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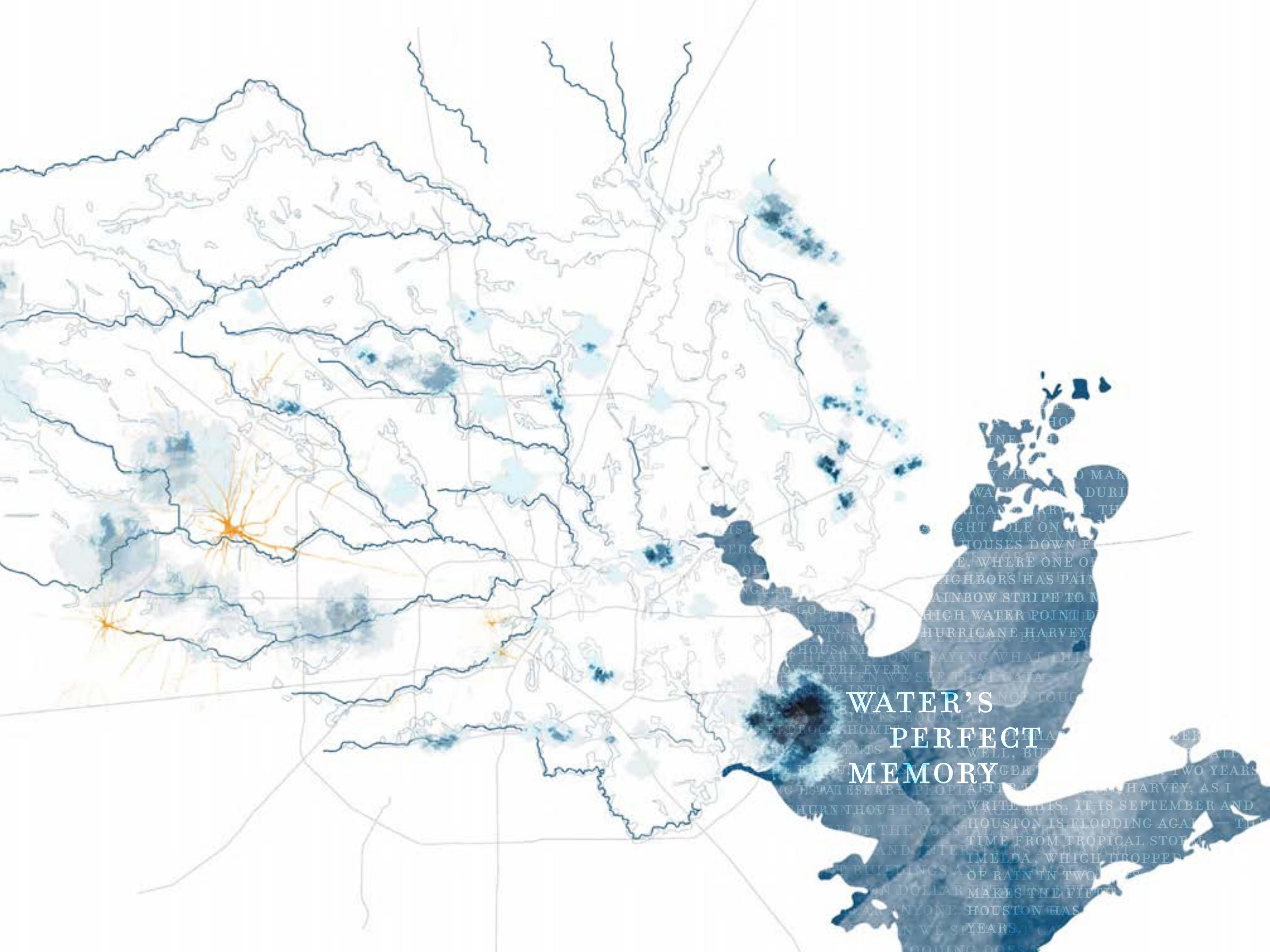
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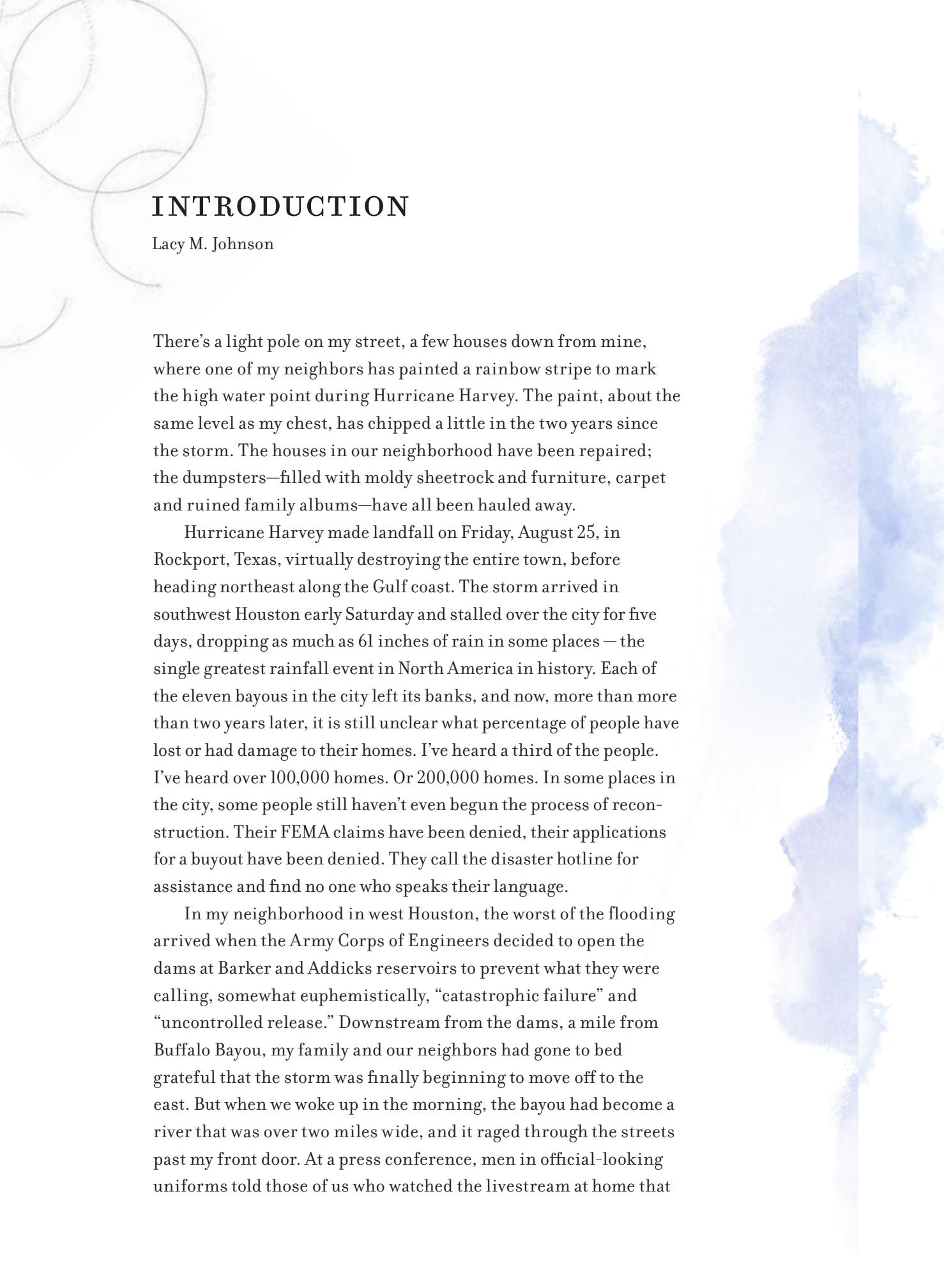
LACY M. JOHNSON

MORE CITY THAN WATER: A HOUSTON FLOOD ATLAS

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EDITED BY LACY M. JOHNSON & CHERYL BECKETT





INTRODUCTION

Lacy M. Johnson

There's a light pole on my street, a few houses down from mine, where one of my neighbors has painted a rainbow stripe to mark the high water point during Hurricane Harvey. The paint, about the same level as my chest, has chipped a little in the two years since the storm. The houses in our neighborhood have been repaired; the dumpsters—filled with moldy sheetrock and furniture, carpet and ruined family albums—have all been hauled away.

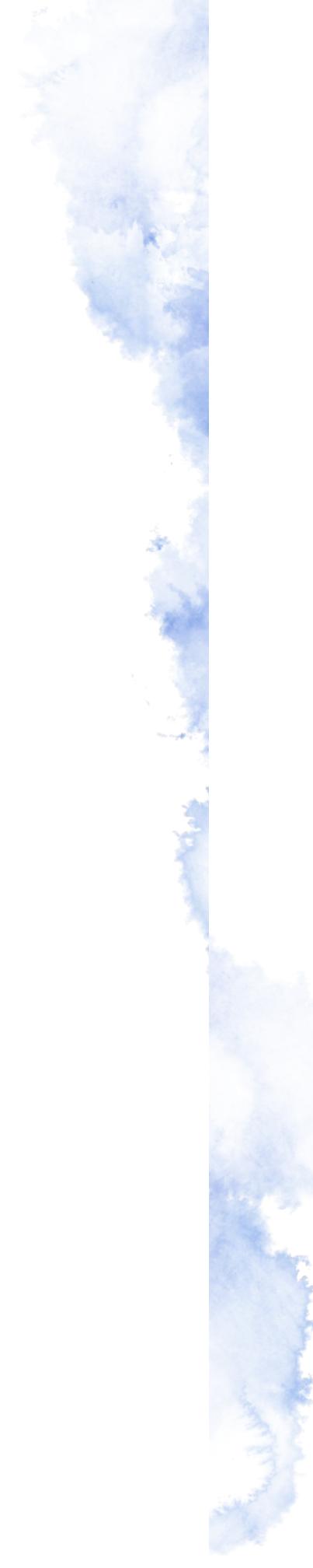
Hurricane Harvey made landfall on Friday, August 25, in Rockport, Texas, virtually destroying the entire town, before heading northeast along the Gulf coast. The storm arrived in southwest Houston early Saturday and stalled over the city for five days, dropping as much as 61 inches of rain in some places—the single greatest rainfall event in North America in history. Each of the eleven bayous in the city left its banks, and now, more than more than two years later, it is still unclear what percentage of people have lost or had damage to their homes. I've heard a third of the people. I've heard over 100,000 homes. Or 200,000 homes. In some places in the city, some people still haven't even begun the process of reconstruction. Their FEMA claims have been denied, their applications for a buyout have been denied. They call the disaster hotline for assistance and find no one who speaks their language.

In my neighborhood in west Houston, the worst of the flooding arrived when the Army Corps of Engineers decided to open the dams at Barker and Addicks reservoirs to prevent what they were calling, somewhat euphemistically, "catastrophic failure" and "uncontrolled release." Downstream from the dams, a mile from Buffalo Bayou, my family and our neighbors had gone to bed grateful that the storm was finally beginning to move off to the east. But when we woke up in the morning, the bayou had become a river that was over two miles wide, and it raged through the streets past my front door. At a press conference, men in official-looking uniforms told those of us who watched the livestream at home that

the water would continue to rise, but they didn't know how much. Maybe one feet. Maybe three feet. Outside, the water bubbled up from storm drains, out of sewers, smelled of the rank contagion of human and industrial waste. One neighbor, a surveyor, got out his equipment to see how much more water the street could take before the flooding reached the houses. None of us could take much more.

Like thousands of others, my family chose to evacuate, carefully placing all our furniture on blocks before walking out the front door. Helicopters circled overhead and the coast guard rode airboats up and down the streets as we trudged through sewage to the end of the block, where we left the neighborhood and entered a militarized zone. Soldiers helped my elderly neighbors off boats and high-water military vehicles while emergency medical responders administered oxygen and first aid under plastic tents. My family eventually found refuge at our friends' home across town, where the streets were dry. Here and there, a branch had fallen into a yard, but busses were running. Pizza could be delivered to your door.

For weeks afterward, many people helped in the ways we knew how: by volunteering our time or labor; by organizing food for the thousands of evacuees; by collecting donations for families and schools in need. I heard dozens of stories of everyday heroism, and these stories—heard and repeated, over and over—have become the official stories of the storm: a story of sacrifice and resilience, of working together for the common good. We repeat these stories because we like what they say about us as people, as a community. But these stories are only partially true. I have also heard the story of a man whose house, built up on a raised foundation above the street level, did not flood at the end of a street where every other house went underwater. The first day the flood receded, when his neighbors were first allowed back to their homes, he sat on his porch with a gun over his knee and aimed it at anyone who tried to park in front of his driveway. In my own neighborhood, the message boards lit up for weeks after the storm with posts about "suspicious" people and vehicles possibly casing the neighborhood. I think we'd prefer to forget these stories, because we do not like what they say about us as people—though that doesn't make them untrue.



My proximity to flooding during Harvey has made me think about it a lot over the past several years, though for a long time I almost never thought about flooding. When I moved to Houston in 2004 with my then-boyfriend, we rented a tiny apartment on the second floor of a duplex in the Montrose and shared only one car between us. We didn't have a television at that time and had little access to the news. Each August through November, during Houston's annual heavy rain season, my mom would call to ask whether our house was flooded. "Houston is all over the news," she would say, watching footage of flooded underpasses and high-water rescues. Our neighborhood was on high ground, I explained; our street was dry except for a few puddles. I knew that a few blocks from our home, Buffalo Bayou had probably left its banks again and filled Eleanor Tinsley park, but just as quickly it would drain and the flooding would disappear, and I would forget the city had ever flooded at all.

This all changed in 2005 when all the televisions in restaurants and waiting rooms showed footage of people waving from the roofs of their submerged houses. Hurricane Katrina had struck New Orleans and the storm surge, which had broken the levees, flooded 80% of the city, killing 1,800 people and displacing over one million. A quarter of these found their way to Houston, migrating in busses, cars, on boats, leaving behind communities, histories, memories, and generations of making a place a home. Two weeks later, before many of the evacuees had found permanent shelter, Hurricane Rita took aim on Houston and then-Governor Rick Perry ordered an evacuation of the entire metropolitan area. Traffic was gridlocked in some places for 24 hours as the temperature rose to 100 degrees. Hurricane Rita dissipated before making landfall, but not before 118 people had died in their cars on the interstate, perishing in the storm that never came.

Suddenly I noticed the flooding that earlier my "dry privilege" had allowed me to ignore. The following year, in 2006, when I was pregnant with my daughter, one especially heavy June storm dropped over six inches of rain in just under 75 minutes. Berry and Sims Bayous left their banks and rushed into 3,370 homes, 561 apartments and one nursing home, where over 100 people had to be

evacuated. In 2008, when my daughter was nearly two, Hurricane Ike made landfall at Galveston Island; its storm surge swamped 2,500 structures; rainfall caused another 1,200 structures to flood — more than \$28 billion in damages in all, the 3rd costliest in US history. The following year, in 2009, spring storms flooded over 2000 structures; highways closed; five children drowned in a car. In 2012, after our son was born, overflowing creeks flooded dozens of structures; in 2014, the year we bought our home, Greens Bayou left its banks and entered over 100 homes; in 2015, over Memorial Day weekend, entire watersheds filled, damaging more than 6,000 structures and killing seven people. Seven more died and nearly 10,000 structures were flooded during the Tax Day Flood in 2016; and in 2017, creek and river flooding damaged over one thousand additional homes at the end of May. Eight major floods in eleven years — this isn't even counting all of the un-named minor flooding that occurs each time we have a good rain.

