

“WHEN THIS HAPPENS AGAIN”: ANALYZING COMMUNITY PERSPECTIVES OF
FACTORS CONTRIBUTING TO REPEATED DISASTER VULNERABILITY AND THEIR
IMPACT ON RECOVERY

By

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Storm-related flooding is one of the greatest disaster risks facing communities in eastern North Carolina. After flood events, communities of limited means may be incapable of pushing for reconstruction agendas that increase their disaster resilience. Recovery efforts driven by the agendas of outside agencies can perpetuate the pre-disaster status quo and result in a state of continued disaster vulnerability, highlighting the need for recoveries focused on the needs and viewpoints of the afflicted communities. Recently, the town of Windsor, NC has dealt with four floods reaching the 500-year flood stage. Data from participant observation and in-depth interviews with 16 stakeholders in Windsor are used to explore issues inhibiting long-term recovery. Specifically, I argue that part of the failure is due to a political power structure that favors assistance to regions with greater economic growth at the expense of economically vulnerable populations. Second, I show how repeated disaster trauma and disruptions to the recovery cycle have led many residents to distrust external agencies, misidentify the factors and risks for repeated flooding, and doubt the ability of the community to recover. I hypothesize that this attitudinal cluster is another key factor that mitigates against long-term recovery by inhibiting community building mechanisms. The goal of the research is to propose a more inclusive and holistic recovery model that addresses community viewpoints, actively seeks to create mutually beneficial relationships between residents and external agencies during recovery

efforts, and views disaster recovery as a single step in a system that promotes community health and reduces vulnerability.

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Chapter 1: Introduction

1.1 Statement of the Problem

While the world continuously seeks solutions for future problems caused by global climate change, communities along the coasts of North Carolina and other southern states must contend with their present risk for natural disasters. Many of the vulnerabilities these communities face emerged over time through the interaction of human occupation and development-driven urbanization, resulting in communities that are maladapted to their present local environment (Freudenburg et al., 2009; Marino, 2015; Miranda Sara et al., 2016). This maladaptation can persist even after a natural disaster, as communities lacking the resources to self-manage recovery may become reliant on external agencies whose efforts reflect their own agendas rather than those of the impacted communities (MacKinnon & Derickson, 2013). Failure to address the needs of an impacted community can perpetuate the vulnerabilities of the pre-disaster environment, resulting in a state of sustained vulnerability that features prolonged periods of disillusionment and strained communal ties ((MacKinnon & Derickson, 2013; Barrios, 2016; SAMHSA, 2017).

This project examined one such cycle of disaster vulnerability in the eastern North Carolina community of Windsor, in Bertie County. Floods have inundated Windsor four times in the last 20 years and efforts to reconstruct and increase disaster resiliency have been limited in both scope and success. In the Summer of 2017, only months after Windsor's most recent severe flood, research was undertaken to examine how Windsor's residents understood the flooding in their area and to determine what options they perceive possible for the future.

The objectives guiding this research were: (1) to understand how knowledge of the local environment informed stakeholder thoughts on the causes of, and solutions to, the flooding and

(2) to examine how flood experiences influence stakeholder views of the future. These objectives were based upon ideas of traditional environmental knowledge and adaptation (Marino, 2015) and the idea that disasters, environments, development, and lifeways are linked as part of a socio-ecological system (Freudenberg et al., 2009; Berning, 2014). Using these objectives, a set of hypotheses were derived from media reports about Windsor's floods over the years, from a variety of local, regional, and national news sources. Themes such as land use, future flooding, and the local economy are present throughout the available media on Windsor's floods. These themes are reflected in the initial hypotheses. The hypotheses guiding the initial research phase were:

1. that most stakeholders will identify changing land-use patterns and new civil construction projects in recent years as a factor contributing to increased flood frequency due to their familiarity with the local environment.
2. that stakeholders who have experienced property damage in the last 20 years will predict further increases in flood frequency and severity in the next 20 years.
3. that stakeholders who have experienced property damage and predict future increases in flooding will predict worsening economic conditions in Windsor.
4. that stakeholders who have identified changing land-use and development as key factors will propose solutions that focus on reducing the use of at-risk spaces (4a) and prefer to reduce the potential for damage and will therefore propose solutions focusing on proactive rather than reactive measures (4b).

To meet these objectives, a series of 16 semi-structured interviews were conducted with members of the local business community, religious leaders, and long-time residents (Bernard, 2002). The Windsor-Bertie County Chamber of Commerce's list of members was used as an

initial sampling framework, with other participants added through networking. The interviews were analyzed using grounded theory analysis and the results portray a community that is struggling to remain united under the pressure of a changing local environment.

Because the communities themselves are an important resource for the creation and implementation of resiliency efforts, an important goal of this project is to use the findings to facilitate communication between external agencies, local leaders, and residents about what residents believe the causes of these disasters to be, what impacts repeated disasters have had on economic survival and mental health, and what solutions are deemed viable in the local context. While the permanent evacuation and dissolution of a community must always be a considered option, community residents are likely to entertain it only when all other possibilities have been exhausted (Kuhl et al., 2014; Marino, 2015). More holistic resilience plans that incorporate local viewpoints and attempt to address community concerns are required, and thus it is important to examine how residents of vulnerable coastal communities understand their current situations.

Many residents interviewed remain hopeful as they grapple with a negative sense of fatalism, leaving them unsure of the community's path forward. Ties within the community have been stressed by the floods and there are now notable divisions, while the repetitive nature of the disasters has eroded faith in state and federal government agencies and non-local explanations of the flooding. Familiarity with the local environment and this wariness of external factors have combined to produce a series of explanations for the floods that focus on local factors, despite contradictory evidence from experts. The research presented here suggests that a poorly balanced local socio-ecological system can result in repeated disaster traumas that obscure the distinction between natural and manmade disasters, causing the splintering of communal ties both internally and externally. The survival of communities like Windsor depends upon incorporating ideas of

environmental adaptation into planning for sustainable local economies, creating communities that can withstand both environmental and economic stressors. This study illustrates some of the challenges that external agencies may face when working with communities on such projects, and how taking local perspectives such as these into account can improve the effectiveness of programs promoting disaster resilience.

1.2 Background: Description of the community and the context

Before proceeding, it is necessary to introduce the town of Windsor, the risks it faces due to hurricanes, and concepts relevant to the study of disaster vulnerability and the disaster cycle. In the history of the United States, hurricanes rank among the deadliest and costliest disasters the country has faced. North America's Gulf Coast and East Coast have an increased likelihood of being struck by hurricanes due to their positioning relative to hurricane alley. Hurricanes and tropical storms moving across the Atlantic follow warm waters around the equator westward from Africa, sometimes diverting to the north due to changing sea surface temperatures. The result is an increased likelihood of storms impacting the many islands in the western Atlantic or making landfall along the Atlantic coastline of North America. In the past, the severity of hurricanes striking North America were exacerbated by less reliable meteorology, less reliable communication, and distrust of storm reports coming from Atlantic islands. In 1900, the damage of the Galveston Hurricane was magnified by just such a set of circumstances.

Though modern science and technology often help in reducing the number of deaths associated with hurricanes, hurricanes can still adversely affect communities through either direct damage to buildings and infrastructure or indirect damages such as loss of business. Events like Hurricane Katrina in 2005 and Hurricane Sandy in 2012 have stuck in the minds of

Americans as examples of the incredible destructive potential of these storms. Powerful winds are certainly a danger, but the most damaging aspects of hurricanes may be the floods that come in their wakes. Hurricanes can cause flooding by both their storm surge and their heavy rainfall. When combined with rising sea levels and vulnerable populations residing along the coasts, the potential for disaster is greatly increased. While the collective consciousness of the United States tends to reflect upon how large cities like New Orleans are affected by flooding from hurricanes, it's important to remember that small, rural communities along the Atlantic coast are just as vulnerable to flooding from hurricanes.

Small communities in North Carolina's coastal plain have dealt with the impacts of dangerous hurricanes multiple times in the last 20 years. Flooding has been particularly problematic in these communities, many of which have experienced multiple severe floods during this time span. The Town of Windsor in Bertie County, NC has experienced four severe floods since 1999. Two of those floods occurred in 2016. The first came about due to the heavy rainfall in the region following Tropical Storm Julia in late September. Only two weeks later, Windsor experienced another flood as Hurricane Matthew drenched the area again. The floods caused widespread damage, and costs for the lengthy recovery process are being estimated in the millions of dollars for Bertie County. The high cost of recovery is concerning for a region already undergoing economic hardship, and it raises questions about how a town like Windsor will cope with similar storms in the future.

A Historic Storm

Hurricane Matthew was classified as a Category 5 hurricane on October 1, 2016, with sustained wind speeds exceeding 136 knots (Stewart, 2017). After making landfall in Haiti on October 4, Cuba on October 5, and the Bahamas on October 7, Hurricane Matthew impacted South Carolina on October 8, 2016 (Stewart, 2017). Matthew's center of rotation remained off the coast of North Carolina through October 9, continuing to lash the Southeast with heavy rainfall as the storm proceeded northward. Matthew transitioned from a hurricane to an extratropical cyclone off the North Carolina coast and continued to move to the east-northeast before merging with a larger extratropical system off the eastern coast of Canada on October 11 (Stewart, 2017). Though damage from Matthew's strong winds and storm surge were primarily limited to the Outer Banks and other coastal regions, the storm's large footprint brought heavy rainfall across the eastern half of the North Carolina that caused floods and flash floods. Many counties reported 10 inches or more of rainfall during a 36-hour period, and 17 counties reported record rainfall during that span (Stewart, 2017). In the days following, the rainwaters accumulated in the rivers of eastern North Carolina and eventually spilled over the banks, inundating large swaths of the region's relatively flat and low-lying land. Many small communities in the region dealt with flooding and are still recovering from the damages more than a year later. The town of Windsor, in Bertie County, is one such community. Hurricane Matthew marked the fourth flood to reach the 500-year flood stage in recent years, coming only two weeks after the third flood to do so.

At the time, Hurricane Matthew was the 10th most costly hurricane to affect the United States. As of January 2018, Hurricane Matthew is listed as the 13th most costly storm in US history by the National Hurricane Center with total damages caused by wind and water estimated

at \$10 Billion. The North Carolina Department of Public Safety estimates roughly \$4.8 Billion in damages to homes, businesses, agriculture, and infrastructure across the state. These estimates account for direct damages and losses from the storm but not for the economic disruption caused by the storm. Estimates like these also cannot fully portray the trauma and hardship experienced by the impacted populations well after the storm has passed (Stewart, 2017). By the end of 2016, 50 of North Carolina's 100 counties, including Bertie, were declared eligible for federal disaster aid (FEMA, 2016). Between six and eleven inches of rain fell in Bertie county, accumulating in the region's many wetlands, streams, rivers, and other bodies of water before spilling into low-lying areas (Bertie County Resilient Redevelopment Plan, 2017). The accumulation of water led to widespread flooding, with USGS Gage 0208111310 in the Cashie near Windsor recording a peak water elevation of 16.63' that impacted more than 40 businesses in Windsor and many public resources (Bertie County Resilient Redevelopment Plan, 2017). Total damage estimates for the region are rough, but Bertie County Manager Scott Sauer places the damage in the range of \$20-25 million (Motley, 2017).

The Town of Windsor and Bertie County

Windsor's current state of disaster vulnerability is not a chance occurrence. Vulnerability is a created state that emerges in a population over time. Stemming from more than just location, vulnerability is the product of a variety of factors such as poverty, low relative educational attainment, age, marginalization, access to healthcare, access to resources or means, and ability to utilize accessible resources. Examining Windsor's present vulnerable state requires understanding why the town is at its present location and considering the different factors that led to the population's high vulnerability to natural disasters.

