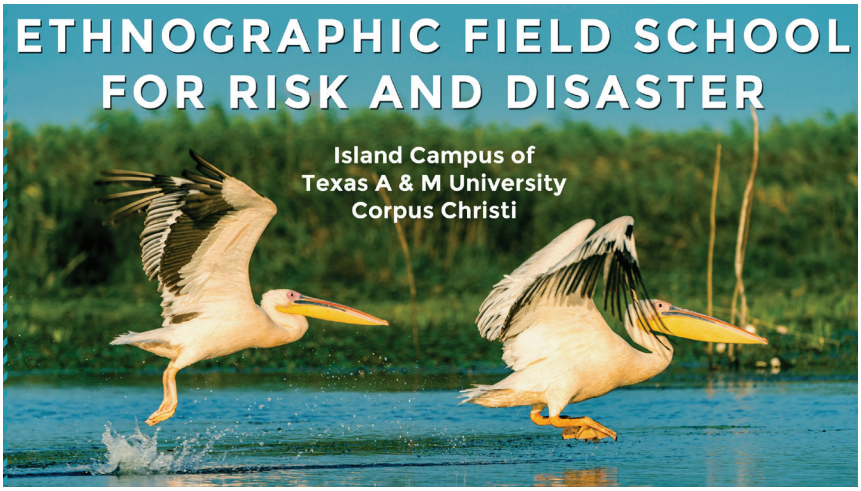
RESEARCH REPORT:

Rockport Residents and Life After Harvey

Results from the 2019 Colorado State University Ethnographic Field School Study



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All satellite imagery from Google Earth Pro

THE ROCKPORT-FULTON AREA

BEFORE AND AFTER HURRICANE HARVEY

COPANO RIDGE

COPANO COVE

SOUTH ROCKPORT

Aerial views of each study neighborhood before (January 2017, at left) and after (late August 2017, at right) Hurricane Harvey.

1. Introduction

ABOUT HURRICANES AND THE GULF COAST

Scientists in recent years have escalated their projections about the growing risks of living in coastal areas. At the Geophysical Fluid Dynamics Laboratory (GFDL), a Princeton University research lab housed within the National Oceanic and Atmospheric Administration (NOAA), researchers stated that as a consequence of the warming climate and the increased water vapor in the atmosphere, we can expect increases in extreme precipitation. They further stated that the "sea-level rise associated with future climate warming is expected to contribute toward increasing the risk of extreme coastal flooding events..."[1] In September 2019, the Intergovernmental Panel on Climate Change[2] issued their Special Report on the Ocean and Cryosphere in a Changing Climate concurred with this assessment, noting that because of climate change, extreme sea-level events that used to occur once in a century are projected to become at least annual events.

As a result of such projections, some scholars are calling for coastal residents to abandon their homes and relocate now, asserting that their lives are no longer safe.[3] Other scholars believe the risks do not yet compel such drastic measures. They note that our understanding of flooding impacts caused by both heavy precipitation and storm surge is still incomplete.

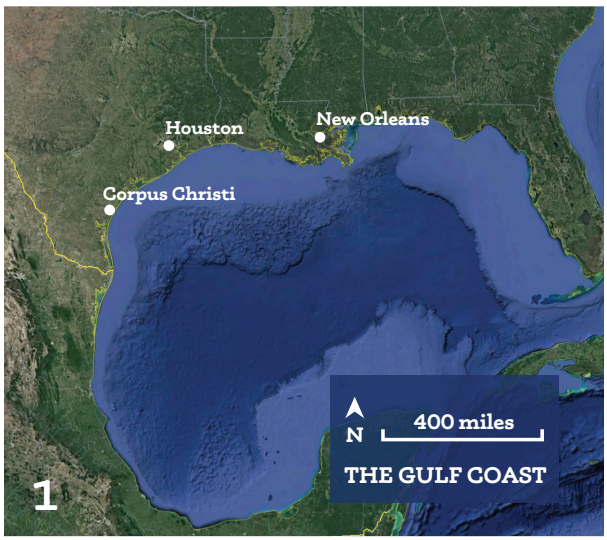
In light of these debates and the undeniable increase in intensity of storms, we designed our first year's field school research around questions of risk perception and how people felt attached to the coastal area in which they live. This report is designed to give voice to community residents who communicated a great deal about the big and small ways that Harvey has changed life and how it has brought new awareness of risk to a small Texas town on the Gulf of Mexico. We hope this report will provide some value to emergency managers, planners, community groups, scholars, and residents.

ABOUT HURRICANE HARVEY AND ROCKPORT, TEXAS

People commonly associate Hurricane Harvey with the epic downpour of up to 60" of rain on greater Houston. This historic "rain bomb" created massive damage in the metropolitan areas in and around the city. Harvey's impact spanned a diameter of 280 miles and impacted 22 counties in Southeast Texas. Loss and damages affected areas to the east, west, and south of Houston, including rural towns with family farming and ranching properties, semi-rural areas with oil and gas industries, and coastal towns dependent on tourism. Across all the areas impacted, more than 200,000 homes were destroyed or damaged, and a million cars were ruined. In the two years since the storm, the damage has reached $125 billion, representing the second most expensive disaster in US history, second only to Hurricane Katrina.

GENESIS OF THE ETHNOGRAPHIC FIELD SCHOOL FOR RISK AND DISASTER

By the one-year anniversary of Harvey, disaster anthropologist Kate Browne was well into her National Science Foundation-funded Harvey research project with a wide range of Texas residents. She realized how much a field school opportunity could offer students and considered different settings along the Harvey-impacted Texas coast. Browne appreciated the unsung ethnographic importance of the small coastal towns of Rockport, Fulton, and Port Aransas where Harvey made landfall, and where media had long since left to cover the story in more densely populated urban areas. These coastal towns suffered direct hits from Hurricane Harvey that



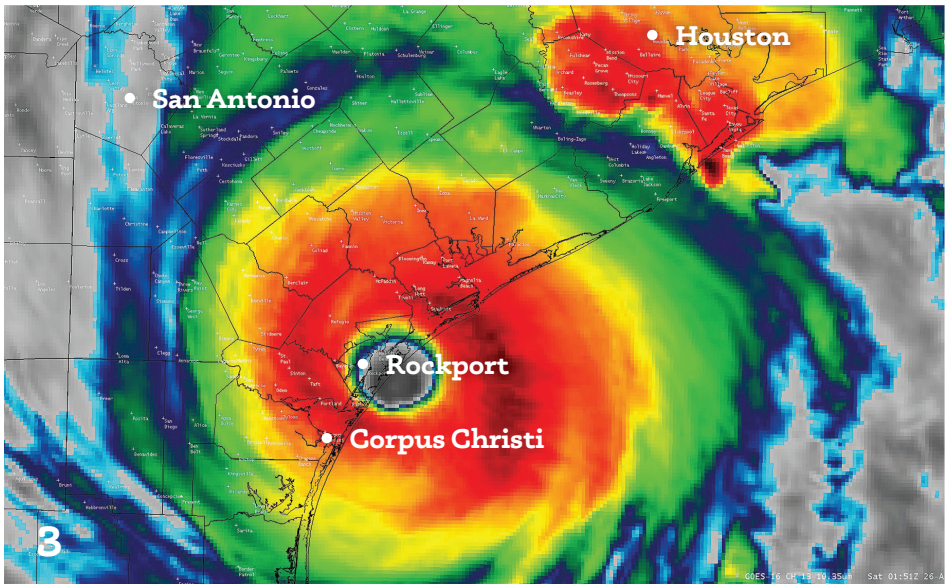
brought terrifying winds and a storm surge that together ruined thousands of coastal homes and properties.

Browne undertook a collaboration with Texas A & M University-Corpus Christi (TAMU-CC) and with their distinguished center for geospatial science research, the Conrad Blucher Institute led by interim director, Dr. Philippe Tissot. The campus offered excellent lodging and classroom facilities for Colorado State University students. Thanks to the supportive administrators and willing collaborators at TAMU-CC, as well as interested contacts in Rockport, the idea for the Ethnographic Field School for Risk and Disaster was born.

WHY ROCKPORT?

The town of Rockport, Texas, is located on the mid-Texas coast in the heart of the Coastal Bend, a geographic area named for the distinctive curve in the Texas coastline bordering the Gulf of Mexico. The designation encompasses Rockport, Fulton, and Port Aransas and eleven counties, from Aransas and Refugio to Kleberg and Kenedy.

Rockport has long drawn visitors with its small-town charm and arts community, its waterfront views, fishing and recreation, birdwatching, its good food, friendly people, peaceful atmosphere, and



1. The Gulf Coast. Satellite imagery via Google Earth Pro.

2. Counties associated with the Texas Coastal Bend. Satellite imagery via Google Earth Pro.

3. The eye of Hurricane Harvey passing over the Rockport area late night on August 25, 2017. Radar imagery via NOAA.

easy, "island" pace of life. In late May 2019, just a week before the launch of the CSU Ethnographic Field School for Risk and Disaster focused on Rockport, Rockport was voted by USA Today readers as one of the best coastal towns, ranking 2nd in the nation.

OUR PURPOSE AND MISSION

The Ethnographic Field School for Risk and Disaster represents the first program of its kind in the United States. The program brought undergraduates and graduate students from Colorado State University to Corpus Christi, Texas, for the month of June 2019. The students generated original research through extensive interviewing in Rockport with interested residents who experienced Hurricane Harvey.

In our inaugural year, the program included 13 undergraduate students and 2 graduate teaching assistants. Students worked 6 days a week: 2 days in the classroom to learn research methods and the literature about risk and disaster; 3 days commuting an hour's drive to Rockport where we conducted interviews with residents about life since the Harvey disaster; and half a day on Saturdays to debrief what we learned that week, check in with our goals and make plans for the following week. Students used evenings and Sundays for reading and writing homework, socializing and enjoying field trips.

2. Methodology

OUR RESEARCH GOALS

The goal of our research in Rockport was straightforward: to learn how people feel connected to the Rockport area, how people experienced Harvey, how they are recovering nearly two years later, and how their sense of risk related to how they prepared for Harvey and how they will prepare for future storms. We combined our in-depth interviews with surveys and a participatory mapping exercise.

There were three main topics we wanted to learn about:

1. First, we wanted to learn about residents' experience with Harvey – deciding whether to evacuate, describing what the aftermath was like, and defining what the long-term recovery has been like.
2. Second, we wanted to learn about what it's like to live in Rockport – what are the things that people love about living here, the things that make it home, and whether the experience of Harvey changed their relationship to Rockport.
3. Third, we wanted to learn from local residents what kinds of hazards they believe the area is prone to and where, exactly, they would locate these risks on maps.

HOW DID WE APPROACH THE STUDY?

Ethnographic methods: Ethnographic data comes from getting to know a place and its people: immersing ourselves in the life of Rockport by taking time to visit neighborhoods and public spaces; taking in the sights and sounds and scents of the area; learning where important places are located and what landmarks were lost. Before our fieldwork began, we had identified the three neighborhoods of our study based on differences in income, ethnicity, and the area's exposure to risk during Harvey. The biggest effort required students to knock on doors, introduce themselves and then interview residents willing to share their stories. As this report details, we paid careful attention to the elements that make up each of the three areas where we conducted research. Throughout our weeks of work over long, hot summer days, our team felt grateful for the friendliness of local residents and the small-town environment that made us feel welcome.

The social science approach to our study: During this field school, students learned

how social scientists study disasters. Natural scientists try to model and predict a storm's development, power, and path so that we can plan for greater safety. Social scientists study the human aspect of the storm: how social systems shape people's vulnerability to disasters and their capacity to recover from damages, how disaster and recovery experiences are different for different groups of people, and what we can learn from different people's experiences in order to make things better for more people the next time disaster strikes.

The strength of the social science approach to disaster studies is that we study people where they live. We consult published data, but our primary research involves going straight to the source, in this case, the people who experienced Harvey. We conducted 40 interviews with residents, lasting two hours or longer. The stories and perspectives we heard made it possible for us to grasp the fuller context of the situation.

By looking at disasters through a holistic social science lens, students gained a better understanding of how disasters affect every aspect of human life and what factors shape who is most likely to be systematically exposed to risk and who is able to access resources to cope with and recover from

1. Field School student researchers knocking on doors of prospective participants.

2. Map showing how a resident indicated their perception of where risk exists.

NOTE TO READERS:

We believe that the findings of this work will resonate with many residents and that the insights we have learned could be useful in considering next steps for increasing preparedness, improving messaging of risk, or designing new research that would build on insights here. The work contained in this report is based on student-led interviews and analysis over their four weeks of field school training and hands-on research. It is not a comprehensive study of post-Harvey Rockport, and we make no claims to the representativeness or statistical significance of the 40 households included in our sample.

disaster impacts. The field school taps into knowledge from multiple disciplines and perspectives, including anthropology, geography, sociology, political ecology, political economy, history, psychology, public health, and journalism, for a well-rounded, multidisciplinary experience.

The research project combined in-depth interviews with short surveys and risk mapping. Our in-depth interviews gave us the chance to understand how people think about their community, their losses from Harvey, their affection for Rockport and their concerns about its future. The mapping exercise introduced a spatial perspective in which we asked residents to use large laminated maps we provided to identify the kinds of hazards the area is prone to and where they understood these hazards to be located. With the map data we collected, we produced a "heat map" showing the distribution of these hazard-prone areas as identified by our respondents. Through this exercise and all of our related questions, we could learn how residents evaluate their post-Harvey lives and their sense of future risk. Our report addresses what we discovered through these multi-faceted research methods.

3. About Our Research in Rockport

ROCKPORT HISTORY

Rockport has historically built its reputation around one primary industry that has changed over time, from cattle ranching to commercial fishing to tourism. With the 1888 arrival of the San Antonio and Aransas Pass rail system to Rockport, four stops a day at the Rockport Station brought a steady number of tourists who began flowing into the area year-round.[4]

Over time, Rockport's momentum as a tourist destination has increased, and today the area's economy is centered there. The emphasis on tourism over the years has had the effect of drawing new permanent residents attracted by the coastal lifestyle with waterfront beauty, breezes from the Gulf, good fishing, and friendly, small-town atmosphere.[5] According to the Rockport-Fulton Chamber of Commerce, total spending by tourists to the area now exceeds $100 million per year. The city's strong reliance on tourism as its most important economic driver has attracted related businesses that can supply and deliver goods and services aimed at tourists. But any single-engine economy can render a city's well-being vulnerable to unexpected downturns or crises provoked by devastating events like Hurricane Harvey.