By the time Harvey hit in late 2017, my young family had moved to the far west part of the city. We were excited to find a place only a mile from Buffalo Bayou and to find that the bayou had a park I could run through. We lived there uneventfully for several years, long enough for us to befriend neighbors, to learn that one of them would run through the park with me several times a week, and to understand how the Bayou changes throughout the year. The sun comes up behind the bayou's southern bank in winter, and over the northern bank in the height of summer. The flowers that grow in May and June are different from the ones that grow in January. I had learned I couldn't run through the park after even a few hours of heavy rain because in the park's lowest places the bayou runs leaves its banks and muddies the path, and in the dark of the early morning hours, when I like to run with my friend, this can mean a bad fall. I've learned that after an entire day of heavy rain, the bayou fills the low basins of the park, though usually only briefly. I began to see how the hills and valleys that make this park so beautiful and a challenge to run had been carved by flooding during all the bayous seasons, beginning long before I started running here. Before I moved to Houston, and before my neighborhood was undeveloped farmland, and even before all of this place



was part of Mexico a country that had been reclaimed from Spain, and long before the Bidais and Akokisa tribes came to fish and trade along the water's edge, the bayou had a memory of journeying beyond its banks to shape and reshape the place nearly seven million people now call home.

"All water has a perfect memory," Toni Morrison writes, but people tend to forget.

Or, perhaps we remember quite well, but the memory of water is longer than our own. Two years after Hurricane Harvey, as I write this, it is September and Houston is flooding again—this time from Tropical Storm Imelda, which dropped 43 inches of rain in two days. This flood makes the fifth 500-year flood Houston has

suffered in five years. For the fifth year in a row, we've pulled one another from submerged vehicles and flooded homes. This time a man drowned in his van, another in a pickup, one in a car, another trying to rescue his horse. One man drowned in a ditch. For a short time the entire town of Winnie, Texas, was under water. Port

Arthur was destroyed, again. Barges containing toxic chemicals crashed into one another along the Houston Ship Channel, again, and the second-largest petrochemical complex in the world continues to supply the only nation to have withdrawn from the Paris Climate Accord with enough petroleum and natural gas to cause ice in the arctic to melt, to cause sea levels to rise, and to cause natural disasters to become more catastrophic here and around the world every single year.

The same year that Hurricane Harvey inundated Houston, Hurricane Maria claimed the lives of over 3,000 people in Puerto Rico; over 1400 tornadoes caused \$18 billion in damages in the United States alone, and a wildfire leveled the entire town of Paradise, California—the deadliest and most destructive wildfire in state history. In 2018, an unusually heavy monsoon season dumped thirty inches of rain on Kerala, India, demanding that thirty-five out of the fifty-four dams within the state be opened for the first

All water has a
perfect memory

time in history, resulting in nearly 500 deaths, and a million people displaced from their homes. A month later Hurricane Florence stalled over the southeastern United States, dumping 34 inches of rain in some places, causing catastrophic flooding all along the east coast. In the spring of 2019, Cyclone Idai brought a storm surge 13 feet high to the coastal areas of Mozambique, bringing with it an "inland ocean" 80 miles long by 15 miles wide, displacing 100,000 people and claiming at least 750 lives. In the American midwest, record snowfall combined with heavy rains resulted in catastrophic floods completely devastating a wide swath of the farm belt across Iowa, Nebraska, South Dakota, and several other states. Our amnesia for these events, makes us more susceptible to disaster in the future, not less.

Houston is designed to flood, I have heard people say again and again, as they replace more and more of the coastal prairie with streets and interstates and apartment buildings and enormous multimillion dollar estates. But I do not hear anyone saying what this means when we see that catastrophic flooding does not touch people's lives equally. The greater Greenspoint area—a low-income community situated along Greens Bayou—floods over and over again; some homes have flooded more than ten times since Hurricane Allison in 2001. In the predominantly African American neighborhood of Houston Gardens in Northeast Houston, a single mother who had been denied assistance by FEMA was living in a tent in the yard of the house she was renting, trying to muck it out herself before volunteers arrived to assist her. But on the other side of town, in Meyerland, which is predominantly affluent and white, when a friend's home flooded her family had help from FEMA and insurance adjusters and within days a team of contract laborers were swinging hammers. A year and a half later, FEMA was still calling this friend on the phone to ask if she needed more money, if there's more help they could give. The wealthiest neighborhoods, especially those located in the city center—River Oaks, Montrose, and West University—never flood at all.

The Houston Ship Channel also rarely floods because the purpose of the Addicks and Barker Reservoirs is to prevent flooding downstream on Buffalo Bayou, which snakes through my neighborhood, Highland Village, River Oaks, and Downtown

Houston before it becomes the Houston Ship Channel, home to the second-largest petrochemical complex in the world.

In the 1940s building those reservoirs was an especially urgent project because the world was at war, and if the ship channel flooded — as it was prone to do — we wouldn’t have oil and fuel for the war machine. Now, all these years later, pipelines flow from the Ship Channel like a vast circulatory system; refineries all along the ship channel pump blood into those veins. A catastrophic flood in the Houston Ship channel would mean an environmental disaster like the world has never seen.

This is a story that needs telling, even if the official one resists change. In this city, buildings go up. Buildings come down. One hundred thousand people move here every year, cramming into tiny apartments, or three-bedroom homes in suburbs, or tents along the bayou, or vast sprawling estates. Refineries churn thousands of tons of toxic chemicals into the air every year and yet gardens bloom here every day. An ideal map of the city should include, marked in different inks, this history and all its implications: articulated and silent, evident and hidden.



Just after Hurricane Harvey — at least partially in response to our city’s persistent collective amnesia about catastrophic flooding — I began working to bring together a massive team of people to launch The Houston Flood Museum: a project that is meant to discover and collect these histories, as many as we can, about this storm and all the others, about the flooding to which this city is exceptionally prone, and to think in a critical way about the city and its heroes and its flaws — to reflect on our collective history, to learn from it, to mourn what we have lost and to imagine how to move together into the future. For me, this is the broad purpose of telling any story: to make sense of that which is nonsense, to make order from chaos, to make a purpose from the messiness and joy and occasional disaster that is life.

This Atlas is the second-year project of the Houston Flood Museum. With generous funding from the Houston Endowment and the Humanities Research Center at Rice University, I began working on this project in 2018, just after the launch of the Museum



in August. In response to the essays — some of which have been previously published; some were commissioned specifically for this project — a group of 25 senior graphic design students at University of Houston created maps under the supervision of Professor Cheryl Beckett. A smaller group of six designers has continued working on this project after graduation: Manuel Vasquez, Kristen Fernandes, Ilse Harrison, Jesse Reyes, Julia Ong, and Clarisse Pinto. I am grateful to Kristen, Julia, and Clarisse in particular for their vision, patience, and continued dedication to this project.

The maps you will find in these pages will not help you navigate a commute to the Woodlands, or learn the fastest route to the beach in Friday afternoon traffic, because what we hope to navigate here is not traffic or congestion, but rather our relationship to the land, to the future, and to one another. In this regard, Houston does seem a bit lost. Less than a year after Hurricane Harvey, Houston City Council unanimously backed a developer’s plan to build hundreds of homes in a west Houston floodplain. Development continues more or less unchecked today. Some of us seem to think more infrastructure will save us from future storms: more channelizing the bayous, larger drain pipes, and possibly a third reservoir. Meanwhile, on the other side of town, a handful of corporations continue to expand their investment in fossil fuels, lobbying local, state and federal government agencies to ease environmental restrictions and regulations without regard for the harm they are doing to the people those laws and regulations are designed to protect.

This atlas isn’t comprehensive; it doesn’t include every perspective on flooding, but it does bring together, in fifteen essays and their accompanying maps, some of what I consider the best thinking about it. In “From Ice to Inundation,” Rice Anthropology Professor Cymene Howe considers what new satellite modeling reveals about the relationship of melting ice in the Arctic to sea level rise in the Gulf of Mexico. In “Higher Ground,” Bryan Washington describes the chaos and confusion of the early days after the storm, and the many obstacles people faced while trying to attend to the needs of their communities. In “Community

Power,” Ben Hirsch writes about the birth of West Street Recovery, an organization dedicated to providing recovery assistance to people who have been excluded from the broader recovery effort. In “Gusher,” Houston native Sonya Hamer writes about the history of oil discovery and its relationship to enduring wealth inequality and environmental racism. And, in the final piece in this collection, my co-editor Cheryl Beckett offers a visual essay about her growing intimacy with hurricanes.

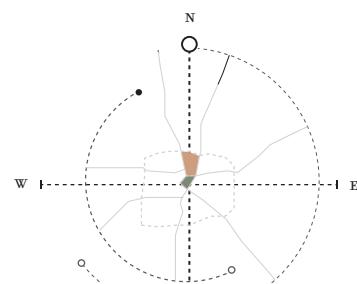
For this Atlas, I’ve asked writers to share their thoughts about what is revealed or obscured by catastrophic flooding. My intention here is to focus on perspectives that offer a vision, critical as it may be, of who and where we are. Because being honest and candid about our collective history can help us to learn from it, to mourn what we have lost and, hopefully, to find inspiration about how we might move together into the future.

Houston, 2019.



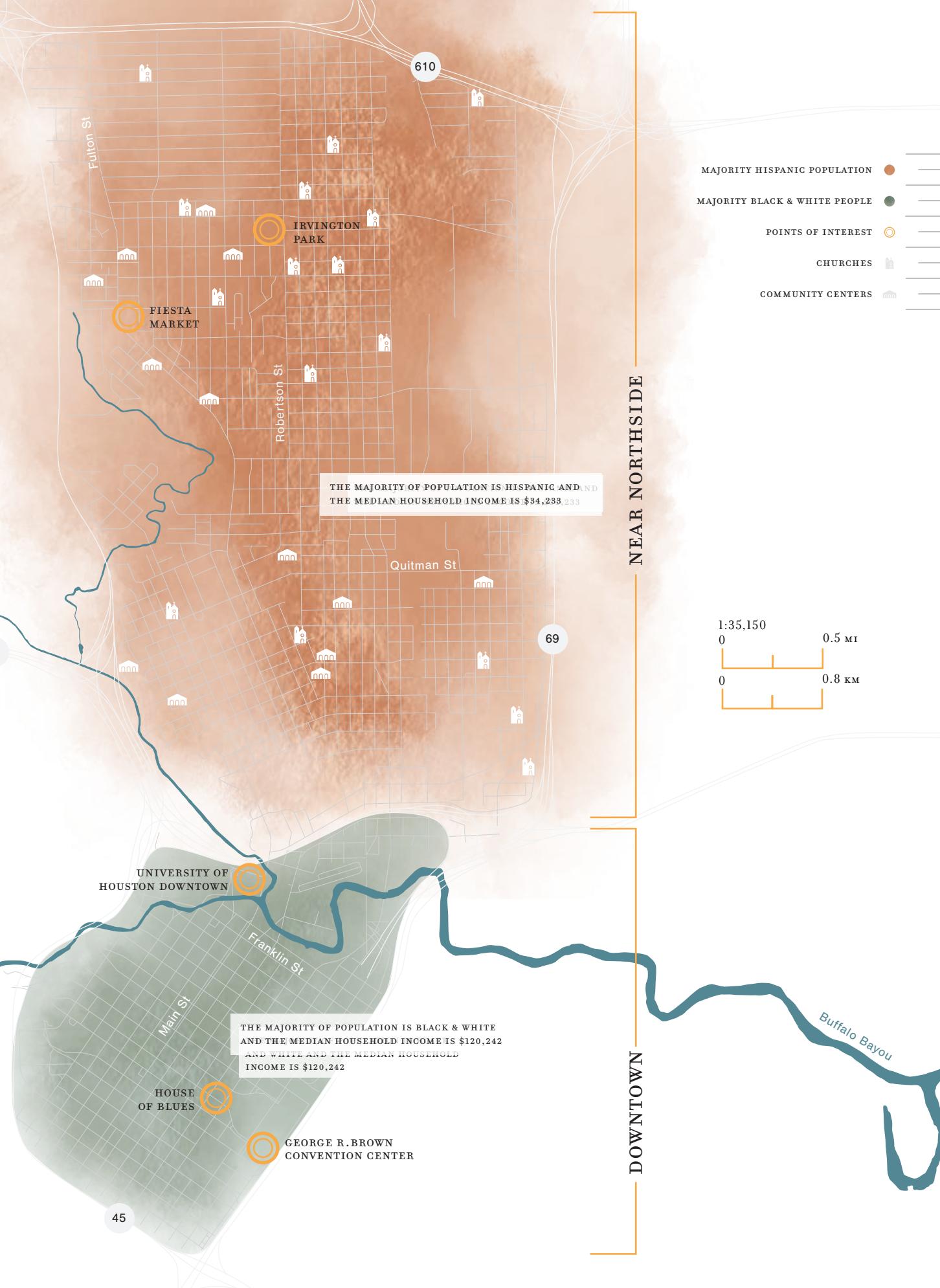
CLIMATE DIGNITY

READING BALDWIN AFTER HARVEY AND IN THE NEAR NORTHSIDE



AS DEVASTATING NATURAL DISASTERS BECOME THE NEW NORMAL, THE SYSTEMIC FACTORS THAT DIVIDE THE COUNTRY'S MOST DIVERSE CITY BECOME GLARINGLY APPARENT. HOWEVER, SO DO THOSE THAT UNITE ITS LOCAL COMMUNITIES. THIS MAP AIDS TO DEPICT HOW THE POWERS THAT BE CLASH WITH THE POWER OF CIVIC ORGANIZATION, NOT JUST ACROSS THE HIGHWAY BUT ACROSS COUNTLESS OBSTACLES OF FINANCE AND ACCESS.

DESIGN BY CLARISSE PINTO, MANUEL VAZQUEZ, AND WESTON WOODFIN



CLIMATE DIGNITY: READING BALDWIN AFTER HARVEY AND IN NEAR NORTHSIDE

Daniel Peña

In the wake of Harvey, I'm reading the title essay from James Baldwin's *Notes of a Native Son* (Beacon Press) with my first year students. The first lines go, "On the 29th of July, in 1943, my father died. On the same day, a few hours later, his last child was born." Someone goes whooooooaaaaa. What does Walter Mercado have to say about that?

Everyone laughs—we need to laugh—or at least everyone who is vaguely familiar with Mercado, a staple in Spanish language homes in Houston. Especially in the parts of Houston where my students live: Near Northside, which is just north of Downtown, which is just west of the industrial scrapyards near Fifth Ward and, a little past that, the refineries that pour benzene over Manchester though my students have no illusions or pride over which neighborhood is safer, cleaner, less susceptible to cancer. As a student told me once, Houston is cancer. This, they're always careful to remind me, especially includes Near Northside.

