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# Landscapes of Control: River Infrastructure in the Mississippi Delta

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# River Infrastructure in the Mississippi Delta

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by

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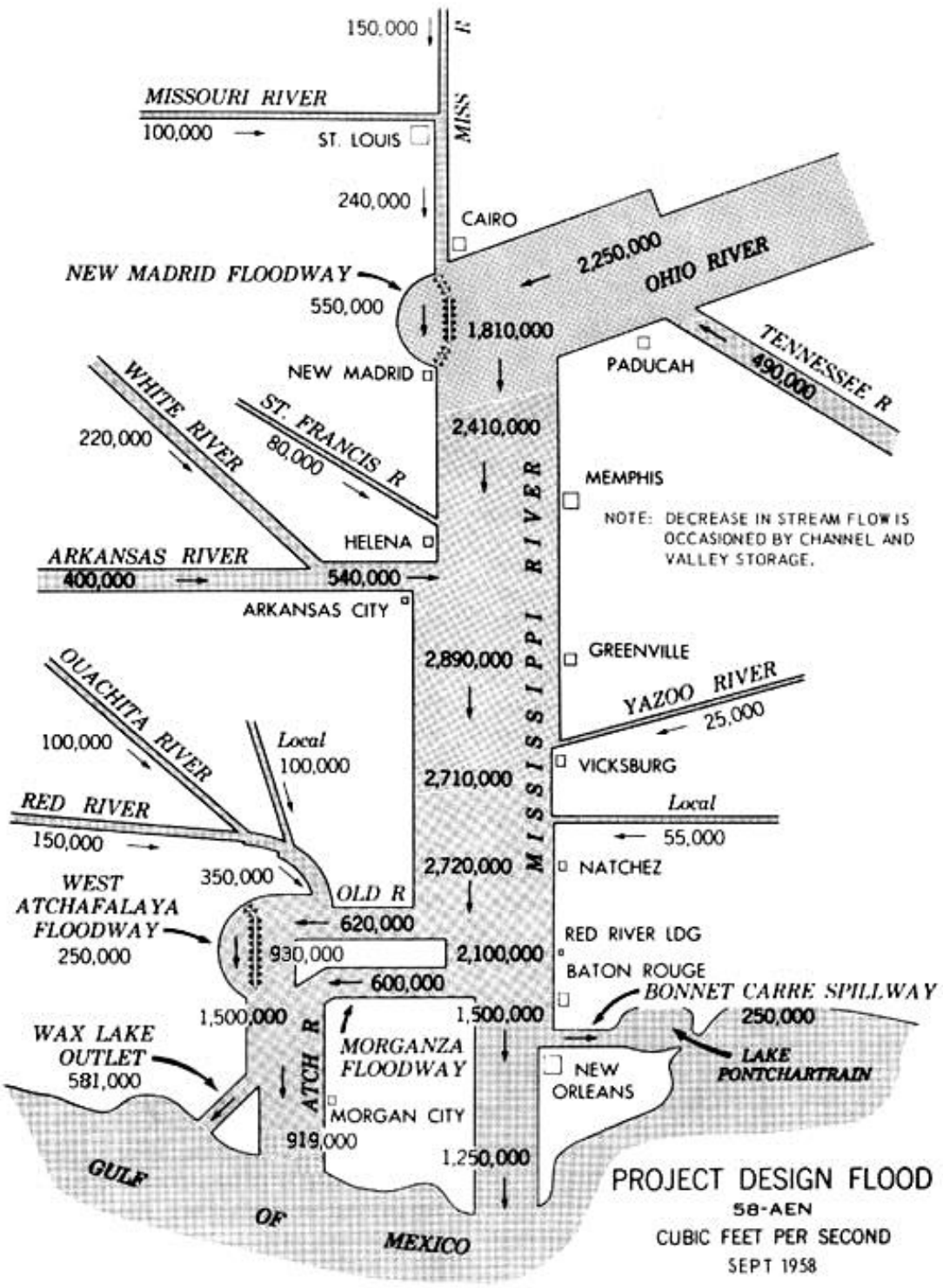


*Project Design Flood: 1958 plans by the US Army Corps of Engineers for a maximum capacity flood on the Mississippi, including all major federally-maintained structures.*

Dedicated to Mr. Chamberlin and Delp.

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Introduction

**Encounters**

The first time I encountered the Mississippi, it was at The Fly, a riverfront portion of Audubon Park on the western, uptown side of New Orleans. Its grassy lawns, flanked with live oaks, end in a short concrete embankment along the water. Below the embankment, there are various forms of erosion control – a step of wire cages full of stones and schist, leafy stretches of batture forest. They're not the first thing you see, though. You see the river looming broad and flat.

At this point (January 2014), I hadn't spent much time on waterfronts in the city. When I saw water, it was sluiced through militaristic canals on the east side, or flushed into storm drains in the Central Business District. Always it was channeled and revetted through concrete passages or pooled up in grassy ditches, out of sight and mind. All of the places I confronted water in New Orleans seemed to be highly controlled situations, even City Park with its "wild" stretches of artificial bayou. Initially this made sense to me – here we have a major city in the middle of the largest deltaic complex in North America. This is a river known, above all else, for its temperament and massive flood events – which formed the very sedimentary plain that New Orleans was founded on. Of course water in the urban landscape will always be somehow predicated by infrastructure, be cosmetic. Encountering water in the city will always be a designed experience. The parks, the outfall canals, the levees are recreational, but the way they are built tells us how engineers and planners perceive the river – a hostile force.

I remember thinking, while driving over NOLA's canals and drainage ditches, of the dry, concrete bed of the Los Angeles River, winding through the city empty and forlorn, an artifact of California's ongoing drought. I remember flying into Phoenix over the Central Arizona Project, a 336-mile canal carrying water from the Colorado River out to arid cities across the Sonoran Desert, most of it evaporating along the way. These massive western projects support city ecologies that grow increasingly difficult to water. They suffer from huge misconceptions about what it means to "green" the urban landscape – enormous amounts of groundwater are wasted on non-native grass species, almonds and swimming pools. These cities highlight the ridiculousness of placing urban hubs in ecologies that fundamentally reject development, which lack the basic local resources to sustain a large human population. They agglomerate vast populations, economies, cultures: they can't be moved.

This is the exact opposite of the problem New Orleans and its fellow cities along the Gulf Coast currently face. In Louisiana, the high-stakes environmental issue is the rising tide. The coast is slowly sinking into the Gulf, and it's a well-known fact that almost half of the city of New Orleans has gradually subsided below sea level. Some of it has to do with infrastructure. All of it has to do with the Mississippi River, and the various attempts to control its notorious floods and watery inundations, from first human contact with the land.

That Sunday at the Fly I remember thinking that the Mississippi, broad and plain under a gray January sky, looked somehow naked. The river's width can create the impression that the water is moving slowly. In fact, about 600,000 cubic feet of

water move by the Fly each second. It's about a half a mile wide here. At Algier's Point, the river measures 200 feet to the muddy bottom. Across the English Turn, there is another revitalized waterfront called Crescent Park, the first section of which opened in 2013. The purpose of such parks in the city – the Fly, the Crescent, and Woldenberg Park (in the French Quarter) – are intended to foster recreation, civil movement and health in the city. They also frame an encounter between the citizen and the river. In almost every park, there is a stark border between the grass, pathway, and the Mississippi's running water, seperated only by a thin concrete line. A park in New Orleans is not the traditional sort of monolithic river control that this project will mainly look at, but it serves as a good introduction. New Orleans' parks offer a more everyday lens into designers' interactions with the river, and how that design is influenced by their perceptions of the river's ecology. The park's design, in turn, influences public experience of the river as bucolic, threatening, or some hybrid territory. New Orleans' most-visited park is situated where all the tourists go: the French Quarter.

Woldenberg Park is a strip of greenery and concrete walkway on top of a concrete and earthen levee, with a rocky embankment leading down into the river. There are a few monuments to immigrants, to soldiers, built in the 1980s, which look like solidified WPA drawings. Sometimes there are music festivals in the plaza. Woldenberg is an outlet for the drunk and sober, native and tourist overflow of the French Quarter, to escape the grid and eat their beignets in the salt wind. However, it is first and foremost a giant levee. The entire park is hemmed to the river shore by the city's rail line (RTA), busy with street cars and large chemical train shipments,

transporting commerce and tourists along the river's edge. Its border with the Mississippi is a distinctively rough edge descending in a scramble of boulders. Mostly, people run along the path, out of direct contact with the river. But there is one prominent structure along its floodwall – a set of roughly hewn wooden bleachers leading down to the water. The High Line in New York has a similar feature, with wooden bleachers facing a glass window above 10th Avenue, framing the every day traffic of bicycles, pedestrians and cars in Chelsea.

The metaphor is clear – it casts you as an audience member in a daily, urban theater of economy and commute. In New Orleans, this theater is the Mississippi. The expanse of brownish-green water extends in either direction, banked with articulated concrete revetments cast in a row field in St. Francisville, LA. To the left, the river is bisected by the Crescent City Connection, a cantilever bridge crossing into Gretna, and the Governor Nichols Street Wharf, one of four major cargo holding facilities in the city core. To the right, imitation steamboat barges, ocean liners and Panamax container ships troll through the channel. That's what the river seems like here – less of a river, more of a channel, a canal, a passageway for inner- and inter-continental trade. Brief ribbons of recreational greenspace extend along the river's edge only in affluent neighborhoods – the French Quarter (Woldenberg), Carrollton (the Fly), and most recently, the rapidly gentrifying Bywater district. The romance of Mark Twain's Mississippi and the promise of adventure it holds seems largely gone this far south – the river seems less landscape than infrastructure.

In Bywater, the first stretch of Crescent Park opened in 2014. It was designed in response to a citywide competition called "Reinventing the Crescent," signed on

in 2008 by then-mayor Ray Nagin (now sentenced to 10 years in federal prison for bribery and money laundering, among other crimes in Katrina's aftermath). The intent of this competition was ostensibly to get New Orleans' major architecture firms to redesign the *entire* New Orleans waterfront as a single connected arc of parkspace (thus, "crescent"). The plan is coming together piecemeal – the next extension, from Mazant Street onward, is due to open in 2015. The first band of park, from Elysian Fields to Mazant, has received largely positive popular response. Doug McCash, writing for the Times-Picayune a few days after its February opening, called it a "sevefire masterpiece," with its repurposed Piety Wharf displaying the "untamed edge of the surging river [as] an open wound [...] with a certain welcome edginess" (McCash). This language is iterated in many discussions of the Mississippi – the vocabulary of riverfront encounters is one of precarity, possible danger.

To enter the park, you have to cross a giant pedestrian bridge made of repurposed metal, which arcs over Bywater's concrete floodwall and an active railroad line. It was designed by starchitect David Adjaye from Washington, D.C., in collaboration with New Orleans' Eskew+Dumez+Ripple, and Hargreaves Associates of Boston. It's true – as McCash suggests, once you enter the park, you are in "untamed" territory. In this way the park operates on two levels, beyond infrastructure and recreation – it's a bucolic expanse of gardens containing native flowering plants and reeds, and a militaristic, harsh-angled wharf built over the ruined pilings of a destroyed railroad. By leaving the edge of the river raw, unaltered save the same kind of informal stone levee at Woldenberg, it reminds the parkgoer of a difficult history of river control. Its progressiveness lies in the fact that it gives

multiple identities to the same space. Most forms of river control in Louisiana, as this project will address, are skeins over the complicated history of watery inundations and  various attempts to staunch them. Here, the pilings stand.

*Fig. 1. Stepped levee design feature for the Crescent by Eskew+Dumez+Ripple (2008).*

This tension between the history of the landscape and the infrastructure that has subsumed it has become one of my central interests through research for this project. It is almost always a problem of uncomfortable scaling – the infrastructure rearticulates the land quite literally as it affects the distribution of sediment across the delta. It simultaneously represents the levee, the revetment's local effect on any particular riverfront, and *also* uniform attempts to do the same thing on almost every inhabited waterfront community in southern Louisiana (i.e., every community). Discussion of the levee system or the trophic effects of river diversions require the kind of thinking in "deep time" that John McPhee discusses in *Basin and Range* (1981). In this book, discussing geological scale, he proposes that "deep time" is not a system of *comprehension* but measurement: "On the geologic time scale, a human lifetime is reduced to a brevity that is too inhibiting to think about. The mind blocks the information" (McPhee 127). Deep time is a kind of personal reconciliation

with the fact that one's field of study, while scientific in nature and subject to academic scrutiny of measurement and method, is almost entirely *invisible,* etched into the surface of an earth millions of years ago.

The joy of Louisiana's geology lies in its youth. It's not so deep after all. The sedimentary mat *(alluvium)* that southern Louisiana sits on is only about 7,000 years old. It is built off of the continental shelf by the Mississippi's outmoded LBM (Land-Building Machine), which for thousands of years spewed sediment into a Gulf stream much slower than its own current – so the sediment settled, accumulated wetlands, and formed the deltaic plain. With the advent of digital imaging, LandSat rasters available for public download from the USGS, GoogleMaps, etc. – this kind of telescopic thinking has become more everyday. In the political map on your phone or on the web, the southern border of Louisiana remains static. In actuality, those young wetlands are rapidly receding into the Gulf. This is in part a result of the way the river has been engineered via levees, spillways, diversions and countless other forms of landscape technologies.

In these structures lies a central predicament: they both enable people to live way out on the deltaic plain (New Orleans, Baton Rouge, and a constellation of smaller towns depend on them), but they are also assisting its slow erosion. They are both false friends and completely necessary. This project will teeter on that fact.

**Infrastructure and the Delta**

In Italo Calvino's "Invisible Cities," a young Marco Polo describes episodes of his travels to the emperor of the Mongol Empire, Kublai Khan, attempting to win his favor. Urbanists love to cite various parts of this book to use as metaphors for whatever city they're looking at. One of my favorite passages, under "Cities and the Sky," describes a place called Thekla:

> Those who arrive at Thekla can see little of the city, beyond the plank fences, the sackcloth screens, the scaffoldings, the metal armatures, the wooden catwalks hanging from ropes or supported by sawhorses, the ladders, the trestles. If you ask "Why is Thekla's construction taking such a long time?" the inhabitants continue hoisting sacks, lowering leaded strings, moving long brushes up and down, as they answer, "So that its destruction cannot begin." And if asked whether they fear that, once the scaffoldings are removed, the city may begin to crumble and fall to pieces, they add hastily, in a whisper, "Not only the city."
>
> If, dissatisfied with the answers, someone puts his eye to a crack in a fence, he sees cranes pulling up other cranes, scaffoldings that embrace other scaffoldings, beams that prop up other beams. "What meaning does your construction have?" he asks. "What is the aim of a city under construction unless it is a city? Where is the plan you are following, the blueprint?"
>
> "We will show it to you as soon as the working day is over; we cannot interrupt our work now," they answer.
>
> Work stops at sunset. Darkness falls over the building site. The sky is filled with stars. "There is the blueprint," they say.
>
> (Calvino 127)

Thekla is a city made entirely of infrastructure. It has no other components – no houses, stores, or town hall, just framework and passageways, none seemingly marked, all intuitive. Its unending construction is directed by a starry imperative to expand and network. It's as if Thekla is the vast support system for another, internal city which will never exist, no matter how deep into the scaffolding you go. It can only exist in a state of constant construction because construction is the only work

available to its inhabitants. Infrastructure is its culture, its reason for existence. These workers operate under a divine order from the heavens (much like Manifest Destiny) to add framework. The slowly shifting pattern of stars is not just their blueprint, but their motivation, their employer and mentor, the only force driving them on in their Sisyphean work – forever pushing a boulder up a hill only to watch it roll back to the bottom. It reminds me, unequivocally, of New Orleans. If Thekla's citizens stop building and updating their support system, it will fall apart – same goes for the Army Corps of Engineers.

