

## The Villainous River

At the Lower Ninth Ward, three fishermen sit in folding chairs perched among riprap boulders inside the Mississippi River levee slope. A walking path atop the levee is dotted with benches next to overflowing garbage cans. Dull humidity is occasionally teased by a gust of turbid air over the brown surface. Red ant bites from the unkempt grass along the backside slope needle my ankle. I slap at a horsefly on my neck. One of the fishermen fusses with a line hung up on a rock. Downriver, a line of tankers muscling against the current align like jetliners to a landing strip. This location—affectionately known by locals as “World’s End”—feels like the backstage of a technical performance. Industry echoes across the ribbony water. A school of three ducks float on a current as if on an ice flow. An amusing thought in this August heat. Every couple of minutes, a bellowing horn communicates a ship’s position. Currents in the middle of the river crest like class 2 whitecaps. A small transport boat, *Miss Emerson*, awaits an approaching downstream tanker making its slide around Algiers Point opposite downtown. This turn is treacherous. Pilots liken it to driving an 18-wheeler on ice.<sup>1</sup> In mid-June 2019, a barge hit the shore in Algiers, knocking over a utility pole and causing an outage for five thousand people.<sup>2</sup> As it swings around, the bow of the tanker points toward the opposite bank and its stern points east to the French Quarter. It turns in slow motion as *Miss Emerson* pulls up beside it. Two men climb out of the smaller vessel onto the ladder on the belly of the tanker. They will navigate the remaining 106 river miles to Pilot Town, which is accessible only by water or air, at the Bird’s Foot. Local pilots, members of the Crescent River Port Pilots Association, exert considerable political influence in the state. They earn more than \$520,000 a year, which is set by the state legislature. Each year, the pilots’s association hosts a delegation of lawmakers at Pilot Town for “educational” purposes. For many of the most experienced pilots, the year 2019 was their most difficult on the river. It had been in flood stage for a record seven months.<sup>3</sup>

After the pilot climbs aboard the tanker, it appears from my distant vantage point that *Miss Emerson* almost nudges the tanker into its turn before backing off and readying for the next tanker coming upstream from Pilot Town. Meanwhile, the nineteenth-century *Creole Queen* paddle wheeler makes its sliding turn behind the tanker as it takes its usual round of tourists to the Chalmette Battlefield to recite the Battle of New Orleans.<sup>4</sup> On the swollen river, debris surfs along the currents. The high stage of the river has inundated the normally sandy forests that sprout up in the sandy batture forest inside the levee. By July 2019, the immediate threat of the levee overtopping had passed, but the river level towered over the Ninth Ward rooftops down the slope of the grassy side of the levee. Strange that such a specter could be normalized.

A pair of tugboats are moored against rusted wharves. There is little of what is perceived as the “natural world” in this industrial corridor—even as the men next to me cast their lines in the water. Their buckets are empty, but they had just arrived. “Y’all leave any fish in the lake for us?” ask three newcomers, who stake a place among the concrete just inside the point where the levee forks into the Industrial Canal and cleaves through the Ninth Ward, forming the Upper and Lower Nine. A pair of tugboats with barges wait in the canal for the St. Claude Avenue drawbridge to rise. This geographic peculiarity opened this neighborhood to Katrina’s wrath. Water was funneled here from the Mississippi River Gulf Outlet (MRGO), which is a gaping passage that connects the Gulf of Mexico to the Industrial Canal, leaving the sliver of the Lower Ninth Ward of New Orleans and the adjacent towns of St. Bernard Parish completely deluged. The Gulf outlet, known as Mister Go, was closed by the Corps of Engineers after Katrina with a shell ridge down its middle to block commercial traffic, but a fifteen-year stalemate over marsh restoration funding between the Corps and the state prevented reducing its gaping width and leaving vulnerable the hardest-hit communities of the Lower Ninth Ward and St. Bernard Parish that were flooded by Katrina.

The fishermen cast their lines of shrimp and other small bait into the brown water as if it was the most normal thing to do—as if the catch was safe to eat, which they said they would do. I walk down the levee through the tall grass to my car and slowly drive upriver toward the French Quarter. Still, the summer before COVID shutdowns, tourists ply T-shirt shops with Styrofoam cups of daiquiris and overwrought straw hats oblivious to the cat-and-mouse game of steel and hydrology taking place just out of view. More Caribbean than American, New Orleans is widely represented and often misunderstood by its visitors. The Louisiana novelist James Lee Burke once described it as a city where “the air smells of the river, dead beetles in a storm sewer, the wine and beer cups in the gutters, damp soil and night-blooming flowers and lichen on stone.”<sup>5</sup> But that doesn’t fully capture it.

We keep the river at arm's length. It hides much danger below its surface. It is notoriously dangerous for those who find themselves in the water by accident or on purpose. Large debris—trees, boat wreckage, even fiberglass bathtubs—may move swiftly beneath the surface. It contains vortices and undertows at ever-shifting depths. Even those who wade along the water's edge may disappear, followed by others trying to save them. In April 2022, three teenagers were lost at Algiers Point across from the French Quarter when two of them waded into the water and a third tried to rescue them. The depth there dips to 100 feet, and a permanent eddy scours out a turn as the river swings eastward at over 90 degrees. There are places in the river that will trap a body under water. Calder and Wilkinson quote a river captain, "Even with a life jacket you can be pulled down. You're not going to swim against the current. It's impossible. The weight of the water is so heavy, and the velocity is so strong. You're helpless."<sup>6</sup>

#### TECHNOSCIENCE AND PATH DEPENDENCE

As a cultural and national symbol, the Mississippi inspired awe. It was characterized as both devil and savior in newspapers, speeches, and music. Some of the earliest forms of activism in the United States were organized around what to do about the Mississippi River. In many ways, the management of the Mississippi River provided a common site for organizing Americans of different geographic areas and political stripes around the modern notion of controlling American waters and ridding them of unruly mud. Through the past two centuries, every flood event represented the river's resistance to control and containment; and over time the river was hardened with higher levees and dams. These added constraints predictably caused a feedback loop of even greater pressure on man-made systems and more violent catastrophes. Extractive Thinking was upheld and reinforced by infrastructure and discourses of the river circulating through the halls of government, newspapers conventions, and various technical reports that reflected attempts to not only control the river, but live securely near it. At any time, the Mississippi could slide back into its preternatural state. Maintaining the Mississippi as a commercial waterway required the continual application of oversight and intervention by the US Army Corps of Engineers, the Mississippi River Commission, parish or county "levee boards," and organized petitions to the federal government. The Mississippi River and its tributaries were described by various interests at various times as a national artery and a great inland ocean that connected a divided land.

Christopher Morris calls the Mississippi our "imagined river," frozen in time and place by memory and earthen walls. Its continued existence relies not only on its cultural importance, but the militaristic determination by the Army Corps of Engineers, which maintains the channel and southern passes by means of a twenty-four-hour dredging and ridge reinforcement project.

As an alluvial river, the Mississippi is quite *unstable* from the perspective of a fixed channel.<sup>7</sup>

#### ENGINEERING CERTAINTY

In terms of engineering, the problem of the Mississippi was threefold. Its mouth was clogged with sandbars; its channel was ever changing from sediment, flood levels, and erosion; and it would often overflow its banks. All these problems are features of natural alluvial processes. They allow the silt and sediment to enrich soils, build land, and produce habitat. The river's shifting behavior affected the political economy of places it bordered. Preferred interventions, whether flood control levees or removal of rapids, that were advocated reflected local financial interests. These contesting interests were couched in discourses of sovereignty, nation building, security, and even religion. And each had a major influence on river science and policy in the nineteenth and twentieth centuries.