Walter Mercado is a lot of things, but he's perhaps best known as the guy who captivates everyone's superstitious tia or 'buelito. He can foresee the cataclysmic events that might enter one's life. He can tell whether this month will be a bad month or a good month for your health. Or your business. Whether your ex has or hasn't been sabotaging your love life. Whether fortune or disaster is in your future or not. He's possibly the most famous TV astrologer in Latin America. People take him seriously. And I mean really seriously.

First year students always have an interesting way of connecting the dots in subconscious ways. While we take a moment to poke fun at Mercado—and by extension our superstitious aunts and 'buelitos—we unpack shades of those same generational rifts that Baldwin explores between himself and his father. But we're unpacking something deeper too—the imagery of the 1943 Harlem

riots which, as one student points out, isn't unlike the imagery all around us in post-Harvey Houston. Talking about the riots, Baldwin writes:

Sheets, blankets, and clothing of every description formed a kind of path, as though people had dropped them while running. I truly had not realized that Harlem had so many stores until I saw them all smashed and open; the first time the word wealth ever entered my mind in relation to Harlem was when I saw it scattered in the streets.

Moving through Near Northside just days after the last rain squall from Harvey has fallen—near Robertson street, say, on the way to Irvington park—it's easy to spot piles of debris. Soggy sheetrock, splayed insulation, discarded clothes, crusting blankets, expensive waterlogged furniture baking in the humidity and sun. The debris lines the curbs, waiting to be collected. Seeing it all unpacked, I would have never guessed there was so much stuff in Houston. But there it is. Waiting to be collected, all of that money hauled off to some dump.

Somehow I knew Near Northside would salvage us. Us as in me and my wife and my cousin, Carlos, and his girlfriend, Nancy. Carlos is my younger cousin, slightly older than my little sister, and being such I've always felt a kind of responsibility for him though I know well he can take care of himself—built like a brick shithouse and incredibly savvy with anything mechanical or electric. He unpacks and assembles too-expensive crystal chandeliers shipped over from China into the port of Houston for a living, his fingers firm but precise as jewelers. Between shifts he shoots hoops in his work uniform-- the only clothes he has left when he arrives to my house.

His own apartment, near the Barker reservoir, flooded past the roof, his car somewhere in the wash. He admitted that he wouldn't want it anymore even if it were salvageable. "The water stunk," he told me, "Something chemical. It's burning my skin."

When he arrived to my apartment downtown, on a bus carrying masses of people to the George R. Brown Convention center where evacuees were being temporarily resettled, he was soaked to the

You have to go where
our people are

bone. News crews parked their satellite vans right up on the curb of the convention center so the busses handling evacuees had to park by the House of Blues on Caroline street, a significant walk to the convention center itself though just two blocks from my apartment where I had tea, a meal, and fresh clothes laid out for Carlos and Nancy.

Germaphobe that I am, I kept thinking on our walk home in the rain how the first thing I'd do was shower and then keep

showering. Take off my clothes and burn them. Scrub my skin endlessly. Get into a bed and fall asleep for days. But Carlos asked for a beer. And then just a drag of tequila to celebrate their survival. And then it wasn't long before we had a feast. Pancakes and eggs and bacon and the orange juice we had left and coffee and cookies and toast and more beer and some cherry tomatoes my wife, Sophia, laid out, "to keep it healthy."

Eventually, the TV went off. And then the radio. And then it was just us in our bubble, us pretending that we had enough of everything. Like everything was normal for two or three days. Never mind that we hadn't planned for four people to live in six hundred square feet with only the food warming in our refrigerator. Never mind that the water reeked as it came out of the faucet. Never mind that we had only so much bottled water left. And the cars were flooding in the garage downstairs. And it kept rising and rising.

When everything was gone, I think it was Nancy—a lifelong Houstonian—who said to me, "You have to go where our people are. Those corner stores and grocery stores. They won't let us starve." Our people as in Latinx people as in the next neighborhood over. Near Northside. In the Fiesta Supermarkets where my students were working throughout the storm. In the panaderias where they were baking as the parking lots and culverts and homes on Fulton street were flooding. In the taquerias owned by their parents where the first responders from all over the city were fueling up to go back out again.



Nancy knew, as her parents knew before her, that to certain grocers—and certain friends who worked in those grocery stores—those rationing signs were simply that: just signs. And if you needed it, and you had a bullet proof excuse, the eggs were yours. The bottled water too. Even tortillas, freshly pressed, freshly packaged under a neon sign.

And when we got there it was true. I couldn't believe it was true. The generosity of my students and their families and their neighbors. The efficiency of the operation. The eggs, the bottled water, the neon sign.

There was a middle-aged woman in a red shirt feeding masa balls into an electric prensa machine with a kind of calm efficiency verging on zen. I remember standing in front of a stack of tortillas taller than my head and watching her. Her face tired and red but not slack. Rheumy eyes one might mistake for sun-worn. I remember I picked up a stack and gave her this nod like, thanks. And she cut me this glance like, I'm busy. And I remember thinking I'd never seen so much abundance. Especially not in a neighborhood so recently devastated. I mean actually in the process of being devastated. And I remember that I couldn't believe she was still working as we just walked around in there, like everyone else was just walking around in there, looking at the stuff. Starving but sated by the sight of so much abundance. And calmed by the fact that you could grab it. And you could leave with it. And in knowing she, like everyone else working there that evening, was there too even as her home might be flooding, her creating some sense of normalcy for all us schmucks who could actually never repay her.

Of course, the circumstances between Harvey and Harlem are different, but the fault lines exposed by those events are not. Concerning Houston, we know now that while the storm largely affected everyone, the poorest (including many people of color) are still the ones left in the shelters. While FEMA assistance is available for those who had the means to own a home, those who

didn't now face the bare-knuckles market that is the newfangled housing shortage. While the financial center of downtown Houston largely avoided catastrophic flooding, unscrupulous land speculators exploited poor brown and black Houstonians who couldn't afford not to live in floodplains, especially (like my cousin, Carlos) in the vicinity of the Addicks and Barker reservoirs. While documented people had the option of fleeing Harvey or sticking it out at home, undocumented people were either corralled as they tried to evacuate or were otherwise left to their own devices for fear of Border Patrol who maintained a presence near area shelters.

The connective tissue I think my students were trying to articulate between Harvey and Harlem goes beyond just the surface of that image. It goes as deep as what that image represents: a riot as a communal expression of frustration with white control over the black body (and by extension black dignity) through systems of oppression, financial and otherwise.

In Notes of a Native Son, the Harlem riots can be read as the black body asserting its dignity over white capitalism. The catalyst for the riot is the murder of a black soldier by a white policeman. It's no accident that in the essay, white-owned business are primarily targeted. That obscene amount of wealth in the face of poverty is targeted. The financial order of white landlord/white business owner leeching off the black community is overturned.

Echoes of that frustration ring out in the classroom as we discuss it. And then we get off on another discussion with Harvey in the backs of our minds: Why were homes ever built and sold in those flood plains to begin with? Which banks, businesses, or people owned that land before? Why is flood insurance so expensive? Why was the financial center of downtown designed not to flood, but the rest of the city wasn't? Why do the reservoirs empty out into the poorest parts of town? How can that much community wealth be wiped out in a matter of days? But more importantly, who were the people who profited?

In these questions we're talking about Baldwin, but of course we're talking about ourselves, about dignity. Latinx dignity specifically. And as my students vent, it suddenly dawns on me: that climate change is a social justice issue too. Harvey alone dumped



33 trillion gallons of water over Houston, enough to cover the entire state of Arizona in one foot of water. And yet there are still those invested in denying that climate change is real. But why? How?

While at once we're raging against the systems that made our communities vulnerable to the storm, we must acknowledge that climate change denial is systematic in the way it strips dignity from vulnerable communities of color not financially equipped to deal with the fallout of those superstorms. And occasionally, even among climate change believers, the rhetoric of oppression is used to place blame on communities of color for simply being (read existing) in the path of destruction.

When a superstorm hits, news anchors, pundits, and analysts of various stripes go on the scene with their spotless LL Bean boots and cable news TV slickers to ask—in so many words—*What did you do that this happened to you?*

At first, the questions are familiar: *Why did you buy here? Why not evacuate? Are you going to hunker down? And then they become weaponized: Do you not bear any responsibility for your family's safety? Do you know [are you too dumb to know] that this storm will kill you? How do you think your family feels about that?*

In that way it's easier to say, they brought it on themselves. They deserved it. Which comes from the same place in the heart as denying service (as Baldwin writes about) or denying someone their dignity. An all too convenient diffusion of responsibility too for climate change deniers—this is a socioeconomic/race/class problem, not a climate change problem. Those red herrings conveniently detract from the truth.

Linking back to wealth, it's obvious but it should be said that energy companies have the most to profit from denial. Historically that's been the truth. But also, there are systems that have historically contributed to and sometimes benefited from the fault lines exposed in the wake of Harvey. With recovery efforts run by energy czars already underway, it seems as though there's an inferred emphasis on the recovery of the energy system which is, in effect, an emphasis on the preservation of white wealth tied up in that system. While Marvin Odum, the former Shell Oil president appointed by Mayor Turner to be Chief Recovery Officer,

has boasted of the \$1.17 billion brought into Houston for federal disaster relief for those affected by Harvey, we also know that that number is only a fraction of the proposed \$10 billion (requested from FEMA) that Houston is considering using to build, "...a coastal barrier of dunes and gates to provide storm-surge protection for the region's vulnerable oil refineries and shipping channel." And as the Odum and his chief of staff, Niel Golightly (also on loan from Shell Oil), phase out of their roles with the city (Odum stepped down from his role as Recovery Czar in November of 2018) there is no doubt that their visions and plans for the recovery are well in place as the city heads into the execution phase of those plans.



I think the images of Harlem and Houston are more interlinked than not. Two different catalysts, but one similar struggle for dignity. And I think it's worth it to ask how brown and black dignities are being considered in light of climate change. It's time we start thinking, too, about climate change's systematic denial and what those who deny its existence have to gain.

Once the rain passed and the bayous fell and the Arkema chemical plant burned itself dry, it seemed (in the aftermath of the storm), like all anyone could talk about was opening doors. People returning home to survey the damage, to piece together what remained of their lives. And steadily, those disaster-porn-freak-show kinds of stories (news crews waiting in the wings) started pouring in to catch heartbreak in action. And I think we were supposed to feel sorry and shocked, but I felt anger before I felt any of those things--anger at the fact that those people, those victims, were being exploited twice. Once by the storm, and once by the cameras that used them as bait.

In the aftermath of Harvey, it seemed the impulse to follow someone into their flooded home--to capture their very private heartbreak on camera--came from the same place in the heart as blaming them for their misfortune. It was, I believe, where #HoustonStrong came from too-- all just ways of looking away, deflecting blame, compartmentalizing a collective trauma in order to compel an entire group of victims to survive, or not. If you are



not Houston Strong then what are you? The answer to that question is arguably a problem for a city that desperately needed to deflect blame, that desperately needed to squash any semblance of victimhood and replace it with pride. You survived this, look at you feels so much better than '*What happened to me? And why did this happen to me? And who is responsible for this happening to me?*' Questions that might unravel an entire city or its government or its government's legitimacy.

To wrap your mind around the absurdism of it all, I think it's easy to think of other major historical disasters in other major cities and see if they still ring true: #DresdenStrong #ChernobylStrong. You get the idea.

Anyway, suffice it to say that after the anger subsided I did feel that shock, my heart breaking for other people returning to their lives, opening their doors. I'm ashamed to say my heart broke a little less for Carlos. Maybe because being my first cousin he is part me, something nearing half. And would you treat anyone nearly as bad as you might treat yourself? As for me, family is always a close second. Deep down, I'm suspicious they'll always be able to handle it. Call it pride or whatever. The defensive, insulating kind of pride that veers away from victimhood (or reacts to it). But also a kind of pride deeper in the blood like the suspicion that neither Carlos nor I could cry any tear our father's and mothers haven't cried before.

How much had our families sacrificed to come to Texas from Mexico? And here we were in Texas ruin. Wrecked but alive. And even amidst ruin, who is to say our 'buelito wouldn't claim even this patch of Texas as his own and be satisfied just to live in it? In the blood I know his own hopes were deeper than just getting by, but deeper in the blood I also know he might have bought and worn a #HoustonStrong cap and worn it most days of the year.

I wasn't there when Carlos stood in front of his door but in my mind he doesn't pause a moment before going in. He just walks in, Kramer-style, and surveys the damage in private. Doesn't even think about his car around the corner that's mostly flooded. Or the weird disk of kombucha bacteria that he keeps in a tank to make kombucha tea (still there in the tank on the floor but the tea long gone). In my mind, he just moves around the soggy room, the smell

of mildew or mold in the air, and tries to put the furniture back where he put it before he evacuated--all of his guitars stacked high by the roof. His most valued and prized possessions worth tens of thousands of dollars.

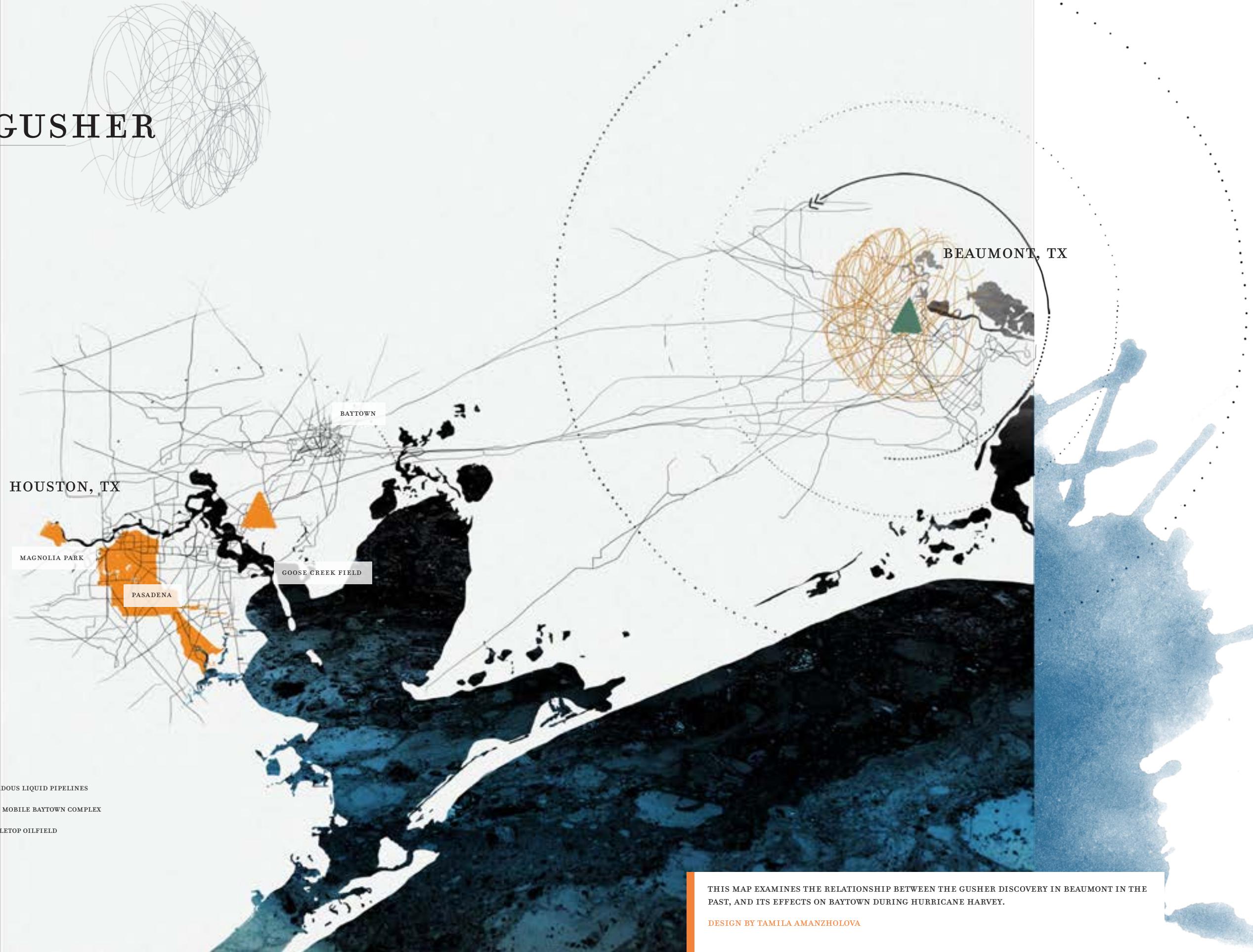
To his amazement, the water carried them up and out into the house before laying them down gently but completely destroyed. The wood on his classical is not perforated or even warped yet, but the tension of the strings has ripped the glued-on bridge away from the body. The white powder of sheetrock dusts the black case. On the complete opposite side of his apartment, Carlos's vintage, out-of-production rosewood Ibanez Musician, an electric guitar which used to belong to his father, my uncle, rests with the case open. There are pieces missing from it and the steel saddle is scarred with grime and patina.

