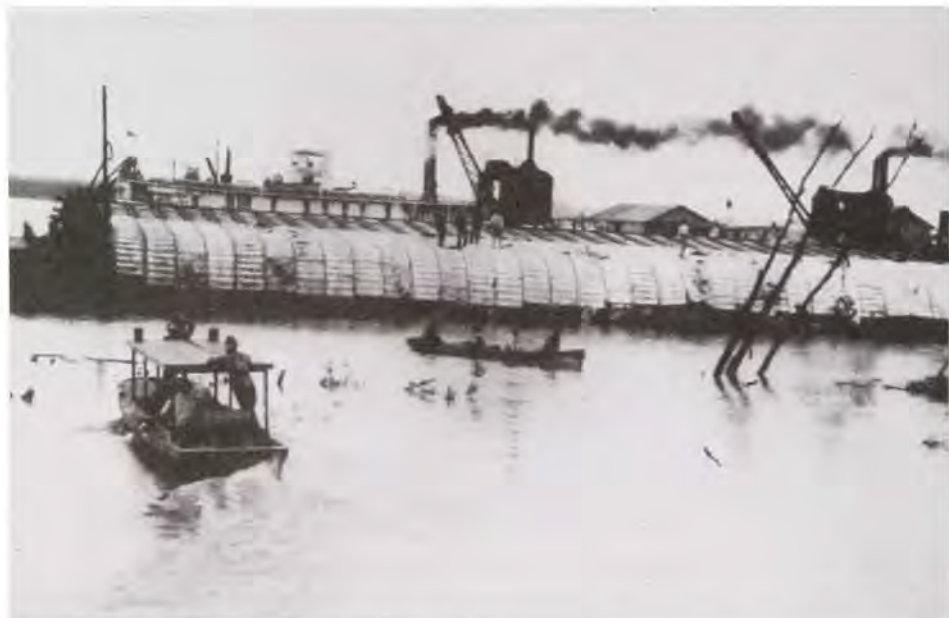
Buttressed by this early success, Ferguson and the MRC vigorously continued to implement the channel rectification program. By May of 1937, they had completed 12 artificial cutoffs, which, together with the Yucatan Cutoff, shortened a 330-mile stretch of the river by almost 116 miles. The cutoffs allowed the MRC to halt resource consuming

revetment efforts on nearly 200 miles of formerly troublesome bends now abandoned by the river. This represented an important, but often forgotten, dividend received through the channel rectification program. While the attention of Congress and opponents to the Boeuf Floodway was clearly focused on the question of lowering flood crest elevations, Ferguson saw the program as the answer to another decades-old problem. The MRC viewed the instability of the riverbanks and the constant threat it imposed in undermining levees as perhaps the greatest problem to contend with on the lower Mississippi. General Brown, the former Chief of Engineers, clearly recognized this back in 1932 when he first advocated the channel rectification program. "Revetment is the most expensive thing we have to do," he remarked to the House committee, "We are prevented from doing it very often when we want to do it by virtue of that expense."⁴¹⁴

Revetment and bank protection, to be sure, had always represented one of the MRC's most major and expensive tasks. Between 1881 and 1931, the MRC had spent \$89.3 million on revetment, most directed at stabilizing the banks at the troublesome bends in the river. In 1907 the MRC reported that 749 miles of the 790 miles of bank line between Cairo and Red River were actively caving during low water conditions. The MRC had certainly made far-reaching advancements since its early reliance on framed and fascine mattresses, which had remained supreme until 1915. In the continuation of efforts to mature a more effective and less costly mode of revetment, the MRC had borrowed from the Japanese the concept of



Lapped slab revetment.



Early articulated concrete mattress sinking operations.

lapped-slab and articulated concrete revetment, but by the early 1930s less than 60 miles of new revetment had been placed along the Mississippi River below Cairo. The abandonment by the river of the most troublesome bends allowed the MRC to focus its revetment efforts on more manageable reaches of the river.⁴¹⁵

Aside from the cost savings in revetment work to the MRC, the shortening of the river also paid substantial dividends to the river transportation industry. By 1935, the cutoff channels were of sufficient depth to carry tows and barges. In the four years prior to the cutoff program (1927-1931), the average downstream trip from Helena to Baton Rouge took 67 hours and 27 minutes. By 1938 this same trip, now 116 miles shorter, took only an average of 56 hours and 45 minutes, a savings in time of 10 hours and 42 minutes. Upstream trips before the program had been reduced from an average of 125 hours and 24 minutes to 105 hours and 5 minutes, a savings of more than 20 hours—nearly one full day. These reductions in time would later play an important role in the war effort during the Second World War, but the real impact of the program was felt in the flood-control arena, particularly during future reconsiderations of the Jadwin Plan and the sensational flood of 1937.⁴¹⁶

The 1935 MRC Plan

Intense public opposition to floodways and dispersion eroded most support for the Jadwin Plan, but nothing had changed or repealed any

engineering or economic features. The MRC's implementation of the channel rectification program, however, coincided with a revolution in American politics brought about largely, if not entirely, by the Great Depression. Following the 1928 general election, Republicans controlled the executive branch and both houses of Congress. Hoover, of course, held the presidency. In the legislative branch, the Republicans enjoyed a 267 to 163-seat majority over the Democrats in the House of Representatives and a 56 to 39-seat advantage in the Senate. At the onset of the depression, the fiscal conservatism of the party reigned supreme, culminating in an economic policy based on balanced budgets and limited government spending. Fiscal conservatives harbored a deep faith in self-reliance, private initiative and American individualism and remained convinced that the key to economic recovery lay in restoring confidence among the general populace. Yet, by 1930 unemployment had risen from 3.2 percent to 8.9 percent, with nearly 4.3 million Americans out of work. Faced with worsening conditions, the Hoover administration initiated an unemployment relief program based on limited increased federal expenditures on public works, but the government's expenditures remained paltry in comparison to the investment made by states and private industry.⁴¹⁷

The political revolution commenced with the 1930 midterm election, which reduced the Republican majority in the House to only two seats (218-216) and in the Senate to one seat (48-47). Hoover again increased federal expenditures to combat unemployment, however, in both reality and perception, the effort was too little and too late. As unemployment soared to 24.9 percent in 1932, American voters cemented the revolution. The 1932 general election carried Franklin D. Roosevelt to the presidency and gave Democrats solid control over both houses of Congress. In the House, they now enjoyed a superiority of 313 to 117, a swing of 300 seats in four years. Similar proportional gains were made in the Senate, where Democrats now held a 59 to 36-seat advantage, a turnaround of 40 seats since the 1928 general election. As part of this revolution, delta area Democrats ascended to positions of considerable power in both houses. Louisiana's Riley Wilson assumed the chairmanship of the House Committee on Flood Control from 1933-1937 and was followed in that role by Mississippi's Will Whittington from 1937-1947. In the Senate, Arkansas' Joseph Robinson became majority leader, a position he held until his death in 1937.⁴¹⁸

Throughout the enactment of New Deal legislation, Roosevelt and Congress abandoned the tight fiscal policies of the Hoover administration and fully embraced the Keynesian philosophy of markedly increased spending in the face of a severe depression. In short order, a surprising irony developed: whereas the Coolidge and Hoover administrations did not



Major General Edward Murphy Markham, Chief of Engineers, 1933-1937. *Office of History, U.S. Army Corps of Engineers.*

find it politically expedient to provide larger appropriations for projects during the prosperous 1920s, Roosevelt's administration now found it possible to appropriate large expenditures during a devastating depression. In January 1934, the Democratic-controlled Congress asked Roosevelt to submit a report describing his vision for the development of the nation's rivers and harbors to be used by the legislature as a template in drafting future flood-control legislation. When Roosevelt transmitted his report to Congress, he promised Chairman Wilson that he would recommend a fair and equitable adjustment to the property owners and local inter-

ests affected by the execution of the project. Roosevelt's interest in the project was not lost on Major General Edward M. Markham, Brown's successor as the Chief of Engineers.⁴¹⁹

Through biannual inspection trips and public hearings conducted at various locations the length of the lower river, the MRC had been listening to the concerns of lower valley interests directed at the Jadwin Plan since the adoption of that plan by Congress in 1928. From October 20-31, 1934, Markham attended a series of hearings on board the steamer *Mississippi* and witnessed one delta resident after the other plead with the members of the MRC to propose modifications to the Jadwin Plan. Chief among their concerns were the still lingering inequities of the compensation issue, but there were other specific concerns as well. Some west banks interests along the Boeuf and Tensas basins appealed to the MRC to abandon the Boeuf Floodway; others from Desha and Chicot Counties in Arkansas only sought the substitution of controlled spillways for the existing fuseplug levees. Levee board members from Greenville and the Yazoo basin pushed for further cutoffs, but they insisted on an east bank diversion route to relieve pressure on their levees. Representatives of Atchafalaya Levee Board and the Pointe Coupee Flood Control Association lamented the inclusion of the Pointe Coupee Parish in the Atchafalaya Floodway, calling the floodway east of the Atchafalaya River a mistake, because the northern end of the parish had been one of the most highly developed areas in the region before the Jadwin Plan.⁴²⁰

Their appeals did not go unheeded. At the end of the session, Markham directed the MRC to submit a report recommending modifica-

tions to the Jadwin Plan based on the two years worth of experimental work carried out under the January 1932 House Committee resolution. The MRC submitted its recommendations to Markham on January 19, 1935. In contrast to the 1,500-page 1931 Corps of Engineers restudy, the 13-page MRC report recommended a major overhaul of the project, sweeping aside many rigid elements of the Jadwin Plan. The MRC based the new plan not only on sound engineering principles, but also on political realities, making the recommended modifications more palatable to lower valley interests. It also based its plan on early results stemming from Ferguson's channel rectification program. By the end of 1934, the MRC had facilitated eight cutoffs, including one in the Greenville Bends. While none of the cutoffs and related corrective dredging measures had fully developed, actual observations on the river corroborated early findings from WES experiments—Ferguson's channel rectification program was succeeding. To what extent, no MRC members were certain, but with the experimental program dangling the prospect of further increases in the carrying capacity of the channel, the MRC first advocated a continuation of the program and then cautiously proceeded to make several high profile recommendations.⁴²¹

The most intriguing modification dealt with the seemingly unending question regarding the Boeuf Floodway. The MRC proposed eliminating the 1.32 million-acre floodway from the plan and substituting in its place a smaller 820,000-acre floodway, farther south and east through the Tensas River basin—one capable of diverting 700,000 cfs from the main river. The proposed floodway, known as the Eudora Floodway, provided the necessary overflow relief under project flood conditions. Being nearly 800 square miles smaller than the Boeuf Floodway, it also eliminated the prospect of future inundation to hundreds of thousands of acres of fertile, valuable, and taxable farmlands. The MRC envisioned the Eudora Floodway, to extend five miles west of the Mississippi River and then southward from Eudora, Arkansas, along the eastern edge of Macon Ridge to the Red River backwater area. The MRC also recommended that the floodway not be governed by fuseplug levees as was contemplated on the Boeuf Floodway under the Jadwin Plan. Instead the Commission intended to construct control works—either gated spillways or concrete weirs—that would commence operation at a stage corresponding to 51 feet on the Vicksburg gauge. The MRC believed that the substitution of control works for the fuseplug levee allowed for the flexibility to open the floodway only when high and prolonged flood stages warranted operation, thereby improving flowage conditions and regulating the extent and duration of diversion. Despite the ongoing effort of the channel rectification program, the MRC remained concerned that the carrying capacity of the river leveed channel



The proposed modifications by Mississippi River Commission to the Jadwin Plan in 1935 reflected the success of the public hearing process.

was not sufficient to prevent a crevasse during a high-water event of project flood proportions. To safeguard against such a crevasse, the MRC recommended the construction of a setback levee on the west side of the diversion route extending northward from the head of the Eudora Floodway to the Arkansas River. The Commission advised that this levee, which was to be built to the same height as the levee on the east side of the river protecting Mississippi, only be constructed after the floodway was completed and all land rights were secured. The west bank riverside levee was to remain at the 1914 grade and section because the MRC estimated that, with the increased carrying capacity of the river, the floodway would be placed into operation before floodwaters reached the height of the existing levee.⁴²²

While the proposal to eliminate the Boeuf Floodway may have been the most intriguing element of the plan, the MRC suggested more striking modifications to the Atchafalaya basin. The channel rectification program on the

Atchafalaya River significantly increased the carrying capacity of the river. However, the MRC questioned the capability of the river to discharge the increased flow to the Gulf of Mexico. The Jadwin Plan provided for only a single outlet to the Gulf at Berwick Bay. The MRC remained confident that the existing outlet would handle ordinary floods, but was leery of the same outcome during an event of project flood proportions. With the river capable of accommodating, but not adequately discharging additional flow, the dire prospect emerged of floodwaters piling up and threatening the developed lands at the extreme southern end of the basin. To handle the increased flows and provide complete protection for the basin, the MRC advised constructing a second outlet to Gulf west of the Berwick Bay outlet, at or near Wax Lake.⁴²³

The MRC then turned its attention from the Atchafalaya River to the two floodways flanking it. The MRC speculated that the fuseplug levees at both the east and west floodways would be overflowed under project flood conditions. It was likely, however, that floods of lower magnitude would inundate only one floodway—which one, depended upon conditions and chance. To remove this uncertainty, the MRC recommended replacing the floodway east of the Atchafalaya River with the Morganza Floodway, equipped with a controlled intake directly on the Mississippi at a location where levees historically crevassed. The controlled spillway was designed so that the floodway would not operate until the flood reached a stage corresponding to a height of 49 feet on the Angola gauge and would be stopped when the flood receded back to that stage. Even then, the floodway would not be operated unless the predicted crest elevation exceeded the safe capacity of the leveed channel. The head of this proposed floodway stretched from Smithland to Morganza, with levees extending to the east bank of the Atchafalaya River and the existing east protection levee.⁴²⁴

The benefits of the substitution were threefold. First, with the intake of the Morganza Floodway directly on the Mississippi River, the MRC postulated it could properly assure the integrity of the flood-control system from Old River to the Gulf. The MRC supported Jadwin's notion that Old River presented the proper place to protect New Orleans, but the Commission still believed what it had professed in its 1927 flood-control plan—that a second spillway was necessary for adequate control of the river and full protection of the city. Second, the new location exempted a large portion of Pointe Coupee Parish from inclusion in the floodway. In 1927 the MRC had advocated providing the more densely populated and agriculturally rich Point Coupee Parish with the same level of protection as other areas in the alluvial valley; the Jadwin Plan, obviously, did not. Third, the MRC firmly believed that the diversion of excess discharge through the



View of a portion of the Mississippi River Flood Control Model at the Waterways Experiment Station depicting the Morganza and West Atchafalaya Floodways in full operation. The large island is that portion of Pointe Coupee Parish that would have been inundated during the operation of the East Atchafalaya under the Jadwin Plan.

Morganza Floodway, combined with the increase carrying capacity of the Atchafalaya River, might improve conditions in the Red River backwater area and spare the West Atchafalaya Floodway from overflow.⁴²⁵

The MRC sought to accelerate construction of the modified floodways by addressing the nagging issue of compensation for flowage rights and levee rights of way. The MRC hoped to exploit the generosity of New Deal Democrats, but recognized that an impediment still existed in the Corps of Engineers. That agency, for the time being, remained wedded to the position that the floodways were natural outlets for overflows, therefore, the federal government held no obligation to compensate landowners. To remedy the situation, the MRC asked the Corps of Engineers to revise its real estate policy by advising the secretary of war to enter into an agreement with the states of Arkansas and Louisiana to hasten the acquisition process. Under the agreement, the states or other local authorities would acquire and transfer land rights to the federal government. The secretary of war would, in turn, reimburse the states at a cost not to exceed 1.5 times the total 1934 assessed value of the land rights acquired.⁴²⁶

In yet another example of the extensive nature of the proposed modifications, the MRC recommended the incorporation of tributary improvements, to include levees and headwater reservoirs, in the St. Francis and Yazoo basins into the general flood-control project for the lower Missis-

ssippi River. The project, as it existed in 1934, afforded protection for a large portion of the fertile agricultural lands in the alluvial valley, but local flooding in the headwater tributaries of the St. Francis and Yazoo rivers prevented both basins from receiving the maximum benefits of protection from Mississippi River overflow. The Yazoo basin, for instance, experienced the most critical flood on record in 1932 when heavy rainfall caused extensive overflows on the Tallahatchie and Yazoo rivers. Unlike the 1927 MRC report, the Jadwin plan made no provisions for tributary improvements. Section 10 of the 1928 Flood Control Act, however, provided for flood-control plans for all tributary streams of the Mississippi River subject to flooding. In response to that provision, the Corps of Engineers completed reports on both basins contemplating the use of levees and reservoirs—seven in the Yazoo and one in the St. Francis at Wappapello, Missouri—but both reports advised against the expenditure of funds for what amounted to localized flood control.⁴²⁷

The MRC endorsed the details of both plans and recommended their inclusion in the overall project. To justify this stance, the MRC contended that Congress, through the 1928 Flood Control Act, has “assumed the protection of the alluvial valley as a national problem and that local interests had already extended their just proportion of flood control costs.” The St. Francis and Yazoo basins certainly reflected the latter condition and, because both rivers were the only rivers to flow entirely within the alluvial valley, the MRC suggested the federal government undertake the proposed projects as part of the larger system of the alluvial valley, with the stipulation that local interests provide necessary rights of way and alterations to existing infrastructure. These proposed projects, operated in conjunction with the proposed modifications to the Jadwin Plan, would complete the protection of 1,930 square miles in the St. Francis basin and protect the entire Yazoo basin, with the exception of the Yazoo backwater area. The reservoirs would also have incidental benefits in lowering flood heights on the Mississippi River, although any reduction in stages would be measured in inches, not feet.⁴²⁸

The MRC estimated the cost of the proposed modifications, including compensation for land rights, at \$313 million, or \$245 million in excess of the non-appropriated balance of the funds already authorized by Congress. The proposed modifications contained in the report did not reflect a change in attitude of the MRC. Instead the six-year plan embodied views long held by the MRC toward just federal compensation, smaller floodways, controlled spillways, and further studies toward tributary improvements and reservoirs. Despite the fact that Edward Flad was the only member of the MRC remaining from the 1927 era, the new plan represented the manifestation of many components posited in the Commission’s



Edward Flad, Member, Mississippi River Commission, 1924-1950.

1927 plan for flood control that was quashed by Jadwin and the Special Board in 1928.⁴²⁹ The realization of these modifications symbolized the very spirit of compromise many lower valley interests had expected from the Special Board, but never materialized. With Jadwin out of the picture and Ferguson's channel rectification program successfully increasing the carrying capacity of the channel, the MRC finally was able to transform the Jadwin Plan and, as the voice of lower valley interests, reassert its influence on the Mississippi River.

The Chief of Engineers concurred with every single MRC recommendation. On February 12, 1935, he

forwarded the report to the House Committee on Flood Control and recommending amending the Jadwin Plan substantially in accordance with the modifications proposed by the MRC. In his transmittal letter, Markham requested that construction not begin on any part of the Eudora and Morganza floodways until all land rights were acquired. He also made one minor change to the MRC proposal by suggesting the formula for acquisition and reimbursement be based on the 1935 assessed values rather than the 1934 values set forth by the Commission. By signing on to report, particularly in regard to compensation to land rights, Markham effectively reversed the Corps of Engineers' real estate policy, which had, along with opposition from Arkansas and Louisiana interests, prevented the completion of the floodways through the Atchafalaya and Boeuf basins.⁴³⁰

For obvious reasons, many delta interests warmly welcomed the new proposed modifications in clear contrast to the 1931 Corps of Engineers restudy of the Jadwin Plan. In commenting on the changes in the Atchafalaya basin, James Kemper, an outspoken opponent of the Jadwin Plan and long-time critic of the MRC, remarked, "For the first time I appear to approve and support . . . the main engineering features of this new project." Harry Jacobs, another vocal opponent of the Jadwin Plan and the former chief engineer with the Louisiana Board of State Engineers, gave a similar ringing endorsement by calling the MRC plan a "splendid recommendation" and asked Congress to authorize the modifications, *posthaste*. The Board of State Engineers shared its former chief engineers' sentiments. In a letter to Chairman Wilson, the board concluded that the plan

came "as near being a perfect plan, consistent with justifiable outlay of funds, as it is possible to conceive. The Board of Mississippi Levee Commissioners and the Yazoo-Mississippi Delta Levee Board also endorsed the modifications, but support for the plan ended at the proposed Eudora Floodway."⁴³¹

Division in the Delta

With Democratic control over the executive and legislative branches of government, it should not have been difficult for Arkansas, Louisiana, and Mississippi politicians to unite and correct the perceived injustices of the Jadwin Plan, especially with the administration's advocacy of increased federal spending. But as often is the case with politics, nothing came easy. During congressional hearings regarding a bill introduced by Wilson to enact the MRC's proposed modifications into law, it soon became evident that Mississippi River Delta cohesion only pertained to the issue of compensation. In rapid fashion the once solid unity of delta interests disintegrated into two strongly entrenched camps on each side of the river.

Although the MRC's channel rectification program was still in its infancy stages, the promising concept of lowering flood heights sparked a movement to eliminate any floodway through southeastern Arkansas and northeastern Louisiana and to provide as much protection as possible against floods in the Red River backwater area. The movement actually predated the MRC's report to Markham recommending the substitution of the Eudora Floodway for the Boeuf Floodway, when in February 1934 Arkansas Congressmen D.D. Glover and Tilman B. Parks introduced two separate bills, both calling for the abandonment of the Boeuf Floodway. While both bills were defeated, the arguments made in their defense reflected the sentiments of those living in the Boeuf Floodway and then later the Eudora Floodway. In both instances, floodway opponents claimed that the MRC closed the natural outlet through Cypress Creek in 1921 and gave the people of the basin an assurance of protection. To secure funding for the level of protection promised by the MRC, basin residents taxed themselves and mortgaged their property to the limit. Now, instead of receiving the same level of protection as other areas in the lower Mississippi Valley, the government now had created a condition guaranteeing the destruction of their property in the event of another great flood. As such property values had declined by as much as 50 percent, and landowners could not secure loans or insurance on their property. In essence, the residents of the Boeuf and Tensas basins were being asked to handle these burdens to protect Mississippi interests in the Yazoo Delta. Naturally, they viewed this as a severe inequity worthy of remediation. With the potential

of lower flood heights thought possible through the implementation of Ferguson's program, they believed levees on both sides of the river should be of equal height to give everyone an equal chance to life and property.⁴³²

Across the river, Yazoo Delta interests, led by Whittington, condemned any attempt to return to the pre-1927 confinement-only policy on the middle section of the lower Mississippi River. In their fatalistic view, raising the levees on the west bank of the river represented such a return and would render useless all work accomplished since 1928. Citing history as an example, they pointed to the floods of 1897, 1913, and 1927 as evidence that the equal protection theory was impractical. The Tensas and Boeuf basins were natural outlets to the Gulf; the Yazoo basin was not. When the historic floods mentioned crevassed levees protecting the Yazoo basin, the water coursed southward and reentered the Mississippi River near Vicksburg, eventually causing levees on the Louisiana side of the river to break. The fuseplug levee on the western bank assured, in a very certain way, where dispersion would take place; to raise it would remove this uncertainty and threaten the entire region with severe devastation. Furthermore, confinement meant higher flood elevations in the Yazoo backwater area. Appreciably sympathetic to the plight of their neighbors on the west side of the river, Yazoo interests exercised great care not to alienate them by reiterating their full support for just compensation, controlled spillways, a narrower floodway and, perhaps eventually, the incorporation of tributary reservoirs. But they were quick to point out that the Tensas Basin and Southeast Arkansas levee districts closed Cypress Creek as an outlet and that the MRC merely consented to its closure at the request of the people of Arkansas and Louisiana, not over their protest. Those same people now were asking for even greater protection, which would render the entire stretch of the river between the Arkansas River and Old River vulnerable to levee crevasses and overflow at points nearly impossible to predict.⁴³³

Markham recognized the near impossibility of gaining a consensus between the two camps. While appearing before the House committee to answer questions on the proposed modifications to the Jadwin Plan, Markham remarked, "As you talk with Tom, Dick, or Harry, each has his own opinions and will stick to it very tenaciously." Markham wanted to find a more equitable solution to the floodway dilemma, but he was certain that dispersion, not confinement, was the answer. The channel rectification program was paying dividends in terms of increasing the carrying capacity of the main channel, yet he simply could not consent to any plan calling for the abandonment of a west bank floodway. He believed, however, that the Eudora Floodway concept was as reasonable and generous a solution as conceivably possible from both the engineering and economical view-

points, much more so in light of the provision for a controlled spillway at the head of the floodway.⁴³⁴

Ferguson's testimony somewhat echoed that of the Chief of Engineers. He began by explaining that measurements taken during the recent high-water event of 1935 showed an increase in the stage/discharge relationship of the river by 20 percent at Arkansas City and 9 percent at Vicksburg. He indicated, however, that the carrying capacity of the river did not reach the point where dispersion was no longer necessary. The channel rectification program was designed to confine floodwaters and secure as rapid a discharge as possible, but would permit dispersion when absolutely necessary to prevent catastrophe. During a heated exchange with committee member John L. McClellan, in which the Arkansas congressman prodded Ferguson with a salvo of questions as to whether or not the whole purpose of the Eudora Floodway was to divert floodwaters to protect the Yazoo basin, the MRC president fired back, "It permits the diversion of waters where of necessity they must go." He continued, "You have a physical situation that outranks the laws of Congress and all the opinions of engineers."⁴³⁵



Congressman John Little McClellan of Arkansas. He served as a U.S. Representative from 1935-1938 and a U.S. Senator from 1943-1978. *U.S. Senate Historical Office.*

The hearings took an unexpected turn when Ferguson mentioned that the MRC had completed a study in 1934 examining the feasibility and benefits of a comprehensive system of reservoirs for flood control on the lower Mississippi River. The study concentrated on two plans. The first contemplated 151 reservoirs on all principle tributaries of the Mississippi River at an estimated cost of \$1.25 billion. The MRC concluded that the combined 98 million acre-feet of storage provided by the reservoirs could lower the project flood by such a margin as to avoid dispersion through the floodways. The second called for 26 reservoirs divided evenly between the White and Arkansas Rivers at an estimated cost of \$127 million. Here the MRC surmised that, along with the increased carrying capacity of the river brought about by the channel rectification program, the 15 million acre-feet of storage would eliminate the need for the Eudora Floodway in protecting against a flood of comparable origin and discharge as the devastating 1927 flood. Under project flood conditions, the reservoirs would

lower flood stages by as much as five feet, but protection of the middle section of the project still required the operation of the Eudora.⁴³⁶

Until Ferguson's revelation of the MRC reservoir report, there had been a near unanimous consensus, Eudora landowners notwithstanding, that the modifications proposed by the MRC and submitted by Markham represented the most reasonable and cost-effective solution to the floodway question. Opponents to the Eudora Floodway, though, quickly latched onto the Arkansas/White River reservoir scheme and began to rally support. They found a champion in Joseph Ransdell, the former Louisiana senator who lost his re-election bid in 1930 to the infamous Huey Long. Ransdell owned 2,100 acres in East Carroll Parish near the head of the proposed Eudora Floodway and, for obvious reasons, he vehemently opposed its creation.

Ransdell gladly assumed the presidency of the North Louisiana Flood Protection Association and fought bitterly against the floodway. Naturally, he framed his arguments in the larger context of the inequities of east bank versus west bank interests and complained that the bill contained a provision authorizing \$48 million for the construction of reservoirs in the Yazoo basin. Conveniently ignoring that the Yazoo basin reservoirs were designed for local flood protection, not to reduce stages on the Mississippi River, Ransdell questioned the fairness of spending vital resources on reservoirs that would offer, at best, a six-inch reduction on the Vicksburg gauge. In lieu of the floodway, he pushed the committee to incorporate the 26-reservoir scheme into the legislation. Despite the testimony from Markham and Ferguson indicating otherwise, Ransdell argued that diversion through the Eudora Floodway was not necessary for the protection of the valley because the reservoirs, in tandem with the increased carrying capacity of the river, offered near similar reductions in stages as the floodway.⁴³⁷

The House committee, unable to reconcile the differences between east-west interests, did not report favorably on Wilson's bill to enact the MRC's proposed modifications into law. Senator John H. Overton, however, picked up the mantle in the Senate the following year. Overton, of Louisiana, was a relative newcomer to the scene, having been elected in the 1932 general election. Hoping to heal the rift among delta interests, he engaged Whittington, McClellan, and Robinson in helping to craft compromise legislation. All were open-minded leaders who did not wish to see local rivalries prevent protection for the valley. Whittington, while a staunch defender of the Eudora Floodway, was entirely sympathetic to the plight of his neighbors in Arkansas and Louisiana as evidenced by his continual support for just compensation, controlled spillways, and smaller floodways. McClellan, despite his clash with Ferguson, completely



Senator John Holmes Overton of Louisiana (front and center) with the members of the Mississippi River Commission during the April 1946 high water inspection trip. The members of the MRC from left to right are: Edward Flad; Major General Robert W. Crawford, President; Albert L. Culbertson; Colonel Ernest Graves, retired; Harry N. Pharr; Colonel Clark Kittrell; and Rear Admiral Leo O. Colbert.

endorsed the engineering features of the MRC recommendations. The Eudora Floodway, despite traversing two counties in southern Arkansas, directly benefited a larger portion of the state by protecting against crevasses above the floodway. McClellan's objections centered on the plan's treatment of the compensation issue, which he believed, if enacted into law, would have rendered the completion of the floodway impossible. Robinson, the Senate majority leader from Arkansas, understood the need for the floodway and the opposition to it. He saw in Markham's reversal of the Corps of Engineer's attitude toward compensation a real possibility to finally advance the project in the middle section of the lower Mississippi River.⁴³⁸

In January 1936, Overton introduced Senate Bill 3531 to the Senate Committee on Commerce. The bill authorized, with only slight changes, the proposed modifications to the Jadwin Plan developed by the MRC and forwarded by the Chief of Engineers in 1935. Once again, opposition to the bill was not directed at the engineering features of the bill—with the exception of Eudora interests who still favored reservoirs over diversion—but instead centered on the compensation issue. Section 12 of the bill stated, "The United States shall forthwith acquire flowage rights for all flood waters that will pass by reason of diversions along the Mississippi River south of the Arkansas and along the Atchafalaya Basin... and shall pay to the owner thereof just compensation for such property so taken or

damaged." The provision clearly placed the onus of compensation on the federal government, as desired from the start by lower valley congressmen and their constituents. But for those seeking to finally settle the issue considered the language of "just compensation" as too vague.⁴³⁹

Overton worked closely with Markham to develop language clearly defining what exactly constituted just compensation, while capping the total liability to the government so as not to inhibit acquisition and the eventual construction of the floodways. In the end, they agreed to substitute a new formula for determining the amount of compensation. The MRC would not begin construction of the floodways until the 75 percent of the land rights in both floodways had been secured, meaning the fate of the floodways now united. The secretary of war would still enter into agreement with the states, which would acquire the land rights and be reimbursed upon their transfer to the government. The valuation of land rights, however, would no longer be based on 1.5 times the assessed total value of those acquired. Instead, the new legislation provided a cap of \$20 million for the acquisition of 75 percent of the land rights. Upon reaching that plateau, the language authorized the Chief of Engineers to use condemnation proceedings to acquire the remaining 25 percent. Also of significance, the new language addressed acquisition of land rights in the floodway west of the Atchafalaya River. To bring that issue to a close, the bill authorized acquisition of flowage rights from property owners living behind the fuseplug levee at the head of the floodway in an amount not to exceed \$2.25 million.⁴⁴⁰

Whittington probably had a hand in securing the language linking the acquisition of land rights in both floodways. He had left the 1935 hearings sensing a shift in momentum toward the use of the Arkansas and White River reservoir scheme as a substitute for the Eudora Floodway. He was not opposed to the incorporation of the reservoirs into the overall project—in 1928 he fought for a similar, but subsequently defeated, measure—but he was insistent that the floodway be constructed and remain in operation. Whittington was concerned that the next major flood might not originate in the Arkansas basin, rendering the proposed reservoirs useless in terms of preventing overflow from a flood originating from the upper Mississippi or Ohio rivers. In this regard he maintained that the floodway must be preserved as a safety factor. The linking of the Morganza and Eudora floodways placed the burden of pressuring property owners in the Eudora Floodway directly on the shoulders of their counterparts in the Atchafalaya basin. Unlike those residing in the floodway to the north, residents in the Atchafalaya basin simply wanted closure. Opponents to the Atchafalaya and Boeuf floodways had won several legal battles regarding compensation, but the issue remained far from settled. In reality, the rulings had only

succeeded in blocking construction of the guide levees within the both the Boeuf and Atchafalaya floodways. The fuseplug levees at the head of the floodways, therefore, remained set in law, leaving the entire Atchafalaya basin vulnerable to overflow during a major flood. While not particularly fond of the fuseplug levee concept, Atchafalaya landowners came to view it as a necessary evil and pushed for the completion of the floodway guide levees. They now saw in the Overton bill and the proposed Morganza Floodway a chance to finally complete the protection of the basin, while limiting the amount of land to be inundated, and incidentally the potential for lowering flood stages in the Red River backwater area. Furthermore, the proposed controlled spillway at Morganza promised the ability to govern the extent and duration of floodway operation. All of this, though, was now contingent upon their neighbors to the north.⁴⁴¹

With the possible fate of the Morganza and Eudora floodways linked, the schism in delta unity quickly shifted from an east-west divide into a contentious north-south battle between Atchafalaya and Eudora interests. The backdrop for the split had emerged earlier in the hearings when Ransdell and his supporters maintained that diversion through the Boeuf and Tensas basins was not necessary. They continued their push for elimination of the Eudora Floodway in favor of reservoirs and giving the channel rectification program more time to develop. Ransdell even testified that many property owners in the floodway would "never consent to be driven from their homes, as they would have to be, even if you paid them double just compensation." In response, Harry Jacobs complained bitterly that the Louisiana Board of State Engineers represented all levee districts in the entire state of Louisiana, including the 5th District in the Eudora Floodway, and all 19 districts had the previous year signed onto the plan to substitute the Eudora Floodway for the Boeuf Floodway. In obvious criticism of Ransdell, who did not oppose the creation of the Boeuf Floodway while serving as a member of Congress, but was now opposed to the Eudora Floodway where he owned land, Jacobs complained that he and the state board "think that is entirely wrong for the leading citizens of one levee district to be so selfish as to tie up a recommendation which would benefit the entire State, while they themselves are looking only to their own section for benefit." In other words, the state board contended that Ransdell and his supporters in four parishes were forcing 32 other Louisiana parishes to take the flood with them. Jacobs then added, "I do not see why the entire State must be sacrificed because of the opposition of some three or four leaders in that district."⁴⁴²

Despite the pleas from Jacobs and the state board, the complete alteration of the compensation language in Section 12 secured the passage of the bill in the Senate and the measure was referred to the House Committee on

Flood Control. There was, to be sure, some discussion of the linkage between the Eudora and Morganza Floodways, but the most contentious issue involved reservoirs on the Arkansas and White rivers. Arkansas Congressman John E. Miller proposed an amendment calling for the inclusion of 13 reservoirs on the Arkansas River and 13 reservoirs on the White River into the general flood-control plan for the lower Mississippi River. Miller's amendment was not designed to eliminate the Eudora Floodway, rather it was meant to augment it. Nonetheless, fellow Arkansas Congressmen William Driver and John McClellan, along with Whittington and Wilson, opposed the amendment from the viewpoint that the added costs of reservoir construction would invite a presidential veto of Overton's bill. The amendment passed, but was later dropped and added to a separate bill during the House-Senate conference.

Finally, on June 15, 1936, Congress passed Overton's bill, which came to be known as the "Overton Act." The act effectively killed the Jadwin Plan, at least on paper. Over the next several months, 85 percent of the requisite options for land rights in the Morganza Floodway had been secured, but that number only reached 30 percent in the Eudora Floodway. As such, the lower Mississippi Valley went into the following year, 1937, still under the general protection of the Jadwin Plan.⁴⁴³

A Surprise Test

While the MRC and the Corps of Engineers were actively acquiring land rights in Arkansas and Louisiana, a high-pressure weather system stalled over the Ohio Valley. During a three-week period in January, steady rain fell over the entire Ohio River basin and an isolated portion of the lower Mississippi Valley. The rain totaled 16 inches in parts of southeastern Missouri and northeastern Arkansas, prompting serious flooding on the St. Francis and White rivers. Similar amounts of precipitation over northern Mississippi also caused significant flood stages on the Yazoo River. It was the Ohio River basin, however, that received the brunt of the stalled high-pressure system. The ground in the Ohio Valley was already saturated by late December precipitation that, because of abnormally warm temperatures, fell in the form of rain rather than snow. The prolonged January rains immediately turned into runoff, swelling the Ohio River and many of its tributaries. Flood stages quickly reached unprecedented levels, surpassing previous high-water marks from West Virginia to the confluence with the Mississippi River.⁴⁴⁴

The MRC watched with great interest and concern as the flood crest rolled down the Ohio River toward Cairo. They soon realized the flood, upon reaching the Mississippi River, would represent the most serious test of the flood-control project since its inception in 1928. Practically all of



The 1937 flood.

the main-line levees for the entire length of the river had been constructed to the 1928 grade and section, although in some areas the levees had settled slightly below grade and needed improving. The MRC had also completed the setback levee in Birds Point-New Madrid Floodway in 1933. All flowage rights and fee simple titles in the floodway had either been obtained or were before the courts for settlement, but because agreements had not been reached with all landowners, the 11-mile fuseplug levee had not been lowered by the 3.5 feet necessary to make it correspond with a stage of 55 feet on the Cairo gauge. Just above New Orleans, the Bonnet Carré Floodway was ready for operation, with the spillway structure having been completed in 1931 and the side levees in 1932.