Located on the banks of the Cashie River, Windsor was incorporated in 1768.

According to local history, the 1768 settlement is the second in the area. An earlier settlement was founded up the river at Hoggard's Mill in 1722 to exploit natural resources for use in the British economy, but changes to ship design during the 18th Century made stretches of the Cashie River more difficult to navigate and reduced shipping traffic in the area. Trade on the Cashie River shifted to Gray's Landing, and a petition was presented for the formation of a new town at the site. The motion was approved in 1768, though it would be several years before the move to Gray's Landing was completed. The modern town of Windsor still occupies this site. (Town of Windsor)

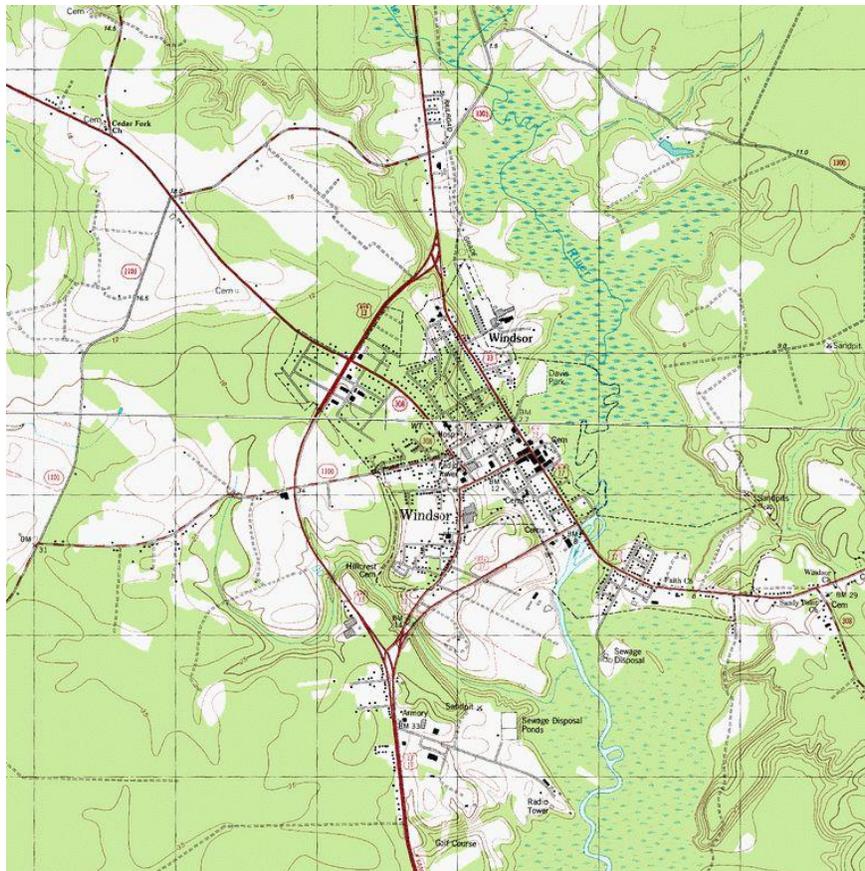


Figure 1: Town of Windsor, Bertie County, NC

River trade is no longer crucial to the livelihoods of Windsor's residents. In the 20th Century, the tobacco industry played a central role in Windsor's economy, as it did in the economies of many communities in eastern North Carolina. Bertie County's fertile soil and Windsor's position as a center of local commerce allowed for a flourishing of downtown businesses. At the height of the region's tobacco economy, Windsor built a bustling downtown business district as farmers coming for the tobacco market spent their earnings in the various shops and restaurants. Since then, numerous factors such as the ending of the controlled tobacco market and the discovery that tobacco use is definitively linked to cancer have reduced the viability of the tobacco market for individual farmers, causing most farmers to shift away from growing tobacco (Public Radio East, 2014). Illustrating this shift, the US Agriculture Census shows a significant reduction in the number of farms in Bertie County since the middle of the 20th Century. Census reports from 1954 show Bertie County having 3,165 farms, while the 2012 report records only 325 farms (US Census of Agriculture, 1959; 2012). Changes in the agricultural market have affected economic conditions across the region and reduced the viability of Windsor's downtown business district, though it is still home to numerous small businesses and is viewed as the heart of Windsor. Bertie County remains one of the most agriculturally productive counties in the state and nation, but the income generated by this production is concentrated in a small number of farms. Furthermore, increasing rates of corporate ownership and contracting mean that money generated by local agriculture is often passing through the local economy rather than coming into it. For an area like Bertie County that has been historically reliant on agriculture and natural resource exploitation, such a shift can have a broad and long-lasting influence on the local economy and, by extension, the local population. Small businesses are still a significant component of Windsor's economy, though they are not as successful as they

once were. The downtown area is no longer the booming district it once was, and Windsor now struggles with economic depression and stagnation the same as much of Bertie County.

The economic downturn in Windsor and Bertie County affects the lives of residents in multiple ways, including employment, income, education, and population growth. Bertie County currently lags the rest of North Carolina in several important metrics that should be discussed to illustrate the stressful conditions in Windsor and the surrounding area. The numbers reported are for Bertie County, except when noted otherwise. Most of the available data for the area are at the county level, though data specifically for Windsor are used when available. In 2014, the Frank Hawkins Kenan Institute of Private Enterprise at the University of North Carolina (The Kenan Institute) published an economic development plan for Bertie County that contains statistics for Bertie County provided by the county's elected leadership and compared to regional and state statistics. The statistics illustrate the many ways that the area's socioeconomic conditions are influencing residents' quality of life and life outcomes.

According to the Kenan Institute's statistics, Bertie County currently lags surrounding counties and the rest of North Carolina in several important metrics, many of which are linked with heightened disaster vulnerability. Employment and income are two such metrics. While the unemployment rate fell from 12.8% in January 2013 to 9.8% a year later, this reduction is attributable to losses in the labor force rather than increased labor force participation. Over the same time span, the state unemployment rate fell from 8.8% to 6.7%. The median household income in Bertie County is \$29,000, while the state average is \$44,000. Individual wages lag similarly, with the average annual wage of \$27,861 in Bertie County falling more than \$18,000 short of the average for the state. Roughly 24% of residents in Bertie County live below the poverty level, while the average for the state is a bit lower at 17%. Academic achievement in the

county is also an area of concern, as individual vulnerability is positively associated with education. Only 11.1% of residents have attained a 4-year degree or higher, although 25.5% of residents reported attending some college without receiving a degree. Of the remaining residents, 37.3% report completing their high school education while 26.1% report that they did not complete high school. Both the state and surrounding counties report higher percentages for attainment of advanced degrees and lower numbers of high school dropouts than Bertie. Students in Bertie County also have worse average performance on standardized tests when compared to the rest of the state. These numbers are all indicative of serious economic depression in the county, often associated with increased disaster vulnerability. Although the town of Windsor may fare a little better than the rest of the County, economic depression and poverty are still significant factors in the current state of disaster vulnerability. (The Kenan Institute, 2014)

Windsor has several population trends worthy of note. Over the last several decades the population has seen moderate increases and decreases. The 2010 U.S. Census, however, records the population as 3,630 individuals, showing an increase of a little more than 1,400 residents since the 2000 Census. Yet this 65% increase since the 2000 Census is not due to rising birthrates or a sudden boom in incoming domestic migration, but rather the completion of the Bertie Correctional Institution. The Bertie Correctional Institution was completed in 2006 and houses some 1,400 inmates, accounting for nearly the entire population increase. Windsor is not attracting new residents in meaningful numbers,

The presence of the prison complicates examination of the town's demography. If only the raw census data for 2010 is considered, the numbers would suggest that Windsor is experiencing significant external migration of working-age women. Though the male-female distribution among minors is roughly equal at 7.7%-7.6%, the distribution is skewed for all other

age groups. Based on the raw census data, 51.5% of the population is male and over 18, while only 33.1% is female and over 18. The median male age is 33.4 years, while the median female age is 46.9 years. In a stable population, such a distribution would likely indicate that women are moving away from the town as they come of age to attend post-secondary education or enter the workforce. Instead, this represents the sudden influx of a prison population that is entirely male and primarily young and African-American. Because of this, the age data for women is likely more representative of Windsor's residential population than the male data or the combined data. Based on this assumption, Windsor has an older population compared to the rest of the state and the nation. Comparison of the 2010 Census to the 2000 Census also provides further context, as the 2000 Census provides a snapshot of the community prior to the completion of the prison.

While the 2010 Census data indicates that Windsor's African-American population is nearly twice the size of the white population, the 2000 Census shows that there is likely less of a difference in distribution among the residential population. In 2000, 52.43% of Windsor's residents reported as African-American while 45.88% reported as white, a difference of only 144 individuals. The current distribution among residents is likely similar, as the incarcerated population accounts for as much as 98% of the population increase between 2000 and 2010.

The combination of high unemployment, low income, little or no population growth, reduced educational outcomes, and an aging population suggest continuing hardship in the near future. Conditions like those seen in Windsor have negative impacts on individual residents and the cumulative effect is vulnerability across the community. Many residents lack the means to move elsewhere for better opportunities and it does nothing to help the community when individuals are able to make such a move. Overall, Windsor lacks the capital, means, and agency to push for needed changes, leaving the community in a state of vulnerability and reliant on

external help to deal with numerous issues. For a community in a region that regularly faces damaging tropical storms, a state of such prolonged vulnerability is not sustainable.

The goal of this thesis was to examine how members of a community contextualize disaster and recovery in a reoccurring disaster scenario. Numerous scholars and professionals have researched these issues and have formulated models of disaster life cycles, community recovery cycles, and disaster coping mechanisms. None of the models fully capture the complexity of the situation in Windsor and similar communities, where populations already disadvantaged in several ways face repeating disasters that shorten the recovery and preparation phases of any model. A review of the literature will provide a set of basic concepts on how vulnerability is created, how it contributes to continuing states of vulnerability, and why current disaster and recovery models are inadequate for Windsor and the increasing number of other communities facing similar situations.

1.3 Project Rationale: Review of the Literature

Natural Disasters and Disaster Recovery

Natural disasters are not, as they are often presented in the media, inevitable and unavoidable events that inflict harm upon random targets. Rather, a natural disaster is the confluence of a natural event and a vulnerable population. In this usage, vulnerability takes on two separate meanings: populations can be vulnerable in that they live in spaces that are at increased risk for a potentially damaging natural event, and they can be vulnerable in a sociopolitical sense that entails issues such as poverty, disenfranchisement, age, or even race. In many cases, the populations that suffer the most damage meet both criteria. They are living in

areas vulnerable to potentially damaging events for a variety of reasons, not always because of personal choice. In some cases, indigenous peoples or other minority groups may be forced to abandon lifeways well-suited to their local environment to meet policy decisions that are solely reflective of a political power structure that does not consider non-Western viewpoints (Marino, 2015). In other cases, extant populations can become more vulnerable to disasters because development and land use projects are driven by the agendas of external agencies and power structures that favor the members of those agencies and structures over those potentially affected (Freudenburg et al., 2009).