What would New Orleans be without its levees, without the networked system of flood control along the river, stretching up to St. Louis? Now, virtually the entire city is below sea level, which is an anthropogenic condition – the land outside the natural levee of the river, denied its yearly inundation of sediment during spring floods, slowly sank below grade. Further – what would New Orleans be without the vast, networked river control system scattered along the Mississippi to the north, all the way to Arkansas? Louisiana would return to its original growth state, before the first French and Spanish colonies of the 1700s – a cypress-dominated marshland, an ever-expanding estuary with freshwater currents, an alluvial plain steadily growing to the size of the Nile's delta.

The Mississippi River delta is, as John McPhee described it, an "upside-down superhimalaya," a natural phenomenon like no other in the Americas (McPhee 3). Superhimalayas are the hilly roller coasters that rocket you along a small circuit, the kind at county fairs. This is to say that the Mississippi isn't a static object of nature – it's a river that shifts drastically over the landscape with the change in distribution

of sediment and gravity. If the Mississippi River has many characters, operates as many different kinds of protagonists, the Dynamo is one of these personalities – the river as it existed before its concrete constraints and military mandates. The Dynamo personality is a true agent of what William Cronon defines as "wilderness:" a thickly social construction of nature, combining sublime beauty with the spiteful hand of God, a "sacred" place with a "primitive" temper (Cronon 5). However, the wilderness Cronon writes about are benign natural tracts that have become famous in the American imagination – Hetch Hetchy, Yellowstone, the Adirondacks, etc. – protected from the likes of John Muir and other conservationists in the late 1800s. These were placed perceived as "temples," havens of the good spirit of nature. The Mississippi's malignness, perhaps, is what opens it to thick development, to surveillance and control at an unimaginable scale.

Wherever the river goes, it brings that uncertain encounter with it, that capacity always to breach its shores and flood the land. All attempts to make permanent settlement in the southern half of Louisiana, Acadiana, have been contingent on the river's precarity. At the same time, it is impossible for there *not* to be a major American city on this fringe territory – New Orleans is situated at the mouth of the largest single American river. For this reason, Peirce Lewis has described it as "the impossible but inevitable city" (Paleo 20). New Orleans is the trade post that sees everything going in and out of mainland America, everything in the boundaries of the Louisiana Purchase – all the way north to current-day South Dakota, east and west as far as the watershed extends, encompassing more than half the continent. The "birdfoot" mouth of the river, named so for its forking channels

reaching out into the Gulf was originally a wide, shallow plain of sediment, thickly shifting out into the slower saltwater territory. Now it is a deep, dredged channel, trafficked by barges.

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This project wishes to examine past and present forms of river control in the Mississippi delta, identify their macro-effects on the coastal ecology of Louisiana, and their micro-effects on city planning in New Orleans. It's therefore a project about uncomfortable shifts in scale – comparing the evolution of an entire coastal ecology to the evolution of a street plan, the encounter framed by a park or a canal. Such an analysis requires an extraordinary amount of backwork through history, legislation, trade relations between early colonists, native inhabitants of the coast, political refugees, slaves, wooden structures long flushed away by the river, and environmental racism laid out across the land. It's a big topic, and I don't want to attempt the form of an ethnography or historiography unsuccessfully.

Instead, I'd like to take a cue from Brian Larkin and focus on the "poetic mode" of infrastructure – the everyday intersections of water, social processes and technology, told in a fragmented narrative similar to actual lived experience (Larkin 335). Over the month of January 2015, I visited New Orleans and spent my days traveling between various river control structures in the city and across southern Louisiana. These include the Bonnet Carré Spillway, the Morganza Floodway, the Old River Control complex, and various sites of levee crevasses, pumping station failures, and watery inundations of all kinds, inside New Orleans and out. At these sites, I interviewed biologists and engineers in the US Army Corps of Engineers

(USACE), digital mapping experts in the USGS, and landscape architects dealing with water in New Orleans – all members of a very large and diverse task force of organizations charged with the maintenance of old infrastructure and the imagining of a new system.

In the poetic mode, Larkin writes, "form is loosened from technical function. Infrastructures are the means by which a state proffers these representations to its citizens and asks them to take those representations as social facts" (335). In other words, infrastructure is something people are taught to look past, to take advantage of as a civic *given* – a dam as something to drive over, a sewer as something that doesn't exist anywhere outside the imagination (until it malfunctions). Larkin also notes that we often privilege the *end effect* of infrastructure – "we often see computers not cables, light not electricity, taps and water but not pipes and sewers" (329). When Le Corbusier wrote "Eyes That Do Not See," in *Toward An Architecture* (1923) his elegy to ocean liners, airplanes and cars, he wished to create a more plastic definition for architecture to include objects symbolic of the industrial age – icons of globalization and mass production. In urban theory today, the word infrastructure has come into its own vogue and experienced a similar widening of its definition. Kazys Varnelis has argued that Le Corbusier's phrase – eyes that do not see – is useful for infrastructure precisely because it's something made invisible, built into the walls and under the streets. This project will be an attempt to look with fresh eyes at the familiar, the banal structures of concrete and steel that have reconstituted the landscape and urban imaginaries of southern Louisiana – the

levees, revetments, spillways, blast-plugs, floodwalls, locks, chevrons, cutoffs, dredge and drainage projects.

The word "infrastructure" itself can mean any number of things. In simple terms, infrastructure is an "architecture of circulation," a series of physical structures aiding the flow of goods, people or ideas, or more generally, "matter enabling the movement of other matter" (329). Or restricting movement, streamlining movement, editing movement, inhabiting any number of temporary switch-and-bait roles depending on the river's flood level.

There's water infrastructure of the sort I'll be looking at in detail, but there's also *informational* infrastructure evolving simultaneously. The French geographer Elisée Reclus, boating into New Orleans for the first time in 1853, noted with surprise that before they passed a single settlement on the coast, he noticed a telephone wire extending into the distance. He remarked, with distaste, that in this muddy wilderness, "science seems out of place [...] here, on soggy ground that is not even part of the continent yet, but only the residue of waves, the telegraph is the first work of humans" (Reclus 41). Far before the boom and boon of the coastal fishing industry, an information-based economy was already vital to New Orleans' existence as a trade post. This is infrastructure aiding the networked system of merchants, monitoring the traffic of ships and foreign cargo entering and exiting the river. In addition to being an unsightly reminder of the frontier economy, Reclus also notes that the wires were largely inefficient, routinely knocked down by Cuban cows brought there by immigrant farmers.

Walter Benjamin called infrastructure the "collective fantasy of society" – an architecture of desire, an enabling mechanism that allows the rest of society to function smoothly, aided by an invisible support system (Larkin 328). According to Benjamin, infrastructures, despite their apparent inertia, express communal desires almost entirely separate from their concrete, technical functions. What desire is expressed by a levee? The simple desire not to have one's home flooded, but perhaps also a shared desire to best nature, as John McPhee has suggested in a landmark 1987 essay "Atchafalaya." River control, he suggests, functions basically as a military offense against nature, an Army Corps stronghold tasked with the defense of everybody living in the Mississippi delta (or at least those within the levees).

How else might we define infrastructure? It is also a "mechanism to control time," according to Graham and Marvin – in the case of the Mississippi, river control wishes to keep the river perpetually flowing along the same course it travelled in the 1800s, at the time of New Orleans' settlement (332). It is simultaneously a *military* project, a project of controlling *sight*, a project of *circulation* dependent on constant efficiency, a tool to measure a society's functionality. In Louisiana, it attempts to make sense a messy ecology into a system where every last drop of water and sediment are weighed and accounted for: an impossible but inevitable task.

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Delta is not just a geological feature but a mathematical symbol signifying change over time. It's represented by a triangle. This is useful

– it turns a simple pronoun into an equation, a sentence with action. The Mississippi River Δ. The Mississippi River changes over time. So do its people, their houses, their streets, bridges and dams, agriculture and economy, in conversation with the river. The delta is flat – it's not a landscape that can be stood above and looked out over, to see whether a barrier island has disappeared that was there a year ago. The changes in such a place can be drastic, but perception and evaluation of them is slow to the draw.

The first section of this project will look at early accounts of the delta and its various technologies from French and Spanish geographers, traders, travelers, engineers, and the often-ignored population that maintained the levees until 1849: West African and Native American slaves working on sugar and cotton plantations along the river, Cajun, Creole and immigrant populations. It will track the history of specific river-control projects and their different articulations as they switched from private to public hands: from willow to concrete, from provisional to permanent constructions.

Chapter 1: Imaginations

**Imaginations of the Mississippi**

I was born and raised in Savannah, GA. As with New Orleans, visitors talk wistfully of it as a sleepy southern town, existing somehow outside the political functions of the rest of the country. People are supposed to be kinder, operating under a code of hospitality symbolized by the pineapple – an exotic fruit endemic to the Caribbean, adopted by European colonists as a false symbol of good intentions. In wealthy neighborhoods, you see pineapples on doorsteps or embroidered into curtains and upholstery. Above you are live oak trees bearded with Spanish moss, whose hundred-year-old roots fracture and burst through the 21st-century asphalt. These are the Southern Gothic images that sell on postcards, alongside images of carriages bumping along the cobblestone roads of River Street – the cobblestones didn't actually come from Savannah but from the northeast, ship ballast used as cheap and convenient paving material.

One of the most prominent features of Savannah is its squares – a grid of twenty-four green spaces inspired from the designs of old Turin and redevelopment in London after the fire of 1666. Twenty-three squares, now that one's been cleared to build a parking garage. They're bordered by one-way roads that create a functional circulation of traffic without stoplights. James Oglethorpe (whose name now lives on in a shopping mall out in the boonies) was the British general who drafted the plan in 1733, about a hundred years after the first French settlement of New Orleans.

Both cities bear the visible character of military settlements – New Orleans' original plan was a symmetrical sixty-six block grid bordered by the signature star-shaped walls of French prisons and forts. This proto-grid is the current-day French Quarter, elevated from floods on the natural levee of the Mississippi. Along the shore grew batture forests, consisting mostly of black willows and cottonwoods, both fluvial trees thriving off of constant inundation in water. Behind the natural levee, the land mostly sloped off into slightly lower wetlands – porous land dominated by bald cypress.

Growing up, Savannah and New Orleans seemed like sister cities to me, sharing so much of the same visual culture, food and wetland species of grass and amphibious fauna. My paternal grandmother, Irma Lee Pittman, came from Amite, LA (just north of New Orleans), and drove back every December to deliver a Christmas sermon in Cajun dialect at her childhood church. Her parents were killed in the 1908 Dixie tornado outbreak that tore apart most of the town. One of the only undamaged items in the otherwise torn-apart house was a Dutch girl quilt, which Irma Lee later cut up and divided among her six children. A piece of it is framed in our laundry room, the bonnet and apron stitched in faded pinks and greens. My grandfather, Harry Rollings, received his medical training at Charity Hospital, the oldest free teaching hospital in America. They married and moved to Savannah. In 2005, only a few years after each of their deaths, about half of the city of New Orleans flooded after the I-walls on several outfall canals burst with storm surge from Hurricane Katrina. Charity Hospital weathered severe flooding, with a small team of German doctors taking care of the patients who weren't able to escape in

time. Now the hospital is permanently closed despite its structural integrity, and subject to a citywide debate about what to do with it – Mayor Mitch Landrieu proposed renovating it as city hall, a team of activists behind the documentary "Big Charity" continue to rally for its reopening as a public hospital. Plans for its destruction as part of a neighborhood-wide clearance project to build a new LSU-VA teaching hospital complex were shot down last year, leaving hundreds of people without homes in a demolished historic district near mid-City. Amite, LA was torn apart again this past December by another congregation of tornadoes ushered south from the plains (Sanchez 1). More than a dozen families moved away from Tangipahoa Parish. Goes to show – even in northern Louisiana, away from the brunt of storm surge flooding and erosion, natural disasters still fluke the landscape, displacing vulnerable communities.

The Dynamo characterization of the Mississippi is unpredictable: it redirects over a hundred-mile radius at the tip of a hat, its current runs upstream for a night, its oxbows bend so steeply that they cut off. The town of Delta is three miles below Vicksburg one year, the next year it's two miles above (Twain 5). Picture a jar of Mississippi water, freshly sluiced from a floodgate – a mythological substance. It's a dense greenish-brown, filled with suspended matter that dances around in Brownian motion – sediment settling into a gradient, gravel, small benthic organisms in various stages of development, petrochemical runoff, decayed bits of fish flesh, clay. It smells neutral, earthen – or somewhat like mildew if there's been an chemically-triggered algae bloom nearby, increasingly common along the American Ruhr. There's a tradition among riverdogs of tasting the sediment for

good luck. Now it's avoided, a notoriously chemical sludge from Baton Rouge southward.

This thick water comes from a river that is intensely *alive,* in the sense of Jane Bennett's "vibrant matter." It's matter that, through its popular personifications, takes on a role as actor in the human world – a substance with agency. Bennet notes " ... that we are much better at admitting that humans infect nature than we are at admitting that nonhumanity infects culture, for the latter entails the blasphemous idea that nonhumans – trash, bacteria, stem cells, food, technologies, weather – are actants more than objects" (Bennett 115). The Mississippi, too is perceived as a nonhuman force driven over the vast gradient of mainland America by gravity alone. Its drainage basin ranges from western New York state to Idaho, making it responsible for the drainage of unimaginable quantities of water. It's a lawless entity transcending political boundaries – a wall of reinforced concrete means as little to it as the state line between Louisiana and Mississippi, which snakes along its path, changing as it does. It moves over some of the flattest land in America, but never lazily. At all times, it merely follows the path of least resistance to the Gulf with shifts in the land, traveling in and among human constructions.