THE NUMBERS:

In 2017, the year Harvey hit, Rockport residents numbered 10,200. The population is 66 percent White, 25 percent Hispanic, and about 4 percent Asian. The median age of residents is 49.1, reflecting a higher proportion of retirees in the population than the US generally (with a median age of 38). Rockport's median household income is $59,500 compared to the US generally with a median household income of $63,179.[6] Each year "Winter Texans" flock to Rockport to reside for the winter months, boosting the population by 3,000-5,000 temporary residents.[7]

In the following pages of this Research Report, we introduce our post-Hurricane Harvey research findings based on interviews we conducted in June 2019 with people from 40 households in three areas of Rockport, each distinguished by socioeconomic status, types of properties, and ethnicity of residents. These three areas include South Rockport, Copano Cove, and

Copano Ridge. Across these areas, we found several patterns that may be of interest to city officials and emergency managers. Nothing in this research is conclusive or final, but our findings may offer guidance for future research.

Before we delve into our findings by neighborhood, we want to describe a few patterns that characterized a majority of participants.

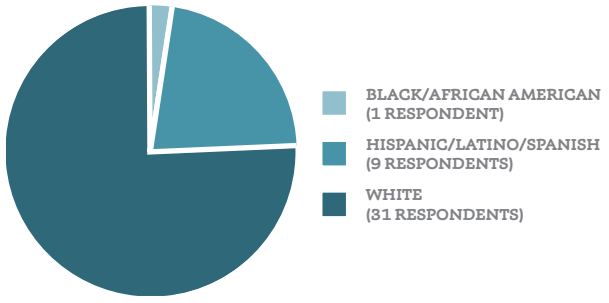
OUR RESEARCH PARTICIPANTS

As these charts of our sample depict, we interviewed a wide variety of people based on household income, ethnicity, and age. Compared to the Rockport population, our sample is about the same ethnic breakdown with White (75%) and Hispanic (25%). The median age of our 40 respondents is higher (age 61) than the median for the area (age 49). In fact, most of the people we spoke to fell between the ages of 50 and 80, with only five of 40 participants below age 50. The median household income of our respondents is also considerably lower than the $59,500 median for Rockport. We believe this reflects an underrepresentation of the highest income residents, explained by the fact that we did not interview any residents of Key Allegro where wealth is most highly concentrated. According to the US Government website "Data USA,"[8] the neighborhood with the highest median income in Rockport is found in Census Tract 9502, Key Allegro, where the median income is more than $87,000, nearly 50% higher than the overall median income for Rockport.

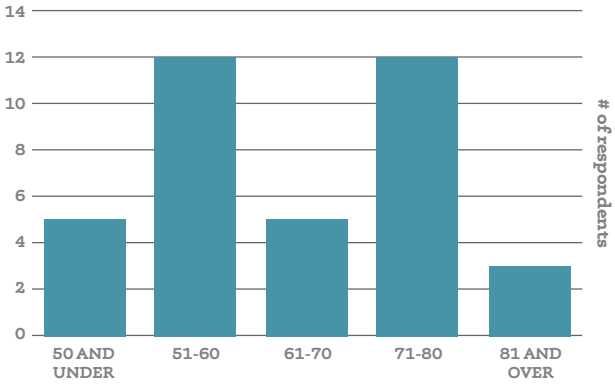
We learned that two-thirds of people in our sample evacuated before the storm and most experienced significant damage or a total loss of their homes. As the graph on page 8 shows, these patterns are relatively consistent across all three neighborhoods.

Many of our respondents suffered severe damage or total loss of their home, but those with the resources used the damage as an opportunity to make some home improvements, such as retiling the kitchen and bathroom, or installing a new roof. In each neighborhood, we witnessed a do-it-yourself mentality, but most people who were offered help from volunteers and community members were happy to accept.

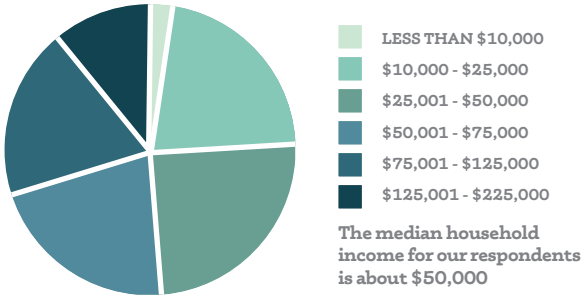
ETHNICITY: ALL RESPONDENTS



AGE: ALL RESPONDENTS

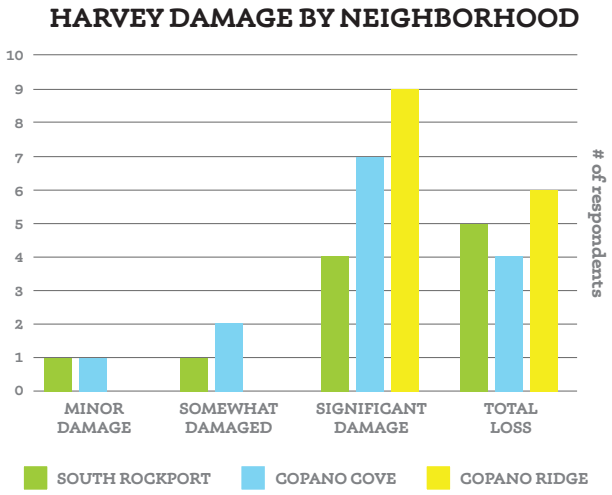


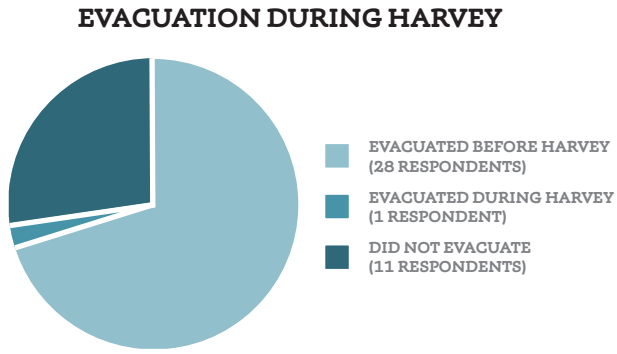
HOUSEHOLD INCOME: ALL RESPONDENTS



The median household income for our respondents is about $50,000

Ethnicity, age, and annual household income across our sample of Rockport residents.





Above (bar chart and pie chart): Damage and evacuation rates during Hurricane Harvey. We learned that two-thirds of people in our sample evacuated before the storm and most experienced significant damage or a total loss of their homes. As the bar graph shows, these patterns are relatively consistent across all three neighborhoods.

Above photo: Shorn trees and piles of debris testify to the slow work of recovery.

Those with adequate savings accounts relied on their own funds to start the rebuilding process almost immediately. Others with insurance, but little to no savings, waited for checks to arrive. Most people who depended on insurance reported having trouble getting satisfaction from the state wind insurer, Texas Windstorm Insurance Association (TWIA). Those who worked with private insurance providers tended to report less frustration. Those without insurance struggled to rebuild as they could. It is noteworthy that hundreds of low-income families were forced to leave Rockport after the storm because their modest housing was unlivable. As of June 2019, no affordable replacements had yet appeared to help them return to the area.

A few low-income families we interviewed who suffered a complete loss of their homes were able to qualify for a new home built by religious and volunteer organizations like the Mennonites or Hands of Hope. Each of these respondents indicated that they now feel safer and more comfortable than they did before the storm. Although the emotional challenges after the storm were daunting, rebuilding by volunteers and help through the community gave many a much needed hand in helping with recovery. Whether or not they benefitted directly, all of our participants noted the amazing volunteers who brought people, material, meals, hands and smiles.

There was unspeakable suffering in the accounts of people who were forced to accept the everyday sight of destroyed homes and landmarks, all the lost, cherished trees the town is known for, and the miles and miles of debris piles that lined residential areas and later State Highway 35. Once the brigade of government-contracted trucks began removing debris piles, residents noted the relief they felt. Getting going through the recovery process is mentally, emotionally, and physically exhausting, but gradually,

over months and months, debris piles got smaller and people pushed through the setbacks, heartaches, and frustrations.

Across all our areas of study, respondents reported that their experience with Harvey has led them to increase the extent of their preparedness.

4. The Affection for Rockport

The most striking similarity across the people we interviewed involves the reasons cited for living in the Rockport area. Just like visitors to Rockport, local residents appreciate the coastal atmosphere, the quiet beauty, and the casual pace of everyday life. An overwhelming number of our respondents also mentioned the friendly people who create a pleasant social environment within the coastal atmosphere. Members of the community seem to know each other in one way or another, perhaps through a shared volunteer role, such as helping at the Aransas National Wildlife Refuge, attending the same local church, or being a regular at a community center or one of the restaurants in town. Some of the current residents came to Rockport to retire. Some take up temporary residence in Rockport each year as "Winter Texans" who live in the area five or six months of the year.

As noted earlier, the town of Rockport has a population with a higher than usual number of retirees. We learned that for many residents, the relaxing pace of life is a desirable feature of the area and consistent with the nature of favorite recreation activities. There is also much to enjoy about the lively town with its artist galleries, crafts and specialty shops, and variety of popular restaurants. Retired and older residents reported their appreciation for the mild winters and warm temperatures for year-round recreation.

Residents we interviewed expressed enjoyment of the natural world surrounding and defining their town. Many noted their relationship to the water. Those with coastal property commonly gestured out their windows to the waterfront views when we asked what they liked about the area. Many noted the pleasure of fishing

FROM OUR PRESENTATION

AT THE PUBLIC LIBRARY ON THE LAST DAY OF OUR FIELD SCHOOL

People who live here seem to love it for a number of very similar reasons. The small-town feel makes many residents want to engage at the local level, whether it be through businesses, the art scene, or recreation. People indicated their love for the natural environment in the form of the beautiful beaches and waterfront areas, and the recreation opportunities they provide. Birding was also mentioned on many accounts, and everyone loves the famous whooping cranes. The live oak trees, especially pre-Harvey, held a special place in people's hearts. Additionally, respondents with young children had very positive comments about the school district. We also noticed the widespread extent of community engagement among residents. Many noted their involvement in churches or their volunteer work with local organizations, such as the Aransas National Wildlife Refuge.

and boating. Other residents reported how much they cherish the live oak trees or the many species of shorebirds and migratory birds. Rockport officials leverage Rockport's attractive coastal nature to increase tourism. The city hosts a number of festivals each year to celebrate the blue crab, shrimp, hummingbird, and the whooping crane, a true testament to the town's twin embrace of nature and tourism.

5. Social Vulnerability and Recovery

For as much as people appreciate the beauty and outdoor opportunities of Rockport, a beautiful environment can carry risks. For example, all residents face hazards from simply choosing to live in a coastal town where there are regular threats of hurricanes, storms and flooding. Hurricane Harvey also exposed a different kind of risk: the resource-related risk that makes some people less well positioned to recover from devastation. Even if the devastation from a bad storm may seem to carry "equal opportunity" impacts, a closer look at research suggests that this assumption is often inaccurate. People who have few financial resources, have elderly family members or those with disabilities, or have experienced systematic discrimination based on their ethnicity or immigration status are already living with challenges, financial and otherwise. As research has shown, a disaster can impose outsized demands on a family's time, income, and knowledge about how to navigate bureaucracies and outside organizations offering aid.[9] In short, household level factors such as race, ethnicity, age, health, and economic status compound risk by influencing where people live, their access to resources, and their realistic capacity to recover.[10]

Anthropologists and other social scientists use the concept of "social vulnerability" to discuss and explain how certain kinds of life circumstances combined with the upheaval of a disaster can translate into paralyzing problems for those already struggling. In our research, we learned that all people impacted by Harvey faced difficulties of one kind or another in reclaiming their lives. Still, the speed, quality, and extent of recovery for an individual household depended significantly on the specific mix of barriers imposed and assets available to overcome such barriers. Moreover, it became apparent that the experiences of vulnerability and resilience tended to resemble each other more within a given neighborhood than they resembled households across our study neighborhoods.

As this report documents, the contrasting levels of recovery success can be better understood by recognizing how social vulnerability shapes outcomes.

Literature in the social sciences documents the many forms and consequences of social vulnerability and how these patterns reveal social structures that are in place long before a disaster strikes. People with low income, for example, tend to live in areas where land is less costly and in homes that are older or less sturdy. Some families live in areas that are vulnerable to chronic flooding because low-lying land is the only land they can afford. Often, such areas and structures correspond to elevated risk exposure, such as risk of flooding or damage from strong winds. When we can understand more about social factors that put people at risk, we can help society lower risk from future storms and help more people recover better when something like Harvey happens.[11]

Rebuilding from disaster relies most often on the free market, and this reality makes it important to have economic resources in order to recover fully from extensive loss and damage. Many people in Rockport live on modest incomes, which means they are rarely able to put money into savings. Without such personal resources, many are unable to begin the rebuilding process without some form of external aid. Some families became dependent on help from non-profit aid groups to rebuild. The waiting was often long, and a long wait prolongs a family's displacement and suffering. We saw these circumstances with a number of people we interviewed who had been living in low income rental properties or travel trailers before Harvey. They tended to have little or no savings, and some were unable to insure their homes. When people were both uninsured and did not meet FEMA qualifications for assistance, the financial burden of rebuilding became extremely challenging.

Lack of resources is a key source of vulnerability that often remains invisible to the larger society until something like a disaster occurs. And it is a grim reality that the most vulnerable are often the targets of unethical contractors. Many people reported they had been scammed by operators who took their money without performing the work they promised.

THE LOSS OF LOW-INCOME RESIDENTS IN ROCKPORT

Most of the economic activity in Rockport is centered on tourism. This fact has channeled recovery efforts and attention to public areas and tourist

1. Official searching through destroyed mobile home for survivors.

2. Oyster harvesters working to recover the oyster business after Harvey. Photo by Scott Ball/Rivard Report.

attractions. However, insufficient thought was given to recovery needs of the essential service side of a tourist economy. Two years after Harvey, there remains a desperate need for labor force housing that was lost in the storm. New housing being built in the area by private companies and landlords ends up costing more than pre-Harvey housing. These dwellings and multi-family structures are often built to appeal to retirees and winter Texans. However, without affordable housing, the labor force for restaurants, hotels, the construction industry, landscaping businesses, and grocery stores cannot afford to return.