The guitar is from the 80's but in my mind it might as well be as old as my family itself. That Ibanez had been there for every Christmas and every New Year's in San Antonio since forever, plugged into a staticky amplifier first and then, in our teenage years, filtered through a cheap fuzz pedal to mask the crackling and pings that eventually got us relegated to the porch in the dead of winter where the adults would drink with red eyes and someone's weird boyfriend would smoke alone and we'd play Metallica too long and our Texas heroes too--Stevie Ray Vaughan and Erick Johnson. Maybe a lick or two. Carlos could play the songs in their entirety. Talented in that way, even at twelve years old. He could play anything. He'd show up to contests. Win more guitars. He'd bring them over. He'd let our uncle Mario play La Bamba on them after Uncle Mario asked if we had girlfriends and say, "Watch this." And it was always the same La Bamba and we had to be like cool. And then he'd do it again come Thanksgiving. Or my 'buelito's birthday. Or his funeral. And then the Christmas after that. New Year's after that. Mother's day. My wedding day. That guitar just clanging away the years like it might never stop.



An earlier version of this essay appeared at Ploughshares on September 25, 2017.

GUSHER



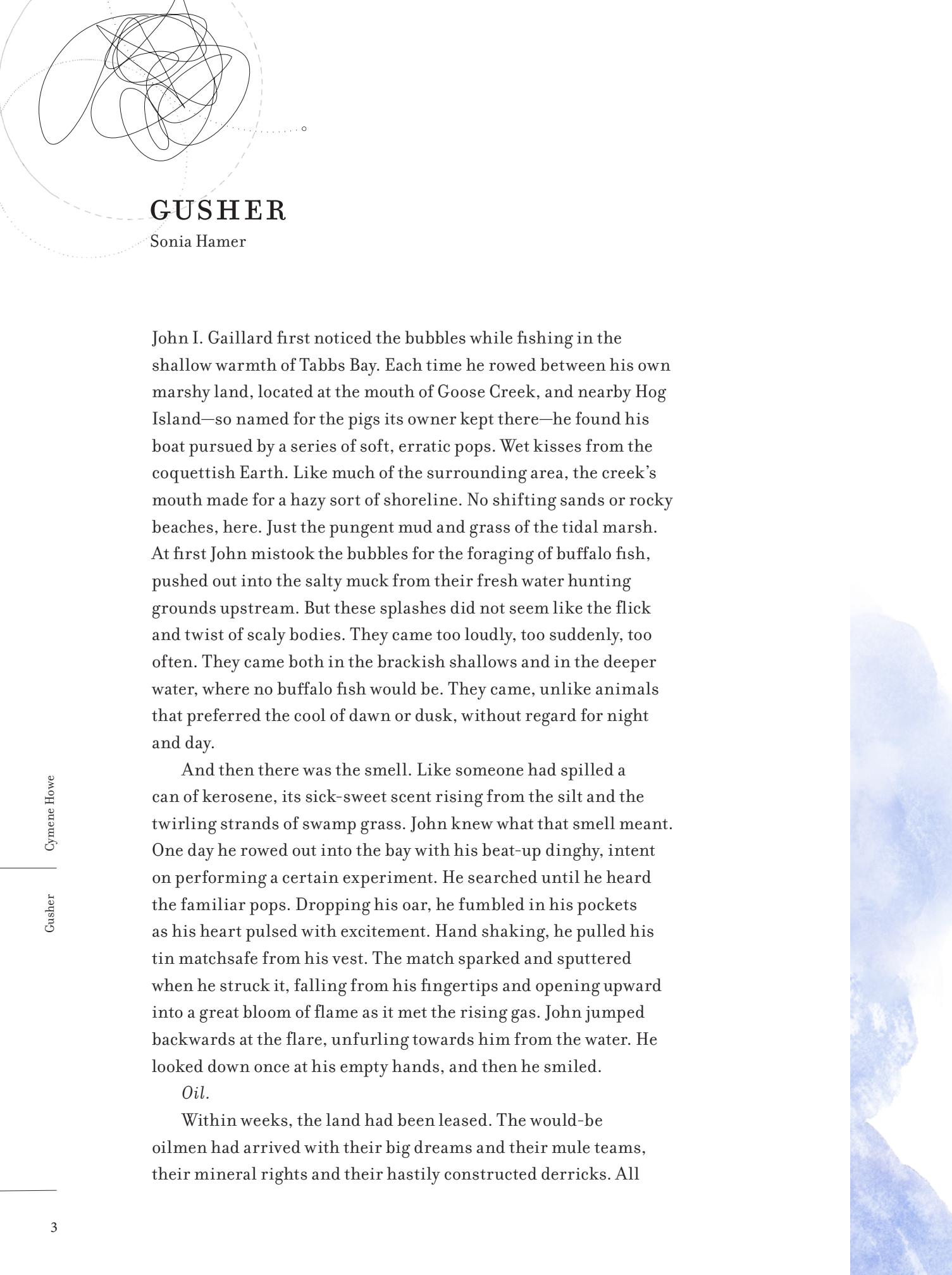
HAZARDOUS LIQUID PIPELINES

EXXON MOBILE BAYTOWN COMPLEX

SPINDLETOP OILFIELD

THIS MAP EXAMINES THE RELATIONSHIP BETWEEN THE GUSHER DISCOVERY IN BEAUMONT IN THE PAST, AND ITS EFFECTS ON BAYTOWN DURING HURRICANE HARVEY.

DESIGN BY TAMILA AMANZHOLOVA



GUSHER

Sonia Hamer

John I. Gaillard first noticed the bubbles while fishing in the shallow warmth of Tabbs Bay. Each time he rowed between his own marshy land, located at the mouth of Goose Creek, and nearby Hog Island—so named for the pigs its owner kept there—he found his boat pursued by a series of soft, erratic pops. Wet kisses from the coquettish Earth. Like much of the surrounding area, the creek's mouth made for a hazy sort of shoreline. No shifting sands or rocky beaches, here. Just the pungent mud and grass of the tidal marsh. At first John mistook the bubbles for the foraging of buffalo fish, pushed out into the salty muck from their fresh water hunting grounds upstream. But these splashes did not seem like the flick and twist of scaly bodies. They came too loudly, too suddenly, too often. They came both in the brackish shallows and in the deeper water, where no buffalo fish would be. They came, unlike animals that preferred the cool of dawn or dusk, without regard for night and day.

And then there was the smell. Like someone had spilled a can of kerosene, its sick-sweet scent rising from the silt and the twirling strands of swamp grass. John knew what that smell meant. One day he rowed out into the bay with his beat-up dinghy, intent on performing a certain experiment. He searched until he heard the familiar pops. Dropping his oar, he fumbled in his pockets as his heart pulsed with excitement. Hand shaking, he pulled his tin matchsafe from his vest. The match sparked and sputtered when he struck it, falling from his fingertips and opening upward into a great bloom of flame as it met the rising gas. John jumped backwards at the flare, unfurling towards him from the water. He looked down once at his empty hands, and then he smiled.

Oil.

Within weeks, the land had been leased. The would-be oilmen had arrived with their big dreams and their mule teams, their mineral rights and their hastily constructed derricks. All

The rule of first capture governed their frenzy: whoever scooped up the oil first *kept it.*

along the eastern edge of Tabbs Bay, they surveyed, drilled, and dredged. They tramped through wetlands and exploded bedrock and produced pile after pile of pulverized sand. To no avail.

Dry wells and a few sluggish barrels were all their hopeful hustle brought them. Gaillard discovered the promise of surface methane bubbles in 1903, but it would be another thirteen years before Goose Creek got its first honest-to-goodness gusher.¹ An American Petroleum contractor named Charles Mitchell brought in the well on August 23, 1916. His team drilled for 2,000 feet before they hit the pocket, boring down through an existing well known as Gaillard No. 1. When the team struck, oil erupted from the end of the pipe. It spewed in black, viscous sheets and blanketed the men, the machines, the rolling water and the marsh. From the ground, it boiled up and came rushing, rushing into the world. The men cheered. The oil poured. There would be no putting it back.

I mention the story of Goose Creek's first gusher for a reason. The spirit of that strike presses forward into the present day, spilling over into the complicated aftermath of contemporary disasters. Because, just over a hundred years after that scene around Gaillard No. 1, on August 26, 2017, Hurricane Harvey made landfall in Rockport, Texas. From Rockport the storm swept east, flooding the coast from Corpus Christi to Port Arthur, inundating the flaring heart of the petroleum industry that had grown up along the Gulf. Though the days of the gusher had long faded, the oil strikes of old had left their mark on the region. After the strike at Goose Creek a new wave of hopeful wildcatters poured into the area. The rule of first capture governed their frenzy: whoever scooped up the oil first kept it. Consequently, productive oil fields became battle grounds, the sites of dramatic races to pump as much oil as rapidly as possible, efficiency and safety be damned.² Local newspapers covered the chaos at Goose Creek, describing tent cities, bustling streets, bar fights and legal disputes. In Pelly, one of the towns closest to the field, a make-shift restaurant sprang

up, built in a burned down cottage with tables housed by the open sky. And everywhere, blankets of oil draped across the plants, the animals, the water. Trees drip with petroleum, the Houston Post proclaimed. And their leaves glisten in greasy splendor. When all that oil finally dried up, a ready infrastructure of refineries, ports, and pipelines was left behind. Harvey tore through that spreading industrial web. Its waters breached containers and shut down security measures. In the storm's wake, contaminated water washed across parks, schools, neighborhoods. Most of them poor, many of them overwhelmingly black and brown. Oil refineries don't loom over luxury urban lofts or master-planned communities. Above the water, volatile organic chemicals billowed into the atmosphere, released by downed air scrubbers and burst pipelines. Watersheds, airsheds, picked up these contaminants and sent them percolating out into the world.

And, not far from the spot where Mitchell and his men stood watching oil spew into the air, another gusher appeared. Water damage to Exxon Mobile's Baytown complex, the largest integrated refinery and petrochemical plant in the United States, released a torrent of almost half a billion gallons of industrial wastewater. Elsewhere in the complex, floating roof tanks used for the storage of various products failed, releasing toxic benzene, butadiene, and vinyl chloride into the air. The story begun at the confluence of Tabbs Bay and Goose Creek with oil blanketing a marshy field came to its fruition as petroleum byproducts poured into the boiling waters of an unprecedented storm.

The sun had yet to rise when it came time to take the boats out, to carry them from the shipping container where we stored them down towards the unkempt bayou and the undergrowth-choked protrusions of industry. Most mornings the squelching, water-logged ground would rise up to encase our feet as we picked our way towards the makeshift dock, causing us to stumble and sway beneath the unwieldy shells. The mud usually stank of rich decay, a smell that mingled, depending on the way the wind was blowing, with the fumes of the nearby refineries. And each time we lowered our boats into the water a parade of soggy trash—diapers, plastic bags, a deflated soccer ball—salute our struggle as it floated past.

That was years ago, before the storm. I don't remember why I joined the rowing team, now. Not really. Whatever it was, I couldn't have been very committed; I quit after just one semester of early morning practices and predawn drives across the city. We practiced on a bendy bit of Buffalo Bayou, past downtown but before the Ship Channel, where the water flows between Denver Harbor and the Second Ward. Nineteen years I'd lived in Houston, and the first time I'd seen that portion of it was at five in the morning, gearing up to steer a \$10,000 piece of aluminum past the dormant warehouses and steel mills. There were other people from Houston on the team, too, including our coach. None of them knew much about the neighborhood we were practicing in, either, let alone the people that lived in it. If we'd thought about it, we likely would have called ourselves visitors. Get in, get out. By seven each morning, we'd be gone.

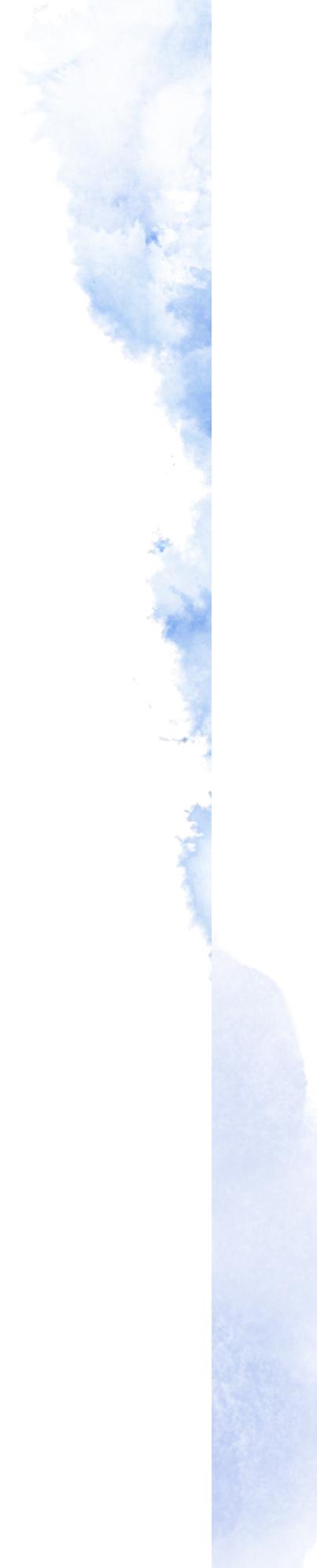
I try not to make a secret of the fact that I grew up in the suburbs. That I lived behind the hedges at Rice for four years; that I continue to benefit from things I didn't earn. When I say I'm from Houston, what I should really say is that there are a lot of Houstons. I come from one of them. And, at nineteen, coasting along that bayou, I still thought of my Houston as separate, somehow, from the other ones. Walled off, protected. Elevated. I could feel guilt about the difference, sure. But it wasn't like that guilt drove me to do anything. I just wanted off the hook. Those people weren't me, after all. Those problems weren't mine.