Taming the Mississippi River was an acute preoccupation, particularly for those whose fortunes were tied to it. The river appeared impervious to control. Bottom depths were ever changing from moving sandbars. Islands surfaced indiscriminately. Seasonal floods added orders of magnitude to its current and height. Mark Twain described the Mississippi as a particularly unruly object in his memoir, *Life on the Mississippi*: "A cut-off plays havoc with boundary lines and jurisdictions: for instance, a man is living in the State of Mississippi today, a cut-off occurs tonight, and tomorrow the man finds himself and his land over on the other side of the river, within the boundaries, and subject to the laws of the State of Louisiana! Such a thing, happening in the upper river in the old times, could have transferred a slave from Missouri to Illinois and made a free man of him."<sup>8</sup>

The Mississippi's most famous traveler cut his teeth as a steamboat pilot in the heyday of riverboat culture. In his memoirs, Twain reflects on the constant vigilance required of an apprentice pilot who plied the Mississippi before the age of dams and jetties. The turbid rush of sediment and silt built and washed away subsurface sandbars and protruding islands in a manner so fickle that nineteenth-century riverboat pilots were required to memorize every changing inch, curve, and depth with each new trip, "as if one were dropped at random on the longest street in New York in the middle of an 'inky black night' and must describe every lamppost and doorway."<sup>9</sup> By the return journey, the report had again changed. In fall and spring, the water could rise with "terrifying rapidity and overflow its banks in certain reaches till it is 60 miles wide."<sup>10</sup> The Mississippi was the only river in the world with "mud lumps," or volcano-like geysers of gases and liquid mud. They ranged in height from 3 to 10 feet and could spontaneously lift a passing ship.<sup>11</sup> Twain describes the river of his youth as one whose alluvial banks cave and change constantly. Where underwater trees, called snags, were always "hunting up new quarters, whose sandbars are never at rest, whose channels are forever

dodging and shirking, and whose obstructions must be confronted in all nights and all weathers without the aid of a single light-house or a single buoy; for there is neither light nor buoy to be found anywhere in all this three or four thousand miles of villainous river."<sup>12</sup> As a proxy for one of the many secondary sources Twain used to fill out his memoirs, he quotes a traveler, Mrs. Trollope, who described in 1827 approaching a muddy mass of waters that mingled with the deep blue of the Mexican Gulf. "I never beheld a scene so utterly desolate as this entrance of the Mississippi," she writes. "Had Dante seen it, he might have drawn images of another Borgia from its horrors. One object rears itself above the eddying waters; this is the mast of a vessel long since wrecked in attempting to cross the bar, and it still stands, a dismal witness of the destruction that has been, and a boding prophet of that which is to come."<sup>13</sup> Such ghost wreckages were common signposts of caution to travelers, who had few travel alternatives. Rail was not yet common. Horse-drawn carriages invited their own danger. But the river generated a unique set of hazards. Boats that went aground on a sandbar might be stuck for days or weeks until either help arrived or the river rose. Sandbars in the low summer season made the river impassable. Then there were floating trees: saplings, hardwoods, and "ancient giants." They smashed into bottlenecks on tight bends and formed "boxing, clunking plateaus in the shallows." Clumps of them would fasten together through mud and debris. "These were known as wooden islands, and they would go careening down the river for hundreds of miles at a stretch. The unmistakable cracking and grinding echoing along the surface, colliding with whatever was in its path along the shore." Boats that could not be maneuvered out of the way would be pummeled by splintered logs.<sup>14</sup>

Hunting subsurface snags required a particular skill for reading the current and decoding patterns. As Sandlin explains, "A trailing braid in smooth water was a sure sign of a snag; a quilted ripple was a tangle of submerged logs; a line or fold across the water was an undertow; a persistent swirl of froth was a whirlpool, where a strong tributary flowing quickly into the main current had created a vortex beneath the surface. The voyageurs had to teach themselves all these clues by experience and the river put a premium on fast learners."<sup>15</sup>

Snags were so varied that they generated their own vernacular. A tree standing straight up on the river bottom with branches just under the water line was called a "Planter." A "Sleeper" would stick sideways into a riverbank or sandbar stretching out at full length under the water. "Sawyers" waved back and forth in the current in a sawing motion. A "Preacher" bobbed up and down, rising out of the water and falling back like one administering a baptism. Snags could rip a hull or capsize a boat. They were everywhere and invisible to the layperson's eye. "It was traversing a flat and infinitely malleable surface of mud, silt, and clay—and this meant that it was free to move however and whenever its currents shifted."<sup>16</sup> Uncertainty was the rule: "Every day, somewhere along the river, huge bluffs were collapsing; overgrown banks were falling in on themselves; ancient stands of trees were sliding down into

the tide. Sandbars were growing into islets. Islets were accumulating rocks, rotten logs, and mud, and sprouting with countless scattered seeds. With every voyage, the familiar was reshaped or erased while new hazards appeared out of nowhere.” There was simply no way to confidently map the changing course of the river.<sup>17</sup>

During frequent stops at a critical pilot station in St. Louis, chance may have steered Twain’s path across that of James Eads, who clerked at the station. Had the two contemporaries sat for a drink, the conversation would likely have turned on worldviews looking in opposite directions. While Twain’s later fame hinged on works that celebrated and lamented the disappearing wildness of a river and bygone frontier, Eads built his fortune causing Twain’s lament: taming the river. Like Twain, Eads was self-educated and ambitious. Both men learned their trade from the pilots and practice on the river itself: Twain by piloting the treacherous surfaces, Eads by walking the bottom using salvaging tools and a self-designed diving bell.

#### PROFITABLE HAZARD

The moving, unstable bed of the river was a treasure trove for adventurous entrepreneurs willing to brave the depths to excavate. Steamboats were lost every week to the violent maelstrom of the changing river. Boiler explosions were common and exacerbated by sediment-laden river water used as coolant in overheated pipes. Hulls were ripped open by underwater tree snags.<sup>18</sup> Valuable equipment and cargo were quickly buried in mud and quicksand. Insurance companies were willing to give salvage wreckers as much as half of the rescued cargoes. Once a vessel or freight had been wrecked for five years, it belonged to whomever could retrieve it.<sup>19</sup> Eads was among the first people to walk the riverbed. At the age of twenty-two, he formed a partnership with a boat builder to begin salvaging the underwater graveyard. He and his team used modified diving bells to descend into the violent darkness. He designed the bells from wooden barrels connected by oxygen tubes to a floating wrecker. Eads described wading through a “snowstorm” of sand and finding little purchase for his feet as he pushed against the constant force that few attempted or understood.<sup>20</sup> Eads would search into the depths with little certainty of what he would find.<sup>21</sup> “Eads and his partners worked up and down the river for hundreds of miles.”<sup>22</sup> He walked the bed of the river four hours a day, every day. As Twain published *Life on the Mississippi*, which looked back with nostalgia on a frontier that was disappearing from the national imagination, Eads was busy attempting to eradicate the idea of wildness at its very essence. In an 1878 report to Congress, Eads described the Mississippi River as a force that was both immense and tamable.

Every atom that moves onward in the river . . . is controlled by laws as fixed and certain as those which direct the majestic march of the heavenly spheres. Every phenomenon and eccentricity of the river, its scouring and depositing action, its caving banks, the formation of the bars at its mouth, the effect of waves and tides of the sea upon its currents and deposits, are controlled by laws as immutable as the Creator,

and the engineer needs only to be assured that he does not ignore the existence of any of these laws, to feel positively certain of the result he aims at.<sup>23</sup>

The more capricious the river seemed in its “terrible games,” which to others appeared to be the result of chance, the more men like Eads viewed it as an invitation to demonstrate man’s control over nature.<sup>24</sup> The nineteenth century saw an almost religious belief in science that would reveal the laws of the river’s mechanics and put it to work for men. This modern approach essentially meant erasing and hardening its murky boundaries so that water rather than mud would be its main currency.

In less than a century, the proverbial mudscape would be transformed. Its edges would be leveed, and most of its adjacent alluvial forests would be drained and dried for plantation agriculture and urban settlement. By the time Twain had penned *Huckleberry Finn*, the river represented in the book lived only in the author’s memory. Rail had supplanted river commerce due to its safety and speed. The marauding river flotillas and town ports were supplanted by depots and new centers of commerce. Traffic on the river was relegated to barges and bulk traffic. In *Life on the Mississippi*, Twain makes note of the unusual sight of two steamboats at New Madrid, Missouri, just south of the Ohio River–Mississippi River confluence where the Lower Mississippi begins: “Two steamboats in sight at once! an infrequent spectacle now in the lonesome Mississippi. The loneliness of this solemn, stupendous flood is impressive—and depressing!”<sup>25</sup> Steamers by then would be novel and notable for their extravagance, an homage to a bygone era. As *Huckleberry Finn* was enshrining the Mississippi with its iconic status in 1884, the river and its culture had already indelibly changed. According to Sandlin, Twain was waxing nostalgic for a river that its contemporaries in the early nineteenth century decried for its accompanying chaos and corruption. Twain’s predecessors saw the river as “crowded, filthy, chaotic and dangerous. . . . Where Twain saw eccentricity and charm, they had seen corruption and unchecked evil. Where he saw freedom, they had seen a jerry-rigged culture swept by strange manias and mysterious plagues, perpetually teetering on the edge of collapse.”<sup>26</sup>