Since Harvey, the chronic shortage of workers has forced some employers to cut back services or hours of operation. Restaurants and hotels are struggling to find workers, WalMart has not been able to stay open 24 hours, and other businesses can't fill their shifts. The job postings on the Rockport-Fulton Chamber of Commerce website quickly convey the area's unfulfilled demand for skilled and unskilled laborers. These shortages contribute to a feedback loop that not only negatively impacts low-income people who cannot afford to return, but also costs the businesses that provide goods and services for tourists. Many residents, including those in affluent areas like Copano Ridge, expressed dismay that funds raised locally and nationally to help reconstruction have been directed toward the needs of wealthier residents and tourists. Aid organizations told several residents that they had been rushed out of town prematurely to create the illusion of a complete recovery for summer visitors.

A tourist town must certainly consider business interests and the perceptions of tourists. However, the traditional Rockport workforce will only be able to return if there exists decent housing that they can afford. Many residents we interviewed reported concern that the city has not taken a more pro-active role in helping restore life to a livable level for all of its residents. As often happens after a disaster, higher income areas that generate more tax revenue are rebuilt first, while funds for rebuilding infrastructure and housing in lower income areas must wait. Rental housing is hit especially hard after a disaster and slow to be rebuilt. In towns like Rockport, this kind of delay hurts everyone because the economy itself is built on the interdependence of people at all levels.[12]

Destroyed (and un-rebuilt) affordable housing has slowed return of the workforce.

VULNERABILITY BASED ON GEOGRAPHY AND ACCESS TO RESOURCES

Every neighborhood in Rockport faces some degree of risk from storms and flooding, and all were exposed to and affected by Hurricane Harvey. On Copano Ridge where the storm surge arrived on a direct path, eighty percent of respondents reported their home as a total loss. In South Rockport, several residents told us that tornadoes swept through the area's flat land, causing most of the damage to homes. In Copano Cove, where the elevation of land varies, exposure to flooding was variable. And yet, although our respondents in South Rockport experienced less total property loss than residents in Copano Ridge, they encountered much greater difficulties in their material recovery. Even in areas that were exposed to the same kind of damage during the event, the wide variation in access to resources shaped the experience and speed of recovery.[13]

In Copano Cove, residents who could afford to buy new homes did so on higher land located along the canal system, while those living on lower land more at risk tended to live in manufactured homes or travel trailers. In the Cove, then, there was wide variation in vulnerability between residents. One low-income retired couple experienced multiple vulnerability factors: their old age and disability prevented them from evacuating, their low income made it difficult to properly prepare for storms despite their extensive knowledge and prior experience of disasters from living in other areas, and their location in the Cove was susceptible to flooding. There were two families in Copano Cove still living in the midst of devastation and unhealthy conditions who have been unable to rebuild and recover from the damage of Harvey. Both of these families have very low income and contain members with disabilities. Another woman described how her yard remains flooded to this day, so she has not rebuilt from the damage of Harvey yet. She feels that taking this issue to the city would not effectively solve her problem, demonstrating the gap in communication between vulnerable community members and city officials. Almost all respondents reported having trouble navigating bureaucracies and insurance.

Away from Copano Cove's canal waterfront homes that are tucked up close to the southern edge of Salt Lake, the other subarea of Copano Cove known as Rattlesnake Point lies quite spread out. In this southern portion of the Cove, we found that respondents cohere as "independent outsiders," people who regard themselves as self-reliant and different from the area's majority population, particularly in their political views and interests. On the one hand, the independence and sense of self-reliance of these Rattlesnake Point area residents provided them an asset that became visible through the home repairs they were determined to make on their own. Ironically, being independent outsiders could present a barrier to recovery. As we found in other areas, a strong neighborhood community and a

shared sense of neighborly support for each other could facilitate recovery. When residents have fewer social ties to draw on, this life circumstance becomes a source of vulnerability that can impede the chances of a full recovery.[14]

South Rockport is a low-lying area prone to flooding and has historically been home to people with low-to-moderate income. Within South Rockport, one respondent and her husband have been subsisting off of disability and social security after they both suffered severe health complications a decade ago. They have a number of dependents who rely on them, including children, grandchildren, and other relatives. They have 20 grandchildren in the area, and six of them live in their home. As a large low-income family, protective storm impact measures such as insurance, savings, and home preparedness were unattainable. Their grandchildren evacuated to Austin, but the couple's disabilities and lack of savings forced the two of them to stay at home rather than evacuate for the storm. They took shelter in a hallway as they experienced their home getting shredded apart from what was likely a tornado spawned by the hurricane. Luckily, the two endured no storm-related injuries, but they were faced with devastating challenges including a total loss of their home. Because of their financial situation, the family was eligible for a rebuild by the Mennonites, but faced a 13-month displacement during which they resided in a two-bedroom apartment with 10 other people.

Households with members living with disabilities face unique barriers to coping with and recovering from disasters as well as during displacement. Such life circumstances were not uncommon for some of our respondents in South Rockport.

Copano Ridge, where most of our respondents suffered a total loss of their homes, was arguably the neighborhood with the greatest material damage from Harvey. Residents here were mostly retired, and when we encountered them, nearly all were living in fully rebuilt homes. For these residents, access to time, resources, and social networks have proved major factors in their rapid recovery timeline. The interaction of assets also provided additional resources. For example, the strong social networks of people in Copano Ridge combined with the swift action residents took in the days immediately following Harvey created access to insurance claims adjusters and contractors. Thus, although they experienced devastating property damage, they were able to rebuild quickly and to their desired standards. Many residents in these one or two-person households described how they drew on savings accounts while waiting for money from insurance. Residents were able to stay in apartments or hotels paid for by insurance, and some respondents had second homes where they were able to stay. The flexibility of living options during the rebuilding process was largely due to the fact that most residents are retired or semi-retired. For them, there was very little loss of income following the storm, unlike the residents in our other two study neighborhoods.

A number of Copano Ridge residents returned in the week after the storm to begin demolition and secure contractors, demonstrating how life circumstances made it possible for them to take immediate action after a disaster, action that can alter the outcome of recovery.[15] One resident described the advantage of being able to stay in an undamaged portion of their property during the rebuilding process to supervise, protecting themselves from contractor fraud. The Ridge is pocked with empty lots where people have either decided to cut their losses and relocate elsewhere, or have the flexibility to wait to begin to rebuild. Some have reduced their exposure to risk by downsizing to RVs and minimizing possessions. Darin explained the need to minimize when he said, "you sure don't want a Stradivarius violin in a glass case in your living room." It is important to note here that while many of

the respondents we encountered in Copano Ridge had the financial means to recover more rapidly in a material sense, the trauma of such a devastating event still affected them in significant ways, as we discuss in the next section.

VULNERABILITY AND HEALTH

Vulnerability affects peoples' exposure and reaction to health risks. Existing conditions combine with current circumstances to decrease or increase vulnerability.[16] We heard from many respondents across neighborhoods that their mental and physical health had deteriorated since Harvey. People who had been healthy were having what they believe to be stress-related illnesses and physical ailments directly related to the storm. Residents who had first and second-hand experience with these post-storm deaths told us stories of people having heart failure. One respondent from South Rockport said that within the first year of the storm, two of her family members died of cardiac arrest, and four more died suddenly in the 22-month time frame following the storm. Other people continued to lose their friends, neighbors, and loved ones. Residents also reported their experience of the increased cases of cancer. In their view, the root cause of these ailments involved asbestos from old insulation and other carcinogens that became exposed and scattered by the storm.

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We also learned from participants across all neighborhoods that respiratory issues were common. Some of our respondents in Copano Ridge had nicknamed their coughs "The Harvey Crud." Segments of the population already suffering from poor health were particularly vulnerable. One woman lost her husband to an asthma attack a few weeks after the storm. People still report being depressed, jumping at sudden sounds, and becoming increasingly anxious during hurricane season. Elderly people seem most at risk for these illnesses and death. In Copano Ridge, the study area with our oldest population, people spoke about how they miss their


2

1 and 2. Mold-affected houses are still common, complicating return and recovery.

neighbors who have gotten sick and left to be closer to health care and away from the mental stressors of recovery.

We heard the lament that people miss their neighbors and loved ones who have died since the storm. Throughout our study areas, we heard this sorrow expressed enough times for it to register strongly among all members of our team. Several of our respondents mentioned that the authorities too easily report the "low" official count of Harvey casualties. They pointed out that, from their perspective, there is a big disparity between official counts and the reality of many more deaths caused by longer term impacts and stress. Our respondents also indicated that chronic stress and health consequences may often be masked by the apparent recovery of the built environment.

6. A Sense of Belonging in Rockport

In the course of our research, we met families that had called Rockport home for many generations. One resident we interviewed lived with four generations of family in one home. Several others identified family settled in the area as far back as five or more generations. Nearly every long-term resident who became part of our research indicated that because of their historical and family ties to the area, they would never move. Newer residents shared a similar appreciation for the attractions of the area, but they were much less likely to feel a strong sense of place attachment to Rockport, and so indicated they would likely leave if circumstances changed. We will elaborate on this finding in the individual neighborhoods below.

IDENTIFICATION WITH PLACE AND CONNECTIONS TO RISK PERCEPTION

Identification with a place, known as "place attachment" in the social sciences, is about people's love for where they live, a "mutual caretaking bond between a person and a beloved place."[17] The affective bond of place attachment is constructed through physical, sociocultural, symbolic, and psychological components, which can take form through specific memories, buildings or relationships experienced in a place. Bethie, a resident in Copano Ridge, currently lives in the house she grew up in. After the storm, her pier was destroyed and so were the trees that provided shade for family gatherings. She felt a great loss for those parts of her home. Another woman enthusiastically showed us her back yard that borders a canal and explained how much she loves the natural beauty. In the context of disaster, there is a direct relationship between place attachment and risk perception. Risk perception refers to personal or communal interpretation of vulnerability to a hazard, a perception that can be influenced by one's sense of place attachment. Environmental psychologists and others describe how individuals with a strong sense of place attachment tend to minimize their perception of risk related to that area.[18] This insight helps explain some of the risk perceptions we captured among residents of Rockport as we will detail in a later section.

People with a strong degree of place attachment are less likely to relocate after a disaster because their identification with a place outweighs their perceived risk for a future disastrous event. Findings from our research support this pattern. The life-long residents of Rockport we spoke to stated they had no intention of ever leaving Rockport, even as they considered the prospect of another disaster. One respondent who believes there is potential for another major storm to hit the town of Rockport said he still feels safer here than other places on the Texas Coast. He will never move because this is where he raised his children as a single father, goes to church, volunteers, and is a source of support for his friends and family. This

respondent fully intends to spend the rest of his life here despite understanding the risk of future disasters.

These lifelong residents often have large families in the area which contributes to an even stronger feeling of attachment to place. For example, one resident we spoke to continues to live in a home with persisting mold damage as a result of the storm, but refuses to vacate the property because it was built by her father in the 60s to accommodate her, the new addition to the family. By contrast, people who had lived in Rockport for less than 10 years or so indicated that they would relocate if another storm were to hit the area. The couple Shawn and Carlie have lived in Copano Ridge for less than five years. They love their home, the birds (including a family of ducks that live on their street), and the quiet pace of the neighborhood. However, they told us they had already decided to leave that behind in the event of another storm.

An individual's place attachment is linked to both emotional (e.g., attachment, closeness, belonging) and mental (e.g. coherence, agency, reflection) components.[19] Many respondents we met exhibited both reason-based and emotional attachments to places within their communities, including their homes and personal belongings. Olivia, a South Rockport resident, emphasized her affection for the 50 trees that she had lost during Harvey. She recounted to us that upon returning home after the storm to see her yard strewn with downed trees, she felt an immense sense of loss. Over the months to come, she felt depressed as she waited for the leaves to return to her remaining trees. In this case, Olivia's sense of place attachment to her home was both cognitive (mental), in that she remembers the 50 trees that used to shade

1. The Rockport coast is famous for its whooping cranes, which draw birders from around the world. Photo by Klaus Nigge/ USFWS.

2. Bait stands are part of the coastal landscape. Photo by Michael Hanson.

her yard, and emotional, in that she felt emotionally connected to the natural environment that the trees represented.

Place attachment for communities as a whole can also be impacted by disaster. The destruction of the community space Paws & Taws Convention Center in Fulton was mentioned across neighborhoods as a particular loss. The facility was a common place where people gathered to dance, hold wedding receptions and proms, and meet with each other. One respondent who had a close relationship to the facility mentioned that he had recently returned to the spot for its official re-groundbreaking. Though they were reconstructing the actual building, he felt that it would never be the same. His cognitive memory of Paws & Taws (square dance terms for male and female partners) remains after the storm, but his emotional attachment has decreased significantly. This relationship to Paws & Taws is an example of what scholars call "solastalgia,"[20] or missing a place that is lost. Solastalgia can produce significant mental distress during a disaster, which is sometimes amplified by the rebuilding process.

Similarly, each individual's connection to a community space is highly personal. Many respondents we spoke to highlighted the post-Harvey absence of the movie theater as a huge community loss, but the relationships to the theater varied among individuals. For example, one gentleman we spoke to had multiple disabled family members in his household, and the movie theater served as the only source of recreation for the family in a very outdoor oriented area. As one of the only activities they could enjoy together as a family, they felt the loss greatly. Another respondent explained how she looked forward to Tuesday nights at the movie theater every week because they had five-dollar movie night that included a free popcorn bar with over 20 toppings. Other retirees cited the theater as a fun place to gather with friends. Hence, the loss of the movie theater creates solastalgia among the community as a whole, but the individual connections have deeply personal meaning.