Community members are often reluctant to simply leave their homes, further compounding the issues associated with vulnerability. For some, such as the Iñupiat residents of Shishmaref, Alaska, a great deal of their individual and communal identity is linked to place (Marino, 2015). Residents in regions vulnerable to natural disasters may also be reluctant to leave disaster-impacted areas due to age, financial investment, or even family history. The human desire for the familiar, the comfortable, and the “normal” influence the decision-making processes of peoples living in at-risk areas, meaning that communities often seek to recover in the wake of a disaster rather than leave. Strong attachment to place has been shown to positively influence the perception of environmental risks, though it has also been found to mitigate the adoption of preventive behaviors in some high-risk contexts (De Dominicis et al., 2015). Even in cases where return and recovery are impossible, displaced survivors lament the loss of their place. Many express a desire to return to their homes and a few, despite the dangers presented, do return (Craft, 2011; Morris, 2016).

A natural disaster begins a cycle of recovery for a community, of which the return of residents is only a single step. The recovery cycle can be long and arduous, and not every

community or resident is able to weather the process. Some may opt to leave, while others with more limited resources may be left with no option but to attempt recovery. Several models describing the disaster and recovery cycle exist, often representing the purview of specific fields such as emergency management. Many models are designed around a three-part cycle that describe aspects of the pre-disaster period, the disaster period, and the post-disaster period. The Substance Abuse and Mental Health Services Administration (SAMHSA) of the United States government uses a model that seems the best fit for this project, as it describes a series of interactions, emotional states, and outlooks that communities experience during a six-phase model of the disaster cycle (Figure 2). Since this project focuses on community attitudes and responses, a model that considers the development of emotions and attitudes is more appropriate than one that simply describes response procedures.

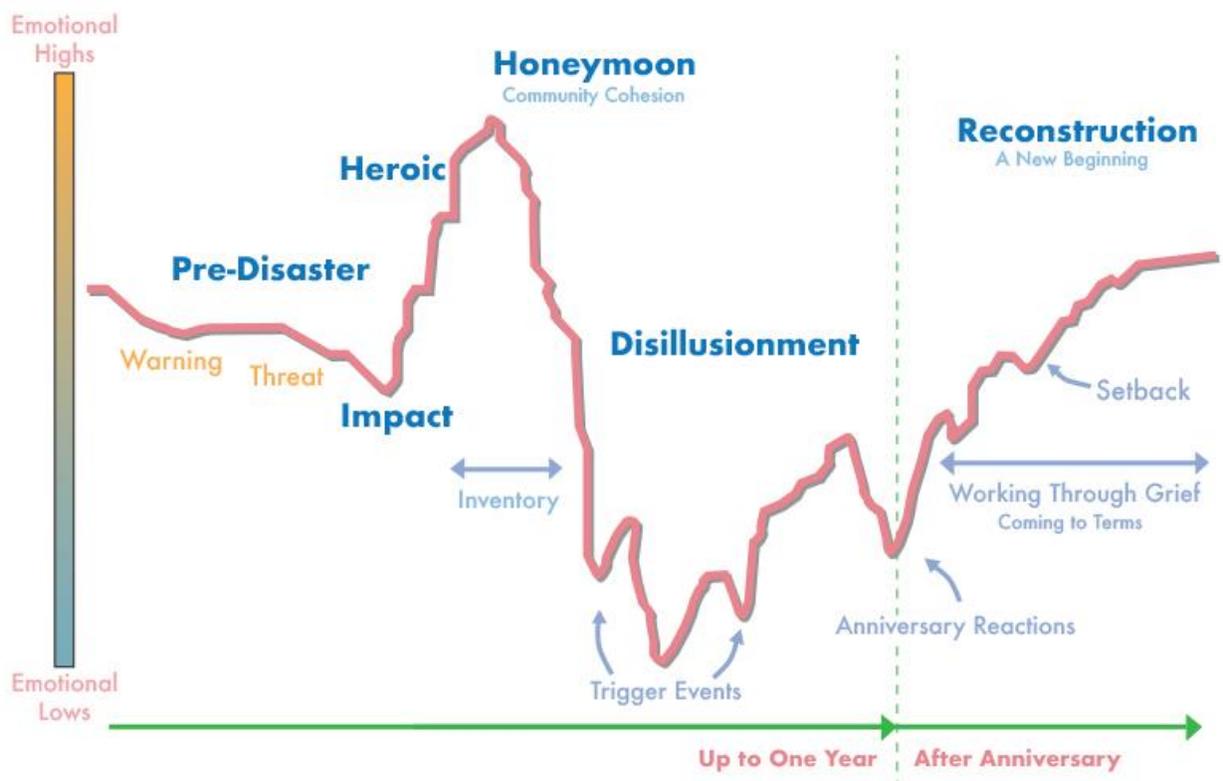


Figure 2: The SAMHSA Disaster Model

As seen in Figure 2, the SAMHSA disaster recovery model identifies six distinct stages within the cycle: pre-disaster, impact, heroic, honeymoon, disillusionment, and recovery. Each stage is characterized by a set of responses to certain events in the cycle, though the type of disaster can influence the exact manifestations during a phase. The length of the pre-disaster phase is dependent upon the type of disaster and the amount of warning, but no matter the length of this phase it usually features feelings of fear, uncertainty, loss of control, and guilt in the community. Impact is typically the shortest phase in the cycle, beginning and ending with the disaster event. Intense emotional responses are typical of this stage, ranging from shock to panic and frequently leading to self-preservation behaviors. The high emotions and adrenaline during impact carry over into the heroic phase, in which community members may engage in altruistic-but-risky behaviors stimulated by the impact. The SAMHSA notes that the heroic phase is often a period of high activity but low productivity, as the desire of impacted communities to begin recovery are counterbalanced by the limitations introduced by disaster. As portions of the community stabilize and outside assistance becomes available, the heroic phase quickly shifts into the honeymoon phase. For several weeks, groups giving assistance build relationships with the community and boost community cohesion and optimism in the wake of a disaster. Unfortunately, the positivity seen in this stage dissipates rather quickly. (SAMHSA, 2017)

Community optimism in the recovery effort is tempered as the realities of disaster assistance set in. As aid limitations become apparent, communities undergo a quick reversal in emotions and enter a period of disillusionment. Feelings of discouragement, isolation, and abandonment contrast sharply with the hope and collectivism that were so recently prevalent, and the shift to disillusionment is often associated with an increase in social problems such as substance abuse and domestic violence. Disillusionment can last from months to years and is

often extended by events that trigger rumination, such as the anniversary of a disaster. Feelings of *communitas* typical of the heroic and honeymoon phases are undermined by feelings of abandonment as some residents witness other portions of their community returning to a state of normalcy with relative ease. Per the SAMHSA, the disillusionment phase only ends with the onset of the reconstruction phase. Reconstruction is the phase of recovery, as residents work through grief, assume responsibility for rebuilding their lives and community, and adjust to the new normal. Yet for a community like Windsor that seems trapped in disaster cycles and has limited means, reaching such a point may appear nearly impossible. Instead, it is possible that the community begins adapting to a norm focused around the vulnerable state and ceases to move beyond disillusionment. (SAMHSA, 2017)

Vulnerability and the Selectivity of Disasters

Perhaps the most important concept to understand when examining disasters, and one that may be the least obvious to the layperson, is that disasters do not affect populations with impartiality. Instead, disaster vulnerability is often a state that owes as much to marginalization of a population as it does to location (Friis, 2012; Marino, 2015; Erikson, 1994). In some cases, vulnerable populations come into existence when marginalized groups are pushed to settle in high risk areas. This happens for numerous reasons, including the presence of opportunities not otherwise available to a group, loss of traditional or ancestral lands, or even official misrepresentation of risk in the interest of justifying development projects that benefit those at the top of sociopolitical hierarchies (Freudenburg et al., 2009; Erikson, 1994; Miranda Sara et al., 2016). Even individuals who understand the risk in a region may choose to move there because they feel the relative benefits outweigh the relative risks.

It is also possible for disaster vulnerability to emerge in a population over time. Long-term marginalization leads to reduced access to resources and capability to utilize resources, curtailing the ability of communities to appropriately address changes in their local environment and increasing their vulnerability. Populations that have managed to live in relative stability despite marginalized status can find themselves suddenly vulnerable due to forces outside of their control, becoming reliant on outside help to enact solutions even when those solutions are driven by the community's desires (Marino, 2015). Vulnerability can also emerge in a community as the population's demography changes. For example, an individual's relative vulnerability is influenced by their health. Populations with increasing rates of obesity or that are aging can expect increased disaster vulnerability as they contain a higher proportion of individuals with heightened vulnerability (Gray, 2017; Ngo, 2001). Education can also play a role in a population's vulnerability, as higher rates of educational attainment are positively correlated with vulnerability reduction and improved post-disaster outcomes (Striessnig et al., 2013; Frankenberg et al., 2013). Factors such as wealth, size of social support networks, and access to information/communication technology (ICT) also have a significant influence on disaster vulnerability (Gares & Montz, 2014; Toya & Skidmore, 2015). These factors increase the risk of natural disasters for a population, though there is nothing natural about these factors. Understanding the ways in which vulnerable populations are created demonstrates that disaster vulnerability is a socially constructed state and that "natural disaster" merely describes the type of event rather than the full set of causes. Dealing with the socially constructed components of vulnerability is key to reducing disaster vulnerability.

The role of disasters in creating disaster vulnerability also cannot be ignored. Disaster impacts are shared across numerous aspects of a society, affecting health, education, and

economic outcomes for both individuals and populations. In the proper circumstances, disaster events can create a positive feedback loop in which the disaster increases a population's disaster vulnerability and increases the likelihood of suffering further disaster traumas (Sodhi, 2015). Considering the tendency of disasters to afflict vulnerable and marginalized sections of a population, a reinforcing disaster vulnerability feedback loop could be devastating. Victims already lacking the means and ability to mitigate their vulnerability become decreasingly able to do so while become increasingly likely to experience disaster trauma. Another way to think of this relationship is as a chronic hazard, being a hazard that has disrupted the "functioning of a community or society" and "exceeds the ability of the affected community or society to cope over a prolonged period" (Guppy & Twigg, 2012, p. 7). Communities whose ability to cope with a disaster hazard has been compromised risk entering a positive feedback loop of disaster vulnerability that further erodes their ability to cope, emphasizing the need for disaster responses that mitigate or remove disaster vulnerability.

Reconstruction, Recovery, Resilience, and Sustainability

Per the SAMHSA, reconstruction is the final step and the goal of the disaster cycle. As mentioned before, reconstruction involves the assumption of responsibility by members of an impacted population for their own recovery and the return to a perceived state of normalcy (SAMHSA, 2017). Depending on how the concepts of reconstruction, recovery, and normalcy are understood and applied, setting reconstruction as a post-disaster goal can be incredibly problematic and often involves the rebuilding of communities to have to same vulnerability that existed before a disaster (Jouannic et al., 2016). If the goal of the recovery effort is a return to the pre-disaster norm state, then it must be understood that this entails the renewal and preservation

of vulnerabilities that contributed to disaster in the first place (Barrios, 2016). The preservation of these weaknesses leaves the community at risk for further disasters, meaning that it is in the interest of an impacted community to address vulnerability during recovery. Yet vulnerable communities are often in this state due to their lack of resource access and incapability to fully utilize the resources available to them, meaning they likely lack the means to drive their own recovery agendas (Rodriguez, 2016). Recovery efforts are often guided by government agencies that have adopted a one-size-fits-all procedure for disaster response that fails to address the specific sociocultural needs of impacted communities, inhibiting the organization of community-based efforts and negatively influencing recovery outcomes (Hsu et al., 2015; Browne, 2015). Disasters further reduce the ability of these communities to organize and utilize resources, making them reliant on outside agencies to drive recovery efforts.