The Morganza and Eudora floodways, though, remained conceptualized, leaving the middle section of the flood-control project in upheaval. The acquisition of land rights bogged down over the resistance of Eudora property owners to reach settlement. This left intact several miles of levees built only to the 1914 grade that were originally intended for use as the fuseplug opening to the Boeuf Floodway. No work had been done on the guide levees designed to contain overflow through the floodway, thereby leaving the Boeuf and Tensas basins vulnerable. In much better condition was the Atchafalaya basin. The channel rectification program had succeeded in increasing the carrying capacity of the river, although no one knew to what extent, and the majority of the levees flanking the river had been brought up to the proper height. Many of the guide levees in the floodway west of the river had been raised to an interim grade, some six

feet lower than the final grade, and afforded a certain level of containment protection. Little work, though, had been accomplished in the east floodway. In these ways, the fate of the Atchafalaya, Boeuf, and Tensas basins rested on the integrity of the levees and the outcome of the channel rectification program.⁴⁴⁵

On January 15, prompted by severe flood conditions on the St. Francis and White rivers and rising stages on the Mississippi, the Memphis Engineer District mobilized for a flood fight. With the Mississippi River barely exceeding flood stages, the primary focus of the flood fight activities centered on these tributaries. Four days later floodwaters crevassed the levees along the St. Francis River, flooding nearly 50,000 acres of land near Kennett, Missouri. On January 23, flood heights at Cairo surpassed 55 feet—the height at which fuseplug levee at the head of the Birds Point-New Madrid Floodway was intended to fail. The next day Ferguson met with Colonel Eugene Reybold, the Memphis District Engineer who would become the Chief of Engineers in 1941, to discuss flood fight preparations on the Mississippi River. The flood was just cresting on the Ohio River at Pittsburgh, making it difficult to accurately predict flood stages on the Mississippi River, nonetheless it was decided to prepare for possible flood stages of 62 feet at Cairo, 55 feet at Memphis, and 66 feet at Helena, all potentially shattering previous high-water marks and all well above the level of protection afforded by their corresponding levees.⁴⁴⁶

The Memphis District sent personnel and work teams to oversee the strengthening and topping of Mississippi River levees throughout its jurisdiction, but all eyes were on Cairo and the Birds Point-New Madrid Floodway. Cairo was protected by a floodwall and levees up to a height of 60 feet on the Cairo gauge, therefore, these had to be raised if the flood, indeed, approached a possible stage of 62. As the majority of Cairo's residents fled to high ground, the Corps of Engineers secured the assistance of 2,500 civilian laborers, nearly half of which came from the Civilian Conservation Corps (CCC) and the Works Progress Administration (WPA), in placing earth-filled bulkheads on the tops of the floodwall and levees protecting the city.⁴⁴⁷

In the meantime, efforts were underway to place the Birds Point-New Madrid Floodway into operation. On January 23, Ferguson instructed Reybold to open the floodway manually. Attempts to breach the fuseplug levee with picks and shovels failed to produce the desired result, but this was a fortunate circumstance when it was found that several farmers had ignored the evacuation orders issued to the 3,000 inhabitants residing in the floodway. Reminiscent of the 1927 flood, some of the stragglers were armed and threatened to prevent the opening of the floodway by force. As a result, Secretary of War Harry Woodring asked newly elected Missouri



Raising the level of protection at Cairo during the 1937 flood.

Governor Lloyd C. Stark to summon the Missouri National Guard to remove the stragglers and protect workers attempting to open the floodway. On the evening of January 24, Reybold ordered his men to blast the fuseplug open with dynamite. Over the next 24 hours, holes were drilled in the levee and filled with explosives. The subsequent detonations blew open a small section of the fuseplug that eventually widened to nearly 3,000 feet. Floodwaters coursed through the floodway and immediately reduced the flood stage at Cairo by 3.5 feet. For the first and only time to date, the Birds Point-New Madrid Floodway was placed into operation.⁴⁴⁸

While the flood crested in the northern section of the project without reaching the dreaded possibilities prepared for, it did surpass the highest flood stages ever experienced on the river from Cairo to Helena. On the Cairo gauge, the river reached 59.41 feet, some three feet above the previous high 56.4 recorded in 1927; at New Madrid it topped the old 1913 mark by 3.36 feet; at Memphis the 1913 mark by 6.65 feet; and at Helena the 1927 mark by 3.46 feet. As the crest rolled past Cairo and Memphis and news of the unprecedented stages spread, fear gripped those living along the middle and southern sections of the project. Media accounts predicted flows 25 percent in excess of previous record flows and warned that



Blasting the fuseplug levee at the Birds Point-New Madrid Flood on January 25, 1937.

the Boeuf and Atchafalaya fuseplugs would soon fail. Speculation of the latter was only hastened when, on January 28, the Bonnet Carré Spillway was opened for the first time. As the tension heightened, Boeuf Floodway landowners began patrolling the fuseplug and threatened resistance to any attempt to open the fuseplug.⁴⁴⁹

Such predictions never materialized.⁴⁵⁰ Throughout the stretch of the river between the Arkansas River and Old River, the channel rectification program had dramatically increased the carrying capacity of the river. For rising stages above 45 feet at Arkansas City, the

discharge of the 1937 flood approached 700,000 cfs in excess of that carried at the same stage during the 1929 flood, a 50 percent increase. Just below the Greenville Bends, the peak discharge of the 1937 was 20 percent greater than that of 1929, but the crest elevation was one foot lower. Allowing for the difference in the characteristics of the two floods, the MRC estimated that the 1937 crest elevations were lower 10-12 feet lower at Arkansas City and 4-6 feet lower at Vicksburg than the 1929 flood. Similar improvements were experienced on the Atchafalaya River, where the river carried an additional 470,000 cfs at a stage 4.1 feet lower than same flow during the 1927 flood just before the river crevassed neighboring levees. Simply put, the increased carrying capacity of the two rivers emanating from the channel rectification program spared the Boeuf and Atchafalaya floodways from operation.⁴⁵¹

The 1937 flood represented the greatest controlled flood ever to be passed on the lower Mississippi River up to that time. The channel rectification program allowed more water to be carried safely to the Gulf of Mexico than ever before, without the use of the floodways in Arkansas and Louisiana. The improved main-line levees held firm. The Birds Point-New Madrid Floodway, along with emergency topping of the floodwalls and levees, helped save Cairo from inundation. At Bonnet Carré, 285 of the 350 spillway bays were opened, thereby diverting more than 200,000 cfs to Lake Pontchartrain, holding the Carrollton gauge under 20 feet, and relieving pressure on the levees guarding New Orleans. Because none of the modifications authorized under the Overton Act had been completed, the flood-control project, with the exception of the channel rectification program, still represented the Jadwin Plan. Despite the success of the project in confining overflow, the flood exposed the inadequacies of the project as it existed in 1937. The project flood to which the Jadwin Plan was designed to protect against allowed for maximum discharge at Cairo ranging from 2.25 million cfs to 2.4 million cfs with one foot of freeboard. The upper Mississippi River contributed less than 200,000 cfs to the peak discharge and the 1937 flood still only registered in at a shade over 2 million cfs; yet Cairo was barely saved from disaster. With the majority of the flood originating from the Ohio River, speculation increased as to what would have resulted had the upper Mississippi and Missouri rivers contributed even moderate flood discharges. The editorial staff of the *Engineering-News Record* complained that 1937 represented the year that the Jadwin Plan was to be completed and yet "Inevitably the future adequacy of the Mississippi system is in question. The safety of the valley has not been secured." In short order, numerous calls for another broad restudy of the flood-control project sprang forth across the valley and the nation.⁴⁵²

The House Committee on Flood Control had already made such a request to the Chief of Engineers before the flood had fully crested. By a resolution dated February 10, 1937, the committee asked Markham to submit revised comprehensive plans for the Mississippi and Ohio River valleys. Markham responded in April and conceded that the existing project flood dimensions at Cairo were insufficient. Pointing to new meteorological studies, Markham suggested that the maximum probable flood at Cairo could reach as high as 2.6 million cfs, with the upper Mississippi contributing 1 million cfs and the Ohio River 1.6 million cfs. Although the Ohio River added approximately 2 million cfs during the flood, the studies suggested that the atmospheric conditions causing winter floods on the Ohio River, similar to that latest flood, would produce a maximum discharge of only 400,000 cfs from the upper Mississippi River. Conversely, the studies did not anticipate a 1937-caliber flood out of the Ohio River

during the spring flood season on the upper Mississippi River. While the flood-control project at Cairo, as it then existed, could not protect against a flood of 2.6 million cfs, Markham advised against raising the levees any higher, for fear of increasing the danger in the event of a crevasse. Instead, he recommended the extension of the channel rectification program upstream toward Memphis and the construction of reservoirs to reduce peak discharge at Cairo.⁴⁵³

The Flood Control Act of 1936 had already authorized dozens of flood-control reservoirs throughout the country, including many in the Mississippi and Ohio River drainage areas. With this in mind, Markham recommended an additional 45 reservoirs in the Ohio River basin at a cost of \$246 million. He estimated that these reservoirs, along with those already authorized in 1936, would reduce the peak discharge of the new project flood by 200,000 cfs. He also proposed constructing seven reservoirs in the Missouri River basin and three in the upper Mississippi River basin below St. Louis at a cost of \$154 million. These reservoirs, if constructed, would decrease the discharge from the upper Mississippi River at Cairo by 140,000 cfs. Markham, therefore, concluded that the combined storage capacity of these reservoirs would reduce an unrestrained flood of 2.6 million cfs at Cairo to a rate of discharge more suitable to the levee system from Cairo to the Arkansas River.⁴⁵⁴

Markham also addressed the lower sections of the alluvial valley flood-control project. Six of the reservoirs contained in the Miller amendment to the Overton's bill had been incorporated in the 1936 Flood Control Act, but Markham argued that an effective decrease in the discharge of the Arkansas and White Rivers could only be achieved through the incorporation of additional reservoirs in lower basins of the two rivers. As such, he recommended constructing, at a combined cost of \$81.6 million, seven additional reservoirs in the Arkansas River basin and six in the White River basin, which combined would reduce the flood discharge of the Mississippi River below the Arkansas River by 200,000 cfs.

Markham's advocacy of these reservoirs may have been tied to a desire to eliminate the Eudora Floodway in light of his suggestion that the provisions governing the acquisition of land rights needed revision. While sticking to the position that dispersion of excess flow through the floodways was necessary to insure the integrity of the Mississippi River levees, the circumstances surrounding the operation of the Birds Point-New Madrid Floodway during the 1937 flood left the Chief of Engineers considerably dismayed. "I am now of the opinion that no plan is satisfactory which is based upon deliberately turning floodwaters upon the homes and property of people," he lamented, "even though the right to do so may have been paid for in advance." As a result, Markham recommended that



The Birds Point-New Madrid Floodway in full operation.

Congress authorize \$52 million for the government to secure the flowage rights in the Eudora, Morganza, and Atchafalaya floodways through fee simple purchase.⁴⁵⁵

The Final Transformation

In October 1937, Major General Julian L. Schley succeeded Markham as the Chief of Engineers. Schley saw the advantages in Markham's proposal to pursue fee simple options in the floodways and continued to tout it as a potential solution to the ongoing dilemma. The recommendation, however, did not rest well all landowners in the floodways, despite having garnered President Roosevelt's support. The land was theirs and they preferred living in their little slice of the Mississippi River Delta. Many simply did not wish to move from the places where they were born and raised; where their children were born and raised. Some



Major General Julian Larcombe Schley, Chief of Engineers, 1937-1941. *Office of History, U.S. Army Corps of Engineers.*

state and local authorities, too, were against the recommendation, fearing the federal government's purchase of the lands would eliminate valuable property tax revenues.⁴⁵⁶

Both the Senate Commerce Committee and the House Committee on Flood Control held hearings in March and April of 1938 to gain insight into a number of bills geared toward further modifying existing flood-control legislation. One such bill, introduced by Senator Overton, sought to amend his 1936 legislation by divorcing the Morganza and Eudora Floodways. By eliminating the link between the two floodways, Overton hoped to heal the schism in Louisiana unity by allowing work to proceed on the Morganza Floodway as soon as 75 percent land rights had been secured, regardless of the unwillingness of Eudora Floodway landowners to agree to compensation. The Louisiana senator surely knew that Mississippi politicians, namely Whittington, now chairman of the House committee, and Senator Theodore G. Bilbo, would object to such a provision. But this did not stop him from complaining, "Is it not bad enough that Louisiana must bear the burden and sacrifice entailed by these floodways without having Mississippi to dictate when and how and in what order they shall be constructed."⁴⁵⁷

Overton found some support for his cause in Schley and Ferguson. Both officers testified that there was no engineering reason as to why construction of the Morganza Floodway could not precede the construction of the Eudora Floodway. Ferguson, in fact, had sent a memorandum to Markham during the 1937 flood indicating that the Morganza Floodway, if it had been constructed, would have lowered flood heights on the river by several feet. As such he impressed upon the Chief of Engineers that the Morganza Floodway "is the one objective that must not be obscured."⁴⁵⁸

Whittington, on the other hand, wanted to keep the fate of the floodways linked. He correctly worried that the Eudora Floodway would never come to fruition if the two floodways were separated. "There was always objection to the Eudora floodway by certain citizens of Louisiana inasmuch as Eudora would protect Arkansas and Mississippi," he remarked in obvious retort to Overton's complaint, "It develops that the Morganza floodway, which will only protect the Morganza area, is desired by Louisiana." Whittington too, found support in Ferguson's testimony. The MRC president preached patience with regard to the ability of the channel rectification program to further increase the carrying capacity of the river. Ferguson, though confident in the value of the program, would not commit to the possibility of abandoning the Eudora Floodway until the program fully developed. In the meantime, he contended, the floodway was necessary as an insurance policy to protect the integrity of main-line levees against flows of project flood proportions. Ferguson warned the House

committee, "That long 1,000 miles of levees is very disturbing to an enormous number of people."⁴⁵⁹

With the future of the Morganza and Eudora floodways remaining bogged down, Overton and Whittington eventually recognized the need to cooperate with one another. Together they reached a compromise measure divorcing the land rights acquisition processes of the two floodways. Under the agreement, construction could begin on the Morganza Floodway without delay once the requisite flowage rights and easements were acquired. With respect to the Eudora Floodway, the agreement authorized the Chief of Engineers to enter condemnation proceedings in either floodway if landowners refused to sell. The compromise amendment was incorporated into the 1938 Flood Control Act—a national legislative act passed on June 28, 1938. In addition to the acquisition agreements, the act made several stipulations to the lower Mississippi flood-control project. To placate residents in the Eudora Floodway, the legislation provided for a controlling masonry weir corresponding to an elevation of 51 feet on the Vicksburg gauge and allowed for the construction of a fuseplug levee behind the sill weir to prevent overflow into the floodway if it should be determined by the Chief of Engineers that the flood could be safely confined within the leveed channel. It also mandated that the existing fuseplug levee, from the Arkansas River to Vacluse, Arkansas, be raised to the 1914 grade and 1928 section. In the Atchafalaya basin, the law stipulated that the fuseplug levees at the head floodways were to be raised to the 1928 grade and section and that the Morganza Floodway could not go into operation until after completion of the Wax Lake Outlet. Lastly, the law authorized the construction of nearly all of the reservoirs recommended by Markham in 1937, but did not incorporate them into the general flood-control project for the lower Mississippi River. Nonetheless the alluvial valley would receive the benefit of their protection.⁴⁶⁰

As with previous compromises, the consensus reached in 1938 quickly faded. As the MRC channel rectification program continued to gradually increase the carrying capacity of the river, west bank interests renewed their push for the elimination of the Eudora floodway. On August 2, 1939, the House Committee on Flood Control called upon the Chief of Engineers to review the project once more to determine the feasibility of further modifications. On March 12, 1940, the Senate Commerce Committee passed a near identical resolution. Schley heeded the resolutions and directed the MRC to examine the project and issue its recommendations.⁴⁶¹

By this time, the MRC had experienced another round of turnover in its membership since issuing the 1935 restudy of the project. Edward Flad, Colonel Ernest Graves, and Rear Admiral Leo O. Colbert, of the Coast and Geodetic Survey, were the only remaining members who had signed that



The members of the MRC onboard the steamer *Mississippi* at St. Louis in 1939. From left to right are: Major General Harley Ferguson, President; Rear Admiral Leo O. Colbert; Albert L. Culbertson; Edward Flad; Colonel Roger Powell; and Harry N. Pharr. Ferguson retired shortly after this photograph was taken and was replaced by Brigadier General Max C. Tyler as President of the Mississippi River Commission.

report. Brigadier General Max C. Tyler replaced Ferguson, who retired in 1939, as MRC president. In 1935 Harry N. Pharr, a long-time civil engineer with the St. Francis Levee District in Arkansas, assumed the seat vacated by Charles West two years earlier. Albert L. Culbertson, a Purple Heart recipient during the First World War and brigadier general in the Illinois National Guard, replaced Lawrence Glenn as the non-civil engineer member on the Commission. Lastly, Colonel Roger G. Powell assumed the seat opened by Colonel Francis B. Wilby's reassignment as Chief of Staff for the 1st Army.⁴⁶²

In the subsequent examination, the MRC found the existing project above of the Arkansas River to be adequate, particularly so in light of the tributary reservoirs authorized by the Flood Control Acts of 1936 and 1938. The MRC also determined that the project from Old River to the Gulf was equally adequate to handle the project flood. The only remaining problems to the overall flood-control project were confined to the middle section in between those two points, where the residents on both banks of the Mississippi River continued to clash over the fate of the proposed floodway through Arkansas and Louisiana and, of increasing importance, over the level of protection to be afforded to the Yazoo and Red River backwater areas. The MRC, though, was careful to note that problems in

the middle section of the project did not stem from engineering defects in the two plans forwarded thus far. The Commission concluded that both plans, the first providing for the Boeuf Floodway and the second proposing the Eudora Floodway, were feasible and sound from an engineering standpoint, but were found impractical because of local opposition—opposition strengthened by the success of the channel rectification program in lowering flood heights.⁴⁶³

Before proceeding into proposed modifications to rectify the situation, the MRC first recommended a new project flood discharge at Arkansas City. The existing project called for protection against a peak discharge of 2.85 million cfs at Arkansas City, but recent studies indicated a probability of a peak discharge of 3 million cfs. Assuming 1928 channel conditions, the capacity of the leveed channel at Arkansas City was 1.95 million cfs, with the remaining 900,000 cfs being diverted through the Boeuf Floodway. Owing to the success of the channel rectification program and the advancements in soil mechanics and levee construction, which allowed for stronger levees, the MRC now estimated the channel in the middle section of the project had the ability to accommodate a discharge of 2.6 million cfs without overtopping any levees, with the exception of a 1.5-mile stretch of levee in the vicinity of Vacluse. Additionally, the authorized reservoirs on the Arkansas and White rivers were capable of reducing a discharge of 3 million cfs by 200,000 cfs, bringing project flood numbers down to 2.8 million cfs, or only 200,000 more than the new capacity of the leveed

channel. In layman's terms, the MRC contended that because of the increased carrying capacity of the channel, it was now possible to actually confine an identical 1927 flood within the levee system. Under channel conditions in 1928, prior to the execution of the channel rectification program, the confinement of the 1927 flood necessitated raising the levees by nearly 12 feet—an alternative deemed too dangerous by all concerned. Had the improved channel conditions existed in 1928, the MRC suggested that serious thought probably would have been given to either confining the project flood between higher levees.⁴⁶⁴

In light of these revelations, the MRC presented five alternate plans, all



Brigadier General Max Clayton Tyler, President, Mississippi River Commission, 1939-1945. *Office of History, U.S. Army Corps of Engineers.*

of which took into account economic matters and the impacts to the Yazoo and Red River backwater areas. The first three ranged from constructing the proposed Eudora Floodway as provided in the Overton Act, to building a narrower 394,000-acre floodway, to limiting the floodway to 190,000 acres in Arkansas. Because these alternatives provided for a floodway in one form or another, the acquisition of flowage escalated the costs involved in implementing these plans. The remaining plans, in reminiscence of Colonel Potter's earlier stance, proposed the complete elimination of any west-side floodway in lieu of confining the floods between higher levees. Without having to account for flowage rights, these plans were noticeably less expensive.

Plan 4 called for equal protection on both banks of the river with levees constructed one foot above the estimated height of the project flood flow line or six feet above the crest elevation of a confined 1927 flood. The MRC contended that west bank interests found the plan acceptable because with overflows no longer expected to course through the Eudora Floodway, nearly 285,000 acres in the Red River backwater would be spared from inundation. East bank interests, on the other hand, opposed the deprivation of their three-foot levee height superiority. The plan for confinement rather than dispersion also raised the expected project flood crest elevation to 62.5 feet on the Vicksburg gauge, some 2.5 feet higher than afforded under the Jadwin Plan and five feet higher than anticipated under improved conditions realized through the channel rectification program. Furthermore, the higher stages generated by this plan would inundate an additional 247,000 acres in the lower end of the Yazoo backwater area than would be flooded with the Eudora Floodway in operation.

Through the public hearing process, the MRC recognized that opposition to the Eudora Floodway had evolved from a compensation issue to one calling for the complete elimination of the floodway. The Commission also knew that opposition from Mississippi interests to establishing parity in levee protection would be of equal intensity. To this end, the MRC developed a compromise interim plan to provide increased protection to the area west of the river, without eliminating the three-foot levee superiority enjoyed by east bank interests and without increasing stages in the Yazoo backwater area. Plan 5 was a compromise in that it provided immediate protection to the west bank by raising levees three feet above the flow line of a confined 1927 flood, while raising east bank levees six feet above the same mark or one foot above the confined waters of the new project flood. Such a plan maintained Mississippi's levee superiority over the west bank, but necessitated an additional 27,000 acres in the Yazoo backwater area to be overflowed under project flood conditions than would have been inundated with the Eudora Floodway in operation. The MRC

considered the plan as interim because west bank interests had to defer protecting against a project flood until such a time that the channel rectification program was developed and the authorized tributary reservoirs were constructed. The level of protection for Arkansas and Louisiana, while only temporary and unequal to that on the opposite side of the river, was still substantial. The MRC also hinted that, once fully developed, the increased carrying capacity of the river and the storage capacity of future reservoirs might ultimately prove the proposed level of protection adequate for security against the project flood.⁴⁶⁵

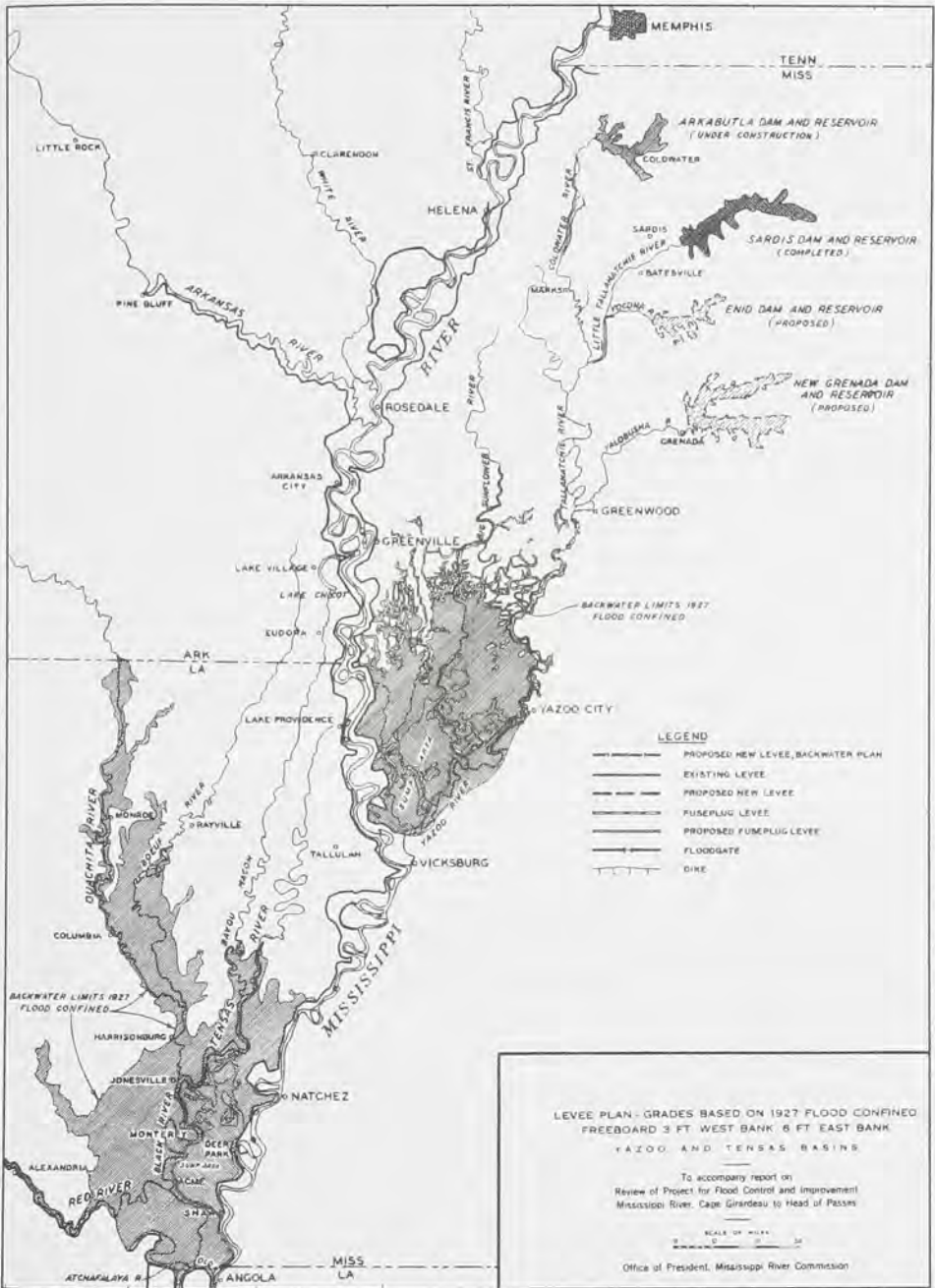
Unlike in its previous restudies of the flood-control project, this time the MRC made no formal recommendation on the floodway issue. Any of the alternate plans, the Commission explained, could be executed from an engineering standpoint if the east-west interests ever reconciled their differences, but because the difficulties in implementing them were political in nature, the MRC placed the onus of selection on Congress. This is not to say, however, that the MRC did not have a preference. The MRC was confident that Plan 5 represented the type of practical compromises necessary to move forward in the middle section of the project. Evidence of the MRC's confidence that Congress would approve of and select one of the interim plans was found in recommendations for improving conditions in the Yazoo and Red River backwater areas, the protection of which was becoming an issue of increasing importance to interests on both sides of the river.⁴⁶⁶

Both the Corps of Engineers and the MRC came to depend upon the storage capacities of the backwater areas as a benefit for flood control. These areas, as described by the MRC, "had an unhappy history." The low-lying areas functioned essentially as reservoirs, storing vast quantities of waters that decreased flood heights on the main river. Compounding this unfortunate circumstance was the continued taxation of backwater area property owners, who were forced to contribute money to fund the construction and maintenance of the levees that induced flood heights on their lands. Since the inception of the Jadwin Plan, calls for improving conditions in the backwater areas gained momentum and, while holding the position that the backwater areas could never be fully redeemed from flooding, both agencies eventually conceded that the more valuable portions could receive minimal protection during ordinary floods provided nothing hampered the reservoir effect of the areas during more severe floods. Congress had shown a willingness to accept this responsibility in the 1936 Overton Act by providing authorization to protect a portion of the White River backwater area. Hoping to capitalize on this precedent and make the plans for abandoning a west bank floodway more palatable to

east bank interests, the MRC proposed measures to minimize flooding in the Yazoo backwater area.⁴⁶⁷

The MRC plan for improving the Yazoo backwater area was predicated on the acceptance of the interim plan. It called for protection corresponding to a stage of 56.5 feet on the Vicksburg gauge by extending of the existing Mississippi River levee along the west bank of the Yazoo River to connect with the levee authorized under the Overton Act to control headwater floods. The MRC recognized that such a recommendation, if implemented, would result in interior drainage problems, particularly those presented by the Sunflower River, whereby the backwater levees would impound runoff. To address the problem, the Commission recommended transferring the impounded water, when river conditions permitted, by means of floodgates and culverts into sump areas. When stages on the Mississippi and Yazoo rivers were too high to allow for gravity drainage, the water could be pumped over the levee by installing pumps with a capacity of discharging 14,000 cfs. The MRC surmised that this plan would protect 634,000 acres in the Yazoo backwater area from all but the largest floods on the Mississippi River, with inundation expected at a frequency of once in every 31 years. Perhaps not to alienate west bank interests, the MRC similarly recommended protecting the Tensas-Cocodrie area in the Red River backwater area from all but significant floods by constructing a levee extending from the existing Mississippi River levee in the vicinity of Shaw, Louisiana, and continuing westward and northward to Newlight, Louisiana.⁴⁶⁸

On March 7, 1941, General Tyler forwarded the report to Schley, who in turn, sent it to Henry L. Stimson, the secretary of war. Despite the fact that Stimson did not formally submit it to Congress until August, the report was incorporated into the record during hearings before the House Committee on Flood Control in May. As anticipated, Mississippi interests opposed plan 4 on the basis that it deprived them of their superiority in levee heights and the related assurance of diversion of overflow through Arkansas and Louisiana. To complicate matters, Arkansas and Louisiana interests, championed by Louisiana Representative A. Leonard Allen and Arkansas Representative William F. Norrell, also unexpectedly balked at the interim plan on the grounds that, while eliminating the floodway, it did not provide equal protection to that afforded to east bank interests. Whittington and Overton, though, were eager to finally settle the issue and heal, once and for all, the schism in delta unity. Just after the hearings before the House committee ended, Overton developed a scheme to combine plan 4 with the interim plan by proposing to raise west bank levees one foot above the estimated project flood flow line, while raising east bank levees three-feet above the same crest elevation and thereby main-



Plan No. 5

taining an east bank superiority in levee heights. The compromise also allowed for protection of the Yazoo backwater area up to a level corresponding with 56.5 feet on the Vicksburg gauge. Although hesitant at first, Whittington accepted the compromise, conceding that the channel

rectification program and anticipated reservoir construction allowed for higher levees as a substitute for diversion.⁴⁶⁹

On August 18, 1941, President Roosevelt signed the 1941 Flood Control Act into law. The act incorporated the Overton-Whittington compromise and formally abandoned the Boeuf Floodway and all components of the Eudora Floodway. It also authorized an additional \$11.9 million to execute the MRC recommendations for improving the Yazoo backwater area—including the pumping stations – and \$7 million for Red River backwater area plan. As historian Martin Reuss points out in his examination on the control of water in the Atchafalaya basin, “The ‘Battle of the Floodways’ was officially over.” The act, though, accomplished more than healing the schism in delta unity resulting from the floodway controversy. Together with the previous modifications contained in the Overton Act and the 1936 and 1938 Flood Control Acts, the 1941 act signaled the final and long-awaited transformation of the Jadwin Plan or more accurately, the emergence of the modern Mississippi River and Tributaries project (MR&T).⁴⁷⁰

By the close of 1941 and as the nation geared up for the Second World War, the only remaining recognizable elements of the original 10-year, \$325 million, Jadwin Plan were the already completed Birds Point-New Madrid and Bonnet Carré floodways. The more comprehensive MR&T



A U.S. submarine on the Mississippi River during World War II. As a part of the war effort on the home front, the river proved to be a vital artery.

project reflected the desires of valley residents and, more precisely, a shift to plans advocated by the MRC in 1927. The \$663 million authorized between 1928 and 1941 nearly mirrored the \$684 million in expenditures requested by the MRC in its final comprehensive 1927 plan.⁴⁷¹ The west overbank floodway through Arkansas and Louisiana, which MRC President Charles Potter had described during the 1928 flood-control hearings as "bad engineering," was eliminated. The east Atchafalaya Floodway was made smaller and renamed the Morganza Floodway. The reduction in size of the floodway afforded protection for the agriculturally rich lands in Point Coupee Parish, just as the MRC had proposed in 1927. Plans for a controlled spillway at the head of the Morganza Floodway vindicated the MRC's early advocacy of controlling flows rather than Jadwin's dependence on fuseplug levees. Furthermore, the MR&T included larger expenditures for bank stabilization and dredging and higher levees with more freeboard—all of which were provided in the original MRC plan.

The MR&T project, though, extended beyond the scope of the MRC's 1927 recommendations in several ways. Owing largely to maturity in attitude concerning long-standing scientific doctrines and a growing confidence strengthened by hydraulic experiments at WES, the MRC developed new techniques and promoted long-standing, but refined, recommendations that were incorporated into the project. The MRC did not contemplate backwater protection, tributary reservoirs, a second outlet in the Atchafalaya basin, or the channel rectification program in 1927, but demonstrated a willingness to consider new alternatives and the adeptness to move forward. A number of factors, therefore, led to the ultimate transformation of the Jadwin Plan. The establishment of a hydraulics laboratory; the open-mindedness of Generals Brown, Markham and Schley to be less rigid and doctrinaire than Jadwin; the success of lower valley politicians to exert influence over flood-control policy in the valley and enact the MRC's proposals into law; and the ability of lower valley interests to blunt the widening division in Mississippi River Delta unity all were prime factors in the eventual unraveling of the Jadwin Plan. None, however, may have had a greater impact than Ferguson's channel rectification program. The lowering of flood stages and increased efficiency of the channel made all of the aforementioned factors possible and allowed the Jadwin Plan to be supplanted by a truly comprehensive river management program in the MR&T project.

Afterword

A Partnership of Hope

The history of the MRC through the advent of the modern MR&T project in 1941 is best understood within the context of an evolutionary process shaped by a myriad of social, economic, political, and engineering considerations. Following several decades of political squabbles, engineering disputes, and regional bickering going back to the mid-nineteenth century, Congress recognized the importance of harmonizing river improvements through a central organization and, assisted by the efforts of a coalition of flood-control and navigational interests, established the Mississippi River Commission in 1879. In addition to its responsibilities for overseeing the improvement of the Mississippi River, the newly established MRC gave Mississippi Valley interests—vested stakeholders in contemporary lexicon—a greater voice in shaping federal policy. It can be argued, in fact, that the practice of addressing issues and concerns through the formal hearing process, so critical in the federal government's civil works mission today, began in the Mississippi Valley with the creation of the MRC.

Clearly, though, the establishment of the MRC represented only the next logical step in the process of improving the Mississippi River, and the following five decades marked an era of experimentation. Relying heavily on input from local partners and comparative information available on the upper Mississippi, the Missouri, the Danube, and other prominent European rivers, the MRC developed a general plan of improvement with its first annual report in 1880. Implementing the plan proved to be more difficult. Cost considerations forced the MRC to abandon revetment as a bank stabilization method in 1886, just as technical advances were finally providing effective bank protection. Additionally, constitutional concerns regarding the federalization of flood control stagnated the full development of a meaningful flood-control program by leading to legislation restricting the implementation of MRC policy. When the restrictions were finally lifted in 1890, the MRC, with the support of understandably impatient lower valley interests, retreated into the controversial position that an adequate levee system, void of costly adjuncts, could protect the valley from inundation. The First Flood Control Act of 1917 facilitated the final implementation of a doomed levees-only program.

Ten years later, the great Mississippi River flood of 1927 forced a wholesale reappraisal of the MRC's levee policy and galvanized legislative, engineering, and popular support for a comprehensive river



A resident of the lower Mississippi Valley addresses the members of the Mississippi River Commission in the meeting room of the steamer *Mississippi*. The public hearing process played an instrumental role in shaping the modern Mississippi River and Tributaries Project.

improvement plan buttressed by large appropriations. The ensuing 1928 Flood Control Act did not, however, signify the modern culmination of navigation and flood-control improvements on the Mississippi River, though the legislation did represent the most important milestone in the process. Despite appropriations exceeding a then staggering \$300 million over 10 years, the Jadwin Plan quickly proved inadequate to the needs of the valley, both for engineering and non-engineering reasons. Through face-to-face interaction with the Corps of Engineers, lower valley interests and elected officials, the MRC played a leading role in modifying the Jadwin Plan and fostering the development of a truly comprehensive project that included levees, bank revetment, cut-offs, outlets, and reservoirs. By 1941, the MR&T project reflected a little of Charles Ellet and Andrew Humphreys, of James Eads and Cyrus Comstock, of John Freeman and John Ockerson, and of Edgar Jadwin and Harley Ferguson, while balancing the often conflicting interests of the entire Mississippi Valley.