#### PLYING THE WILD

Landings in river towns represented not only the hub of commerce but also danger. Crews were notorious, loud, and boisterous. Drunken brawls spilled out into the backstreets of dock districts. “Few towns were enthusiastic about welcoming the river people. At St. Louis, there was a night watch with 50 armed men assigned to the dock district, just to make sure that the river people didn’t stray too far from the levee.”<sup>27</sup> A town’s river district was often cordoned off. A landing with a “maze of slums and shanties” would be distanced safely away from the town center. Natchez, for instance, was situated high on a bluff overlooking the makeshift shanties built from wood salvaged from wrecked or abandoned flatboats. Disorderly

music wafted up from the commotion, along with pops of gunfire and frequent screams. Just before dawn, the procession of boats would break into a “reveille of river horns” and drift out into the expanse of the river.<sup>28</sup> “The immensity of the river, the vagaries of the current, and the crowds of traffic down every bend meant that the next night they’d be sorted into wholly different congregations downriver. It was a rare event for any boats on their way to the delta to encounter each other twice. The river didn’t encourage lasting friendships.”<sup>29</sup> Flatboats and barges carried everything to the insatiable delta markets downriver: pelts, minerals, soaps, cured meats, lard, coffee beans, apples, pigs, turkeys, horses, whiskey, furs, wheat, rice, and animals. Goods were sold, bartered, or stolen.

River merchants could be found docked at a levee or village to display their goods. Such floating markets of kitchenware or books or tools or even furniture and cabinetry could be found on any stretch of the river. There were gambling boats, smithies, greenhouses, tailors, and fully stocked general stores; there were showboats of traveling troupes; there were doctors and traveling medicine shows; there were musicians and burlesques; and there were mesmerists, homeopaths, and snake oil salesmen. They could pack up and disappear as quickly as they came. Past the great confluence of the Missouri and Ohio, the Mississippi River traffic below St. Louis was described as a jumbled assembly of all types of watercraft: barges, pirogues, keel boats, canoes, schooners, tugboats, ferries, houseboats, and shanty boats—all crammed with cargo and people.<sup>30</sup> Immigrants, itinerant laborers, and enslaved people were carried by so-called soul drivers, which, unlike other river shanty boats, would keep to themselves because they were shunned by the other river people.<sup>31</sup> Often river folks would tie up together for safety. Sometimes families were on the move looking for a better life, carrying with them furniture, children, and farm animals. They anchored for the night, passing on gossip or bartering food or jobs.

As the landscape changed and foliage unfolded into the delta, soughs and bayous and swamps grew around the river. The delta region was described as a partial gloom of Spanish moss and lagoons whose pungent smell was known to sicken travelers. The banks on either side “melted away into an indeterminate ooze” that widened into expansive meadows of reeds and cattails. “There was no firm line between the river delta and salt estuaries. But in the end, the last islets fell away and the great freshwater flood of lime, gold, and brown” emptied into the Gulf of Mexico.<sup>32</sup>

#### DANGEROUS DUTY

A simple fall overboard could be fatal from the current’s turbulence, competing vortices, and undertows, or simply the cold temperature. The main current was hidden within the dark cover of mud and sediment hidden from sunlight. The cold of the murky depths could lead to hypothermia. And the water was so braided with crosscurrents and undertows that a man overboard was generally considered



a man lost. "Even if the rest of the crew noticed in time that he was floundering in the water, there usually wasn't much they could do for him; the boats couldn't be turned around against the force of the current, and most were too unwieldy to be maneuvered quickly into shore—assuming the crew was willing to try."<sup>33</sup> A man who did manage to swim to shore might find himself hundreds of miles from the nearest settlement.<sup>34</sup>

Even in the best conditions, danger lurked. Notwithstanding the snags, the river's thick sediment and mud clogged and overheated boilers. An anthology compiled by the Mississippi River Commission details a historic log of spectacular disasters from boiler explosions. The first steamboat had arrived in New Orleans in 1812. By 1830, there were more than 120 there. "Moving upstream at the unheard-of speed of 14 miles an hour, riverboats not only made it easy and affordable to travel and migrate, but they became the standard means for transporting agricultural commodities and manufactured goods."<sup>35</sup>

The very first boiler explosion on the Lower Mississippi occurred in 1817. Just off the west bank of Pointe Coupee, Louisiana, a year-old steamer, named the *Constitution*, was rounding the point when its boiler exploded, wrecking the front part of the cabin and killing or wounding thirty passengers.<sup>36</sup> Black Hawk Point, an infamous location just north of the Mississippi and Atchafalaya confluence, was the scene of two remarkable steamboat accidents. On the first occasion, "the steamer Black Hawk was southbound on December 27, 1837, when she passed this point with a large number of deck passengers, some Army officers, and a shipment of government payroll money on board." The boat's steam boilers blew. The explosion swept some of the passengers and "a number of the boxes of government money" into the river. "The steamer then caught fire and drifted downstream, leaking furiously and burning very rapidly."<sup>37</sup> An estimated thirty people drowned.

Almost two decades later, in March 1854, the *John L. Avery*, loaded heavily with passengers and freight, gathered at the same Pointe Coupee, hit a snag heading upriver at Black Hawk Point and sank. Hogsheads of sugar were stacked along the outside edge of the deck, effectively hemming in all the deck passengers. The boat went down too rapidly for escape. An estimated eighty to ninety people drowned. Most of them were Irish immigrants.<sup>38</sup> Outside of St. Maurice, Louisiana, at mile 271, the colossal *J. M. White*, once called "the finest river boat in the world," caught fire on December 13, 1886, and sank.<sup>39</sup> The 320-foot-long riverboat had been commissioned in 1878, the year after a yellow fever epidemic. Its partially buried wreckage could be seen for years after in low water periods until it was eventually buried in a sandbar. There are an untold number of buried vessels in the alluvial plains adjacent to the river.

One of the most egregious river disasters happened in 1837 to a Creek tribe that was being forcibly relocated by the federal government. Their Mississippi River

steamboat, the *Monmouth*, collided with a downstream vessel just north of Baton Rouge. The *Monmouth* was chartered to take the Creek to the Arkansas River for their eventual resettlement in Oklahoma. “Northbound at the island with a heavy load of passengers, the *Monmouth* collided with a sailing vessel called the *Trenton*, which was being towed downstream by the steamer *Warren*.” The collision at Profit Island caused the *Monmouth* to break apart. Hundreds were lost in the water. Accounts of the accident were vague and very brief. An estimated three hundred to four hundred Creeks drowned. The toll may have been higher. According to the account by the Mississippi River Commission, “No one really seemed to know or care.”<sup>40</sup>

When an accident like that occurred, the smashed property and drowning people were swept downriver. A farmer hoeing corn on the riverbank or a resident walking about in a nearby town might be alerted to the sight of fire in the distance or the haunting percussion of pleas for help that grew louder as the wreckage approached. Visible signs of the accident would be strewn about, with survivors hanging on to shoreline limbs or large flotsam. If the accident happened at night, there would be no point in attempting rescue. “Every traveler on the river got to know the sight of bodies drifting with the current, or hanging from a floating island, or boating among the logs piled up on a river bend—the red shirt that the voyageurs wore, the closest thing the river had to a uniform, could be spotted a mile off like a distress signal.”<sup>41</sup> The largest accident occurred on the *Sultana*, caused by a massive boiler explosion whose concussive blast set off the other two boilers, killing most of the crew and all the cabin passengers. The wreckage filled the river with scalded victims, corpses, and floating debris. Boat whistles and church bells rang out from the waterfront as the wreckage passed. A pillar of fire and smoke rose above the hills with the early light of dawn.<sup>42</sup> The bones of such wreckages were made visible by an extended drought in fall 2022—recounted in Facebook posts and newspaper stories of curious residents descending the inside of the levees and batture for the novel walk.