Post-disaster reliance on external sources of aid has the potential to reflect large-scale sociopolitical hierarchies, which can have negative consequences for an impacted community. Just as much of the marginalization that contributes to the vulnerable state benefits entities at the top of the sociopolitical hierarchy, externally-driven recovery efforts can be tailored to benefit those at the top of the hierarchy and reflect their own agendas rather than the needs of the impacted community (Freudenburg et al., 2009; MacKinnon & Derickson, 2013). Recovery efforts focused around improving resilience in impacted communities are becoming more popular in discussion, but because of the varying definitions and applications of resiliency there is still a need for more consistent application that does not favor the pre-disaster status quo as heavily (Brown, 2014). The result has been resilience efforts that too often serve to protect economic growth and development over social and environmental values (Oliver-Smith, 2016).

More comprehensive and holistic goals of resilience require consideration of numerous factors in the natural and social environment of vulnerable communities.

Incorporation of sustainability theories could significantly increase the long-term success of recovery efforts focused on resilience. Resilience has traditionally focused on the response of human systems to natural stimuli, creating a dichotomy in which human and natural systems are opposed (Berning, 2014). In contrast, sustainability seeks to meet the needs of human populations while maintaining or improving natural systems essential for life (Kates et al., 2001). The synthesis of these viewpoints represents a crucial step toward both the reduction of disaster vulnerability and the promotion of disaster resiliency. By emphasizing balanced socioecological systems (SESs) in which both the natural and human systems are adaptive to new stimuli, humans can promote sustainable utilization of resources that contribute to the long-term health of a community and help reduce vulnerability (Xu et al., 2015; Turner, 2010). Promotion of long-term, sustainable solutions that are intended to reduce vulnerability should increase resilience in the community, helping the community achieve greater agency in managing responses to natural disasters.

Adoption of the “Build Back Better” (BBB) principle for recovery that was proposed following the 2004 Indian Ocean Tsunami could also have a positive influence on the success of long-term recovery efforts. Through a holistic approach to recovery, BBB emphasizes that the social recovery of the community should be treated equally to the economic recovery and reconstruction, highlighting the need for psychosocial support and involvement of affected communities following a disaster (Mannakkara & Wilkinson, 2015). One of the main focuses of the BBB principle is to use post-disaster recovery efforts as a means to lower vulnerability in an impacted population, effectively transforming the pre- and post-disaster phases into a single

phase that uses knowledge from the most recent disaster event to lower the risk of future events (Jouannic et al., 2016). With the limited purview of individual government agencies, non-profit groups, non-government organizations, and contractors, effective collaboration between stakeholders at multiple organizational levels is necessary to successfully address the diverse needs of a disaster-impacted community (Lu et al., 2017). The number of actors involved in post-disaster recovery and assistance can be quite confusing to community members, and so alongside increased collaboration it is necessary to encourage the creation of comprehensive local communication networks and interface directly with those networks for the timely distribution of accurate information (Tagliacozzo & Magni, 2016). Improved communication and collaboration with disaster victims as drivers of the recovery agenda helps build trusting relationships between community members and the groups rendering assistance, granting communities a higher degree of ownership over the recovery that should be one of the primary objectives of the central government following a disaster (Ireni-Saban, 2012).

Communities as a Resource

Increased community agency for disaster planning and response should be one of the primary objectives of recovery efforts since residents are the people who have the greatest stake in the recovery and survival of their community. Their lives and livelihoods are, in some way or another, tied to the continuation of the community. Evidence of this is seen in the mutual spatial correlation between the return of businesses and households to communities in the post-disaster period, even when controlling for damage (Xiao & Van Zandt, 2012). Businesses are more likely to return to areas where their consumer market remains intact, and residents are more likely to return to areas that show promise of economic recovery. Furthermore, increasing the

community's resilience and agency allows the community itself becomes more readily usable as a resource during disaster planning and response. Reducing a population's vulnerability reduces the number of people likely to become victims during a disaster, increasing the efficacy of community-based mitigation and response programs (Lichterman, 2000). Empowering communities to act as a resource during their own disaster response is also important because of the residents' knowledge of their local environment. Owing to their daily interactions with the landscape, residents develop a local environmental knowledge that is often highly accurate for the identification of risks (Ruin et al., 2007; Lazrus, 2015; De Dominicis et al., 2015). In a time of crisis, the availability of responders able to quickly assess local risks can make a significant difference in assisting victims.

Improving the resilience and response capabilities of communities would also remove some of the burden from aid groups, allowing for more efficient and concentrated allocation of resources and personnel in the disaster area (Skertich et al., 2012). Though some agencies, such as the Federal Emergency Management Agency (FEMA), engage in practices that help reduce the vulnerability of a population, this should be a guiding policy for aid agencies. Aid agencies, due to the relationships and close contact they make with communities during the post-disaster period, are well positioned to help develop grassroots organization in the community that can address a variety of social ills and significantly improve outcomes for community residents (Barrios, 2014). Measures that seek to address social ills such as illiteracy or endemic poverty that have contributed to the vulnerable state are more likely to improve the outcomes of recovery and resiliency efforts, thereby improving potential outcomes for community residents (Postigo, 2014). The inverse is equally true, as agencies that subdue grassroots efforts and fail to address

vulnerability during post-disaster recovery efforts risk causing further physical and psychological damage to communities should another disaster strike.

Risks of Failed Recovery and Prolonged Vulnerability

As if to underscore the ways in which communities with low sociopolitical status experience disasters differently, the psychological effects of disasters are different across varying levels of society. Physical location has been shown to influence post-disaster recovery outcomes, as availability and strength of local social capital networks and post-disaster planning can vary by neighborhoods or by local government jurisdiction (Rumbach et al., 2015). When looking at an entire society, natural disaster like storms are positively associated with increases in societal trust over time (Toya & Skidmore, 2014). This effect is, in part, attributable to the fact that modern information/communication technology allows anyone with access to see the government response to a natural disaster, while a very small percentage of the population experiences it. It should also be noted that resilience is often higher at the societal level than at the communal level. Economic disruption is a common facet of a disaster scenario, and large societies are able to absorb the shock more easily than small communities by spreading the shock out among a greater number of people (Park et al., 2010). Although small communities can effectively increase resilience through collective actions, they lack the innate resilience seen at the societal level and instead shape their futures through a combination of individual and communal processes.

The decision to return in the wake of a disaster is one example of this relationship. As noted before, the return of households and businesses are linked such that greater rates of return

in one group increase the likelihood of returns in the other (Xiao & Van Zandt, 2012). Studies of external migration in the post-disaster timeline reveal the reluctance of individuals to leave their communities, even though external migration is positively associated with reduced marginalization and distress exposure (Graif, 2016). Despite this, studies of household migration have shown that natural disasters do not significantly drive migration away from a region when compared to changes in long-term weather patterns (Bohra-Mishra et al, 2014). Since disasters are more likely to affect marginalized and low-income populations, the communities attempting to return after a disaster are most likely returning to a place that has contributed to the population's vulnerability.

Disaster exposure can have significant psychological effects among an impacted population. Isolated disaster exposure is positively correlated with post-traumatic stress disorder (PTSD) and functional impairment but does not predict depression or anxiety as strongly as financial stress or repeated disaster exposure (Pollack et al., 2016; Lowe et al., 2015). But considering the relationships between financial stress, disaster vulnerability, and likelihood to return following a disaster, it is safe to say that marginalized and disadvantaged groups are more likely to face repeated disasters and struggle with depression and anxiety as well as PTSD and functional impairment. Exacerbating this, disaster-impacted communities run the risk of becoming further marginalized relative to the rest of society. Just as communities are expected to assume responsibility for their own recovery, they are often assumed responsible for their vulnerability (SAMHSA, 2017; Fekete, 2012). The transfer of responsibility absolves the rest of society and calls the rationality of the vulnerable population into question. Marginalization of rationality is already a factor in the creation of vulnerable populations, and so vulnerable populations with already marginalized rationalities can become further marginalized as they are

blamed for their own misfortunes (Rodriguez, 2016). The interplay of vulnerability, marginalization, and disaster risk create the possibility of feedback cycles threatening to the long-term health and survival of a community. A community caught in such a cycle would become increasingly marginalized, deal with repeating and overlapping disaster cycles, see increased rates of mental health issues, face declining economic conditions, and struggle to address factors that initially led to vulnerability as the community's capability, access, and agency are eroded by this cycle. Such a community would likely become incapable of recovering without outside assistance but would become increasingly distrustful of outside assistance. Windsor, NC may be just such a community.

Anthropological Approaches to Disaster: Developing a Theoretical Framework

A glance over the disaster literature cited here reveals how many fields are currently engaging with disaster research and theory, each bringing their own perspectives into the body of knowledge surrounding disasters. Studies of disasters and climate change are becoming increasingly inter-disciplinary as the urgency to address these issues encourages the sharing of methods and data between fields. Anthropology's role in studying disaster is less easily defined than that of a field like Disaster Management, but the anthropological foci on lived experiences, holistic approaches, and the historical-structural dimension are vital to furthering understanding of disasters and improving disaster responses (Oliver-Smith, 1996). For a town like Windsor, understanding the historic origins of vulnerability and local viewpoints is important for creating disaster response paradigms that address local viewpoints and actively empower residents to take a greater role in the community's recovery. Anthropology is a field particularly well-suited for such studies since it has a long history of considering human-environmental interactions within

the context of political ecology and greatly aids in the understanding of disasters as events with social origins (Orr et al., 2015). Two particular case studies provide a blueprint for applying frameworks incorporating history and political ecology to the study of disaster, a framework quite apt to addressing the situation in Windsor.

Elizabeth Marino's study of the town of Shishmaref, Alaska, *Fierce Climate Sacred Ground*, provides an excellent example of the perspectives anthropology brings to the study of natural disaster and disaster response. One of Marino's main points is that "vulnerability is the product of systems of inequity, not a characteristic inherent in a single community" (Marino, 2015, p. 96). Marino outlines the historic context that has led to the present situation for Shishmaref's residents, a history of marginalization and colonial policy that forced the creation of a permanent settlement that is no longer viable. The once-nomadic Kigiqtaamiut residents of Shishmaref were forced to abandon their traditional lifeway by legislation that did not treat their perspectives as valid, a trend that continues into their present drive to keep their community intact in the face of climate change. Permanent settlement on the island of Sarichef has brought the Kigiqtaamiut into regular contact with increasingly dangerous storm surges that are eroding the land at an alarming rate. Rather than attempt to remain in place, the Kigiqtaamiut desire to keep their social community intact and move the town to a new, safer location within their traditional foraging range. Despite having little responsibility for the current situation in which they find themselves, the residents of Shishmaref are burdened with the financial responsibility for such a move. Marino feels this is an unethical position, calling for government support of the relocation effort as a small measure of justice for a marginalized people. The situation of the Kigiqtaamiut is not a perfect parallel for the situation in Windsor, but there are enough similarities in their vulnerability and the response of the government to warrant comparison.