The characterizations go on: the river is personified as devilish, scheming, intelligent, opportunistic, two-faced and deeply charismatic. It is also Twain's bucolic river, representative of freedom and true, untamed wilderness. Geologically, it's also relatively young – younger than the Rocky Mountains, and just about the "youthfulest batch of country that lies around there anywhere" (Twain 5). Yet in the time of its existence, it has switchbacked over nearly the entire states of Louisiana,

depositing sediment and forming vast new territories of wetland extending out into the Gulf of Mexico. Here is how historian John Barry describes its current, in his account of the 1927 flood:

> The Mississippi never lies at rest. It roils. It follows no set course. Its waters and currents are not uniform. Rather, it moves south in layers and whorls, like an uncoiling rope made up of a multitude of discrete fibers, each one following an independent and unpredictable path, each one separately and together capable of snapping like a whip. (Barry 38)

The Gulf Stream is a gentle lull in comparison. Most of the sediment that is not carried out to Florida and up the eastern seaboard simply settles along the Louisiana coast – it is a giant Land-Building Machine (LBM). It is an river that, according to Twain, "is always changing its habit *bodily* – it is always moving bodily *sidewise*" (Twain 5). It is a restless current with an almost corporeal presence.

Its currents will sometimes be intensely landscaped by river technologies, and sometimes completely obliterate them. Because of its personality, it does this not just as a function of physics, or pressure, but supposedly as an act of rebellion. Take river cut-offs. Straightening the river was one of the Army Corps of Engineers' major projects in the early 1900's, in order to reduce the amount of time and energy it took barges to navigate the great looping turns of the river. Wherever the river threw out oxbow bends, the USACE dug a channel between the two closest edges of the river, cementing each edge with dikes to keep it from flooding during construction. Often the dikes would be outfitted with "blast-plugs" to let the river flow in and destroy the structure when the time was right – or, they would simply be blown up with dynamite, letting the river divert its flow to the shorter path. 128 such cut-offs occurred between the years of 1930 and 1942 under the direction of

Corps director James Buchanan Eads, shortening the river by almost 150 miles (Barry). Studies conducted by the Corps had suggested this process would also drastically reduce yearly floods, killing two birds with one stone. Its skeptics feared that in doing so, meander cut-offs would also *deepen* the channel of the river, denying the coastal region of Louisiana its yearly inundation of sediment.

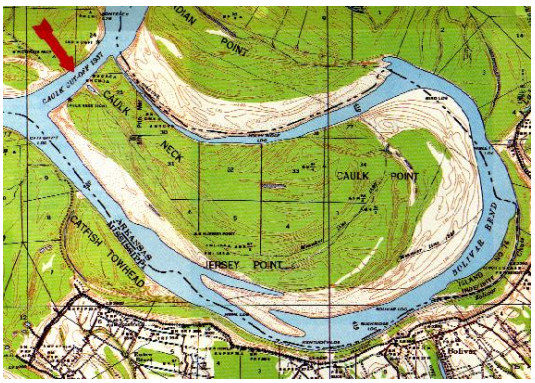


*Fig. 1: Manufactured river cut-off (USGS).*

Meander cut-offs are a project that the river also naturally emulates through time. Occasionally its oxbows, stretched to a ridiculous angle, will cut themselves off through years of erosion and flooding, turning the parenthetical body of water into an oxbow lake, which may gradually dry out without flooding.

*Fig. 2: Oxbow cut-off (Radical Cartography).*

Many river control practices do the same: edit the landscape by emulating natural processes, but collapsing them in time. Constructed levees, on one hand, are merely a reinforced mimicry of the river's natural levees. Revetments (which in the

1930's consisted mostly of willow mattresses laid down on the river banks, now made of articulated concrete links) are merely a reinforced riverbank, one that doesn't allow for erosion or change. They are intended as *permanent* versions of the geological forms the river has "naturally" created over hundreds of years – built, primarily, to preserve the river's path as it existed in the early 1900's. In doing so, these technologies preserved the communities that thrived off its commerce. Above the entrance to the engineering school at the University of Wyoming, there is a sandstone plaque etched with the words: "STRIVE ON – THE CONTROL OF NATURE IS WON, NOT GIVEN." John McPhee noticed a version of this etched into the belt buckle of a river engineer named LeRoy Dugas, or "Dugie," in 1989, an iteration of the manifesto: "TO HELP CONTROL THE MISSISSIPPI" (McPhee 13). It might as easily read, To preserve the Mississippi circa 1950, forever.

The river must move an incredible amount of water through a landscape that has not been carved out for it by glaciers, and because of this exercises great freedom in redirecting to whichever route is most geographically convenient at the moment – and there are few barriers that keep it from throwing out oxbows to test for a slightly steeper gradient. Or, with the gradual shift in distribution of sediment across the state of Louisiana, it will simply begin diverting its waters into a tributary until the original path of the river is a shadow of its former self. The entire southern portion of Louisiana has been formed by these deviations.

Harold Fisk, a cartographer commissioned by the US Army Corps of Engineers in 1944 to map the river's lineage, immortalized these overlapping, ever-changing pathways. As far north as St. Louis, red, pink and green zones indicate

formerly dominant routes – each weaves through others, billowing out like variegated ribbons. Each ghosted riverbed fertilizes young forests with the alluvium of a bygone era. The Cotton Kingdom of Louisiana and spine of sugar plantations along the river thrived off this rich sediment – the agricultural economy of Louisiana depended on it. John McPhee writes that "southern Louisiana exists in its present form because the Mississippi River has jumped here and there within an arc about two hundred miles wide, like a pianist playing with one hand – frequently and radically changing course" (McPhee 5). Each previous course has been settled with "arcuate strings of Cajun towns" – Bayou Teche, Bayou Lafourche. These are now fishing communities along creeks and tributaries of the main river, now cemented in place. In the 1940s, Fisk and a geographer named R.J. Russel identified six discrete lobe-shaped deltas, each with their own sub-deltas dating back only about 7,200 years (Campanella 78). As a result, much of the land along the coast had only really been *land* for a few hundred years at the time of New Orleans' settlement. The city was built not on hard lithosphere, but on a "doormat" of alluvium that, without a replenishing supply of sediment, would just as easily subside back into the Gulf. For the first two hundred years of its existence, New Orleans was not defined as part of Louisiana state proper, but appropriately, as a coastal island.

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In 1851, a young anarchist fled his native France after Louis Napoléon's coup d'état. In the years after his escape, he served as a tutor across Europe and Central America. He'd trained in geography, like many of his siblings, and came to be known for this – his name was Elisée Reclus, now known as the father of social geography.

All through his travels he kept fragmentary journals and letters describing the ecology of various regions, and eventually arrived at the Mississippi River Delta in 1853, via the Caribbean. His accounts are remarkably attuned to the estuary's ecology – he describes the delta as a "vast alluvia" composed of sands and clays from all the mountain ranges of America, stratified along the Louisiana coast (Reclus 33). All these sediments, this immense particulate migration, either filters "through the sea continuously in a creative process that adds islands, peninsulas, and coastline to the continent, or else, carried away by the Florida current, they are deposited a thousand leagues away on the banks of Newfoundland" (33). As his little boat navigated the "birdfoot delta" to drift upriver to New Orleans, his next teaching post, he described running ashore constantly – all throughout the channel, small alluvial islands had formed, to be washed away and reformed elsewhere the following day, with the shifting current.

Basil Hall, an English visitor, described a similar experience entering the river twenty-three years earlier:

> "We coasted along, past numerous small, sandy islands," he wrote, "over shallow banks of mud, and through several immense basins, such as Lake Borgne and Lake Pontchartrain, half fresh, half salt, and filled with bars, spits, keys and ... shoals [typical of areas] whose Deltas are *silently pushing themselves into the sea[,] raising the bottom to the surface."* (Campanella 5)

The landscape Reclus and Hall describe is porous and flexible, a delta changing drastically during storms, its soils shifting constantly. The same path is never trustworthy twice. This is the silt-heavy landscape that earned the Mississippi its nickname "the Big Muddy," because of the enormous pains that meant for dragging equipment through its sludge. Reclus' discussions of social politics and ecology are

surprisingly intertwined for a writing of this era. Most of the books I'll look at follow in Reclus' tradition of a hybrid historical study, observing the communication between the ecology of the landscape and the various structures that form around it – whether as tools of social oppression in urban space, or technologies of the river, with their own forms of restriction and release.

What follows is a survey of three major USACE structures (the Bonnet Carré Spillway, Morganza Floodway and Old River Control) and other methods of river control (levees, cutoffs and sediment diversions). Geographically speaking, it slowly moves from southern Louisiana to the region just north of Baton Rouge. It also moves generally from the earliest and most normalized forms of river control (levees) to the most recent and contested (modern dredge technology and sediment diversions). After looking at specific structures, I follow the delta to its very end, the southernmost tip of Louisiana in Plaquemines Parish. *Scaling up* all along the coast, I use Plaquemines to talk about land loss writ large around the Gulf coast, and the problematics of mapping it. Then, I *scale down* to talk about the politics of water in New Orleans. Like the USACE's mission to control the Mississippi, and subsequent attempts to reverse the process through coastal restoration, this project attempts to cover far too much in a limited amount of time with rapidly depleting resources. In this concession, this freedom of movement across the deltaic plain, maybe it also imitates a new style of river control – a semisolid, semifluid, swerving engagement with the landscape.

Chapter 2: Structures

**I. Fixing the Riverbed: the Levee Debate**

In his book on the origin of blues music in Louisiana, the ethnomusicologist Alan Lomax writes:

> Driving through the Delta, you hardly ever see the river, but the levee is always close by, a great green serpent [...] the levee is unobtrusive, since its slope is green and gradual, but in fact it is immense – higher and longer than the Great Wall of China, very likely the biggest thing that man has ever made. (Lomax 212)

The problem with levees, as Lomax would have it, is simply that they're part of a system too large to imagine. They exist, on a person-to-slope basis, virtually everywhere. If you are standing anywhere in southern Louisiana, chances are there is one very nearby – an inclined, grassy serpent trailing the river. But the entire system is unimaginably large, outlining the Mississippi and all of its tributaries, branching out like lung pathways through its entire watershed across the interior of North America. They're so common I often forgot they are anthropomorphic land structures, built up out of the earth and maintained since the arrival of Louisiana's earliest occupants. In this way, the modern levee system perfectly demonstrates the problem of scaling with Mississippi River infrastructure – so common that it becomes difficult to perceive its networked effect on attitudes toward the river, and its ecological consequences.

Today, most levees around the New Orleans area double as recreational parks – many have paved running and biking lanes on top. The Mississippi River Trail, which stretches 3,000 miles from the river's headwaters at Lake Itasca, Minnesota, all the way to Venice, Louisiana, runs directly through NOLA on top of a

levee. Despite their apparent simplicity from the ground perspective, Lomax is right – they're an enormous engineering feat, perhaps more important in their size and effectiveness than any other river control feature. They predate every other style of river control – earthen dikes built to prevent flooding or encourage irrigation have been used since the earliest known agricultural projects in the Indus Valley, 2600 B.C.. "Levee" itself is actually a very broad term meaning "lifed" (note: past tense) in French. It encompasses all imaginable styles of embankments using all imaginable materials – piles or walls of sandbags, silt, clay, concrete, wood, tetrapods and geotubes – anything to lift up the existing topography and keep water out. It also refers to the natural levee of the Mississippi, formed of sediment deposits just beyond the riverbank, just beyond the *batture* (riverbank forest, mostly willow and cottonwood). Battures offer invaluable erosion control – its roots quite literally keep the riverbank from being eaten away by every flood. When the batture is clear-cut, concrete forms have to do the same work.

Before artificial levees, high spring water from northern snowpacks flooded over the batture and the natural levee, supplying the backswamp with sediment and nutrients that (for the rest of the year) inflated the soil. The drainage of groundwater from this land causes a reverse process called subsidence – the land literally deflates, falling below sea level and becoming even more prone when the levee is breached. Shortly put – levees have the potential to worsen floods, making them higher, more common and more violent.

The artificial levee is more than a grassy, oblong hill. It's a political border that the Mississippi must obey, by mandate of the Army Corps of Engineers –

without levees, the boundary between Mississippi and Louisiana would remain static and meaningless while the river's curvature shifted across the alluvial plain, and the Port of New Orleans shriveled into irrelevance. According to the USACE, flooding only happens when the river deviates from its leveed boundaries – the fault lies entirely in high spring water. Until the turn of the century, federal river policy didn't reflect that the levees themselves might be partially to blame – actants in an ecological feedback system creating gradually worsening floods. Unpopular theories proposed that, unable to flood over the levee, snowpack waters merely rose ever higher.

This past January, I drove out to River Ridge, LA (just a riverbend north of New Orleans) to the site of an 1849 breach called Sauvé's Crevasse. *Crevasse* means, according to a 1823 journalist, "the name given to a fissure or breaking of the levée [...] almost uniformly produced by neglect" (Campanella 1). They most commonly occur in four ways: overtopping (river rises above), underflow (river scours a hole underneath), slumping (weight of water pushes a section *through*) and erosion (waves cause the levee to slowly degrade). Crevasses in the 1800s were a fairly common event, but were mostly small-scale – flooding agricultural land and not much else. This is because levees in the New Orleans area were still maintained by private, riverside landowners, who were almost entirely plantation owners. And most of the plantations in Louisiana's cotton, sugar and indigo kingdoms, were maintained by slaves of West African, Caribbean and (to a much smaller degree) Native American descent. The construction of levees below the Mason-Dixon line is actually one of the largest concealed labor projects in the U.S. – the Army Corps even

notes in their informational database about levees that it's a common misconception most American levees were built and maintained by the federal government. This is untrue – only half the levees in Plaquemines Parish south of New Orleans, for instant, are federally maintained. The rest are privately owned, mostly by petrochemical corporations, who are then responsible for the implications for the whole parish if their portion of the perimeter fails.

On May 3, 1849, the levee at Pierre Sauvé's sugarcane plantation was cut through by underflow and eaten away to a 150 foot gape, letting spring water flow freely into present-day Elmwood, Jefferson, Hollygrove neighborhoods, then into the "bowl" of New Orleans city central, inundating nearly a fourth of the land that flooded during Katrina. Most of this land in Jefferson County was agricultural or undeveloped at the time, but when the floodwaters reached the city, it began flooding homes at a depth of about six feet. As historian Richard Campanella tracked in a 2014 *Times-Picayune* article, the flood only damaged about ten percent of the land it flooded, but debilitated parts of the city's streetcar line. Steamboats advertised tours of the breach in the local newspapers. A woman named Elizabeth Lamoisse famously painted Canal Street under a few feet of water, devoid of cars. Figures in covered canoes drift between Canal's characteristic median stand of pine trees, shaded from the harsh Louisiana sun.