And then we met Harvey. He came through and our city wound up underwater, on the news. Eventually, the water receded, replaced by a rising tide of information. Breaking reports and exposés chronicled the inequity and insufficient accountability witnessed during the flood and its aftermath.³ These findings confirmed a reality I'd slowly been learning about on my own. Working on clean up and distribution in the wake of the storm, it wasn't difficult to see what direction the aid flowed in. Where government money and local resources went. As more data emerged regarding the exposure to toxic materials during and after the storm, it also became apparent who bore the brunt of Houston's flooded industrial core.

But there's another element in this equation, the part I refused to think about at nineteen, floating down the bayou. Inequality isn't random. It's part of a system, one that relies on extracting profits meant for some and pawning off the costs on others. The illusion of separation disguises that relationship, to the benefit of those reaping the advantages. It encourages them to believe in their own fictions: that they are safe, that they are protected. That they themselves are not implicated in the hardship of others.⁴ Harvey swept away those fictions. The storm illuminated the city's interconnectedness, put a spotlight on the way we all link together in a diffuse, delicate web. What happens in one part of the city has repercussions elsewhere.⁵ When rain falls in the west, it flows downstream. Out of the bayous and the drainage ditches, into the streets. Rushing and rushing until, eventually, it reaches the sea.

The bayou my teammates and I rowed on unites the two sides of the city, flowing from west to east. A slow, silty ribbon, Buffalo Bayou begins as spring water and surface runoff in the prairies and subdivisions surrounding Katy (this includes rainfall collected in the infamous Addicks and Barker reservoirs). Then it winds its way towards downtown Houston, meeting up with several tributaries along the way.⁶ After joining with White Oak east of downtown, the bayou starts to swell. But water isn't the only thing that accumulates in the east. As the river widens and deepens, various industrial enterprises start to crowd along its banks. The Port of Houston begins where Brays disappears into Buffalo Bayou, just inside the east loop. Technically speaking, the port is twenty-five miles of ship berths, cargo terminals, and assorted private enterprises—refineries, chemical plants, shipping companies—that stretch along the Ship Channel and into Galveston Bay.

If water and industrial development flow east, then money flows in the opposite direction. It's no secret that energy built the city; in Houston, most pipelines lead to oil. Every sector of our economy owes something to its thick, viscous lifeblood. People flocked to the city for decades after the oil strikes of the early 20th century, fueling almost eighty years of explosive growth. Even today, thirty years after the economic diversification spurred by oil bust of the 1980s, 175,000 Houston-based employees working



directly in production, oil services and machinery and fabricated metals, and tens of thousands more serve as suppliers or contractors.⁷ In 2016, Houston alone provided about 40% of the country's base petrochemical capacity.⁸ Housing boomed because of oil, as did everything from commercial construction to banking to retail. The LBJ Space Center came to Houston in part because of a deal negotiated between the then-vice president and Ross S. Sterling, Humble Oil's founder. The Texas Medical Center was built with money donated by industry leaders. Universities, museums, and nonprofits across the city all benefit enormously from the energy sector's philanthropy.

But all of this wealth has not been shared equally. The people that live the closest to Houston's industries—the people that provided the labor power for all of this profit—bear the most and benefit the least. The vast majority of Houston's oil wealth does not go to those working in the refineries. Rather, it goes to the executives living on the western side of the city. Oil's profit flows uphill, with just a minute fraction left behind to maintain the human labor force supporting the city's industrial base. And as automation increases, fewer and fewer of the city's oil jobs are industrial. With the cost of labor thus reduced and wages depressed, the gap stands to widen even farther.

Disproportionate paychecks don't constitute the only disparity of risk and reward, though. In a recent study published in PNAS, for instance, researchers specializing in civil engineering established that on average, black and Hispanic minorities bear a disproportionate burden from the air pollution caused mainly by non-Hispanic whites. According to the study's metrics, majority white populations experience 17% less air pollution exposure than is caused by their consumption, while majority Black and Latino populations experience 56 to 63% more.

The roots of that disparity reach deep into our shared history. When I slipped down Buffalo Bayou with my teammates, we might as well have been rowing through the pulsing arteries of Houston's checkered past. After oil began to flow along the coast, refineries bloomed beside the deep clearances of the Ship Channel, just inland enough to shelter them from the capricious storms of the

*...inequality
calcified.*

Gulf. Consequently, the eastside's population began to swell. Mexican immigrants fleeing the turmoil of the Revolution and Tejanos drawn from rural parts of the state to the west and south began moving to the Second Ward and Magnolia Park. Whites from East Texas and Louisiana began settling in Deer Park, Pasadena, and Baytown, while their Black counterparts came to the Fifth Ward. Creoles of color from southeastern Louisiana settled there as well, forming their own enclave in the area still known as Frenchtown. Regardless of their race, most of these new migrants were drawn to the eastside by its proximity to work. But the tidy divisions of the final arrangement didn't happen by accident. The Houston they settled in was a Houston divided by de jure and de facto color lines. Legally speaking, the city was divided into Black and White, contributing to the development of nearly autonomous Black enclaves in each section of the city, the eastside nonexcluded. Meanwhile, Anglo discrimination against ethnic Mexicans—considered White in the eyes of the law, though the communities themselves had identities rooted in histories of acknowledged racial admixture—ensured that yet another spatial separation emerged.

Both private and government-sanctioned forces maintained these divisions; violence committed both by officers of the law and private individuals was backed by the systemic denial of resources to certain parts of the city. White-dominated local government starved non-White areas of funds for education, development,

and infrastructure. White-controlled industries ensured that young White employees had greater economic mobility than their non-White counterparts.⁹ While many individuals flourished despite such rampant and pervasive discrimination, on

the systemic scale the violence did its work: inequality calcified.¹⁰ Today, in addition to living on less than half of the income of their fellow Houstonians the residents of many communities on the eastside face ambient concentrations of 7 separate pollutants at levels that pose a definite health risk. None of the East Houston census tracts have fewer than 3 pollutants in the highest risk



category. Almost 90 percent of the census tracts located here have four or more pollutants present. 'Definite risk pollutants' include diesel particulate matter, carcinogenic 1,3 butadiene, chromium IV, benzene, chlorine, and formaldehyde.¹¹ With a few exceptions (Deer Park, as well as portions of La Porte and Baytown), much of the population in these communities self-identified as Latino or African American on the 2010 census.¹²

| Do we allow the injustice to continue? |

So, while the mass migrations of the 20th century ensured a steady supply of cheap labor to keep profits on the rise, systemic discrimination meant that oil would lose only a fraction of this growing work force to brighter economic horizons. It's no coincidence, then, that in the local politics of the early twentieth century, supporters of segregation joined forces with industry under the banner of states' rights.¹³ Free from federal intervention, de jure segregation could continue, and industry could thrive under a system of self-regulation. For sixty years, refineries and other industrial enterprises polluted the communities around them virtually unchecked by anything except their own profit margins. From the original oil strikes to the post-WWII petroleum boom to the uphill Civil Rights battles of 1960s, local policies ensured a system of profitable inequality that persists into the present day. Time has passed, regulation has been strengthened, and industry technology has improved, but the overall dynamics of injustice have changed little. Local enforcement of regulation has often been lackluster. Over the years the city has allowed industry to build leak-prone storage vats, animal-feed factories, and metal shredding facilities with little regard for the comfort of safety of the surrounding community. Often, even when regulations are enforced, businesses find that penalties are cheaper than the cost of compliance. We've witnessed the truth of that calculation countless times, over the years. Harvey isn't the first example; it's not even the most recent. But no matter how many times we learn something (or no matter how many times we ignore it) there always remains a choice.¹⁴ Do we allow the injustice to continue? Or do we take measures,

however small, to confront it? Do we let the knowledge crush us? Or do we stand up and try our best to make our world a better place?¹⁵

Most days, our coach would have us row until just past sunrise. The swell of the approaching light provided a longer rhythm, one long beat to encase the frantic chopping of our oars. When dawn broke over the bayou, the smog-laden air would scatter the orange embers of daybreak deep into the fading violet of the night. Sometimes we'd cheer to see it; if we could witness that chemically-enhanced sunrise from the boat, it meant we were rowing west, against the current. It meant practice would soon be over, that we'd dock and make our way home. That soon enough, we'd turn our backs on the people and the places once again illuminated by that daybreak's spreading light.

I doubt, when John Gaillard dropped his match, that his thoughts were of destruction. Just opportunity. Likewise, I don't think Mitchell wanted to unleash anything more than oil, wealth, progress. Those that raced to Baytown, the Ship Channel, the eastside, the west—none of them were supremely good or supremely evil. Accretion has no individual culprit. We're all a part of something larger.

But none of that changes the unequal reality of our most recent hurricane, or the inequality that has persisted and widened in its wake. Because as oily water poured into the Channel beside Baytown, more damage was erupting upstream. Waves of runaway oil spilled across Galena Park. A chemical plant in Crosby exploded. Valero's major refinery, located between Manchester/Harrisburg and the southern bank of Buffalo Bayou, released clouds of carcinogenic benzene. Entanglement Technologies, monitoring on behalf of the Environmental Defense Fund and Air Alliance Houston, recorded benzene levels of about 324 parts per million in nearby neighborhoods.¹⁶ Wrath of nature aside, we cannot ignore the reasons that certain communities are exposed to these risks in the first place. That some of their members watch



chemical vats steam from their porches and refineries flare from their backyards. None of this is an accident; rather, our nation has been built so that certain groups of people succeed while the price is paid by others.¹⁷ The hardships faced by these communities have arisen and ossified so that elsewhere others can have their oil and drink it, too. So that they can dance in the gusher without worrying about the acid aftertaste of the rain.

These barriers and these bulwarks, however, do not last forever. When the rain falls fast enough, when the water rises far enough, the bayou bursts its banks. It spreads in all directions. And when that happens, the storm itself doesn't care what side of the city you live on. Working to combat these inequalities is not an act of pity or magnanimity for those on the 'winning' side of them. Rather, it is an act of survival. We've drilled this hole together; when it fills with water, we'll drown together, too. No one will be saved by standing on another's head.

Recently, I paid a visit to Hog Island. Exxon-Mobil owns it, now—Gaillard bought the land from its original owner for \$2000, then turned around and sold it to Humble Oil for \$300,000. Over the years the island has hosted a boarding house, a ferry landing, a landfill. It's served as a hideaway and a lover's lane. Now, though, without a link to the mainland the island stands abandoned. Subsidence has caused a portion of the island to sink beneath sea level, allowing the surrounding water to rush in a split the island in two.¹⁸ Despite the numerous 'No Trespassing' signs, intrepid boaters and kayakers still venture out to the island from the nearby shore, carrying on the spirit of John Gaillard. Clad in sunscreen and floppy hats, they paddle down Goose Creek—beneath the abandoned railroad bridge painted with the words 'Live to Inspire—and make their way across Tabbs Bay to beach their bright, plastic boats on the island's eastern shore. Sometimes, too, local historians lead tours out to a cluster of ruins on the northern tip of the island, remnants of a nineteenth century ferry crossing. After Harvey, I'm told, the island was just a mass of muddy, debris laden scar tissue. The ground was so moist that one feared it might merge with the surrounding water, get swept down the Channel and out into the Gulf. But the island has been cleaned up, since then.

Much of the grass has grown back, although bare spots remain where stunted trees once grew. Depending on which side of the island you stand on, you can see the spires of the Fred Hartman Bridge, the suspended bit of Highway 146 that allows motorists to cross between La Porte and Baytown. It's a big, yellow, cable-stayed bridge that rocks when the wind picks up. If you squint, perhaps, you can see ExxonMobil's complex beyond it, off to the north beside Mitchell Bay. Beyond the bridge, the vats and silos of industry spread out on both sides of the Channel: a shining, distant network of humming pipes, scaffolded spires, and dancing flares that shine through the daylight and into the night. When the sun sets, here, the refineries spread out like a city of stars, their lights and little fires reflecting on the water in as if compensation for the occluded sky.

FOOTNOTES

1. Crafting any narrative necessitates a blend of fact and useful simplification, and I am forced to admit that this essay is no exception. That does not mean, however, that I think facts should be subjugated to story; on the contrary, facts are enormously important to me—perhaps even more so because ‘fact’ as it has been normatively defined in certain times and places has been used as a tool for oppression. I’ve done my best to base this essay on fact, but the epistemological limits of that designation must also be acknowledged, if not applied or reckoned with. This particular quote comes from the January 16, 1917 edition of the Houston post, which I accessed through an online archive devoted to Texas history. My version of Gaillard’s discovery is semi-fictionalized for effect, and draws its historical basis both from articles in the same paper and an account found in the book *Baytown Vignettes: One Hundred and Fifty Years in the History of a Gulf Coast Community*, as well as an MA thesis by one Olga Haenel, *A Social History of Baytown, Texas*.
2. On a similar note, much of my information on the business and environmental history of the Houston comes from an article by Joseph Pratt, “A Mixed Blessing: Energy, Economic Growth, and Houston’s Environment,” found in the volume *Energy Metropolis: An Environmental History of Houston and The Gulf Coast*. I also consulted Henrietta Larson and Kenneth Porter’s *History of Humble Oil and Refining Company* and Thomas Thompson’s *Great Oil Fields of the Gulf Coast*.
3. Meanwhile, the facts of these various inequalities have been investigated in stories from various media outlets, including the Houston Chronicle’s *Silent Spills* and NPR’s *Code Switch*. Academically supported projects like Rice University’s Harvey Registry and
4. That’s not to say there aren’t degrees of culpability. Or that most people are not, in one way or another, implicated in the inequalities of the current system. If you participate, likely you are contributing to someone else’s suffering. When you are a part of an economic, social, and political system that operates locally, regionally, and globally, complicity is inescapable. But neither is that inescapable entanglement an excuse for apathy. The perfect, after all, is the enemy of the good.
5. Though I am focusing on local interconnectedness for the purpose of this essay, the same patterns hold on regional and global scales,

as well. As the authors of the UN's famous 2018 report note, the effects of climate change will be most drastically felt by the regions of the globe that consume the least. Likewise, the same organization's 2019 report on climate change in the Arctic region is pointedly titled Global Linkages. While greenhouse gas (GHG) emissions and pollution from global activities mainly originate outside the region, the authors of the report state, they are causing wide-ranging changes and impacts on the Arctic environment. These changes will, in turn, affect the health of the planet as a whole. Glacial melt impacts both sea level and the circulation of global currents, two issues near and dear to Houston's heart. Climate models predict, for example, that the freshening and warming of the Arctic Ocean will contribute to the weakening of deep, cold water currents like the Gulf Stream. Weakened cold water circulation combined with warming temperatures caused both by human emissions and large releases of carbon compounds from melting Arctic permafrost will likewise lead to stronger and more intense hurricanes.