#### TAMING THE WILD

According to the technology historian Edward Layton, the scientific and technological communities in nineteenth-century America went through a scientific revolution from a “craft affair” similar to that of the Middle Ages, where oral traditions passed from master to apprentice. The new technologist was apprenticed via a college education, a professional organization, and technical literature that was modeled after those of science. By the end of the 1800s, technological problems were treated as scientific ones, and traditional methods and empiricism were supplemented by tools borrowed from science. Changes were taking place throughout the physical sciences, from the engineering branches to

chemistry, biology, and geology. "The result might be termed 'the scientific revolution in technology.'" <sup>43</sup> Controlling the Mississippi River would require more than the hubris of oversized egos and the application of grand engineering methods and technologies. It required trial and error, disasters, and responses. Any force applied to the workings of the river would be met with a counterforce in a cunning exemplar of Newton's Third Law. <sup>44</sup> Engagement with the river was predicated on uncertainty, and the ability to control it was critical to the symbolism of the nation's manifest destiny on the continent, as well as the elevation of the Army Corps of Engineers charged with its management. It also required vast appropriations from Congress, which established the Corps of Engineers as the preeminent agent of modern conquest.

Empirical conquest of nature and natives was wrapped up into the rationales for flood control and navigation improvements. Officially created as a war academy and fort-building agency in 1802, the Corps embodied the discourse of the early American period that success of the Union was tied to the development of the vast continent through control and management of its rivers and harbors. The oft-heard phrase of the period was that developing and improving land was to "complete what God had started." President Thomas Jefferson opposed a military elite, but he revived the US Army Corps of Engineers and signed bills to have the Corps build piers, harbors, and lighthouses for civil purposes. <sup>45</sup> The early Americans understood the strategic importance of water communication, which married the nation's commercial aspirations to its security and defenses. "Surveying and science converged in a literature on the strategic importance of water communication," writes Todd Shallat. "Army maps and reports became aids to commerce that marked the defensible limits of territorial expansion." <sup>46</sup> The US Army Corps of Engineers, in exemplifying the two main progenitors of American philosophy—science and government—has been called a "nation-builder." <sup>47</sup>

Shallat has likened the Corps' operating logic to his observations of Max Weber, who marveled at a bureaucracy's ability to affect policy through its vast power of implementation. The Corps, in Shallat's analysis, attempted to acquire jurisdiction over projects through self-promotion and by cultivating local support from regional directors. It also assisted corporations and promoted its own facility for production. <sup>48</sup> Often the rationale for river intervention was based on the path dependency of protecting a previous intervention. A circular logic emerged early that critics to this day continue to attribute to the Corps' *modus operandi*. If a waterway was navigable, it was important, and worth defending. And once fortified and stabilized, it was worth protecting, if not improving, to facilitate better defenses. Once a river had been dredged, or "de-snagged," the Corps would continue to maintain the waterway regardless of its cost or relevance. Byzantine congressional appropriation bills that contained everything from a pier in St. Louis

to resources to clear the Delaware River breakwater turned waterway spending into a jigsaw puzzle of agreements.<sup>49</sup>

#### SURVEYS AND STATECRAFT

In *Seeing Like a State*, James Scott demonstrates the power of surveys and maps in the execution of modern statecraft. Citizens must adhere to the grammar of the survey and standardized measurements for legal standing. “The categories used by state agents aren’t merely means to make their environment legible,” Scott writes; “they are the authoritative tune to which most of the population must dance.”<sup>50</sup> Administrative practices produce records of ownership, categories of race and ethnicity, arrest records, political boundaries, and economic plans. Modern statecraft is largely a product of internal colonization on behalf of the state itself.<sup>51</sup> Army surveys became beachheads for modern conquest of the American continent, from disciplining wild rivers and cutting canals to opening the west to railroads—often displacing the continent’s native inhabitants in the process. River engineers trafficked in this project of empire. The first comprehensive survey of the Ohio and Mississippi Rivers occurred in 1822. US Army Corps engineers confirmed reports that the Lower Mississippi held thousands of submerged trees that were fatal to riverboats, while the river itself, because of its alluvial nature, constantly tried to change course.<sup>52</sup> There was still no consensus on how best to control floods and improve navigation. Engineers recommended that the government devise new ways to clear the rivers, which included removing submerged trees, implementing dams to narrow the river, removing sandbars, and building levees to hasten navigation and prevent flooding.<sup>53</sup>

#### GIBBONS, FEDERAL OVERSIGHT, AND POLITICAL LOBBYING

Federalist Party leaders, for example, argued that vigorous, central-state programs of internal improvements would create common interests across the regional sectors. In 1824, the US Supreme Court decision, *Gibbons v. Ogden*, held that the commerce clause of the US Constitution gave the federal government the power to regulate river navigation.<sup>54</sup> The *Gibbons* case allowed Congress to direct the Army Corps of Engineers to make navigational improvements to river channels. The General Survey Act of 1826 followed, which appropriated \$75,000 to improve navigation.<sup>55</sup> While federal authority over navigation was codified in the 1824 *Gibbons* decision, flood control was delegated to local landowners and districts, which generally led to uneven construction standards. A weak levee upriver might collapse and spread misery to all. Or sluice cuts through the levee might allow the river to moisten fields during times of drought. Yet different crops had

different needs, which led to local conflict, writes Campanella: "Rice planters liked to inundate their fields to kill off weeds, whereas those raising sugar cane feared excess water would cause root rot." Everyone fretted over the integrity of the sluice itself. "If the river got too high, if the sluice gate malfunctioned, or if erosive currents scoured underlying soils, a levee might cave in, which could lead to a crevasse—that is, total levee failure causing destructive flooding."<sup>56</sup> Major storms also brought fears that saboteurs would intentionally sever a levee across the river to release water pressure on their own levee defenses. This particularly impacted slave states in the lower Delta, which incentivized cotton and sugar plantations through programs to drain and "reclaim" former swamplands. Without official federal oversight on flood control, any significant levee aid required political pressure on congressional representatives.

#### NINETEENTH-CENTURY SCIENCE

In the mid-nineteenth century, there was no pure public policy or clear understanding of the river and its mechanisms, despite myriad surveys and efforts to improve the river for navigation and stabilize it in some way against floods.<sup>57</sup> Until 1837, there were no American books with sections on dams and jetties. Craftsmanship was more ancient than the sciences and relied on apprenticeship and builder-to-builder contact. River engineers faced an array of questions: Why do alluvial rivers like the Mississippi weave back and forth like drunks in an alley? Do meanders result from terrain characteristics or from alluvial processes? How does the sediment or bed-load material moving along a streambed affect sediment deposition? Do bed-load particles leap along the bottom like ballet dancers across a stage, or do they slide along in a layer like maple syrup across a stack of pancakes or roll along like bowling balls?<sup>58</sup>

Three decades into the twentieth century, engineers still knew far more about the structures they placed in streams than about the streams themselves. Variables include sediment load, morphology, discharge, and even location. And even more variables are perpetually coming together to affect river flow, such as velocity, channel width, channel depth, gradient, and bed "roughness" (the resistance of a bed to flow). As Reuss puts it, "The challenge is somewhat analogous to designing suits for a customer who is both demanding in his needs and discontented with his shape, constantly indulging in fad diets and binge eating."<sup>59</sup> Experts must come to a consensus on how to design a dam, revetment, or levee for a constantly changing profile. Reuss again: "The answer is to design within a range of anticipated parameters. Still, neither the tailor nor the river engineer will sanguinely predict success."<sup>60</sup> In river engineering, humility is a necessity.

A river's discharge can vary widely for many reasons, not the least of which is human activity upstream, which modifies the floodplain. River engineers came to recognize that idealized fluid mechanics theories that were French in origin and based on Newtonian physics could not fully account for the many forces