Despite the relatively small amount of inhabited property flooded, the crevasse became New Orleans' rallying cry for the "Swampbuster Act" of 1850, which involved the federal government in widespread drainage of wetlands along the southernmost Mississippi. As Walter Johnson notes in *The River of Dark Dreams,*

during floods levees take on a double identity. Though they were built to keep water *out,* once an overtopping occurs they do the exact opposite – keep it in. Quite simply, he writes: "levees created swamps" though they were intended to prevent them (Johnson 90). With the widespread agricultural clear-cutting occurring in the lower Mississippi Valley, floods became less irrigable and more destructive. By preventing drainage, levees held breach water in, creating anthropogenic swamps and forcing the land's inhabitants to manually drain the water out – and with it, massive amounts of sedimentary topsoil, putting almost half of New Orleans' inhabited land below sea level, where formerly it was at or above. This, very briefly speaking, is the beginning of how massive land subsidence began to occur during the early 1800s (Campanella). The division that carried out these sophisticated drainage projects eventually became the Mississippi River Commission in 1879, a federal entity under the umbrella of the USACE. Around the time of its creation, Samuel Clemens (Mark Twain) was drifting down from St. Louis as a novice steamboat pilot.

*Fig. 3. The levee at Sauvé's Crevasse (personal photo).*

The levee at Sauvé's Crevasse meets today's height requirements of fifteen feet above city grade, part of the USACE's 2011 "Project Flood" plan. The river-facing side of the levee is armored with concrete revetment mattresses that protect the soil from severe erosion. About twenty feet below the pavement, there is a thick, T-shaped concrete wall that prevents water from scouring the levee up from underneath. At thousand feet punctuations, there are pumping stations which gather rainwater from River Ridge neighborhood – from the highway and empty drainage lots – and empty it back out into the Mississippi. Some are decrepit and apparently out of order, like this one from the 1970s, compared to one from the early 2000s:

*Fig. 4. Pumping stations along the levee at Sauvé's Crevasse (personal photos).*

Spraypaint on the asphault designates underground utilities, pipes flowing through the trapezoid of earth. They exist primarily to pump rainwater out of riverfront neighborhoods, where it settles at the lowest elevation, in massive pools that extend across parks, ditches and bioswales after heavy thunderstorms. Wherever outfall canals extend into the city – at 17th Street, Orleans and London Avenue, the levees too fold in with them. These outfall canals are where the majority

of storm surge water breached the Army Corps' levees during Katrina and flooded nearly half the city, and did so precisely because the levees were there.

**II. Sentry to the North: The Bonnet Carré Spillway (1930)**

The town of Norco, LA is about 25 miles west of New Orleans, situated along a stretch of the Mississippi known as the "German Coast" in St. Charles Parish. It's called this because an influx of German immigrants were assigned this stretch of property in 1721. The organization that owned the land was the Company of the Indies, a French banking corporation which held monopoly over most of the land in southern Louisiana until 1731. They left a small population of Germans there as engagés to intermarry with Acadians and operate sugar plantations, supplying surplus food for New Orleans. This area is also the site of the largest slave revolt in American history. In 1811, Charles Deslondes, the son of a Haitian slave and white plantation owner, led 200 slaves of West African and Carribbean descent from Woodland Plantation toward New Orleans, only to be driven back to present-day Norco by planter militia (Bacon-Blood). The heads of forty-five executed rebels were displayed on poles on top of the levees at their owners' plantations (Misrach 28). The place-names along this stretch of river – in corrupted German, French and Spanish – are rich with history, violence, a land stripped of nutrients by centuries of monocrop agriculture, adapted into oil refineries and nuclear facilities. The name "Norco" is merely an acronym for the "New Orleans Refining Company." This company was bought out by Shell and converted into their largest refinery in the continental U.S.. It now employs most of the surrounding population. I don't mean to

pass judgement by collapsing history – all of this is just a testament to the unseen strata of sweat, blood, sugar and semen in this soil.

For our current purposes, here's the most important fact about this place: the two miles of land just west of Norco occupy the shortest distance between the Mississippi River and Lake Pontchartrain of anywhere in their neighboring bodies. This geographic condition makes it the perfect location for a river diversion, a kind of river control not attempted by the Army Corps of Engineers until "the last great flood" of the Mississippi in 1927, best documented by John Barry in *Rising Tide* (1998). This flood is widely accredited as the largest in American history, inundating 27,000 square miles and displacing 700,000 people as far north as Kentucky. Before this "call to arms" against the river's intensifying floods, the USACE had a policy of merely heightening levees with the spring waters. Many engineers – Charles Ellet included, as early as 1852 – argued that levees alone allowed floodwater to scour the river bottom of sediment and rise higher yet, without its normal capacity to drain over the natural levee into the surrounding wetlands. Much better, he argued, to install a system of checkpoint diversions, allowing engineers to tweak the river flow at various key points. During the 1927 flood, a levee just below New Orleans at Caernavon was dynamited, allowing a much-needed outlet for floodwaters and saving many city residents from further destruction. This emergency diversion demonstrated the effectiveness of such allowances. Ellet's vision became Project Design Flood, authorized by the Flood Control Act of 1928, and the Bonnet Carré Spillway was its first major actor. Workers broke ground in 1929 and construction was completed in 1930.

At the time, this was a revolutionary break from tradition for the Mississippi River Commission (the branch of the USACE responsible for its entire drainage basin, which encompasses most of mainland America). This policy shift represents more than a simple change of engineering strategies – it also means *accomodating* the river's deviance and opportunism rather than defying it, walling it off. As John McPhee suggests, if we attempt to see such major floods from the river's point of view (which of course is an exercise in futility), they're merely events of gravity and grade. A surplus of spring water travels according to physical laws regardless of political boundaries: no surprise. 1929 was the kind of event that occurred annually (albeit to a smaller scale) before the settlement of New Orleans – it was how the coastal wetlands received nutrients and sediment and were able to thrive. Thus, Bonnet Carré also represents an acknowledgement that the river's ecosystem extends beyond its banks. It enables the landscape to be a "porous place" with shifting, watery boundaries, to take a term from Adam Mandelman. Its floodway is one of the only places in southern Louisiana where the river's natural flood cycle is still allowed to take place.

The Mississippi, characterized by *New York Times* headlines as "the untameable river," "America's watery aorta," the lifeblood of the American heartlands, which gives but is simultaneously "monstrous" and destructive, becomes accomodated. This may seem like a common-sense policy change that formed in reaction to a series of worsening floods, but thinking about it in entirely military terms complicates the matter. If the Mississippi River Commission is a war against Divine Providence, spillways represent a concession, a compromise –

actually, an agreement on very uneven terms. Practically, they require the displacement of rural communities and the rewilding of agricultural lands, allowing the river to carry out its fundamental flood processes in a series of spigots. Metaphorically, they are military strongholds which serve as outlets for the river's periodical bursts of rage.

While two friends and I walked around the base of the structure to take pictures, I had the distinct feeling of trespassing on federal property. When I heard a voice shout down, "You need anything?" I was sure we'd screwed up. I couldn't have been further from the truth. The voice belonged to Mindy, a woman working the front desk of the Army Corps office, and she was seeing if we wanted to know anything about the spillway before she went to lunch at the Norco Subway. We ended up talking for half an hour about her eight-year-old daughter's obsession with *Frozen* paraphenalia, including a full, blonde braided wig to complete her Elsa costume (not for Halloween, just everyday apparel). Dr. Chris Brantley, a biologist and overseer of the structure, was away that day – but the office shows an educational video to school groups in his stead.

The Bonnet Carré Spillway is an example of a "frame" or "needle weir," a popular style of river control built by French engineers in the early 1800s. A *weir* is different from a *dam* – it's not intended to block the natural flow of water. It only obstructs the flow slightly, so a pool of water forms at its top, while water courses through it. Needle weirs consist of a line of short wooden slats (needles) arranged along a larger structure – in the case of Bonnet Carré, there are 350 concrete bays containing, in total, 7,000 needles. On the spillway side of the structure, there's a

small retention basin and about a hundred meters of concrete pilings to prevent the foundations from being scoured up by severe floodwaters. When annual spring snowmelt comes down, runoff from the Mississippi easily seeps through the bays of the structure into the floodway, converting it into a temporary wetland. Underneath the structure, thousands of wooden pilings are driven into the soil. Like the pilings supporting most of the historic French Quarter's foundations, they won't rot so long as the water table remains steadily above them – no problem in such a wet place.

*Fig. 5. BCS viewed from the floodway – retention basin and needles (personal photo).*

Despite its monolithic, inert appearance, Bonnet Carré is a highly permeable structure, a kind of tweakable membrane between the Mississippi and Lake Pontchartrain. You can't see it in this photo, but on the other side of the structure there is a low, grassy field stretching out about 600-800 feet to the riverbank. In the flat, gray waters of the Mississippi, container ships line out to the horizon in both directions. The names vary but are mostly Asian: SHANDONG, JIN ZHU HAI. On the opposite bank, a cooling tower at the Louisiana Power and Light Waterford steam-

electric generating plant spews fire into the sky, releasing pressure and heat from its three nuclear facilities. If you stand there on the shore hummocked with sediment, you can only think how incredibly removed this is from the Mississippi immemorial of Mark Twain, a romantic river with an unpredictable temper. A river has never looked so tame, so completely divorced from nature.

In 2013, parts of the HBO show "True Detective" were filmed here, capitalizing on the dismal aesthetic of the infrastructure and clear-cut expanse. In one scene, driving along a guide levee, Matthew McConaughey's character remarks, "Pipeline's covering up this coast like a jigsaw. Place is going to be underwater in thirty years." This knowledge seems to have become an accepted tenet of life outside the city floodwalls: the rate of land loss is exponentially growing, and the current system is unsustainable. Everyday life continues until there is another flood or storm, and then the consequences are reaped.

Bonnet Carré's shoreline, according to Project Manager Chris Brantley, was boat-dredged by the Army Corps until the late 1970's, to prevent a natural levee from building up so high as to block the floodway's opening. Now, shore maintenance is done with CAT hydraulic shovels and scoops. The earth is raw, fresh, muddy, altered. Its location is no mistake – Bonnet Carré is situated on the *accreding* bank of the Mississippi, its out-turn, so that sediment deposited on its shore prevents the gradual erosion of the riverbank. The in-turn bank of the Louisiana Power and Light plant is a solid concrete levee with dead grass along its crest.

What seem like small differences in water level to the American northerner make an incredible difference in southern Louisiana, where inches measure the

difference between "high water" and a flood or a breach. Water levels at the floodway (and most river control sites in southern Louisiana) are monitored by the USGS office in Baton Rouge, and data from the past year are publicly available on their website. You can see the monthly trends – in January 2015, the gage height peaked at around 9.2 feet on the 16th, and slowly decreased to its mean of 4.5 by the end of the month (USGS). Chris explains – adding a caveat that he's no weather specialist – that these monthly wet periods are caused by high pressure over the south Pacific, pushed north by La Niña weather events off the coast of Chile. As flood monitoring technologies advance almost exponentially, the USGS can predict high pressure like clockwork before it arrives. Chris' most important job is to take these data models and decide whether they deserve structural attention at Bonnet Carré. If there's ever a sudden need to open up the spillway, he needs to be able to make it happen at a moment's notice. The call actually comes from Major General Mike Wehr, commander-in-chief of the Mississippi Valley Division of the USACE, who mandates the exact amount of c.f.s. (cubic feet of water per second) to be diverted through the structure. For larger structures like Old River Control, 135 miles north in Vidalia, LA, this measurement is decided on by a full Congress – then passed through Wehr.

On ground, it only takes three people to open the spillway – one for each crane, and one to supervise. However, the USACE usually hires out eight specially-trained staff members for each crane, with two supervisors each. The cranes inchworm along the bays, individually removing the needles to allow water through. He has supervised two openings thus far – 2008 and 2011 – and he says his main

source of stress is actually the crowd of locals drawn to watch, up to several thousand. It's a very public event, and people come from all over the area to see the flood, a peculiar spectacle of narrowly averted disaster. He appoints a few staff members to make sure enthusiastic fishermen don't try to launch their boats, or that kids playing along the guide levees don't accidentally get sluiced off to Pontchartrain in the riptide.

Despite these responsibilities, Chris is first and foremost a biologist, and is well aware of the ecological impact that a spillway opening can have on Lake Pontchartrain. Spring floods and occasional openings give the lake a sudden injection of Mississippi water, temporarily reverting its brackish western waters into freshwater. Saltwater organisms are pushed further out into the Gulf, except for oysters, which are sessile. They can withstand up to about a week of freshwater, but after that, massive oyster kills can occur. Blue crab and brown shrimp are driven further out into unfamiliar fishing grounds, to be replaced by blue catfish and largemouth bass. The fishing community is often vocally against openings for this reason. Algae blooms in Pontchartrain can also occur if phytoplankton populations get out of control. There's a whole range of trophic effects these currents can bring. The Army Corps dependably paints a positive picture – ideally, when the lakewater contains beween two and twenty parts per thousand salinity, the majority of freshwater and saltwater organisms can flourish simultaneously. Phytoplankton (supplied by freshwater) are eaten by zooplankton, which feed shrimp populations (supplied by saltwater). Salinity is a delicate balance along the western border of the lake, so measuring the amount of water that's diverted through the spillway can

make all the difference between a much-needed boost in biodiversity and an ecological wreck.

Chris says these gray areas – zones of *intermediate* brackish water in coastal wetlands – are greatly diminishing with land loss. He's all for diversion tactics that will reintroduce freshwater to areas of the coast no longer receiving it – after centuries of straightjacketing the river's high water with levees. I remember the Land-Building delta of Basil Hall, with the plain of basins, "half fresh, half salt," and the incredible range of phytoplankton and all the euryhaline species that can navigate brackish water – gars, eels, bullheads, bluegills, pickerel, catfish, carp. And, of course, shrimp.

The Bonnet Carré Spillway demonstrates a kind of openness rare to other Army Corps sites in southern Louisiana. It's a highly recreational area. There's easy visitor parking. There are no signs to warn off trespassers – in most respects, this is a public park. The Army Corps office is right off the road, instead of set back behind a barbed wire fence (like every other site I visited), and I didn't need to set up an appointment, I just walked in. Perhaps this is because of its proximity to New Orleans, the fact that it's much more likely to receive tourists interested in the spillway, or birders – and hunters, lots of them, who patrol the bordering forests. There's a a number of artificial ponds with names suggesting their community of visitors who have a legacy on the spillway – Wesley, Amy, Holley, Tyrone, Bob, Fhylway, Mr. Ed, Clark, Wacko. Much of the clay salvaged from them go to rebuild nearby levees. During spring floods, they fill with fish and freshwater crustaceans – that was Chris' childhood introduction to the spillway, coming here to net crawfish

with his dad. There's a section devoted entirely to the local RC model airplane club, and a small stretch on the western end for dog training. When I was there, a man fired clay pigeons from the back of his pickup, shot them, and his dog fetched the remains. From a bird's eye view, you can see a huge webwork of ATV tracks: this is also a racegrounds.