6. The course of the waterway is fairly circuitous, although in places various generations of human engineers have straightened, paved, and otherwise altered its course. The straight lines and concrete banks of Buffalo, Brays, and White Oak Bayous are in large part the legacy of the mid-20th centuries philosophy on flood control: if we can shape the water's course, then during heavy rains we can direct the rising tide. The irony is that in the present day, with Houston's floodplains increasingly covered in concrete and more water being diverted to the bayous, these early flood control measures actually worsen flash flooding by eliminating natural bulwarks against heavy rainfall.
7. From Bill Gilmer in a 2018 article published by Forbes, "Proximity Counts: How Houston Dominates the Oil Industry."
8. This figure comes from the Texas Economic Development Corporation.
9. That's just to say that in a system which offers greater support and opportunity to people with lighter skin and whiter names, class mobility becomes easier for poor Whites than their counterparts of color. I don't intend to undermine the accomplishments and hard work of all individuals that are both White and working class—money makes our world go round; having or not having it can have a huge impact on one's life. I'm not even saying that Whiteness in some way guarantees success. Merely that, in a system of White supremacy, the dominant

conception of 'Whiteness' promises success. For many that promise is a broken one, much along the lines of (or perhaps indistinguishable from) the much-vaunted American Dream. That being said, the origins of the promise (as well as who must bear the anger of its unfulfillment) is worth questioning. Class and racial inequality are entangled systems. Pitting them against one another might prove convenient for those benefitting from both structures, but that opposition is not, strictly speaking, true.

10. And not just individuals; each community I've mentioned had its own distinctive, vibrant life that flourished in the face of hardship. *Houston Bound* by Tyinia Steptoe provides much of the history I can't include here. Projects like the Emancipation Economic Development Council's revived Houston Redd Book, Marc Newsom's *I Heart Third Ward*, and Tracy Hick's *Third Ward Archive* also work to document the people and places that make up those stories, both on the eastside and elsewhere in the city. I don't include much here partially because I don't believe those stories are mine to tell and partially because I don't want to risk using the things people built overwhelming odds as an excuse to gloss over the forces they were working against.
11. Quote and figures from a 2006 report by a mayoral task force, "A Closer Look at Air Pollution in Houston: Identifying Priority Health Risks."
12. Census data, it should be noted, is not the best method for measuring the demographic makeup of a given area. Partially because a government-administered head count does not tend to yield an accurate count of individuals that, for various reasons, have little trust for federal officials and partially because, at this point in time, the 2010 census is nearly ten years out of date. And in one of the nation's fastest growing metropolitan areas, ten years is a long time.
13. Another fact of our local history found in Pratt's *Energy Metropolis* piece.
14. Despite the Marxist framework I employ in this essay, I'm also a big (and possibly naïve) believer in both personal and group agency. We make choices every day; all we can do is try to ensure that some of those choices make our world a marginally better place. Many groups are working to combat climate change and environmental inequality in the Houston area, among them T.E.J.A.S., Environment Texas, Houston Air Alliance, One Breath Partnership, the Environmental Defense Fund, and more. All of them need community support.

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15. Part of what I'm advocating here, though I don't say it outright, is a different sort of thinking when it comes to how we decide what is and isn't worth doing. Thinking beyond the self includes considering the wellbeing of others in the present, of course. But it also means considering the well-being of those in the future. Thinking on the scale of generations might not come naturally to us (it certainly doesn't to me, but that could just be my youth) but it does provide hope and possibility where otherwise it might be easy to surrender to apathetic nihilism.
 16. According to EPA recommended guidelines, the maximum time-weighted average exposure limit is 1 part of benzene vapor per million parts of air (1 ppm) for an 8-hour workday and the maximum short-term exposure limit is 5 ppm for any 15-minute period. There is little independently reported information on these events; during the storm the Texas Commission on Environmental Quality left environmental monitoring to a handful of federal regulators and the industries themselves. What data is available has not been forthcoming for public access. And when it comes to enforcement, another responsibility of the TCEQ, response is lackluster as well. According to self-published industry data, of the 4,069 emission events across Texas in 2017, only 58—1.43%—received penalties from the Texas Commission on Environmental Quality. The most decisive local action on toxic releases, it is important to note, has not come from government agencies, but rather the legal victories of various NGOs. Exxon-Mobil, for example, only received an EPA mandate to reduce emissions in Texas and Louisiana after a judge ruled in favor of a joint suit brought against the company by Environment Texas and the Sierra Club.
 17. This reality inflects virtually every legal, social, and economic system in this country—to the point that wealthier, whiter parts of Houston received the majority of post-Harvey federal funding. Government aid after the storm actually exacerbated existing inequality. Those with means, helped along by plentiful emergency assistance, recovered, while elsewhere people continue to wrestle with the wake of the storm.
 18. According to Theron Garcia, Douglas Ming, and Lisa Tuck of the Clay Minerals Institute, this subsidence is likely related to the withdrawal of oil from the Goose Creek Field. The memory of the gusher writes itself upon the land.

- SHELTERS
- DOWNTOWN FLOOD

*we were prepared
for a storm
but not hurricane harvey*

ECCLESSIA
한국인
italiano
française

80% OF THE AREA'S RESIDENTS
LACKED FLOOD INSURANCE

45

يُجَرِّع
tagalog
espanol

"IF YOU SPOKE MANDARIN OR ARABIC, THEY
NEEDED YOU. IF YOU HAD ANY MEDICAL
TRAINING, THEY NEEDED YOU. OTHERWISE,
THE SITE HAD HIT CAPACITY FOR HELPERS."

MORE THAN 30,000 HOUSTONIANS
SOUGHT TEMPORARY SHELTER.

10

69

Louisiana St

Franklin St

Texas Ave

Main St

Leeland St

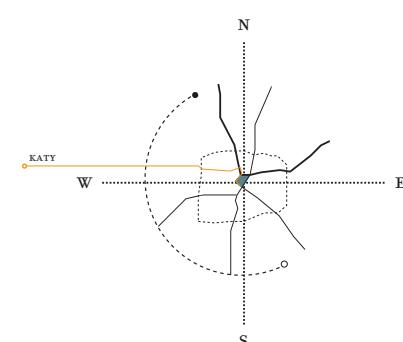
中文
한국어
deutsche

swahili

SALLY'S HOUSE
FOR WOMEN

GEORGE R. BROWN
CONVENTION CENTER
TOYOTA CENTER

HIGHER GROUND



IN DAYS FOLLOWING HARVEY, SHELTER LOCATIONS IN DOWNTOWN HOUSTON'S FLOOD AREAS
INCREASED STEADILY. WASHINGTON MAKES AN ATTEMPT TO VOLUNTEER AT A SHELTER, ONLY TO
DISCOVER THE SHELTERS ONLY NEEDED BILINGUAL SPEAKERS AND THOSE WITH MEDICAL TRAINING.

DESIGN BY MIRYOUNG KIM AND MANUEL VAZQUEZ

HIGHER GROUND

Bryan Washington

My parents stay on the west end of Houston. High ground. It's way out in the suburbs, just beyond the outer loop, and that's where I drove the night that Harvey breached Galveston's coast. I was still splitting time in Louisiana, and I'd spent that morning pacing my place by the Tremé, on the phone with my mom. She told me it probably wouldn't be that bad, and I agreed, because it probably wouldn't. Throughout their time in Fort Bend County, even at its worst, the rain hadn't been a tangible threat. So my mom told me to stay in New Orleans, or drive down, whatever was less of a hassle; and I told her I'd probably leave it alone, but I was headed west down I-10 thirty minutes later.

Harvey made landfall seconds after I hit Harris County. I know this because a guy on the radio told me. The local pop station asked everyone to pray. Our rap folks yelled the city's integral "hunker down." On NPR, our local station read from Matthew Salesses's *The Hundred Year Flood*, and when I opened our garage door, I was expecting to see my parents holding vigil over the television, or watching the sky from their back porch, but the alarm went off, waking the whole fucking block.

While I failed to disarm it, my dad shuffled over in PJs. Here was a man who prepared for everything three times over. He gave me a once-over and asked why I was here. They were sleeping. They were on high ground, he said, everything would be fine for them; and, for another half a day or so, it was.

Altogether, Harvey unloaded 51.88 inches of rain, the highest recorded total of any storm in the history of the States. Over a quarter of Harris County was submerged. That's around seventeen trillion gallons of water. That made August 27th—at 16.07 inches of rain—the wettest day ever recorded in Houston. For a sense of scale, if the amount of rain that fell throughout Harvey hit New Orleans during Katrina, pending the levee failure, that city would've been covered with over twelve stories of rain.

A good chunk of the storm's destruction was due to its speed—or the complete lack thereof: At two miles per hour, Harvey simply sat on top of the region. And it may have been materializing for a few weeks, but plenty of Houstonians only learned about Harvey a few days beforehand: It was the end of the month. Bills were due.

September's rent was looming. And in the face of the duds and false alarms that had preceded the storm, the prospect of picking up and leaving for San Antonio or Austin or wherever simply wasn't worth it for a lot of folks. Also, who'd ever heard of flooding on high ground?

Our sky literally fell.

So we got what you no doubt saw on one digital screen or another: thousands of folks in the Greater Houston area were rescued from their homes. More than 30,000 sought temporary shelter. Hundreds of thousands lost electricity. More than 80 percent of the area's residents lacked flood insurance. FEMA announced that something like 450,000 people would seek federal disaster aid, and 107 people were killed in Texas as a whole. If science is any indicator, these events in the Gulf will become anything but remarkable.

More than a few essayists and pundits broached the question of why Houstonians didn't prepare for a storm, but the question answers itself: We did. The city rallied for a coming storm, not the storm that came. The city's recent history with flooding ranged from the pedestrian to the catastrophic, but a Harvey hadn't happened before. And had there actually been an evacuation, considering that some areas saw nearly ten inches of rain in under two hours, we'd have created six killing lanes across multiple highways and feeder roads. There was simply no way of "preparing" for it—unless, of course, we'd all heeded the scientists and meteorologists and journalists ruing global warming's effect on our Gulf for years.

The first morning, it was sunny, until all of a sudden it wasn't. The rain wasn't torrential. But it just kept going. And going. And not stopping for shit. My parents and I huddled around some luke-warm coffee, watching the situation east of our neighborhood populate across three phones: Whole blocks were filling with water. The folks who could still wade through their yards carried trash bags

into pickups. We did our check-ins, and my mother toyed with the idea of driving to work at the hospital, since she still could. A guy I used to fool around with texted to ask if the rain had reached us, and another friend sent a picture of her porch in Meyerland, with the garden gnomes sunk in a knee-deep puddle.

That night, my dad drove my mom to a nearby hospital in our truck, and the world responded by dumping a ton of water on top of our house. By the next morning, the surrounding roads were largely unnavigable. Most of the folks who'd tried to bounce before morning ended up stranded by the feeder road, forced to park on islands in the street, before being ferried away by emergency vehicles. The reservoir by my parents' place (Barker) started to fill, gradually, until it finally bowled over, burying the first floors of the neighborhoods surrounding it. My father and I wandered the house, watching the news, and also our porch. I texted my people and answered the texts I could. We watched newscasters debate whether a stranded car onscreen was actually occupied, on a bridge, beneath rapidly rising water, or if the driver had simply left their lights on. Before the flood finally overtook it, some firemen extracted a dude from the truck's backseat.

It's mystifying to think about what you did when there was nothing you could do. I paced around the kitchen, simmering a shrimp broth I wouldn't sit down to eat. One friend reached from the Islands. Another reached out from his townhouse in Bellaire. One reached out from the Galleria, another from downtown; another hit me up from an emergency vehicle en route to a shelter; and the ex reached out from Busan, sending footage of Houston from abroad. At one point, a friend of mine living in New Orleans told me to move all of the photos from the bottom floor. He said the thing he'd most regretted in the last flood was losing the photos his parents brought from Vietnam. Shit you couldn't replace. Family members he'd never see again. All of that was gone.

When I told my dad about that, we blinked at each other. Our dresser was heavy, holding roost on the first floor. But we decided that if the water reached the porch we'd move everything, and an hour later we were carrying the chests and the rugs and the vases right up the stairs. Carried albums full of folks in my family that I

haven't spoken to in years. Carried our whole history up the stairs, laying it out on the floor. If you lined everything up, you'd see exactly how we ended up here.

The thing about a flood narrative—or any story whose occupants are ravaged by the earth—is that there's a tangible before and after, but also an invisible one. Sometimes, a country's facades—its supposed wealth in the face of poverty; its supposed goodness in the midst of neglect—are held to the light by the images on the screen, and, in that way, there are as many Harvey stories as there are folks who endured Harvey.

Honestly, though, most everyone in Houston has one hurricane story or another. If you're here for too long, you'll end up with a litany. During Hurricane Rita, my family packed ourselves in a car and made a failed attempt to escape to San Antonio. For Ike, we took shelter in a hospital bunker for two days, watching *My Neighbor Totoro* thanks to the generator.

For the Tax Day floods, I was on my way to see a boy when I took a turn underneath a bridge and capsized my car—the water was right in front of me; I just hadn't seen it, and then it was there. Reversing out of it was no issue, so I put my Corolla in park and sat on the concrete and watched the ripples. My brain knew the area had flooded, and it certainly looked like a flood, but there was a still a disconnect. Like, the place was just there. And I was just there. So for a while, I leaned against my trunk and smoked and waved other cars away from the underpass, but then it got dark, and no one had come to post any warning signage, and it was late, so I got back in my seat and turned myself around.

It rained for days during Harvey, but the water westward began to recede. East of the city, the rain kept a steady pace. The mayor imposed a curfew within the city, and Houstonians rallied when they could, and my dad and I watched the sky from the house, willing the clouds into something like complacency. Eventually, the roads cleared enough to drive to the hospital to get my mom. In her unit, one nurse had brought a tin of curry, and another had carried armfuls of Tupperware with steamed rice and nam prik. They'd spent the past few days holding down the fort, spooning four different continents' worth of food when they could. Back at home, my mom

Family members he'd never see again

asked why we'd moved the albums, and my dad and I shared a look.

Many folks are still rebuilding in the rubble. The city has moved on, because it has to, but not without leaving many residents behind.

That night, I drove downtown for no other reason than that I could: The highway headed eastward was mostly drivable, and the city was opening a second shelter. It needed volunteers. Once I made it off of the highway, I had to stay on the right side of the roads, rerouting from time to time over one pool of water or another. Driving around, the city was as silent as I'd ever heard it. Every few blocks, a bevy of pickup trucks would pass with inflatable boats and kayaks in tow. Downtown, I stopped for a trio of drift boats under a bridge. A lady all in black drove one herself, and a pair of kids handled the others.

By the time I'd reached the shelter, they'd run out of room for many new volunteers. If you spoke Mandarin or Arabic, they needed you. If you had any medical training, they needed you. Otherwise, the site had hit capacity for helpers. A white guy with a megaphone handed out bracelets to the couple hundred of us outside the stadium with our arms crossed. When he ran out of bracelets, the man told us we'd be fine without them, but a Latina standing behind me said that everyone couldn't afford that. HPD was patrolling the streets in accordance with the curfew. Without exactly glancing at me, she said some of us couldn't get by on the benefit of the doubt.