The project in 1941, however, was far from complete. The MRC recognized as much when it concluded in its report of that year, "It would be rash to say that the plans now approved, or even as they may be modified in the near future, are a complete and final answer to the flood and navigation problems in the valley. No one can predict the extent of the development which will take place in the protected basins."⁴⁷² This statement

proved almost prophetic as the continued development of the valley necessitated nearly 50 major modifications to the project. While many of these changes expanded the scope of the project in the tributary basins, modifications to the main stem of the Mississippi River represented the necessary sequels to the flood-control and navigation improvements authorized through the legislative acts of 1928, 1936, 1938, and 1941. From an enhanced channel stabilization program to the construction of the Old River Control Complex and beyond, future modifications were designed to supplement and protect the project as it stood in 1941.⁴⁷³

Challenges and Opportunities

Prosecuted by the MRC under the supervision of the Office of the Chief of Engineers, the comprehensive MR&T project is arguably the most successful civil works project ever initiated by Congress. Since 1928, the nation has contributed nearly \$12 billion toward the project and has received an estimated \$425.5 billion return on that investment, including savings on transportation costs and flood damages. No project levee built to MR&T standards has ever failed, despite several major floods since the projects' inception. Subsequently, the frequency of flooding in protected areas has declined, resulting in a sharp drop in flood damages experienced throughout the lower valley. Despite its many successes, though, the MRC faces ongoing challenges as it continues to implement the MR&T project.⁴⁷⁴

The Mississippi River is a dynamic force, requiring constant vigilance. Since its inception, the MRC has initiated tremendous advances in hydraulic engineering and in the design and construction of regulating works, levees, and revetment; but its work is far from over. In conjunction with the Corps of Engineers, the MRC continues to gather and create new information on the river that defines its purpose, and this information shapes policy development. The ongoing need to inspect and review the MR&T project and its relationship to the river also represents a never-ending and evolving challenge to the MRC. Such reviews have recently led to a revision of project flood discharge numbers and to the project flood flow line, necessitating several changes to the standard levee grade and cross section. These changes require that nearly 500 miles of MR&T levees be improved to the most recent specifications.

Additionally, the MRC is confronted with the difficult task of balancing the flood-control aspects of the project with an increase in development within the floodplain, a task complicated by the project's own record of success in protecting the Mississippi Valley. The MR&T levee system, the channel stabilization program, and the basin-wide system of tributary reservoirs have performed extraordinarily well in keeping flood flows

below project flood conditions, raising expectations throughout the valley. Aside from the Bonnet Carré Floodway, which has operated eight times since its completion, the remaining three MR&T floodways have seldom been used to accommodate excess discharge as designed. The West Atchafalaya Floodway has never come into operation. The Birds Point-New Madrid Floodway and the Morganza Floodway have operated only once each—in 1937 and 1973 respectively—although on a handful of occasions preparations were made to open them for their intended use, only to have flood heights skillfully managed by reservoir operations. As evidenced by the extent of improvements and development in those designated emergency overflow areas, particularly in the Birds Point-New Madrid and the West Atchafalaya, investors and landowners have developed a false sense of security owing to the infrequent operation of the floodways. These floodways, however, remain integral components of the MR&T project, and the very real and dangerous prospect remains that they will go into operation in the future.

The nation's growing environmental awareness has also challenged the MRC to broaden its purview and incorporate environmental sustainability into its flood-control and navigation improvements. Important components of the MR&T project, such as the Yazoo backwater area proj-



The Morganza Floodway in operation during the 1973 flood.

ect and the St. John's Bayou and New Madrid Floodway project, have drawn sharp opposition from environmental groups who fear a loss of wetlands and wetlands forests. Yet, the MRC and the Corps of Engineers have used this challenge as an opportunity to emphasize that they can design and build projects that address flood-control, navigation, and other water resource needs, while also providing a great benefit to the environment. Both envision the controversial projects as perfect examples of environmentally sustainable projects. The former project, one of the vital components of the 1941 compromise culminating in the final abandonment of the Boeuf and Eudora Floodways, provides for a combination of structural and nonstructural approaches to flood control, which could result in the potential conversion of more than 60,000 acres of cleared land into bottomland hardwood wetlands. Similarly, the latter project will result in the reforestation of more than 8,000 acres of cleared land, and Avoid and Minimize measures will improve water quality and fishery habitat.

The natural dynamics of the Mississippi River, the increase in development in the floodways, and the emergence of a greater environmental sensitivity pose both challenges and opportunities for the MRC in the coming years. Created with broad authority over the entire Mississippi River—an authority that still exists today—the Commission is poised to continue its success in implementing the MR&T project and to address new projects that provide a benefit to the nation's environment and economy. Following a Corps of Engineers' reorganization in 1997, which eliminated the Lower Mississippi Valley Division in favor of the current Mississippi Valley Division, the MRC initiated inspection trips as far north as St. Paul, Minnesota, creating an opportunity for the MRC to once again treat the "Father of Waters" as a single system and reintroducing the Commission to its stakeholders in the upper Mississippi Valley. MRC President, Brigadier General Don T. Riley, addressed the importance of these new relationships in a December 2002 speech to the Mississippi Valley Flood Control Association, where he reaffirmed the MRC's commitment to "a partnership of hope" intent on building and maintaining strategic relationships for effective stewardship of the entire Mississippi River Valley.

Notes

- ¹ Mark Twain, *Life on the Mississippi*, (New York: Harper and Brothers Publishers, 1884), 234.
- ² Arthur E. Morgan, the vice-president of the American Society of Civil Engineers and one of the nation's leading authorities on flood control, concluded in 1928 that "no similar problem of similar size ever has been mastered by men." Arthur E. Morgan, "A Policy for the Mississippi," *The Annals* 135 (January 1928): 56.
- ³ Arthur Dewitt Frank, *The Development of the Federal Program for Flood Control on the Mississippi River*, (New York: AMS Press, 1930), 101-102.
- ⁴ Frank E. Williams, "The Geography of the Mississippi Valley," *The Annals* 135 (January 1928): 10.
- ⁵ Gerard H. Matthes, "Paradoxes of the Mississippi," *Scientific American* 184 (April 1951): 19-23.
- ⁶ Williams, "The Geography of the Mississippi Valley," 11.
- ⁷ Alcee Fortier, *Louisiana*, (New Orleans: Century Historical Association, 1914): 58.
- ⁸ Ray Allen Billington, *Western Expansion: A History of the American Frontier*, (New York: Macmillan Publishing Co., 1982), 322.
- ⁹ Lyle Saxon, *Father Mississippi*, (New York: The Century Company, 1927), 245.
- ¹⁰ Frank, *Federal Program for Flood Control*, 21; James P. Kemper, *Rebellious River*, (Boston: Bruce Humphries, Inc., 1949), 45-47; Robert W. Harrison, *Levee Districts and Levee Building in Mississippi: A Study of State and Local Efforts to Control Mississippi River Floods*, (Greenville, Mississippi: Board of Mississippi Levee Commissioners, 1951), 1-7. See also, Robert W. Harrison, *Alluvial Empire*, (Little Rock, Arkansas: Pioneer Press, 1961).
- ¹¹ Martin Reuss and Paul K. Walker, *Financing Water Resources Development: A Brief History*, (Historical Division, Office of Administrative Services, Office of the Chief of Engineers, 1983), 3-12; Martin Reuss, *Designing the Bayous: The Control of Water in the Atchafalaya Basin, 1800-1995*, (Alexandria, Virginia: Office of History, U.S. Army Corps of Engineers, 1998), 4-10.
- ¹² *Ibid.*, 43, 50-52.

¹³ "Paper No. 1400: Final Report of the Special Committee on Floods and Flood Prevention, With Discussion by Messrs. H. M. Eakin, John. W. Hill, M. O. Leighton, Cyrus C. Babb, Kenneth C. Grant, B. F. Groat, H. M. Chittenden, Myron L. Fuller, Gerard H. Matthes, H. K. Barrows, N. C. Grover, E. C. La Rue, Farley Gannett, C. E. Grunsky, C. McD. Townsend, and Morris Knowles," *Transactions of the American Society of Civil Engineers*, LXXI (1917): 1218-1310. Leighton's discussion takes place on page 1245. (Hereafter cited as "Paper No. 1400").

¹⁴ *Ibid.*, 1241-1243.

¹⁵ Todd Shallat, *Structures in the Stream: Water, Science, and the Rise of the U.S. Army Corps of Engineers*, (Austin: University of Texas Press, 1994), 2; Forest G. Hill, *Roads, Rails & Waterways: The Army Engineers and Early Transportation*, (Norman: University of Oklahoma Press, 1957), 4.

¹⁶ Billington, *Western Expansion*, 330; Saxon, *Father Mississippi*, 245-48.

¹⁷ Saxon, *Father Mississippi*, 238.

¹⁸ *Ibid.*

¹⁹ New Orleans *Times-Picayune*, March 21, 1871, 2; *House Executive Document* #220, 43rd Cong., 1st sess., April 15, 1874, 114.

²⁰ *House Executive Document* #16, 33rd Cong., 1st sess., January 4, 1854, 9. In 1832, Major Benjamin Buisson, formerly an engineer with Napoleon's army, recommended the construction of a canal extending from the Mississippi River at Fort Saint Philip into the Isle au Breton Pass, a shallow lagoon of the Gulf of Mexico. Five years later, a report by Major William H. Chase, an engineer in the service of the Corps of Engineers, made an exhaustive examination and study. "I do not hesitate," he concluded, "to adopt and recommend the construction of a ship canal without further delay. *Ibid.*, 39; *Congressional Record*, Appendix, 43rd Cong., 1st sess., June 4, 1874, 407-8.

²¹ Howell made this argument in his initial report on the Fort Saint Philip Canal: "Legislative economy enters too largely into the spirit of American politics to permit men engaged in legitimate business [from] staking their wealth, when it will depend on the turn legislation may take." *House Executive Document* #113, 43rd Cong., 1st sess., February 4, 1874, 82, (Hereafter cited as *House Executive Document* #113); New Orleans *Times-Picayune*, March 16, 1871, 2.

²² Ibid; *The Congressional Globe*, 41st Cong., 3rd sess., December 14, 1870, 92; *Congressional Record*, 42nd Cong., 1st sess., March 14, 1871, 100; *House Executive Document #113*, 13.

²³ The 1870 Census also played an important role in directing Congressional attention to the West. The results of that census evidenced two, very important demographic trends in the United States—that the nation's population was growing rapidly and that the majority of that growth was occurring in the West. Significantly, these changes were reflected in the make-up of the 43rd Congress, which met for the first time in the spring of 1873. Due to reapportionment, that Congress sat fifty more members of the House of Representatives, and, of those fifty, forty-two came from states with waterways that drained into the Mississippi River or its tributaries. Stephen A. Cobb, a Republican from Kansas and a member of that new Congress, believed that the effect would be to “westernize the legislation of the country,” and he was prescient. The 43rd and subsequent Congresses proved to be much more sensitive to the particular needs of the Mississippi Valley. The total number of representatives increased from 243 with the 42nd Congress to 293 with the 43rd Congress. See George B. Galloway, *History of the House of Representatives*, (New York: Thomas Y. Crowell Company, 1962), 295-97. These states (with the number of additional representatives in parenthesis) are: Alabama (2); Arkansas (1); Georgia (2); Illinois (5); Indiana (2); Iowa (3); Kansas (2); Kentucky (1); Louisiana (1); Maryland (1); Michigan (3); Minnesota (1); Mississippi (1); Missouri (4); New York (2); North Carolina (1); Ohio (1); Pennsylvania (3); Tennessee (2); Texas (2); and Wisconsin (2); *Congressional Record*, Appendix, 43rd Cong., 1st sess., June 4, 1874, 413.

²⁴ *House Executive Document #113*, 64. The seven-member board included Lieutenant Colonel John Newton, Q. A. Gillmore, G. K. Warren, William P. Craighill, G. Weitzel, C. W. Worrell, and Colonel J. G. Barnard.

²⁵ *Congressional Record*, 43rd Cong, 1st sess., June 5, 1874, 4621; *New Orleans Republican*, June 23, 1874.

²⁶ *James B. Eads Collection*. Missouri State Archives. Letter from Braxton Bragg dated July 20, 1874. In a letter to Bragg, a fellow Army engineer, Barnard insists that “a canal should not be resorted to... until the question of an ‘open river mouth’ (which I pronounce attainable) is solved.” Bragg included the text of the Barnard letter in a letter of his own to Eads.

²⁷ *House Executive Document #113*, 75.

²⁸ See letter dated January 29, 1874; *ibid.*, 92, 91.

²⁹ Martin Reuss, “Andrew A. Humphreys and the Development of Hydraulic Engineering: Politics and Technology in the Army Corps of Engineers, 1850-

1950," *Technology and Culture* 26 (January 1985): 17; Dumas Malone, ed., *Dictionary of American Biography* (New York: Charles Scribner's Sons, 1934), I: 626-27; see letter from Barnard to Eads dated September 2, 1868. *James B. Eads Collection*. Barnard and Humphreys also had been disagreeing as to the scouring effect of the river for many years. Barnard states "I believe Humphreys and Abbot contest my views aspecting that (in the lower river at least) the current has not made its own bed—that the depth is independent (?) of scouring action."

³⁰ Martin Reuss, "Andrew A. Humphreys and the Development of Hydraulic Engineering: Politics and Technology in the Army Corps of Engineers, 1850-1950," *Technology and Culture* 26 (January 1985): 19-20. Reuss discusses the interesting timing of the bridge boards actions and Barnard's minority report. See also Frederick J. Dobney, *River Engineers on the Middle Mississippi*, (Washington, D.C.: Government Printing Office, 1973), 40-43; Malone, *Dictionary of American Biography*, V: 587-88.

³¹ The two had been corresponding with one another on engineering matters since at least September 1868, and almost certainly well before that. *James B. Eads Collection*. Letter from John Gross Barnard dated September 2, 1868.

³² *Times Picayune*, March 22, 1874; *ibid.*, March 19, 1874; *ibid.*, March 3, 1874; *ibid.*, April 7, 1874. Republicans Jacob Sypher of Louisiana joined McCrary as the leading canalites in Congress. Importantly, the House Committee on Railways and Canals was the presiding committee over the matter.

³³ E. L. Corthell, *A History of the Jetties at the Mouth of the Mississippi River*, (New York: John Wiley & Sons, 1881), 25. On March 15, 1874, that paper published a lengthy article on Eads' proposed jetty plan.

³⁴ *Times Picayune*, March 11, 1874; *New York Times*, June 1, 1874.

³⁵ *Congressional Record*, Appendix, 43rd Cong., 1st sess., June 4, 1874, 411; *ibid.*, June 5, 1874, 4621.

³⁶ *Ibid.*, June 4, 1874, 4573; *ibid.*, June 5, 1874, 4619.

³⁷ *Times Picayune.*, December 15, 1873, 188; *ibid.*, April 7, 1874; *ibid.*, April 5, 1874.

³⁸ *New York Times*, June 1, 1874.

³⁹ *Congressional Record*, 43rd Cong., 1st sess., June 20, 1874, 5294.

⁴⁰ These attacks were surprisingly vehement. West exclaimed that "every attempt that has ever been made to induce the Corps of Engineers of the Army to listen to

the recommendations made by the ablest civil engineers in the country has been resisted with an obduracy that is beyond belief." Senator John A. Logan of Illinois charged that the Corps "can spend more money and do less work than any set of men that ever lived." *Ibid.*, June 22, 1874, 5370, 5368, 5371.

⁴¹ *New York Times*, July 4, 1874; *House Executive Document #114*, 43rd Cong., 2nd sess., June 23, 1874, 2-3 (Hereafter cited as *House Executive Document #114*).

⁴² *Ibid.*, 10.

⁴³ Corthell, *A History of the Jetties*, 60, 63.

⁴⁴ *Ibid.*, 64; *Congressional Record*, 43rd Cong., 1st sess., February 18, 1875, 1447; *New York Times*, February 19, 1875.

⁴⁵ Corthell, *A History of the Jetties*, 81.

⁴⁶ *Statutes at Large*, 31st Cong., 1st sess., September 28, 1850, Ch. 84, 519; Andrew A. Humphreys and Henry L. Abbot, *Report Upon The Physics and Hydraulics Of The Mississippi River; Upon The Protection Of The Alluvial Region Against Overflow; Upon The Deepening Of The Mouths: Based Upon Surveys And Investigations Made Under the Acts Of Congress Directing The Topographical And Hydrographical Survey Of The Delta Of The Mississippi River, With Such Investigations As Might Lead To Determine The Most Practical Plan For Securing It From Inundation, And The Best Mode Of Deepening The Channels At The Mouths Of the River*, Professional Papers of the Corps of Topographical Engineers, U.S. Army, No. 13, (Washington, D.C.: Government Printing Office, 1876, reprint, with additions of Professional Paper No. 4, 1861), 152. (Hereafter cited as *Delta Survey*)

⁴⁷ Martin Reuss, "Andrew A. Humphreys and the Development of Hydraulic Engineering," 5-7. Reuss contends that Conrad wanted Ellet to work alongside the military engineers, but that Ellet wished to work independently. Reuss, *Designing the Bayous*, 43.

⁴⁸ *Senate Executive Document #49*, 32nd Cong., 1st sess., 1852, 2; Albert E. Cowdrey, *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: 1977), 10; *House Committee on Flood Control Hearings*, 1922, 180.

⁴⁹ Frank, *Federal Program for Flood Control*, 33; Cowdrey, *Land's End*, 10. For more on this topic, please see Reuss, "Andrew A. Humphreys and the Development of Hydraulic Engineering," 1-33. See also Humphreys and Abbot, *Delta Survey*.

⁵⁰ Humphreys and Abbot, *Delta Survey*, 153.

⁵¹ *Ibid.*, 181, 183, 185.

⁵² *Congressional Record*, 43rd Cong., 1st sess., 1875, 4654.

⁵³ Frank, *Federal Program for Flood Control*, 30; James M. McPherson, *Ordeal By Fire*, 312. Also see John K. Bettersworth, *Mississippi in the Confederacy: As They Saw It*, (Jackson, Mississippi: The Mississippi Department of Archives and History, 1970), 99-100; Harrison, *Levee Districts and Levee Building in Mississippi*, 26-27.

⁵⁴ B. G. Humphreys, *Floods and Levees of the Mississippi River*, (Memphis: Mississippi River Levee Association, 1914), 22, 24.

⁵⁵ McPherson, *Ordeal by Fire*, 493; *Congressional Record*, 74th Cong., 2nd sess., May 21, 1936, 7732.

⁵⁶ *Congressional Record*, 43rd Cong., 1st sess., 1874, 3151.

⁵⁷ *Annual Report of the Chief of Engineers*, 1875, 538-565.

⁵⁸ Humphreys, *Floods and Levees of the Mississippi River*, 37.

⁵⁹ *Annual Report of the Chief of Engineers*, 1875, 564-565.

⁶⁰ Frank, *Federal Program for Flood Control*, 40; Mary G. McBride and Ann M. McLaurin, "The Origin of the Mississippi River Commission," *Louisiana History* 36 (Fall 1995), 393; Congressional Committees, 1789-1982: *A Checklist* compiled by Walter Stubbs (Westport, CT: Greenwood Press, 1985), 88-89; *Congressional Record*, 44th Cong., 1st sess., December 10, 1875, 191. On March 10, 1871, the House created a Select Committee on Mississippi River Levees. Under Kerr's authorization, this select committee became a standing committee.

⁶¹ *Congressional Record*, 45th Cong., 3rd sess., January 16, 1879, 505; *Ibid.*, February 5, 1879, 1033; Kemper, *Rebellious River*, 65-66.

⁶² "The Mississippi," *Engineering News*, August 12, 1876, 263. *Engineers News* was the forerunner to *Engineering News-Record*.

⁶³ The quote from G.K. Warren regarding the Eads Bridge is borrowed from Reuss, "Andrew A. Humphreys and the Development of Hydraulic Engineering," 19-20. *Annual Report of the Chief of Engineers*, 1875, 564-565; "Capt. Eads vs. the Mississippi River," *Engineering News*, February 7, 1878, 41; Estill McHenry, *Addresses and Papers of James B. Eads, Together with a Biographical Sketch*, (St. Louis: Slawson & Co., Printers, 1884), 616; "Last Scheme of Mr. Eads," *Engineering News*, March 14, 1878, 81-82.

⁶⁴ "Last Scheme of Mr. Eads," *Engineering News*, March 14, 1878, 82-83; Hayes Presidential Center, letter dated June 1, 1878 from James B. Eads to Representative Edward W. Robertson. Eads writes in protest to a letter written by A. A. Humphreys to Robertson, dated May 1, 1878, that Humphreys "assumes that the bill providing for a commission of five engineers to prepare plans for the improvement of the river is designed to place its whole control in my hands." McHenry, *Addresses and Papers of James B. Eads*, 616. Humphreys' quote is borrowed from Dorsey, *Road to the Sea*, 221. See also D.O. Elliott, *The Improvement of the Lower Mississippi River for Flood Control and Navigation*, (Vicksburg, Mississippi: U.S. Waterways Experiment Station, 1932), I: 13; *Congressional Record*, 46th Cong., 2nd sess., January 21, 1880, 496. (The House Committee on Levees and Improvement of the Mississippi River will hereafter be referred to as the Committee on Levees). The 1878 engineer board consisted of Col. John Gross Barnard, Col. Z. B. Tower, Lt. Col. Horatio G. Wright, Major Cyrus B. Comstock, and Major Charles R. Suter. The board advanced the conclusion that a complete levee system would aid commerce during periods of high water, but would have little or no influence upon low-water navigation. The board stated that the greatest obstacle to navigation improvement and levee maintenance was the instability of the river due to bank caving. The report of this board is noteworthy in that it considered flood control and navigation improvements as part of the same problem, but completely divorces the levee system from any influence on low-water navigation. With the creation of the MRC, Congress did not act on the board's recommendations. *Annual Report of the Chief of Engineers*, 1879, 1008-1018; Elliott, *The Improvement of the Lower Mississippi River*, 13.

⁶⁴ *Congressional Record*, 46th Cong., 1st sess., June 21, 1879, 2283.

⁶⁵ *Congressional Record*, 45th Cong., 3rd sess, February 5, 1879, 1033; House Document #35, 17th Cong., 2nd sess., 1823, 21-22.

⁶⁶ *Congressional Record*, 46th Cong., 2nd sess., January 21, 1880, 452.

⁶⁷ U.S. Representative Edward W. Robertson discusses this "fortunate adjustment of rival interests" in his presentation of H. R. 4318. *Ibid.*, January 16, 1879, 496-499.

⁶⁸ Of the seventy-four congressmen who opposed the Robertson bill, twenty-five came from the following states: Pennsylvania (11), New York (5), New Jersey (3), Maine (2), Vermont (2), New Hampshire (1), and Connecticut (1). Twenty-two of these were Republicans. *Ibid.*, February 5, 1879, 1033. On March 3, 1879, eighteen Senators supported a move to table the bill. Of these, seven were from the above states; and all seven were Republicans. *Ibid.*, March 3, 1879, 2309; In the House, half (37) of the seventy-four votes in opposition to the Robertson bill came from the following states: Illinois (9), Indiana (9), Michigan (6), Ohio (6), Wisconsin (3), Kentucky (2), Iowa (1), and Minnesota (1). Of these, twenty-nine were Republicans; *ibid.*, February 5, 1879, 1033. On March 3, 1879, eighteen Senators favored a move to lay the Robertson bill on the table with the intent of killing the bill. Of these, five were from the above states. All five were Republicans. *Ibid.*, March 3, 1879, 2309; *ibid.*, February 4, 1879, 979.

⁶⁹ *Ibid.*, 1033, 2309. Senators from those states supported the bill unanimously as well

⁷⁰ *Ibid.*, 503.

⁷¹ *Ibid.*, 497. Robertson of Louisiana, the sponsor of the bill and a staunch advocate of federal flood control, had received special permission from the Committee on Levees to include these appropriations with the bill as it was introduced to the House floor. They did not have the approval of the whole Committee, though, and were submitted as amendments only; *ibid.*, 507.

⁷² *Ibid.*, 511.

⁷³ *Ibid.*, 501; *New York Times*, July 19, 1879, 4.

⁷⁴ *Congressional Record*, 45th Cong., 3rd sess., vol. 8, January 16, 1879, 507.

⁷⁵ *Ibid.*, February 5, 1879, 1032.

⁷⁶ *Ibid.*, March 3, 1879, 2311.

⁷⁷ *Ibid.*, January 16, 1879, 496; *ibid.*, 46th Cong., 1st sess., June 2, 1879, 1730. Gibson's bill was H.R. 1847.

⁷⁸ *Congressional Record*, 46th Cong., 1st sess., June 18, 1879, 2101; Cowdrey, *Land's End*, 25.

⁷⁹ *Congressional Record*, 46th Cong., 1st sess., June 18, 1879, 2099-2103; *ibid.*, June 21, 1879, 2284; *ibid.*, June 28, 1879, 2423.

⁸⁰ The Robertson bill was introduced to the House with the unanimous support of the committee. The members of the House Committee on Levees for the 45th Congress were as follows: Edward Robertson (D, LA), Robert Hatcher (D, MO), Hernando Money (D, MS), Casey Young (D, TN), Robert Knapp (D, IL), George Landers (D, CT), Ben Martin (D, WV), Russell Errett (R, PA), Thadeus Pound (R, WI), George Robinson (R, MA), and Horatio Bisbee (R, FL). Nine of eleven voted in favor of the original bill on February 5, 1879; Knapp and Bisbee did not vote. *Congressional Record*, 45th Cong., 3rd sess., February 5, 1879, 1033.

⁸¹ *Ibid.*, June 21, 1879, 2283.

⁸² *New York Times*, July 8, 1879, 4.

⁸³ *Laws of the United States Relating to the Improvement of Rivers and Harbors, From August 11, 1790 to November 8, 1966*. (Washington, D.C., Government Printing Office, 1968), I: 304-305; Elliott, *Improvement of the Lower Mississippi River*, I: 14-15.

⁸⁴ Keith I. Polakoff, *The Politics of Inertia: The Election of 1876 and the End of Reconstruction*, (Baton Rouge: Louisiana State University Press, 1973), 145-46.

⁸⁵ Vincent P. DeSantis, "President Hayes's Southern Policy," *Journal of Southern History* 21 (November 1955), 477, 480; James D. Richardson, *A Compilation of the Messages and Papers of the Presidents, 1789-1902*, (Washington, D.C.: Bureau of National Literature and Art, 1904), VII: 619; "The Mississippi," *Engineering News*, August 12, 1876, 263; *The James B. Eads Collection*, Missouri Historical Society, letter from J. W. Ferry to JBE dated July 1, 1879. During his third annual address, Hayes reported to the nation on the success of Eads's work, concluding that the project was a "permanent success" that provided for "an unobstructed channel safely to and from the sea." Eads' appointment represents a fateful moment in the history of the river because it was his plan that laid the foundation for the Commission's eventual implementation of the ruinous levee policy

⁸⁶ *Dictionary of American Biography*, VIII: 353; *The National Cyclopædia*, XII: 328-29; See footnote in Harry J. Sievers, *Benjamin Harrison, Hoosier Statesman: From the Civil War to the White House, 1865-1888* (New York: University Publishers Incorporated, 1959), 165.

⁸⁷ *House Executive Document #114*, 1; *The National Encyclopedia*, VIII: 488-89.

⁸⁸ *House Executive Document #37*, 45th Cong., 3rd sess., 1879, 4-5. See also biographical files in the MRC Technical Records, MRC History Center, Vicksburg, MS.

⁸⁹ Comstock was also a close confidant of John Gross Barnard, having served as his chief assistant during the early years of the Civil War. Reuss, "Andrew A. Humphreys and the Development of Hydraulic Engineering," 17. See also biographical files in the MRC Technical Records, MRC History Center.

⁹⁰ Dobney, *River Engineers on the Middle Mississippi*, 41-43.

⁹¹ *New York Times*, July 8, 1879, 4. According to the *Times*, the appointment of Eads was the best evidence of that: "with Eads as a member of the commission . . . the costly jetties are assured of approval." Sievers, *Benjamin Harrison*, 165.

⁹² *Proceedings of the Mississippi River Commission, 1879-1884*, sessions 1-2 (August 19-20, 1879). In the earlier records of the Commission proceedings, each daily, or some sometimes more frequent, meeting was termed a session. From 1891 forward, the term session was applied only to a series of meetings at one place, from the time the Commission first met until its final adjournment. The MRC later renumbered those early sessions to reflect that change. Furthermore, the pages numbers of the proceedings were not numbered continuously until 1891. For these reasons, the original sessions numbers and dates will be cited in the endnotes.

⁹³ *Pamphlet Publications of the Mississippi River Commission, 1873-1894*, in 9 volumes. See also biographical files in the MRC Technical Records, MRC History Center.

⁹⁴ *Proceedings of the Mississippi River Commission, 1879-1884*. Each session indicates whether or not the individual members of the commission were present.

⁹⁵ E. Eveleth Winslow, *Occasional Papers, Engineer School, United States Army; Number 41: A Resume of Operations in the First and Second District, Mississippi River Improvement, 1882-1901*, (Washington, D.C.: Engineer School Press, 1910), 38; Elliott, *Improvement of the Lower Mississippi River*, 1: 14; Reuss, *Designing the Bayous*, 71-73.

⁹⁶ The "intimate and direct" quote is taken from "An Address by James B. Eads Before the St. Louis Merchant's Exchange," *Engineering News*, February 7, 1878, 44; *Proceedings of the Mississippi River Commission, 1879-1884*, session 11 (January 17, 1880).

⁹⁷ *Ibid.*

⁹⁸ Elliott, *Improvement of the Lower Mississippi River*, 1: 48-49.

⁹⁹ *Proceedings of the Mississippi River Commission, 1879-1884*, session 14 (January 21, 1880).

¹⁰⁰ "An Address by James B. Eads Before the St. Louis Merchant's Exchange," *Engineering News*, February 7, 1878, 45; *Proceedings of the Mississippi River Commission*, 1879-1884, session 12 (January 19, 1880) and session 15 (January 22, 1880).

¹⁰¹ *Proceedings of the Mississippi River Commission*, 1879-1884, session 12 (January 19, 1880); session 15 (January 22, 1880).

¹⁰² *Ibid.*, sessions 12-15, (January 19-22, 1880).

¹⁰³ *Ibid.*, session 15 (January 22, 1880).

¹⁰⁴ *Preliminary Report of the Mississippi River Commission*, February 17, 1880, 2724-2725. This report also appears in the *Annual Report of the Chief of Engineers*, 1881, and *House Executive Document #58*, 46th Cong., 2nd sess.

¹⁰⁵ *Preliminary Report of the Mississippi River Commission*, February 17, 1880, 2725-2730.

¹⁰⁶ Reuss *Designing the Bayous*, 28-29, 33;

¹⁰⁷ *Ibid.*, Elliott, *Improvement of the Lower Mississippi River*, I: 50-52.

¹⁰⁸ Reuss, *Designing the Bayous*, 33-35, 73-77.

¹⁰⁹ *Preliminary Report of the Mississippi River Commission*, 2727-2728.

¹¹⁰ *Ibid.*, 2731-2733.

¹¹¹ *Ibid.*, 2735-2737. This description is based on Floyd M. Clay's account in *History of Navigation on the Lower Mississippi* (Navigation History, 1983), 18. Ironically, though, the section of the report containing the recommended plan of improvement did not mention levees, other than the vague reference to the necessity of securing a uniformity of width of the high-water channel. The discussion of levees and the \$2,020,000, cost estimate to close gaps and repair crevasses had taken place in a separate section of the report. This irony, the offspring of the democratic process involved in advancing resolutions within the MRC, reflected attempts to promote compromises and blend the disparate views of the commissioners.

¹¹² *Preliminary Report of the Mississippi River Commission*, 2739-2740.

¹¹³ Ibid. John M. Barry attributes this quote from Comstock and Harrison's minority report to James Eads. It was Eads, though, who had long championed the use of levees on the riverbanks to improve the low-water channel. See John M. Barry *Rising Tide: The Great Mississippi Flood and How it Changes America*, (New York: Simon and Schuster, 1997, 90-91.

¹¹⁴ Again, Barry contends that "Eads wanted to build cutoffs, believing they had enormous impacts on floods. Humphreys and Ellet opposed cutoffs. Eads was right. The commission followed Humphreys and Ellet." See Barry, *Rising Tide*, 90. Eads, though, had backed away from his advocacy of cutoffs nearly two years before the MRC issued its report. See "Captain Eads vs. The Mississippi River," *Engineering News*, February 7, 1878, 41, 45. Eads signature of the majority report further confirms his abandonment of cutoffs; *House Committee on Flood Control Document #17*, 70th Cong., 1st sess., 1927, 55; also see *Congressional Record*, 45th Cong., 3rd sess., February 4, 1879, 981; *Preliminary Report of the Mississippi River Commission*, 2740.

¹¹⁵ *Progress Report of the Mississippi River Commission*, January 8, 1881, 2742-2747 (also found in *Annual Report of the Chief of Engineers*, 1881; *House Executive Document #95*, 46th Cong., 2nd sess.); *Progress Report of the Mississippi River Commission*, November 25, 1881, 18-20. Upon its creation, the MRC did not entirely usurp the role of the operations of the Corps of Engineers on the river and its tributaries. In one sense, Congress purposefully established dual engineering organizations—the MRC and the Corps of Engineers—to manage the complexities of the Mississippi River. Proof of this intent is found in the 1881 Rivers and Harbors Act. Following the submission of its plan of improvement for the Lower Mississippi River in 1880, the MRC proceeded to examine the upper Mississippi and eventually adopted, with a few minor modifications, the existing systems of improvement being executed by the Corps of Engineers. The 1881 act carried an appropriation of \$1 million dollars for the improvement of the Mississippi River in accordance with the plan recommended by the MRC in its first report, essentially sanctioning the Commission's plan of improvement below Cairo. This bill also authorized the MRC to extend its operations to the tributaries of the Mississippi River "to the extent that may be necessary in the judgment of the MRC to the perfection of the general and permanent improvement of the river." The very next clause in the bill, though, apparently served as a warning to the MRC to not interfere with existing projects being prosecuted by the War Department, "but this clause shall not be construed to interfere with the prosecution by the War Department of the improvement of said Mississippi River and its tributaries under general appropriations made thereof." This language essentially guaranteed the existence of dual engineering organizations on the Mississippi River. The 1882 bill solidified the dual engineering relationship between the two organizations by relieving the Commission of the responsibility of directly implementing its plans and directing the Corps of Engineers to execute them under the direct supervision of the MRC. The legislation also placed the existing

projects on the upper Mississippi between Cairo and the Des Moines Rapids under the direct supervision of the MRC. After the passage of the 1882 act, the Commission created the four MRC districts on the lower Mississippi River, each headed by an engineer officer detailed from the Corps of Engineers who reported directly to the MRC on matters under that agency's jurisdiction. In this manner, the MRC districts were truly entities independent from the Corps of Engineers. For nearly four years, the MRC implemented the plan of improvement on the river between the Des Moines Rapids and the Head of Passes. Then in 1886, Congress struck again. Perhaps impatient of results, the federal legislature removed the projects on the upper Mississippi River from the supervision of the MRC, thereby limiting the jurisdiction of the MRC, in regard to supervising the implementation of its plan of improvement, to the river below Cairo. For the next 30 years, the jurisdiction of the MRC, other than the completion of the general survey of the river and special isolated examinations, remained fixed on the lower Mississippi River. During that time, the river could not, and would not, be treated as a whole. *Laws of the United States Pertaining to Rivers and Harbors*, I: 340, 382-383, 460-466; *Annual Report of the Mississippi River Commission*, 1882, 2118, 2149.

¹¹⁶ That tradition of criticism continues in *Rising Tide*. Barry contends that the Commission haphazardly implemented a "levees-only" flood-control plan for the lower Mississippi River that "combined the worst, not the best, of the ideas of Eads, Ellet and Humphreys." Barry, *Rising Tide*, 90.

¹¹⁷ J. F. Coleman, "Levees as a Means of Flood Control for the Mississippi River," *Transactions* 93 (1929): 757-761. Coleman's paper was one of several papers posited in, "Paper No. 1709: Flood Control With Special Reference to the Mississippi River, A Symposium," *Transactions*, 93 (1929): 655-966. C. S. Jarvis echoes Coleman's reference in the discussion of the papers, page 865.

¹¹⁸ *Progress Report of the Mississippi River Commission*, January 8, 1881, 2747-2753.

¹¹⁹ *Flood Control on the Lower Mississippi River*, 77th Cong., 1st sess., House Document #359, 37-38. (Hereafter cited as *House Document #359*).

¹²⁰ *Preliminary Report of the Mississippi River Commission*, 2732-2733.

¹²¹ *Progress Report of the Mississippi River Commission*, November 25, 1881, 15.

¹²² Elliott, *Improvement of the Lower Mississippi River*, I: 302.

¹²³ *Congressional Record*, 46th Cong., 2nd sess., April 5, 1880, 2331; Sievers, *Benjamin Harrison*, 166; *The National Cyclopaedia*, 17: 415.

¹²⁴ *Laws of the United States Pertaining to Rivers and Harbors*, I: 340; Cowdrey, *Lands' End*, 29-30

¹²⁵ *Progress Report of the Mississippi River Commission*, November 25, 1881, 10.

¹²⁶ *Ibid.*, 30; *Proceedings of the Mississippi River Commission*, 1879-1884, session 64 (August 15, 1882); session 66 (August 17, 1882); session 67 (August 18, 1882).

¹²⁷ *Ibid.*, session 64 (August 15, 1882).

¹²⁸ *Ibid.*, session 68 (August 28, 1882); session 78 (September 18, 1882).

¹²⁹ *Ibid.*, session 86 (November 23, 1882). The earlier recommendation is found in the *Progress Report of the Mississippi River Commission*, November 25, 1881, Appendix G, 129-134.

¹³⁰ The policy of "restraint in the interest of navigation" was first mentioned in the *Progress Report of the Mississippi River Commission*, 1882, 38-39.

¹³¹ Florence Dorsey, *Road to the Sea: The Story of James B. Eads and the Mississippi River*, (New York: Rinehart and Company, 1947) 262-265; McHenry, *Addresses and Papers of Eads*, 364. Eads was replaced by Samuel W. Ferguson, the president of the Board of Mississippi Levee Commissioners.