Bonnet Carré's openness may have to do with how the land was bought out. The Morganza Floodway, for instance, isn't under the federal government's eminent domain – its basin is patchworked with private property, extending from north of Baton Rouge all the way through the Atchafalaya Basin and into the Gulf. The two properties that existed on Bonnet Carré before its construction, the "Diamond" or earlier "Roseland" and "Hermitage" (both sugar plantations) were requesitioned by the USACE in 1928. Diamond (owned by the Kenner family) wasn't being used, but Hermitage was an active farm owned by the Kugler family. Much later, in the 1980s, it came to public attention that there are cemeteries on both properties dating back to their earliest settlement. These graveyards, unmarked on early maps of the property, each contain about 150 bodies of unidentified slaves of West African and Caribbean descent. During the 1975 opening of the spillway, remains of one body came to the surface and were taken by the St. Charles Coroner and Sheriff, who thought it was the body of a dumped murder victim. In 2008, the site was finally scoured and excavated by archaeologists – families of the descendants were contacted about what how the USACE should landscape the site, and in 2012 a meeting was finally held on the topic, led by Chris Brantley. A Kugler family descendant was present, as well as Leon Waters, a local historian and *griot*,

descendant of enslaved rebels involved in the 1811 march to New Orleans. Kugler requested that, on the historical plaque to be installed, a large version of his family insignia would be printed. Waters responds with a long discussion of language to be used on the sign – never "residents" because it obscures the slaves' role as captives, never "African American" instead of "African" or "of African descent" – and that the Kugler name not be printed, because it's no longer Kugler property (USACE 7).

This whole debate brings to light an effect that USACE projects sometimes have on large historic properties in southern Louisiana – that of *dehistoricizing* the landscape. After the spillway becomes public land pockmarked with recreational ponds, the story is occluded of the people who once inhabited it. A similar thing happens with levees in the area. People often forget that the levee system of the Lower Mississippi Valley, until about 1849, was built and maintained by slave labor on private plantations.

All this said, Bonnet Carré is far and away the structure with the most advertising available online and in print pamphlets issued by the USACE – there's even a hokey YouTube video called "the Spillway Story" buttressed by positive tokens of Louisiana culture – gumbo, jazz and scenic bayou shots. All of these convey the same message – the spillway is the poster child for success among a slew of highly contestable and constantly failing public works projects. Its technology, as a needle weir, is very simple and old-fashioned. It also represents the kind of *flexible technology* pushed by coastal restoration advocates, a *deus ex machina* escape duct that time and again saves New Orleans at the last minute. But this is sentimentality. Let's not forget that Bonnet Carré is only one cell in a very complex network of river

engineering, from its oldest and most banal forms (levees and dredge) to most recent and "innovative" (digitally self-aware sediment distribution pods, for instance). And, further, that this system comprises the infrastructure that has enabled everyday life to exist in Louisiana for the past five hundred years, with periods of intermittent wetness – a scale shift to be reckoned with.

This is the kind of "scaling-up" that I find myself constantly having to do when I visit flood control systems – like in Google Earth, viewing the floodway, when I quickly toggle out and the entire surrounding land slowly pixellates into resolution. It's too easy to see the Mississippi's characteristic switchbacking line across southern Louisiana as a static line.

**III. Rewilding the Delta: The Morganza Floodway**

The presence of water nearly always complicates land ownership. River, lakes, estuaries, wetlands – all present fluid borders that contradict traditional American notions of property. A central case in point for this very simple thesis is the Morganza Floodway. Notice the slight word difference – Bonnet Carré is a *spillway,* but the Morganza *floods.* Its appearance is very similar to Bonnet Carré to the untrained eye, but it's fundamentally a gate, not a membrane. Instead of wooden needles, it's lined with thick steel doors. While the B.C.S. is a mile and a half long, Morganza is five, with a twenty-mile floodway. While the B.C.S. has been opened ten times for a total of 415 days, the Morganza has been opened only twice – in 1973 and 2011. This is because, while its floodway only extends twenty miles, the water it diverts into the Lower Atchafalaya Basin drains all the way down to Morgan City

and out into the Gulf of Mexico. After twenty four hours, the water floods down to the area west of Baton Rouge. After forty eight, just north of Morgan City. Three days in, it floods out into the Gulf of Mexico south of Houma and into the surrounding coastal estuaries: geographically, its waters bell out through the entirety of southern Louisiana.

The central concern with Morganza is almost the same as with the Bonnet Carré, but the stakes are much higher. If the structure somehow fails, the Mississippi River will do what it has been attempting to do for almost a hundred years, and redirect down the shorter, steeper gradient to the Gulf: the Atchafalaya. It is situated about twenty-five miles south of the Old River Control Structure (ORCS), and directs its floodwaters into the same basin – only on an extremely temporary basis. In the way that Bonnet Carré serves as an auxiliary structure to the city of New Orleans, Morganza sits as a monolithic supplement to ORCS.

It is not, however, recreational. It is private land under a federal easement. Its plans were proposed in 1928 in the wake of the Great Flood (at the same time as Bonnet Carré), but construction began much later, in 1937. It was completed in 1954. In the intervening years, a much vaster environmental engineering effort occurred than the structure itself. Its construction required that everything in a twenty-mile width south of it, snaking all the way to the Gulf of Mexico, 100 square miles in total, had to be converted to wilderness. Cheramie and Pasquier, in their essay on the relocation of Zion Traveler church during Morganza's construction, liken this to William Cronon's construction of "the American tendency to idealize 'nature,' to separate 'us' from 'it' in order to preserve an Edenic ideal" (Cheramie 3).

In southern Louisiana, wherever you are, this nature-culture divide almost always falls along the guide levee, and nowhere is it clearer than along the borders of Morganza.

The floodway will always be a zone of instability because it is a region that has been repurposed by a military agency to return to a completely natural state whenever federally ordained. At these moments, like Bonnet Carré, it allows the river to complete its flood cycle unhindered – but only within the guide levees. To live between the levees of the Morganza, even though you are protected directly from the portion of the Mississippi nearest you, is always hazardous. That zone operates under two identities: the first is your life-as-usual, whether you're working at a gas station outside Morgan City or shrimping the bayou. The second is an area that, with a single signature, can go underwater in less than 24 hours.

As with other massive public works projects of a similar ilk – close to Bard, for instance, the Ashokan Reservoir – a massive displacement effort occured, spearheaded by the USACE with a billion-dollar budget. "Non-essential structures and spaces," mostly agricultural, were kept in the spillway, but most other structures were relocated just to the other side of the levee – the cemetery shared between Zion Traveler Baptist and Mount Olive churches (one of three) was bought for thirty dollars (Cheramie 5). Without disinterring the bodies, the USACE merely built an identical mock cemetery with empty graves on the dry side of the levee, after rolling the church over on logs. The graves remain empty today, and their bodies unaccounted for in the floodplain, which is now farming land. A large population of African-American farmers were displaced by this move, forced to

either disperse or form new communities several miles away – many of those who stayed still attend service at places like Zion Traveler. This is evocative of something discussed earlier with Bonnet Carré – the peculiar dehistoricizing effect of floodways on the purchased land. The USACE, in building a grid of placebo graves, manages to convince the community around it that they are able to keep their history, just move it 0.3 miles away, but what's lost during this shift? Not only physical bodies, but the rootedness in a particular land replaced by something so similar, so near, that it's almost unnoticeable. It presents the community, if they accept the relocation, with a new version of their own history, like a copied disc, its quality slightly degraded from the original. To somebody driving by, Zion Traveler looks as if it has always been there just to the right of that guide levee – and for the USACE's purposes, it has.


*Fig. 6. NASA and USACE photos of the Floodway in May 2011 (Wikipedia Commons, USACE).*

A question that Morganza raises (by implication) is, what happens to land when the reverse process happens – when land is unflooded? Who do the property

rights go to, and under what conditions does it become federal land? This is a question at the heart of the present-day movement for Louisiana coastal restoration, a project that (as of December 31st, 2014) received $13,427,713,465 in reparations for the 2010 Deepwater Horizon spill.[1] Their public report, online, is available in English, Spanish and Vietnamese. So, say somebody with gulfside property has their land flooded and home destroyed during Katrina. Simple: the land becomes state property. Richard Campanella, a geographer at Tulane, discussed this in an interview with me: "But what happens when water reverts to land on account of coastal restoration? The titleholders of a lot of these properties have to be contacted and involved in the fate of that footprint. Tracking them down and dealing with all those titles is very complicated." The population has been disenfranchised either because of flooding, public works projects or some massive combination of the two – and they're brought back to a reconnoitered land by the same token. But the land has been dehistoricized by the USACE, flooded or farmed – it may be unrecognizable, its soil quality may be completely different, rich with sediment or starved of nutrients in saline water.

The longer land sits underwater, the more it becomes a "non-place," no longer a grid unit in a USGS map, but a territory of water particles obeying only the laws of nature. It's not even a watery realm with the consistency of an ocean or lake – it can exist in multiple states of inundation or wetness, decided entirely by the

[1] For reference, $11,621,821,251 of that is going to individuals and businesses for medical expenses and property damage. $1,472,994,209 is going to local governments in Alabama, Florida, Louisiana, Mississippi and Texas (for seafood testing, tourism and "behavioral health") with a smaller federal allocation. It's unclear how much of these compound funds will go toward projects like the Coastal Protection and Restoration Authority (CPRA).

amount of water in c.f.s. that the Army Corps allows through floodgates a hundred miles to the north. Here you see the disconnect, the shift in geographic scale.

Every year, the USACE sends out letters to residents of the West Atchafalaya (and Atchafalaya Basin) Floodway to remind them that they may be forced to evacuate if there is a need to divert water – regardless, life goes on largely as usual. When those large-scale floods actually do occur (as in 2011), there is an enormous public uproar. As Campanella mimed, "they pick up their phones, call their congressmen and say, 'This is an outrage! The government failed New Orleans when the levees gave in – and can you believe it, they're flooding my land!' " The residents of the Morganza structure's exit path to the Gulf, as well as those inhabiting floodways to the north (the Madrid and the Missouri) are all living under flood easements. They own the land, but the federal government has the right to flood it when necessary.

Campanella argued instead for the establishment of *development* easements – which mean that the federal government, while still not owning the land of the floodway, still hold the right to flood it. The landowners receive additional compensation for not building any more structures on the land. The reasons are simple: people living in a floodplain, even when notified in advance, are always a liability. If you look at any satellite picture of Louisiana from the past twenty years, you will notice that a strip of land from north of Baton Rouge all the way to the Atchafalaya delta is green and seemingly empty. Between the guide levees there are 173,000 acres of cypress swamp and 64,000 of aquatic land, both seasonal wetlands and bayous. It is not, however, empty.

**IV. Atchafalaya Revisited: Old River Control (1963)**

Driving north along I-10 to Baton Rouge is a prime lesson in the ecology of southern Louisiana. Once you exit the last band of levees and outfall canals lining city limits, the highway feels like a thin ribbon of concrete laid out over several hundred miles of swamp. The transition is almost instant. One minute, you're driving through the outskirts of Metairie – the next, you're in no-man's land, the nether-regions of Louisiana known to NOLA simply as "the bayou." It's an endless expanse of heavily forested swampland. In January, the trees are bare and black. The most striking plant is the bald cypress with its buttressed root system adaptable to both wet and dry situations – this is the characteristic bayou tree bearded with Spanish moss, by which most people unconsciously identify the Louisiana coast, in its southern Gothic tradition. From the air, you can see radiating lines cut into the swamp – bald cypresses harvested in "hub and spoke" patterns by early loggers of the flooded areas surrounding New Orleans (*The Anxiety of Influence,* Mandelman). There are other canals dredged without such apparent patterns, a straight, networked system of thruways without an apparent destination. These are usually oil and gas canals dredged for underwater pipelines, which slowly erode away at the surrounding wetlands without yearly floods and supply of sediment. After looking at maps of southern Louisiana for several months, this becomes an unconscious eye exercise: water that appears in straight lines is anthropogenic, water that wanders and sallies (like in the 1945 Fisk maps) is most likely "natural."

The biggest mistake is to assume this land is uninhabited. It is – and thickly. Fifteen-foot plastic skiffs motor around the base of the highway looking for shallow-

water fish. There are fishing shacks all around, with corrugated metal siding and roofs, moored up to the highway pilings. It looks this way about three-fourths of the way to Baton Rouge, about one hundred miles in total. Only then – and the transition is very stark, once again – you reach the continental shelf of the United States. Swampland turns into great stretches of agrarian land, and I-10 is once again sheathed in the endless stretch of pine trees that seem to line every major southern thruway. Like everywhere close to the Mississippi, the towers and cooling eggs of the American Ruhr are never far.

For geological purposes, everything south of Baton Rouge is a web of young, coastal islands linked by a thin mat of wetlands – essentially, a thin alluvial mat extending out into the Gulf, no longer supplied the yearly boost of land-forming sediment that formed them. Without this consistency – and especially without frequent floods since the early 1900s – the Mississippi River is no longer the "Land-Building Machine" (LBM) of yore. Sadly, this fact is old news. Much more recent are the monolithic river control structures further north that keep the old system pinned in place, preserving the Mississippi River circa 1963 *ad infinitum.* Old River Control is the prize jewel of this system – and it's situated well out of the public eye, at the turn of the Louisiana boot's border with Misssissippi.

In comparison to the Old River Control Structure (ORCS), Bonnet Carré can look somewhat cosmetic. The singular here is confusing – ORCS is actually a network comprised of a hydroelectric dam, two "sill structures" (essentially, river weirs, but much sturdier than Bonnet Carré), another dam and a boat lock dredged to eleven feet below sea level. Geographically and temporally this is confusing – all

structures, as usual, were completed at different points in time corresponding to different needs. What makes ORCS so special, other than its expansiveness, is the fact that it's one of the better-known river control sites in Louisiana other than Bonnet Carré – and not for recreational reasons. In February 1987, John McPhee published a piece in the *New Yorker* called "Atchafalaya" about the importance of ORCS in preventing the Mississippi from redirecting entirely down the more convenient pathway – namely, the Atchafalaya River. Two years later, the essay was republished in a collection called *The Control of Nature* – in both publications, the essay was widely read and garnered the Army Corps of Engineers an unwarranted amount of attention. It thoroughly illuminated the futility of the task at hand, and the militaristic language used to describe it. Always, the Army Corps describes a "war" against the river, which must remain straightjacketed within levees for the safety of the surrounding population.