Examining the context in which vulnerability emerges and using that information to inform responses is applicable to any study of disaster vulnerability, especially the study of a community like Windsor that has been repeatedly vulnerable. (Marino, 2015)

The failure to consider local viewpoints and practices is not an issue solely for indigenous populations. The post-Katrina experiences of “The Peachy Gang,” an African-American family from St. Bernard’s Parish in New Orleans, show a similar pattern of disaster response that is inadequate or inappropriate for an affected population. Anthropologist Katherine E. Browne, who published a study of the Peachy Gang’s experiences following Hurricane Katrina, highlights the ways in which the government’s one-size-fits-all approach to disaster response can work to the detriment of victims’ recovery. In the case of the Peachy Gang, the temporary housing provided for them following displacement did not allow them to establish any form of their normal home-life, a life that often revolved around communal gathering and cooking for their large extended family. Establishing a sense of normalcy in the post-disaster environment is an important step because it helps the individual feel a degree of agency and control, empowering them to take a more active role in their own recovery. Faced with a slow bureaucracy, conditions ill-matched to their familial needs, and authorities that refused to work with them on their terms, many members of the Peachy Gang found themselves discouraged and struggling with mental health issues such as anxiety and depression that are associated with uncertainty and lack of agency. Browne’s message of incorporating culturally-sensitive social support during recovery is clear, and one that is certainly applicable to a town like Windsor that is struggling to recover across many dimensions. (Browne, 2015)

These case studies provide examples in which local or indigenous knowledge has been ignored or marginalized in the name of expertise, in both cases to the detriment of the affected

populations. Rather than coming in as experts and dictating to an impacted population, approaches found in public anthropology emphasize the integration of researcher expertise with local expertise (Beck, 2009). One goal of this research is to examine local viewpoints in order to lay a groundwork for later action in Windsor and similar communities. Conducting research in a way that allows the community to benefit provides for “the realization of new policies, new subject positions, and the emergence of new political possibilities” (Lyon-Callo & Hyatt, 2003 – As cited in Beck, 2009, p. 7). This should be a principle goal of all research that engages with disaster-impacted and disaster-vulnerable communities, and it is the principle that has guided this study of Windsor.

The findings of this research will benefit Windsor and towns in similar situations by providing information on how residents contextualize and understand their own disaster vulnerability. Using this information, it is hoped that Windsor and similar disaster-impacted communities with limited means can work with aid groups to push for more comprehensive recovery efforts that help the community become more resilient. It may also be useful to aid groups working with communities that have suffered repeating and overlapping disaster cycles by demonstrating the effects such cycles can have on a population. Using this information, aid groups may be able to improve their methods and improve their rapport with impacted communities, building more trusting relationships between agencies and the populations they are assisting.

1.4 Research Questions and Hypotheses

Question 1: How do stakeholders in Windsor explain trends in regional flooding over the last 20 years?

Hypothesis 1: Most stakeholders will identify changing land-use patterns and new civil construction projects in recent years as a factor contributing to increased flood frequency due to their familiarity with the local environment.

Question 2: How do stakeholder flood experiences influence their predictions of future flooding?

Hypothesis 2: Stakeholders who have experienced property damage in the last 20 years will predict further increases in flood frequency and severity in the next 20 years.

Question 3: How do stakeholder predictions for future flooding in Windsor relate to their predictions for the town's economic future?

Hypothesis 3: Stakeholders who have experienced property damage and predict future increases in flooding will predict worsening economic conditions in Windsor.

Question 4: How are stakeholder-proposed solutions to deal with flooding related to their identification of flood factors?

Hypothesis 4a: Stakeholders who have identified changing land-use and development as key factors will propose solutions that focus on reducing the use of at-risk spaces.

Hypothesis 4b: Most stakeholders will prefer to reduce the potential for damage and will therefore propose solutions focusing on proactive rather than reactive measures.

Precis

This review of the literature demonstrates gaps between the level of systemic understandings of the causes and consequences of disasters and the factors that shape local-level responses. It is important to address these with detailed data from a case study of how one community responded to repeated disasters in order to better inform and potentially revise existing disaster recovery frameworks, especially since most climate scientists agree that the citizens of US coastal zones will face increasing hazards in the coming years. A more detailed description of the methodology, sampling frame, and analysis plan for the collection of data in Windsor, NC is outlined in Chapter 2. Results from the research, along with some of the implications, are presented in Chapter 3. Further discussion and possible ways to improve responses and address community needs are discussed in Chapter 4.

Chapter II: Methodology

Data for this project were collected during a series of interviews with business owners, religious leaders, and long-time residents in the town of Windsor in Bertie County, North Carolina. Windsor, with a population of 3,652 as reported in the 2015 American Community Survey, was selected as a study site because the community has experienced four damaging non-catastrophic floods in the past 20 years and because the two most recent of these floods occurred in late 2016, less than a year before the beginning of the project. The economic and social conditions in Windsor and the surrounding area were also a factor in the site's selection, as Windsor has a higher rate of poverty than the rest of NC, has a lower median household income, and has lower rates of educational attainment. The combination of these factors and the continuing risk for hurricane and flood damage in Windsor creates concern about the community's resilience and sustainability in coming years. It also provides a unique opportunity to learn how a rural community copes with and adjusts to a new norm that sometimes includes catastrophic events, and such knowledge could prove quite useful if weather variability continues to increase as predicted.

Research Design and Interview Guide

The overall goal of this research was to examine the relationship between knowledge of the local environment, flood experiences, perception of flooding causes and solutions, and views on the future. The specific objectives were to understand: (1) how experiences with flooding influence resident decision-making; (2) how experiences with flooding influence perception of the current state of the community; (3) how knowledge of the local environment influences perception of flooding; (4) how experiences with flooding influence views of the community's

future; (5) how experiences with flooding and environmental knowledge inform resident-proposed solutions to the flooding problem. In order to meet these objectives while giving participants the freedom to raise issues and themes important to them, the decision was made to conduct interviews utilizing a semi-structured, in-depth guide. The goal of this technique is to elicit in-depth information and to allow respondents to structure the way they speak about the topics as much as possible. The researcher allows the interview to progress as a conversation and can probe for clarifications or further details, while retaining the ability to redirect the conversation using the questions. When possible, it is important that in-depth interviews be audio-recorded so that the researcher can then analyze the actual words, phrases, and sequencing of topics used by the respondents (see Quinn, 2005 for a fuller explanation of this interview approach). The researcher also takes detailed notes during the conversation for later reference.

A copy of the interview guide developed for this project is included in Appendix A. The guide was designed to take between 30 and 45 minutes, in order to allow for adequate discussion without imposing a time burden on participants. The interview guide was approved by the ECU Institutional Review Board on July 11, 2017, which guarantees the necessary safeguards are in place for human subjects research. The interview questions were designed to elicit information on the research objectives listed above but are organized by the scope and time interval with which they deal.

The first five questions on the interview guide focus on the participant's perception of his/her personal situations past and present. The two questions asked the participant to describe the risk of flooding in the area around their business, church, or home as befit the participant and about whether he/she carried flood insurance. The intent was to gauge the extent of exposure to

flooding, flood damage risk, and participant knowledge of the immediate environment. After establishing how they view their personal flood risk, the second question asks participants whether they currently carry flood insurance on the relevant property. Questions three through five investigate how participants made decisions about flood insurance and what personal effects they have experienced from floods over the past twenty years. These items were designed to meet the first objective of the project.

The next set of questions shift to ask more generally about the effects of flooding on Windsor across two different time periods in line with the second research objective regarding how flood experiences shape the perception of the current state of the community and to provide a background for how the respondent views the community's future and viable solutions to deal with flooding. Since the first severe flood in Windsor occurred following Hurricane Floyd in 1999, the interview guide's sixth question asked participants about the effects of flooding in the last 20 years on the town of Windsor. The following two questions ask participants to compare this to any flooding they saw prior to 20 years and to identify any similarities they see in the different floods. The ninth question on the guide asks them to offer any explanations they have for the floods of the last 20 years. This question was intended to elicit information relevant to the third research objective, dealing with the influence of local environmental knowledge on perceptions of flooding.

Following the discussions of the past and present situations, participants were asked to think ahead and discuss how their views on the risk of future flooding impacts on their lives and the town of Windsor to meet the fourth research objective. The tenth question asks participants to predict the likelihood and severity of future floods, while the eleventh and twelfth questions ask

how they see those floods affecting their lives and the entire town, respectively. These questions were asked to help distinguish how participants view their personal resilience and viability versus how they view that of the town.

The final four questions target the fifth research objective and ask participants to talk about measures that might mitigate the risk of future flooding and promote resilience and sustainability in Windsor. The first of these prompted participants to speak broadly about solutions in the hopes that they would directly address the flooding factors they had previously identified. The remaining three were intended to prompt discussion of more concrete solutions by asking how the respondent would like to see a fairly large sum of money (\$10,000,000) invested in the town, specifically for the promotion of new business growth, for the reduction of damages from flooding, and for the promotion of a healthy local economy. The goal of these questions was to prompt the respondent to think about the situation beyond their personal experiences and to elicit responses that might show a measure of Traditional Environmental Knowledge (TEK) at work in the community.

To avoid any confusion about what was being asked during the interviews, questions using terminology that might be unfamiliar to residents were stated and then restated using different terms. A set of flood maps were present for all interviews in case the participant needed to clarify something or needed a visual aid, but none of the residents interviewed needed to refer to them. When discussing flood zones during the interviews, probabilistic terminology was used rather than the more traditional timespan terminology. Instead of referring to a 100-year flood plain or a 500-year flood plain, these were discussed as a 1% probability flood plain and a 0.2% probability flood plain, respectively. This change came at the request of Windsor's town officials

who noted that past use of the timeline terminology had caused confusion for some residents and that the probability terminology would be preferable.

Sampling Plan

The research design necessitated the recruitment of informants with a personal stake in Windsor's current situation and in the community's continued survival. The sampling plan targeted business owners, religious leaders, and other long-term residents with a long-term investment in Windsor's civic life. Because the floods in Windsor have directly impacted the town's central business district, owners were not only affected financially but also had a financial interest in future decisions about how best to maintain commerce. Religious leaders, who are in direct contact with residents, hear concerns from across the community, and the local churches have played an important role in Windsor's recovery from Tropical Storm Julia and Hurricane Matthew. The sample also included prominent retired and semi-retired long-term residents who were viewed as influential by other community members. Recently arrived residents who are members of Windsor's religious and business communities were considered for interviews provided they were present for both floods and were long term residents of eastern North Carolina and familiar with Windsor and the surrounding area prior to moving to town. The decision was made initially not to include local political officials because their responses could reflect knowledge not available to the rest of the sample group. Following consultation with a member of the University faculty familiar with the area, local political officials were considered if they also satisfied any of the other sampling criteria. A further effort was made, within these specified categories, to recruit individuals with variant experiences with flooding in Windsor, in

order to represent those who had suffered severe flood damage, those who had suffered moderate damage, and those who had suffered little to no damage. As the sample was meant to represent different flood experiences more than population demography, no specific quotas were set for age, gender, or ethnicity in the sample, though efforts were made to recruit a sample that was diverse in these categories.

A target sample size of 18 was set based upon what was believed achievable under the time constraints of the project while also providing a large enough sample for analysis. The original design was to recruit six respondents in each of three groups representing different degrees of flood damage experience. Because of the effect that prior financial situations, property values, and preparedness for flooding have on damage calculations, the length of time it took to recover or reopen the business or church for usage was used as a metric. No damage meant that the individual's property had not been flooded at all, moderate damage meant that the individual was able to recover or reopen within roughly a month, and severe damage meant that the individual had taken more than a month or had not recovered. This gave the sample a somewhat geographic component, as inundation depth plays a role in how much damage a structure sustained.

The Windsor-Bertie County Chamber of Commerce's list of members was used as the initial framework for building the sample. The Chamber counts 169 members on the list that includes local businesses, local churches, and private citizens, though this number is not limited to the town of Windsor and is not exhaustive. The list of members provided a set of initial contacts that could be built from through a combination of networking and personal correspondence. When possible, introductions and requests to participate were handled in person.