¹³² *Annual Report of the Mississippi River Commission*, 1883, 2435; *Annual Report of the Mississippi River Commission*, 1885, 2873; *Annual Report of the Mississippi River Commission*, 1884, 20; George D. Waddill, Memorandum titled "History of the Mississippi River Levees, 1717, 1944," Office of the President of the Mississippi River Commission, Vicksburg, Mississippi, 1944, 5.

¹³³ *Congressional Record*, 46th Cong., 2nd sess., January 21, 1880, 453.

¹³⁴ *Ibid.*, 726. One member of the House compared the "rude, unmethodized mass" of rules to a medieval castle in Europe, "to which addition after addition was made as the necessities or whims of its successive owners demanded, and in which none save those who had longest inhabited it could successfully thread the labyrinthine passages and stairways which led to its chambers and halls;" *National Cyclopaedia*, 3: 57; *Congressional Record*, 46th Cong., 2nd sess., January 8, 1880, 247.

¹³⁵ A suspension of the rules required two-thirds support from the House, but this was generally not a problem as the river and harbor bill included monies for hundreds of Congressional districts; *Congressional Record*, January 22, 1880, 478.

Ibid., 46th Cong., 3rd sess., February 26, 1881, 2148; *ibid.*, 46th Cong., 2nd sess., January 8, 1880, 254.

¹³⁶ *House Report #24*, 46th Cong., 2nd sess., December 19, 1879, 31, 33; *Congressional Record*, 46th Cong., 2nd sess., February 5, 1880, 732-33.

¹³⁷ *Ibid.*, February 11, 1880, 882; *House Report #390*, 46th Cong., 2nd sess., February 27, 1880, 6.

¹³⁸ *Congressional Record*, 46th Cong., 2nd sess., January 21, 1880, 455-456; *ibid.*, January 22, 1880, 478. During the same period, the Commerce Committee had failed to develop a systematic approach for dealing with problems of the Mississippi River, and its work was fragmentary and inadequate. Slow to accept innovation, the Commerce Committee had opposed Eads' plan for improving the mouth of the Mississippi River, turning to him only after its own plan for the Fort Saint Philip ship canal had failed to pass the Senate. Even at that point, the committee refused to throw the full weight of its support behind Eads's project. In fact, the Committee on Commerce was so incredulous and disbelieving that Eads had to proceed with the work at his own cost until he had demonstrated the complete success of his plan. Moreover, that committee had long evidenced an Eastern bias, to the neglect of the Mississippi Valley. Over the years, the Committee on Commerce had expended a total of more than \$200 million in its various rivers and harbors bills, and only \$7 million of that was allocated on the Mississippi River and its tributaries that served as a drainage basin for more than 40 percent of the continental United States.

¹³⁹ "Memorial of John Cowden [sic], addressed to Hon. John H. Reagan, Chairman of the Committee on Commerce of the House of Representatives," House Miscellaneous Document #13, 45th Cong., 3rd sess., January 14, 1879, 10.

¹⁴⁰ Elliott, *Improvement of the Lower Mississippi River*, I: 16; *Annual Report of the Mississippi River Commission*, 1880, 2733. Following the release of the MRC's preliminary report in 1880, special interests in Congress continued their efforts to promote Eads' levee theory. They did this partly through the dissemination of levees-only propaganda in Congress. Here the House Committee on Levees once again played a leading role. Five members of that committee proceeded down the Mississippi River in the company of MRC Commissioners for the purpose of "acquiring a knowledge of its peculiar conditions and wants and to gather information relative to the best methods for its improvement." After spending the entire month of May investigating the Mississippi River from St. Louis to the Head of Passes, the subcommittee reported favorably on the MRC report, concluding that "the methods therein recommended for the treatment of the Mississippi River appear to be correct and should be tested." In addition to its affirmation of support for the Commission's recommendations, the subcommittee testified to the economic importance of those lands serviced by the Mississippi and its

tributaries and stressed the need for increased federal expenditures for the improvement of the route. *Congressional Record*, 46th Cong., 3rd sess., February 15, 1881, 1653, 1654.

¹⁴¹ *Congressional Record*, 46th Cong., 3rd sess., February 10, 1881, 1437, 1438.

¹⁴² *Ibid.*, February 7, 1881, 1326; *ibid.*, February 10, 1881, 1438.

¹⁴³ *Ibid.*, February 15, 1881, 1657, 1651.

¹⁴⁴ *Ibid.*, February 26, 1881, 2153.

¹⁴⁵ *Annual Report of the Mississippi River Commission*, 1881, 4, 9, 15.

¹⁴⁶ Harrison, *Alluvial Empire*, 103; *Annual Report of the Mississippi River Commission*, 1882, 2117.

¹⁴⁷ *Congressional Record*, 47th Cong., 1st sess., April 17, 1882, 2946.

¹⁴⁸ *Senate Executive Document #159*, 47th Cong., 1st sess., April 18, 1882. Arthur's letter is also printed in its entirety in the *Congressional Record*, 47th Cong., 1st sess., April 18, 1882, 2975.

¹⁴⁹ *Ibid.*, 2983.

¹⁵⁰ *Ibid.*, July 8, 1882, 5790; Thomas C. Reeves, *Gentleman Boss: the Life of Chester Alan Arthur*, (New York: Alfred A. Knopf, 1975), 280; *Dictionary of American Biography*, Supplement One, (New York: Charles Scribner's Sons, 1944), 460; *Congressional Record*, 47th Cong., 1st sess., June 15, 1882, 4940.

¹⁵¹ *Ibid.*, June 16, 1882, 5017.

¹⁵² *Ibid.*, June 17, 1882, 5052, 5056, 5061.

¹⁵³ *Ibid.*, July 25, 1882, 6484; *New York Times*, July 27, 1882; Reeves, *Gentleman Boss*, 280; *Congressional Record*, 47th Cong., 1st sess., August 1, 1882, 6759.

¹⁵⁴ *Annual Report of the Mississippi River Commission*, 1882, 2118, 2149; *Proceedings of the Mississippi River Commission*, 1879-1884, session 65 (August 16, 1882).

¹⁵⁵ *Annual Report of the Mississippi River Commission*, 1883, 2410.

¹⁵⁶ *Ibid.*, 2410-11; Clay, *History of Navigation*, 21; Winslow, *Occasional Papers No. 41*, 42-43.

¹⁵⁷ *Annual Report of the Mississippi River Commission*, 1884, 3.

¹⁵⁸ *Nation* magazine claimed that Republicans lost the House due in large part to the excessive 1882 river and harbor act (see editorial, LIV: 347, May 12, 1892); Justus D. Doenecke, *The Presidencies of James A. Garfield & Chester A. Arthur*, (Lawrence: The Regents Press of Kansas, 1981), 99; Edward Lawrence Pross, "A History of Rivers and Harbors Appropriation Bills, 1866-1933," (Ph.D. diss., Ohio State University, 1938), 91.

¹⁵⁹ *Laws of the United States Pertaining to the Improvement of Rivers and Harbors*, I: 460-461.

¹⁶⁰ *Proceedings of the Mississippi River Commission*, 1885-1890, session 171, (July 1, 1887); "An Address by James B. Eads Before the St. Louis Merchant's Exchange," *Engineering News*, February 7, 1878, 42; *Annual Report of the Mississippi River Commission*, 1887, 2759-2766. In an attempt to circumvent the provider, the MRC proposed a scheme to construe the language to mean that, while no new revetment work was allowable, the continuation of existing efforts was acceptable. Lincoln rejected the ploy and the MRC allotted all funds, initially set aside for bank revetment, toward levee repair and construction.

¹⁶¹ "An Address by James B. Eads Before the St. Louis Merchant's Exchange," *Engineering News*, February 7, 1878, 45; *Annual Report of the Mississippi River Commission*, 1887, 2760-2761.

¹⁶² *Proceedings of the Mississippi River Commission*, 1885-1890, session 165 (September 17, 1886); session 170 (June 30, 1887). In the latter instance, Gibson even congratulated the MRC for having its revetment recommendations denied.

¹⁶³ *Annual Report of the Mississippi River Commission*, 1887, 2690; *ibid.*, 1889, 2595, 2597.

¹⁶⁴ *Annual Report of the Mississippi River Commission*, 1884, 3; *Annual Report of the Mississippi River Commission*, 1889, 2595, 2597.

¹⁶⁵ Kemper, *Rebellious River*, 45-47; Harrison, *Levee Districts and Levee Building in Mississippi*, 1-7; Elliott, *Improvement of the Lower Mississippi River*, II: 159-164. See also: Harrison, *Alluvial Empire*.

¹⁶⁶ *Annual Report of the Mississippi River Commission*, 1890, 3083-3084, 308; *Congressional Record*, 51st Cong., 1st sess., May 24, 1890, 5256; Pross, "A History of Rivers and Harbors Bills, 1866-1933;" Harrison, *Alluvial Empire*, 109-10; Elliott, *Improvement of the Lower Mississippi River*, I: 100, 112.

¹⁶⁷ *Congressional Record*, 51st Cong., 1st sess., May 24, 1890, 5256, 5257, 5262.

¹⁶⁸ Ibid., August 15, 1890, 8600.

¹⁶⁹ Ibid., September 6, 1890, 9818; *Statutes at Large*, 51st Cong., 2nd sess., 1890, Ch. 26, 426-65; *Proceedings of the Mississippi River Commission*, 1891-1895, (August 2, 1892).

¹⁷⁰ *Annual Report of the Mississippi River Commission*, 1891, 3397, 3398; Mitchell resigned in 1888 and was replaced by George Davidson. Davidson, in turn, resigned in 1890, vacating the slot eventually filled by Whiting.

¹⁷¹ *Proceedings of the Mississippi River Commission*, 1891-1895, session 16 (November 5-18, 1891).

¹⁷² "Early Presidents of the Society: Henry Flad, 1824-1898," *Civil Engineering*, July 1937, 529-531.

¹⁷³ *Annual Report of the Mississippi River Commission*, 1892, 2902, 2887; *Congressional Record*, 52nd Cong., 1st sess., May 5, 1892, 3980. The MRC's annual reports are full of references to the damaging affects of Congressional policy on appropriations. See the annual reports for 1882 (p. 2117); 1883 (p. 2410); 1885 (p. 2860); and 1889 (p. 2597).

¹⁷⁴ *Laws of the United States Relating to the Improvement of Rivers and Harbors*, I: 638. The original draft of the rivers and harbors bill al appropriated \$1,125,000 for the first year, while authorizing the Secretary of War to make additional contracts not exceeding an aggregate of \$1,625,000 a year for three years. *Statutes at Large*, 52nd Cong, 1st sess., 1892, Ch. 158, 106-7; *Annual Report of the Mississippi River Commission*, 1895, 3644.

¹⁷⁵ *Annual Report of the Mississippi River Commission*, 1893, 3559; *ibid.*, 1895, 3626-3627. In its annual report of 1893, the MRC gave a detailed explanation of its strategy. Due to financial limitations, the Commission planned to continue its conservative "restraint in the interest of navigation" policy, directed first at closing all breaks in the levees system with the goal of establishing a provisional grade only. Such a grade would be of sufficient strength "to resist high waters that recur with substantial regularity" but would remain of insufficient height and strength to confine the entire discharge of the greatest possible flood. The MRC believed that this policy would "give the earliest and widest protection, even if this protection is not complete." As construction proceeded, levee heights varied considerably from site to site depending on local contributions and conditions, but the MRC now generally sought to attain "a grade of 3 feet above the highest [average] flood." In this context, "highest flood" did not refer to the greatest flood on record, the 1882 flood, but rather the several moderate floods of the early 1890s.

¹⁷⁶ Ibid., 1893, 3560; *ibid.*, 1894, 2714; *ibid.*, 1895, 3625.

¹⁷⁷ Ibid., 1896, 3419-3423; *Proceedings of the Mississippi River Commission*, 1891-1895, session 16, (November 13, 1891).

¹⁷⁸ *Annual Report of the Mississippi River Commission*, 1893, 3570-3573.

¹⁷⁹ Ibid., John A. Ockerson, "Dredges and Dredging on the Mississippi River," *Transactions*, XL (December 1898): 247-310. Completed in 1893, the experimental dredge was equipped with two, 30-inch, suction pipes, one located on the bow of the dredge and the other on the stern. The bow pipe carried a straight suction head equipped with jet agitators, while the stern pipe contained a curved drag suction, with both pipes operated by separate pumps. The 30-inch dredge discharge pipe, held together by strong rubber joints and irons coupling bars, extended 33 feet from the vessel. To give the discharge pipe buoyancy, the MRC equipped it with air chambers. Flad designed the dredge to be operated by two head lines attached to piling upstream of the bar to be excavated. Once placed into operation below the bar, the dredge was pulled upstream on the two lines at an average speed of 75 feet per hour. After the dredge completed its first cut, it floated back downstream to make a parallel cut parallel. The repeated this process until the channel reached the desired dimensions. A second experimental dredge, the *Ram*, was constructed under the supervision of the Corps of Engineers in 1893 for use in the Old River. Elliott, *Improvement of the Lower Mississippi River*, II: 208.

¹⁸⁰ *Annual Report of the Mississippi River Commission*, 1893, 3421-22; Quote taken from, Albert E. Cowdrey, *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*, (1977), 33.

¹⁸¹ *Annual Report of the Mississippi River Commission*, 1893., 3421; Albert E. Cowdrey, *This Land, This South* (Lexington: University Press of Kentucky, 1983), 123-24.

¹⁸² "Report on the Mississippi River Floods," *Senate Report #1433*, 55th Cong., 3rd sess., December 15, 1898, 240 (hereafter cited as Nelson Report); on April 4, Flood levels reached 51.8 feet at Helena, exceeding the previous record, 48.1 feet in 1886, by 3.7 feet. *Annual Report of the Mississippi River Commission*, 1882, 2150; *Annual Report of the Mississippi River Commission*, 1883, 2411; *ibid.*, 1897, 3523.

¹⁸³ Humphreys, *Floods and Levees of the Mississippi River*, 53.

¹⁸⁴ See minority reports in the *Annual Reports of the Mississippi River Commission* for 1880, 1882, 1883, 1884, 1885, 1886, and 1887.

¹⁸⁵ See index, *Nelson Report*, 519-22; *ibid.*, II; *Annual Report of the Mississippi River Commission*, 1898, 3137.

¹⁸⁶ *Nelson Report.*, IV, V

¹⁸⁷ *Ibid.*, IX.

¹⁸⁸ *Ibid.*, Harrison, *Alluvial Empire*, 117.

¹⁸⁹ *Annual Report of the Mississippi River Commission*, 1897, 3527.

¹⁹⁰ Humphreys, *Floods and Levees of the Mississippi River*, 55; *Annual Report of the Mississippi River Commission*, 1898, 3150.

¹⁹¹ *Annual Report of the Mississippi River Commission*, 1903, 28.

¹⁹² *Reports of the Chief Engineer, Yazoo-Mississippi Delta Levee District*, 1884-1890, 124.

¹⁹³ *Annual Report of the Mississippi River Commission*, 1911, 3186; Harrison, *Alluvial Empire*, 119; *Annual Report of the Mississippi River Commission*, 1906, 2484.

¹⁹⁴ Elliott, *Improvement of the Lower Mississippi River*, I: 168.

¹⁹⁵ *Annual Report of the Mississippi River Commission*, 1906, 2484; *ibid.*, 1908, 2657.

¹⁹⁶ Elliott, *Improvement of the Lower Mississippi River*, II: 315-316. The Townsend Report is published in its entirety in *Senate Document #24*, 63rd Cong., 1st sess. See also the address, "Flood Control on the Mississippi River" delivered by Townsend in Memphis on September 26, 1912 and the address by the same title delivered by Townsend before the National Drainage Congress in St. Louis on April 11th, 1913, both contained in the MRC Technical Records, MRC History Center.

¹⁹⁷ Harrison, *Levee Districts and Levee Building in Mississippi*, 212-215, 217; "Work of the Mississippi river Commission, 1879-1945," contained in MRC Technical Records, MRC History Center.

¹⁹⁸ For the final version of this legislation, see *Statutes at Large*, 64th Cong., 2nd sess., Ch. 144, March 1, 1917 [H.R. 14777]; *Statutes at Large*, 46th Cong., 3rd sess., Ch. 136, March 3, 1881, 474. The "commerce clause" of the Constitution authorized Congressional appropriations for navigation improvements, but "strict

constructionists" did not believe that the Constitution authorized expenditures for flood control.

¹⁹⁹ John F. Stover, *A History of American Railroads*, (Chicago: Rand McNally & Company, 1967), 47-48; K. Austin Kerr, *American Railroad Politics, 1914-1920: Rates, Wages, and Efficiency*, (Pittsburgh, PA: University of Pittsburgh Press, 1968), 40.

²⁰⁰ Stover, *History of American Railroads*, 51; Pross, "A History of Rivers and Harbors Appropriation Bills, 1866-1933," 145-47.

²⁰¹ *Annual Report of the Mississippi River Commission*, 1912, 1902; Elliott, *Improvement of the Lower Mississippi River*, II: 168-69; Harrison, *Levee Districts and Levee Building in the Mississippi*, 212-215, 217.

²⁰² *Statutes at Large*, 62nd Cong., 2nd sess., Ch. 80, April 16, 1912 [H.R. 23246]. Democrat Robert C. Wickliffe of Louisiana sponsored the bill in the House, and it was referred to as the Wickliffe bill. New Orleans *Daily Picayune*, April 16, 1912, 9; *ibid.*, April 13, 1912, 1. Tragically, Wickliffe was struck by a train and killed while on a fishing expedition in Potomac Park just two months later. *Ibid.*, "Train Kills Wickliffe at National Capital," June 12, 1912, 1; New Orleans *Daily Picayune*, "House Passes Wickliffe Bill Calling for \$300,000—Conference Decides to Ask for \$1,500,000 to Repair Levees," April 16, 1912, 9; *ibid.*, "For Federal Levees," June 9, 1912, 1.

²⁰³ *Congressional Record*, 64th Cong., 1st sess., May 3, 1916, 7339-7341; Frank, *Federal Program for Flood*, 169, 170. Joseph E. Ransdell, co-sponsor of the 1917 Flood Control Act and president of the National Rivers and Harbors Congress (NRHC), called John A. Fox "one of the strongest forces in the success of the Rivers and Harbors Congress." Fox also served in various capacities, including "director at large," for the NRHC. See pamphlet titled "Rivers and Harbors and Flood Control," Box 4, *Ransdell Papers*, Department of Archives and Manuscripts, Hill Library, Louisiana State University, Baton Rouge, Louisiana; Harrison, *Alluvial Empire*, 133, fn.

²⁰⁴ *Congressional Record*, 64th Cong., 1st sess., February 3, 1916, 2083.

²⁰⁵ Vincent J. Marsala, "U.S. Senator Joseph E. Ransdell, Catholic Statesman: A Reappraisal," *Louisiana History* 35, no. 1 (Winter 1994), 38-39; George Q. Flynn, "A Louisiana Senator and the Underwood Tariff," *Louisiana History* 10 (Winter 1969), 5-9; *Biographical Directory of the United States Congress, 1774-1989, Bicentennial Edition* (United States: Government Printing Office, 1989), 1692-93; Andras P. LaBorde, *National Southerner: Ransdell of Louisiana* (New York: Benziger, 1951). Oddly, the LaBorde biography, written in conjunction with Ransdell, makes no reference of the Ransdell-Humphreys Act; *Biographical Directory*

(United States: GOP, 1989), 1232-33; *Congressional Record*, 62nd Cong., 2nd sess., May 29, 1912, 7408. Ransdell's bill [H.R. 24967] called for \$8 million a year for four years, and Humphreys bill [H.R. 24966] provided for \$7 million a year for three years. See New Orleans *Daily Picayune*, May 30, 1912, 1; *ibid.*, June 21, 1912, 2; *Congressional Record*, 63rd Cong., 1st sess., April 7, 1913; 51, 87.

²⁰⁶ *Statutes at Large*, 62nd Cong., 3rd sess., Ch. 144, March 4, 1913 [H.R. 28180].

²⁰⁷ *Congressional Record*, 65th Cong., 2nd sess., September 2, 1918, 9826; *Dictionary of American Biography*, vol. 13 (New York: Charles Scribner's Sons, 1934), 462-63.

²⁰⁸ At a mass meeting of the Progressive Union in New Orleans on June 20, 1912, leading waterways advocate George H. Maxwell argued that Ransdell's levee bill could never pass "because it was backed by only local territory," while, in support of the more-comprehensive Newlands' bill, "all parts of the country would stand together, and the bill would be passed at the next session of Congress." New Orleans *Daily Picayune*, June 21, 1912, 2; As early as 1912, the comprehensive plan claimed considerable support, even in the Lower Mississippi Valley. In mid-April of that year, delegates at the second annual National Drainage Congress meeting in New Orleans passed a resolution adopting Newlands' plan over Ransdell's. New Orleans *Daily Picayune*, April 13, 1912, 1; *ibid.*, April 12, 1912, 1; "Wilson Supports Waterway Reform," *New York Times*, July 8, 1914, 6; New Orleans *Item*, January 31, 1914, 1; New Orleans *Daily Picayune*, January 31, 1914, 3.

²⁰⁹ "Trying to Agree on Protection From Floods," New Orleans *Daily Picayune*, January 27, 1914, 6; also see "Ransdell Sustains Big Appropriations for Ouachita River," New Orleans *Times-Picayune*, May 26, 1916, 16; New Orleans *Daily Picayune*, January 25, 1914, 1; for biographical information on Maxwell, see obituary, *New York Times*, June 20, 1928, 25; *Dictionary of American Biography*, Supplement Number 4 (New York: Charles Scribner's Sons, 1974), 563-64; Anne Wakefield, "The Broussard Papers of the University of Southwestern Louisiana: New Light on Louisiana Progressivism," *Louisiana History*, 31 (Winter 1990, no. 1), 293-300; Letter from Robert F. Broussard to R. Martin (33-7), January 28, 1914, *Broussard Papers*, collection no. 144, reel no. 19, Southwestern Archives and Manuscripts Collection, Dupre Library, University of Southwestern Louisiana, Lafayette, Louisiana; Letter from Robert F. Broussard to John Parker (33-9), January 26, 1914, *Broussard Papers*, collection no. 144, reel no. 19; New Orleans *Daily Picayune*, February 1, 1914, 1-2.

²¹⁰ *New York Times*, July 23, 1914, 10; *ibid.*, July 25, 9; *ibid.*, September 20, 1914, 6; *ibid.*, September 21, 1914, 6; *ibid.*, September 2, 1914, 8; *ibid.*, September 20, 1914, 6; Also see the *Times* for September 21, 1914, 6; September 22, 1914, 22;

September 23, 1914, 9; and September 24, 1914, 10; *Statutes at Large*, 63rd Cong., 2nd sess., Ch. 313, October 2, 1914 [H.R. 13811], 725; *New York Times*, September 30, 1914, 10.

²¹¹ *Memphis News Scimitar*, December 2, 1914; *Congressional Record*, 64th Cong., 1st sess., May 3, 1916, 7344-45; Frank, *Federal Program for Flood Control*, 171; *New Orleans Times-Picayune*, December 10, 1914, 16; also see the *Times-Picayune* for December 11, 1914, 1; December 12, 1914, 1; December 2, 1914, 3; December 4, 1914, 9; December 10, 1914, 10; and November 29, 1914, 2; Pross, "A History of Rivers and Harbors Bills, 1866-1933," 308; *New Orleans Times-Picayune*, March 2, 1915, 2; *ibid.*, March 3, 1915, 1; *Statutes at Large*, 63rd Cong., 3rd sess., Ch. 142, March 4, 1915 [H.R. 20189], 1049.

²¹² An editorial in the *New Orleans Times-Picayune* considered it "unfortunate that improvement projects of national importance and unquestioned merit should be tangled up with minor schemes whose merit and timeliness are, to say the least of it, debatable." *New Orleans Times-Picayune*, September 26, 1914, p. 6; also see *ibid.*, December 10, 1914, 10.

²¹³ Speaker Champ Clark referred to the flood problems of the lower Mississippi Valley as "the greatest economic question that the American people must deal with in the next quarter of a century." *Congressional Record*, 64th Cong., 1st sess., February 3, 1916, 2089, 2090, 2067-71.

²¹⁴ One of the opposition leaders, Republican William E. Humphrey of Washington, concluded that the purpose of the new Flood Control Committee "was to take care of the Mississippi River." Flood-control advocates were, he continued, "afraid that they were not getting as much from the river and harbor bill as they wanted, and did not know as they would be able to get more than their share in that bill; and so the scheme [to create a new committee] was formed, and I have never seen a finer piece of generalship since I have been a Member of this House." *Ibid.*, May 10, 1916, 7784.

²¹⁵ House Committee on Flood Control, *Hearings*, March 1916, 27, 218.

²¹⁶ *New Orleans Times-Picayune*, May 19, 1916, 8; Republican Representative William A. Rodenberg of East St. Louis said that "the question of controlling the flood waters of the Mississippi is in no sense a local question, but it is essentially and distinctly a national problem. That fact was recognized in the platform of principles adopted by the three leading political parties in the campaign of 1912. In every one of these platforms it was clearly and unequivocally set forth that it was the plain duty of the Federal Government to provide the means necessary to protect that part of our common country against disastrous floods and overflows that are periodically visited upon them." *Congressional Record*, 64th Cong., 1st sess., May 3, 1916, 7330; Wisconsin Republican Irvine L. Lenroot proposed the

amendment to increase the local contribution requirement. *Congressional Record*, 64th Cong., 1st sess., May 3, 1916, 7366, 7368; *ibid.*, May 17, 1916, 8220; New Orleans *Times-Picayune*, May 18, 1916, 1.

²¹⁷ The *Times-Picayune* reported that "as there is no disposition on the part of many senators to make this [inter-departmental committee] concession the bill in all probability will have to face as strong a fight as the Nevada senator and his friends can make." *Ibid.*, May 19, 1916, 9; *Congressional Record*, 64th Cong., 1st sess., May 31, 1916, 8933; New Orleans *Times-Picayune*, June 1, 1916, 2; In an interview with the *Times-Picayune*, Humphreys commented that "as Senator Clarke, of Arkansas, is chairman of this [Senate Commerce] committee, we feel no fear there." *Ibid.*, May 23, 1916, 7.

²¹⁸ According to his biographical sketch, White's position on virtually every public policy issue was guided by the basic premise: "What's good for Louisiana sugar is good for America." Clearly, catastrophic floods were not good for Louisiana sugar. Kermit Liltall, Editor in Chief, *Oxford Companion to the Supreme Court of the U.S.*, (New York: Oxford University Press, 1992), 927-28; *Congressional Record*, 64th Cong., 1st sess., July 11, 1916, 10828-29; New Orleans *Times-Picayune*, June 6, 1916, 1; *ibid.*, June 9, 1916, 8.

²¹⁹ For Democratic platform in 1916, see *Official Report of the Proceedings of the Democratic National Convention*, 1916, compiled by J. Bruce Kremer, Chicago, 1916; New Orleans *Times-Picayune*, June 14, 1916, 1; *ibid.*, June 16, 1916, 9; S. D. Lovell, *The Presidential Election of 1916*, (Carbondale, IL: Southern Illinois University Press, 1980), 55-57.

²²⁰ New Orleans *Times-Picayune*, February 16, 1917, 3.

²²¹ *Ibid.*, October 2, 1916, 1; *ibid.*, February 18, 1917, Sunday edition, A-5. According to that paper, "the personnel of the new House is expected to include 215 Republicans, 215 Democrats, and 5 Independents," with 218 votes required for a majority. House Democrats eventually secured the necessary votes to carry over control into the 65th Congress, and Champ Clark retained the speakership.

²²² Letter from Francis Griffith Newlands to Woodrow Wilson, February 11, 1917, *Woodrow Wilson Papers*, film series 2, reel 86, no. 165; New Orleans *Times-Picayune*, February 16, 1917, 3; *Congressional Record*, 64th Cong., 2nd sess., February 6, 1916, 938.

²²³ New Orleans *Times-Picayune*, February 15, 1917, 3; for editorial on rail crisis, see *ibid.*, February 24, 1917, 8; *ibid.*, February 10, 1917, 3.

²²⁴ Letter from Francis G. Newlands to Woodrow Wilson, February 11, 1917, *Woodrow Wilson Papers*.

²²⁵ New Orleans *Times-Picayune*, February 24, 1917, 3; *New York Times*, February 24, 1917, 1, 4.

²²⁶ New Orleans *Times-Picayune*, February 26, 1917, 2; *Congressional Record*, 64th Cong., 2nd sess., February 24, 1917, 4149-50.

²²⁷ New Orleans *Times-Picayune*, February 26, 1917, 2; *Congressional Record*, 64th Cong., 2nd sess., February 26, 1917, 4290; New Orleans *Times-Picayune*, February 27, 1917, 1; *Congressional Record*, 64th Cong., 2nd sess., February 26, 1917, 4305; New Orleans *Times-Picayune*, February 27, 1917, 1; *ibid.*, February 28, 1917, 8.

²²⁸ *Ibid.*, March 1, 1917, 3; Among others, James M. Thomson, publisher of the New Orleans *Item*, sent a telegram to Wilson urging him to give his approval to the bill. See telegram from James M. Thomson to Woodrow Wilson, *Woodrow Wilson Papers*, March 1, 1917, series 4, reel 272, no. 422.

²²⁹ "Text of President Wilson's Address to Congress," *New York Times*, February 27, 1917, 1; Arthur S. Link, *Woodrow Wilson and the Progressive Era, 1910-1917*, (New York: Harper & Row Publishers, Inc., 1954), 271; "Oppose General Grant of Powers: Republicans of Senate and House Strongly Against Wide Authority for Wilson," *New York Times*, February 27, 1917, 1.

²³⁰ Full text of Wilson's address, see *New York Times*, February 27, 1917, 1; Stover, *History of American Railroads*, 47-48.

²³¹ New Orleans *Times-Picayune*, March 2, 1917, 1; C.H. Cramer, *Newton D. Baker: A Biography*, (New York: The World Publishing Company, 1961), 1. According to Cramer, Baker held a strong affinity for rivers. "Born within five miles of the Potomac River he recollected that he swam in it as a boy, fished it as a youth, and romanced over it as a young man until the stream held Biblical connotations for him as 'The river Kishon, that ancient river, the river Kishon.'"; New Orleans *Times-Picayune*, March 1, 1917, 3; *ibid.*, March 2, 1917, 1.

²³² *Ibid.*, A. S. Caldwell, the president of the Mississippi River Levee Association, received the first of these pens in recognition of his important work for the bill. Ransdell delivered the second, a fountain pen handsomely trimmed in gold, to Mayor Behrman of New Orleans for presentation to the Louisiana State Museum; *ibid.*, March 4, 1917, Sunday edition, A-3.

²³³ Link, *Woodrow Wilson and the Progressive Era*, 274. As previously arranged in the compromise with Humphreys, Newlands' proposed interdepartmental commission became "Section 18" of the 1917 Rivers and Harbors bill which passed in August of that year, but the opportunity for a reevaluation of the nation's waterways policy had passed. The war delayed the full implementation of

Newlands' plan, and its author died just four months after the bill's passage, on Christmas Eve, 1917. President Wilson was distracted by the war, and, with Newlands dead, the waterways commission had lost its leading proponent. Weeks, months, and then years passed, and Wilson failed to make the necessary appointments. After the war, Congressional levees-only advocates mounted a successful campaign to repeal the offending section, replacing Newland's proposed waterways commission with a less-threatening Federal Power Commission (FPC). That latter commission lacked its predecessor's license to study flood control. After considerable wrangling, Congress passed the legislation, and President Warren G. Harding signed it into law on June 10, 1920. The Water Power Act included in its title the repeal of Section 18 of the 1917 Rivers and Harbors Act. *Statutes at Large*, 66th Congress, 2nd sess., June 10, 1920, 1063-77.

²³⁴ The 1906 act, approved on June 4, 1906, stated in part, "... That any funds which have been, or may hereafter be, appropriated by Congress for improving the Mississippi River between the Head of the Passes and the mouth of the Ohio River, and which may be allotted to levees, may be expended, under the direction of the Secretary of War, in accordance with the plans, specifications, and recommendations of the Mississippi River Commission, as approved by the Chief of Engineers, for levees upon any part of said river between the Head of Passes and Cape Girardeau, Missouri." *Laws of the United States Pertaining to Rivers and Harbors*, II: 1165; The 1913 Rivers and Harbors Act, approved March 4, 1913, added: "The Mississippi River Commission shall make an examination of the Mississippi River from Cape Girardeau, Missouri, to Rock Island, Illinois, with a view to such improvements as will at the same time promote navigation, develop water power, and protect property adjacent to said river from damage by floods; and in making such examinations consideration shall be given and recommendations made as to plans for cooperation by the localities affected; and for the purpose of such examination and for the building of such levees between said points upon the river in aid of navigation, as may be found necessary or desirable by the commission and approved by the Chief of Engineers, the sum of \$200,000 is hereby appropriated." *Ibid.*, II: 1596-1597.

²³⁵ Humphreys, *Floods and Levees of the Mississippi River*, 138-148. Townsend's Memphis address, delivered on September 26, 1912, is duplicated in Appendix A of this study.

²³⁶ *Ibid.*, 147-148.

²³⁷ R. S. Taylor, "Waste Weirs: A paper presented at the 126th session of the MRC." This document is located in the MRC Technical Records, MRC History Center. James P. Kemper, *Floods in the Valley of the Mississippi: A National Calamity*, (New Orleans, 1928), 31-37; Reuss, *Designing the Bayous*, 97-99.

²³⁸ Major Clarke S. Smith, "Report on Spillways, Vicinity of New Orleans, LA," dated October 8, 1914. Document contained in the MRC Technical Records of the MRC History Center. Elliott, *Improvement of the Lower Mississippi River*, II: 317; Reuss, *Designing the Bayous*, 98; Kemper, *Floods in the Valley of the Mississippi*, 37.

²³⁹ J. A. Ockerson, "Outlets for Reducing Flood Heights: A paper presented at the 126th session of the MRC." This document is located in the MRC Technical Records, MRC History Center; *Proceedings of the Mississippi River Commission*, 1912-1914, session 130, (November 19, 1914).

²⁴⁰ "Paper No. 1400," *Transactions*, LXXI (1917): 1218-1310. Reasons for establishing the committee are scattered throughout the ensuing discussions of the committee's report. The quote is taken from Herbert M. Eakins' discussion on page 1235.

²⁴¹ *Ibid.*, 1229-1230. Charles Saville was also a member of the committee. In 1894 Marsden Manson and Carl Grunsky, consulting engineers with the state of California, developed a flood-control plan for the Sacramento River based heavily on diversion. This early plan was partially adopted for the control of floods on the Sacramento River by the California Debris Commission. See: T.H. Jackson, "Flood Control on Alluvial Rivers," *Engineering News-Record*, January 15, 1931, 105.

²⁴² "Paper No. 1400," *Transactions*, LXXI: 1219-1223.

²⁴³ *Ibid.* This method was less costly, necessitating only the purchase of easements for the lands to be inundated. The committee also recognized that the cost-to-benefit ratio of reservoir construction could be made more appealing if used for multiple purposes, such as hydropower generation, water supply, and low flow augmentation, but insisted that if to be properly employed to lower flood heights, the reservoirs, out of necessity, had to be operated for the primary purpose of flood control. The committee, however, did not condemn the concept of multi-purpose reservoirs, recommending instead that such reservoirs be constructed of adequate dimensions exceeding the capacity needed for other purposes, thereby allowing proper storage space in the event of heavy rains. As such, they recommended strict supervision of reservoir operations by the federal government to ensure the flood control would not be superseded by other purposes.

²⁴⁴ *Ibid.*

²⁴⁵ *Ibid.*

²⁴⁶ Martin Reuss, "The Art of Scientific Precision: River Research in the United States Army Corps of Engineers to 1945," *Technology and Culture*, 40, (April

1999): 300-301. Reuss points out that Louis Jerome Fargue constructed the first known movable model in 1875 to examine river improvements on the Garonne River. A decade later, Osborne Reynolds of England first properly correlated time and depth scales.

²⁴⁷ Ibid., 301-303. Reuss indicates that several hydraulic laboratories existed in the United States, with the first being established at the University of California in the early 1880s. By 1922 there were 39 hydraulic laboratories on college campuses, 12 commercial laboratories, and a hydraulic flume at the Bureau of Standards, but none of these were designed to study the behavior of sediment bearing streams. Ben H. Fatherree, *The First Seventy Five Years: The History of Hydraulics Engineering at the U.S. Army Engineer Waterways Experiment Station*, (Vicksburg, 2004) 4. Herbert D. Vogel, "Origins of the Waterways Experiment Station," *Military Engineer*, 1 April 1961, 132; The following studies provide more information on the relationship between civilian and military engineers in: Arthur E. Morgan, *Dams and Other Disasters: A Century of the Army Corps of Engineers in Civil Works* (Boston, 1971) 185-235; Reuss, "Andrew A. Humphreys and the Development of Hydraulic Engineering," 32-33.