Old River Control is well off the beaten path. Driving there, my GPS directed me along a levee-side road that traverses some of the poorest land in Louisiana. As of 2013, almost thirty percent of Concordia Parish lived under the poverty line (ten percent below state average), about sixty percent white and thirty percent black (US Census). For about another hour past Baton Rouge, I sped past tarpapered structures set up on concrete blocks and motor homes strewn with tinsel and Christmas decorations. According to the census, the majority of the local population works in retail and "office jobs," with only about ten percent farming. Not being a social statistician by any means, I wonder what significance a structure like ORCS has on the local economy. In terms of its landscape presence, it's easy to miss. The

lower sill structure, Sidney Murray Hydroelectric Station, and auxiliary (or "closure") structure all double as roadways – all except the last are fairly inconspicuous. But the auxiliary structure is a series of seven enormous concrete bays connected by walkways and stairwells, whose purpose still somewhat eluded me during my site visit. It's situated much higher above grade to provide additional release should it ever need to release flood waters back through the Mississippi. From the structure extend two curved conrete walls to prevent shore erosion in the unlikely event that the mammoth structure actually be *dug up* like a levee. Given the sheer size of the structure, the fact that such an event is possible stumps me. The shores on the southern side of the structure were parched, dry to the point of cracking. Because of this, you can tell it's composed mostly of clay – the lower outlet of Old River hasn't received smaller sedimentary particles since 1963.

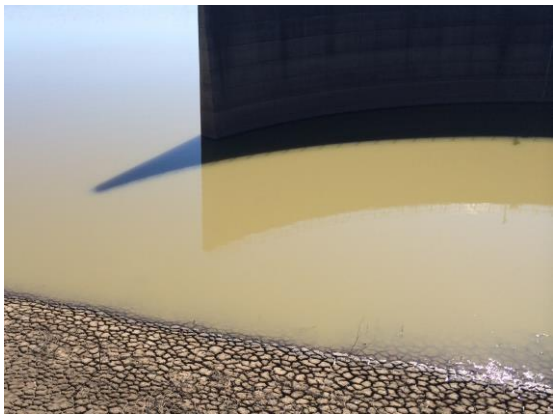


*Fig. 7. Lower Auxiliary Structure at Old River (personal photo), ORCS via USACE Flickr and GoogleEarth.*

Despite the Auxiliary Structure's impressiveness, the main component of the ORCS network is the sill structure a few thousand feet to the north. This is where McPhee's attention is directed in the 1987 essay. It has ten bays with metal gates that restrict the water input into the Atchafalaya River, like the Bonnet Carré or Morganza. There is little difference in structural design, really – except for the fact that the ORCS sill mediates the flow of an *active waterway.* Not only that, it's not just battling the Mississippi's floodwaters. It's battling the gravity of the entire Mississippi river (floods included) – which tells it without a doubt to redirect down the Atchafalaya, the easier path to the Gulf. I say this with some drama, but all of it warranted: the fate and livelihood of all Louisiana residents living below the ORCS depends entirely on its functionality, every day of the year.

For this reason, the ORCS network represents a profoundly different war than the floodways that preceded it. From the standpoint of flood policy alone, it would be enormously convenient for the Mississippi to redirect down the Atchafalaya. In this scenario, the former path of the Mississippi would gradually become a bayou a third of the original channel's size, not subject to occasionally

violent spring waters. But with the floods, everything else would dwindle – the river's utility as a major trade route into the heartlands of the U.S., encompassing over 39 states with their major cities. The petrochemical industries thriving off of this accessibility would likewise fall, their massive plants rendered useless. The port and city of New Orleans would eventually be bankrupted, and its industries would shift to more convenient locations like Morgan City, Houma or Lafayette. This is the worst-case scenario. From a land conservation standpoint, it would also be complicated – the birdfoot delta, no longer receiving its yearly load of sediment, would fade away (like it's already doing), but the Atchafalaya delta would flourish. A new deltaic lobe would begin formation, and the LBM would be, Army Corps notwithstanding, back in business – fifty miles west of New Orleans.

The banks of the river here are heavily manufactured, lined with concrete revetments and supported by stone jetties like those built along Lake Pontchartrain. More than any other river control site, ORCS made the Mississippi look like an industrial channel carved into the land, a thruway for massive trade boats. Geographically, its evolution is somewhat complicated. Around the time Abraham Lincoln came down the river on a flatboat in 1828, the junction between the Mississippi and the Atchafalaya (via the Red River) was completely blocked by a natural logjam. Thousands of fell trees that had fallen into the river from erosion and flooding gradually built up in a pile at the rivers' confluence and were cemented together with sediment, effectively acting as a weir that only allowed in a fourth of the actual current. In 1831, Captain Henry Shreve of the Union Army dug a channel through Turnbull's Bend, the oxbow that joined the two rivers. This channel filled

with water – except for a thin earthen wall that contained explosives. When it was dynamited, the Mississippi quickly redirected down the faster route, reopening the entrance to the Atchafalaya. Such minor alterations – a small channel dug a few hundred feet between two river bends – demonstrate the complete opportunism that the river became known for in that time. At its size and velocity, it will take any open route that offers the path of least resistance to lower ground, and eventually the Gulf. At the present moment, it has been mandated against the better route.

Chapter 3: Scaling Up

**Venice, Louisiana**

> Travel (something the ethnologist mistrusts to the point of hatred)
> constructs a fictional relationship between gaze and landscape.
> Marc Augé, "Non-Places" (86).

During my month in Louisiana, I followed a simple itinerary. In the morning, I drove out of New Orleans (Marigny neighborhood) to various river control sites throughout southern Louisiana. I talked to USACE officials, geographers, landscape architects, or whomever I ran into while crawling over concrete structures and taking pictures. In the afternoon, I went to libraries, wrote and read. At night, I ate as much crawfish étouffée as possible. In no way does this constitute ethnography. Maybe it more resembles the travelogue genre, in which the intrepid writer researches a place, arrives with a list of preconceptions, and piece by piece attempts to verify each one. Or Twain's model, where the intrepid writer arrives with no ideas and no plans – just a rucksack – ready to be filled with firsthand impressions of the landscape and "genuine," local interactions. I say this tongue-in-cheek, with some amount of distrust. If I'm concerned with categories, maybe I would classify this month simply as a time to satisfy my obsessions, and ask people on the ground: how exactly is life sustainable here? What kind of system can be designed – so late – to repair a complex of river control technologies that have literally *become* the ecology of the region, the one governing factor controlling where water is allowed and where it's not?

Admittedly, I read a fair amount of ethnography and I find it very useful to read river infrastructure through an anthropological lens – one which networks the

system of actors, human and nonhuman, that plume out from these structures all through the Mississippi River delta, literally flooding the banks. I won't pretend to take the same approach. I had too many moments of outright failure, incomplete trips, or intuitive drives out to obscure locations to identify my experience as ethnographic. My conversations were exactly that – conversations, not interviews. My excursions felt more like scouting for a larger, unrealizable project, one that could examine on a closer scale all the displacement, unrest and coastal instability caused by Louisiana's infrastructure. For instance, one Saturday after breakfast, a friend and I decided to get in the car and drive as far south as possible.

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It's not difficult to get to the southernmost tip of Louisiana. The directions are basic: from New Orleans, cross the Crescent City Connection, make a right-hand turn onto Louisiana 23-S, and drive to the end of civilization. In whole, it takes about two hours. You may feel the surrounding landscape collapsing into a horizontal blur of infrastructure, petrochemical industry and housing units – never allow yourself the luxury of ignoring the blur. Plaquemines Parish, which you enter almost immediately upon exiting the floodgates of New Orleans, is a place in which most central questions of river control are posed at their most extreme. I mean "floodgates" very literally – at the southern city limit, there is a point where a levee meets the highway. On either side of the road, long metal gates flank the length of the road, which can be closed during high water events, effectively sealing the flood out – but also the entire population of Plaquemines. 23 is their only artery to the north. Admittedly, the gates aren't obtrusive and are easy to miss as you drive by,

but they send a very clear message – if you live south of this line, God help you when the next storm comes.

Infrastructure, however, continues. South of Chalmette, the earthen levees along 23 were under extensive construction when I drove down in January 2015. Small clusters of cranes and CAT crawlers distributed and packed mounds of soil into a compact trapezoidal shape, reinforced with buried concrete T-walls to prevent erosion. This work is done by the Coastal Protection and Restoration Authority (CPRA), a division of the USACE established soon after Katrina to mitigate wetland loss. As soon as you exit the floodgates, citrus groves begin. They're everywhere – planted in cemeteries, backlots and trailer parks, alone in a stretch of swampland or a hundred meters from an enormous processing plant, separated only by a chain-link fence and a hundred meters of soil. Little orange stands litter the roadside. A pile of children's bicycles accumulate in a front yard.

There are quonset huts, sallow fields, men riding tractors down the center of the highway, endless trailers set up on concrete blocks – maybe temporary homes provided by FEMA that were never upgraded, or whose occupants moved out. There are always smokestacks in the distance. By these towers, you can always measure your distance from the Mississippi – plants and facilities for Monsanto, Halliburton, Chevron, OMI, TARGA, and endless other big names in petrochem trace the river's every switchback. This has earned the stretch of river between New Orleans and Baton Rouge various unflattering nicknames – Cancer Alley is the one Kate Orff and Richard Misrach use in their book "Petrochemical America," which traces the history

and impact that chemical breaches, displacement, and oil buyouts have had on surrounding communities' health and living quality.

Another transition is also clear: human settlement spreads ever thinner the further south you go, and when it does appear, it appears on increasingly higher pilings. Even the cross in front of a Presbyterian church is elevated on a small platform – and I think, "come Hell or high water." I imagine this clause must figure literally or figuratively in many of the land contracts and leases in Plaquemines Parish – who would make such an investment, other than oil workers and fishermen? On 23-S you pass two enormous public schools, both of them raised a full two floors on massive columns, with double staircases leading to the entrance. They look, unsurprisingly, like fortresses with their hexagonal wings and tightly-sealed windows, echoing the militaristic lingo of the USACE. I wonder, what level of flooding legitimizes a day off? Is it something they deal with yearly, or entirely provisional, only becoming necessary when hurricanes breach the surrounding levee? I would have asked somebody, but on a hot January Saturday, both schools were empty.

The further south you go, the more harbors and shrimp boats there are. The raised nets of shrimp trawlers are the only other prominent vertical element in the landscape besides cranes. You can tell there is a large Vietnamese population here by the names carefully painted on the back of each boat – Thuy Trang, the Lady Hana. The width of the land on either the side of the highway is barely half a mile in total. In every direction the Gulf yawns out, docile and flat. This is the region that appears on colonial maps from the 1800s as the "birdfoot delta" – a projection of

three waterways from the central path of the Mississippi, a region that we can remember was described by Basil Hall and Elisée Reclus as a thickly shifting field of sediment and soil hummocks, coastal barrier islands that were never the same day to day. Now it's open water, with an increasingly vulnerable community at its border.

During a lecture for his geography class at Tulane, Richard Campanella reminded us that the birdfoot delta is the only area of southern Louisiana where the Mississippi River still functions in its pre-colonial land-building mission. Unfortunately, so much sediment has been trapped in various wetlands and diversions before it reaches Venice that even this last frontier has become impotent. Venice itself – the last township at the end of 23-S – isn't so much a municipality as it is a small network of marinas and anonymous, gray-brick, fenced-off facilities for Chevron, Halliburton and OMI Environmental Solutions (a company offering oil spill and hazmat response). This is also the site of the Delta National Wildlife Refuge, a swatch of wetlands of about 49,000 acres extending out through Terrebonne Parish. It encompasses almost all of the previous deltaic lobes of the Mississippi – from the Atchafalaya through Bayou Sauvage, Bayou Teche, Bogue Chitton, etc. The office and center of this coastal empire is situated at the branching off of Grand Pass Bayou from the Mississippi called "The Jump," and I have to admit it was a little disappointing. It consists of a tiny information booth, a patch of grass, and a bench facing the marsh. At the booth, there are single-fold hunting information pamphlets – in order to become a certified hunter, all you have to do is sign the bottom of one and bring it with you on your outrigger as you speed along.

My friend Ginny and I sat there for a while watching fishermen motor by in shoddy boats, talking about the odd feelings this place gave us. First, there was a profound feeling that we were trespassing, stopping by various petrochem plants to take pictures of dirt mounds flocked with pelicans. At the same time, there was a feeling of lawlessness – that you could pull off the highway and fish wherever you wanted, put your boat in, hunt unperturbed. What exactly does federal oversight look like in such a complex web of oil canals? Venice is a peculiar mix of the corporate, of unimaginably large entities with their high-security plants, and local fishing culture, Cajuns at the very end of land. On online employment boards for the Venice-Boothville area, most open positions are at the TARGA plant, offshore platforms, and the local Dollar General. The population is 212. A Vietnam veteran who lives down the street from me in Savannah comes here for a few months each summer to work on BP oil rigs, and lives off that salary for the rest of the year – it makes me wonder how long each of those 212 citizens have been here. Before Katrina? Here on short-term contracts, just a summer and then gone?

For such a prominent place in the Louisiana imagination, Venice is surprisingly data-poor. Beyond 2005 images of fishing boats and houses stranded in the middle of the highway, there is not much information available about the birdfoot region online. There is, however, a huge community of birders who travel regularly down here to see coastal birds in unbelievably large numbers. As we drove along the last stretch of highway, twenty or so pelicans drifted over the water alongside us, finally flaring their wings to land, feet out. A husband-wife couple crouched on the shoulder of the road, watching through enormous binoculars.

23-S, at its very end, meets Tide Water Road, which takes you out to what is technically the southernmost tip of Louisiana. It ends in the parking lot to a Chevron refinery, with a small unpaved trail leading out into the reeds. There is a sign: "The Gateway to the Gulf."

*Fig. 8. The southernmost tip of Louisiana (personal photo).*

About eight miles below this point, the Head of Passes directs all traffic in and out of the main channel of the Mississippi. From 1852 to 1872, there was a small lighthouse situated at the center of the "birdfoot" operated by the U.S. Coast Guard. In 1854, its 67-foot tower was moved to Pass à l'Outre, and the Coast Guard lit a Fresnel lens in the single dormer window. It was destroyed by a storm. Now there is an unmanned, 27-foot reflective platform. This changing of hands makes me wonder about the history of navigation in the birdfoot. At the Historic New Orleans Collection in the French Quarter, I focused a magnifying glass on the three-branched waterway on a map dating from 1794, by a cartographer named John Ross (during

the Spanish rule of New Orleans).[2] At the birdfoot, there were two small inkblots, "Tree 1" and "Tree 2." The surrounding deltaic region and web of sedimentary banks is labeled as "low and marshy meadows" with "shallow water covered with small islands, which are but very little known" (HNOC). The significance of the birdfoot in the late 1700s and 1800s – this unusually geometric waterway – was that it was a recognizable entrance to the Mississippi amid a vast plain of changing waterways and landforms. This must have been extremely confusing to an 18th-century trade ship headed for the port at New Orleans. Even when you reach it, Ross places two lone trees for you to triangulate your position and make sure you've reached the *actual* birdfoot. But gradually, as the network of sedimentary islands around it subsided and dissipated into the Gulf, even the need for a lighthouse dwindled. It is the Mississippi's last alluvial arm reaching out into open ocean. This simple fact obscures what seems, to me, an extraordinary sadness.