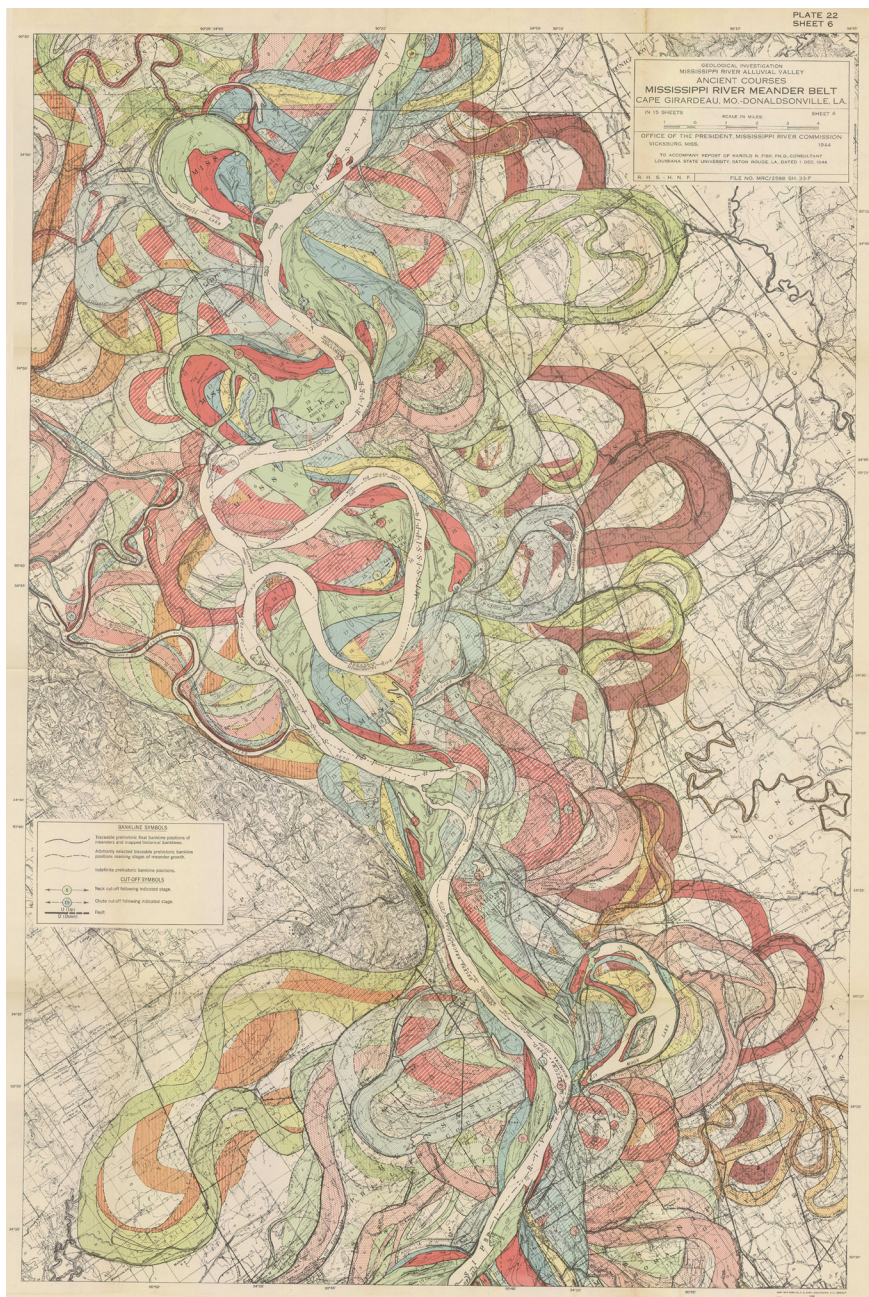


FIGURE 5. Fisk Maps. Harold Fisk, an LSU geologist, tracked the meander path maps of the entire Lower Mississippi River from Cairo, Illinois, to the Gulf of Mexico, using aerial photos, geologic samples, and hand-drawn cartographic representations dating to 1795. Image courtesy of USACE historic photo.

that influence river dynamics. The US Army Corps engineers relied, therefore, on empirical adaptation and “inductive reasoning,” says Reuss.<sup>61</sup> River construction was reduced to a regimen of standardized steps. “When planning a project, they would ascertain the river’s shape and geometry, the velocity and volume of water passing a particular point, regional geology, and the quantity and concentration of sediment.”<sup>62</sup> But as their study moved from planning into the field, the Corps became a champion for large “scientific” projects—which were political by nature—such as canals, dams, and ports. Often the costs of large projects were only partly divulged to Congress to begin a project that would clearly require subsequent authorizations to complete. Lobbying the Corps for projects was a national pastime of elected officials from every corner of the country. Louisiana, for example, was unabashed in its flood protection requests. Such requests were made through a decentralized system of local, regional, and state harbor boards, levee commissions, and other public constituencies.

Such ambiguity about river management allowed various constituencies to advocate for solutions that served their local interests. While flood control was the main preoccupation among southern states, there were many civilian engineers, some Corps engineers, and even downstream residents who were beginning to advocate various combinations of outlets and spillways beyond a wholly “levees-only” approach. As early as the 1840s, the Louisiana State Engineer, Paul Octave Hebert, theorized that spillways would divert water only during heavy floods. Many engineers favored a controlled spillway outlet at Bonnet Carré upriver from New Orleans, which had been the site of the 1844 levee break into Lake Pontchartrain.<sup>63</sup>

#### THE SWAMPLAND ACTS

An 1849 flood swamped New Orleans when it broke through the levee at Pierre Sauvée’s plantation 17 miles upriver. Within three days, floodwaters reached the French Quarter. Nervous residents on the uptown side considered severing the levee at the New Basin Canal behind the French Quarter. The idea was met with the threat of armed response by downtown residents. Three weeks later, the upper New Basin Canal collapsed anyway, which deluged 220 midcity blocks and forced the evacuation of twelve thousand residents.<sup>64</sup> Afterward, Congress acceded to pressure from southern constituents to pass the Swampland, or “Swamp-buster,” Acts, which provided a mechanism for levee construction through land reclamation. The federal government turned over riverine bottomlands and swamps of the *batture* to states, which sold them to private interests. States used the money to finance levee building and flood control projects. A year later, Congress extended the program to California, Florida, Oregon, and eleven states in the Ohio-Mississippi valley. By 1909, nearly 82 million acres had passed into private hands through the swampland program, from ten cents to \$1.25 per acre.<sup>65</sup> The swampland program also boosted the flood control cause by sponsoring Army Corps of Engineers

surveys, which consistently recommended that the federal government build protective levee projects.<sup>66</sup>

Swampland grants financed levee lines and drained swamps in California, Arkansas, Louisiana, and Mississippi and were responsible for accelerating the growth of large-scale agriculture and forestry. This led to the formation of state levee districts, which directed construction work and had the power to sell bonds based on the future value of the previously overflowed land. Such district laws varied from state to state. They generally required a petition by the owners of the land to be drained. Once approached, a district could assess taxes in proportion to the landowners' estimated future benefits, which were determined by a board of reviews. The Swampland Acts trained capitalist landholders to organize politically. Flood control advocates were now well funded and organized to lobby the Army Corps of Engineers for flood control assistance.<sup>67</sup> "The creation of levee districts was, therefore, an important step for an agency that had devoted itself solely to navigation improvement work."<sup>68</sup> The acts allowed the federal government to encourage flood control outside of its official purview. Before 1860, less than 100,000 acres of farmland were serviced by drainage districts and municipal drainage projects. In the next forty years, the amount of acreage served by districts grew exponentially. In the last decade of the nineteenth century, more than 6 million acres of US farmland were served by drainage projects.

#### NEW ORLEANS AS THE LARGEST SLAVE MARKET

As the riverlands were being surveyed, de-snagged, and de-muddied, so too was the political economy of slavery and global capitalism. Demand for enslaved labor throughout the southern river basin increased as adjacent swamplands were drained and cleared for plantation agriculture.<sup>69</sup> In this way, Extractive Thinking was part and parcel of *racial capitalism*—a heuristic that interrogates how race and capitalism intersect in the production of racialized differences that undergird capitalist exploitation of land and labor.<sup>70</sup> Cheap farmland attracted thousands of white slave owners from the Atlantic seaboard to make their fortune. A settlement boom in the Delta was comparable to a second gold rush. "The second middle passage," as the historian Ira Berlin describes it, "was the central event in the lives of African American people between the American Revolution and slavery's final demise in December 1865."<sup>71</sup> Enslaved people were transported in forced migration overland and by sea from the older slave states to the newer cotton states and sugar plantations of South Louisiana. By 1850, a quarter of New Orleans's population had come from the North.<sup>72</sup> An article reprinted in the New Orleans-based *De Bow's Commercial Review* in 1858 touted the strength of local levees to protect newly reclaimed delta farmland: "We can levee successfully! We have but one outlet, the Yazoo Pass, and the levee there, the heaviest and highest in the world, has stood the flood. It stood because it was properly and securely built."<sup>73</sup>



The population in Mississippi and Alabama doubled between 1840 and 1860, from 179,074 whites and 195,211 enslaved to 354,000 whites and 436,631 enslaved. Cotton production more than doubled in half the time, from 194 million pounds in 1849 to 535 million pounds in 1859.<sup>74</sup> Some ships also continued to smuggle persons from West Africa and the Caribbean. By 1860, the number of enslaved people in Louisiana had multiplied sixteen-fold, to more than 331,000.