But it didn't change the fact that there were no more bracelets. It was just past midnight, but I could try again in the morning. So I drove back downtown, a suddenly reasonable commute, and on a

whim, I parked, and decided to take a walk. Houston's core was vacant. Who knew when that would happen again. I've spent a handful of evenings on Houston's downtown streets: One time, in the

midst of a fling, I walked what felt like the entire length of the theatre district, high off of possibility. Another time, I'd forgot which parking garage was mine after a show, and I walked from street to street, trying to recall their entrances. But this time, I had

beer in my trunk, a remnant of living in New Orleans. Some firemen smoked by their truck, waving as I passed. Across from a gloss sushi joint, some teens skated on the curb. Occasionally other loiterers passed, pointing, brandishing cameras, and every now and again we'd make eye contact and nod.

In the end, Harvey's damage ranged from nonexistent to extreme. The reservoirs receded. Slowly but surely, the rain dissipated.

Today, if you drive through some parts of South Houston, or Harris Country's eastern outskirts, many, many homes are still in ruins. Many, many folks are still living in hotels or trailers. Many, many folks are still rebuilding in the rubble. The city has mostly moved on, because it has to, but not without leaving many of its residents behind. And the relocated, and the dislocated, and the bereft, too, have also had to move on. It makes for a strange contemporary limbo—you're home, but not at all.

I resist the inclination to spin this into a remarkable experience—mine or anyone else's—because, if science is any indicator, these events in the Gulf will become anything but remarkable. Of course there will be more damage.

And then, beyond the literal devastation, there's the feel of what happened. It's in this city's nature, I think, to downplay catastrophe, because we are "scrappy" and we can get by with whatever's around, but as Houston continues to thrive, so will the problems it faces—and it remains to be seen how long the promise of development and capital will deem the risk required in acquiring and living around it negligible.

The next morning, I drove to the coffee bar I live across from now. Swaths of the city were still underwater. They'd stay that way for the next few days, and some wouldn't clear out for a couple of weeks. When I motioned to pay, the first thing the barista asked me was if I spoke Tagalog (I don't). Then he asked if I spoke Mandarin (I don't). He asked if I spoke Farsi (I don't). His wife, he said, was looking for translators. There were certain languages they just needed more of.

We were lucky, he said. So we're doing what we can.

High ground, he said, and I nodded, because this time that notion had held fast.

There will be as many different iterations of this storm, and the ones to come, as there are Houstonians. It'll be decades before we see all of them. But whenever they get here, we'll be ready to hear them, because we have to hear them. They're what will pave our map for the next one.

Not that we haven't already started. One afternoon, a few weeks later, three folks walked by this building I was volunteering at, bearing garbage sacks. I was folding clothes beside an older Latino couple, and a pair of Chinese women. We'd all seen each other around; we crossed orbits about once a week. We all spoke just enough of each other's languages to communicate, and when one of the Chinese woman said that she'd also been homeless for a little while, the Latina woman joked that we all were. Her husband said, That makes us family. And eventually, he added, it always stops raining.

We all winced. Of course he was right. It always, always stops raining. But there was no way not to remember that it hadn't felt like that at the time.



FROM ICE TO INUNDATION



FLOOD IS WATER IN MOTION, DISPLACED FROM ONE PLACE TO ANOTHER. ICE IN THE ARCTIC THAT IS IN THE FORM OF GLACIERS AND ICE SHEETS IS RAPIDLY CHANGING FROM SOLID TO MELTWATER. THIS MAP ILLUSTRATES HOW, WHEN GREENLAND MELTS, GALVESTON FLOODS. IT PUTS AN EMPHASIS ON THE CONNECTION BETWEEN SITES OF MELTING ICE AND SITES OF OCEANIC RISE.

DESIGN BY KAREN ALVARENGA AND ALEX RAMOS



FROM ICE TO INUNDATION

Cymene Howe

Flood is water in motion, displaced and traveling from one place to another. Flood is inundation, saturation, contamination, a swelling hydrosphere that often rots and destroys on its way in and on its way out. Flood is biblical. But it is also banal. It leaves traces of itself in both intimate and mundane spaces, insidious markers of how water refuses containment and how porousness is a condition of living.

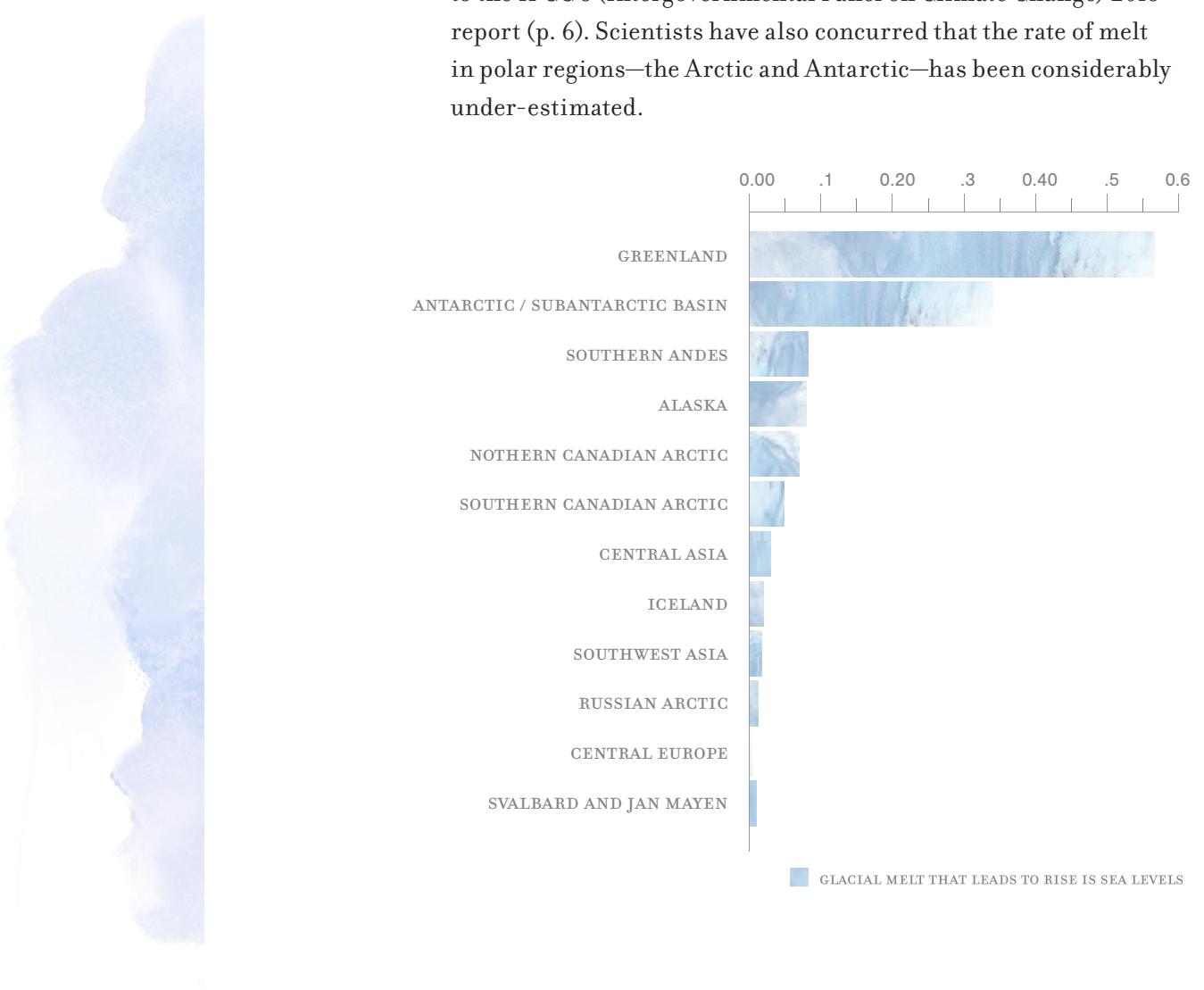
Flood is water out of place. Or, at least water that feels out of place when it moves, unwelcomed, into our homes and workplaces, gardens and garages. Of course, water out of place is a relative perspective, one dependent upon where we imagine water ought to be. Out-of-placeness was something that Mary Douglas, a cultural anthropologist working in the mid-20th century, thought quite a lot about. Douglas wrote specifically, and quite eloquently, about dirt. Dirt was an idea. But it was also materialized as a substance that might be fine over there, outside the walls of our homes, but that was never welcome inside. Indeed, some dirt—when out of place—could even rise to the level of pollution or taboo.

Douglas's meditation on dirt reveals the cultural attitudes we still hold how the earthly, or watery, world should remain under our control. We want dirt, like water, to stay in its place. That is, in the place we want it. But that human proclivity is being increasingly challenged in times of anthropogenic climate change when there is a lot of matter, or many matters, out of place. Water moving outside of its usual boundaries is also much more than a philosophical question. It is a painful reality in times when extreme storms, sea level rise and floods are increasingly flowing into, and over, our doorsteps.

Like Douglas, I am a cultural anthropologist, and spend most of my time thinking about water out of place—in the form of melt and flood. As ice melts around the world, I am attempting, in a sense, to follow the water from one place to another. I begin where ice is

melting and then move to places where seas are rising and flooding is imminent. Part of this work involves trying to unravel how water out of place is being charted and graphed by scientists. Another part of this work requires asking questions about how communities, planners and others are contending with ice loss or bracing for sea level increases.

My research has taken me to the Arctic region to see where ice—in the form of glaciers and ice sheets—is rapidly changing from a solid form to meltwater. Polar ice melt is widely understood as a key indicator of global temperature increase, both on land and in the seas. And ice is melting nowhere faster, and faster than expected, than in the Arctic region¹, which is warming at about two to three times the rate of anywhere else on Earth according to the IPCC's (Intergovernmental Panel on Climate Change) 2018 report (p. 6). Scientists have also concurred that the rate of melt in polar regions—the Arctic and Antarctic—has been considerably under-estimated.



This melt of course, has consequences elsewhere. In 2018, the Arctic Monitoring and Assessment Programme report—which amasses scientific data to assist Arctic

policy makers—detailed that global sea levels will rise much more quickly than previously thought; new estimates are almost double the pace previously predicted by the IPCC in 2013². Melt is becoming flood, even if incrementally and unevenly.

The transformation of the world’s ice into meltwater is a vivid indicator of what the critical philosopher Timothy Morton has called the “Age of Asymmetry,” —a geological period in which humans have a direct effect on the substrata of earthly reality. Looking at the effects of sea level encroachment in places like Galveston and Miami, as well as places like Bangladesh and the Marshall Islands, we can see that sea level effects are also asymmetrically felt; climate crises are not distributed evenly and in most cases those centers of power and resource exploitation that have contributed most to climate change, will not be the people and places to suffer its most egregious effects.

Not all flood is sea level rise. But sea level rise is a certain kind of flood: a slow, accretive and now, inevitable one.

OCEANS

In elementary school, most of us learn about world geography through maps and images. Maps neatly designate Earth’s oceans: the Arctic, Atlantic, Indian, Pacific and Southern. Each have their proper name and place. But for oceanographers and other scientists these are mutable waters, interconnected and moving swiftly and fluidly across lines marked on maps. This is the world ocean. One ocean. One that covers about 70% of the Earth’s surface.

Earth scientists agree that melting land ice is contributing significantly to sea-level rise around the world and that continued warming will exacerbate the risks for human populations. Many climate experts now believe that an overall sea level rise of 2-3 feet worldwide by the end of the century is a realistic estimate. This

...like a spinning top.

does not mean that the ocean would come inland two or three feet, but that what we now consider “sea level” (or zero elevation) would be under two or three feet of water. This would affect different coastlines differently because there are multiple factors involved in local sea level rise. So, while these designations are valuable for estimating future potential harm and perhaps more importantly, for alerting populations to sea level threats, these diagnoses are limited in that they speak to an average.

Many accounts of sea level rise reproduce a simplistic accounting of sea level rise, “the median global sea level,” also known as “the bathtub model.” In the bathtub model meltwater entering the world ocean appears to manifest in a uniform way, distributing evenly across the world’s coasts. This is inaccurate for several reasons, including the fact that local sea levels are determined by myriad factors—13 in total—according to the US National Oceanic and Atmospheric Administration. These include: land composition (erosion, subsidence, sediment compaction and bedrock porosity), weather (storms, wind and air pressure distribution), ocean circulation (waves, tides, currents and the global ocean conveyor), and finally, global sea level fluctuation caused by oceanic thermal expansion and melting land ice. These are complex, site specific processes and

Melt ice anywhere on Earth and I can give you the shape that the ocean will adopt.

NOAA has, very helpfully, developed a mapping tool, the Sea Level Rise Viewer (<https://coast.noaa.gov/slris/>) that interactively shows a variety of local sea level rise scenarios on U.S. coasts.

In trying to follow the melted water of the Arctic to its ultimate destination as sea level rise in the lower latitudes I have learned that unlike the lines on maps, the flow of planetary water does not conform to a simple path.

ARCTIC EVERYWHERE

The Arctic region is currently shedding its cryosphere at a rate of 447 billion tons of ice per year. From 2005 to 2015, an average of 14,000 tons of water have been pouring into the world ocean

every second. From 1986 to 2005, only 5,000 tons per second were being discharged; that means that in only ten years, the amount of meltwater flowing into the world ocean has more than doubled from the previous twenty-year period.

Research from the Geological Survey of Greenland and Denmark, which was released in December 2018, overviews almost 50 years of cryospheric data from satellite readings as well as local sea level measurements. The report shows that the Arctic region is the leading contributor to overall, global sea level rise. It also demonstrates that Arctic glaciers are the most significant factor affecting current sea level rise. While the Antarctic continent contains far more ice in terms of sheer quantity, its contribution to sea level rise doesn't come close to the rates of meltwater being discharged from the Arctic region. Arctic ice is causing the world ocean to swell by more than a millimeter every year.

As melted ice becomes integrated into the world ocean, the planet's gravity, as well as its rotation, are shifted, creating spatial patterns of sea level rise distribution around the world. Until very recently, the relationship between changes to Earth's cryosphere and its impact upon local sea level shifts have been difficult to track, making it challenging to forecast and plan for sea level rise in coastal cities.. In the hopes that coastal planners and governments would benefit from a more precise understanding of future sea levels, a team of physicists at NASA has created an online tool to visualize and quantify sea level impacts for nearly 300 of the world's coastal cities. The tool is able to show, with great accuracy, where freshwater melt contributions to global sea level rise are being distributed among 293 coastal cities. The NASA program illustrates "gradient fingerprint mapping" (or GFM) and is, according to its creators, currently the only tool capable of attributing specific locations of melting ice with their effects on the world's coastal cities. In short, it shows how Earth's gravitational processes are contorted by the melting of the world's ice. Drawing upon the physics of shifting ice and water, the GFM tool allows users to see with precision where melting ice results in specific amounts of sea level rise in particular cities the world over. The tool allows us to see that in Houston, the fate of our coast is tied to that of the Greenland Ice Sheet.



12 YEARS

The Intergovernmental Panel on Climate Change report released by the United Nations in October, 2018, announced that fossil-fuel emissions would need to be cut in half within 12 years to avoid severe climate disruptions. I think that bears repeating: 12 years. When world leaders signed the Paris agreement in 2015—re-established most recently in Poland—the mandate was to keep global temperature rise to well-below 2 degrees Celsius, and to

SHAPE, NOT FLOW

The GFM device is a way of illustrating change and impact. It is important to note, however, that it does not follow water from sites of melt to sites of rise. Instead, it captures the shape of the ocean, tracking its gravitational agitations as ice becomes water, becomes ocean.