I'll allow myself a brief lapse into environmental romanticism: once upon a time, the entrance to the Mississippi River was *labyrinthine*, a guessing-game in a plain of "the youngest land in the world," the Land-Building Machine at all engines go, a sand motor at full throttle (Jacobs). It was marked by two trees in an expanse of muddy jetties, and a small, intermittently manned lighthouse. Now, the entrance to the Mississippi is singular. The plain is gone, and the river's path circa 1930 extends out into the Gulf, preserved in perpetuity. But even it is eroding – and quickly. In "Bayou Farewell" by Mike Tidwell, the author is on a shrimping trawl near Grand Isle, LA, watching the GPS, when suddenly he notices they are about to

[2] *Course of the River Mississippi from the Balise to Fort Chartes* (1794). By John Ross, pub. Laurie & Whittle (1982). Property of the Historic New Orleans Collection.

collide with a sand jetty at full speed. He tries to catch the attention of the man driving the boat, Knuckles, but can't – and then they motor on through the landform. Knuckles says, "I bought dat computer map in 1993 [...] we used to haf to zig and zag t'rough canals and bayous here, now it's a straight shot. [...] De whole time, de GPS says we're going t'rough land" (Tidwell 179). In seven years (seven life cycles of brown shrimp, Tidwell notes), the obstacles are all gone. The mud lumps of Reclus and Hall eroded to the sparse jetties navigated by Knuckles, to the open water experienced by Tidwell. Today, if you enter the birdfoot delta from the Pass à L'Outre (from the west), you see massive turbidity curtains before any sign of land.

South of the birdfoot, pluming out all along the coast of Louisiana, there is now a famously large dead zone in the Gulf of Mexico. This hypoxic region is inhospitable to most marine life, and measures between 7,286 and 8,561 square miles in area – the size of a squashed New Jersey. It is caused largely by the chemical runoff from the "American Ruhr," the snake of petrochemical development along the Mississippi, who are notorious for their spillage incidents – but also by fertilizer runoff from farms.

These stories litter Louisiana newspapers only a little less than they pollute the river itself. In January, the massive Evangeline Pipeline finally burst in Cameron Parish. It had been leaking since October, but not repaired. In February, an oil barge spilled 31,500 gallons of light crude oil into the river after crashing into a towboat between NOLA and Baton Rouge (Merchant). In early March, BP claimed to have reached the "baseline condition" of cleanup after the 2010 Deepwater Horizon Oil Spill, an explosion that pumped 210 million gallons of oil into the Gulf of Mexico,

largely accepted as one of the largest environmental disasters in American history (Marshall). The day after this statement was released, the U.S. Coast Guard released a statement that it was supervising the ongoing removal of a 25,000 pound oil tar mat from East Grand Terre Island, off Louisiana's southeast coast. Two adult bottlenose dolphins washed up dead the following day. Meanwhile, at a munitions camp in Minden, LA, a private contractor named Explo Systems abandoned a demolition site containing over 18 million tons of M6 propellant sold to them by the U.S. Army in 2012 (Robertson). Since then, they have exploded small portions of this stock irregularly, in the middle of the night. A committee of local ranchers and environmental activists has only recently rallied up with the EPA to address pollution concerns. In 2010, the USGS measured that 12.7 million pounds of toxic chemicals were dumped into the river (Callais). In 2012, they released another report that 57% of agricultural streams and 83% of urban streams were unsuitable for aquatic health (Mueller).

This horrifying laundry list of transgressions, both recognized and committed covertly on a daily basis, warrants a whole project of its own. Algae blooms caused by all these excess nitrates released into the river are only one facet of the environmental disaster flowing out of the birdfoot, and washing back on its shores. Pollution, quite literally, circulates in every direction. Before I began this project, the kind of dire attitudes I encountered in articles about land loss and pollution seemed to be overly dramatic – now they seem like understatement.

In a series of articles titled "Losing Ground" by ProPublica and the Lens, there is an interactive map online where readers can toggle between the birdfoot at

Venice from the 1930 to 2014. Between 1932 and 1956, a little corrosion occurs – blue creeping slowly into the green that is assumed to be wetlands. In the mid-70s, the blue multiplies exponentially. A thin webwork of land spreads out over place-names that have disappeared with their corresponding land masses: Pass de Wharf, Bayou Tony, Yellow Cotton Bay, Wagon Wheel (this last one no doubt after early logging patterns). Toggling out, this process replicates all along the coast – in devastatingly clear graphics, you can trace the disappearing green as it is slowly eaten at by the blue. The border between the two is made out to be a much clearer line than it is in actuality.

On the ground, the difference is much less clear. As Adam Mandelman argues in "Wetlands as Borderlands," one of the reasons land loss is such a difficult issue to measure is that it always occurs as a "gradient between dry land and open water" that is often not entirely clear, existing as both "boundary and intersection" (Mandelman). In digital mapping terms, these areas are dealt with by using *rasters* – contiguous data sets that shift gradually over a dynamic field. They may be temporal, existing for only a season or depending on an unreliable water source. As Mandelman would have it, their identity as such an uncertain borderland, or liminal or hybrid space, shrouds them in a kind of doubt.

Rasters and borderlands suggest a kind of geographic liminality – a wet surface that hides shifting, underwater values ranging in sediment, water, pollutants and dry soil. It is a geologic hybrid difficult to express in aerial maps, even with their extraordinary ability to scale in and out with LandSat imagery. These wetlands depend on the oblique view, a wandering through the swamp, a gritty materiality to

be felt in the hand and tasted in the mouth, full of sense-perceptions inexpressible by digital mapping. They depend on a quality of light to determine their turbidity, the amount of particulate matter, only really perceptible by a blinking, oblique gaze as you wander through the shallow water, your boots stuck in the mud, sweat beading along the brim of your baseball cap. This, to me, is how land loss feels. Or, as Tidwell describes – a shrimper in Terrebonne Parish notices one day that his family cemetery has been almost completely inundated with water. All cemeteries are above grade in southern Louisiana, so that bodies don't rot in the water table or in the event of a flood – wherever you go, there are roadside grids of white stone mausoleums.

In order to be convincingly displayed in USGS graphics, land loss has to be displayed in binary terms: land versus water, illustrated by false-color maps in only blue and green. Blue corrosion has become symptomatic of nearly all land loss maps. Or, more dramatically, the Louisiana raster is cast in monochrome black and white, with the eroded wetlands coded in red. Both gradients train the eye to notice negative space rather than positive – if you look closely, on the western coast of Louisiana the Atchafalaya River and Wax Lake Outlet continue to build new land, with new rivulets and streams slowly emerging from the river mouth. Brett Anderson, in a cartographic study for Medium, uses a devastating visual argument – Louisiana has nearly lost its characteristic boot shape, as its outline swiftly hems in from the south. The political boundary, if it were shifted to an accurate depiction of current dry land, would more resemble a column, eaten away at the base.

In other places, land loss is much clearer: Isle de Jean-Charles became a poster child for coastal erosion upon the release of the blockbuster hit "Beasts of the Southern Wild" (2012), which renamed it the "Bathtub" and featured many dramatic shots of its only access highway, stretching exposed through an expanse of open water with its one line of telephone poles. The road has two lanes, and one has almost entirely eroded into the Gulf – waves steadily lap across its pavement as another storm buffers in. This place has even less security than Venice: no levees, no governmental funding, only the prospect of heightening the pilings beneath your home or moving away if you can't afford it. A nine-year-old actress named Quvenzhané Wallis narrates: "Daddy says, up above the levee, on the dry side, they're afraid of the water like a bunch of babies. They think we're all gonna drown down here. The ground is gonna sink and the water is gonna rise up so high, and everything south of the levee is going under." In the film, the Bathtub's community rallies up and builds shelters on boats, hatching plans to dynamite the levee.

A more recent documentary, "Can't Stop the Water" (2014) shows the actual Army Corps plans that have resulted in the fictional Bathtub's sinking. In 1998, the USACE drafted a new levee guide plan that included Isle de Jean-Charles and its causeway. Swiftly afterward, the plan was revised to leave the island out. Since then, the width of the island has eroded from about five miles to a fourth of a mile, about 2,000 square miles of dry land gone. Chief Albert, a member of the Biloxi-Choctaw-Chitimacha community that has been on the island since the 1840s, drives his boat around the island's perimeter and points out to the camera a series of recently built oil rigs and the canals dredged for their pipelines, remarking that the island's

inhabitant have gotten monthly royalties after their construction – about thirty dollars each. All of these compound effects, against an ocean rising from climate change and subject to more frequent and violent storms, gives the residents a tone of sad acceptance in their speech. What if the levees were built now? So much has been lost already, so many people gone.

Even the methods of coastal restoration worked on by the USACE are under intense scrutiny. Here is where the scaling out occurs. By dint of the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) enacted in 1990, there is now a Federal Task League working on about 110 coastal restoration projects including marsh creation, sediment diversions, the construction of oyster barrier reefs and levee reconstructions. This act was vetoed by George Bush, but was repassed by the 110th Congress in 2007 with a budget of $1.6 billion, each of fifteen target projects costing up to $280 million (Marshall). All are technically slated for completion in 2032, but with an increasingly dwindling budget, many have been stalled in the meanwhile.

The redrawing of the levee around L'Isle de Jean-Charles is just one example of this effect, which has had consequences for the landscape all across the coast, from Louisiana into Texas. Eleven of the federally-funded projects have been re-estimated at about 500 million over budget each. Much of this project's stimulus package came out of BP following the Deepwater Horizon oil spill. John Barry, the author of "Rising Tide: The Great Mississippi Flood of 1927" recently helmed *another* lawsuit against 93 oil and gas companies (including Exxon, BP, Mobil and Chevron), suing them for wetland damaging caused by the construction of wells and

dredging of canals. The *New York Times Magazine* ran a cover story on it in October 2014 with the words "Every hour, an acre of Louisiana sinks into the sea. Who is to blame?" placed over an image of a canal bisecting the remnants of a swamp in Plaquemines (Rich).

In February 2015, board members appointed by Governor Bobby Jindal shot down the lasuit with the help of Judge Nannette Jolivette. The defense stated that the plaintiff's charges of nuisance, negligence and drain (among others)[3]did not represent violations of the Clean Water Act, the Rivers and Harbors Act or the Coastal Zone Management Act because these were not designed to defend coastal communities against erosion, storm surge, or "indirect economic losses" (Brown 10). Namely, that the Levee Authority didn't have the data to prove a direct connection between the oil companies' activities and land loss (despite the USGS' many studies) – and even if they did, their complaint cited unrelated environmental protection acts. The Deepwater Horizon fell in direct penalty for the oil spill for pollution rather than erosion *as a result of* something done in the past (dredging) – this is what they mean by a failure to establish an "indirect" connection. The CWPPRA website paints a positive picture of restoration, but on the ground, most investigative journalism describes the efforts as paltry, poorly funded and badly researched.

The construction of barrier islands is near unanimously accepted as a beneficial force – it both keeps sediment in the marshes and protects the coast from

[3] Other than the construction of oil and gas wells, for: "road dumps, ring levees, drilling activities, fluid withdrawal, seismic surveys, marsh buggies, spoil disposal / dispersal, watercraft navigation, impoundments, and propwashing / maintenance dredging" (Brown 3).

storm surge (and therefore, erosion). River diversions, however, have proved to be hotly contentious for a wide range of reasons. Environmental advocates who fiercely support coastal restoration have turned against diversions, claiming that although they provide the wetlands much-needed sediment blocked by the levee system, they will simultaneously introduce the Mississippi's pollutants. This has potentially devastating effects for the bayou's biodiversity, especially for declining crawfish and brown shrimp populations. If the Bonnet Carré Spillway goes under great ecological scrutiny for its infrequent injections of freshwater into Lake Pontchartrain every ten years or so, diversions make the same impact – except daily. They push back salinity regimes, potentially displacing historic fishing grounds, which means bad business for small-scale fishermen up against larger companies for a living.

Some geologists, including Chris McLindon (of Stone Energy Corporation, an offshore drilling investor) have argued that diversion projects have done more harm than good. McLindon says that these freshwater introductions, laden with agricultural nitrates and pollution, weaken the roots of coastal marsh grasses by overexposing them to nutrients, quickening the erosive process when hurricanes pass through – namely in the Caernarvon diversion in Plaquemines Parish, not far from Venice (Alexander-Bloch 1). He argues instead for the prevalent use of pipeline dredging. Here, imagine dredge boats siphoning settled material from the bottom of a bay and pumping it through an articulated pipeline that sits precariously on concrete blocks in open water. On the other end of the bay, it spews this sediment onto a jetty. Hour by hour, a barrier island slowly rises from the ocean. This is one of

many techniques currently used by the Army Corps. McLindon's opinions have been swiftly denied by other scientists, who argue that diverting the Mississippi's sedimentary loads is the *only* way to majorly impact wetlands increasingly lost to the Gulf, and that the nitrate levels are safe. As fast as we can build islands around the wetlands for protection, the wetlands themselves disappear. The conversation is ongoing, but land loss continues worsening, especially in the late summer when hurricane season comes around.

The Caernarvon diversion is one of many that have been in place for decades. It was constructed in 1991, but is inconspicuous – simply a concrete culvert under 23-S (the road to Venice) which connects the main stream of the Mississippi to the surrounding wetlands of Plaquemines Parish, less than half a mile away. There is a much more conspicuous diversion in western Louisiana that receives much less attention. It was built in 1941, is almost fourteen miles long, and is called the Wax Lake Outlet, connecting the Atchafalaya River directly to the Gulf of Mexico. Primarily designed to alleviate flooding in Morgan City, LA (which has become even more important with the building of the Morganza Floodway), it has had enormous unintended consequences. This is because, through the Atchafalaya, it is receiving an inordinate amount of sediment. And like the Atchafalaya, a deltaic plain has been forming at its mouth for about fifty years.

Its presence is striking when you know it's there, but easy to pass over in maps pinpointing land loss – way over there, on the western end of the state, two separate LBM's (Land Building Machines) have been churning away, accumulating sediment and wetlands in a veined lobe protruding from the coast. The Atchafalaya

and its unlikely sister channel, made by the same dredging process that drained the backswamps of New Orleans.

Geographer and urban historian at Tulane University Richard Campanella (who spoke earlier about Sauvé's Crevasse) has become somewhat of a well-known public figure in New Orleans over the past decade. His books on Lincoln's steamboat journey down the Mississippi and early colonial tales of New Orleans' settlement (in addition to his monthly writings in the *Times-Picayune*) have made him something of a recognizable city pundit. In January, he invited me to attend the opening meetings of a geography seminar at Tulane's architecture school, and I interviewed him the following day. He has a positive opinion of diversions, but most recently has been publishing and advocating the idea of utilizing dredge material from the deepening of the Mississippi in wetland renewal. In "Beneficial Use: Balancing America's (Sediment) Budget," he presents this fairly simple proposal. With the widening of the Panama Canal and the necessity to dig the Mississippi channel deeper for so-called Panamax container ships, why not steer that sediment toward diversions and siphons rather than tossing it in the water column to be washed away by the Gulf.