In other situations, potential participants were contacted by phone and asked for an interview. Individuals were called a maximum of three times, at which point no further effort was made to contact them. Snowball sampling was also utilized to find potential participants by obtaining contact information for potential participants from individuals already recruited for the project. Respondents were asked to sit down for an hour-long interview appointment, for which they were compensated with a \$25 gift card for a local grocery store. Compensation was offered in recognition of the fact that many of the interview participants would be giving up a part of their working day to take part in the research. Since many of the potential participant business owners operate service businesses, the \$25 gift card was selected as compensation in order to provide incentive for participation while not being so much as to compel participation.

Description of the sample and research process

The investigator lived in Windsor from June 18, 2017 until August 1, 2017 conducting participant observation, with interviews conducted from July 11, 2017 until the end of the research stay. It was important to be in the community during the research period to gain an understanding of daily life in Windsor and to build rapport with residents. Following the end of the research period, additional trips were made to Windsor to complete interviews through January 31, 2018. Participants were asked to pick a location and time that would be convenient for them. Informed consent was obtained from all interviewees who were reminded that all responses would be confidential and the interviews could be paused at any time.

A total of 16 interviews with 17 individuals were completed. One interview was conducted with a pair of business partners who requested to be interviewed together. This pair will be counted as individuals for the description of the sample but treated as a single interview participant for purposes of analysis. The sample consisted of nine women and seven men. Sixteen participants were white and one was African-American. The recruitment rate for African-Americans was much lower than originally anticipated. Many who were contacted indicated an initial willingness to participate, but then were unable to meet on the dates and times established. Multiple attempts were made to reschedule these appointments without success. Near the end of the project, at the suggestion of faculty advisors, recruitment was expanded to African-American funeral home directors and a school official but these efforts too proved unsuccessful because these individuals had numerous demands on their time that conflicted with scheduled appointments. It may also be that African-Americans were more reluctant to participate for other reasons. Because the final sample has little ethnic diversity, ethnicity will not be used as a variable in the analysis.

The occupations represented in the sample included three religious leaders, thirteen business owners, and one retiree. Three participants were semi-retired but still working. One member of the sample group held a position in the local government in addition to his/her other occupation. Dividing the sample into groups based on flood damage proved more complicated than originally thought. Because of the spacing of the two floods in 2016, many of the participants affected by the floods in any capacity took more than a month to recover and would therefore have been placed into the severe damage category as originally described. Additionally, the nature of some businesses requires that they are open for operation even during a disaster recovery scenario, further complicating the original metric. Eleven of the interviews were

conducted with participants whose properties had flooded and five with participants whose properties had not. Participants' descriptions of the work required to restore their properties after the floods provide a better view of the damage sustained. Five of the eleven flooded participants indicated that they needed to do fairly minimal work to recover, including drying of floors and replacement of HVAC systems. The other six indicated additional work was required such as replacing or repairing significant portions of building interiors and equipment.

Analysis Plan

Detailed notes were kept during interviews for this project. Additionally, interviews were recorded with the permission of the participant. The original intent was to fully transcribe the interviews for analysis. Because of time constraints, members of the investigator's research committee discouraged full transcription and proposed instead that partial transcriptions of key passages be combined with intensive reading and review of interview notes as the basis for analysis. Interview recordings were listened to multiple times and analyzed using grounded theory analysis. Grounded theory analysis enables the researcher to identify themes and categories within the interview responses and formulate models that explain the links between certain categories (Bernard, 2002, p. 463).

During the first round of analysis, the interviews were checked for general themes that appeared in the participants' statements. An iterative process was used. When a key theme was found in one interview, subsequent interviews were inspected for similar wording and themes. Following the initial round of analysis, themes recorded across the interviews were examined

and divided into broader categories. The second round of analysis used the set of simplified themes determined during the first round of analysis and coded the interviews using these thematic categories. Additionally, the interviews were checked for the co-occurrence and recurrence of themes. Once specific themes had been identified and catalogued, the appearance and co-occurrence of themes were checked against demographic identifiers to determine if differences and similarities in the thematic content of the interviews was attributable to the representation of specific groups within the sample. The primary descriptor used for comparison was the participant's damage and recovery experience. These categories were based on the descriptions given about individuals' post-flood recovery processes, rather than previously proposed metrics of financial damage or time taken to recover. Comparison of different ethnic groups represented in the sample was discarded due to poor representation of differing ethnicities in the sample. A brief examination of responses based upon gender groups was conducted as an exploratory measure.

The questions that emerged during the planning of the project and limited media coverage of the situation in Windsor led to the creation of a set of hypotheses that serve as the starting point for the analysis. The hypotheses guiding the analysis are:

- Hypothesis 1: Most stakeholders will identify changing land-use patterns and new civil construction projects in recent years as a factor contributing to increased flood frequency due to their familiarity with the local environment.
- Hypothesis 2: Stakeholders who have experienced property damage in the last 20 years will predict further increases in flood frequency and severity in the next 20 years.
- Hypothesis 3: Stakeholders who have experienced property damage and predict future increases in flooding will predict worsening economic conditions in Windsor.
- Hypothesis 4a: Stakeholders who have identified changing land-use and development as key factors will propose solutions that focus on reducing the use of at-risk spaces.
- Hypothesis 4b: Most stakeholders will prefer to reduce the potential for damage and will therefore propose solutions focusing on proactive rather than reactive measures.

Hypothesis 1 was confirmed if more than half of participants identified changing land-use patterns as a factor contributing to increased flood frequency in the last 20 years. Hypothesis 2 was confirmed if all business owners whose businesses suffered flood damage in the last 20 years predicted further increases in flooding for the next 20 years. Hypothesis 3 was confirmed if all business owners whose businesses have suffered flood damage during the last 20 years expressed concerns about economic hardship when discussing Windsor's economic future. Hypothesis 4a was confirmed if owners who listed land-use patterns as a cause of flooding offered solutions that proposed to change those patterns. Finally, hypothesis 4b was confirmed if more than half of business owners suggested plans that relied on proactive measures to deal with future flooding rather than reactive measures.

There are difficulties in the analysis and presentation of these data that must be addressed. The timing of the project may play a key role in the content of some or all of the interview responses. Based upon the SAMHSA timeline of disaster recovery, the research period fell during the disillusionment phase. Populations going through the disillusionment phase of disaster recovery are characterized by feelings of discouragement, feelings of abandonment, and negative reactions to their traumatic experience such as physical and mental exhaustion. Given the timing of the interviews, it is almost certain that feelings of disillusionment influenced the content of the responses. No attempt was made to specifically identify the influence of disillusionment, instead treating it as part of the context for the interviews. Another concern were statements that named specific persons or entities in Windsor. The majority of these statements were positive or merely descriptive, and when possible have been retained without the inclusion of any identifying information. In other instances, interviews contained emotionally charged or inflammatory statements about recent events or other members of the community. It is the belief

of the investigator that the rare occurrence of inflammatory statements is due to high tensions among residents during the recovery process rather than deep and long-running interpersonal conflicts. Though it is necessary to consider these statements during research, none have been retained for presentation in this, or any other, publication. Windsor is in search of healing and committing such statements to writing would only open wounds.

Because Windsor is a small community in which an individual's social networks may cover large portions of the residential population, there is a need to protect participant confidentiality in the reporting of interview data. Since the majority of the sample consists of business owners and religious leaders, it is even more necessary to obscure identities in the reporting of results. Therefore, every effort has been taken to dissociate quotations from the identifying characteristics of participants. Rather, themes are often reported in aggregate in terms of categories of flood damage with limited information on the geographic location of such damage.

Chapter 3: Results

In-depth interviews were conducted with 16 business owners, religious leaders, and community residents in Windsor, NC. The format encouraged a conversational style and enabled respondents to speak at length about topics important to them (see Quinn, 2005). Interviews were digitally recorded and partially transcribed in order to capture not only the content of what people said but also the ways that they structured the sequences of topics and imposed narrative coherence in the discourse. Analysis involved both an investigation of the hypotheses proposed initially as well as an analysis, using the grounded theory framework, of the emergent themes found in individual interviews and shared more widely across respondents (see Glaser and Strauss, 1967).

There are several similar themes across the body of interviews, suggesting that there are community processes at work as residents attempt to make sense of the repeated floods they have experienced. Nonetheless, there is also considerable variability across the sample, which reflects individual attitudes and experiences.

For the purposes of this examination, the discussion of results will be organized by the hypotheses to which they most directly relate. The relevant hypotheses are reproduced at the top of each section, followed by an analysis of the data relating to that topic. Some themes present in the interview data fall outside the scope of the original research questions. Where possible, the sections relating to hypotheses incorporate these themes. Those that do not fit well into another section are covered in a final section on emergent themes.

Windsor is a close-knit community. Because a small number of fairly well-known stakeholders were interviewed about sensitive topics for the project, care must be taken not to

inadvertently reveal the source of data obtained confidentially. As a result, identifying information within quoted material has been removed, replaced with generic identifiers such as [business] when a single word substitution suffices or with [...] when an entire phrase must be removed so that specific quotes cannot be associated with particular respondents. Additionally, respondents will be identified using third person plural pronouns to mask their gender.

3.1: “That bridge turns into a dam” – Windsor residents speak about the causes of flooding

Hypothesis 1: Most stakeholders will identify changing land-use patterns and new civil construction projects in recent years as a factor contributing to increased flood frequency due to their familiarity with the local environment.

Residents identified a wide array of factors during interviews that they believe contribute to the flooding in and around Windsor. The most frequently identified factors were found across the damage/recovery categories, suggesting that these are actively being discussed throughout the community. The specific factors identified during interviews are listed in Table 3.1, along with the number of residents who identified them as contributing to the flooding.

As seen in Table 3.1, most of the factors identified by respondents deal with human occupation of, and interaction with, the local environment. Only sea level rise (SLR), weather patterns, the presence of swamps, and storm surges, mentioned with a combined frequency of seven times (11.86% of all factors), are factors that do not deal with such interactions. Respondents presented these non-interaction factors as things outside of their control while other factors were things they had more agency over. Residents viewed factors they could exert any control over as worthy of greater attention. Residents are clearly concerned with how changes in their lifestyles and interactions have altered the local environment, viewing their previous patterns of living as more suitable to their local ecosystem. None of the residents interviewed cited anthropogenic climate change as a factor, though they clearly understand that human interaction with the ecosystem can create higher disaster risk. Changes in the landscape leading to increased runoff into the river came up in eleven of the interviews. Two stakeholders viewed the increased runoff as being due to changes in how land is being used for resource exploitation.

Flood Factor	Frequency	Percentage
Cashie River Bridge	12	0.2034
Runoff - From Paving, Forestry, Agriculture	11	0.1864
Cessation of dredging	7	0.1186
Loss of Mill Ponds/Wetlands/Natural Drainage	7	0.1186
The Bypass (17)	4	0.0678
Debris in the River	3	0.0508
Bridge Upriver	3	0.0508
Filled Land/Bottleneck	2	0.0339
Sea Level Rise	2	0.0339
Weather Patterns/Natural Processes	2	0.0339
Buildings Located in Flood Zone	2	0.0339
Too Many Swamps in Area	2	0.0339
Storm Surge	1	0.0169
Roanoke Dam	1	0.0169

Table 3.1: Flood factors identified by respondents with percentage of total factors

A huge change, in all the area around here, is the solar panels that are being built. [...] But the concern is the change that it does make in the landscape. You know, we're a country area and they knock down a significant amount of woods, and fields, and trees. It destroys all of that. And I understand that renewable energy versus non-renewable energy is a huge issue, but I don't know that it's doing – you know, cutting off somebody's nose to save their face. It's destroying a huge amount, and for some reason Bertie County has become a huge home for solar panels. [...] I certainly think that has something to do – there has to be ground, you know, to absorb the water. [7/21 #1]

You hear that people have logged all the swamps, so the water comes out of the swamps a lot faster than it used to. [...] The water just gets out faster because there's more cleared land and there's less obstruction than there used to be. [7/27 #2]

Another resident discussed the interaction between changing land use and erosion, still tying human interactions with the land to flooding:

With modern farming practices, tilling and things like that – I've got a family member who works for the USDA, and they say that farmers are losing more and more dirt out of their fields into the rivers. So, my guess would be that the depth of the rivers has changed drastically, also. [7/18 #1]

Residents are comfortable with the idea that human-environmental interactions play a role in the flooding they have experienced, as is seen in these quotes and others that will follow. But, when looking for explanations of the floods, they favor explanations with a local scope. They also favor explanations with higher visibility, especially those that have left a visible mark on the landscape.