The expansion of plantation capitalism required clearing forests and mechanical transportation to get commodities to market in New Orleans. As American settlers began clearing the alluvial lands of the Mississippi River basin in earnest in the 1830s and 1840s, efforts to open the Mississippi River's large tributaries, such as the Red River, intensified. One of the main impediments to steamboat trade from the Mississippi into the Red River to reach into Arkansas and Texas was a massive hundred-mile logjam, the Great Red River Raft mentioned previously. A series of natural logjams in northwestern Louisiana and southwestern Arkansas, it was passable only by small boats that could snake their way through the swampy lakes. Because it impeded access and large-scale commerce, the logjam initially provided natural protection for Indigenous inhabitants, many of whom were being pushed into the Red River territory.

The Great River Raft was the result of a spring snowmelt and rainstorms. Riverbanks in the northern basin caved in, and trees fell into the channel with their roots clinging to the soil. Spring floods could carry trees that were 60 feet long downstream and jam the narrowing meander crossings. Older trees at the bottom of the clogs rotted and sank into the riverbed. "Silt collected in the interlaced branches, cementing the cottonwood and cypress trees into natural dams. Men rode horses on the largest obstructions, brushing past live trees 18 inches thick."<sup>75</sup> The raft crept and cracked. "Timber at the foot, or lower end, slowly rotted away and disintegrated while yearly storms added new trees to the head." More material washed down than rotted away, which increased the raft size as it inched north. Western travelers described large inland swamps consisting of trees and driftwood that reduced "the Mighty Red River to a slow moving sludge."<sup>76</sup> The main channel could be clogged with an assortment of cypress, white gum, cottonwood, ash, pecan, hickory, willow, mulberry, and locust trees that were entangled with canebrakes, vines, and creeping plants. Natural dams pushed backwater into the countryside, forming chains of bayous, lakes, and wetlands that created sanctuaries for thousands of birds. Bison roamed the isolated prairies and woodlands above the raft.

The modern American eye saw not a wonderland of natural bounty but a land to be conquered and cultivated with Black and Brown bodies. Peter Custis was sent to the region by Thomas Jefferson in 1806. He described a future "paradise of America" that could be produced by cotton plantations once the raft was removed.<sup>77</sup> Opening it up to investment and cultivation that was spreading into South Carolina, Georgia, Tennessee, Mississippi, and Louisiana required regular

steamboat service. Cotton was replacing tobacco as the main cash crop, and steamboats would accelerate the transformation. "Steamboats were both a means and an end to transforming the environment." The forces of manifest destiny required not only the logs and "rafts" to be cleared for grand plantations, but also the Indigenous inhabitants who were in the way. "While the raft was intact, Americans surrendered to nature rather than conquered it."<sup>78</sup> Capitalists like Capt. Henry Shreve looked upon the great raft not as a natural *a priori* feature of the landscape but an impediment to be removed. His snag boats began clearing the great log raft to open the Red/Atchafalaya complex to trade.

Starting in 1834, the state of Louisiana began removing river debris with the nation's only antebellum state snag service. The state Board of Public Works applied an \$85,000 federal Red River appropriation to "purchase 50 good hands." It bought two skilled men the following year while liquidating a state-sponsored railroad.<sup>79</sup> According to the historian Aaron Hall, the Louisiana legislature purchased men, which it then wielded as "public hands." Their strength, intellect, health, and knowledge became instruments of statecraft to convert clogged bayous into navigable waterways that then enabled planters' enslaved laborers to turn waterlogged prairies into profitable cane and cotton fields. "Purchasing men enabled Louisiana to develop a skilled, ever-available service corps on the cheap."<sup>80</sup> It allowed for "flexible, year-round waterway clearing." Season after season, the enslaved became experts "sustained by a proslavery cost-benefit analysis that persuaded Democrats and Whigs alike."<sup>81</sup>

Because of its riverine swampy geography, Louisiana was particularly reliant on waterway upkeep, which generated a bureaucratic formation dependent on slavery-based expertise and governance on all levels of organization. The program was Louisiana's most stable and largest public-labor sector. In this way, the institution of slavery was inseparable from state building. As Hall writes, "State slavery stimulated administrative growth."<sup>82</sup> The state reduced expenses by placing fully enslaved crews under a white captain. Slave-operated boats included the *Crab*, *Experiment*, *General Walker*, *Harmanson*, *Agnes*, *Florida*, *Pioneer*, *Two Friends*, *Franklin*, *Governor Hebert*, *Amite*, *Randall*, *Algernine*, and *Atchafalaya*. "These crafts evolved from modified steamers into custom snag boats bearing cranes, reinforcements, and double hulls to ram, yank, and cut obstructions."<sup>83</sup>

The public hands lived on the boats, which they kept in service through modified improvements, toolmaking, and maintenance. "With no other residence, no place of rest beyond bunks or riverside camping, the enslaved men inhabited a working and living space that overlapped in ways that served state interests."<sup>84</sup> When the program ended in 1861, some of the men had been employed clearing bayous and rivers for years. Planters and communities petitioned their officials for help and in return received the labor of public hands whose training and expertise became instruments of statecraft. Slavery was not

just a peculiarity. It was essential to the political economy of Louisiana to build, support, and expand its agricultural economy and to reinforce the belonging of whiteness. State legislators, governors, commissioners, engineers, and superintendents dispatched the enslaved workforce with boats and machinery to extend a riverine network for the steamboat age. "Being a slave-master state was a collective, democratic project for Louisiana's enfranchised white public, who exercised their political power to sustain the program and receive its benefits," writes Hall.<sup>85</sup>

Public slavery—in solving Louisiana's riverine problem—became a *public good*. Governor André Roman declared that the answer to Louisiana's riverine governance problem lay in systematic public slavery: it was "not only the cheapest, but the only means of succeeding in a regular and permanent system of Internal Improvements" that was less expensive than white laborers and more reliable than immigrant labor. "By recasting rafted rivers and impassable bayous as problems to remedy with government slavery, the state developed on the ground and in public perception," writes Hall.<sup>86</sup> Naturally, then, the enslaved men experienced the violent backlash of the river itself to human intervention.

- In 1834, Louisiana deployed engineers, steamboats, and fifty-seven enslaved men. Nineteen came from the interstate slave trader Isaac Franklin; 13 were dead by January 1835.
- In 1835, legislators authorized purchasing up to "two hundred able bodied negro men, none of which to exceed thirty years of age, of good character, and healthy." The service counted 88 men in 1836 before death took 7. Deadly conditions pushed the population below 70 men before officials increased "the state force" to 129 by 1850.<sup>87</sup>
- On June 9, 1860, the state's Internal Improvements Division sold 79 men at the City Hotel auction block. They included two engineers, four blacksmiths, three pilots, three carpenters, two cooks, and ten boat mates. Where a wilderness had existed, an engineer in 1848 recorded "extensive and highly cultivated fields, gardens and comfortable dwellings, quarters and out-houses; forming almost one continuous settlement."<sup>88</sup>

The public works improvements carried out by public slavery in order to open the Red River valley to plantation agriculture spurred population growth throughout the region, particularly where water navigation was opened for market delivery. Louisiana's population increased from 215,739 (including 109,588 enslaved) in 1830 to 708,002 (including 331,726 enslaved) in 1860.<sup>89</sup>

White settlers poured into the region, dragging with them thousands of enslaved Black people, who were forced to cultivate the landscape. "Because the swift change from wilderness to cotton cultivation required the labor of thousands of slaves, a thriving interstate slave trade to the region blossomed." The city of Shreveport almost overnight served as a transfer point for agricultural products going downriver to New Orleans and for finished goods moving upriver.<sup>90</sup> An area

that Captain Shreve described as “remote” in 1832 produced one-fifth of Louisiana’s cotton crop eight years later.<sup>91</sup>

This settler boom placed severe pressures on Indigenous peoples who had been on the move since American expansion into western lands. There were multiple wholly distinct tribal groups living within the Red River–Ouachita watershed. The Caddo, Alabama-Coushatta, Cherokee, and Quapaw had been enjoying relative isolation. The Red River raft impediment limited their exposure and allowed relative protection to hunt and cultivate wild corn, pumpkin, and vegetables. Some Indigenous bands fled to Spanish Texas by 1801–2 in order to avoid the Americans just as they had escaped the British.<sup>92</sup> Others, like the Apalachee, Biloxi, Pascagoula, and Taensa, had successfully petitioned for lands between the Sabine and Trinity Rivers in Spanish Texas, but few had moved by 1802 when Louisiana was handed back to France by Spain and rumors grew that it would soon be American territory. Some began to leave in the following years, with most of them going to Texas after 1820.<sup>93</sup> The Caddoan speakers occupied most of northwestern Louisiana until they ceded land to the United States in 1835 and attempted to move into Texas. “After 1840, they moved en masse to the banks of the Blue River in the Kiamichi Mountains and into Texas and Mexico, leaving the area that had been their home for well over a thousand years.”<sup>94</sup>