²⁴⁸ *National Hydraulic Hearings Before a Subcommittee of the Committee of Commerce, United States Senate, 68th Cong., 1st sess., on S.J. Res. 42: A Resolution to Establish a National Hydraulic Laboratory*, 21 May 1924 (Washington, D.C., 1924) 15-17. (Hereafter cited as *National Hydraulic Laboratory, Senate Hearings*). In short order the debate surrounding the movement became framed in the larger context of civilian engineering instruction versus military engineering instruction. General Andrew Humphreys attacks on Charles Ellet and the public squabbles between that same officer and James Eads epitomized the clash between civilian and military engineering instruction in the 19th century. The subsequent establishment of the MRC in 1879 was meant to bring the two factions together and to give civil engineers a larger role in managing the Mississippi River. Much of the goodwill arising from the establishment of the MRC eventually eroded when the Commission finally instituted a policy of confining floods with levees over alternate methods of flood control. In the eyes of many within the civilian engineering community this policy represented a direct endorsement of Humphreys. Many prominent civilian engineers believed the MRC, by failing to repudiate Humphreys, had become an instrument of the Corps of Engineers, not an independent executive body. To this end, the task of remaking the Mississippi River, viewed by many as the most exciting and challenging job in the nation, had come to rest with a Commission closely tied to the Corps of Engineers and the West Point system of engineering instruction. Morgan, *Dams and Other Disasters*, 89, 192; Arthur E. Morgan, "The Basis of the Case Against Reservoirs for Mississippi Flood-Control," *Transactions*, 93 (1929):751; Barry, *Rising Tide*, 90; C.S. Jarvis on Mississippi River Flood Control, discussion on "A Symposium on Flood Control With Special Reference to the Mississippi River," *Transactions*, 93 (1929): 865; Reuss, "The Art of Scientific Precision."

²⁴⁹ *National Hydraulic Laboratory, Senate Hearings*, 3-4, 10, 15-17.

²⁵⁰ Reuss, "The Art of Scientific Precision," 303; Morgan, *Dams and Other Disasters*, 194-198. Morgan's account reproduces in their entirety primary source material from Record Group 77: Records of the Office of the Chief of Engineers, National Archives. Beach's quote is taken from such a reproduction. Lee F. Pendergrass, *Mimicking Waterways, Harbors, and Estuaries: A Scholarly History of the Corps of Engineers Hydraulic Laboratory at WES, 1929 to the Present*, (Vicksburg, Mississippi: Waterways Experiment Station, 1989) 10-12.

²⁵¹ Morgan, *Dams and Other Disasters*, 200-204; *National Hydraulic Laboratory Hearings Before the Committee on Rivers and Harbors, House of Representatives*, 70th Cong., 1st sess., on S. 1710: An Act Authorizing the Establishment of a National Hydraulic Laboratory in the Bureau of Standards of the Department of Commerce, April 26-27, 1928 (Washington, D.C., 1928) 40-41. (Hereafter cited as *National Hydraulic Laboratory, House Hearings*).

²⁵² Elliott, *Improvement of the Lower Mississippi River*, II: 318-319.

²⁵³ *Report of the Board of State Engineers of the State of Louisiana*, April 20, 1914 to April 20, 1916, 25; *Proceeding of the Mississippi River Commission*, session 135 (April 18, 1915).

²⁵⁴ *Annual Report of the Mississippi River Commission*, 1916, 3363, 3451; *Proceedings of the Mississippi River Commission*, 1912-1916, session 134 (February 26, 1916) and session 135 (July 7, 1916).

²⁵⁵ *Report of the Board of State Engineers of the State of Louisiana*, 1918-1920, 23; *Annual Report of the Mississippi River Commission*, 1920, 3079; Reuss, *Designing the Bayous*, 97.

²⁵⁶ J. A. Ockerson, "Examination and Survey for Protection of Atchafalaya, Black, and Red Rivers," 1923; Colonel Charles L. Potter, "Notes on Separation of Red and Atchafalaya Rivers from the Mississippi River: Comments on Mr. Ockerson's Notes," June 1, 1923. Both documents located in the MRC Technical Records, MRC History Center; Reuss, *Designing the Bayous*, 97.

²⁵⁷ *Annual Report of the Mississippi River Commission*, 1922, 2040-2041.

²⁵⁸ Reuss, *Designing the Bayous*, 97-99; John Klorer, "The Flood Problem of the Lower Mississippi River," *Transactions*, LXXXVIII (1924): 1007-1014.

²⁵⁹ J. A. Ockerson, "Flood Control of the Mississippi River," *Transactions*, LXXXV (1922): 1478-1479. Ockerson's paper was one component of "Paper No.

1505: Flood Problems, A Symposium, By Messrs. J.G. Sullivan, Gerard H. Matthes, Nathan C. Grover, John R. Freeman, J. A. Ockerson, Roy N. Towl, Arthur P. Davis, C. E. Grunsky, and Charles H. Paul," *Transactions*, LXXXV (1922): 1383-1562. Retired Colonel Townsend later supported Ockerson's contentions. See, Colonel C. McD. Townsend, "Spillways," *Proceedings of the Louisiana Engineering Society*, XI, August 1925.

²⁶⁰ *Report of the Board of State Engineers of the State of Louisiana, 1924-1926*, 84-85.

²⁶¹ *Ibid.*

²⁶² *Proceedings of the Mississippi River Commission, 1925, 1922-1925*, session 167 (February 25-26, 1925).

²⁶³ *Ibid.*, session 167 (February 25-26, 1925); *Report of the Board of State Engineers of the State of Louisiana, 1924-1926*, 85.

²⁶⁴ *Report of the Board of State Engineers of the State of Louisiana, 1924-1926*, 52; Reuss, *Designing the Bayous*, 101.

²⁶⁵ Harrison, *Alluvial Empire*, 133; *Annual Report of the Mississippi River Commission, 1926*, 1818.

²⁶⁶ *Ibid.*, 1793.

²⁶⁷ *Chicago Daily Tribune*, 22 April 1927.

²⁶⁸ Barry concludes that "it was not Congress or the White House that decided these things," referring to the cost and the scope of the bill. Instead, "they were settled in a more intimate forum by the Tri-State Flood Control Committee." John M. Barry, *Rising Tide*, 400, 401.

²⁶⁹ See Washington Star, June 12, 1927; *New York Times*, August 28, 1927, Section 8, p. 1. This famous Hoover quotation was cited in William MacDonald, "Devastations of the Mississippi Flood," *Current History* 26 (July 2, 1927): 630.

²⁷⁰ H. C. Frankenfield and others in "Monthly Weather Review Supplement," Jan, 28 or earlier. In 1858, Cairo recorded a record-high discharge of 1,420,000 cfs. That city recorded maximum discharges of almost 1,800,000 cfs in 1927. Similarly, Arkansas City recorded its maximum discharge of 1,742,000 cfs in 1892. In 1927, discharges at that location reached 2,472,000 cfs. A. J. Henry, "The Floods of 1927 in the Mississippi Basin," *Science* 67 (January 6, 1928). 15. Barry, *Rising Tide*, 425.

²⁷¹ The estimated confined height of the 1927 flood would have exceeded the MRC's provisional levee grade, or height, at Greenville, Mississippi, by seven feet and at Arkansas City, Arkansas, by almost nine feet. A grade based on 1927 gauge readings would require that levee heights be increased by as much as nineteen feet in some places, which was wholly impractical. Frank, *Federal Program for Flood Control*, 187-88.

²⁷² *Congressional Record*, 70th Congress, 1st sess., March 29, 1928, 5611.

²⁷³ *Annual Report of the Mississippi River Commission*, 1927, 1840. For a contemporary "human interest" account of the 1927 flood, see Frederick Simpich, "The Great Mississippi Flood of 1927," *The National Geographic Magazine* 52 (September 1927): 243-289.

²⁷⁴ *New York Times*, July 11, 1927, 21.

²⁷⁵ The White House was inundated with letters and wires from all over the country requesting a special congressional session, and, in early June, forty members of the House of Representatives, most of them from districts in the flooded regions, signed a petition calling for a special session and presented it to Coolidge. For a list of the forty congressmen, see letter dated 1 June 1927, from Representative William A. Oldfield of Arkansas to Coolidge in *Coolidge Papers*, series 1, 3848, reel 181; For additional letters, see *ibid.*, 28 April-15 May 1927; William McDonald, "Devastations of the Mississippi Flood," *Current History* 26 (2 July 1927), 630-32. Practically from the outset, Coolidge made it clear that he would be "unable to visit the flooded region as he had been urged to do by governors of states affected." *New Orleans Times-Picayune*, 3 May 1927, 1. Coolidge's personal papers include a newspaper clip and some personal correspondence that sharply criticize his decision to forgo a tour of the devastated Mississippi Valley in favor of a two month vacation in the Black Hills. An editorial by E. M. Duck, dated 15 July 1927, recommended that Coolidge be exiled "to some lonely section there [in the Mississippi region] amid ruin and sadness and desolation" and "be constrained to spend his whole [vacation] time on one of the little ruined and devastated farms, where the flood has had its own way. Relief and reconstruction there are urgent, waiting upon the legislative and executive branches to take the lead. They have shirked their duty, gone away where they cannot hear the cry of the needy and homeless, basking in plenty and idle ease." *Coolidge Papers*, series 1, 3848, reel 181.

²⁷⁶ *New York Times*, 28 August 1927, section 2, 7; Donald R. McCoy, *Calvin Coolidge: The Quiet President* (Lawrence, Kansas, 1967), 330.

²⁷⁷ *Statutes at Large*, 2 March 1849, Ch. 87, 352-53; *Statutes at Large*, 28 September 1850, Ch. 84, 519-20. Also see Harrison, *Alluvial Empire*, 69, 88-89.

²⁷⁸ For a list of crevasses, see Congress, House, Committee on Flood Control, *Flood Control in the Mississippi Valley*, Report no. 1072 submitted by Frank R. Reid, 70th Cong., 1st sess., 29 March 1928: 250-51, [Hereafter cited as *House Report no. 1072*]. Also see Congress, House, Committee on Flood Control, *Flood Control: Hearings before the Committee on Flood Control*, 70th Cong., 1st sess., 1927, I: 8, 17-21 [hereafter cited as *House Flood Control Hearings*]. For damages in Illinois, see *Chicago Daily Tribune*, 16 April 1928, 5; *Statutes at Large*, 21 January 1927, Ch. 47, 1013. The *Memphis Commercial-Appeal* concluded, somewhat suspiciously, that "What is in the minds of the people of Chicago is the ultimate realization of the lakes-to-gulf waterway so that Chicago may some day be a gulf port." *Memphis Commercial-Appeal*, 8 November 1927; *ibid.*, 16 November 1927.

²⁷⁹ Joan Hoff Wilson, *Herbert Hoover: Forgotten Progressive*, (Boston, 1975), 125-126. For interest in Dawes and Lowden as presidential candidates, see *New Orleans Times-Picayune*, 9 June 1927, 8; *Washington Post*, 2 December 1927, 1; *New York Times*, 25 January 1928; and *Washington Post*, 28 April 1928, 1.

²⁸⁰ The Commissioners from Illinois were Jerome O. Christie (1923-1926), an Illinois delegate to the 1924 Republican National Convention; John W. Stipes (1926-1930), a businessman from Champaign; Lawrence A. Glenn (1930-1933), the brother of Illinois Republican Senator Otis F. Glenn; Albert L. Culbertson (1935-1954), a general in the Illinois National guard; Egbert A. Smith (1954-1956), the mayor of Cairo; and Harry Bolen (1956-1961), a WWII veteran and successful Illinois banker. For Reid see, *New York Times*, 28 February 1928, III, 8; *ibid.*, 26 January 1945 (obituary), 21. For Madden, see *St. Louis Post-Dispatch*, 4 June 1927, 1; *New York Times*, 28 April 1928 (obituary), 1,8; *Washington Post*, 28 April 1928 (obituary), 1. For Jones, see *American National Biography*, ed., John A. Garraty (New York, 1999), 12: 255-56; *Dictionary of American Biography*, Supplement I, ed., Harris E. Starr (New York, 1944), 21: 454-55; *National Cyclopaedia of American Biography*, ed., John Howard Brown, (New York, 1917), 392-93. Also see *Biographical Directory of the United States Congress*, "<http://bioguide.congress.gov>"

²⁸¹ For William Hale Thompson's presidential ambitions and his association with Al Capone, see Frederic Babcock, "Pineapple Politics," *The Nation* 126 (3277), 16 April 1928: 480-81; Douglas Bukowski, *Big Bill Thompson, Chicago, and the Politics of Image*, (Urbana, 1998), 191-92. For Thompson's journey to New Orleans, see "Big Bill Cowboys to Whoop it Up on River Voyage," *Chicago Sunday Tribune*, 10 April 1927, 5; "Boosters Go to Bring 'Orleans' Trade Up River," *Chicago Daily Tribune*, 19 April 1927, 4; "Chicagoans Ride Floods, Aid Victims," *Chicago Daily Tribune*, 22 April 1927; "'Big Bill' Comes to Town, Urging Flood Control," *New Orleans Times-Picayune*, 25 April 1927, 1; *House Flood Control Hearings*, I: 2-4. Also see Thompson's speech to the Governors' Conference at Mackinac Island, Michigan, dated 25 July 1927, *Coolidge Papers*, series

1, 3848, reel 181. For discussions between Mayors Thompson and O'Keefe about creating "a proper organization or agency through which to voice our demands," see New Orleans *Times-Picayune*, 25 April 1927, 1.

²⁸² See letter from the secretary of the Republican National Committee, Roy O. West of Illinois, to Coolidge dated 11 May 1927 and internal memorandum dated 14 May 1927, *Coolidge Papers*, series 1, 3848, reel 181; According to president's personal secretary, Everett Sanders, the MFCA was "working with us in delaying adoption of plans until facts are available." Telegram from Dwight Davis to Sanders dated 18 May 1927, *Coolidge Papers*, series 1, 3848, reel 181; New Orleans *Times-Picayune*, 3 June 1927, 1. For a list of the legislators who took the Mississippi River tour, see New Orleans *Times-Picayune*, 5 June 1927, 18.

²⁸³ *New York Times*, 3 June 1927, 9. The Chicago Police Department band was also on hand with an orchestra and glee club. A drum and fife corps performed in the lobby. Also see New Orleans *Times-Picayune*, 3 June 1927; *House Flood Control Hearings*, 1: 2-4; Jadwin stated that "so great a threat to the seven states of the lower valley constitutes a menace only less serious than war itself, and must be met fairly and squarely by the entire nation." New Orleans *Times-Picayune*, 4 June 1927, 1, 3. Fresh from a conference with the president, Longworth stressed that "the time has come when the Federal Government should take action, not only for relief but to prevent a recurrence." St. Louis *Post-Dispatch*, 4 June 1927, 3. For Watson's comments, see *New York Times*, 5 June 1927, 24; New Orleans *Times-Picayune*, 4 June 1927, 1, 8. Longworth suggested that "no person in America is more sincerely in sympathy with the movement for flood protection and relief than is President Coolidge." *New York Times*, 5 June 1927, 24. On its final day, the conference completed a lengthy resolution declaring flood control in the Mississippi Valley the "sole responsibility" of the national government and asking the president to call a conference to be composed of "army engineers, civil engineers, conservationists, geologists, financiers, agriculturists and other experts." This special conference would formulate a "comprehensive plan for navigation and permanent flood control" for the Mississippi River, extending into the tributaries. When Thompson put the question of the resolution to the delegates, most "jumped to their feet" in approval." Not one dissenting vote was cast. Longworth hailed the conference in its closing minutes as "typically, truly and unselfishly American." For a copy of the conference resolutions, see letter from Representative William E. Hull and accompanying resolutions dated 6 June 1927, in *Coolidge Papers*, series 1, 3848, reel 181; and *New York Times*, 5 June 1927, 24. For membership of the various conference committees, see St. Louis *Post-Dispatch*, 4 June 1927, 3; New Orleans *Times-Picayune*, 5 June 1927, 1; Arthur Krock, editorial correspondent for the *New York Times*, reported that "Mayor Thompson's capture of flood control headquarters for Chicago is an illustration of his new usefulness. St. Louis and New Orleans are large cities, too, and the destinies of the Mississippi Valley are paramount with them. But Big Bill got there first with his idea of a congress to stimulate the formation of flood control plans

for the future . . . " *New York Times*, 13 June 1927, 18. Thompson and several of his associates delivered the Chicago Flood Control Conference resolutions to Coolidge in person on 10 June 1927. See page seven of Thompson speech dated 26 July 1927, *Coolidge Papers*, series 1, 3848, reel 181. Also see *New Orleans Times-Picayune*, 7 June 1927, 3.

²⁸⁴ *St. Louis Globe-Democrat*, 5 May 1927, 18. *New Orleans Times-Picayune*, 4 May 1927, 1. Also see *House Report no. 1072*, 87; Coolidge did not trust the MRC, which he saw as a vehicle for Southern interest groups, so he turned to a trusted ally, Edgar Jadwin, whom he had appointed and held in high regard. The 1927 Rivers and Harbors Act authorized the Corps of Engineers to prepare general multipurpose plans to improve navigation, waterpower, flood control, and irrigation for all the navigable rivers of the United States that seemed capable of supporting hydropower. The resulting so-called "308 reports," named after the House document in which the cost estimates for the reports first appeared, provided basic data for multipurpose development for decades to come. For Jadwin's views on the Rivers and Harbors Act of 1927, see the *House Flood Control Hearings*, V: 3564-67. Congress authorized the Corps of Engineers in 1927 to prepare general multipurpose plans to improve navigation, waterpower, flood control, and irrigation for all the navigable rivers of the United States that seemed capable of supporting hydropower. The resulting so-called "308 reports," named after the House document in which the cost estimates for the reports first appeared, provided basic data for multipurpose development for decades to come.

²⁸⁵ *New York Times*, 5 February 1928, section 3, 8; *New York Times*, 5 October 1927, 45. Illinois Congressman William E. Hull accompanied Reid on his trip in May, and newspaper clippings from the *Peoria Evening Star* dated 17 May 1927 give his account of the trip. *Coolidge Papers*, series 1, 3848, reel 181. *New York Times*, 5 February 1928, 8. Also see "Statement Issued by Representative Frank R. Reid," 22 January 1928, in *House Flood Control Hearings*, VI: 4910-13; Reid admitted that "I have had a great many requests to call a meeting of the committee before the beginning of Congress in December," but, before receiving Thompson's letter, he had "refrained from taking up the matter." *New York Times*, 5 October 1927, 45. The Speaker of the House, Nicholas Longworth of Ohio, made such a request at the Chicago Flood Control Conference, suggesting to Reid that "it might be wise for his committee to meet together as individuals while waiting for congress to convene." *Chicago Sunday Tribune*, 5 June 1927.

²⁸⁶ *New York Times*, 7 November 1927, 1, 3; *ibid.*, 8 November 1927, 1, 22.

²⁸⁷ Among those taking the stand were: Illinois Governor Len Small, U.S. Representative William Hull, and Cairo Mayor August Bode. Prominent waterways advocate and Democratic Senator from Missouri, Harry Hawes, also appeared before the committee to formally present his views on waterways development and his "Missouri Plan" for flood control. Other notables included Senators Wat-

son of Indiana and Pat Harrison of Mississippi. See *House Flood Control Hearings*. For the "Missouri Plan," see *New York Times*, 30 October 1927, section 2, 1; *ibid.*, 16 November 1927, 7.

²⁸⁸ *House Flood Control Hearings*, I: 2; *New York Times*, 8 November 1927, 22; *ibid.*, 9 November 1927, 24.

²⁸⁹ *New York Times*, 5 February 1928, section 3, 8; *New York Times*, 5 October 1927, 45. Illinois Congressman William E. Hull accompanied Reid on his trip in May, and newspaper clippings from the *Peoria Evening Star* dated 17 May 1927 give his account of the trip. *Coolidge Papers*, series 1, 3848, reel 181. *New York Times*, 5 February 1928, 8. Also see "Statement Issued by Representative Frank R. Reid," 22 January 1928, in *House Flood Control Hearings*, VI: 4910-13. *New York Times*, 13 July 1927, 10; *ibid.*, 11 December 1927, section 3, 1; The report called for \$200 million over ten years to supplement regular appropriations for the Mississippi River and its tributaries and for the adoption of a comprehensive flood-control plan to include outlets and, possibly, tributary reservoirs. See "Hoover Supports Inland Waterways," *New York Times*, 15 November 1927, 4; and "Hoover's Plan to Harness Our Waters," *New York Times*, 28 August 1927, section 8, 1. This latter article details Hoover's plans for waterways development throughout the country. For Hoover's comments on local contribution, see *New York Times*, 21 July 1927, 1; There is some indication that Coolidge disliked his Secretary of Commerce. As Hoover campaigned for the Republican nomination in early 1928, the president said of him: "That man has offered me unsolicited advice for six years, all of it bad." Wilson, *Herbert Hoover*, 122.

²⁹⁰ *New York Times*, 7 December 1927, 24; "Coolidge Message Shocks Flood Area," *New York Times*, 11 December 1927, section 3, 1.

²⁹¹ Jadwin was a veteran of both the Spanish-American War and the First World War. In the Great War, he was awarded the Distinguished Service Medal, as well as the Legion of Honor by the French government for "exceptionally meritorious and distinguished services." *Dictionary of American Biography*, ed. Dumas Malone (New York, NY, 1932), 9: 570-71; *New York Times*, 20 September 1927, 14.

²⁹² See Thompson's speech dated 26 July 1927, and Ransdell's telegrams to Coolidge, dated 30 April, 4 May, and 12 May 1927, in *Coolidge Papers*, series 1, 3848, reel 181; Letter from Secretary of War Dwight Davis to Everett Sanders (secretary to the president) dated 15 June 1927, *Coolidge Papers*, series 1, 3848, reel 181. Years before at the request of Theodore Roosevelt himself, Stevens had served as chief engineer and chairman of the Isthmian Canal Commission that built the Panama Canal; Ironically, Jadwin was a proud member of the ASCE, even acting as chairman of that society's waterway division. See *House Flood Control Hearings*, VI: 4298-99; letter from Secretary of War, Dwight Davis, to

Everett Sanders (secretary to the president) dated 25 June 1927, *Coolidge Papers*, series 1, 3848, reel 181. Also see letter from Coolidge to Secretary of Commerce, Herbert Hoover, dated 20 June 1927 from Rapid City, South Dakota, *Coolidge Papers*, series 1, 3848, reel 181; and letter from Davis to Coolidge dated 5 July 1927, *Coolidge Papers*, series 1, 3848, reel 181.

²⁹³ Kemper, *Floods in the Valley of the Mississippi*, 128-129; Col. Charles Potter, "Tensas Basin Floodway: Memorandum for Board of Three," dated June 15, 1928. (Document located in MRC Technical Records, MRC History Center); "Commission Finds Mississippi Flood Control to Cost \$684,000,000," *Engineering-News Record*, December 22, 1927, 1007; "Col. Potter Comments on Differences in Cost Estimate of Two Mississippi Flood Plans," *Engineering-News Record*, January 5, 1928, 27; See House, Congress, Committee on Flood Control, Committee Document #1, 70th Cong., 1st sess., November 28, 1927. *Congressional Record*, 70th Cong., 1st sess., 29 March 1928, 5646; *House Flood Control Hearings*, IV: 2105-07; *ibid.*, V: 3587-90; *Flood Control in the Mississippi Valley*, 70th Cong., 1st sess., 8 December 1928, House Document #90, (Hereafter cited as *Jadwin Report*); *New York Times*, 24 January 1928, 29.

²⁹⁴ "Commission Finds Mississippi Flood Control to Cost \$684,000,000," *Engineering-News Record*, December 22, 1927, 1006.

²⁹⁵ *Jadwin Report*. For a comparison of the MRC plan and the Jadwin plan, please see, *House Report no. 1072*, 73-75.

²⁹⁶ There is good reason to believe that Jadwin and Coolidge colluded, for example, on 80-20, if for no other reason than that Jadwin refused to deny it when it would have been in his interests to do so. *House Flood Control Hearings*, V: 3609-13, 3625-26; See Coolidge's letter to Congress dated 8 December 1927, and submitted with the Jadwin Plan, *Coolidge Papers*, series 1, 3848, reel 182.

²⁹⁷ Elliott, *Improvement of the Lower Mississippi River*, I: 14; *Annual Reports of the Mississippi River Commission*, 1926-1932, 1920-1921; *Laws of the United States Relating to the Improvement of Rivers and Harbors*, I: 304-305. The so-called veto power of the Chief of Engineers over the MRC was established in the Rivers and Harbors Act of 1905. Congress established the MRC as an executive body that reported directly to the Secretary of War.

²⁹⁸ Elliott, *Improvement of the Lower Mississippi River*, I: 14; Norman R. Moore, *Improvement of the Lower Mississippi River and Tributaries, 1931-1972*, (Vicksburg, Mississippi: Mississippi River Commission 1972), 1-2.

²⁹⁹ *House Flood Control Hearings*, VI: 4378-4379, 4444-4445; *Jadwin Report*, para. 139, 146.

³⁰⁰ *Ibid.*, para. 147.

³⁰¹ *House Flood Control Hearings*, VI: 4378-4379, 4444.

³⁰² *House Report no. 1072*, 61, 64-65.

³⁰³ Driven in part by his distrust of the Corps of Engineers, Hawes fell behind a radical plan to move the Corps of Engineers from the War Department over to the Interior Department. Jackson *Clarion-Ledger*, 16 December 1927; *Memphis Commercial Appeal*, 16 December 1927; *New York Times*, 24 January 1928, 29; *Flood Control Hearings before the Senate Committee on Commerce*, 1928, I: 313-316, 363; *ibid.*, III: 577. (Hereafter cited as *Senate Flood Control Hearings*).

³⁰⁴ *House Flood Control Hearings*, I: 351; *ibid.*, VI: 4378, 4444; *Senate Flood Control Hearings*, II: 528; *ibid.*, III: 578.

³⁰⁵ *House Flood Control Hearings*, V: 3057-3058.

³⁰⁶ *Ibid.*, VI: 4526-4527; *Senate Flood Control Hearings*, III: 595-596.

³⁰⁷ *Senate Flood Control Hearings*, III: 636.

³⁰⁸ *New York Times*, 18 December 1927; *ibid.*, 11 December 1927; For more on the position of the Chamber of Commerce, see *New York Times*, 29 September 1927, 30; *ibid.*, 29 October 1927, 8; *ibid.*, 18 December 1927. For Marteneau's position, see *ibid.*, 15 December 1927, 11. Also see *ibid.*, 11 December 1927, section 3, 1; *House Report no. 1072*, 21; Support for the bill came mainly from the upper and lower Mississippi Valley and from Western states, regions with vested interests in flood-relief (Reid-Jones bill), farm-relief (McNary-Haugen bill), and waterways legislation (Muscle Shoals and Boulder Dam bills). While proponents denied any collusion or logrolling, critics charged that "an effort is under way to amalgamate Congressional advocates of all three projects, with the understanding to prevail that each group will vote for what the other desires." *New York Times*, 25 December 1927, 12. Perhaps the most overt reference to that activity took place on 3 March 1928 when Republican Congressman, Lester J. Dickinson of Iowa, reminded his Democratic colleague from Louisiana, James O'Connor, that "if he [O'Connor] wants flood relief on the Mississippi river he had better get in on the farm relief." *New Orleans Times-Picayune*, 4 March 1928, 1. For mention of this "block" in Congress, see speech by Congressman from Maine, Ira G. Hershey, *Congressional Record*, 70th Cong., 1st sess., 24 April 1928, 7126-27.

³⁰⁹ *House Report no. 1072*, 47-48, 50-72; "Flood-Hearing Sees Jadwin-Reid Clash," *New York Times*, 26 January 1928, 5; *House Flood Control Hearings*, V: 3585-87; *ibid.*, VI: 4379. One particularly heated exchange between Reid and

Jadwin concluded with the Flood Control chair angrily dismissing the chief of engineers with the command to "withdrawal, General." Ibid., 3758.

³¹⁰ For the Reid bill (H.R. 8219) in its entirety, see *Congressional Record*, 70th Cong., 1st sess., 29 March 1928, 5616-17; *New York Times*, 17 February 1928, 1. From early in the process, Reid went to great lengths to tap civilian engineering talent. Among the agencies he contacted was the American Engineering Council, which concluded that "data available are insufficient to warrant the laying out of a permanent plan of flood control." Instead the council recommended turning over responsibility for flood control to a new "Mississippi River Conservancy Board, to consist of five or seven members to be appointed by the President from among the most eminent hydraulic engineers." *New York Times*, 7 February 1928, 47.

³¹¹ *New York Times*, 18 February 1928, 1; *ibid.*, 26 February 1928, section 9, 4. Also see "Deadlock is Near on Flood Control," *New York Times*, 20 February 1928, 2.

³¹² *New York Times*, 24 January 1928, 29; *ibid.*, 9 January 1928, 11; Also see *New York Times*, 25 December 1927, 12.

³¹³ In a letter to Ransdell dated 19 September 1927, Jones towed the party line, "I do not believe that an extra session of congress should be called to deal with this situation unless our engineers and the president have a concrete proposal to submit to congress." Wesley L. Jones to Ransdell in *Wesley Jones Papers*, University Archives and Special Collections, University of Washington, Seattle, Box 211, File 11; *New Orleans Times-Picayune*, 9 June 1927, 6; *American National Biography* (1999), 12: 255; *New Orleans Times-Picayune*, 16 February 1928, 1.

³¹⁴ *New York Times*, 5 February 1928, 19; *New Orleans Times-Picayune*, 25 February 1928, 7.

³¹⁵ "Coolidge Yields on Flood Control," *New York Times*, 25 February 1928, 1; "Coolidge Agrees to Let U.S. Bear Burden of Floods," *New Orleans Times-Picayune*, 25 February 1928, 1; Letter dated 5 March 1928, from Congressman Frederick M. Davenport of New York to Coolidge that included the text of a bill proposing the creation of an economic commission. *Coolidge Papers*, series 1, 3848, reel 182; *New Orleans Times-Picayune*, 25 February 1928, 1; *New York Times*, 29 February 1928, 42.

³¹⁶ *New Orleans Times-Picayune*, 25 February 1928, 1; *ibid.*, 7 March 1928, 1.

³¹⁷ *Ibid.*, 6 March 1928, 1; During the bill's revision, Jones insisted on a policy of secrecy. *Ibid.*, 23 March 1928, 1; The revised Jones bill omitted the only section that would have required local interests to pay a portion of the flood-control expenses; negotiated an increase in the size of the proposed engineering board

from three to five, adding two additional civilians including the Secretary of War; and authorized the Corps of Engineers to submit to Congress "projects for flood control on all tributary streams" of the Mississippi River and to investigate alternative control methods, to include reservoirs; For the revised Jones bill (S. 3740), see *Congressional Record*, 70th Cong., 1st sess., 28 March 1928, 5482-83. In the midst of his national campaign for the Democratic presidential nomination, Senator James A. Reed of Missouri applauded the changes and reiterated his view that "this is not merely a cold business proposition, but a question of humanity." *New York Times*, 25 March 1928, 20; *New York Times*, 24 March 1928, 16. In a letter dated 23 March 1928 transmitting the revised flood-control plan to Coolidge, Jones explains that "I have done the very best I could to hold this bill as nearly as possible to what I believed to be for your desires. With the intense interest in flood control in the Mississippi Valley, and with several Senators on the Committee from the states directly affected, the pressure for extreme action has been very strong." *Coolidge Papers*, series 1, 3848, reel 182.

³¹⁸ *New York Times*, 29 March 1928, 1. *New Orleans Times-Picayune*, 29 March 1928, 6.

³¹⁹ *House Report no. 1072*; *New Orleans Times-Picayune*, 29 March 1928, 1.

³²⁰ These amendments authorized a study of reservoirs for flood-control purposes and included a \$5 million authorization to fund tributary surveys already called for in the Senate version. *New York Times*, 1 April, 1928, 1; *ibid.*, 4 April 1928, 28.

³²¹ *Ibid.*, 6 April 1928, 1; Letter from Coolidge to Jadwin dated 6 April 1928, *Coolidge Papers*, series 1, 3848, reel 182.

³²² Anxious to avoid "complicating the machinery of administration with another board," the chief of engineers criticized the proposed engineering body whose members may "prove more pliable to the selfish interests than did the disinterested Federal experts" and whose "decisions... may involve the expenditure of hundreds of millions of dollars" for new projects not provided for in the \$325 million authorization. Even without new projects, Jadwin predicted massive cost overruns. First, the Jones-Reid bill made no provisions for local contribution and "open[ed] wide the doors for raids on the Treasury for private gain, with no curb on demands for wasteful and uneconomic construction." Additionally, the provision obligating the federal government to pay damages and purchase all lands within the proposed floodways was, according to Jadwin, "profligate, ridiculous and revolutionary," since both the Tensas and Atchafalaya basins were already subject to overflow under extreme flood conditions. See Jadwin's "Analysis of the Reid Bill as it is Reported from the Flood Control Committee of the House of Representatives," 6 April 1928, *Coolidge Papers*, series 1, 3848, reel 182: 6, 4, 5, 1, 9; "Suspensions of 'Pork' in the Flood Control Bill," *The Literary Digest* (14 April 1928), 10-11. *New York Times*, 7 April 1928, 14.

³²³ Despite Madden's success, the headstrong Reid continued to exchange barbs with the president. On April 18, Coolidge called the Jones-Reid bill "the most extortionate proposal that has ever been made upon the nation's revenues." See *New York Times*, 18 April 1928, 1. Several days later, an exasperated Reid told the national press that "We have been trying to protect the people's lives and now the Government comes along and proposes to drown them." *New York Times*, 22 April 1928, 24.

³²⁴ Flood-control advocates placed tremendous faith in the proposed engineering board, which they hoped would mitigate Jadwin's influence when it came to administering the 1928 act. It is likely, then, that Reid and his allies believed that a reduction in the size of the proposed board would have no detrimental effect on its usefulness, as the loss of one civilian engineer would be countered by the removal of Secretary Davis, who was aligned closely with the administration; *Congressional Record*, 70th Cong., 1st sess., 23 April 1928, 7005; *New York Times*, 23 April 1928, 31; *ibid.*, 24 April 1928, 1; *ibid.*, 25 April 1928, 1; As April drew to a close, Republicans faced the unhappy prospect of two presidential vetoes, the other being the popular McNary-Haugen plan for farm relief. According to the *New York Times*, the Republican leadership on Capitol Hill feared that an "Executive veto of two major proposals of such vital importance to the Central West might prove a serious handicap to the party in the coming campaign." *New York Times*, 19 April 1928, 29.

³²⁵ *New Orleans Times-Picayune*, 27 April 1927. The conferees for the Senate were Jones, Ransdell, Duncan U. Fletcher of Florida, Charles McNary of Oregon, and Hiram Johnson of California. The House conferees were Reid, Roy G. Fitzgerald of Ohio, Charles F. Curry of California, William J. Driver of Arkansas, and Riley J. Wilson of Louisiana, a future chair of the House Flood Control Committee. *New Orleans Times-Picayune*, 29 April 1928, 20. Also see various conference reports, including House, Congress, Conference Committee, *Conference Report to Accompany S. 3740*, 70th Cong., 1st sess., 3 May 1928, House Report no. 1505; *New Orleans Times-Picayune*, 30 April 1928, 10; Sitting at the desk in his Capitol office conversing cheerfully with an Illinois colleague, the 73 year-old Madden suddenly gasped, placed his hand over his chest, and sank into his chair, stricken with an acute heart attack. Efforts to revive him failed, and the "Chief," as his close friends called him, died on his office couch. *Washington Post*, 28 April 1928, 1, 2; *New Orleans Times-Picayune*, 28 April 1928; *New York Times*, 28 April 1928. Madden's health problems had been on-going for more than a year. While at the Chicago Flood Control Conference in June 1927, he admitted that "he hadn't been well and oughtn't to be at the conference, but he couldn't resist taking part in one of the outstanding problems of the nation." *Chicago Daily Tribune*, 4 June 1927.

³²⁶ New Orleans *Times-Picayune*, 3 May 1928, 1, 13; *ibid.*, 4 May 1928, 2; *ibid.*, 5 May 1928, 3.

³²⁷ *New York Times*, 5 May 1928, 1; New Orleans *Times-Picayune*, 5 May 1928, 1. Also see internal White House memorandum dated 3 May 1928, *Coolidge Papers*, series 1, 3848, reel 181; New Orleans *Times-Picayune*, 6 May 1928, 1; *New York Times*, 6 May 1928, 19. The *Times-Picayune* referred to another "well-defined plan" to "take the work out of the hands of the corps of engineers altogether." *Ibid.*, 5 May 1928, 3. Sharing in the frustrations of the Lower Valley, comedian Will Rogers joked that the government would continue to put off all relief legislation with "the hope that those needing relief will perhaps have conveniently died in the meantime." *New York Times*, 10 May 1928, 29.

³²⁸ According to the *New York Times*, "The sponsors of the measure recognized that unless the bill were [sic.] made acceptable to the President, it could not be passed over his veto and Congress might adjourn without doing anything for those in the Mississippi Valley." *New York Times*, 8 May 1928, 1. At this late date, the issue was increasingly one of sufficient time for a veto-override, as House Republican Leader Tilson was pushing for a May 19 adjournment. New Orleans *Times-Picayune*, 6 May 1928, 17; As passed by the House, all tributary surveys were to be directed to the new board. Coolidge and Jadwin insisted that these surveys be directed to the MRC instead, so that the administration could "do away with the Control Board when its main function of drafting plans has been concluded." *New York Times*, 8 May 1928, 1. Hawes continued to lament that "bureaucratic influences" had "hindered representation of the 200,000 civilian engineers of the country on the board created." New Orleans *Times-Picayune*, 10 May 1928, 2; Regarded as of vital importance, this concession sharply reduced the estimated level of federal compensation in the proposed floodways. *New York Times*, 8 May 1928, 1; New Orleans *Times-Picayune*, 8 May 1928, 1; *New York Times*, 10 May 1928, 29; New Orleans *Times-Picayune*, 12 May 1928, 1; *ibid.*, 16 May 1928; *Chicago Daily Tribune*, 16 May 1928.