In addition to the disruption associated with changes in one's physical environment, disruption of one's daily routine following a disaster can also be disorienting. An employee of the Aransas National Wildlife Refuge explained to us how her job changed completely after the storm. In the immediate weeks after Harvey, the Refuge was overseen by the National Fish and Wildlife service, and employees were asked to stay home and focus on their personal recovery. Laura described how her absence from work added to the emotional stress and left her with no escape from the damage to her own home. Upon returning to the Refuge, she

Paws and Taws, destroyed by Harvey, was a beloved local gathering place.

described it as "eerie and sad," noting how she was left speechless. The destruction of 300-year-old oak trees and the beloved visitor center was felt by the employees as a great loss. Both their everyday jobs as well as their relationship to the Refuge changed significantly. When a disaster dramatically affects both a person's home and professional worlds, it is especially trying.

7. Findings From Neighborhoods In Our Study

In the following section, we will introduce our findings for each of the three neighborhoods where we conducted research with residents: South Rockport (south of the town center); Copano Cove, (south and east of Salt Lake); and Copano Ridge, (north of Salt Lake bordering Copano Bay). For an orientation to all three areas within the larger Rockport community, see the map on the inside front cover.

RESEARCH IN SOUTH ROCKPORT

The land known today as South Rockport was originally land where cattle ranchers settled. With the arrival of the new tourist industry in the 20th century and the decline of the cattle industry, new housing developments grew up in the South Rockport area. From the beginning of Rockport's settlement through all of its economic transitions, Hispanic families have brought cultural and workforce diversity to the predominately white population.[21] This diversity remains one of Rockport's strengths today.

The residents we interviewed in South Rockport live in small frame homes, and a majority of them reported belonging to large families in the area. Their multi-generational ties form family-based systems of interdependence that we did not encounter in the other two areas we studied. These families tend to live in dispersed households, but in close proximity to each other. They are commonly lifelong residents who communicate and depend on each other

The South Rockport neighborhood. Satellite imagery via Google Earth Pro.

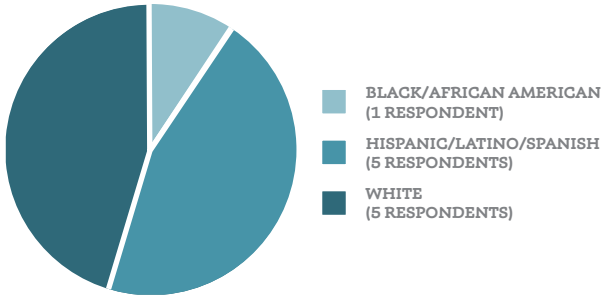
in an everyday way. These intrafamilial ties have provided vital emotional support as well as skilled labor and shared childcare services during the recovery process. In addition, most of our respondents in the South Rockport area noted that they look out for each other as neighbors, checking in after a storm or to borrow a cup of sugar. These ordinary practices help explain the shared sense of community so commonly identified among residents in this area.

Since our interviews took place nearly two years after Harvey, there was much to learn about the degree of progress toward recovery across the three areas of study. In general, our research participants in South Rockport have experienced the slowest material recovery. This reality owes in part to the lack of savings that would allow for rebuilding homes without waiting for insurance or government aid. Without financial resources, it takes a long time to rebuild, and even when aid does eventually come through, it often isn't adequate to fully rebuild. For these reasons, most people in the area are still struggling to rebuild and manage the intricacies of insurance. A startling finding was that nearly all of our respondents in South Rockport reported living with mold because they have not had the time or money to mitigate properly. Mold can easily go undetected because it is so often odorless and invisible, growing behind sheetrock. Living with it can have serious health consequences.

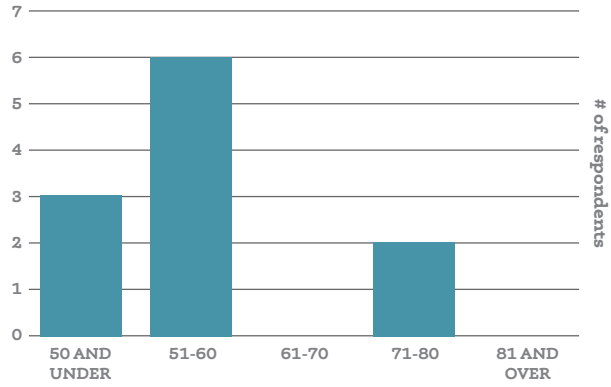
In South Rockport, we also learned of a few people who had received welcome help from religious groups such as the Mennonites, Samaritan's Purse, and Hands of Hope. These generous organizations provided extensive aid, but the process of applying for the aid and waiting for construction took well over a year. In some cases, residents are still displaced and waiting for help that has been promised.

In addition to the most pronounced problems with slow recovery in all our study areas, residents in South Rockport also reported a much higher degree of livelihood impacts from the storm. In six of eleven households, people we interviewed at length reported that their work had changed significantly because of the storm. In some cases, these changes concerned significant amounts of income loss; in other cases, people lost their jobs entirely. The loss of livelihood and income, alongside the

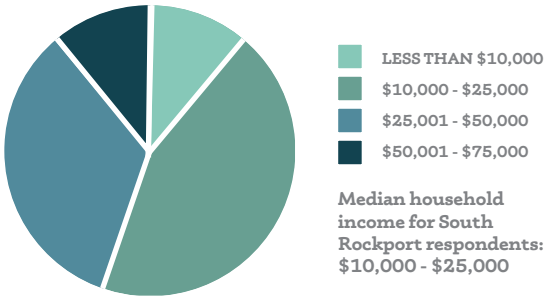
ETHNICITY: SOUTH ROCKPORT



AGE: SOUTH ROCKPORT



HOUSEHOLD INCOME: SOUTH ROCKPORT



Ethnicity, age, and household income across our sample of 11 South Rockport households.

damages from the storm, created serious hardships made harder because of the unavoidably long, drawn out process of recovery as explained earlier.

THE ORIGINS OF COPANO COVE AND COPANO RIDGE

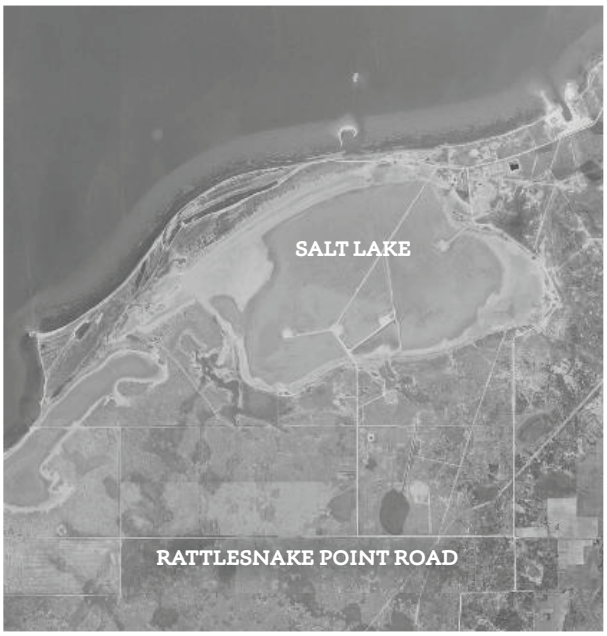
To the northwest of South Rockport lie Copano Cove and Copano Ridge where water front homes are more common, financial resources are more stable (or, in the Ridge, affluent), and the average age of residents is higher.

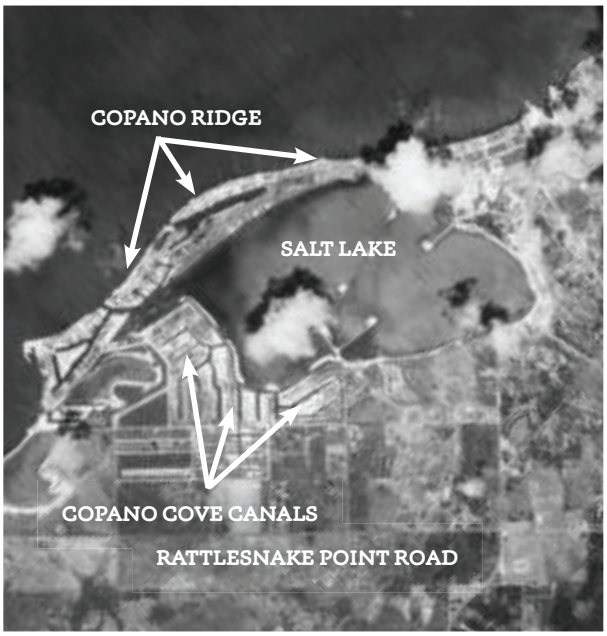
Once large-scale housing projects had begun in the early 1960's with Key Allegro, a new trend in land development emerged to create the areas of Copano Cove and Copano Ridge. By building both long and short length canals, developers used material dredged from the channel to elevate the plots of land (see images below). This model of developing plots, reinforced by concrete embankments upon dredged material, provided an area for middle class housing in the general Copano Bay vicinity. Such water-oriented development gave birth to the Copano Cove and Copano Ridge areas and made possible a connection between Salt Lake and Copano Bay.

RESEARCH IN COPANO COVE

The Copano Cove area south of Salt Lake suffered from the storm surge that Hurricane Harvey produced in Copano Bay. Page 23 includes graphs describing the Copano Cove respondents.

The striking range of household income in this area ($10,000-225,000) relates to the two different subareas of development within the Cove that drew people with distinct resources. At the lower end of income, we interviewed many households in which income earners had dependents with disabilities who required financial support, straining families with already meager resources. Some Cove residents moved to the area to retire, while others had deeply-rooted family ties in the Rockport area. The single-family homes around the canal systems belong to retired and semi-retired couples and families.





Left: Copano Cove area in 1952 before development. Right: Copano Ridge and Copano Cove developments, 1969. Photo courtesy of USGS.

Further out from these canal-facing strips of small, developed neighborhoods, we noted a different pattern of development: larger plots and lower-lying land brought a wide mix of mobile homes, travel trailers and modest single-family houses. These outlying areas were home to several households with low-income and were interspersed among moderate income households. In the starkly low-income pockets, homeowners were still struggling to rebuild their properties twenty-one months after Hurricane Harvey. They were still attempting to locate government and non-governmental resources. Many people faced the additional financial responsibility of caring for family members with disabilities. By contrast, the Copano Cove respondents who lived closer to the waterfront and canal systems had insurance coverage and/or savings to help them rebuild their middle-class homes.

In short, the Copano Cove residents in our sample tended to fall into one of two groups: the first group was composed primarily of recreation-oriented retirees living comfortably on waterfront properties. These residents were involved in the community through their volunteer work at a local church or with a community organization.

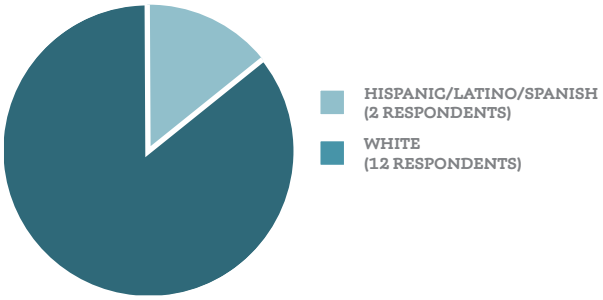
The second group of residents we named "independent outsiders." This term reflects our finding that there are a number of people with modest means who are employed and whose homes are located further inland in sporadically developed areas with a lot of undeveloped land. These residents conveyed a concern with self-reliance and were often unconnected to neighbors and community activities. (See also discussion on page 13). Many of the "independent outsiders" we encountered live in mobile homes. Despite a degree of isolation from others, some identified strong relationships with friends and/or family members in the broader area.

Residents of both portions of Copano Cove are still actively rebuilding their lives. Compared to residents we interviewed in South Rockport, however, they faced different sets of challenges. For example, none of our respondents lost or changed their jobs compared to more than half of our South Rockport residents. Still, Cove residents without financial aid from insurance or FEMA were required to take

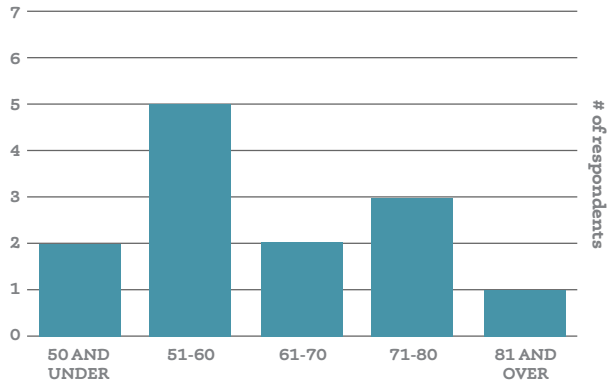
The Copano Cove and Coopano Ridge neighborhoods, 2019. Satellite imagery via Google Earth Pro.

time off from work to rebuild and manage home repairs as best they could. A common difficulty for these residents concerned the extensive amount of extra time it took to commute regularly between a temporary place of residence, their damaged home, and their place of work.

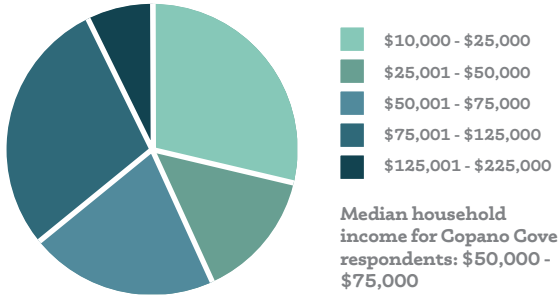
ETHNICITY: COPANO COVE



AGE: COPANO COVE



HOUSEHOLD INCOME: COPANO COVE



Ethnicity, age, and annual household income across our sample of 13 Copano Cove households.

Many retirees were able to navigate the demands on their time to rebuild because of their more flexible schedules and because they had no children to manage. In addition, retirees who lived on the canal waterfronts could typically afford to hire contractors to get work done. Those who promptly submitted their insurance claims or requests for help from FEMA consistently got help faster than others. In fact, many studies show that acting quickly after a disaster not only speeds rebuilding, but also can preempt difficulties related to a drawn-out recovery process. The consequences of slow recovery include extreme stress and uncertainty, discomfort and dislocation, and increased prices for everything required to rebuild. Indeed, the lowest-income residents we interviewed who were without aid or insurance became demonstrably stuck in a cycle of waiting for help that might or might not arrive. We encountered two residents in Copano Cove area who are still dealing with unlivable houses that have yet to be demolished.