#### DELTA SURVEY

The disastrous 1849 floods that inundated most of the Lower Mississippi Valley and resulted in the 1849–50 Swampland Acts also increased congressional focus on the river itself. Floods were not the only problem. There were also sandbars. “At the mouth of the Mississippi enormous sandbars often blocked access to the Gulf of Mexico. Sometimes 50 ships waited there for the sandbars to dissipate enough to allow passage into or out of the river; the largest ships sometimes waited as long as three months.” There was still no consensus on how best to control floods and improve navigation. On September 30, 1850, Congress authorized a complete survey of the lower valley from Cairo, Illinois, to the Gulf. “The aim was to discover the laws governing the Mississippi River and determine how to tame it.”<sup>95</sup> Secretary of War Charles Magill Conrad authorized the Mississippi Delta Survey, calling on military engineers to conduct a study whose primary purpose was to discover a means to prevent flooding. After pressure from some congressmen and after conferring with President Millard Fillmore, Conrad divided the \$50,000 appropriation between the army and the US Civilian Corps, each of which would issue competing surveys.

Charles Ellet would lead the civilian survey. Educated in France, he had the year before published an essay in which he described his method for allowing year-round navigation of the river: the use of reservoir basins along tributaries of the Ohio to store water during flood season that could spill back into the river

during low water stages. Ellet issued his report within a year.<sup>96</sup> It was 150 pages and outlined four reasons that floods on the Mississippi were growing: the expansion of cultivation of farmland, which meant that forests and swamps no longer absorbed floodwaters and runoff; the extension of the levee system; the creation of cutoffs; and the lateral elongation of the river into the Gulf of Mexico. His prescription required three approaches: stronger levees, improved natural and artificial outlets, and a system of high dams and floodwater reservoirs to release excess water during low water season. His work is considered more theoretical exposition than a survey.<sup>97</sup>

The other report was assigned to Andrew Humphreys of the US Topographical Corps, which would merge into the Corps of Engineers in 1863. Humphreys would take eleven years to complete his report because of his assignment by Sen. Jefferson Davis to direct the Pacific Railroad Surveys, followed by multiple health-related breakdowns. Once finished, the report would make a lasting impact on national river management policy. The *Report upon the Physics and Hydraulics of the Mississippi River* was completed just months before the Civil War.<sup>98</sup> In the report, Humphreys and his coauthor, Lt. Henry L. Abbot, a fellow West Point alumnus, rejected reservoirs and cutoffs. It concluded that building continuous levee lines would “concentrate” the flow of the river.<sup>99</sup>

Humphreys’s survey teams painstakingly obtained data on crossing river channels and geologic formations. They took measurements from the confluence of the Mississippi and Ohio Rivers to the Bird’s Foot Delta. They studied the tributaries of the Lower Mississippi. They applied insights from geology and European hydraulics to challenge the conventional wisdom about alluvial deposits. The result, declared the *American Journal of Science*, was “one of the most profoundly scientific publications ever published by the U.S. government.”<sup>100</sup> Their final analysis recommended maintaining all water flow within the main channel by closing natural outlets that drained water away into adjacent swamps. It recommended stronger levees. The endorsement of a “single-channel theory” tied flood control interests to navigation interests but also happened to be the most politically attractive option.<sup>101</sup>

Humphreys went on to serve as a Union officer during the Civil War. He was commended numerous times for his service in battle, where his stubborn tenacity earned him the moniker, “the Fighting Fool of Gettysburg,” for resisting a Confederate attack. He served as chief of staff of the Army of the Potomac under Maj. Gen. George G. Meade. In November 1864, he took command of the II Corps, earning more accolades in contributing to Robert E. Lee’s final surrender at Appomattox Courthouse.<sup>102</sup>

Humphreys was promoted to brigadier general. Sixteen months after the Civil War ended, Gen. Ulysses S. Grant appointed him to lead the Army Corps of Engineers. Ellet, meanwhile, served as a Confederate colonel during the Civil War and

was mortally wounded at the Battle of Memphis. But Humphreys would soon identify a new foe in the person of James Eads, against whom he would battle for the future of the Mississippi River.

### THE CORPS, POLITICS, AND SCIENCE

With the Delta Survey, the Corps of Engineers proved it was the one institution capable of gathering and analyzing data that was necessary to plan large-scale flood control programs along America's waterways. Although the Humphreys-Abbot levees-only "universal formula" later proved flawed, their report received the respect of engineers around the world. "No one could fault the authors' ambition, intelligence, and diligence. In this, Humphreys and Abbot clearly surpassed their fellow army engineers."<sup>103</sup>

Surveys and intervention on the rivers moved Congress toward national planning and bonded engineers to the state. "[Engineers] saw themselves as an emerging professional class whose technical expertise would command respect."<sup>104</sup> The Corps had become powerful because it utilized statistics and packaged information to shape government, while Congress issued shifting mandates and ambiguous legal directives. The Corps' powers of implementation extended federalism but also stirred a critique that dogs its management to this day. The rise of scientific professionalism was a gradual process. Statistical reporting, cost-benefit analysis, specialized field offices, and standardized forms and regulations were sold as the solution to partisan gridlock. The professional state was a response to the chaos that had stalled public works. But the Corps was not immune to chaos either. "The Corps, say its defenders, suffers for sins of Congress, but engineers invite the abuse by overselling their science and lavishing public money on four-color books and pamphlets that downplay the long resistance to federal projects."<sup>105</sup> There was seldom a time in American history, not even wartime, when the Corps worked in a political vacuum without facing stiff opposition from river organizations and bureaucracy.<sup>106</sup>

### THE HUMPHREYS/EADS DICHOTOMY

As artfully explored by John Barry in *Rising Tide*, the disagreement over river management played out in a rivalry between two of the largest personalities in river management. Once ascendant, Andrew Humphreys met a new archrival in James Eads, who had personally experienced the alluvial floor of the river. As a river diver, he did not believe that the riverbed was made of blue clay as Humphreys asserted. He believed that a jetty system to constrain the width of the river would increase the velocity enough to scour the bed and lower the level of the river even during low stages. He also advocated for cutoffs to shorten the river's path to the Gulf and hasten the water flow.<sup>107</sup> Eads argued that a jetty system could also

deepen the troubled mouth of the Mississippi River, whose shallow mud lumps and sandbars regularly blocked shipping lanes. He made a formal proposal to open the mouth in 1874. By then, as chief of the Army Corps of Engineers, Humphreys was developing plans for a shipping canal that would bypass the mouth. Humphreys vociferously fought, undermined, and attempted to sabotage Eads's proposal, leading Eads to put up his own money to win the project.

Humphreys believed any jetties created to increase the power of currents would be offset by tides from the Gulf. The House rejected jetties and passed Humphreys's \$7.4 million canal request. The Senate, though, refused to consider it. The two bodies compromised by creating a new board of engineers.<sup>108</sup> Staffed with three army engineers, three civilians, and one member from the Coast Guard, the board voted 6–1 to allow Eads to put up \$10 million of his own money to achieve and maintain a depth of 28 feet. Grant signed the legislation for the jetty project over the objection of Humphreys. On June 9, 1875, a steamer left from New Orleans tugging a pile driver and three flatboats of housing materials. They arrived in a cloud of biting mosquitoes at the Mississippi River's South Pass, one of three openings at the Bird's Foot, where a torrent of brown water boiled into the green expanse of the Gulf.

The new jetty system, Eads promised, would carve a channel using the river's own sediment to accomplish hydraulically what months of dredging could not. At the height of the project, eight hundred fifty workers drove several thousand lumber piles deep into the muddy banks of the pass. In less than three months, the piles "extended in a lonely curve of wood two and one-third miles into the Gulf."<sup>109</sup> The piles were lined with thin, flexible willow tree trunks coated with limestone-based concrete that acted as fascine mattresses. All the raw materials, the lumber, the willow trees, and sandstone, had been collected upriver and shipped to the project site. Within a year, the partially completed lining had already begun compressing the current and deepening the channel of the pass.<sup>110</sup> Within three years, Eads's jetty system had blown away impermanent sandbars and accomplished what levees could not. By squeezing the water, the river was able to scour its own channel. Eads proposed building modified jetties all along the lower river, making cutoffs, and temporarily confining the river with levees to help concentrate the flow and deepen the channel. In the 1870s, both Eads and Humphreys sought to force their views on others at the cost of scientific debate. Both castigated engineers who advocated for a more diversified approach to flood control, and neither tolerated dissent.