A landscape architect named Bradley Cantrell has also recently put forward designs with the landscape architecture program at LSU. With his class, he designed several models of "cyborg" technologies that distribute upstream sediment down through the delta – specifically, the Atchafalaya, one of the most productive areas of the coast. One proposal is called "PodMod." In mesh tubes attached to river control structures, sediment accumulates rather than hitting the weir and accumulating

(later to be routinely dredged out by the USACE). Instead, these tubes would fill smart, balloon-like "pods" with the substance, programmed to release when full, float down the river and trigger a "process of electrochemical corrosion" when it reaches a target area (Strickland). Then, each pod deposits its separate sedimentary load so that a "choreography" of sediment could be programmed into the full system, reflecting the changing needs of the delta, able to respond to real-time data on land change. This represents what Cantrall terms a "tunable infrastructure" – a technology with the adaptability of the ecosystem itself, a kind of decidedly less anthropocentric river control. It's also a comically grandiose idea considering the way the Army Corps currently spends money, with barely enough to properly maintain its perimeter levees.

Campanella and Cantrell's ideas represent two very different thought experiments about how river control should be modified – one intensely practical, with an eye always on the budget, and one an architectural imaginary that pokes at what it perceives as the realer, larger problem behind land loss. That problem is the arrogance of engineering nature, an attempt to reign supreme over the landscape at any cost. Here I remember the dictum inscribed on the U of Wyoming's engineering building: "STRIVE ON, THE CONTROL OF NATURE IS WON, NOT GIVEN," or chalked into the slate of ORCS: "Do What's Right, and Be Prepared to Fight as Infantry When Required!!!" (McPhee 13, 21). This militaristic language permeates all of the USACE's projects, understandably – they are a military engineering branch of the federal government. Cantralls' unrealizable technologies are, in a way, impossible attempts to win back the delta's favor, working in tandem with the stream to imitate

its earlier land-building process. They reject a military engagement with the deltaic ecology, staging accomodation rather than strict control at all costs. Campanella might critique this as mere environmental romanticism, attempting to turn back the geological clock to a time before the first human footprint in Louisiana mud, or the first concrete berm laid across the water.

**Conclusion: Scaling Down**

There is only one thing that I left Louisiana certain of in February: attempting to reverse river control is an exercise in futility, and there is no environmentally sound solution. These levees, revetments and cutoffs, spillways and diversions, are largely necessary to keep the urban populations of Southern Louisiana from Katrina-level flooding. But even the Army Corps' revised perimeter system surrounding New Orleans can't withstand a Category 3 storm in models released by the National Hurricane System in the past few weeks (Marshall). This is largely because the wetlands that previously acted as buffers to storm surge are now underwater, gradually eroded away by canal dredging and the lack of a consistent sediment supply. It's as if the Mississippi's engineering and the surrounding bayou ecosystem have entered a negative feedback cycle, damaging and outmoding each other until the fuse burns out in the delta, and life without the presence of high water is no longer possible.

This project has covered early stages of that cycle: first, the construction of a comprehensive levee system to *forever* prevent flooding (and replenishment of the surrounding wetlands with nutrients and sediment) and the draining of the

backswamp to build New Orleans and the plantations snaking along the river northward. Second, the realization that a levees-only system was unsustainable – worsening the flood cycle, most evident in the great flood of 1927. This disaster enabled the formation of the Mississippi River Commission and its new vision of Project Flood, a network of interconneced structures (floodways, diversions, weirs and dams) that would *forever* protect the major cities of southern Louisiana. Chief among them was Old River Control, a sill with the sole purpose of keeping the Mississippi River from redirecting down the Atchafalaya, preserving its current course *in perpetuity.*

All these stages of controlling the river share that common ambition: to function as a kind of time machine, to break the clock of Louisiana's ecology in the mid-1900s. Or, in the USACE's military terminology, to win the war against the river, subdue and domesticate it into a well-behaved channel whose high spring waters are predictable and able to be accomodated. The implicit missions: to keep New Orleans a major port city and fuel its economy. To keep afloat the oil and gas industries which employ such a large population of the southern parishes, but funnel their money to offices in the north, out of state and local hands. The compound effects of these landscape technologies – large-scale urban and rural subsidence, the flooding of ancestral lands and displacement of graves and fishing grounds, among others – are not their responsibility.

It is altogether too easy to demonize the Army Corps for their many failures: the failure to properly maintain the walls of New Orleans' outfall canals before Katrina hit, though they had been inspected and known to be in poor condition, the

failure to include coastal communities like l'Isle de Jean-Charles within their updated levee system. Many of these failures are markers merely of an extremely small budget which is still shrinking. As Campanella put it to me, even a modest settlement from the oil companies up against John Barry would only "pay for the paperclips" in a series of coastal restoration projects costing several billion dollars over a century. Even then, the coast will never be the same as it was in the time of Basil Hall, Elisée Reclus, Pierre Le Moyne d'Iberville, or any witnesses of the Big Muddy when its nickname actually applied. It will be protected by human-constructed barrier islands harboring a network of intricately planned wetlands supplied sediment by artificial river diversions. The ecological consequences of such a profoundly new coastal landscape is still an imaginary – it sometimes seems like an attempt to make an enormous diorama of precolonial Louisiana, for which there is neither funding or time. I am still not sure what other options exist.

It is especially imaginary within the city limits of New Orleans, a walled city that forgets its walls are there. However, this year – 2015 – is one of several reality checks. It marks the ten-year anniversary of Hurricane Katrina (August 23rd) and the five-year anniversary of the Deepwater Horizon oil spill (April 20th). Beyond the horrendous social and ecological havoc wreaked in the aftermath of both, they were events that also rolled back the curtain on many much slower, ongoing disasters. Flooding that occurred during Katrina, spread out unequally across the city, demonstrated to a tee the kind of environmental racism built into the city's plan since its foundation. It showed that lower-income, majority black populations live in topographically lower areas of the city, worst affected by both flooding and the

damages done by insurance companies on their return, while the higher-income "white teapot" (so called for its shape across the cityscape) live along the natural levee, and were largely unaffected by floods. The Deepwater Horizon spill shed a light on the kind of pollution that petrochemical industries along the Gulf had gotten away with for decades (still do) and focused the nation's eye on the growing dead zone below the birdfoot delta. Images of oil-coated pelicans and dolphins washed up dead on beaches, along with aerials of the Lower Ninth Ward underwater – these are now part of the national American narrative of disaster, a train of events in Louisiana dating back to the 1927 flood. They are not isolated incidents. They are peaks in a sequence of interconnected calamities, which have eaten away at the landscape and alienated its inhabitants. Oddly enough, both of them hold some allegiance to the few successes and more frequent failures of the river control system.

Out in the bay, two dredge boats look like yellow houses built on a watery plain. From the bottom of the bay they suction sediment, pump it through a thin, articulated pipeline across the water and spew it onto a series of jetties constructed over a grid. This is how land is built now, more or less. You don't have the right to live wherever you want and expect your telephone poles not to erode into the Gulf. In small towns, the streets buckle and split along the canal walls. A snag boat tears rebar from the broken concrete. One day you're on a speedboat with a man in a Saints jersey and an eyepatch. With wide gestures, he points at the portions of open, green-blue water which used to be islands he played on as a kid. The heat beats down, but you've grown used to it, just like you've grown used to the water and the

mosquitoes. I think the thing to fear isn't Louisiana underwater, but something to do with vanity, engineering, and the determination to develop no matter what the obstacles.

There are several small-scale projects that have popped up inside the city limits of New Orleans that bring some hope to the larger coastal water issues. Dutch Dialogues, a series of conversations with Dutch landscape architects, has turned into the Greater New Orleans Water Plan in the past few years, spearheaded by David Waggonner of Waggonner and Ball Architects. This plan includes a comprehensive revision of New Orleans' drainage system including streetside bioswales, water retention basins in empty lots and below-grade trenches to circulate rainwater to major pumping stations along the city perimeter. It also has plans to revitalize major outfall canals as blueways that basically serve as public parks, part of its idea to create a city-wide network of bicycle, running and walking thruways (reducing the number of NOLA residents using personal cars to commute). Due to lack of funding, the plan has turned into an educational phase with Waggonner and Ball partners getting piecemeal funding for each project – the first of these projects to get sponsorship, the Lafitte Greenway, opens this summer.

Behind all these plans, David Waggonner articulates a larger issue: the failure to use waterways in the urban scape of New Orleans creates a kind of city-wide psychology that water belongs definitively *outside* the levee. Why not instead circulate it throughout streets and canals, thereby both reducing nuisance flooding and the stigma it brings? This seems to be the plan's central tenet: taking a term from Timothy Pachirat, to create a new "politics of sight" for New Orleans in which

water plays an active role. Establishing water as a part of a citizen's everyday routine is more convenient system than relegating it to badly maintained canals which inevitably overflow. It's also an implicit, infrastructural reminder of the larger context of the city – a place which, in the next century, will have to make some serious concessions to deal with land loss. Without the sediment trapped in spillways and dams to the north, with all the dredged canals, it is quickly returning to its watery origins.

What these micro-plans (in New Orleans) and macro-plans (along the Louisiana coast) share in common is a vision of a hybridized relationship between human life and the delta. Perhaps idealistic, and definitely lacking the financial support they need to be realized, they propose that river control (and infrastructure in general) should actually start *resembling* the ecology it reconfigures. This is a form of accomodation much larger than Bonnet Carré, Morganza or Wax Lake, which function as spigots in which the river's "fury" can be let out by federal mandate. It requires that river control actually replicate controlled floods on a much larger scale, keep its floodwaters *inside* city boundaries rather than pumping it out, and distribute sediment with data-conscious "pods" like Cantrell's – this is a cyborg dreamland. People are struggling to keep the pilings supporting their homes from rotting.

Leaving New Orleans is always an unhappy event. Taking the on-ramp to I-10, cruising past the Superdome and the Bonnet Carré Spillway on Lake Pontchartrain, over all the protective layers the city has congealed, and out into the expanse of watery terrain and cypresses, it is startling how stranded the city is. Way

out here, in the middle of a deltaic plain that is disintegrating away. This transition startling even the fourth or fifth time driving away from the city. After that, it's depressing.

Like in the Eames film "Powers of Ten," my mind's eye always telescopes upward over the state from my own moving car. From above, so much is clearer given a little history: the long-lot agricultural plots dating back to *antecedent cadaster* planning for sugar plantations, trailing along the river like a spine, and the surrounding bayous with their knotted strings of Cajun towns. To the west, the Atchafalaya Basin laid out wide and green with the Morganza Floodway and Old River Control at its peak – such comparatively small and simple structures to generate such an epic landscape over half a century. Then there is the river itself, which is always slightly out of reach, like a drainage channel in the city – its container ships and fish kills and oil-slicked surface, its cottonwoods, giant reeds and shores that are muddy where they haven't been overlaid with concrete mattresses. I would like not to be romantic or to yearn for a deltaic system that's unattainable. I would like to live in this place for as long as it's here. This is a way of starting.

Appendix: Additional Photos, January 2015.

1. Bridge at Crescent Park (2013), Bywater neighborhood.

2. Water's edge at Crescent Park.


3. Bayou St. John, the original portage of Pierre Le Moyne d'Iberville, 1699.

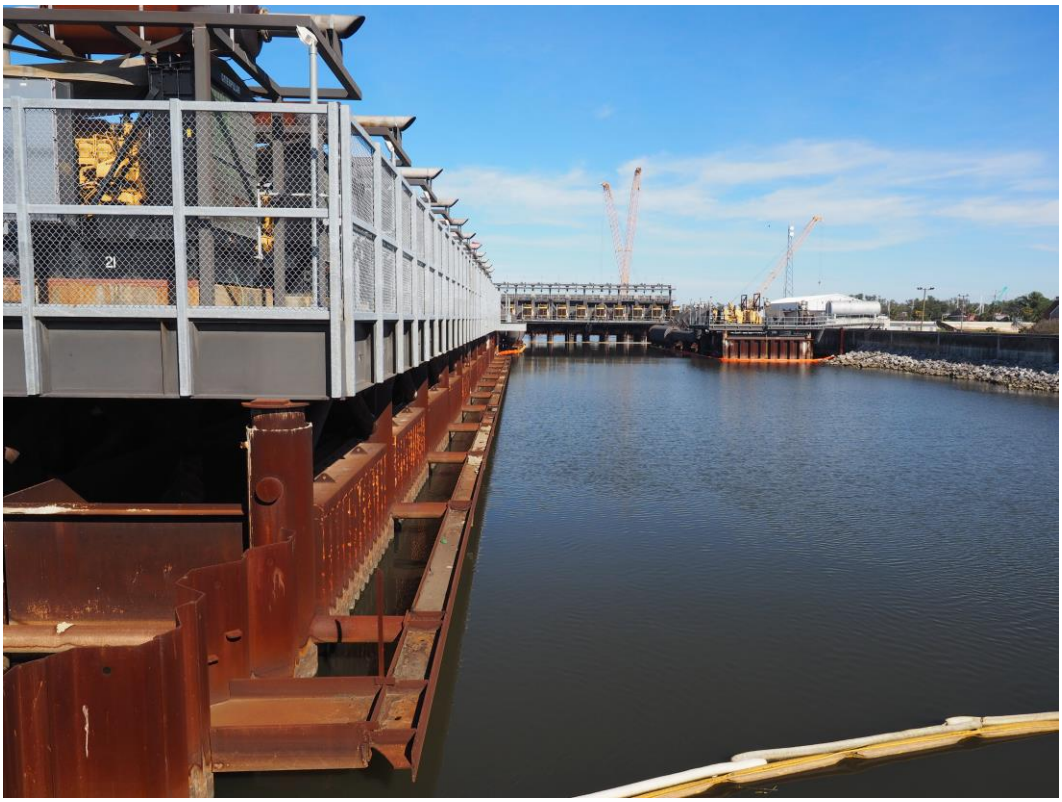
4. Scant reeds at Bayou St. John today.

5. Shell oil refinery in Norco, LA.

6. Bonnet Carré Spillway (1930). Norco, LA.

7. Kenta Canal in Barataria Preserve, probably a logging canal from the early 1900s.

8. Oil remnants in the wetlands at Barataria Preserve.



9. Post-Katrina lakeshore pumping station at 17th Ave. Canal, New Orleans.

10. Stone levee at Bucktown Harbor on Lake Pontchartrain, New Orleans.

11. Trash along the interior of a guide levee at Orleans Ave. Canal, New Orleans.

12. Construction of a new lakeshore pumping station at Orleans Ave. Canal, New Orleans.

13. Near-empty drainage canal in Broadmoor neighborhood, New Orleans.

14. Model of canals and pumping stations in New Orleans at Waggonner & Ball Architects.

15. Flood / rainwater drainage at Fort Jackson, Plaquemines Parish.

16. USACE pipeline dredging project at a harbor in Plaquemines Parish.

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