The majority of our respondents in Copano Cove reported being inspired by the damage from Harvey to make home improvements to protect their property against future storms. For example, many reported putting metal brackets on window frames to better withstand wind gusts. A few also reported efforts to raise their land to reduce flooding.

RESEARCH IN COPANO RIDGE

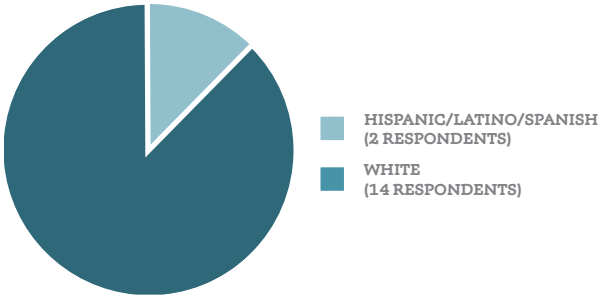
The strip of land on the south shore of Copano Bay and on the north shore of Salt Lake known as Copano Ridge was developed much like Copano Cove and Key Allegro. The land of Copano Ridge was built up using the dredged sediment from deepening the canal system on the shores of Copano Bay. Housing developments on Copano Ridge followed a dredging project in the 1960's that opened Salt Lake up to the bay. The community that presently lives on what they call "The Ridge" is a

community of overwhelmingly white, middle and upper-middle income retirees. The two-block arc of homes includes a number of large rental properties scattered among permanent local residents. These retirees have chosen to live on "The Ridge" for its quality of life, including its views of the water and its ready access to boating and fishing. Most Copano Ridge residents we interviewed moved to Rockport in recent years; we found only one lifetime resident of Rockport.

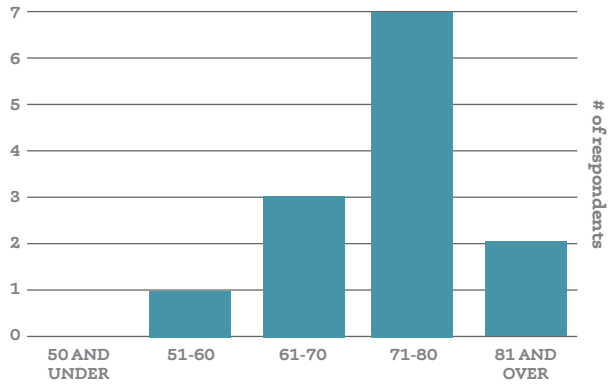
All our Copano Ridge respondents live alone or as a couple. Their homes are large, well-built, and well-appointed, and respondent reports of income indicate that everyone in the Copano Ridge neighborhood lives with a degree of affluence that we did not witness in the other neighborhoods. This affluence is not quite apparent from the Household Income chart because residents in The Ridge were retired or semi-retired and had little to no income from work. They were instead living off of their savings accounts and investments. It was these financial reserves that made it possible for them to fund the initial weeks of recovery while waiting for insurance checks to arrive. The Ridge is also the community with the oldest population of the areas we studied. Nine of 16 participants were over age 70, and 12 of 16 were over age 60. Many residents here made it clear that their mental and physical health had declined after Harvey. These declines were not unique to The Ridge, but the older age of community members made the post-storm ailments and deaths notable to our research team. Some of the residents most well-known by their neighbors relocated to be closer to medical care, and respondents reported that a few have died since the storm in 2017.

The sadness and difficulty of circumstances for more affluent people on The Ridge made it clear to us that, irrespective of material wealth, all people we interviewed faced immense hardships in the aftermath of Harvey. People in Copano Ridge were able to summon abundant resources, like retirement savings and personal time to start reconstruction. These resources made it possible for people to achieve material recovery faster and more fully than the two other neighborhoods. Today Copano Ridge is the most thoroughly rebuilt neighborhood that we studied. On the other hand, it was also drastically altered

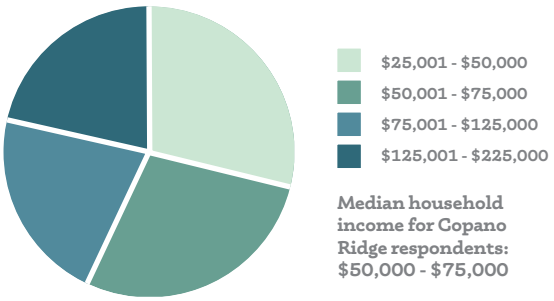
ETHNICITY: COPANO RIDGE



AGE: COPANO RIDGE



HOUSEHOLD INCOME: COPANO RIDGE



Ethnicity, age, and household income across our sample of 14 Copano Ridge households.

as people sold their destroyed homes and land to new people seeking to build rental home construction on the property where permanent residents had lived.

8. Risk Perception and Storm Preparation on the Texas Coast

OVERVIEW

During our time on the Texas Coast, we noted how residents are well accustomed to the threat of extreme weather events. Prior to Hurricane Harvey, the Central Texas Coast had been unaffected by a major storm since Hurricane Celia in 1970. Since Celia, Harvey was the first major storm in almost fifty years, and it blew up from a tropical storm to a Category 4 hurricane in under 48 hours. The long lull between these two major events, paired with the rapid intensification of Hurricane Harvey, resulted in a rushed response from officials of Rockport and from local residents themselves.

Our research was partially focused on how risk perception influenced the way people prepared for and responded to Harvey. This section of the report will explore the variety of factors that influenced the response and preparation of our respondents. Additionally, we will describe how experience with Harvey has affected attitudes toward future storms and preparedness.

RISK PERCEPTION AND PAST EXPERIENCES

Through our interviews, we found that previous experience with hurricanes (or the lack thereof) influenced how prepared individuals were for Harvey. The influence of these prior experiences depended upon whether they occurred during a person's childhood or adulthood. Additionally, we found that the lull between major disasters impacted how Rockport was able to prepare as well as how residents viewed risk.

Our respondents who lived through hurricanes as children noted how different it was to be an adult during Harvey. As children, their parents were responsible for preparing and responding to disasters, a role they had to adapt to once they were older. Brenda, who experienced Hurricane Celia, stated that "After Harvey I realized that I had gone through those storms as

1. A post-Harvey mess in a Copano Cove kitchen.

2. News photo of the devastation in Copano Cove one year after Harvey. Photo courtesy of Rick Mendiola.

a child, and it's very very different when you are taken care of... when you have some adult holding your hand, taking you wherever you've got to go." On the other hand, our interviewees who had experienced major storms as adults were more equipped to respond adequately to the disaster. One respondent had experienced Hurricane Katrina as a member of the search and rescue team and had also lost a home during Hurricane Rita. As a result, he reported being as prepared as anyone could have been for Hurricane Harvey. Overall, we found that any past experience had a positive impact on a person's preparation for and response to Harvey.

Another finding from our research showed how past experiences with warnings that do not materialize can numb people to the actual risk and leave them unprepared for a serious event. Living on the Texas Coast acquaints residents with regular warnings of approaching storms and possible hurricanes. TAMU-CC hurricane scholar, Pat Fitzpatrick, explained to our class how the "error cone" commonly shown on TV weather services helps visually depict the zone of storm risk as a storm approaches the coast. However, this real-time modeling of the probable track of a storm is too easily dismissed because predictions are inaccurate a third of the time. The routine familiarity of warnings and missed projections of a storm's path lead many people to underappreciate the actual risk. As the tropical storm in the Gulf became Hurricane Harvey, people waited for Category level 3 or 4 to react, but by then, it was very late. Victoria, a respondent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1. Heavy machinery was barely a match for the massive scale of debris.

2. South Rockport home built by volunteers from Samaritan's Purse.

from South Rockport, explained how she was not planning to evacuate at all until the morning of Hurricane Harvey and that she "didn't expect anything like this." It wasn't until she saw the morning news that she realized Harvey had intensified to a Category 4 with 130 mph winds. By then, she only had a couple of hours to prepare her home and family for the storm before she evacuated.

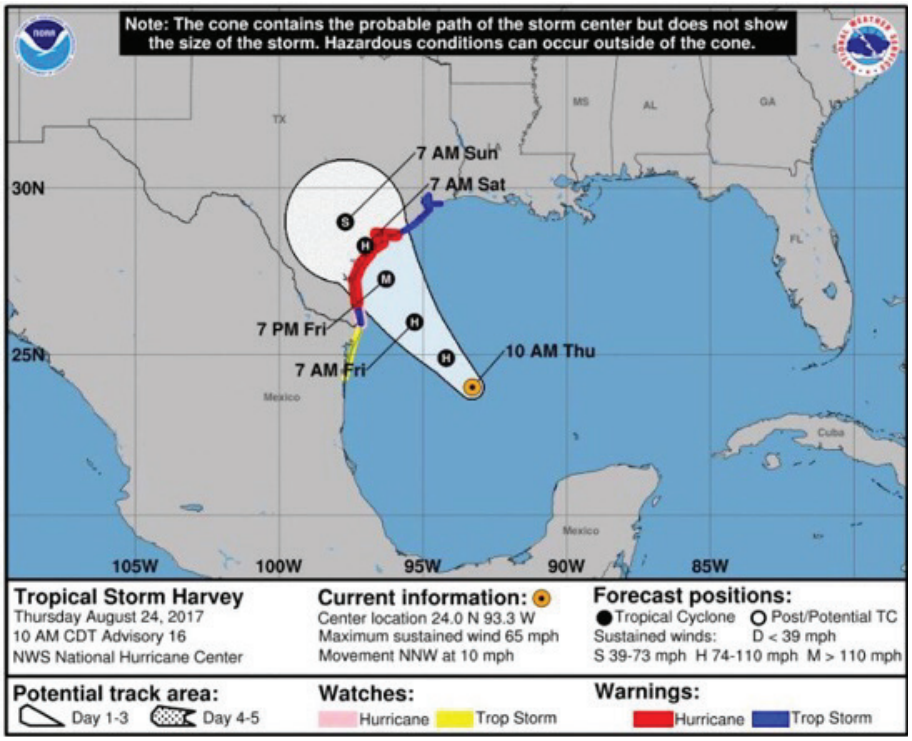
In sum, our research revealed that, for the most part, residents of Rockport either prepared for Harvey and responded in advance or didn't depending on the nature of past experiences with other major storms.

PREPARATION AND RESPONSE

Because of the rapid intensification of Harvey, there was a generally rushed response in Rockport from the public as well as officials. People had limited time to prepare themselves, their homes, and their community for the incoming storm. Many evacuated the day before or even as late as the morning of the day Harvey made landfall. Twenty-five percent of our sample did not leave the Rockport area despite the mandatory evacuation posted by city officials.

There are many reasons that people chose not to evacuate before Harvey, including, as mentioned above, their past experience with storm warnings that did not materialize, as well as factors such as the limited amount of time, limited funds, decreased mobility due to disabled members within a household, fear of losing property, and lack of transportation. Tim, a resident of Copano Ridge, rode out Harvey with his elderly father as they had in the past for other storms. His father's old age and disabilities made evacuation too difficult, so they stayed, witnessing their home torn apart by the winds of Harvey. Alternatively, those who did leave were left with the task of finding an effective evacuation route as well as accommodations.

Whether individuals evacuated or remained in Rockport, those who were able attempted to prepare their homes for a Category 4 hurricane. Preparation included boarding up windows, the tying down of outdoor equipment, moving possessions to higher ground to avoid water damage, grabbing personal items, and taking pictures of property. Unfortunately, some



The "cone of uncertainty" represents the probable track of the center of the hurricane based on models used to make the forecast. Image courtesy of NOAA.

of the people we spoke to did not have the means or strength to adequately prepare their homes on short notice.

Not only were individuals rushed before the arrival of Hurricane Harvey, but public officials were as well. During our time in Rockport, we had the opportunity to speak with emergency management coordinators (EMCs) in the area. With Harvey looming on the horizon, public officials were faced with the challenge of expediting and/or completely revising their disaster plans. According to one EMC in the area, no one was prepared for the loss of technology during and following Harvey. All eight Rockport emergency backup generators failed during the storm. Additionally, public services that normally aid in evacuation efforts such as the 211-phone number (an alert system that triggers picking up people from their homes who cannot evacuate on their own) were unable to be dispatched because of the loss of communication.

Another of the challenges of a disaster hitting a small coastal town such as Rockport was the lack of resources. Sara Williams, the EMC for San Patricio County, stated that Rockport and surrounding areas were understaffed for such a large catastrophe. Most of the disaster plans prior to Harvey focused on response without considering recovery. The chaos of attending to the lack of necessary resources combined with the disconnect between federal and local governments proved to be a daunting challenge for public officials in the aftermath of Harvey.

In visits to our class, we heard from emergency managers who not only had to be responsible for themselves during the storm, but for their community as well. One EMC mentioned the difficulty of having to respond to a disaster that affected him as well. First responders and emergency coordinators had not planned on being victims themselves. According to another public official, this reality resulted in many first responders experiencing psychological trauma that persists today.

Overall, because of the quick growth of Harvey, there was a hurried response in Rockport from the public as well as officials. All those affected by Harvey did the best that they could with the given circumstances, but rapid intensification

Interview and mapping exercises with residents sometimes took place in civic spaces like the Aransas County Public Library.

events can be expected and have happened in the Coastal Bend (Brett, 1999 and Celia, 1970 for example). Clearly, there is room for improvement in local preparedness.

ADAPTING AFTER DISASTER

Following the destruction from Hurricane Harvey, the risk perception of many Rockport residents increased. Many people we spoke with stated that they planned to improve their methods of preparedness though some were left with feelings of increased apathy.

The psychological and emotional impacts of Harvey are still widespread in Rockport. The continuous mental impacts on the Rockport community may relate to the prevalence of "optimistic bias" before the storm. Research has shown that "people have an optimistic bias concerning personal risk; when it comes to potential harm, such as disease or catastrophe, people think that others are more likely to be affected than themselves."[22] The phenomenon of optimistic bias leads to both more confidence in success and prosperity, as well as increased levels of risk-taking or even reckless behaviors. Phrases such as "my neighbor had it worse" and that Harvey was a "once in a fifty-year storm" (suggesting that Rockport will not be hit by another major storm for another fifty years) were common examples of optimistic bias that we heard in our interviews. Prior to Harvey, interviewees did not believe they were at risk for a major storm. The idea that the Coastal Bend including cities within the bays were more protected and immune to big damage was also prevalent before the 1916/1919 hurricanes.[23] However, following Hurricane Harvey,

1. As many people told us, the recovery process takes more than rebuilding physical structures.

2. Contractor points to the new bracketing hardware for strengthening home construction in hurricane-prone areas like Rockport.

optimistic bias has generally lowered, and more residents see the risk of another major storm arriving sooner rather than later.