³²⁹ For the final legislation, see *Statutes at Large*, 15 May 1928, Ch. 569, 534-39. For quote, see *New York Times*, 16 May 1928, 1; New Orleans *Times-Picayune*, 16 May 1928, 1; *ibid.*, 22 May 1928; *ibid.*, 23 May 1928; *ibid.*, 24 May 1928. For photos, see *ibid.*, 22 May 1928, 3; *ibid.*, 23 May 1928, 3. The *Times-Picayune* also printed a half-page welcome to Reid, *ibid.*, 22 May 1928, 30.

³³⁰ As late as March 1928 Ransdell characterized the \$325 million appropriation as "not adequate." Louisiana Representative Riley J. Wilson of the House Flood Control Committee called it "unthinkable" that the federal government would "propose to put a river three times the size of the St. Lawrence through his district without more than reconnaissance surveys and before it is known definitely that such a diversion is imperative." New Orleans *Times-Picayune*, 16 February 1928, 7. Another Louisiana Representative, Whitnell P. Martin, insisted that "no flood-

ways or diversion channels should be constructed in Louisiana until it has been fully determined by further surveys that equitable or partial control cannot be had by means of reservoirs." Senator Pat Harrison of Mississippi admitted that the bill was "not entirely satisfactory in every particular to the people of the lower valley." *Ibid.*, 4 March 1928, 1. For general opposition, see *ibid.*, 6 March 1928, 1. For original Democrat plan, see "Robinson Prepares Flood Control Bill," *New York Times*, 2 August 1927.

³³¹ Kemper, *Floods in the Valley of the Mississippi*, 159-160.

³³² Joseph J. Hagwood, Jr., *The California Debris Commission: A history of the hydraulic mining industry in the western Sierra Nevada of California, and of the governmental agency charged with its regulation*, (Sacramento, California: 1981), 50, 58-60. In 1894 Marsden Manson and Carl Grunsky, consulting engineers with the state of California, developed a flood-control plan for the Sacramento River based heavily on diversion. This early plan was partially adopted for the control of floods on the Sacramento River by the California Debris Commission, of which Jackson was a member from 1907-11 and 1922-1928. Jackson also considered reservoirs as sound from the engineering standpoint because they provided greater certainty and safety than levees and advocated their use only as supplementary aids to levees. T.H. Jackson, "Flood Control on Alluvial Rivers," *Engineering News-Record*, January 15, 1931, 105.

³³³ *House Flood Control Hearings*, 1930, V: 1768; "Potter Superseded as Head of Mississippi River Commission," *Engineering News-Record*, June 14, 1928, 947; "A Public Loss," *Engineering News-Record*, June 21, 1928, 955; "Gen. Thomas H. Jackson New Head of Mississippi River Commission," *Engineering News Record*, June 21, 1928, 986-987 "Letter but Not Spirit," *Engineering New-Record*, September 6, 1928, 337; Kemper, *Floods in the Valley of the Mississippi*, 170-172; *Engineering News Record*, June 21, 1928; 987.

³³⁴ Reuss, *Designing the Bayous*, 121-127.

³³⁵ *Laws of the United States Relating to the Improvement of Rivers and Harbors*, III: 2004; *Senate Flood Control Hearings*, III: 578.

³³⁶ *Laws of the United States Relating to the Improvement of Rivers and Harbors*, III: 2007-2008.

³³⁷ *Ibid.*, 2007.

³³⁸ Annual reports of the MRC indicate such operations took place on the Mississippi River in the Rock Island District from 1929-1935 and 1953-1961 and in the St. Louis District from 1929-1935 and 1944-1952. The same reports also indicate operations on the Illinois River from 1930-1940 and 1946-1942. The Flood Con-

trol Acts of 1936, 1938, 1941 and 1943 authorized additional work for the districts, sometimes executed on the very same levees where section 6 work was being prosecuted under the supervision of the MRC. Despite the close proximity of the work authorized by the acts of 1936 onward, the work remained outside the jurisdiction of the MRC.

³³⁹ "Abolishing the Northern District, Mississippi River Commission," Memorandum from BG T.H. Jackson to the Chief of Engineers, dated July 7, 1928; "Field Reorganization", Memorandum from BG T.H. Jackson to the Chief of Engineers, dated July 13, 1928. Both documents found in the National Archives and Records Administration, Central Plains Region, Record Group 77, Entry 521A, Box 19, *Proceedings of the Mississippi River Commission, 1926-1928*, 4762, session 188, (July 12, 1928). The MRC at this time was probably the most inexperienced it had been since its creation. Jackson had only three weeks to gain an understanding of the history, machinations and operations of the Commission. Colonel Ernest Graves, Jadwin's former assistant, had only been with the Commission for 1 week. Colonel Charles W. Kutz, the Central Division Engineer, had the longest seniority of the military members with a little less than a year-and-a-half on the MRC. The civilian side of the MRC was comprised of Edward Flad, a civil engineer from St. Louis and the son of former commissioner Henry Flad; John W. Stipes, a businessman from Champaign, IL; and West, a former longtime engineer with the Mississippi Levee Board. Flad had been with the MRC for nearly four years; Stipes only two years. West and Robert L. Faris, of the Coast and Geodetic Survey, represented the longest serving members of the Commission with 18 and nine years of service, respectively. Outside of West and Faris, the remaining members of the MRC had a combined experience of only seven years with the Commission.

³⁴⁰ "Functions and Agencies of the Mississippi River Commission," Memorandum from T.H. Jackson to the Chief of Engineers, dated July 27, 1928, National Archives and Records Administration, Central Plains Region, Record Group 77, Entry 521A, Box 18; "An Act for the control of floods on the Mississippi River and its tributaries, and for other purposes," May 15, 1928, *Laws of the United States Relating to the Improvement of Rivers and Harbors*, III: 2007-2008.

³⁴¹ "Designation of Functions and Agencies for the Execution of the Mississippi River Flood Control Project Adopted by the Act approved May 15, 1928," dated November 14, 1928, National Archives and Records Administration, Central Plains Region, Record Group 77, Entry 521A, Box 18; "Reorganization of Engineer Department at Large," Memorandum from Thomas M. Robins, LTC, Corps of Engineers, to BG T.H. Jackson, dated October 7, 1929; War Department, General Orders, No. 15, dated October 7, 1929; War Department, Special Orders, No. 68, dated October 7, 1929. All documents found in the National Archives and Records Administration, Central Plains Region, Record Group 77, Entry 521, Box 13.

³⁴² The Flood Control Act of 1936 compounded this perception by broadening the scope of the Corps of Engineers flood-control activities to include coverage of the entire nation.

³⁴³ Vicksburg *Post-Herald*, 3 June 1956

³⁴⁴ Ironically, levees represented the least criticized aspect of the plan, and, to carry this irony further, many of the complaints directed at levees reflected a desire to see them built higher than specified under the Jadwin Plan. The strong, and often volatile, lack of consensus in many respects validated the Commission's adoption of levees as the most applicable and least controversial line of defense against overflow.

³⁴⁵ *House Flood Control Hearings*, VI: 4378; An article by an assistant editor of the *Engineering News-Record* described the ensuing controversy over the plan as engaging "the attention of civilian engineers as to its adequacy, of Congressman and state officials as to its legality and to politicians as to its expediency, see "The First of the Mississippi Floodways," *Engineering News-Record*, May 29, 1929, 816.

³⁴⁶ *Annual Report of the Mississippi River Commission*, 1929, 1932-1935; "General Jadwin Reports on Flood Protection System for Mississippi River," *Engineering News-Record*, December 15, 1927, 961-962; "The First of the Mississippi Floodways," *Engineering News-Record*, May 23, 1929, 817; "Today in the Mississippi Flood Area: The Cypress Creek Diversion Down the Boeuf River," *Engineering News-Record*, March 29, 1928, 513.

³⁴⁷ "Boeuf Floodway for Mississippi Flood Control," *Engineering News-Record*, September 5, 1929, 379-383; U.S. Congress, House of Representatives, Committee on Flood Control, *Control of Floods in the Alluvial Valley of the Lower Mississippi River*, 71st Cong., 3rd sess., March 3, 1931, House Document #798, 2, (Hereafter cited as *House Document #798*); "Today in the Mississippi Flood Area: The Cypress Creek Diversion Down the Boeuf River," *Engineering News-Record*, March 29, 1928, 512-516. The Red River backwater area is one of four principle backwater areas in the alluvial valley, with the others being the St. Francis and White on the west bank and the Yazoo on the east.

³⁴⁸ "General Jadwin Reports on Flood Protection System for Mississippi River," *Engineering News-Record*, December 15, 1927, 961-962; "Planning a Huge Diversion Weir: Bonnet Carré Spillway," *Engineering News-Record*, August 15, 1929, 243; Emory L. Kemp, "Stemming the Tide: Design and Operation of the Bonnet Carré Spillway," *Essays in Public Works History*, December 1990, No. 17.

³⁴⁹ U.S. Congress, House of Representatives, Committee on Flood Control, *Opinion of the Attorney General in Regard to Certain Provisions of the Mississippi Flood Control Act of May 15, 1928*, 71st Cong., 1st sess., July 19, 1929, Committee Document #2, 10-12. (Hereafter cited as *Committee Document #2*).

³⁵⁰ *New Orleans Times-Picayune*, August 15, 1928; "Today in the Mississippi Flood Area: The Cypress Creek Diversion Down the Boeuf River," *Engineering News-Record*, March 29, 1928, 514-515. This article describes the population living within the floodway as in excess of 40,000, but a study by the Vicksburg District placed the number at exactly 49,577 inhabitants. See "Number of Inhabitants in Boeuf Diversion Floodway," Memorandum to the President, Mississippi River Commission, dated March 2, 1929, and "Number of Inhabitants in Atchafalaya Diversion Floodway," Memorandum to the President, Mississippi River Commission, dated March 4, 1929, both of which can be found at the National Archives and Records Administration, Central Plains Region, RG 77, Entry 521A, Box 19.

³⁵¹ *Jadwin Report*; "Report of the Mississippi River Flood Control Board," Committee Document #28, 70th Cong., 1st sess., Reuss, *Designing the Bayous*, 126-127.

³⁵² Letter from George C. Schoenberger, Chief State Engineer, State of Louisiana, to Senator Joseph E. Ransdell, dated August, 28, 1928. National Archives and Record Administration, Central Plains Region, RG 77, Entry 521a, Box 18; "Flood Control Being Tested on the Mississippi," *Engineering News-Record*, February 11, 1937, 223.

³⁵³ *Ibid.*

³⁵⁴ *Committee Document #2*, 1-6. The brief was signed by Representatives Riley J. Wilson (D-LA), William J. Driver (D-AR), Jere Cooper (D-TN), William V. Gregory (D-KY), Dewey Short (R-MO), Hubert D. Stephens (D-MS), Thaddeus H. Caraway (D-AR), Will M. Whittington (D-MS) and Senators Frederick M. Sackett (R-KY), Joseph E. Ransdell (D-LA), Harry B. Hawes (D-MO) and Kenneth D. McKellar (D-TN).

³⁵⁵ *Ibid.*, 13-16

³⁵⁶ *Kincaid v. United States*, 35 F.(2d) 235, See also Reuss, *Designing the Bayous*, 130-133.

³⁵⁷ "Injunction to Stop New Madrid Spillway Refused," *Engineering News-Record*, May 30, 1929.

³⁵⁸ Supreme Court of the United States, Patrick J. Hurley, Secretary of War, et. al., Petitioners, v. R. Foster Kincaid; Reuss, *Designing the Bayous*, 131-133; *Engineering News-Record*, October, 24, 1929, 668.

³⁵⁹ *Kincaid v. United States*, 35 F.(2d) 235; "Flood-Control Work in Boeuf basin is Enjoined by Court," *Engineering News-Record*, December 29, 1929, 983-984; "A Far Reaching Decision," *Engineering News-Record*, December 19, 1929, 951.

³⁶⁰ Supreme Court of the United States, Patrick J. Hurley, Secretary of War, et. al., Petitioners, v. R. Foster Kincaid; "U.S. Court Rules Floodway Lands Must Be Paid For," *Engineering News-Record*, May 21, 1931, 867; "United States Supreme Court Rules Kincaid Injunction Illegal," *Engineering News-Record*, February 5, 1932. The Tucker Act represented the existing law referred to by the Supreme Court.

³⁶¹ *House Flood Control Hearings*, 74th Cong., 1st sess., April 1-13, 1935, 94-96; Reuss, *Designing the Bayous*, 132-134.

³⁶² *Annual Report of the Mississippi River Commission*, 1922, 2038-2040; *Annual Report of the Mississippi River Commission*, 1929, 1961-1964, 1969-1970; "Today in the Mississippi Flood Area," *Engineering News-Record*, March 8, 1928, 398; C.S. "Mississippi River Flood Control," *Engineering News-Record*, January 17, 1929, 142. The authors of the *ENR* articles were associate editors with the publication. They describe the post-1927 timeframe as a "new era in levee design in the valley" because for the first time "economy has not had to be the ruling factor." They contend before the 1927 flood "limited funds made it necessary to build the levees just barely safe enough." The second of the *ENR* describes some of the newer innovations in building levees at a more rapid pace. *House Flood Control Hearings*, 74th Cong., 1st sess., May 3 and 16, 1935, 5.

³⁶³ Moore, *Improvement of the Lower Mississippi River and Tributaries*, 149-150; "Flood Control Being Tested on the Mississippi," *Engineering News-Record*, February 11, 1937, 222-225.

³⁶⁴ Reuss, *Designing the Bayous*, 133-139.

³⁶⁵ *Ibid.*; *House Flood Control Hearings*, 1930, V: 1283; Lytle Brown, "Mississippi Flood Control," *Engineering News-Record*, February 6, 1930 230-231; Lytle, Brown, "Discussion on Cutoffs," *Transactions*, 113 (1948): 22, (Discussion of Gerard H. Matthes, "Paper No. 2329, Mississippi River Cutoffs, With Discussion by Messrs. W. E. Elam, C. L. Hall, H. D. Vogel, Harry N. Pharr, Lytle Brown, Anson Marston, E. J. Williams, Jr., and Eugene A. Graves, and Gerard Matthes," *Transactions*, 113 (1948): 1-39.) Hereafter cited as *Transactions*, 1948. In the *ENR* article, Brown indicated that any modifications to the plan would

secure dependable, affordable and timely protection based on a possible combination of levees, floodways and reservoirs.

³⁶⁶ *Jadwin Report*, paragraph 69.

³⁶⁷ "Special Report of the Mississippi River Commission on Revision of Plans for Improvement of Navigation and Flood Control of the Mississippi River Commission," September 1928, 1927, paragraphs 241-344; Matthes, "Mississippi River Cutoffs," *Transactions*, 1948, 1; The King's Point incident was not the only cutoff to have a great impact on formulation of the MRC's policy. The Commerce Cutoff, 40 miles below Memphis, in 1874, the Devil's Elbow Cutoff, 44 miles above Memphis, in 1876, and the Centennial Lake Cutoff, which left the Vicksburg harbor isolated from the main channel in 1876, also had a tremendous influence on the MRC. Combined, these three cutoffs shortened the Mississippi River by over sixty miles in less than a decade and definitely had a profound impact on the MRC. The forces unleashed by the natural phenomena produced drastic changes in the regimen of the river and resulted in the formation of new problem areas elsewhere. The changes in the alignment of the river, the formation of new bars, the increased rate of erosion and bank caving, and the myriad of problems at the Memphis and Vicksburg Harbors were still being felt when the MRC was established in 1879. In an era when the facilitation of navigation was of extreme concern for the nation, it was nearly impossible for the MRC not to fear the uncertainty of cutoffs, whether natural or artificial. See Elliott, *Improvement of the Lower Mississippi River*, I: 58-61.

³⁶⁸ Anson Marston, "Discussion on Cutoffs," *Transactions*, 1948, 23; William E. Elam, "Flood Control Through Slope Correction," *Engineering News-Record*, June 28, 1928, 996-998; William E. Elam, "Discussion of Cutoffs," *Transactions*, 1948, 16-17; William E. Elam, *Speeding Floods to the Sea*, (New York, 1946).

³⁶⁹ Harley B. Ferguson, *History of the Improvement of the Lower Mississippi River for Flood Control and Navigation, 1932-1939*, (Vicksburg, Mississippi: Mississippi River Commission, 1940), 43-45; Matthes, "Mississippi River Cutoffs," *Transactions*, 1948, 5; "New Plans for the Mississippi: Straightening by Cutoff Channels," *Engineering News-Record*, June 29, 1933, 838.

³⁷⁰ Memorandum Report from Edward N. Chisholm, Jr., Captain of Engineers to President, MRC, "Caving Banks Threatening Cut-Offs," dated November 24, 1924; Memorandum Prepared for General Jackson, September 25th, 1939. Both documents are contained within the MRC Technical Records, MRC History Center; "New Plans for the Mississippi: General Review of Present Program," *Engineering News-Record*, June 22, 1933, 800; T.H. Jackson, "Flood Control on Alluvial Rivers," *Engineering News-Record*, January 15, 1931, 107-108; Vogel, "Discussion on Cutoffs," *Transactions*, 1948, 19-20.

³⁷¹ Matthes, "Discussion on Cutoffs," *Transactions*, 1948, 30; Vogel, "Discussion on Cutoffs," *Transactions*, 1948, 19-20.

³⁷² Harley B. Ferguson, "Memorandum for the Board of Engineers for Rivers and Harbors on Control of Mississippi River Floods," November 22, 1930. Document contained within MRC Technical Records, MRC History Center. (Hereafter cited as *Ferguson Memorandum*)

³⁷³ *Annual Report of the Mississippi River Commission*, 1880, 2733-2735; "The Mississippi," *Engineering News*, August 12, 1876, 263-264; "Capt. Eads vs. The Mississippi River," *Engineering News*, February 7, 1878, 41; "The Mississippi: An Address by James B. Eads before the St. Louis Merchant's Exchange," *Engineering News*, February 7, 1878, 44-45.

³⁷⁴ *Ferguson Memorandum*.

³⁷⁵ Ferguson, *Improvement of the Lower Mississippi River*, 129-130. Ferguson describes the distance as only 45 miles, but the map opposite page 129 depicts the distance as 50 miles.

³⁷⁶ *House Flood Control Hearings*, April 1-13, 1935. Ferguson explains the nature of the program and cutoffs as an incidental component on pages 680-681. Ibid., 75th Cong., 3rd sess., March 30-April 19, 1938, 48; Ferguson, *Improvement of the Lower Mississippi River*, 7-8; *Ferguson Memorandum*; Moore, *Improvement of the Lower Mississippi River and Tributaries*, 144-145.

³⁷⁷ *Ferguson Memorandum*.

³⁷⁸ Ibid.

³⁷⁹ U.S. Waterways Experiment Station, "Experiment to Determine the Effects of Proposed Dredged Cut-Offs in the Mississippi River," *Report No. 1*, April 15, 1932, 1-2.

³⁸⁰ *National Hydraulic Laboratory, House Hearings*, 47-51.

³⁸¹ *Jadwin Report*, 33; *National Hydraulic Laboratory, House Hearings*, 76; Fatherree *The History of Hydraulics Engineering* 7.

³⁸² *National Hydraulic Laboratory, House Hearings*, 63-64.

³⁸³ Ibid., 81; Letter from MG Edgar Jadwin, 18 June 1929, Washington, D.C. Document located in MRC Technical Records, MRC History Center.

³⁸⁴ Herbert D. Vogel, "Application of Model Research to Mississippi Flood Control Problems," *Engineering News-Record*, 16 July 1931, 85-86; Gordon A. Cotton, *A History of the Waterways Experiment Station, 1929-1979* (Vicksburg, MS, 1979) 7. Because WES was under the administrative control of the commission, the President of the MRC held the responsibility for requesting experiments; but the laboratory was not closed to work originating from outside the jurisdiction of the commission. Almost from its inception, it undertook hydraulic engineering investigations from Corps of Engineers' offices around the nation. By 1949, only 25 percent of the investigations performed at WES were related to the MRC. Recognizing this, LTG Lewis A. Pick, the Chief of Engineers, issued a directive, dated July 29, 1949 to remove the laboratory from the administrative supervision of the MRC and place its operations directly under the Corps of Engineers' Director of Civil Works.

³⁸⁵ Fatherree, *The History of Hydraulics Engineering*, 15-19, 23-24.

³⁸⁶ U.S. Waterways Experiment Station, "Experiment to Determine the Effects of Proposed Dredged Cut-Offs in the Mississippi River," *Report No. 1*, April 15, 1932. "Paper 1," as it is referred to, contains previous the reports from early cutoff experiments in its appendices; Matthes, "Discussion on Cutoffs," *Transactions*, 1948, 16, 31-32; Vogel, "Discussion on Cutoffs," *Transactions*, 1948, 19. See also, "New Plans for the Mississippi: Straightening by Cutoff Channels," *Engineering News-Record*, June 29, 1933, 838-842; Vogel, "Discussion on Cutoffs," *Transactions*, 1948, 19.

³⁸⁷ Matthes, "Discussion on Cutoffs," *Transactions*, 1948, 31; U.S. Waterways Experiment Station, "Experiment to Determine the Effects of Proposed Dredged Cut-Offs in the Mississippi River," *Report No. 1*, April 15, 1932, 40.

³⁸⁸ Reuss, *Designing the Bayous*, 133, 138-139.

³⁸⁹ *House Flood Control Hearings*, 1930, V: 1283, 1362.

³⁹⁰ *Ibid.*, 1330-1332; 1363-1364, 1897; Reuss, *Designing the Bayous*, 140-141.

³⁹¹ *Ibid.*, 1375, 1897.

³⁹² *House Document #798*, 4-7.

³⁹³ *Ibid.*, 13-14.

³⁹⁴ Lytle Brown, "Mississippi Flood Control," *Engineering News-Record*, February 6, 1930, 230-231.

³⁹⁵ *House Flood Control Hearings*, 1932, 6-8. While Brown also informed the committee that Ferguson's proposed program would not eliminate the need for a floodway, either through the Boeuf or Tensas basin, he remained unsure as to whether or not straightening the bends would decrease the amount of diversion through the floodway

³⁹⁶ *Ibid.*, 9.

³⁹⁷ *Ibid.*, 9-10; *National Hydraulic Laboratory, House Hearings*, 40. Brown surmised it would take 2-3 years to complete the actual cutoff experiment on the river.

³⁹⁸ *House Flood Control Hearings*, 1932, 55.

³⁹⁹ Matthes, "Discussion on Cutoffs," *Transactions*, 1948, 33-31; Marston, "Discussion on Cutoffs," *Transactions*, 1948, 22-23.

⁴⁰⁰ T.H. Jackson, "Flood Control on Alluvial Rivers," *Engineering News-Record*, January 15, 1931, 107-108. Jackson believed the primary benefit to be derived from cutoffs was a more efficient channel that was less expensive to maintain than the costly and often ineffective process of bank revetment.

⁴⁰¹ Brown, "Discussion on Cutoffs," *Transactions*, 1948, 21-22.

⁴⁰² *Ibid.*, 22; Matthes, "Discussion on Cutoffs," *Transactions*, 1948, 31-33; Vogel, "Discussion on Cutoffs," *Transactions*, 1948, 19.

⁴⁰³ Joseph B. Tiffany, *History of the Waterways Experiment Station*, (Vicksburg: U.S. Waterways experiment Station, 1968) IV-2; *Annual Report of the Mississippi River Commission*, 1933, 1258, 1284, 1294-1295; *Annual Report of the Mississippi River Commission*, 1930, 2027; Reuss, *Designing the Bayous*, 133-134.

⁴⁰⁴ This account of the operations at Diamond Point is posited in a memorandum from George R. Clemens, a senior engineer with the MRC. The memorandum, "Diamond Point Cut-off: Impressions gained by observing the making and development of the cut-off," dated January 13, 1933, is located in the MRC Technical Records, MRC History Center.

⁴⁰⁵ U.S. Army Corps of Engineers, Vicksburg Engineer District, *Mississippi River Flood Control by Dredging: Vicksburg Engineer District, 1932-1942*, 11-15. (Hereafter cited as *Mississippi River Flood Control by Dredging*.); Ferguson, *Improvement of the Lower Mississippi River*, 32-39.

⁴⁰⁶ "George R. Clemens Describes The Diamond Point Cut-Off to Visiting Civil Engineers," *Vicksburg Evening Post*, May 6, 1933; Matthes, "Mississippi River

Cutoffs," *Transactions*, 1948, 4-5, 13-14; Ferguson, *Improvement of the Lower Mississippi River*, 47-49.

⁴⁰⁷ Vicksburg Engineer District, *Mississippi River Flood Control by Dredging*, 6-10; Elliott, *Improvement of the Lower Mississippi River*, II: 206-214; Moore, *Improvement of the Lower Mississippi River and Tributaries*, 191-193.

⁴⁰⁸ Matthes, "Mississippi River Cutoffs," *Transactions*, 1948, 4-5, 13-14; Ferguson, *Improvement of the Lower Mississippi River*, 47-49. Ferguson's study provides an in depth discussion on the details of each cutoff operations and corrective dredging measures for each reach of the river.

⁴⁰⁹ *Ferguson Memorandum*; Ferguson, *Improvement of the Lower Mississippi River*, 21-39.

⁴¹⁰ *Ibid.*, 129-132; "New Cutoffs Being Made on the Mississippi," *Engineering News-Record*, September 21, 1933, 358-359.

⁴¹¹ Vicksburg Engineer District, *Mississippi River Flood Control by Dredging*, 19; *Engineering News-Record*, September 21, 1933, 358-359.

⁴¹² George R. Clemens, "Straightening the Father of Waters," *Engineering News-Record*, February 20, 1936, 269-276. Clemens, a senior engineer with the Mississippi River Commission, was heavily involved in the implementation of the channel rectification program. His account provides an excellent overview of the cutoff program, with the exception of the Caulk cutoff, and is much easier to consult than Ferguson's lengthy account. Unlike Ferguson's study, however, Clemens does not attempt to explain corrective dredging efforts and focuses entirely on cutoffs.

⁴¹³ *Annual Report of the Mississippi River Commission*, 1935, 1645; *House Flood Control Hearings*, April 1-13, 1935, 76; Clemens, "Straightening the Father of Waters," *Engineering News-Record*, February 20, 1936, 276; U.S. Waterways Experiment Station, "Studies of Existing Cut-Offs and Atchafalaya River Improvements," *Technical Memorandum No. 92-7*, dated October 5, 1937; See also U.S. Waterways Experiment Station, "Experiment to Determine the Effects of Proposed Dredged Cut-Offs in the Mississippi River," April 15, 1932; U.S. Waterways Experiment Station, "Experiment to Determine the Effects of a Cut-Off at Tarpley Neck"; U.S. Waterways Experiment Station, "Experiment to Determine the Effects of Various Cutoffs in the Greenville Bends"; U.S. Waterways Experiment Station, "Experiment to Determine the Superflood Flowline of the Mississippi River in the Vicinity of Slough Landing Neck."

⁴¹⁴ Ferguson, *Improvement of the Lower Mississippi River*, 161-165; *House Flood Control Hearings*, 1930, V: 1319; *Annual Report of the Mississippi River Commission*, 1932, 1971.

⁴¹⁵ Ferguson, *Improvement of the Lower Mississippi River*, 161-165; "New Plans for the Mississippi: Recent Investigations of Bank Revetment," *Engineering News-Record*, August 10, 1933, 166. "Bank Revetment Developments on the Mississippi River: Asphalt Mat Revetment," *Engineering News-Record*, June 28, 1934, 825; "Bank Revetment Developments on the Mississippi River: Tetrahedron-Block Revetment," *Engineering News-Record*, July 5, 1934, 5-8; "Today in the Mississippi Flood Area: Revetment and Some River Hydraulics," *Engineering News-Record*, March 15, 1928, 437-439; See also, "Fabricating Fascine Mattress for Mississippi Revetment," *Engineering News-Record*, July 3, 1930, 4-7; "Articulated-Concrete Revetment Construction on the Mississippi River," *Engineering News-Record*, December 25, 1930, 996-1003; "Articulated Block Revetment Replaces Upper Bank Slabs," *Engineering News-Record*, May 30, 1935, 773-774; "Mississippi River Flood Control: Revetment Construction Plant and Methods," *Engineering News-Record*, January 31, 1929, 182-185; "Constructing Framed Mattress for Mississippi Revetment," *Engineering News-Record*, May 1, 1930, 720-724; "Slab-Revetment Equipment, Mississippi River," *Engineering News-Record*, April 14, 1932, 554-557.

⁴¹⁶ Ferguson divulged this information in a presentation delivered to the Louisiana Section of the Society for Military Engineers on May 17, 1939. A copy of the presentation can be found at the National Archives and Records Administration, Central Plains Region, RG 77, Entry 521, Box 7.

⁴¹⁷ Joseph L. Arnold, *The Evolution of the 1936 Flood Control Act*, (Fort Belvoir, Virginia, 1988), 22-29; William Willingham, *Civil Works, 1933-1941: From Depression to War*, (Extract reproduced from the records of the Office of History, Headquarters, U.S. Army Corps of Engineers, Alexandria, VA), 2; Reuss, *Designing the Bayous*, 137.

⁴¹⁸ Election results and numbers pertaining to the composition of both houses of Congress were obtained from the official websites of the U.S. House of Representatives and the U.S. Senate.

⁴¹⁹ House Committee on Flood Control, *Flood Control Works in the Alluvial Valley of the Mississippi River*, 74th Cong., 1st sess., February 12, 1935, Committee Document #1, 17, (Hereafter cited as *Committee Document #1*, 1935); Albert E. Cowdrey, *Civil Works, 1917-1933: From War to Depression*, (Extract reproduced from the records of the Office of History, Headquarters, U.S. Army Corps of Engineers, Alexandria, VA), 27; Reuss, *Designing the Bayous*, 177. Roosevelt's letter is partially quoted in Reuss' study.

⁴²⁰ *Proceedings of the Mississippi River Commission*, 5093-5109, session 203, (October 20-31, 1924).

⁴²¹ *Committee Document #1, 1935*, 21-22. The MRC recommended no modifications to the project above the Arkansas River despite the commission's early resistance to the Birds Point-New Madrid Floodway. By the time of the report the commission considered the floodway a *fait accompli*. Instead the MRC focused its attention on the middle and southern sections of the flood-control project.

⁴²² *Ibid.*, 22-23; *House Flood Control Hearings*, April 1 to 13, 1935, 3, 13.

⁴²³ *Committee Document #1, 1935*, 23-24.

⁴²⁴ *Ibid.*, 25-26; "History of the Morganza Crevasse," Memorandum compiled under the direction of Major Clarke Smith, conforming to a resolution of the Mississippi River Commission, dated November 20, 1912. Located in the MRC Technical Records. MRC History Center.

⁴²⁵ *House Flood Control Hearings*, April 1-13, 1935, 77-85.

⁴²⁶ *Committee Document #1, 1935*; William Willingham, *Civil Works, 1933-1941: From Depression to War*, 44-46; Reuss, *Designing the Bayous*, 181-185.

⁴²⁷ The plan originally called for seven reservoirs in the Yazoo basin—two on the Coldwater River, one on the Little Tallahatchie River, one on the Yacona River, two on the Yalobusha River, and one on the Skuna River, a tributary of the Yalobusha. The plan was later modified by the Chief of Engineers to include only four reservoirs: Sardis Reservoir on the Little Tallahatchie River, Arkabutla Reservoir on the Coldwater River, Enid Reservoir on the Yacona River, and Grenada Reservoir on the Yalobusha River.

⁴²⁸ *Committee Document #1, 1935*, 27-28; Moore, *Improvement of the Mississippi Rivers and Tributaries*, 178-181; *House Flood Control Hearings*, 74th Cong., 2nd sess., on S. 3531, April 30-May 1, 1936, 64.

⁴²⁹ *Committee Document #1, 1935*, 29; Lawrence Glenn and Charles West were no longer with the MRC. Glenn resigned in May 1933 and West died one month later. Their replacements, Albert L. Culbertson and Harry N. Pharr did not become commissioners until 1935. In this respect, only Commissioners BG Ferguson, Edward Flad, Col. Graves, Col. George R. Spalding, and RADM Colbert signed the 1935 report.

⁴³⁰ *Committee Document #1, 1935*, 13-15; Reuss, *Designing the Bayous*, 181; Willingham, *Civil Works, 1933-1941: From Depression to War*, 45.

⁴³¹ *House Flood Control Hearings*, April 1-13, 1935. Jacobs' testimony can be found on pages 258-267; Kemper's on page 774. Statements from the Board of Mississippi Levee Commissioners and the Yazoo-Mississippi Delta levee board can be found on pages 217-219. The latter from the Louisiana Board of State Engineers is quoted in Reuss, *Designing the Bayous*, 181.

⁴³² *House Document #359*, 15; Glover's bill, HR 8146, sought to raise the fuse-plug levee to the same height as the levees protecting the Yazoo Delta on the east bank of the Mississippi River, which ranged from 3 to 6 feet higher than the fuse-plug levees. Park's bill called for the same outcome but via a different method by repealing the Jadwin Plan altogether. The discussion of these bills can be found in *House Flood Control Hearings*, 73rd Cong., 2nd sess., on H.R. 8146 and H.R. 8048, February 27, 1934.

⁴³³ *House Flood Control Hearings*, February 27, 1934, 18-21; *ibid.*, April 1-13, 1935, 818-829 (Whittington statement).

⁴³⁴ *House Flood Control Hearings*, April 1-13, 1935, 3-8. (Markham testimony).

⁴³⁵ *Ibid.*, 75-78, 85-96. (Ferguson testimony).

⁴³⁶ *Ibid.*, 658-661. (Ferguson testimony).

⁴³⁷ *House Flood Control Hearings*, May 3 and 16 1935, 133-138. (Ransdell testimony).

⁴³⁸ McClellan had introduced his own bill, H.R. 7128, which adopted the engineering features of the MRC report. In contrast to Wilson's bill, H.R. 7128 did not aim to repeal Section 4 of the 1928 Act, rather it sought to retain and strengthen it by including language forcing the government to compensate for land rights. *House Flood Control Hearings*, May 3 and 16, 1935, 130-133; *Senate Flood Control Hearings*, 74th Cong., 2nd sess., on S. 3531, January 27-30, 1936, 3-8.

⁴³⁹ Reuss, *Designing the Bayous*, 182; *Senate Flood Control Hearings*, January 27-30, 1936, 2-3. Overton's draft is contained in this document.

⁴⁴⁰ Reuss, *Designing the Bayous*, 182-185.

⁴⁴¹ *Ibid.*, 184-186. Reuss posits the theory that Whittington probably had a hand in tying the acquisition of land rights in the Morganza Floodway to that of the Eudora Floodway as a means of pressuring Eudora residents to turn their land rights over to the government. This position is supported by Whittington's statements before the house committee. *House Flood Control Hearings*, April 1 to 13, 1935, 818-828; *ibid.*, May 3 and 16, 1935, 66-77; *ibid.*, April 30 and May 1, 13-

15.

⁴⁴² *House Flood Control Hearings*, January 27-30, 1936. See Ransdell testimony, 114, and Jacobs testimony, 211-215.

⁴⁴³ *House Flood Control Hearings*, April 30 and May 1, 1936, 1-5, 40-48, 51-67; Reuss, *Designing the Bayous*, 186-187. The text of the Overton Act can be found in *Laws of the United States Relating to the Improvement of Rivers and Harbors*, III: 1913-1939, 2392-2398. Moore, *Improvement of the Mississippi River and Tributaries*, 15. The Overton Act is often confused with the 1936 Flood Control Act, which resulted from the passage of the omnibus flood-control bill on June 22, 1936; one week after the Overton Act was passed. The omnibus bill extended the government's responsibility to flood control from exclusively pertaining to the Mississippi and Sacramento Rivers to a nationwide responsibility. Six of the Arkansas River basin reservoirs contained in Miller's amendment were attached to the omnibus legislation. These included the Caddoa Reservoir in Colorado, the Conchas Reservoir in New Mexico, and the Optima, Fort Supply, Hulaa and Great Salt plains Reservoirs in Oklahoma. For more information on the omnibus bill, see Arnold, *The Evolution of the 1936 Flood Control Act*. The final version of Overton's bill included the "a-b-c" requirements contained in the amendment set forth by Ohio Congressman Thomas A. Jenkins. These requirements, which were also attached to the 1936 Flood Control Act, only pertained to reservoirs in the Overton Act.

⁴⁴⁴ "Twenty-Day Storm Caused Floods," *Engineering News-Record*, February 4, 1937, 156.

⁴⁴⁵ *Annual Report of the Mississippi River Commission*, 1937, 1739-1744; "High Water in the Lower Mississippi," *The Military Engineer*, May-June 1937, 163-168. Monroe, Louisiana, at the foot of the proposed Boeuf Floodway was protected by a ring levee constructed by the MRC. This represented the only substantial measure of protection within the floodway.

⁴⁴⁶ Floyd M. Clay, *A Century on the Mississippi: A History of the Memphis District, U.S. Army Corps of Engineers, 1876-1976*, (Memphis, 1976) 145-149; "High Water in the Lower Mississippi," *The Military Engineer*, May-June 1937, 163-168.

⁴⁴⁷ "Conditions in Flood-Beleaguered Cairo," *Engineering News-Record*, February 4, 1937, 153.