In one of our conversations together, Eric Lauror, the physicist who led in developing the GFM tool, explained that the most complicated aspect of the modeling device is “sea level rotational feedback,” or the change in the rotation of the Earth as ice melts.

He described it like this. “It’s like a spinning top. If you could modify the spinning top while it rotates, maybe touch it and remove some mass, it will start wobbling very differently... [A]s soon as you remove a bit of mass from that big giant spinning top, which is the Earth, the rotation axis of the spinning top wants to move towards the mass that was lost.”

A connection between melt (here) and flood (there) exists, but not through a flow of melted water in one site to inundation in the other. In fact, the process demands understanding Earth’s fluid envelope at scale, and, importantly, in its distributive mass rather than its linear connectivity.

In other words, the process of melted ice becoming sea level rise and flood is not exactly about flow. It is about shape. As Eric put it: “Melt ice anywhere on Earth and I can give you the shape that the ocean will adopt.”

Sites of cryospheric loss and sea level increase are therefore linked, though not through the logic of flow, but in the gravimetric re-ordering of the world ocean as cryospheres continue their collapse.



aim for only a 1.5 degree increase above pre-industrial levels to avoid climate-related disasters like widespread food shortages and mass die-offs of coral reefs. But with global fossil-fuel emissions continuing to rise each year, the planet is now expected to cross that temperature threshold within 35 years.

A connection between melt and flood exists

There are many challenges in conveying the risks of a rapidly warming, storming and flooding planet. Some people refuse it; perhaps the emotional load is too heavy. Others remain committed to the trajectory of burning fossil fuels for political or financial expediency. Some are baffled by the science of it all.

Sheila Jasanoff, a scholar of science and technology, reminds us that “abstraction” is the key tool by which modern science cements its validity and universality. By turning any phenomenon in the natural world into an abstraction, science can show how fragments, elements, and pieces can be meaningful independent of the whole. It is for this reason that we have abstracted entities—quite useful ones—like the periodic table, the nitrogen cycle, the metric system, biodiversity, and of course, climate change.

But if the abstraction exercised within science produces knowable fragments, taking parts from wholes and rearranging them otherwise, it is also worth remembering that we may not need more data. The ocean, after all, cannot be broken into fragments and climate change and its effects are no longer abstract for many, maybe most, people around the world. The re-formation of the world as we knew it is already underway. And so while we do need more recognition of how science shows us a clearer picture of the changes we face, we also need more ways of feeling melt and flood and all the other socioenvironmental phenomena that we will face in the coming hundreds, indeed thousands, of years.

As the world ocean undergoes status shifts from ice to ocean, there is an opportunity to consider the new kinds of connectivities that are created between places of melt and rise in a newly watery world. Let me end with one instance of how these kinds of connectivities may be felt.

TWO WOMEN, CONNECTED BY WATER

Kathy Jetnil-Kijiner is a poet from the Marshall Islands, situated in that part of the world ocean known as the Pacific, near the planet's equator. Aka Niviâna is also a poet, an Inuk woman from Greenland. Both of them have been following the water. But before these two indigenous poets had ever even met in person they had already composed a poem together. They call it "Rise."

In late 2018, Jetnil-Kijiner traveled from her island where the water continues to encroach as the sea rises and rises, drowning the land and flooding once-human occupied terrains. She and Niviâna wanted to compose together and then come together atop a glacier, one that is melting steadily, a pockmarked body of ice on the remote edge of Greenland's southern ice sheet. And so they did. One woman was the "sister of ice and snow" and the other, the "sister of ocean and sand." Atop the glacier, they exchanged some shells and stones and they recited their words.

A filmmaker who captured the event described that the collaboration was meant to build awareness and to show the connections between affected communities that are, effectively, on the other side of the world from one another. And yet, through the world ocean—and through water out of place—they are now intimately connected. As Jetnil-Kijiner put it, "I'm just trying to create a different sort of experience that speaks more truth to my own." In this kind of creation out of destruction, we may in fact have a route to follow the water toward new ways of feeling climate and melt and flood as well as new ways to reckon with our futures.

FROM THEIR POEM, "RISE"

From one island to another
I ask for solutions.
From one island to another
I ask for your problems

Let me show you the tide
that comes for us faster
than we'd like to admit.
Let me show you
airports underwater
bulldozed reefs, blasted sands
and plans to build new atolls
forcing land
from an ancient, rising sea,
forcing us to imagine
turning ourselves to stone.

Sister of ocean and sand,
Can you see our glaciers groaning
with the weight of the world's heat?
I wait for you, here,
on the land of my ancestors

heart heavy with a thirst
for solutions
as I watch this land
change
while the World remains silent.

FOOTNOTES

1. www.climatecentral.org/news/arctic-ice-melting-faster-18967
2. The 2017 Arctic Monitoring and Assessment Programme report detailed that global sea levels will rise much more quickly than previously thought; the new estimates are almost double the pace predicted by the IPCC in 2013.
3. Hyperobjects: Philosophy and Ecology after the End of the World, Timothy Morton (University of Minnesota Press, 2013), p. 161.
4. We intentionally adopt the oceanographic term “world ocean” to emphasize that this is a continuous body of water encircling the Earth, with relatively uninhibited interchange and transference across the world hydrosphere. Human designations of “the [Atlantic, Pacific, Southern, etc.] ocean” or “sea” may be useful geographic markers for human-imagined demarcations, but the Earth’s fluid envelope is not similarly bounded.
5. <https://oceanservice.noaa.gov/globalvslocalsealevel/>
6. Scientists have demonstrated that terrestrial ice melting into the ocean creates a non-uniform pattern of regional sea level rise which can be tracked using “sea level fingerprints.” Recently, it has been shown that ocean station measurements of sea level fingerprints correspond with that calculated from satellite measurements, which are able to determine ocean mass changes over time in local settings (HSU 2017), accounting for gravitational fluctuation.
7. <https://vesl.jpl.nasa.gov/sea-level/slrgfm/> see “Should coastal planners have concern over where land ice is melting?” *Science Advances* 15 Nov 2017: Vol. 3, no. 11, Larour, Eric, Erik R. Ivins and Surendra Adhikari DOI: 10.1126/sciadv.1700537
8. A joint effort by NASA and the Deutsche Forschungsanstalt für Luft und Raumfahrt (DLR) in Germany, GRACE (Gravity Recovery and Climate Experiment) satellites, launched in 2002, are now operating under “an extended mission” phase. GRACE is comprised of two spacecraft, 220 kilometers apart in a polar orbit, 500 kilometers above Earth. The objective of GRACE is to map the Earth’s gravitational field by accurately measuring the distance between the two satellites, using GPS and microwave signals. GRACE satellites have provided data on: changes due to surface and deep currents in the ocean; runoff and ground storage on land masses; exchanges between ice sheets or glaciers and the ocean; and variations of mass within



- Earth. GRACE is also being utilized to better profile Earth’s atmosphere, and the project overall is seen to be making very significant contributions to NASA’s Science Mission Directorate, Earth Observation System (EOS) and global climate change studies. https://www.nasa.gov/mission_pages/Grace/overview/index.html
- P. Wessel, and W. H. F. Smith. 1996. “A Global Self-consistent, Hierarchical, High-resolution Shoreline Database,” *Journal of Geophysical Research* 101, #B4, pp. 8741-8743 and Michael M. Watkins, David N. Wiese, Dah-Ning Yuan, Carmen Boening, Felix W. Landerer. 2015. “Improved methods for observing Earth’s time variable mass distribution with GRACE using spherical cap mascons,” *Journal of Geophysical Research* 120, 4 pp. 2648-2671. <https://doi.org/10.1002/2014JB011547>
9. <https://www.nytimes.com/2018/12/15/climate/cop24-katowice-climate-summit.html?action=click&module=Top%20Stories&p-gtype=Homepage>

OMBrophobia

Cheryl Beckett

[FEAR OF RAIN]

HARVEY
Harvey



Over 60 hurricanes have made landfall on the Texas Gulf Coast since 1850. I moved to Houston in the late 1980s when such storms had spared the city for an entire decade between 1989 and 1999. This explains why hurricanes were not a big concern in my early years in Texas; the big issues were the lack of zoning, the oil bust, congested roadways, and the fight to block MetroRail. **The Great Storm of 1900** in Galveston seemed a long-ago tragedy of little relevance [At least 6,000 fatalities, most due to an 8-12' storm surge] and **Alicia (1993)** (This marked the first time the National Weather Service provided local interests with landfall probabilities—Wikipedia) was before my time. In 1994, we purchased a “bungalow on blocks” in the Heights. Although its elevation played no part in our decision to buy this house, we learned that this was a major asset when tropical storm **Allison (2001)** hit Houston. She dumped over 35" of rain in a 6-day period; some areas received 28" in one day. [22 fatalities; 95,000 damaged vehicles; 73,000 damaged residences; 30,000 residents in shelters; more than \$5 billion in property damage—HCFCD] We waded through the streets in torrential rain to check White Oak Bayou as it inched its way block by block closer to our house. At daybreak, I-10 and the bayou were one

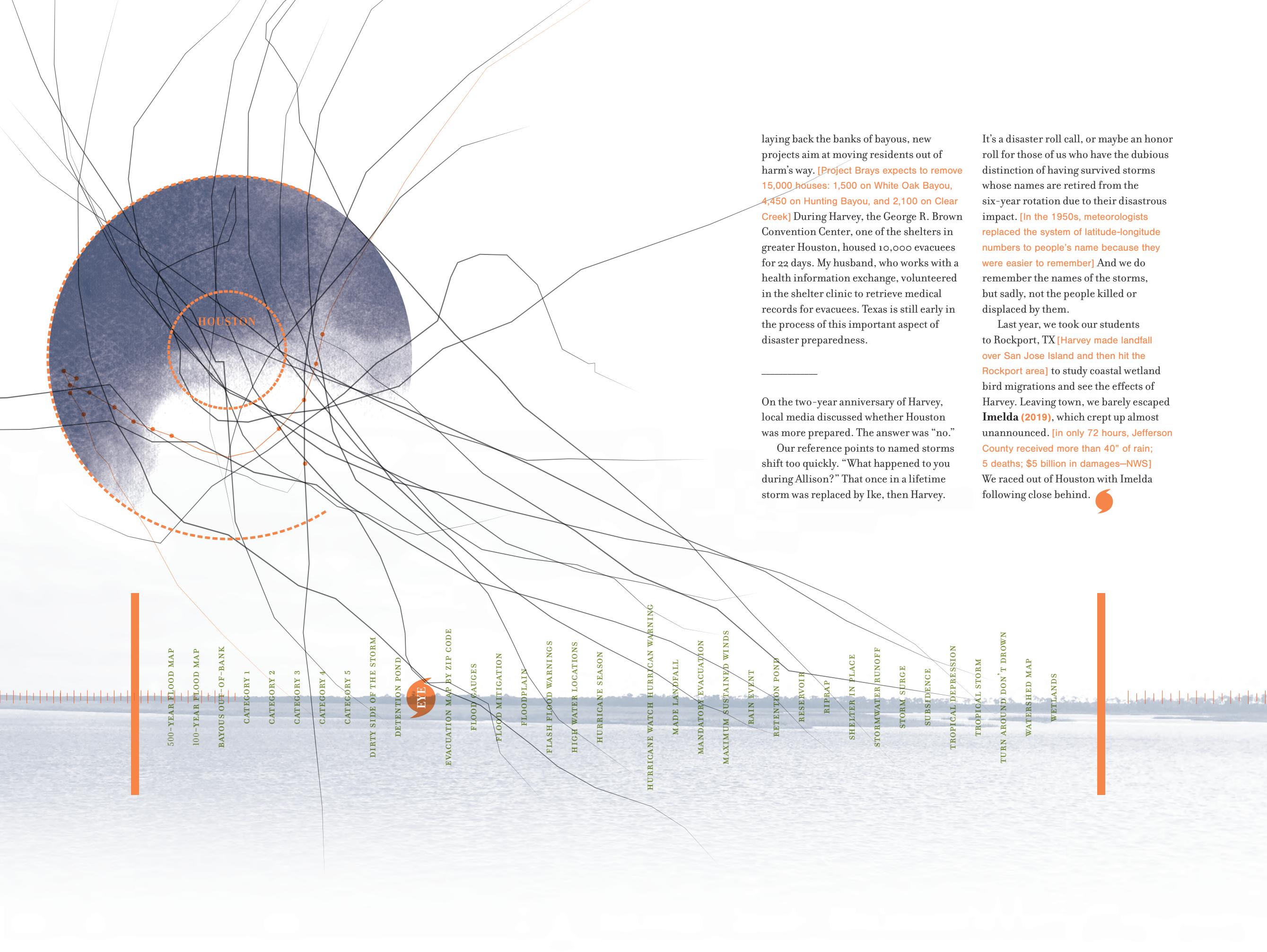
giant waterway whose depth was suggested by totally submerged semis. Weeks of news coverage reported losses—people, property, and infrastructure. The high water created a real possibility of drowning for those who drove to work. I began carrying a ball peen hammer in my car, then I bought a Seatbelt Cutter—Window Breaker—Emergency Escape Tool. [The “Turn Around, Don’t Drown” campaign was launched on May 22, 2003]

New Orleans bore the brunt of **Katrina (2005)**. [80% of New Orleans underwater; 1,833 fatalities; \$108 billion in damages—NOAA] Houston took in about 250,000 residents in the aftermath, and Houstonians took to heart the notion that “failure to evacuate” was to blame in part for stranding tens of thousands in New Orleans’s Superdome for over a week. [50 levees failed; 400,000 people permanently displaced—National Geographic] So, two weeks later, Houston residents evacuated for **Rita (2005)**, a mass migration that caused its own disasters. [2.7–3.5 million Houston/Galveston residents evacuated; 107 evacuation-related fatalities] Some families and pets were stuck on freeways for 36 hours in 100° heat. At 3:00 a.m. at a gas station off of I-10, I learned that the line between civility and anarchy is very thin. Although it took 4 hours to go 5 miles, we

KATRINA

IKE





laying back the banks of bayous, new projects aim at moving residents out of harm's way. [Project Brays expects to remove 15,000 houses: 1,500 on White Oak Bayou, 4,450 on Hunting Bayou, and 2,100 on Clear Creek] During Harvey, the George R. Brown Convention Center, one of the shelters in greater Houston, housed 10,000 evacuees for 22 days. My husband, who works with a health information exchange, volunteered in the shelter clinic to retrieve medical records for evacuees. Texas is still early in the process of this important aspect of disaster preparedness.

It's a disaster roll call, or maybe an honor roll for those of us who have the dubious distinction of having survived storms whose names are retired from the six-year rotation due to their disastrous impact. [In the 1950s, meteorologists replaced the system of latitude-longitude numbers to people's name because they were easier to remember] And we do remember the names of the storms, but sadly, not the people killed or displaced by them.

Last year, we took our students to Rockport, TX [Harvey made landfall over San Jose Island and then hit the Rockport area] to study coastal wetland bird migrations and see the effects of Harvey. Leaving town, we barely escaped Imelda (2019), which crept up almost unannounced. [in only 72 hours, Jefferson County received more than 40" of rain; 5 deaths; \$5 billion in damages—NWS] We raced out of Houston with Imelda following close behind.