In many ways, Hurricane Harvey resulted in people having an increased perception of the risks that exist within the area. When reflecting on the attitude Rockport residents had towards potential storms prior to Harvey, one respondent from the Copano Ridge neighborhood stated, "My guess is that none of us were prepared, really." As a result, many people we spoke with expressed distinct plans to improve preparation efforts for future hurricane seasons. One respondent reported avoiding travel and medical procedures during hurricane season. Another Rockport resident stated that they keep constant tabs on possible hurricanes in the Gulf, as well as not "taking weather for granted." Some of the people we interviewed even stated that they would permanently leave Rockport if they were hit by another major hurricane. Overall, the attitude that Rockport residents have towards potential storms has definitely shifted following Harvey.

Nonetheless, the window of increasing preparedness and awareness is rapidly closing. One EMC we spoke with stated that prior to Harvey, complacency was the "norm." She stated that many people were in denial and did not evacuate because of this. Additionally, "the growing coastal population of individuals who have little to no hurricane experience may result in more individuals underestimating the risk involved with living in hazard-prone areas."[24] Harvey served as a wake-up call to the reality of risks but, with each passing uneventful hurricane season, this awareness will fade away if changes fail to be made.

The residents of Rockport are still within the window of opportunity to make further adaptations and preparation plans in response to future hurricane risks. Efforts such as educating residents on the risks that exist within the area, the insurance and preparedness processes, and more detailed emergency and recovery plans could better prepare residents for the next major storm, whenever it arrives.

9. Mapping Risk Perception, Part 1

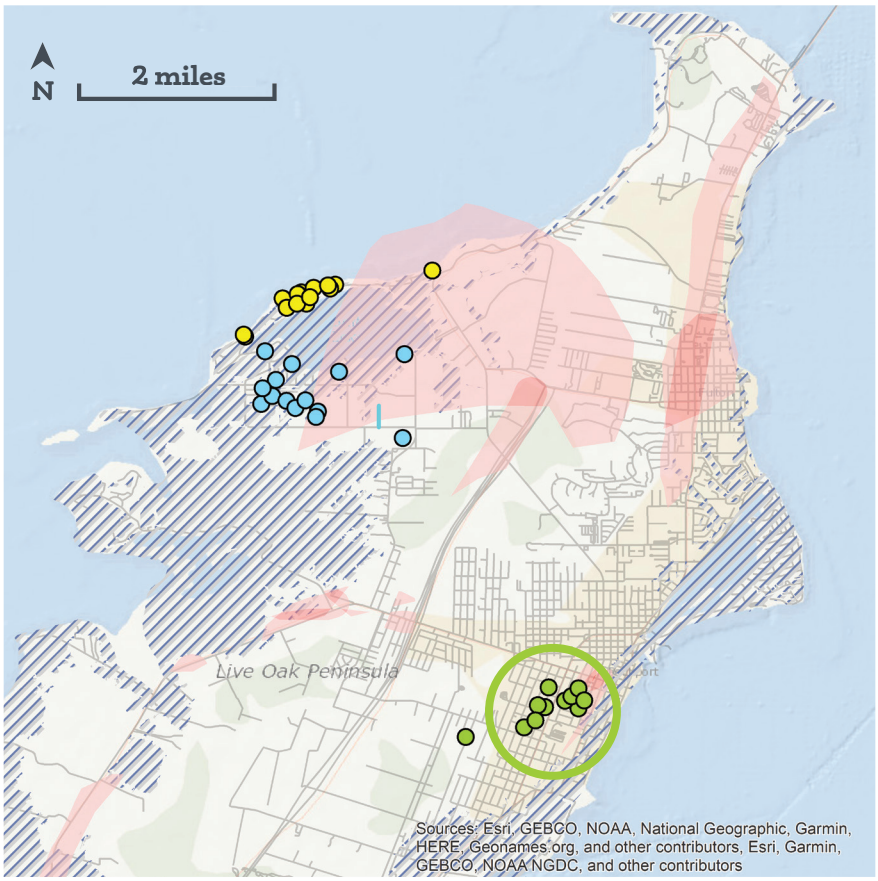
The following graphics are the results of the risk perception mapping exercises conducted with respondents in 40 households. The results are presented by type of risk starting with flooding from rain, and by community, starting with South Rockport.

Respondents identified different kinds of risks on maps at all three scales—neighborhood, community, and regional. This method of participatory mapping is particularly valuable because it can supplement theoretically-based flood map data (created by an analysis of variables such as elevation) with lived experiences. We saw the most interesting comparisons across neighborhoods with the community-level map where everyone marked the types and locations of risks they perceived to exist. This scale encompasses the full community of Rockport and Fulton including all three neighborhoods and Copano Bay, as well as portions of Aransas Pass and Port Aransas.

LEGEND: RISK PERCEPTIONS FOR FLOODING FROM RAIN

Pink to red shaded areas on these figures indicate regions where at least half of the participants in the given neighborhood identified a risk of flooding from rain, with darker shades indicating a greater number of participants' risk perception. The cross-hatched areas on the map indicate FEMA's assessment of the floodplain.

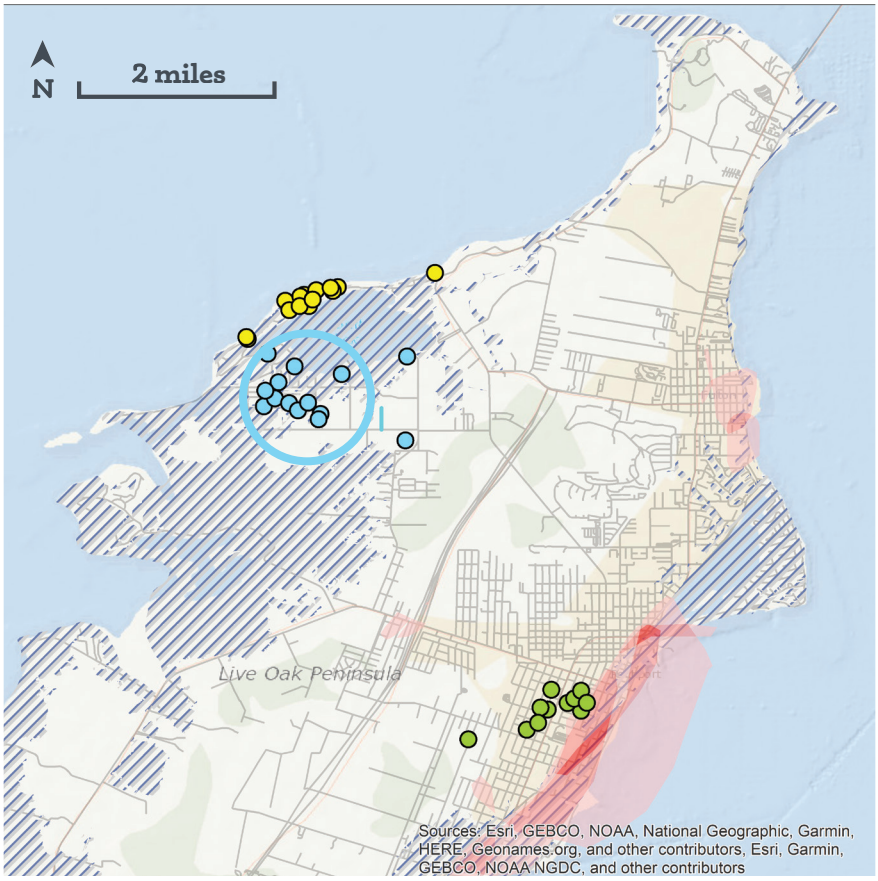
- *South Rockport participants (11 households)*
- *Copano Cove participants (13 households)*
- *Copano Ridge participants (14 households)*
- *FEMA floodplain*



SOUTH ROCKPORT residents' perceptions of where there is risk of flooding from rain. FEMA 100-year floodplain maps updated in 2016 are shown in diagonal stripes.

Consensus (out of 11 households)

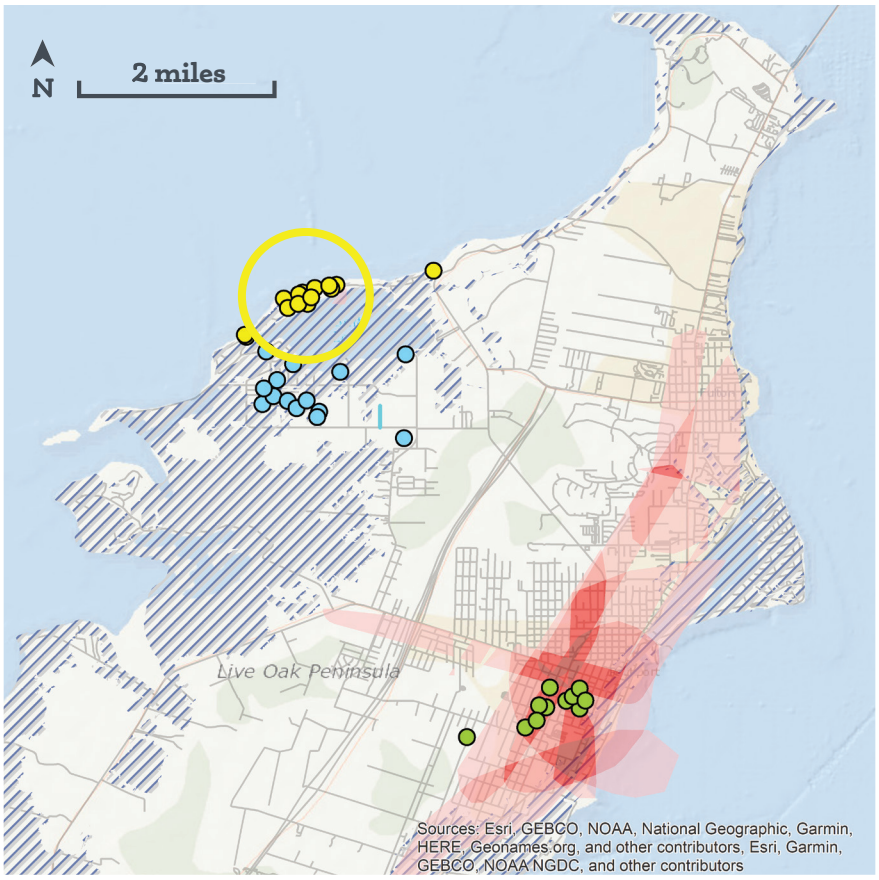
- *6 households*
- *7 households*
- *8 households*



COPANO COVE residents' perceptions of where there is risk of flooding from rain. FEMA 100-year floodplain maps updated in 2016 are shown in diagonal stripes.

Consensus (out of 13 households)

- *7 households*
- *8 households*
- *9 households*



COPANO RIDGE residents' perceptions of where there is risk of flooding from rain. FEMA 100-year floodplain maps updated in 2016 are shown in diagonal stripes.

Consensus (out of 14 households)

- *7 households*
- *8 households*
- *9 households*
- *10 households*
- *11 households*

In Part 1, we focus on one of the most frequently cited risks by all groups—flooding from rain. The comparative maps show how, for a given neighborhood, the respondents we interviewed pointed out the parts of the community that are at risk of flooding from rain.

Each of the three maps in Part 1 not only conveys residents' perceptions about where risk of flooding from rain is located, they also integrate 2016 FEMA flood maps for the same area, a layer represented as diagonal lines on each map. The relationships between residents' perceptions and FEMA flood maps provide interesting contrasts to consider.
In the next section, we describe a set of findings related to these maps and offer a possible explanation for patterns we see.

Results of our risk perception exercise with respondents revealed interesting relationships between risk perception and place attachment. Specifically, our respondents in both Copano Ridge and Copano Cove identified the risk of flooding from rain in the waterfront areas of Rockport and Fulton where FEMA maps also identify an important floodplain. In contrast, South Rockport respondents who live in these designated flood-prone areas of central Rockport did not identify risk of flooding from rain in their own area or nearby town center. Instead, they located most risk of flooding from rain some distance away, in the general Copano Bay area, the area north of Rockport called Fulton, along FM 1069, along Market Street, and especially around the crosstreets of Church and Market.

What is striking about these differences is that in Copano Cove and Copano Ridge, the extensive risk identified by a majority of residents we sampled aligns well with

FEMA floodplain maps. These overlapping maps of risk perception and actual risk are also apparent in the ethnographic stories we heard about people's experience with flooding in central Rockport and Fulton.

Why did people in South Rockport, with their proximity to these waterfront floodplain areas, not identify them as at-risk areas? The question poses an interesting case, one which we offer a possible scenario to explain. In the literature about risk perception, some researchers have found that in areas where people feel a strong sense of place attachment, people may unconsciously minimize their recognition of risk and consequent preparedness in that place.[25] This finding suggests to us that the places we are attached to emotionally or cognitively become important to us and we may be less likely to acknowledge the risks that exist in these places. Knowing one's environment and its fluctuations so well may thus create a sense of familiarity that effectively normalizes risks that others less familiar with the area recognize better. Our research points to the need for further investigation into the potential role of place attachment on risk perception.

The ethnographic interviews indeed revealed that South Rockport residents display a strong sense of place attachment to their local environment and to Rockport generally. Several reasons help make this attachment clear. First, the majority of South Rockport residents we interviewed are lifelong residents of the area, a finding not shared by our sample in the other two neighborhoods. Second, more than half of these residents, who are Latino or African American, maintain large families in the immediate area. And third, these large families depend on each other and effectively provide support for each other. In addition, they can insulate their members from risk of all kinds. In short, the majority of people we interviewed in South Rockport seem to exhibit many reasons for their deeper sense of connectedness to place and, consequently, don't appear to recognize the risks immediate to their area as clearly as those who do not live there.

A resident uses paint markers on a laminated map to identify the location of specific kinds of risk.