Changes to local infrastructure were a common theme, recurring 19 times across the interviews (32.2% of all factors). Differing explanations focused on general expansion of paved areas in the region, inadequacy of extant infrastructure, or referred to specific construction projects. Residents who brought up these factors consistently discussed them in terms of the effect they had on the movement and transport of water across the land:

My [spouse] says every field is drained and things being brought, I mean, built up. You know, the more concrete you have, the more runoff you have. And it's gotta go somewhere, it's not like it can – I think it's a sign of the times, and I'll say, frankly, I don't know there's anything to be done. [7/15 #1]

It didn't flood like it does now. And I think a lot of it is runoff with all the paved stuff we have now. More paved areas. [7/16 #1]

Of course, construction, highways, that kind of stuff. 'Cuz the bypass out here has been built since '99. But the bridge to Williamston was already there. [...] From what I understand, the problem's that the water gets here so fast and doesn't drain very fast. [...] A long, long time ago, I don't remember what year it was, there was a new parking lot over there that flooded. 'Cuz we had a friend that had a car parked in the parking lot. It was most unusual, 'cuz it was like a flash-type flood. Just a lotta rainfall. [7/12 #1]

Specific areas of development, like the 17 Bypass or the Cashie River Bridge, came up during discussion of flood factors in multiple interviews. Like the statements above, discussion of the 17 Bypass as a flooding contributor focused around how it altered the movement of

rainwater toward low-lying areas, though it often also contained sentiments that the government was unwilling to listen to local viewpoints.

I've had a few people I know around different parts of Windsor who say, 'well, since the bypass was built, you know, we have the big rains and water comes in our neighborhood where it used not to.' So, that's just personal experience and all you have to do is live there and you know that certain rains used to not cause rain to come your way. [7/11 #1]

I feel like they done something wrong when they did the four-lane, the bypass. They done something wrong in the area there and it has caused these other places to flood that did not used to flood. Because we did not get the water that we got when Floyd came through. It wasn't as much. I mean, it was enough to flood us, but you know what I'm saying? It wasn't – It was less amount. And those places flood and they didn't flood when Floyd came through. They done something wrong out there, when they put that four-lane in. [7/25 #2]

The state won't do anything about the road. All I need is another pipe under that road. That's all I need, and they won't do it. [7/13 #1]

Feelings of government apathy occur throughout the interviews but are most prevalent in responses to questions about flood factors and flood responses. The perceived lack of action has caused many residents to question the priorities of government agencies, their decision-making processes, and whether they are even qualified to perform their intended functions.

The DOT is there in Raleigh making decisions and not listening to the grunts who are out here, actually doing it. Who can tell 'em how they really ought to be doing it. [7/27 #2]

A serious level of expertise needs to come, it needs to be studied. It's not something that a group of people sitting around a table are going to say, 'Hey, let's do this.' There needs to be a serious study. And I don't really know that that's ever been done. We get a lot of ideas thrown out there from various persons within the State, not that I'm saying the State's not qualified, but I'm just saying you should be looking for your top-notch people. [7/21 #1]

The same sentiments also appear in discussions of the most frequently identified flood factor: the Cashie River Bridge.

Although the bridge was identified more frequently than any other factor (20.34% of responses), the current bridge has only been present for two of the four floods in the last 20 years, those occurring in 2016. From 2009 to 2012, the NC Department of Transportation (NCDOT) worked on project B-4434 to replace the dilapidated Bridge 14 over the Cashie. The new bridge is wider and longer than the previous Bridge 14, roughly doubling the size by adding 4380 sq. feet. Residents say that several different bridge designs were proposed and feel that many of the other proposed designs would have been better suited than the design selected for the new bridge. Residents who discussed the bridge as a factor were concerned with the bridge's relatively low clearance over the water and what they perceived as a narrower mouth.

They promised it [the bridge] was gonna be higher and wider and it was – the way they built it, they say it's actually narrower and lower. [7/13 #1]

I guarantee you, everybody – most everybody, I'd say 75% or higher – the average person you talk to say they think that's [the bridge] a problem. [7/11 #1]

I really wish that I understood – and the only reason I know this is because [name] told me [...] the plans for the bridge that the state was gonna build. I mean, it was a huge – like a high-rise type thing. And, you know, all they did was turn around and go right back in the same spot. And raised it up, I understand, six inches. I know nothing about if that's true or not. And it really does not help anything. [7/15 #1]

The alternate bridge designs residents say were considered prior to construction were referenced in five interviews. Playing into the same sentiment that the government is not serving the town's needs, residents explain the design discrepancy by saying that better or safer designs were abandoned in favor of a design that saved money. Documentation of project B-4434 is

publicly available from NCDOT but contains none of the supposed alternate designs. That is not to say that other designs were never considered, merely that the claim could not be verified as they do not appear in the official documents. In either case, residents commonly asserted that the chosen bridge design altered the environment in a negative manner and contributes to the repeated flooding because it impedes the flow of the Cashie river during high-water conditions.

Here especially, though, it's the bridge. To me, they need to extend that bridge out to that corner, 'cuz all that water's trying to rush under that bridge and look how low the bridge is. [7/25 #2]

They always talk about, 'the bridge isn't a problem.' My simple thing to them would be: if it's not that big a deal, why is water trying to get out and why is it getting caught in places where it doesn't normally flow? It's doing its best to get out, but there's obstructions that keep it from happening. [7/11 #1]

People say it's a dam. Here again, that's not the only reason. I just think it's a lot of things, compounding. [7/15 #1]

Need some way to spread out the water coming down. That bridge is like a bottleneck, you know? Keeps it from moving fast enough. [7/16 #1]

When it floods, that bridge turns into a dam. It absolutely turns into a dam. It boggles me, because I've heard our mayor say that – the exact opposite. That the dam [the bridge] didn't cause a problem. [...] I've been to that bridge and saw it looked just like white-water when you let it out of the bottom of a dam. When they're releasing water out of the bottom of a dam. I've seen it come under the Cashie Bridge just like that. You can't tell me it ain't holding water. [7/18 #2]

Despite widespread agreement that the new bridge contributed to flooding, residents disagree on the specific processes that led to such flooding, especially with regard to how exactly the bridge influenced the flow of water during heavy rainfall. Most agreed with the view that the bridge slows or restricts flow, but there is at least one resident in town who believes the opposite.

They say the opening for our bridge going across the Cashie has more opening and lets more water through. That's what they're saying. I don't know, I don't know that for a fact. They're saying some of the bridges have more space underneath them than they used to have, so they let more water through. [7/12 #1]

This view more closely aligns with local explanations of the way bridges upriver influenced flooding in Windsor. All three residents who identified other bridges along the Cashie as a contributing factor explained their effect the same way: the bridges upriver from Windsor have large mouths that let water through unrestricted, allowing it to flow faster into Windsor than it can flow out.

Bridges are built with bigger openings than they were then, so bridges aren't holding back the water anymore. [7/27 #2]

Here's what's happened in the last 20 years or 30 years. There have been a number of bridges built above town, and I can show you the figures on them. There've been 5, I think, in the last 20 years. I can show you the figures. One of them, they went in there and made the opening 69% wider than it was. Another one, 49. [...] And another one 9. There're two that I don't know about. One, they did not open it up anymore. [...] The hydrologists will tell us if that's a problem. It is in my opinion, because the water's getting here so much faster. They've already said the water gets here faster than it used to, so they're trying to figure out why it gets here faster than it used to. [1/24 #1]

Although they disagree somewhat on the processes involved, the frequency with which respondents focus on the built environment demonstrates a comfort with explanations that hinge on human actions. Disagreements arise more from distrust of the power structure and misunderstandings about the influence of specific structures on the hydrology of the area. It should also be noted that, though there are some tensions between residents and local leadership, nearly all residents interviewed believe that the mayor and other local leaders are trying their

hardest with a difficult situation. Criticisms that were made against local leadership dealt more with specific decisions or perceived issues of communication than with doubts about capability or willingness of local leadership.

Interview data also suggests that residents connect their thoughts on the causes of flooding to the solutions they believe are viable. Though every respondent identified factors they felt contributed to the flooding, they did not always do so when prompted. In several cases, respondents had trouble naming specific factors when asked; instead, they named them when asked about solutions to deal with flooding. This is particularly true for the Cashie River Bridge. The Bridge was identified as an issue in twelve interviews total, but in four of those instances the respondents only added it as a factor when asked to discuss potential measures to reduce or end flooding. In other words, instead of reasoning from the causes to possible solutions as the majority did, these individuals reversed the chain of logic and started with solutions working backward to the causes that must therefore be implied by them. Understanding causal reasoning is important because people's views inform decisions being made for the town's future and the community's survival.

Regarding the hypothesis that opened this section, it is safe to say that most stakeholders believe changing land-use patterns and new construction projects are contributing to repeated flooding around Windsor. Table 3.1 show that 67.78% of responses, including four of the five most commonly referenced causes, meet this criterion. Hypothesis 1 is, therefore, accepted.

3.2: “We’re all gonna be washed away” – Residents speak about Windsor’s future

Hypothesis 2: Stakeholders who have experienced property damage in the last 20 years will predict further increases in flood frequency and severity in the next 20 years.

Hypothesis 3: Stakeholders who have experienced property damage and predict future increases in flooding will predict worsening economic conditions in Windsor.

Though all stakeholders who experienced property damage during the last 20 years predicted continuing floods and economic hardship, they are not unique in this respect. Every resident interviewed, no matter the amount of damage sustained or the length of time it took them to clean up following the floods, believed that Windsor and the surrounding area would still face further floods in the future in part because they see weather patterns changing.

There probably will be. There probably will be more flooding. Because it seems different now. When we have a really torrential rain it's starting to come up. I'm from [City] [...] We've seen a lot of flooding. But for here to be flooding is really odd to me. Extremely odd. So, if there's rain, we just have one downpour and it's like, 'Okay, we got a flood watch.' So, right now I see more flooding [...] It may be the same way it has been. Water coming up and taking days to go down, and back to normal. [7/25 #1]

I think the first flood caught everybody by surprise. Everybody in our area was told that was a 500-year flood. When it happened again a couple years later, the joke was they must have got it at the end of 500 years and then got it again at the beginning of 500 years. And then when it happened two more times, everybody's just said, you know, something's changed and the folks that said 500-year flood probably didn't really know what they were talking about. Something has changed, and this is more of a – Now people haven't said, 'If this happens again,' they've said, 'when this happens again.' [7/18 #1]

Windsor's residents also view the certainty of future flooding as being partially within society's control, aligning well with their views that human actions have contributed to their current state of flood vulnerability. Frequently, as illustrated by the following quotes, residents spoke of government inaction when discussing the potential for future floods.