⁴⁴⁸ "How Birds Point Fuseplug Levee Was Breached With Dynamite," *Engineering News-Record*, February 4, 1937, 155; Clay, *A Century on the Mississippi*, 148-150; Martin Reuss, *Army Engineers in the Memphis District: A Documentary Chronicle*, (Memphis 1982), xxiii.

⁴⁴⁹ Mississippi River Commission, *Stages of the Mississippi River and Tributaries*, 1937-1938; Moore, *Improvement of the Lower Mississippi River and Tributaries*, 203. For examples of such dire predictions see, "Superflood Devastates Lower Ohio and Now Threatens Mississippi Levee System," and "Mississippi Flood Fighting Begins," *Engineering News-Record*, February 4, 1937, 151, 205.

⁴⁵⁰ Those predictions were made oblivious to the fortunate circumstance that the floods on the Arkansas, White, Yazoo and other lower tributaries crested well before the discharge from the Ohio swelled the Mississippi River out of its banks south of Arkansas City,

⁴⁵¹ *Annual Report of the Mississippi River Commission*, 1937, 1753-1754; Gerard H. Matthes to Meigs O. Frost, March 6, 1937. National Archives and Records Administration, Central Plains Region, RG 77, Entry 521a-1, Box 18, Memorandum from BG Max C. Tyler, dated December 29, 1937, National Archives and Records Administration, Central Plains Region, RG 77, Entry 521, Box 17. The comparison of the correlation between stage and flow for any two floods can only exist under fixed conditions—a fixed channel, a fixed slope, a fixed temperature and a fixed sediment load. These conditions do not exist anywhere on the Mississippi River or any other river. The channel, slope, temperature, and sediment load of the Mississippi River are constantly changing.

⁴⁵² "Permanent Flood Safety," *Engineering News-Record*, April 14, 1938, 531; Memorandum from BG Max C. Tyler, dated December 29, 1937, National Archives and Records Administration, Central Plains Region, RG 77, Entry 521, Box 17; Arthur E. Morgan, "Flood Control by Reservoirs," *Engineering News-Record*, August 12, 1937, 263; "Control of Great Floods," *Engineering News-Record*, August 12, 1937, 255; "Permanent Flood Safety," *Engineering News-Record*, April 14, 1938, 531.

⁴⁵³ Comprehensive Flood-Control Plan For Ohio and Lower Mississippi Rivers. House Committee on Flood Control, Committee Document #1, 75th Cong., 1st sess., April 28, 1937, 6. Ferguson had already been developing plans to extend the channel rectification program upstream. Three additional cutoffs were executed by his successor as MRC president, BG Max Tyler from 1939-1942.

⁴⁵⁴ *Ibid.*, 4-7. The seven Missouri Basin reservoirs included two on the Kansas River, three on the Osage River, and one each on the Gasconade and Grand Rivers. The three upper Mississippi River Basin reservoirs include two on the Meramec River and one on the Kaskaskia Rivers.

⁴⁵⁵ *Ibid.*, 7-10. Markham also recommended one reservoir in the Red River basin, which he suggested would eliminate the possibility of a large flood on the Red River from coinciding with a similar flood on the Mississippi River

⁴⁵⁶ *House Flood Control Hearings*, April 6, 1937, House Flood Control Committee Document #1, and Subsequent Reports of the Chief of Engineers, and Amendments to the Flood Control Acts of June 15, 1936, June 22, 1936, and August 28, 1937, March 30-April 19, 1938, (Schley testimony), January 27-30, 1936, 114; Reuss, *Designing the Bayous*, 192.

⁴⁵⁷ *House Flood Control Hearings*, April 6, 1937, House Flood Control Committee Document #1, and Subsequent Reports of the Chief of Engineers, and Amendments to the Flood Control Acts of June 15, 1936, June 22, 1936, and August 28, 1937, March 30-April 19, 1938, 817-818 (Overton testimony); Quoted in Reuss, *Designing the Bayous*, 191.

⁴⁵⁸ *House Flood Control Hearings*, April 6, 1937, House Flood Control Committee Document #1, and Subsequent Reports of the Chief of Engineers, and Amendments to the Flood Control Acts of June 15, 1936, June 22, 1936, and August 28, 1937, March 30-April 19, 1938 (Markham testimony). The memorandum from Ferguson is quoted in Reuss, *Designing the Bayous*, 191. Ferguson also went on to support Markham's recommendation to pursue fee simple options, hoping that Mississippi interests would drop their opposition to separating the two floodways

⁴⁵⁹ *House Flood Control Hearings*, April 6, 1937, House Flood Control Committee Document #1, and Subsequent Reports of the Chief of Engineers, and Amendments to the Flood Control Acts of June 15, 1936, June 22, 1936, and August 28, 1937, March 30-April 19, 1938, 930-931. (Markham testimony).

⁴⁶⁰ Moore, *Improvement of the Mississippi River and Tributaries*, 15; Reuss, *Designing the Bayous*, 194; *Laws of the United States Relating to the Improvement of Rivers and Harbors*, III: 1913-1939, 2598-2614.

⁴⁶¹ *House Document #359*, 2. The report is also printed in its entirety in: *House Flood Control Hearings*, 77th Cong., 1st sess., on H.R. 4911, April 21-May 14, 1941, 608-639.

⁴⁶² Ferguson retired as a brigadier general in 1939, the 1941 Flood Control Act carried a provision allowing past and future MRC presidents, who served in that capacity for 4 or more years, to receive the rank, pay and allowances of a retired major general.

⁴⁶³ *House Document #359*, 2. The report is also printed in its entirety in: *House Flood Control Hearings*, April 21-May 14, 1941, 8-15.

⁴⁶⁴ *House Document #359*, 16-18, 28-29; *House Flood Control Hearings*, April 21-May 14, 1941, 640 (Tyler testimony);

⁴⁶⁵ *House Document #359*, 28-34; Tyler advances further explanations of the five alternate plans in his testimony before the house committee. See *House Flood Control Hearings*, April 21-May 14, 1941, 640-656.

⁴⁶⁶ *House Flood Control Hearings*, April 21-May 14, 1941, 37-38, 697 (Tyler testimony).

⁴⁶⁷ *House Document #359*, 37-38.

⁴⁶⁸ *Ibid.*, 38-43.

⁴⁶⁹ *House Flood Control Hearings*, April 21-May 14, 1941, 640-698, 711-712, 724 (Tyler testimony); Reuss, *Designing the Bayous*, 196-197.

⁴⁷⁰ *Laws of the United States Relating to the Improvement of Rivers and Harbors*, IV: 2773-2776; Reuss, *Designing the Bayous*, 197.

⁴⁷¹ The 1928 Flood Control Act authorized \$325 million; the 1936 Overton Act \$272 million; the 1938 Flood Control Act \$40 million; and the 1941 Flood Control Act \$25, 982,000. These totaled \$662,982,000; "Commission Finds Mississippi Flood Control to Cost \$684,000,000," *Engineering News-Record*, December 22, 1927, 1006.

⁴⁷² *House Document #359*, 8-9.

⁴⁷³ For an in-depth discussion of modifications to the MR&T project through 1973, including the 1944 Flood Control Act's provisions for the channel stabilization program and the evolution of the Old River Control Complex, please see Moore's *Improvement of the Lower Mississippi River and Tributaries*. For a detailed list of modifications, please see *Mississippi River Commission, Annual Report of the Secretary of the Army on Civil Works Activities, FY 2001*, Table 41-D.

⁴⁷⁴ For the sake of clarity, a major flood in this context represents an event exceeding 1.7 million cfs on the Arkansas City gauge. Since 1927, floods of this magnitude occurred in 1929, 1937, 1945, 1950, 1973, 1975, 1979, 1983, and 1997.

Select Bibliography

Federal Agency Archives and Records

- Headquarters, U.S. Army Engineer Research and Development Center. Library. Vicksburg, Mississippi.
- Mississippi. Mississippi River Commission. Michael C. Robinson History Center. Technical Records. Vicksburg, Mississippi.
- Vicksburg, Mississippi. National Archives and Records Administration. Central Plains Region. Record Group 77. U.S. Army Corps of Engineers. Kansas City, Missouri.

Congressional Documents

- Congressional Record*, 1871-1928, (41st Cong., thru 70th Cong.)
- U.S. Congress. House of Representatives. Laws of the United States Relating to the Improvement of Rivers and Harbors from August 11, 1790 to June 29, 1938, 3 vols. Washington, D.C., Government Printing Office, 1940.
- _____. 33rd Cong., 1st sess., January 4, 1854, Executive Document no. 16.
- _____. 43rd Cong., 1st sess., February 4, 1874, Executive Document no. 113.
- _____. 43rd Cong., 2nd sess., June 23, 1874, Executive Document no. 114.
- _____. Committee on Flood Control, *Hearings, Floods of the Lower Mississippi River*, 64th Cong., 1st sess. 1916.
- _____. Committee on Flood Control. *Hearings, Mississippi Valley Flood Protection*, 67th Cong., 4th sess., 1922.
- _____. Committee on Flood Control. *Hearings, Control of the Destructive Flood Waters of the United States*, 70th Cong., 1st, sess., 7 vols, November 7, 1927 – February 1, 1928.
- _____. Committee on Flood Control. *Special Report of the Mississippi River Commission on Revision of Plans for Improvement of Navigation and Flood Control of the Mississippi River Commission*, 70th Cong., 1st sess., November 28, 1927. Committee Document no. 1.
- _____. *Flood Control in the Mississippi Valley: Report Submitted by Hon. Frank R. Reid*, 70th Cong., 1st sess., 1928, Report no. 1072.
- _____. Committee on Rivers and Harbors. *National Hydraulic Laboratory Hearings*. 70th Cong., 1st sess., on S. 1710: An Act Authorizing

the Establishment of a National Hydraulic Laboratory in the Bureau of Standards of the Department of Commerce, April 26-27, 1928.

_____. *Report of the Mississippi River Flood Control Board*, 70th Cong., 2nd sess., August 8, 1928, Committee Document no. 28.

_____. *Flood Control in the Mississippi Valley*, 70th Cong., 1st sess., 8 December 1928, Document no. 90.

_____. Committee on Flood Control. *Opinion of the Attorney General in Regard to Certain Provisions of the Mississippi Flood Control Act of May 15, 1928*, 71st Cong., 1st sess., July 19, 1929, Committee Document no. 2.

_____. Committee on Flood Control. *Hearings, Flood Control on the Mississippi River*, 5 vols, 71st Cong., 2nd sess., 1930.

_____. Committee on Flood Control. *Hearings, Flood Control on the Mississippi River*, 71st Cong., 3rd sess., 1931.

_____. Committee on Flood Control. *Control of Floods in the Alluvial Valley of the Lower Mississippi River*, 71st Cong., 3rd sess., March 3, 1931, House Document no. 798.

_____. Committee on Flood Control. *Hearings, Flood Control on the Mississippi River*, 72nd Cong., 1st sess., 1932.

_____. Committee on Flood Control. *Hearings, Progress and Present Status of Flood Control on the Mississippi River and Its Tributaries*, 73rd Cong., 1st sess., 1933.

_____. Committee on Flood Control. *Hearings, Flood Control on the Mississippi River*, 73rd Cong., 2nd sess., 1934.

_____. Committee on Flood Control. *Flood Control Works in the Alluvial Valley of the Mississippi River*, 74th Cong., 1st sess., February 12, 1935, Committee Document no. 1.

_____. Committee on Flood Control. *Hearings, Flood Control in the Mississippi Valley*, 74th Cong., 1st sess., (on H.R. 6833), April 1-13, 1935.

_____. Committee on Flood Control. *A Report on the Thirteen Reservoirs in the Arkansas River Basin and the Thirteen Reservoirs in the White River Basin in Response to a Resolution of the Committee on Flood Control of the House of Representatives Dated April 24, 1935*, 74th Cong., 1st sess., Document no. 2.

_____. Committee on Flood Control. *Hearings, Flood Control in the Mississippi Valley*, 74th Cong., 1st sess., (Supplemental Hearing), May 3 and 6, 1935.

_____. Committee on Flood Control. *Hearings, Control of Floods on the Mississippi River*, 74th Cong., 2nd sess., (on S. 3531), April 30-May 1, 1936.

- _____. Committee on Flood Control. *Comprehensive Flood Control Plan for Ohio and Lower Mississippi Rivers*, 75th Cong., 1st sess., 1937, Committee Document no. 1.
- _____. Committee on Flood Control. *Hearings, Comprehensive Flood Control Plans*, 75th Cong., 3rd, March 30 to April 19, 1938.
- _____. Committee on Flood Control. *Flood Control on the Lower Mississippi River*, 77th Cong., 1st sess., House Document #359, 1941.
- U.S. Congress. Senate. 32nd Cong., 1st sess., 1852, Executive Document no. 49.
- _____. 47th Cong., 1st sess., April 18, 1882.
- _____. "Report on the Mississippi River Floods," *Senate Report #1433*, 55th Cong., 3rd sess., December 15, 1898.
- _____. Committee on Commerce. *Hearings, National Hydraulic Laboratory*, 68th Cong., 1st sess., on S.J. Res. 42: A Resolution to Establish a National Hydraulic Laboratory, 21 May 1924.
- _____. Committee on Commerce. *Hearings, Flood Control of the Mississippi River*, 70th Cong., 1st sess., 3 vols, 1928.
- _____. Committee on Commerce. *Hearings, Flood Control in the Lower Mississippi Valley*, 74th Cong., 2nd sess., on S. 3531, January 27-30, 1936, 3-8.

Federal Government Sources

- Annual Report of the Chief of Engineers*, 1866-1950.
- Annual Report of the Mississippi River Commission*, 1879-1950.
- Arnold, Joseph, L. *The Evolution of the 1936 Flood Control Act*. Fort Belvoir, Virginia: Office of History, U.S. Army Corps of Engineers.
- Clay, Floyd M. *A Century on the Mississippi: A History of the Memphis District, U.S. Army Corps of Engineers, 1876-1976*. U.S. Army Corps of Engineers, Memphis: Memphis District, 1976.
- 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: New Orleans District, 1977.
- Dobney, Frederick, J. *River Engineers on the Middle Mississippi: A History of the St. Louis District, U.S. Army Corps of Engineers*. Washington, D.C.: Government Printing Office, 1973.
- Elliott, D.O. *The Improvement of the Lower Mississippi River for Flood Control and Navigation*. 3 vols. Vicksburg, Mississippi: U.S. Waterways Experiment Station, 1932.
- Fatherree, Ben H. *The History of Hydraulic Engineering at the U.S. Army Engineer Waterways Experiment Station*. Vicksburg: U.S. Engineer Research and Development Center, 2004.

- Ferguson, Harley B. *History of the Improvement of the Lower Mississippi River for Flood Control and Navigation, 1932-1939*. Vicksburg: Mississippi River Commission, 1940.
- _____. *Memorandum for the Board of Engineers for Rivers and Harbors on Control of Mississippi River Floods*. November 22, 1930.
- Hagwood, Joseph J. *The California Debris Commission: A history of the hydraulic mining industry in the western Sierra Nevada of California, and of the governmental agency charged with its regulation*. Sacramento, California: 1981.
- Humphreys, Andrew A. and Henry L. Abbot. *Report Upon The Physics and Hydraulics Of The Mississippi River; Upon The Protection Of The Alluvial Region Against Overflow; Upon The Deepening Of The Mouths: Based Upon Surveys And Investigations Made Under the Acts Of Congress Directing The Topographical And Hydrographical Survey Of The Delta Of The Mississippi River, With Such Investigations As Might Lead To Determine The Most Practical Plan For Securing It From Inundation, And The Best Mode Of Deepening The Channels At The Mouths Of the River*. Professional Papers of the Corps of Topographical Engineers, U.S. Army, No. 13. Washington D.C.: Government Printing Office, 1876; reprint, with additions, of Professional Paper No. 4, 1861.
- Johnson, Leland, R. *The Ohio River Division, U.S. Army Corps of Engineers: The History of a Central Command*. Cincinnati: Ohio River Division, 1992.
- Mills, Gary B. *Of Rivers and Men: The Story of the Vicksburg District, U.S. Army Corps of Engineers*. Vicksburg: Vicksburg District, 1978.
- Moore, Norman R. *Improvement of the Lower Mississippi River and Its Tributaries, 1931-1972*. Vicksburg: Mississippi River Commission, 1972.
- Ockerson, John A. *Examination and Survey for Protection of Atchafalaya, Black, and Red Rivers*, 1923.
- _____. *Outlets for Reducing Flood Heights: A paper presented at the 126th session of the MRC*. November 1913.
- Potter, Charles L. *Notes on Separation of Red and Atchafalaya Rivers from the Mississippi River: Comments on Mr. Ockerson's Notes*. June 1, 1923.
- _____. *Texas Basin Floodway: Memorandum for Board of Three*. June 15, 1928.
- Proceedings of the Mississippi River Commission, 1879-1950*.
- Reuss, Martin. *Army Engineers in the Memphis District: A Documentary Chronicle*. Memphis: Memphis District, 1982.

- _____. *Designing the Bayous: The Control of Water in the Atchafalaya Basin, 1800-1995*. Alexandria, Virginia: U.S. Army Corps of Engineers, 1998.
- _____. and Paul K. Walker. *Financing Water Resources Development: A Brief History*. Washington, D.C.: Office of Administrative Services, Office of the Chief of Engineers, Historical Division, 1983.
- Smith, Clarke S. *Report on Spillways, Vicinity of New Orleans, LA*. October 8, 1914.
- Taylor, Robert S. *Waste Weirs: A paper presented at the 126th session of the MRC*. November 1913.
- Townsend, Curtis M. *Flood Control of the Mississippi River: An Address by Col. McD. Townsend, United States Army, at Memphis, Tenn*. September 26, 1912.
- U.S. Army Engineer Waterways Experiment Station. "Experiment to Determine the Effects of Proposed Dredged Cut-Offs in the Mississippi River," *Report No. 1*, April 15, 1932.
- _____. "Experiment to Determine the Effects of Cut-Offs at Diamond Point and Yucatan Point, Mississippi River," 1933.
- _____. "Studies of Existing Cut-Offs and Atchafalaya River Improvements," *Technical Memorandum No. 92-7*, dated October 5, 1937.
- Winslow, E. Eveleth. *Occasional Papers, Engineer School, United States Army; Number 41: A Resume of Operations in the First and Second District, Mississippi River Improvement, 1882-1901*. Washington, D.C.: Engineer School Press, 1910.

Nonfederal Primary Sources

- "An Address by James B. Eads Before the St. Louis Merchant's Exchange." *Engineering News*, February 7, 1878, 44-45.
- Brown, Lytle, "Mississippi Flood Control," *Engineering News-Record*. February 6, 1930, 277-231.
- "Capt. Eads vs. the Mississippi River." *Engineering News*, February 7, 1878, 41.
- "Col. Potter Comments on Differences in Cost Estimate of Two Mississippi Flood Plans." *Engineering-News Record*, January 5, 1928, 27.
- "Commission Finds Mississippi Flood Control to Cost \$684,000.00." *Engineering-News Record*, December 22, 1927, 1007.
- Corthell, E.L. *A History of the Jetties at the Mouth of the Mississippi River*. New York: John Wiley & Sons, 1881.
- Elam, William E. "Flood Control Through Slope Correction." *Engineering News-Record*, June 28, 1928, 996-998.
- Ellet, Charles, Jr. *The Mississippi and Ohio Rivers: Containing Plans For The Protection Of The Delta From Inundation; And Investigations Of*

The Practicability And Cost Of Improving the Navigation Of The Ohio And Other Rivers By Means Of Reservoirs With An Appendix On The Bars At The Mouths Of The Mississippi. Philadelphia: Lippincott, Grambo, and Co., 1853.

"General Jadwin Reports on Flood Protection System for Mississippi River." *Engineering News-Record*, December 15, 1927, 961-966.

Jackson, Thomas H. "Flood Control on Alluvial Rivers, I." *Engineering News-Record*, January 17, 1931, 58-63.

_____. "Flood Control on Alluvial Rivers, II." *Engineering News-Record*, January 15, 1931, 105-108.

_____. "Flood Control on Alluvial Rivers, III." *Engineering News-Record*, January 22, 1931, 144-148.

"Last Scheme of Mr. Eads," *Engineering News*, March 14, 1878, 81-82.

"Letter but Not Spirit," *Engineering News-Record*, September 6, 337.

Matthes, Gerard H. "Paper No. 2329, Mississippi River Cutoffs, With Discussion by Messrs. W. E. Elam, C. L. Hall, H. D. Vogel, Harry N. Pharr, Lytle Brown, Anson Marston, E. J. Williams, Jr., and Eugene A. Graves, and Gerard Matthes." *Transactions of the American Society of Civil Engineers*, 113 (1948): 1-39.

_____. "Paradoxes of the Mississippi." *Scientific American* 184 (April 1951): 19-23.

McDonald, William. "Devastations of the Mississippi Flood." *Current History* 26 (2 July 1927): 630-632.

McHenry, Estill. *Addresses and Papers of James B. Eads, Together with a Biographical Sketch.* St. Louis: Slawson & Co., Printers, 1884.

Ockerson, J.A. "Paper No. 838, Dredges and Dredging on the Mississippi River," *Transactions of the American Society of Civil Engineers*, XL (December 1898): 215-310.

"Paper No. 1400: Final Report of the Special Committee on Floods and Flood Prevention, With Discussion By Messrs. H. M. Eakin, John. W. Hill, M. O. Leighton, Cyrus C. Babb, Kenneth C. Grant, B. F. Groat, H. M. Chittenden, Myron L. Fuller, Gerard H. Matthes, H. K. Barrows, N. C. Grover, E. C. La Rue, Farley Gannett, C. E. Grunsky, C. McD. Townsend, and Morris Knowles." *Transactions of the American Society of Civil Engineers*, LXXI (1917): 1218-1310.

"Paper No. 1505: Flood Problems, A Symposium, By Messrs. J.G. Sullivan, Gerard H. Matthes, Nathan C. Grover, John R. Freeman, J. A. Ockerson, Roy N. Towl, Arthur P. Davis, C. E. Grunsky, and Charles H. Paul." *Transactions of the American Society of Civil Engineers*, LXXXV (1922): 1383-1562.

"Paper No. 1709: Flood Control With Special Reference to the Mississippi River; A Symposium." *Transactions of the American Society of Civil Engineers*, 93 (1929): 655-966.

Report of the Board of State Engineers of the State of Louisiana. 1898-1940, 9 vols.

"The Mississippi." *Engineering News*, August 12, 1876, 263-264.

Townsend, C. McD. "Spillways," *Proceedings of the Louisiana Engineering Society*. XI (August 1925).

Published Secondary Sources

Cowdrey, Albert E. *This Land, This South: An Environmental History*. Lexington, Kentucky: The University Press of Kentucky, 1983.

Frank, Arthur Dewitt. *The Development of the Federal Program of Flood Control on the Mississippi River*. New York: Columbia University Press, 1930.

Hill, Forest G. *Roads, Rails, and Waterways: The Army Engineers and Early Transportation*. Norman, Oklahoma: University of Oklahoma Press, 1957.

Humphreys, Benjamin G. *Floods and Levees of the Mississippi River*. Washington, D.C.: The Mississippi River Levee Association, 1914.

Kemper, James P. *Floods in the Alluvial Valley of the Mississippi: A National Calamity, What Should be Done About It*. New Orleans: National Flood Commission, 1928.

_____. *Rebellious River*. Boston: Bruce Humphries, Inc., 1949.

Klorer, John. "The Flood Problem of the Lower Mississippi River," *Transactions of the American Society of Civil Engineers*, LXXXVIII (1924): 1007-1014.

McBride, Mary G., and Ann M. McLaurin, "The Origin of the Mississippi River Commission." *Louisiana History* 36 (Fall 1995): 389-411.

Morgan, Arthur E. *Dams and Other Disasters: A Century of the Army Corps of Engineers in Civil Works*. Boston: Porter Sargent Publisher, 1971.

Pabis, George. "The Destiny of a River: James Buchanan Eads, the U.S. Army Corps of Engineers and the Mississippi, 1865-1881." *Journal of the Georgia Association of Historians*, XXII, (2001): 100-141.

Reuss, Martin, "Andrew Humphreys and the Development of Hydraulic Engineering: Politics Politics and Technology in the Army Corps of Engineers, 1850-1950." *Technology and Culture* 26 (January 1985): 1-33.

_____. "The Art of Scientific Precision: River Research in the United States Army Corps of Engineers to 1945." *Technology and Culture*, 40, (April 1999): 292-323.

Robinson, Michael C., and Loyde T. Ethridge. "History of Bank Protection Through the Use of Revetment." *Centenary of the Permanent International Association of Navigation Congresses*, Brussels, Belgium, PIANC, 1985.

Shallat, Todd. *Structures in the Stream: Water, Science, and the Rise of the U.S. Army Corps of Engineers*. Austin: University of Texas Press, 1994.

Appendix A

Presidents of the Mississippi River Commission

Brevet Major General Quincy A. Gillmore

1st term: 1879-1882

2nd term: 1884-1888

Born Ohio. Graduate USMA 1849. Gillmore was an assistant engineer during the construction of Fort Monroe and later headed fortification of New York Harbor. During the Civil War, he earned a battlefield promotion for reduction of Fort Pulaski. He commanded Union forces that won the battle Somerset and later received a brevet promotion to major general resulting from his leadership in capturing Fort Wagner and demolishing Fort Sumter. He served as member of the MRC from 1882-1884 in between terms as MRC president. Gillmore was recognized as one of the preeminent 19th century authorities on cement materials—a reputation earned through his authorship of, *Practical Treatise on Limes, Hydraulic Cements and Mortars*, in 1872.

Brevet Brigadier General Cyrus B. Comstock

1st term: 1882-1884

2nd term: 1888-1895

Born Massachusetts. Graduate USMA 1855. Comstock served in many campaigns during the Civil War, including the siege of Vicksburg and the battles of Fredericksburg, Chancellorsville, Wilderness, Spotsylvania, Cold Harbor, Petersburg, Fort Fisher and Mobile. He served as General Ulysses S. Grant's secretary. After the war, he was superintending engineer of the geodetic survey of the Northern and Northwestern Lakes and later for the progress of the Eads jetties at the mouth of the Mississippi River. He was a member of the 1874 jetty board and the 1878 engineer board to improve low-water navigation on the Mississippi immediately prior to be named a member of the MRC. He was a Member of the MRC from 1879-1895 and served two terms as President. Comstock was elected as a member of the National Academy of Sciences in 1884.

Colonel George L. Gillespie 1985-1901

Born Tennessee. Graduate USMA 1862. During the Civil War, Gillespie commanded two engineer companies for the Army of the Potomac, building pontoon bridges and fortifications. He earned the Congressional Medal of Honor for most distinguished gallantry during the Battle of Cold Harbor and participated in climatic engagements in Virginia, including the surrender at Appomattox. His immediate post-war assignments were with occupation forces in the Southwest and along the Gulf of Mexico. He served with various harbor and fortification boards around the nation. He was supervising engineer of government control for erection of the Statue of Liberty. While MRC President, Gillespie also served as Chief of Engineers from 1901-1904.

Lieutenant Colonel Amos Stickney 1901-1903

Born Missouri. Graduate USMA 1864. During the Civil War, Stickney served on General Oliver O. Howard's staff during the March to the Seas and the Carolina campaign. His post-war services were largely connected with fortifications and river and harbor improvements. He helped to build the original canal on the Mississippi River at Keokuk, IA, including the design of all machinery. Prior to his appointment as MRC President, he served as the Fourth MRC District Engineer and as a Member of the Commission from 1894-1901. In these capacities he was heavily involved with formulating the Commission's early plans for treating the Atchafalaya River. Stickney also was appointed president of the Missouri River Commission in 1896.

Lieutenant Colonel Oswald H. Ernst 1903-1906

Born Ohio. Graduate USMA 1864. Ernst served as an assistant engineer for the Army of Tennessee during the Georgia campaign of the Civil War and was appointed assistant engineer of fortification for the Pacific Coast after the Battle of Atlanta. He was engaged in various river projects along the Mississippi River, mainly as the officer in charge of improvements between the mouths of the Missouri and Ohio Rivers, where he developed several successful contraction works methods. He served as aide-camp to President, and former MRC Member, Benjamin Harrison, followed by five years as Superintendent, USMA. He commanded the 1st

Brigade, I Corps, in Puerto Rico during Spanish-American War and served on the commission to determine the route of the Panama Canal. Ernst also served as a Member of the MRC from 1888-1894.

Colonel Clinton B. Sears 1906-1908

Born New York. Graduate USMA 1867. During the Civil War, Sears served in the enlisted ranks of the 95th Ohio Regiment during the battles of Vicksburg and Jackson. After the war, he served as an instructor at the USMA and was placed in charge of the construction of the academy's observatory. He also in charge of the MRC Third District and oversaw improvements to Vicksburg harbor. Sears served as Chief Engineer for the Philippine Islands Division from 1901 to 1903 and then as a Member of the MRC from 1904-1906.



Brigadier General William H. Bixby 1st term: 1908-1910 (As Colonel) 2nd term: 1917-1918 (acting)

Born Massachusetts. Graduate USMA 1873. Prior to his initial appointment to MRC, Bixby was assigned to river, harbor and lighthouse duty at Wilmington, Newport, Philadelphia, Cincinnati, Detroit and Chicago. As a captain, he served on the study team to determine a new maximum length of suspension bridges, thus avoiding channel blockages by bridge piers. This 1894 study was considered an engineering breakthrough, particularly on wind effects. After his first term as MRC president, he was promoted to the rank of Brigadier General and appointed Chief of Engineers from 1910-1913. Bixby left retirement to serve a second term as acting MRC President during World War I to free MRC President C. McDonald Townsend for active service.

Colonel Walter L. Fisk 1910-1911

Born Illinois. Graduate USMA 1877. After graduating from the USMA, Fisk was assigned to river, harbor, and defense projects along the Gulf Coast, Great Lakes and northeast coast and was placed in charge of the defenses for Portland Harbor. He also headed a survey of the northern and northwestern lakes prior to being named Chief Engineer Officer, Philippines Division. Fisk became Division Engineer, Lakes Division, prior to MRC appointment.



Colonel C. McDonald Townsend 1912-1920

Born New York. Graduate USMA 1879. After routine assignments, Townsend worked on the construction of the Washington, D.C. aqueduct. He headed the MRC Third District at Memphis and then was placed in charge of construction at Grand Rapids. He was assigned to the 3rd Engineer Battalion, Philippine Islands, and supervised road and harbor construction. He returned to Washington as a member of the Board of Engineers for Rivers and Harbors. World War I interrupted his term as MRC President. After retiring, Townsend authored, *The Hydraulic Principles Governing River and Harbor Construction*, in 1922.

Colonel Charles L. Potter 1920-1928

Born Maine. Graduate USMA 1886. Originally in the U.S. Cavalry, Potter served in the Indian Territory before transferring to the Corps of Engineers. During the Spanish-American War and the Philippine Insurrection, he was Chief Engineer, 8th Army Corps. During World War I he was Director of the Gas Service. His early rivers and harbors assignments included work at Memphis, Duluth, St. Paul, and St. Louis. Potter served as MRC president during the 1927 flood and prepared the MRC's comprehensive river control plan that was quashed by General Jadwin.

Brigadier General Thomas H. Jackson 1928-1932

Born Canada. Graduate USMA 1899. Jackson served as Engineer Officer, Department of Visayas, and as supervisor of construction at Iloilo and Fort William McKinley, all in the Philippine Islands. As secretary of the California Debris Commission, he developed a diversion and spillway plan for improving the Sacramento River. This was followed by district assignments at Dallas and Wheeling. During World War I, he organized engineer support for the American Expeditionary Force and remained in France after the armistice to supervise engineer supply operations. His post-war activities included 9th Corps Area Engineer and Pacific Division Engineer. During his term as MRC President, he ceded much of the independent authority of the Commission. Jackson also moved the MRC headquarters from St. Louis to Vicksburg, established the Waterways Experiment Station, and began implementing the Jadwin Plan.

Brigadier General Harley B. Ferguson 1932-1939

Born North Carolina. Graduate USMA 1897. Ferguson experienced military combat in Cuba, the Philippines and China. He made engineering history in 1911 with the raising of the *USS Maine* in Havana harbor. Just prior to World War I, he held several rivers and harbors assignments in the Northwest Division. During the war, he commanded the 105th Engineers and was 2nd Corps Engineer. After war, he served as Division Engineer for the Gulf, Central and South Atlantic Divisions. As MRC President, he directed the channel rectification program that made possible the ultimate transformation of the Jadwin Plan. Ferguson is considered one of the nation's great civil engineers.

Brigadier General Max C. Tyler 1939-1945

Born North Dakota. Graduate USMA 1903. Tyler worked on several Ohio River locks and dams prior to World War I and was District Engineer, Washington, D.C., from 1919-1923. After that assignment he was assistant and then District Engineer for the Wilson Dam and Lock and Dam No. 1 on the Tennessee River. Tyler was District Engineer for the New Orleans and Buffalo Districts, Division Engineer for the Great Lakes

Division, and Assistant Chief of Engineers prior to appointment as MRC President.

Major General Robert W. Crawford 1946-1948

Born New York. Graduate USMA 1914. Crawford commanded one of the first offensive gas units during World War I. His civil works assignments included District Engineer at Duluth, Honolulu, and New Orleans; executive assistant for the Administrator of Public Works; and briefly as a member of the Board of Engineers for Rivers and Harbors. He served in the Plans Division in late pre-war and early World War II years before becoming a combat commander in the 8th Armored Division. He was Assistant Chief of Staff, G-4, at Supreme Headquarters, Allied Expeditionary Force, and helped in the planning of the Normandy invasion. Crawford retired to become Executive Vice President, Lower Mississippi Valley Flood Control Association.



Brigadier General Peter A. Feringa 1949-1953

Born Netherlands. Graduate Lehigh University 1921. Feringa enlisted in the Army during World War I. He was commissioned as an officer shortly after graduating from Lehigh University. His early civil works assignments included District Engineer at Jacksonville and Savannah; Assistant to the Chief, Rivers and Harbors Division; twice a member of the Board of Engineers for Rivers and Harbors; and Assistant Chief of Engineers for Civil Works. In early assignments with the Office of the Chief of Engineers, Feringa pioneered the concept of basin-wide planning which was incorporated into the Flood Control Acts of 1936 and 1938.



Major General John R. Hardin 1953-1957

Born Maryland. Graduate USMA 1918. Hardin's assignments between the First and Second World Wars included assistant to the District Engineer, Washington, D.C.; duty with the 3rd Engineers, Hawaii; and construction of the spillway and main control gates at the Fort Peck Dam. He directed Army Air Forces construction in the Atlantic, Alaskan, and South American areas. During World War II, he served as Deputy Chief Engineer, European Theater of operations. His first post-war assignment was as MRC Secretary and as Deputy Division Engineer, Lower Mississippi Valley Division. Hardin later served as New Orleans District Engineer, Great Lakes Division Engineer, and Assistant Chief of Engineers.



Major General William A. Carter 1957-1960

Born Texas. Graduate USMA 1930. During World War II, Carter was 2nd Corps Engineer in North Africa and Sicily and later developed and executed the engineering plan for the Army portion of the Normandy invasion. Following the capture of the Remagen Bridge, he directed the construction of 11 additional spans across the Rhine River. His post-war assignments included, 3rd Army Engineer, Director of Installations (Logistics) at the Pentagon, and Engineer and Assistant Chief of Staff, G-4, in Japan. Carter left the MRC to be governor of the Panama Canal Zone.



Major General Thomas A. Lane 1960-1962

Born Massachusetts. Graduate USMA 1928. Prior to World War II, Lane held various assignments, including the Nicaragua Canal Survey. During the war, he organized and trained aviation units and was then operations officer on the Southwest Pacific Theater engineer staff. Lane's post-war assignments included Engineer Commissioner of the District of Columbia and Commander, Fort Leonard Wood.



Major General Ellsworth I. Davis 1962-1966

Born Washington. Graduate USMA 1932. Davis commanded engineer units during World War II and the Korean War. His civil works assignments included Assistant Supervising Engineer, Panama Canal; Executive Officer, Sacramento District; and Pacific Ocean Division Engineer. Immediately prior to appointment as MRC President, Davis was Engineer for U.S. Army Europe.



Major General Robert G. MacDonnell 1966-1969

Born Washington. Graduate USMA 1934. During World War II, MacDonnell was assistant engineer and later acting engineer for the 8th Army during the Pacific campaigns. His civil works assignments included Southwest Pacific Division Engineer. Prior to his appointment as MRC President, he served in the Office of the Chief of Engineers as Director of Military Supply, Director of Civil Works, and Deputy Chief of Engineers. MacDonnell's additional duties included chairmanship of the California Debris Commission, the Board of Engineers for Rivers and Harbors, and the Red River Compact Commission.



Major General Andrew P. Rollins, Jr. 1969-1971

Born Pennsylvania. Graduate Texas A&M College 1939. Rollins commanded the 27th Engineer Combat Battalion in the Southwest Pacific and during the occupation of Japan. His civil works assignments included Waterways Experiment Station Director and Kansas City District Engineer. He served the Office of the Chief of Engineers as Deputy Director and then Director of Military Construction. He was assigned to Vietnam in 1959-1960 with MAAG and returned there in 1967 as Commanding General, 18th Engineer Brigade. Rollins also served as Commanding Officer, Fort Leonard Wood, immediately prior to appointment as MRC President.