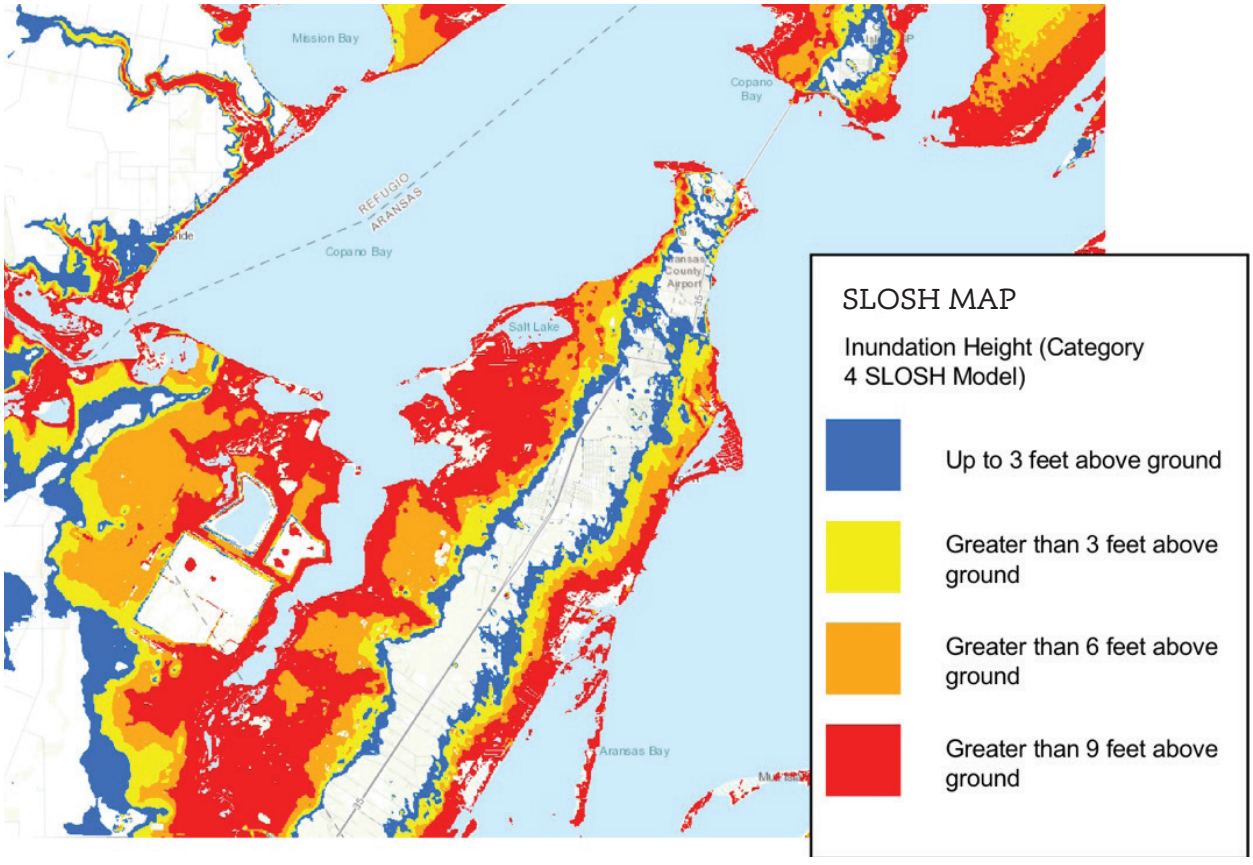
10. Mapping Risk Perception, Part 2

The next set of figures compares the three neighborhoods' perceptions of surge-flooding risk with the National Weather Service's "SLOSH" maps.

The map below depicts potential storm surge heights estimated by the National Weather Service's (NWS) "Sea, Lake, and Overland Surges from Hurricanes" (SLOSH) model for a Category 4 hurricane. The SLOSH model is a computer-generated map of risk from hurricane storm surge. It is produced by simulating hurricanes from all possible directions and combining the maximum storm surge heights in the area. In other words, the SLOSH model estimates a "worst-case scenario" for flooding from surge that could result from a hurricane of a certain strength in the area.[26]

As was clear in Hurricane Harvey, not all areas of the Rockport-Fulton community highlighted in the SLOSH map were affected by storm surge, but many were. In particular, the low-lying areas south of Salt Lake experienced significant damage from storm surge, which aligns with the SLOSH model's identification of at-risk areas. Recall, too, that the canals and waterfront areas of Copano Cove were created from material dredged up from Copano Bay and installed to increase elevation. The necessary trade off of this kind of "new land" to elevate an area is that the areas surrounding the new material are lower than before and at even more risk than before.

If Harvey had followed a different path, it is likely other areas of the peninsula highlighted on the SLOSH map would have been affected by flooding from storm surge. Whether a given area is at-risk for



flooding in a particular hurricane depends on the hurricane's path and primary wind direction, but the SLOSH map shows all areas that could be affected under the right (or wrong) conditions.

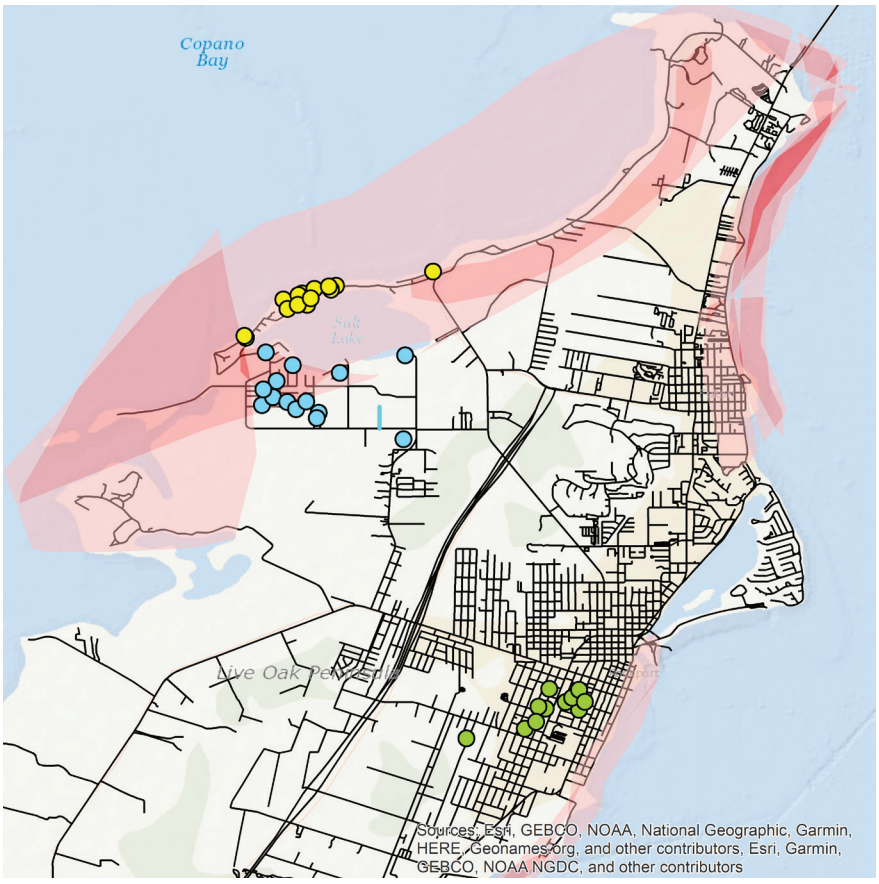
LEGEND: RISK PERCEPTIONS FOR FLOODING FROM STORM SURGE

Pink to red shaded areas on these figures indicate regions where at least half of the participants in the given neighborhood identified a risk of flooding from storm surge, with darker shades indicating a greater number of participants' risk perception.

- *South Rockport participants (11 households)*
- *Copano Cove participants (13 households)*
- *Copano Ridge participants (14 households)*

The three figures on pages 35-36 show the aggregated results of our mapping exercise with residents from each of the three study areas regarding their perception of risk related to flooding from surge.

The differences in patterns of risk perception for flooding from storm surge between neighborhoods suggests another possible relationship between place attachment and the perception of risk, as we identified in the earlier risk perceptions of flooding from rain. South Rockport respondents identified risk for storm surge along Copano Ridge and the northwest and northeast sides of the peninsula, as well as along the coast to the west of Copano Cove. They also pointed to risk of flooding from surge along the coast to the south of the Rockport city center, though almost no risk in the town center.

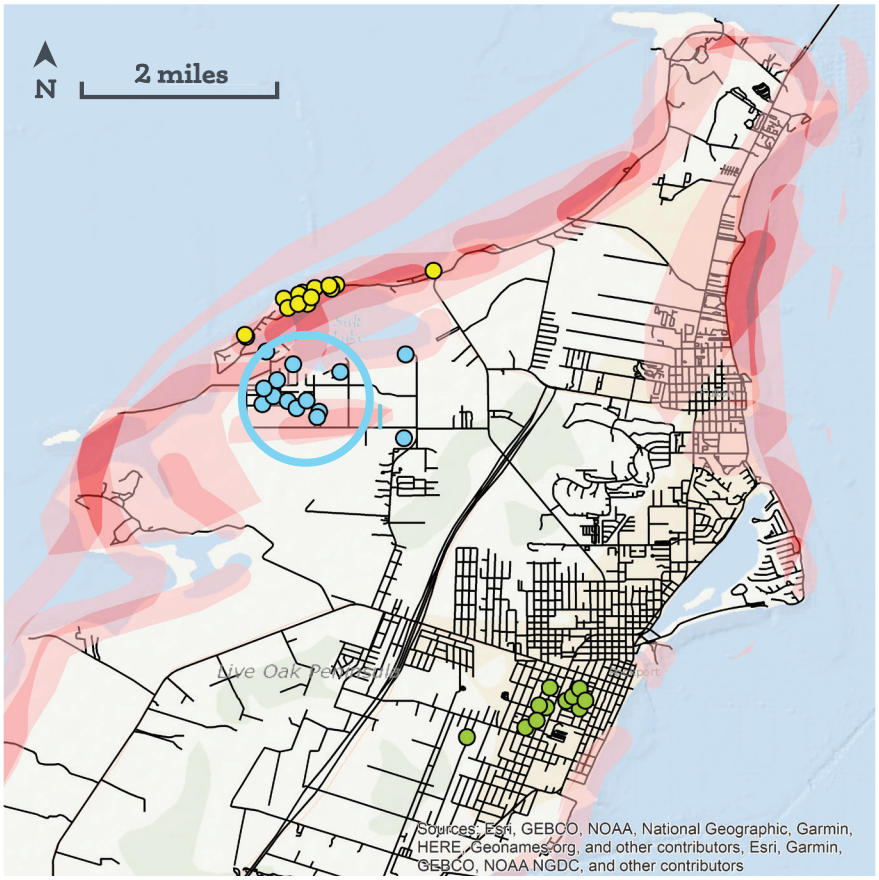


SOUTH ROCKPORT residents' perception of where there is risk of flooding from surge.

Consensus (out of 11 households)

- *6 households*
- *7 households*
- *8 households*

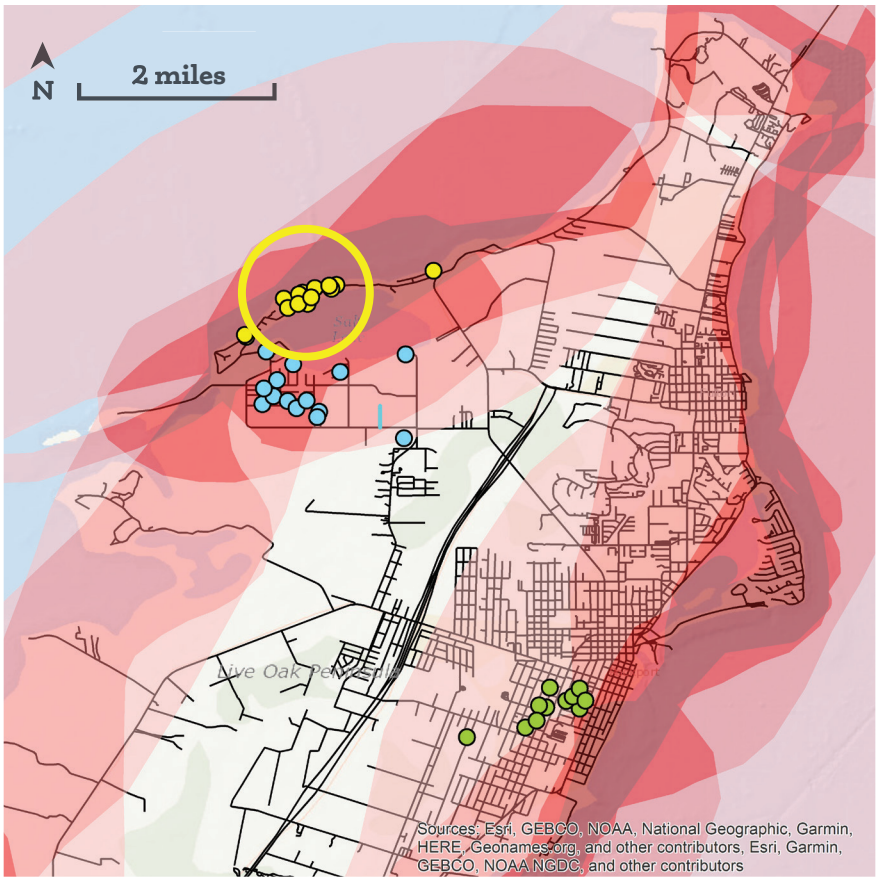
Copano Cove residents similarly identified risk along the northern edges of the peninsula and south of Rockport, but, in addition, they identified risk of flooding from surge along Key Allegro and further south into Port Bay and in their own neighborhood. Copano Ridge residents identified risk along the entire coastline of the



COPANO COVE residents' perception of where there is risk of flooding from surge. .

Consensus (out of 13 households)

- *7 households*
- *8 households*
- *9 households*



COPANO RIDGE residents' perception of where there is risk of flooding from surge.

Consensus (out of 14 households)

- *7 households*
- *8 households*
- *9 households*
- *10 households*
- *11 households*

peninsula visible in our community maps, across Copano Bay toward the town of Bayside, and across the northern channel around the town of Lamar. Most strikingly, The Ridge respondents identified a high degree of risk near the town center of Rockport, a pattern absent from the risk perception maps of South Rockport and Copano Cove residents in our study. The areas of risk with most consensus (darkest on the map) appear along Key Allegro, along the coast of south Rockport, and in their own neighborhood of Copano Ridge.