In the wake of the success of Eads's jetties, which were completed in 1879 (and remain today), his supporters proposed a bill to create a commission of civilian and military engineers independent of the Corps of Engineers, with Eads presumably as chair. Legislators in favor of such a commission saw it as an opportunity to decrease their reliance on the Corps' advice. The Mississippi River Commission (MRC) would be a seven-member body consisting of four civilian



engineers and three representatives from the Army Corps of Engineers appointed by the president. The MRC would oversee future internal improvement projects on the Mississippi River and advise the Army Corps of Engineers. Humphreys opposed the bill since he felt the Corps was entirely capable of managing the Mississippi, and he retired shortly after it was established.

Although Eads became a commission member, northern critics saw some of President Hayes's early appointments to the commission as evidence that Hayes intended it to promote levees for flood control.<sup>111</sup> Debates again focused on the constitutionality of aid that might directly benefit private landowners rather than navigation. Private engineers attacked the Corps' competence. However, many were at least as concerned about their exclusion from public works projects. Criticism of the Corps appeared in numerous journals and periodicals.<sup>112</sup>

Many officials, however, continued to hold the Humphrey report in high esteem.<sup>113</sup> "Humphreys came to identify attacks on the report as attacks on the Corps itself." He became increasingly frustrated and defensive about emerging engineering concepts.<sup>114</sup> The more he was attacked, the less willing he seemed to modify his position. Tragically for the Corps, it was this inflexibility that became his main legacy rather than scientific dedication to truth.<sup>115</sup> It is not clear that Humphreys biased his report to give it an obvious political appeal. "Quite the contrary," according to Reuss, "he insisted on a rigorous unbiased approach to the work. However, when he finally did arrive at the levees-only policy, he firmly put his reputation behind it and defended it before critics within and outside of Congress."<sup>116</sup>

By the 1880s, army engineers were building flood control levees all along the Lower Mississippi River. As the levee lines became more complete, downstream residents continued to suffer. The levees-only approach was causing the river to carry a greater volume of water, and it was raising the riverbed, thus forcing engineers to construct taller levees. Any break in these larger, modern levees wreaked tremendous devastation. Yet other proposals to manage river flooding, such as opening spillway outlets into bayous, required the government to appropriate private lands, which met resistance. "Levees-only" represented a political compromise, supported by enough engineers and scientists, along with Delta landowners, to become accepted policy.

After years of organizational work, personal politicking by activists, and actions by sympathetic legislators, flood control supporters eventually won official aid for the Mississippi and Sacramento Rivers with the 1917 Ransdell-Humphreys Flood Control Act.<sup>117</sup> It directed the Corps of Engineers to provide levee aid for the two rivers and authorize federal payment of up to two-thirds of the cost of levee construction. Local interests remained responsible for acquiring the rights-of-way and some maintenance costs. Yet, in spring 1922, the Lower Mississippi River flooded again. The river was so high that its tributary waters flooded six Yazoo-Mississippi Delta counties. Some critics blamed the flood on the closure of the Cypress Creek Gap by the Corps of Engineers the year before. The only remaining outlet on the



Mississippi was at Old River, where Capt. Henry Shreve made his 1831 cut to the Red River. The cut would later threaten to open a permanent course for the Mississippi down the Atchafalaya River away from New Orleans and require an ongoing regime of intervention through the Old River Control Structure.

#### GATHERING STORM

During the winter and spring months of 1927, the Mississippi River surpassed record flood stages. Prolonged rainfall in the headwaters swelled its tributaries and increased the already elevated water levels in the Lower Mississippi. In April 1927, waters began to rise precipitously, approaching 60 feet above mean sea level. Federal levees along the Lower Mississippi began to breach. By May, floods had devastated thirty-two towns and cities and pushed the Ohio tributary backward.<sup>118</sup> On May 24, the river broke through Old River and sent 30-foot waters down the Atchafalaya. The breach panicked New Orleans authorities, who convinced the Corps of Engineers and the Mississippi River Commission to dynamite the levee south of the city. They used thirty-nine tons of dynamite—starting in a noontime spectacle of press, VIPs, and newsreels—to sacrifice the small rural farmers and fur trappers downstream for the good of the city. The first explosion opened a ditch 10 feet deep and 6 feet wide. Two more explosions followed to little avail. Workers used pitches and shovels. Divers set depth charges beneath the surface. Finally, the disappointed crowds went away. It would take another ten days of dynamiting to do the job. When it was over, 250,000 cubic feet per second, or 20 percent of the river's volume, poured through a hole 3,213 feet wide into St. Bernard Parish and Plaquemines Parish on its southeastern border. According to John Barry, 526 claimants filed suits against the city of New Orleans. Total claims reached \$35 million. The city settled \$3.9 million but then deducted \$1 million for feeding and housing the claimants while they were homeless. Of the settlement, half went to the Acme Fur Company for losses of the muskrat habitat caused by the flooding. Not a single trapper received any compensation. Another \$600,000 went to Louisiana Southern Railroad. The remaining \$800,000 was divided among 2,809 claimants who averaged \$284 for losing their homes and livelihoods. An additional 1,024 claimants received nothing, despite commitments by Louisiana governor Oramel Simpson that all victims would be compensated.<sup>119</sup>

Some have argued that city leaders were motivated to show investors the extent they would go to protect capital investments at the port, which was essential to the city's economy. In truth, the river had crested north of Baton Rouge the month before the dynamiting. All spring, local newspapers had played down the panic. Yet business was drying up.

Referred to as the greatest peacetime disaster in US history by Secretary of Commerce Herbert Hoover, the 1927 floods caused staggering economic losses and human suffering. Over 16 million acres in seven states were inundated, and

property loss estimates varied from \$236 to \$363 million. Nearly 700,000 people are known to have died. Another 637,000 were left homeless. The American Red Cross, responsible for most of the relief work, provided food and shelter for more than 300,000 people in refugee camps. Black refugees were particularly harmed. In refugee camps, they were coerced to perform manual labor and prevented from fleeing the Delta because planters were afraid of losing their workforce.<sup>120</sup> In the aftermath of the devastation, Congress ordered the Army Corps of Engineers to examine the flood problem in a national context.

Congressional appropriations to “fix” the Mississippi River ballooned over the next half century. In 1928, Congress approved the Mississippi River and Tributaries Project, known colloquially as Project FLOOD, which gave responsibility for federal flood control projects to the Army Corps of Engineers. “The federal government now undertook the full cost of levee building and left to local levee boards only the tasks of obtaining rights-of-way and maintaining the completed levees.” In 1930, Congress authorized the construction of twenty-three locks and dams for the Upper Mississippi River. In 1932, the MRC cut sixteen canals into its meander paths, shortening the distance from Memphis to Vicksburg by 170 miles, to increase the river’s velocity and scour its own channel. In the New Deal spending era, river investment increased. In 1944, Congress authorized another 150 projects, totaling \$750 million.<sup>121</sup> In all, the Corps has constructed over 300 multipurpose reservoirs, as well as thousands of miles of levees, bank revetments, and strategically placed floodgates, pumps, and upstream dams on far-flung tributaries. The federal government has enlisted billions of dollars of infrastructure to build spillways, cut through wide meander necks, seal off the remaining Louisiana marshes from its progenitor, and construct Old River Control at the confluence of the Mississippi, Red, and Atchafalaya Rivers about thirty minutes north of Baton Rouge. Entire floodplains have been walled off from the river’s mouth all the way to the city of Cairo, Illinois.

The techno-politics to maintain the river in its current course requires constant maintenance, dredging, and lobbying. Project FLOOD did not quiet the cacophony of river politics in reaction to the many attempts to prevent another major flood after 1927. Such measures have both led to the seizure of private land to redirect floodways through Louisiana and launched new problems in the form of massive coastal erosion and land loss at the river’s lower delta. Since the 1930s, Louisiana has lost 2,000 square miles of wetlands. Today it is not only a loss of silt and sediment that Louisiana must contend with but also the politics that produced the Father of Waters that flows through it.