Major General Charles C. Noble 1971-1974

Born New York. Graduate USMA 1940. During World War II, Noble served as a battalion commander in the European Theatre. After the war, he served as Executive Officer, Manhattan District and deputy executive secretary of the Military Liaison Committee to the Atomic Energy Commission. His civil works assignments included Assistant District Engineer, New York District; District Engineer, Louisville District; and Director of Civil Works, Office of the Chief of Engineers. After directing the construction of Minuteman ICBM facilities in the Western United States, he became head engineer for the, United Nations Command and 8th Army in Korea. He served as Commanding General, U.S. Army Engineer Command, Vietnam, immediately prior to appointment as MRC President. Noble later ordered the first operation of the Morganza Floodway during the 1973 flood.



Major General Francis P. Koisch 1974-1977

Born New York. Graduate USMA 1942. During World War II, Koisch served with the Engineer Section, 8th Army, in the South Pacific, Philippines, and Japan. He also served as Deputy District Engineer, Philadelphia; Area Engineer in Keflavik, Iceland; Commander, 79th Engineer Group; and Deputy Director for Military Construction with the Office of the Chief of Engineers. As Fort Worth District Engineer, he was responsible for administering the designs and construction of the NASA Manned Spacecraft Center at Houston. Koisch served as special assistant to the Commanding General, U.S. Army Vietnam; North Atlantic Division Engineer; Director of Civil Works, Office of the Chief of Engineers.



Major General Robert Marshall 1977-1980

Born Washington, D.C. Graduate USMA 1943. During World War II, Marshall served with the 305th Engineer Battalion in the European Theater. During the Vietnam War, he was commanding officer of the 937th Engineer Combat Group. His other overseas assignments included Greece, Turkey and Korea. He also served as Assistant Director of Civil Works, Mobile District Engineer, Commanding General of Safeguard System Command at Huntsville, and Ballistic Missile Defense Program Manager in Washington D.C. Immediately prior to appointment as MRC President, Marshall served as Deputy Chief of Engineers.



Major General William E. Read 1981-1984

Born North Carolina. Graduate USMA 1950. During the Korean War, Read served with the 808th Engineer Aviation Battalion, in Okinawa and Korea. During the Vietnam War, he served as Commander, 5th Engineer Battalion, 9th Infantry Division; Commander, 4th Infantry Division Support Command; and Commander, Task Force Ivy. His other assignments included multiple positions with the U.S. Army Aviation Systems Command and Deputy Commanding General for Material Readiness. Read's civil works assignments included Tulsa District Engineer, Missouri River Division Engineer, and Assistant Chief of Engineers.



Major General Thomas A. Sands 1985-1989

Born Tennessee. Graduate USMA 1958. Sands, early career included several engineer assignments overseas. During the Vietnam War, he served with the 334th Armored Helicopter Company and was Commanding Officer, 26th Engineer Battalion, 23rd Infantry Division. He held various staff positions, including Executive Officer, U.S. Army Engineer Command in Vietnam, Assistant Director of Civil Works with Office of the Chief of Engineers, and Military Assistant to the Deputy Under Secretary of the Army. Sand's also served as the New Orleans District Engineer and the North Atlantic Division Engineer.



Major General Arthur Williams 1990-1992

Born New York. Graduate Saint Lawrence University 1960. During the Vietnam War, Williams served as a company commander for the 87th Engineer Battalion and as operations officer for the 577th Engineer Battalion. He also served as Commander, 44th Engineer Battalion, 2nd Engineer Group with the United Nations Command, U.S. Forces in Korea. His civil works assignments included Deputy Commander, St. Paul District, Sacramento District Engineer, and Pacific Ocean Division Engineer. Williams was promoted to rank of lieutenant general in 1992 and served as Chief of Engineers from 1992-1996.



Major General Pat M. Stevens, IV 1992-1994

Born California. Graduate USMA 1963. During the Vietnam War, Stevens served as Company Commander, 103rd Engineer Company, and with Headquarters, 159th Engineer Group. During operations Desert Shield and Desert Storm, he served as Deputy Director, Logistics, United States Central Command, Saudi Arabia. His other key positions included Chief of Staff, U.S. Army Corps of Engineers; Commanding Officer, 30th Engineer Battalion; and Plans Officer, Office of the Assistant Chief of Staff for Intelligence. Stevens' civil works assignments included Vicksburg District Engineer and North Pacific Ocean Division engineer.



Brigadier General Eugene S. Witherspoon 1994-1995

Born South Carolina, Graduate USMA 1961. During the Vietnam War, Witherspoon served with the 937th Engineer Group. His civil works assignments included Vicksburg District Deputy Commander, New Orleans District Engineer, Missouri River Division Engineer and Transatlantic Division Engineer.



Major General Robert B. Flowers 1995-1997

Born Pennsylvania. Graduate Virginia Military Institute 1969. During Operations Desert Shield and Desert Storm, Flowers served as Commander, 20th Engineer Combat Brigade. His other key command and staff assignments included, Assistant Division Commander, 2nd Infantry Division; Deputy Commanding General, U.S. Army Engineer Center; and Assistant Commandant, U.S. Army Engineer School. Prior to his appointment as MRC President, he was deployed to Bosnia as the Deputy Chief of Staff for Engineering, U.S. Army Europe. Flowers was promoted to rank of lieutenant general in 2000 and appointed Chief of Engineers.



Major General Phillip R. Anderson 1997-2000

Born California. Graduate Virginia Military Institute 1970. Anderson's troop assignments included Company Commander, 27th Engineer Battalion; Executive Officer, 307th Engineer Battalion; and commander of both the 20th Engineer Battalion and the 36th Engineer Group. He was involved in many humanitarian relief efforts, including Army Forces Engineer during Operation Restore Hope in Somalia and Deputy Commander of U.S. Forces during the United Nations Mission in Haiti. Upon leaving MRC, Anderson became the South Atlantic Division Engineer.



Brigadier General Edwin Arnold 2000 -2002

Born Texas. Graduate University of Texas, 1972. Arnold's career assignments included battalion operations officer, supply officer, and commander at several posts within the U.S. He also served as Deputy Commander of the U.S. Army Engineer Center, Fort Leonard Wood; Commander, 1st Armored Division Engineer Brigade; and Southwestern Division Engineer.



Brigadier General Don T. Riley 2002 -

Born California. Graduate USMA 1973. Riley's troop assignments include, Commanding Officer, 14th Engineer Battalion; Assistant Division Engineers and Chief, Plans and Exercises, 3rd Armored Division; Commander, 7th Engineer Battalion; Commander, 17th Engineer Battalion, Fort Hood; Chief, Plans and Exercises, I Corps; Commander 555th Engineer Group; Director, Maneuver Support Battle Lab, Fort Leonard Wood; and executive officer to the Commanding General, U.S. Army Training and Doctrine Command. Riley also served as the contract construction engineer for the Far East District in Korea and as Deputy Chief of Staff, Engineer Headquarters, U.S. Army Europe.



Appendix B

Members of the Mississippi River Commission

Bvt. BG Cyrus B. Comstock	U.S. Army	1879-1895
Benjamin Harrison (Indiana)	Civilian	1879-1881
James B. Eads (Missouri)	Civilian Engineer	1879-1883
Henry Mitchell	U.S. Coast & Geodetic Survey	1879-1888
Bvt. MG Quincy A. Gillmore	U.S. Army	1879-1888
Bvt. BG Charles R. Suter	U.S. Army	1879-1896
Benjamin M. Harrod (Louisiana)	Civilian Engineer	1879-1904
Robert S. Taylor (Indiana)	Civilian	1881-1914
Samuel W. Ferguson (Mississippi)	Civilian Engineer	1883-1890
George Davidson	U.S. Coast & Geodetic Survey	1888-1890
Lt. Col. Oswald H. Ernst	U.S. Army	1888-1894
Henry L. Whiting	U.S. Coast & Geodetic Survey	1890-1897
Henry Flad (Missouri)	Civil Engineer	1890-1898
Lt. Col. Amos Stickney	U.S. Army	1894-1901
MAJ Thomas Handbury	U.S. Army	1896-1902
Henry L. Marindin	U.S. Coast & Geodetic Survey	1897-1904
John A. Ockerson (Missouri)	Civilian Engineer	1898-1924
Lt. Col. Henry M. Adams	U.S. Army	1901-1904
MAJ Thomas Casey	U.S. Army	1902-1906
Lt. Col. Clinton B. Sears	U.S. Army	1904-1906
Henry B. Richardson (Louisiana)	Civilian Engineer	1904-1909
Homer P. Ritter	U.S. Coast & Geodetic Survey	1904-1919
Lt. Col. James L. Lusk	U.S. Army	1906-1906
Col. William T. Rossell	U.S. Army	1906-1913
Col. James G Warren	U.S. Army	1906-1919
Charles H. West (Mississippi)	Civilian Engineer	1910-1933
Col. Curtis McDonald Townsend	U.S. Army	1911-1920



Colonel William T. Rossell, Member,
Mississippi River Commission, 1906-1913.

Col. Lansing H. Beach	U.S. Army	1913-1920
Edward A. Glenn (Missouri)	Civilian	1914-1923
Robert L. Faris	U.S. Coast & Geodetic Survey	1919-1932
Col. Mason M. Patrick	U.S. Army	1919-1920
Col. Harry Burgess	U.S. Army	1920-1922



Colonel Harry Burgess, Member, Mississippi River
Commission, 1920-1922.

Col. Herbert Deakyne	U.S. Army	1920-1920
Lt. Col. Gustave R. Lukesh	U.S. Army	1921-1925
Col. George M. Hoffman	U.S. Army	1922-1927
Jerome O. Christie (Illinois)	Civilian	1923-1926
Edward Flad (Missouri)	Civilian Engineer	1924-1950
Col. Charles W. Kutz	U.S. Army	1925-1928
John W. Stipes (Illinois)	Civilian	1926-1930
Col. Edward H. Schulz	U.S. Army	1927-1929
Col. Ernest Graves (retired)	U.S. Army	1928-1953
Lt. Col. Jarvis J. Bain	U.S. Army	1929-1930
Lawrence A. Glenn (Illinois)	Civilian	1930-1933
Col. George R. Spalding	U.S. Army	1930-1935
RADM Leo O. Colbert	U.S. Coast & Geodetic Survey	1933-1956
Col. Francis B. Wilby	U.S. Army	1935-1938



Members of the Mississippi River Commission onboard the steamer *Mississippi* in Memphis during the May 1947 high water inspection trip. The members from left to right are: Colonel Ernest Graves, retired; Albert L. Culbertson; Colonel Clark Kittrell; Edward Flad; Harry N. Pharr; and Major General Robert W. Crawford, President.

Harry N. Pharr (Arkansas)	Civilian Engineer	1935-1947
Albert L. Culbertson (Illinois)	Civilian	1935-1954
Col. Roger G. Powell	U.S. Army	1938-1941
Col. Malcolm Elliott	U.S. Army	1941-1946
Col. Clark Kittrell	U.S. Army	1946-1950
DeWitt L. Pyburn (Louisiana)	Civilian Engineer	1948-1968
BG Don G. Shingler	U.S. Army	1950-1952
Eugene F. Salisbury (Missouri)	Civilian Engineer	1950-1965
BG Herbert D. Vogel	U.S. Army	1952-1954
BG Charles G. Holle	U.S. Army	1954-1955
Egbert A. Smith (Illinois)	Civilian	1954-1956
BG William E. Potter	U.S. Army	1954-1956
Col. John L. Person	U.S. Army	1955-1956
BG Paul D. Berrigan	U.S. Army	1956-1957
BG Lyle E. Seeman	U.S. Army	1956-1958
Harry L. Bolen (Illinois)	Civilian	1956-1961



Mr. Tom Gibson of Friars Point, Mississippi, (standing) addresses the Members of the Mississippi River Commission during a public hearing onboard the steamer Mississippi in May 1954. Sitting from left to right are: Brigadier General Herbert D. Vogel; Rear Admiral Leo O. Colbert; Brigadier General John R. Hardin, President; Albert L. Culbertson; and Eugene F. Salisbury.



The Members of the Mississippi River Commission in 1966. From left to right are: Major General George H. Walker; Harold T. Council; Dewitt Pyburn; Major General Ellsworth I. Davis, President; Colonel Joe Clema (standing), Secretary; Vice Admiral H. Arnold Karo; Brigadier General Walter P. Leber; and Dr. Frederick H. Kellogg.

RADM H. Arnold Karo (retired)	U.S. Coast & Geodetic Survey	1956-1966
MG Gerald E. Galloway	U.S. Army	1958-1958
MG Keith R. Barney	U.S. Army	1958-1960
BG William W. Lapsley	U.S. Army	1958-1961
BG William R. Shuler	U.S. Army	1960-1962
BG Jackson Graham	U.S. Army	1961-1963
Harold T. Council (Mississippi)	Civilian	1961-1977
BG Carroll H. Dunn	U.S. Army	1962-1964
BG Robert F. Seedlock	U.S. Army	1963-1963
BG Walter P. Leber	U.S. Army	1963-1967
MG George H. Walker	U.S. Army	1964-1967
Dr. Frederick H. Kellog (TN)	Civilian Engineer	1965-1974
RADM James C. Tison (retired)	U.S. Coast & Geodetic Survey	1967-1968
BG William T. Bradley	U.S. Army	1967-1968
MG Willard Roper	U.S. Army	1967-1974

BG C. Craig Cannon	U.S. Army	1968-1969
MG Clarence C. Haug	U.S. Army	1968-1969
Roy T. Sessums (Louisiana)	Civilian Engineer	1968-1984
RADM Don A. Jones	National Oceanic Survey	1968-1972
MG Harold R. Parfit	U.S. Army	1970-1975
RADM Adam L. Powell	National Oceanic Survey	1972-1979
BG Wayne S. Nichols	U.S. Army	1974-1975
W. Richard Hall (Tennessee)	Civilian Engineer	1974-1979
BG Charles I. McGinnis	U.S. Army	1975-1977
MG Elvin R. Heiberg, III	U.S. Army	1976-1979
BG William R. Read	U.S. Army	1977-1979
James W. Yancy (Arkansas)	Civilian	1978-1979
MG Richard L. Harris	U.S. Army	1979-1980
MG Louis W. Prentiss, Jr.	U.S. Army	1979-1981



The Members of the Mississippi River Commission onboard the motor vessel *Mississippi* in 1984. From left to right are: Rear Admiral John D. Bossler; Brigadier General Richard S. Kem; Sam E. Angel; Major General William E. Read, President; R. D. James; Brigadier General Jerome B. Hilmes; and Colonel Yore, Secretary.

Sam E. Angel (Arkansas)	Civilian	1979-
R.D. James (Missouri)	Civilian Engineer	1981-
MG Hugh Robinson	U.S. Army	1981-1983
BG Richard S. Kem	U.S. Army	1981-1985
RADM Herbert R. Lippold	National Oceanic Survey	1982-1983
BG Jerome B. Hilmes	U.S. Army	1983-1988
RADM John D. Bossler	Nat. Oceanic & Atmosph. Adm.	1984-1986
BG Robert J. Dacey	U.S. Army	1985-1987
Frank H. Walk (Louisiana)	Civilian Engineer	1987-1998
BG Charles E. Edgar	U.S. Army	1987-1990
RADM Wesley V. Hull	Nat. Oceanic & Atmosph. Adm.	1988-1990
BG Gerald E. Galloway, Jr.	U.S. Army	1988-1995
BG Paul Y. Chinen	U.S. Army	1990-1992
RADM J. Austin Yeager	Nat. Oceanic & Atmosph. Adm.	1991-1995
BG Albert J. Genetti, Jr.	U.S. Army	1992-1998
RADM John C. Albright	Nat. Oceanic & Atmosph. Adm.	1995-1999
William Clifford Smith (LA)	Civilian Engineer	1998-
BG Robert Griffin	U.S. Army	1998-2001
RADM Nicholas A. Prael	Nat. Oceanic & Atmosph. Adm.	1999-
BG Carl A. Strock	U.S. Army	1998-2001
BG Steven R. Hawkins	U.S. Army	2001-
BG David Fastabend	U.S. Army	2001-2003
BG William T. Grisoli	U.S. Army	2003-

Appendix C

1879 Mississippi River Commission Act

Forty-Sixth Congress, Sess. I. Ch. 43. 1879

Chap. 43 - An act to provide for the appointment of a "Mississippi River Commission" for the improvement of said river from the Head of the Passes near its mouth to its headwaters.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That a commission is hereby created, to be called "The Mississippi River Commission," to consist of seven members.

Sec. 2. The President of the United States shall, by and with the advice and consent of the Senate, appoint seven commissioners, three of whom shall be selected from the Engineer Corps of the Army, one from the Coast and Geodetic Survey, and three from civil life, two of whom shall be civil engineers. And any vacancy which may occur in the commission shall in like manner be filled by the President of the United States; and he shall designate one of the commissioners appointed from the Engineer Corps of the Army to be president of the commission. The commissioners appointed from the Engineer Corps of the Army and the Coast and Geodetic Survey shall receive no other pay or compensation than is now allowed them by law, and the other three commissioners shall receive as pay and compensation for their services each the sum of three thousand dollars per annum; and the commissioners appointed under this act shall remain in office subject to removal by the President of the United States.

Sec. 3. It shall be the duty of said commission to direct and complete, such surveys of said river, between the Head of the Passes near its mouth to its headwaters as may now be in progress, and to make such additional surveys, examinations, and investigations, topographical, hydrographical, and hydrometrical, of said river and its, tributaries, as may be deemed necessary by said commission to carry out the objects of this act. And to enable said commission to complete, such surveys, examinations, and investigations, the Secretary of War shall, when requested by said commission, detail from the Engineer Corps of the Army such officers and men as may be necessary, and shall place in the charge and for the use of said commission such vessel or vessels and such machinery and instruments as may be under his control and maybe deemed necessary. And the Secretary of the Treasury shall, when requested by said commission in like manner detail

from the Coast and Geodetic Survey such officers and men as may be necessary, and shall place in the charge and for the use of said commission such vessel or vessels and such machinery and instruments as may be under his control and may be deemed necessary. And the said commission may, with the approval of the Secretary of War, employ such additional force and assistants, and provide, by purchase or otherwise, such vessels or boats and such instruments and means as may be deemed necessary.

Sec. 4. It shall be the duty of said commission to take into consideration and mature such plan or plans and estimates as will correct, permanently locate, and deepen the channel and protect the banks of the Mississippi River; improve and give safety and ease to the navigation thereof; prevent destructive floods; promote and facilitate commerce, trade, and the postal service; and when so prepared and matured, to submit to the Secretary of War a full and detailed report of their proceedings and actions, and of such plans, with estimates of the cost thereof, for the purposes aforesaid, to be by him transmitted to Congress: Provided, That the commission shall report in full upon the practicability, feasibility, and probable cost of the various plans known as the jetty system, the levee system, and the outlet system, as well as upon such others as they deem necessary.

Sec. 5. The said commission may, prior to the completion of all the surveys and examinations contemplated by this act, prepare, and submit to the Secretary of War plans, specifications, and estimates of costs for such immediate works as, in the judgment of said commission, may constitute a part of the general system of works herein contemplated, to be by him transmitted to Congress.

Sec. 6. The Secretary of War may detail from the Engineer Corps of the Army of the United States an officer to act as secretary of said commission.

Sec. 7. The Secretary of War is hereby authorized to expend the sum of one hundred and seventy-five thousand dollars, or so much thereof as may be necessary, for the payment of the salaries herein provided for, and of the necessary expenses incurred in the completion of such surveys as may now be in progress, and of such additional surveys, examinations, and investigations as may be deemed necessary, reporting the plans and estimates, and the plans, specifications, and estimates contemplated by this act, as herein provided for; and said sum is hereby appropriated for said purposes out of any money in the Treasury not otherwise appropriated.

Approved, June 28, 1879.

Appendix D

1917 Flood Control Act

Sixty-Fourth Congress, Sess. II. Ch. 144. 1917

Chap. 144. An Act to provide for the control of the floods of the Mississippi River and of the Sacramento River, Calif., and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That for controlling the floods of the Mississippi River and continuing its improvement from the Head of Passes and the mouth of the Ohio River the Secretary of War is hereby empowered, authorized, and directed to carry on, continuously, by hired labor or otherwise, the plans of the Mississippi River Commission heretofore or hereafter adopted; to be paid for as appropriations may from time to time be made by law, not to exceed in the aggregate \$45,000,000: Provided, That not more than \$10,000,000 shall be expended therefore during any one fiscal year.

(a) All money appropriated under authority of this section shall be expended under the direction of the Secretary of War in accordance with the plans, specifications, and recommendations of the Mississippi River Commission as approved by the Chief of Engineers, for controlling the floods and for the general improvement of the Mississippi River, and for surveys, including the survey from the Head of the Passes to the headwaters of the river, and a survey of the Atchafalaya Outlet so far as may be necessary to determine the cost of protecting its basin from the flood waters of the Mississippi River either by its divorcement from the Mississippi River or by other means, and for salaries, clerical, office, traveling, and miscellaneous expenses of the Mississippi River Commission.

(b) That no money appropriated under authority of this section shall be expended in the construction or repair of any levee unless and until assurances have been given satisfactory to the commission that local interests protected thereby will contribute for such construction and repair a sum which the commission shall determine to be just and equitable but which shall not be less than one-half of such sum as may have been allotted by the commission for such work: Provided, That such contributions shall be expended under the direction of the commission, or in such manner as it may require or approve, but no contribution made by any State or levee district shall be expended in any other State or levee district except with the approval of the authorities of the State or district so contributing.

(c) Any funds which may hereafter be appropriated under authority of this Act for improving the Mississippi River between the Head of the Passes and the mouth of the Ohio River, and which may be allotted to levees, may be expended upon any part of said river between the Head of Passes and Rock Island, Illinois.

(d) No money appropriated under authority of this Act shall be expended in payment for any right of way for any levee which may be constructed in cooperation with any State or levee district under authority of this Act, but all such rights of way shall be provided free of cost to the United States: Provided, That no money paid or expense incurred by any State or levee District in securing such rights of way, or in any temporary works of emergency during an impending flood, or for the maintenance of any levee line, shall be computed as a part of the contribution of such State or levee district toward the construction or repair of any levee within the meaning of paragraph (b) of this section.

That the watercourses connected with the Mississippi River to such extent as may be necessary to exclude the flood waters from the upper limits of any delta basin together with the Ohio River from its mouth to the mouth of the Cache River, may, in the discretion of said commission, receive allotments for improvements now under way or hereafter to be undertaken.

Upon the completion of any levee constructed for flood control under authority of this Act, said levee shall be turned over to the levee district protected thereby for maintenance thereafter; but for all other purposes the United States shall retain such control over the same as it may have the right to exercise upon such completion.

Sec. 2. Sacramento River, Calif.

General Provisions.

Sec. 3. That all the provisions of existing law relating to examinations and surveys and to works of improvement of rivers and harbors shall apply, so far as applicable, to examinations and surveys and to works of improvement relating to flood control. And all expenditures of funds hereafter appropriated for works and projects relating to flood control shall be made in accordance with and subject to the law governing the disbursement and expenditure of funds appropriated for the improvement of rivers and harbors.

All examinations and surveys of projects relating to flood control shall include a comprehensive study of the watershed or watersheds, and the report thereon in addition to any other matter upon which a report is required shall give such data as it may be practicable to secure in regard to (a) the extent and character of the area to be affected by the proposed

improvement; (b) the probable effect upon any navigable water or waterway; (c) the possible economical development and utilization of water power; and (d) such other uses as may be properly related to or coordinated with the project. And the heads of the several departments of the Government may, in their discretion, and shall upon the request of the Secretary of War, detail representatives from their respective departments to assist the Engineers of the Army in the study and examination of such watersheds, to the end that duplication of work may be avoided and the various services of the Government economically coordinated therein: Provided, That all reports on preliminary examinations hereafter authorized, together with the report of the Board of Engineers for Rivers and Harbors thereon and the separate report of the representative of any other department, shall be submitted to the Secretary of War by the Chief of Engineers, with his recommendations, and shall be transmitted by the Secretary of War to the House of Representatives, and are hereby ordered to be printed when so made.

In the consideration of all works and projects relating to flood control which may be submitted to the Board of Engineers for Rivers and Harbors for consideration and recommendation, said board shall, in addition to any other matters upon which it may be required to report, state its opinion as to (a) what Federal interest, if any, is involved in the proposed improvement; (b) what share of the expense, if any, should be borne by the United States; and (c) the advisability of adopting the project.

All examinations and reports which may now be made by the Board of Engineers for Rivers and Harbors upon request of the Committee on Rivers and Harbors relating to works or projects of navigation shall in like manner be made upon request of the Committee on Flood Control on all works and projects relating to flood control.

Sec. 4. That the salary of the civilian members of the Mississippi River Commission shall hereafter be \$5,000 per annum.

Approved, March 1, 1917.

Appendix E

1928 Flood Control Act

Seventieth Congress, Sess. I. Ch. 596. 1928

Chap. 569-An Act For the control of floods on the Mississippi River and its tributaries, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the project for the flood control of the Mississippi River in its alluvial valley and for its improvement from the Head of Passes to Cape Girardeau, Missouri, in accordance with the engineering plan set forth and recommended in the report submitted by the Chief of Engineers to the Secretary of War dated December 1, 1927, and printed in House Document Numbered 90, Seventieth Congress, first session, is hereby adopted and authorized to be prosecuted under the direction of the Secretary of War and the supervision of the Chief of Engineers: Provided, That a board to consist of the Chief of Engineers, the president of the Mississippi River Commission, and a civil engineer chosen from civil life to be appointed by the President, by and with the advice and consent of the Senate, whose compensation shall be fixed by the President and be paid out of the appropriations made to carry on this project, is hereby created; and such board is authorized and directed to consider the engineering differences between the adopted project and the plans recommended by the Mississippi River Commission in its special report dated November 28, 1927, and after such study and such further surveys as may be necessary, to recommend to the President such action as it may deem necessary to be taken in respect to such engineering differences and the decision of the President upon all recommendations or questions submitted to him by such board shall be followed in carrying out the project herein adopted. The board shall not have any power or authority in respect to such project except as hereinbefore provided. Such project and the changes therein, if any, shall be executed in accordance with the provisions of section 8 of this Act. Such surveys shall be made between Baton Rouge, Louisiana, and Cape Girardeau, Missouri, as the board may deem necessary to enable it to ascertain and determine the best method of securing flood relief in addition to levees, before any flood-control works other than levees and revetments are undertaken on that portion of the river: Provided, That all diversion works and outlets constructed under the provisions of this Act shall be built in a manner and of a character which

will fully and amply protect the adjacent lands: Provided further, That pending completion of any floodway, spillway, or diversion channel, the areas within the same shall be given the same degree of protection as is afforded by levees on the west side of the river contiguous to the levee at the head of said floodway, but nothing herein shall prevent, postpone, delay, or in anywise interfere with the execution of that part of the project on the east side of the river, including raising, strengthening, and enlarging the levees on the east side of the river. The sum of \$325,000,000 is hereby authorized to be appropriated for this purpose.

All unexpended balances of appropriations heretofore made for prosecuting work of flood control on the Mississippi River in accordance with the provisions of the Flood Control Acts approved March 1, 1917, and March 4, 1923, are hereby made available for expenditure under the provisions of this Act, except section 13.

Sec. 2. That it is hereby declared to be the sense of Congress that the principle of local contribution toward the cost of flood-control work, which has been incorporated in all previous national legislation on the subject, is sound, as recognizing the special interest of the local population in its own protection, and as a means of preventing inordinate requests for unjustified items of work having no material national interest. As a full compliance with this principle in view of the great expenditure estimated at approximately \$292,000,000, heretofore made by the local interests in the alluvial valley of the Mississippi River for protection against the floods of that river; in view of the extent of national concern in the control of these floods in the interests of national prosperity, the flow of interstate commerce, and the movement of the United States mails; and, in view of the gigantic scale of the project, involving flood waters of a volume and flowing from a drainage area largely outside the States most affected, and far exceeding those of any other river in the United States, no local contribution to the project herein adopted is required.

Sec. 3. Except when authorized by the Secretary of War upon the recommendation of the Chief of Engineers, no money appropriated under authority of this Act shall be expended on the construction of any item of the project until the States or levee districts have given assurances satisfactory to the Secretary of War that they will (a) maintain all flood-control works after their completion, except controlling and regulating spillway structures, including special relief levees; maintenance includes normally such matters as cutting grass, removal of weeds, local drainage, and minor repairs of main river levees; (b) agree to accept land turned over to them under the provisions of section 4; (c) provide without cost to the United States, all rights of way for levee foundations and levees on the main stem

of the Mississippi River between Cape Girardeau, Missouri, and the Head of Passes.

No liability of any kind shall attach to or rest upon the United States for any damage from or by floods or flood waters at any place: Provided, however, That if in carrying out the purposes of this Act it shall be found that upon any stretch of the banks of the Mississippi River it is impracticable to construct levees, either because such construction is not economically justified or because such construction would unreasonably restrict the flood channel, and lands in such stretch of the river are subjected to overflow and damage which are not now overflowed or damaged by reason of the construction of levees on the opposite banks of the river it shall be the duty of the Secretary of War and the Chief of Engineers to institute proceedings on behalf of the United States Government to acquire either the absolute ownership of the lands so subjected to overflow and damage or floodage rights over such lands.

Sec. 4. The United States shall provide flowage rights for additional destructive flood waters that will pass by reason of diversions from the main channel of the Mississippi River: Provided, That in all cases where the execution of the flood-control plan herein adopted results in benefits to property such benefits shall be taken into consideration by way of reducing the amount of compensation to be paid.

The Secretary of War may cause proceedings to be instituted for the acquirement by condemnation of any lands, easements, or rights of way which, in the opinion of the Secretary of War and the Chief of Engineers, are needed in carrying out this project, the said proceedings to be instituted in the United States district court for the district in which the land, easement, or right of way is located. In all such proceedings the court, for the purpose of ascertaining the value of the property and assessing the compensation to be paid, shall appoint three commissioners, whose award, when confirmed by the court, shall be final. When the owner of any land, easement, or right of way shall fix a price for the same which, in the opinion of the Secretary of War is reasonable, he may purchase the same at such price; and the Secretary of War is also authorized to accept donations of lands, easements, and rights of way required for this project. The provisions of sections 5 and 6 of the River and Harbor Act of July 18, 1918, are hereby made applicable to the acquisition of lands, easements, or rights of way needed for works of flood control: Provided That any land acquired under the provisions of this section shall be turned over without cost to the ownership of States or local interests.

Sec. 5. Subject to the approval of the heads of the several executive departments concerned, the Secretary of War, on the recommendation of the Chief of Engineers, may engage the services and assistance of the

Coast and Geodetic Survey, the Geological Survey, or other mapping agencies of the Government, in the preparation of maps required in furtherance of this project, and funds to pay for such services may be allotted from appropriations made under authority of this Act.

Sec. 6. Funds appropriated under authority of section 1 of this Act may be expended for the prosecution of such works for the control of the floods of the Mississippi River as have heretofore been authorized and are not included in the present project, including levee work on the Mississippi River between Rock Island, Illinois, and Cape Girardeau, Missouri, and on the outlets and tributaries of the Mississippi River between Rock Island and Head of Passes in so far as such outlets or tributaries are affected by the backwaters of the Mississippi: Provided, That for such work on the Mississippi River between Rock Island, Illinois, and Cape Girardeau, Missouri, and on such tributaries, the States or levee districts shall provide rights of way without cost to the United States, contribute 33 1/3 per centum of the costs of the works, and maintain them after completion: And provided further, That not more than \$10,000,000 of the sums authorized in section 1 of this Act, shall be expended under the provisions of this section.

In an emergency, funds appropriated under authority of section 1 of this Act may be expended for the maintenance of any levee when it is demonstrated to the satisfaction of the Secretary of War that the levee can not be adequately maintained by the State or levee district.

Sec. 7. That the sum of \$5,000,000 is authorized to be appropriated as an emergency fund to be allotted by the Secretary of War on the recommendation of the Chief of Engineers, in rescue work or in the repair or maintenance of any flood-control work on any tributaries of the Mississippi River threatened or destroyed by flood including the flood of 1927.

Sec. 8. The project herein authorized shall be prosecuted by the Mississippi River Commission under the direction of the Secretary of War and supervision of the Chief of Engineers and subject to the provisions of this Act. It shall perform such functions and through such agencies as they shall designate after consultation and discussion with the president of the commission. For all other purposes the existing laws governing the constitution and activities of the commission shall remain unchanged. The commission shall make inspection trips of such frequency and duration as will enable it to acquire first-hand information as to conditions and problems germane to the matter of flood control within the area of its jurisdiction; and on such trips of inspection ample opportunity for hearings and suggestions shall be afforded persons affected by or interested in such problems. The president of the commission shall be the executive officer thereof and shall have the qualifications now prescribed by law for the

Assistant Chief of Engineers, shall have the title brigadier general, Corps of Engineers, and shall have the rank, pay, and allowances of a brigadier general while actually assigned to such duty: Provided, That the present incumbent of the office may be appointed a brigadier general of the Army, retired, and shall be eligible for the position of president of the commission if recalled to active service by the President under the provisions of existing law.

The salary of the president of the Mississippi River Commission shall hereafter be \$10,000 per annum, and the salary of the other members of the commission shall hereafter be \$7,500 per annum. The official salary of any officer of the United States Army or other branch of the Government appointed or employed under this Act shall be deducted from the amount of salary or compensation provided by, or which shall be fixed under, the terms of this Act.

Sec. 9. The provisions of sections 13, 14, 16, and 17 of the River and Harbor Act of March 3, 1899, are hereby made applicable to all lands, waters, easements, and other property and rights acquired or constructed under the provisions of this Act.

Sec. 10. That it is the sense of Congress that the surveys of the Mississippi River and its tributaries, authorized pursuant to the Act of January 21, 1927, and House Document Numbered 308, Sixty-ninth Congress, first session, be prosecuted as speedily as practicable, and the Secretary of War, through the Corps of Engineers, United States Army, is directed to prepare and submit to Congress at the earliest practicable date projects for flood control on all tributary streams of the Mississippi River system subject to destructive floods which shall include: The Red River and tributaries, the Yazoo River and tributaries, the White River and tributaries, the Saint Francis River and tributaries, the Arkansas River and tributaries, the Ohio River and tributaries, the Missouri River and tributaries, and the Illinois River and tributaries; and the reports thereon, in addition to the surveys provided by said House Document 308, Sixty-ninth Congress, first session, shall include the effect on the subject of further flood control of the lower Mississippi River to be attained through the control of the flood waters in the drainage basins of the tributaries by the establishment of a reservoir system; the benefits that will accrue to navigation and agriculture from the prevention of erosion and siltage entering the stream; a determination of the capacity of the soils of the district to receive and hold waters from such reservoirs; the prospective income from the disposal of reservoir waters; the extent to which reservoir waters may be made available for public and private uses; and inquiry as to the return flow of waters placed in the soils from reservoirs, and as to their stabilizing effect on stream flow as a means of preventing erosion, siltage, and improving navigation: Provided, That

before transmitting such reports to Congress the same shall be presented to the Mississippi River Commission, and its conclusions and recommendations thereon shall be transmitted to Congress by the Secretary of War with his report.

The sum of \$5,000,000 is hereby authorized to be used out of the appropriation herein authorized in section 1 of this Act, in addition to amounts authorized in the River and Harbor Act of January 21, 1927, to be expended under the direction of the Secretary of War and the supervision of the Chief of Engineers for the preparation of the flood-control projects authorized to be submitted to Congress under this section: Provided further, That the flood surveys herein provided for shall be made simultaneously with the flood-control work on the Mississippi River provided for in this Act: And provided further, That the President shall proceed to ascertain through the Secretary of Agriculture and such other agencies as he may deem proper, the extent to and manner in which the floods in the Mississippi Valley may be controlled by proper forestry practice.

Sec. 11. That the Secretary of War shall cause the Mississippi River Commission to make an examination and survey of the Mississippi River below Cape Girardeau, Missouri, (a) at places where levees have heretofore been constructed on one side of the river and the lands on the opposite side have been thereby subjected to greater overflow, and where, without unreasonably restricting the flood channel, levees can be constructed to reduce the extent of this overflow, and where the construction of such levees is economically justified, and report thereon to the Congress as soon as practicable with such recommendations as the commission may deem advisable; (b) with a view to determining the estimated effects, if any, upon lands lying between the river and adjacent hills by reason of overflow of such lands caused by the construction of levees at other points along the Mississippi River, and determining the equities of the owners of such lands and the value of the same, and the commission shall report thereon to the Congress as soon as practicable with such recommendation as it may deem advisable: Provided, That inasmuch as the Mississippi River Commission made a report on the 26th day of October, 1912, recommending a levee to be built from Tiptonville, Tennessee, to the Obion River in Tennessee, the said Mississippi River Commission is authorized to make a resurvey of said proposed levee and a relocation of the same if necessary, and if such levee is found feasible, and is approved by the board created in section 1 of this Act, and by the President the same shall be built out of appropriations hereafter to be made.

Sec. 12. All laws or parts of laws inconsistent with the above are hereby repealed.

Sec. 13. That the project for the control of floods in the Sacramento River, California, adopted by section 2 of the Act approved March 1, 1917, entitled "An Act to provide for the control of the floods of the Mississippi River and of the Sacramento River, California, and for other purposes," is hereby modified in accordance with the report of the California Debris Commission submitted in Senate Document Numbered 23, Sixty-ninth Congress, first session: Provided, That the total amounts contributed by the Federal Government, including the amounts heretofore contributed by it, shall in no event exceed in the aggregate \$17,600,000.

Sec. 14. In every contract or agreement to be made or entered into for the acquisition of land either by private sale or condemnation as in this Act provided the provisions contained in section 3741 of the Revised Statutes being section 22 of title 41 of the United States Code shall be applicable.

Approved, May 15, 1928.

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