These differences may be explained using a similar framework as the risk perceptions of flooding from rain. As mentioned earlier, South Rockport residents that we interviewed show a high degree of place attachment that may be linked to their large extended families, intergenerational ties to the city, longtime residence in the area, and deep familiarity with the local environment. Most of the Copano Ridge residents in our study, in contrast, are relative newcomers to the area, many having moved to the neighborhood to retire. Their sense of place attachment is considerably weaker than that of the South Rockport residents, and it is generally linked to the natural environment surrounding Salt Lake and Copano Bay rather than to familial ties within the Rockport community. It is likely that this variance in the strength of place attachment between Copano Ridge and South Rockport residents explains the differences we see in the surge-flooding risk perception maps. South Rockport residents may also minimize the potential for catastrophic surge flooding in their neighborhood because living alongside chronic flooding has normalized the risks that less seasoned residents notice. The Copano Cove residents that we spoke to expressed varying degrees of place attachment and had varying times of residency in the area and family ties within the community. As would be expected, the map of their perception of risk for surge-flooding shows an intermediate total length of risk along the coastline and includes portions of Key Allegro and the Rockport coast.

Each group of respondents identified areas of storm surge risk that align with the SLOSH model to varying degrees. South Rockport residents primarily identified risk in the Copano Cove and Copano Ridge areas, as did Copano Cove residents. Residents of The Ridge and The Cove identified similar risk in the South Rockport area, while Copano Ridge residents identified a much larger area of risk overall.

The risk perception map of Copano Ridge residents aligns more closely with all at-risk areas on the SLOSH map, possibly suggesting that that Copano Ridge residents' experience with storm surge in Hurricane Harvey influenced their understanding of risk in the greater Rockport-Fulton community. Both Copano Ridge and Copano Cove experienced significant damage from storm surge during hurricane Harvey, but 80 percent of Copano Ridge residents we interviewed experienced total loss of their properties as well as the contents of their homes. This direct experience with storm surge and its destructive force undoubtedly shaped the risk perceptions about flooding from surge for Copano Ridge residents who also identify such risk beyond their own neighborhood. The fact that both South Rockport and Copano Cove residents minimized storm surge risk along the east side of the peninsula where the SLOSH map does identify risk also speaks to the fact that the storm surge from Harvey did not affect these areas nearly as much as the Copano Ridge and Copano Cove areas. It seems that Copano Cove and South Rockport residents' perception of risk was shaped primarily by the damaging effects of Harvey, leaving unidentified the at-risk areas that were not affected by Harvey's

storm surge. It is also worth noting as we have pointed out earlier, that prior experience with a storm's devastation can cause those who experienced it to shift their perceptions about risk.

11. Conclusion

The following points offer some highlights of our report. We hope they suggest a starting place for thinking about future research and future storms.

Key takeaways from our research:

- **What makes Rockport home.** We learned that what makes Rockport home includes a big list of natural features in the environment, recreational opportunities for fishing, boating, birdwatching; social qualities of the town's residents, the small-town atmosphere with many artists in residence; the mild winter weather, and the relaxed pace of island life.

- **The different challenges of social vulnerability.** We learned that, apart from the physical exposure to risk, there are many forms of social vulnerability that shape a family's capacity for a speedy or a full recovery. Many people discussed the hardship of having to dip into savings set aside for other priorities in order to rebuild. Some had no savings at all. Some households have elderly family members who are not mobile or people with disabilities. Life circumstances that are already rooted in hardship create additional suffering in the aftermath of disaster that can be difficult to overcome.

- **Problems with bureaucracies.** We learned that significant frustrations with insurance companies and government organizations are common and occurred irrespective of socioeconomic status. Most respondents also criticized the endless requirements for navigating unfamiliar paperwork and forms, as well as the lack of a caseworker assigned to help them.

- **Challenges of working with contractors.** We learned that most of our 40 households reported contractor-related challenges in rebuilding, including problems owing both to the shortage of contractors and to fraudulent contractors who took advantage of the urgent post-disaster needs.

- **The interconnections of tourism, labor, and affordable housing.** We learned that a high proportion of Rockport's low-income worker population was forced to leave the area after their homes were destroyed and they have not returned because of the lack of affordable housing. These working families are needed to fill the demand for labor in Rockport's tourist-driven economy of restaurants, hotels, and services. Labor shortages can also threaten business viability and create unstable employment situations for workers.

- **Health impacts after a disaster.** We learned that there are ongoing health impacts of Harvey, including indirect deaths, stress-related ailments; heart disease, respiratory issues ("the Harvey crud") caused by persistent mold in dwellings and other exposures; and mental health impacts including depression, anxiety, and medically diagnosed PTSD.

- **Place attachment.** We learned that many people with a strong sense of place attachment are likely to want to stay no matter what the future

brings. Big families we interviewed are lifelong residents and share a strong connection to Rockport. They live in close proximity and can be resources for each other, buffering the emotional weight of dealing with recovery and a lack of adequate resources. They can also perpetuate perceptions about risk. In our research, these families represented lifelong residents and share the conviction that, irrespective of future hurricanes or risk, they will continue to live in Rockport.

- **Preparedness.** We learned that preparation for storms is more likely after one has experienced a serious storm, and less likely if storm warnings do not eventuate in a serious disaster.

- **Concern about Rockport's future.** We learned that quite a few residents feel concerned about the plans to "overdevelop" Rockport as a tourist destination in ways that would encourage the building of more tourist vacation rental properties, displace even more low-income populations, and imperil the beloved, easy-going residential atmosphere.

A home under construction in Copano Cove.

Some wisdom from Rockport residents:

- **File claims immediately.** You are able to start an insurance claim without even seeing the damage to your home. File as soon as you can for FEMA benefits as well. The FEMA website notes that FEMA has 10 days to respond when a home inspection is required, but it could take longer.

- **Locate organizations that are offering help and advice,** get on their lists, and watch out for fraud.

- **Accept help.** People who recover best are those who have help with the process.

- **Do not dismiss health concerns.** Harvey left multiple health problems in its wake that are unaccounted for. Indirect health effects should be tracked and included in our understanding of recovery.

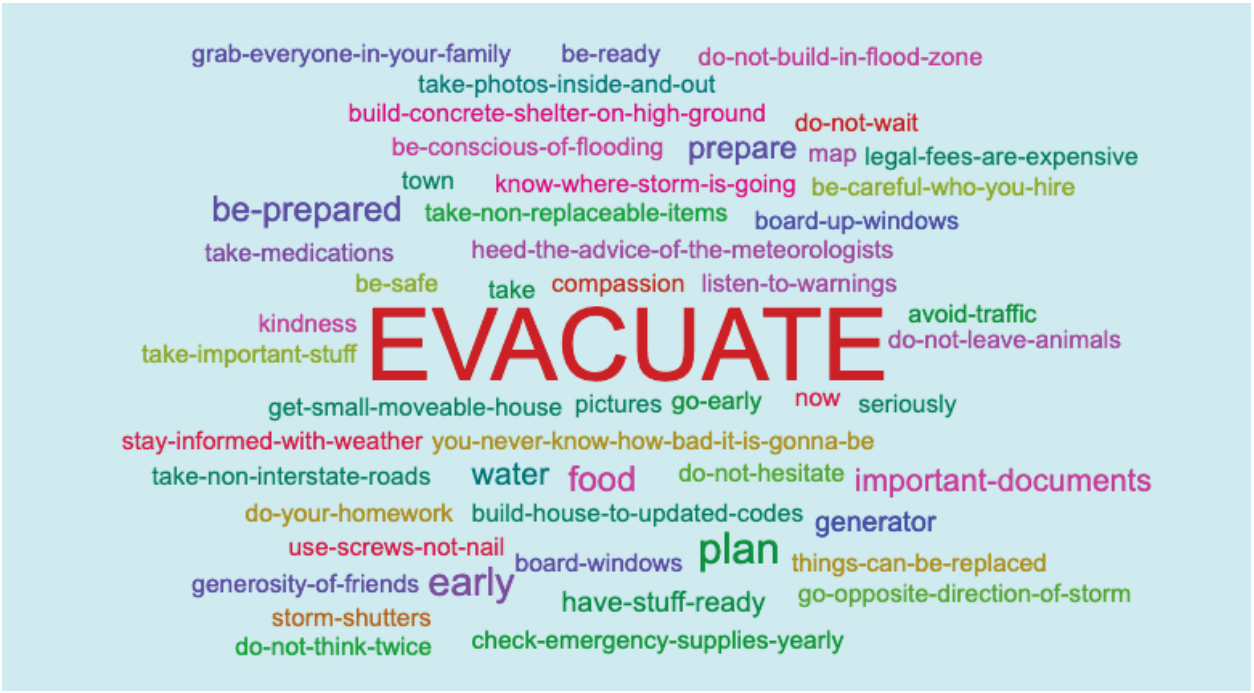
- **Recognize and act on stress.** It is critically important to stay alert to your health after a storm. People dismiss feelings of stress, but stress can cause headaches, nerve pain, stomach upset, and a host of much more serious problems.

- **Keep moving.** Keep walking or exercising to give your body a chance to process the day's difficulties.

- **Get to know your neighbors.** Social relationships can help lift physical and emotional burdens and remind you that life is better with strong social ties.

- **Support each other.** Residents who came together to help and support each other in the storm's aftermath strengthened the bonds with their community and their sense of goodwill.

One of the most interesting things we learned during our interviews was the advice that our respondents provided when we asked them what they would say to people they don't know who become impacted by a disaster like Harvey. We typed all the advice and put it into a word cloud, which is an image composed of text contributed, in this case, from people in the 40 households where we conducted interviews. The more often a specific word pops up in response to our question, the bigger and bolder it appears in the word cloud. As you can see, there was one word that got repeated far more times than other words people used: evacuate. Other advice that people offered strangers was to leave early, grab important documents, be stocked up on food and water, and to take seriously the need to prepare for future storms and disasters.



Generated by the 2019 Ethnographic Field School for Risk and Disaster based on interviews with Rockport residents in June 2019.

Notes

1. NOAA—GFDL: https://www.gfdl.noaa.gov/extremes/
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5. The Aransas County- Rockport Centennial, 1970.
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14. Browne, 2015; Daniel Aldrich, *Building Resilience: Social Capital in Post-Disaster Recovery*. (Chicago: University of Chicago Press, 2012).
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16. Faas 2016
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20. Knez et al., 2018
21. The Aransas County- Rockport Centennial, 1970.
22. Neil D. Weinstein, "Optimistic biases about personal risks," *Science* 246 (No. 4935, 1989): 1232. GaleOneFile: Health and. Medicine, Accessed January 5 2020. For more recent work

investigating the relationship between optimistic bias and risk perception, see Craig Trumbo, Michelle A. Meyer, Holly Marlatt, Lori Peek, Bridget Morrissey, ""An Assessment of Change in Risk Perception and Optimistic Bias for Hurricanes Among Gulf Coast Residents" *Risk Analysis* 34 (No. 6, June 2014): 1013-1024.

23. National Weather Service, National Oceanic and Atmospheric Administration: "The Hurricane of 1919" story posted on the NWS website noted below states, "Early in the 20th century, citizens of Corpus Christi came to believe that their Sparkling City by the Sea was safe from hurricanes after several near misses occurred during the early 1900s. Two Category 4 hurricanes made landfall on the Texas coast in the previous 4 years - the first at Galveston in August of 1915 and the second near Baffin Bay in August of 1916. Some believed the barrier islands protected their city from devastating storm surge." The NWS site indicates the extreme danger of such false confidence. In September 1919, a Category 3 hurricane unleashed a storm surge of 16 feet on Corpus Christi. Despite warnings, people ignored the risk and many perished as a result: https://www.weather.gov/crp/hurricane1919. (Accessed 1.3.20)
24. Bridget Morrissey, *Optimistic Bias in Relation to Hurricane Risk*. Master of Science Thesis. (Department of Journalism and Technical Communication, Colorado State University, 2010).
25. S. Mishra, S. Mazumdar, D. Suar. "Place attachment and flood preparedness", *Journal of Environmental Psychology* 30 (2, 2010): 187-197.
26. As the SLOSH model is not a state-of-the-art hydrodynamic model, its predictions should be considered approximate. But SLOSH has the advantage of being computationally very efficient compared to more recent models allowing for the thousands of runs necessary to capture hurricanes of all strengths and paths. These maps are also readily available from NOAA. The lower accuracy of the SLOSH predications, as compared to state-of-the-art hydrodynamic models, e.g. ADCRIC, is unlikely to be significant for this study.

Acknowledgements

Special thanks to the following people who helped make our inaugural Field School experience a resounding success:

All participants in the research study, thank you so kindly. We also thank the following people for their generous contributions: Dr. Philippe Tissot, Interim Director, Conrad Blucher Institute, Texas A&M-Corpus Christi (TAMU-CC); Dr. Pat Fitzpatrick, hurricane specialist and Professor of Atmospheric Science, TAMU-CC; Sara Williams, Emergency Management Coordinator, San Patricio County; Naylene Dillingham and Donna Vaughn, Les Dames d'Escoffier (philanthrophic women chefs); John Metz, Warning Coordinator Meteorologist, National Weather Service; Rick McLester, Emergency Management, Rockport; Ginger Easton Smith, Texas A&M AgriLife Extension Agent; Leo and Josie Villa, Suzanne Villa, JD Villa; Laura Clark; Martha Berkebile, Dr. Alan Berkebile; Dr. Frank Pezold, Dean, College of Science & Engineering, TAMU-CC; Gina Concannon, TAMU-CC; Dr. Lucy Huang, Conrad Blucher Institute, TAMU-CC; Diane Probst, President, Rockport-Fulton Chamber of Commerce; Dr. Mica Glantz, Chair, Department of Anthropology and Geography, Colorado State University; Stefanie Berganini, PhD student, Colorado State University (design and layout of this report).

To all the people who helped us learn about Rockport and the challenges of recovery from Harvey. This gallery is a small representation of the many who were generous with their time and their stories. Thank you.



















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THANK YOU, ROCKPORT!

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