I feel like if they don't do something, it's gonna stay the same. It's gonna keep right on flooding. I mean, they keep hollering it's the beaver dams that's doing it, but I don't think all of it has got to do with beaver dams. [7/25 #2]

We're gonna have some more. I'm thinking, I'm not sure. I'm not hoping we will, but I feel like we'll have some more. Course they're doing some types of study about it, but I don't know that they'll be able to do anything fast enough. September won't be too far. All of ours have been in September, except the one of them that was in October. [7/12 #1]

See, you have to put the money towards what can fix the problem. I mean, I hate to be redundant, and all these monies – whether it's a study, or towards the businesses, or towards the 'what would you do' – it's all relevant on what can fix the problem. That's the most important thing. 'Cuz, like I say, then if it's from a monetary or a financial point of view saying that it's not really feasible to do this, then that's when you got to look at alternatives. [...] Can't do all those, all those can't's. Can't do that. Then you just gonna have to say, 'Well, everybody from here or a certain point has got to go to higher ground.' And then, it's like, I'm thinking, if we're not fixing the problem or trying to fix it, then it's gonna be expanding. The floods will get probably worse through time. [7/11 #1]

These quotes merely provide a sample of a sentiment that runs throughout the interviews, the idea that future floods will happen primarily due to inaction. In total, eleven of the residents interviewed believe that inaction and lack of preparedness would lead to future flood devastation. Residents recognize that some aspects of the floods are outside of their control but feel that there are measures that could greatly minimize the damage inflicted by the region's floods. For them,

the issue is more that the government and its assorted agencies are unwilling to do the necessary work than that the work is impossible.

Feelings of abandonment or neglect are common sensations for disaster survivors after the initial rushes of exposure and assistance (SAMHSA, 2017). What is being described by Windsor's residents, however, seems to go beyond simple frustration with lagging recovery processes. When Windsor's stakeholders voice their frustrations with the bureaucratic systems of the government, they tie those thoughts to the future of their town. Without action, residents foresee more floods, but they cannot see a future for Windsor through those floods.

Windsor, as a whole – The flood affects every aspect. I can't imagine anybody wanting to buy a building or a home in Windsor that's been flooded that many times. Not just because of the chance of flooding again, but mold and, I mean, structurally – a flood does so much more damage than just getting it wet for a few hours. It's long-lasting damage. That's just making our property values go down, our downtown scene. [7/18 #1]

I think, little by little, it'll turn into – and it's a harsh word – but I think little by little it'll eventually turn into somewhat of a ghost town. So to speak. Like some of the other small towns that we've got that are out in this whole area. [7/21 #1]

Fears that Windsor will cease to be are based upon more than just physical damages, as referenced above. With each flood, Windsor's stakeholders struggle with losses in their community. Valued neighbors are lost as victims decide that they can no longer afford to stay in harm's way, moving to new areas of the town or leaving town altogether. Stakeholders fear that, with each loss, other members of the community become more likely to make similar decisions.

If we have one flood the magnitude of Floyd or greater, it could very well mean the death of the business community of Windsor because the majority of it, right now, is right there on King Street. And the people that own the land out toward the bypass and that – a lot of it is farmland, it's very expensive, and that's not the heart of the town. The heart of the town is right down there on King Street. So, if

there's another flood the magnitude of Floyd, you've killed the heart of Windsor. There may be some who would be willing to come back, but, I don't know, there are many who are just – I don't know about business owners, but home owners – that are like, 'four times is enough, I'm done ... We can't deal with it anymore, we can't deal with this.' You know, it can be pretty heart breaking. [7/21 #2]

I think we're going to dry up. The town is just going to – I really do. And [name] had considered moving out to the Food Lion strip, you know, renting a place. But I think he might have changed his mind. [7/27 #1]

I think the last two floods kinda made it a lot worse, 'cuz now the actual business owners have gotten discouraged also. There was a lot of talk about not coming back. Actually hearing people say that they're not coming back, that makes them go somewhere else also. It's word of mouth, people like, 'they said they're not coming back.' And then it's like, 'well, we're gonna go over here then, over to Williamston.' It's pretty much a domino effect. [7/25 #1]

With each flood, residents struggle with damage to their own holdings, damage visible across the town, and the sense that they could be the next ones to move. Damages to physical structures and the fabric of the community following each flood change the makeup and strength of Windsor's economy, leaving those reliant upon it in doubt about the future.

Physical damage after a flood is quite visible, and the post-disaster cleanup provides a visual indicator of recovery. In addition to the visible damages, however, floods deal significant damage to a region through loss of productivity and stagnated economies that cannot be easily gauged by sight. Business owners in Windsor who experienced flooding on their properties said that the time to recover to the point of reopening typically takes six to eight weeks from the time of the flood, but the economy can still be in trouble even after the town has the appearance of normalcy. Even business owners whose properties were not damaged have felt the economic impacts of the floods:

It hasn't gotten back right. I've been here five years – I'm going into my fifth year and I wouldn't say I've made enough money to retire, but I certainly haven't missed a meal. Since September, I have struggled. [...] I'm at a point now where I'm not even 100% sure I can sustain it. I'm at a huge crossroads right now. I've struggled worse since the flood than I did in my first year. Traditionally, when you have a small business, the first year is nothing but debt and, you know, that's your struggle. That's your struggle, and of course it was a struggle. But the struggle since September has actually been worse. [7/21 #1]

Considering that 42 of Windsor's businesses had to recover from flood damages after Hurricane Matthew, the slow economic recovery is understandable. Business operators need to divide their time, money, and energy between recovering from the last flood, continuing to provide for themselves and their families, and figuring out how they can make their next recovery easier. Each flood brings a fresh set of costs and worries that are exacerbated by a slowed economy, making each recovery more difficult.

Uncertainty about individual economic futures leads to uncertainty about the economic future of Windsor. When asked about Windsor's future, ten of the residents made negative predictions about Windsor and the downtown area. As is the case with most of the themes found in interviews, predictions that Windsor or the downtown will cease to be are found across the different damage categories and suggest that the sentiment is based on thoughts shared throughout the community rather than personal experiences and outcomes. For most, the economic future of Windsor's downtown is tied directly to the damaging effects of future floods.

I can't see Windsor's economy improving at all with the way the floods keep happening. I can't see there being opportunities for employment downtown, or in the immediate historic area where it floods. [7/18 #2]

We've got to figure out what to do about the water and what to do about the economy. Because one day, if we don't do something, the only people that are going to be here are the ones who can't escape and the ones who have the money to leave whenever they want to. [7/21 #2]

There's not gonna be a downtown. Everybody will leave. They will definitely get out of there, as far as businesses. [7/25 #1]

Dumping money into downtown is a waste of money. Maybe they could turn it into a park. [7/16 #1]

I'm afraid it's [future flooding] gonna decimate it. Now, I don't know how determined some people are. The very center of the town, you know, where the town hall is, that seems to stay dry. [...] There's very few structures downtown that are not affected. And this little section of buildings right here, now we've seen [business] go. They stuck it out for, like, three years and now they've moved to the bypass. The [other business] have moved to the bypass, and they used to be downtown. And who in their right mind is gonna go in there? I guess until a certain length of time to not be flooded and people start to forget or tend to not be so intense about it. Maybe somebody will go back in there. [7/15 #1]

Themes of common sense and the need to forget are frequently found in statements about the town's economic future, as seen in the last quote above. One resident estimated that it would take ten to fifteen years without a flood to rebuild confidence in the downtown area, while another estimated that it would take “four to five years for them to forget and think it ain't coming again” before people would really want to come back downtown. Until such a time, there is little hope among interviewed residents to bring in new business opportunities downtown. Reliance on an influx of money from outside Windsor was common in discussions of the future, and those who foresee a declining economy discussed reasons why potential entrepreneurs, investors, and even new residents would be wary of Windsor.

How can you promote something that's flooding every year, year and a half on average? How can you promote that? I mean, can you look somebody in the face and say, 'you need to come to Windsor and start a business' or 'you need to come to Windsor and live and let your family grow up here, raise a family?' How can you promote something like that, unless you want to promote it by saying every year and a half you get to deal with a flood and go through all that, that situation? [7/11 #1]

You got to have money to start the cycle, and it's just not here. With what's happening in downtown, it's just very difficult for people to decide. Going into business for yourself is a huge risk to start with and the chances of being successful are not in your favor. Going into business in a flood area is not helping your risk factors at all. People are really taking their life in their hands when they do that. [7/27 #2]

Business-wise, the town does not have anything to draw people downtown. They've tried to do some things like dress up the windows and do all that. And we're better than some towns, I will say that. Some of the other towns in the county have just totally dried up. But Windsor does have some businesses downtown, but they're not businesses that draw a lot of people. So, I don't know the solution. [7/16 #1]

Perceived lack of interest from the outsiders that many feel are needed to drive the local downtown economy is conflicting directly with a desire to see the downtown area continue. With limited means at their disposal, residents invest time and energy in ways they feel are most beneficial on a day-to-day basis.

Believing that there is no longer interest in the downtown area, many residents are reluctant to invest effort or money in projects to help revive the area. Several commercial spaces downtown sit vacant and, in some cases, see little care and are very visible reminders of a more prosperous past. Residents' beliefs about future flooding and the lack-of-interest in new business investments are, in some ways, creating a self-fulfilling prophecy. One resident, the owner of a downtown property that sits vacant and in need of repair, described the reasoning behind why they were not dedicating time and resources to that space:

That's why it just keeps deteriorating. I don't really use it, so I don't put much work over there. There's no need to put money in it. And who's gonna come down here right now? [7/13 #1]

The property in question has been inundated in each of the four 500-year flood events, making any investment in the space a risk despite being in a highly visible downtown location. Vacant spaces in the flood zone serve as visible reminders of the flooding and have a continuous influence on the attitudes of residents and outsiders. Flooding has eroded local faith in the downtown area and many residents question whether it is wise to continue committing resources there.

There's no point in trying to keep historic Windsor alive where it is if businesses literally cannot operate. You know, without having a flood come through every couple of years and literally wiping out everything you work hard for. [7/18 #2]

I guess you'd say, when you've been in a warzone three or four times you get a little jumpy. [...] There are people who are very, very discouraged. A few, I guess at least two or three, have not moved back on King Street. They moved around on Granville Street, down on the other end where it hasn't been as affected by floods. [7/26 #1]

One resident, discussing how they would potentially invest grant money intended to help stabilize Windsor's business community, felt that investment in the downtown area was a nonstarter due to future uncertainty.

I really wouldn't know where to tell them to start. At this particular point, just based on the patterns and what I'm seeing, I wouldn't feel comfortable really even saying that would be an option. That a game plan for sustainable businesses in this area is really an option at this point. I don't even know that that – Why invest \$10,000,000 into building up the businesses when we have no idea if the next time it comes around, you know, we're all gonna be washed away. [7/21 #1]

Considering repeated experiences with flooding, visible reminders of flooding, high costs of starting a new business or moving, and perceived likelihood of future flooding, it is understandable that residents are uncertain about the future. Caught between diffuse sets of goals for the town and their personal lives, limited means to realize those goals, and precarious

economic conditions that require a focus on managing the short-term, residents are left in a state of limbo where a positive future for Windsor is contingent upon what they view as a series of serendipities. A lifelong resident with deep ties to the community felt that the lack of a clear path forward was a great obstacle to healing for Windsor.

See, I think part of the problem is they don't see any future. That the town is not gonna be worth it for them to build new stuff. But I think a visionary could come in there and make it a town that people would come to be, come to see. [7/16 #1]

Views of the future may have a significant impact on outcomes as they influence investment of effort and resources. If presented with a positive, achievable vision of the future, residents could find a renewed strength and energy to address readily identified problems in their community. Issues such as flooding, a slowed economy, and education are barriers to a positive future for Windsor, but not all of these problems are without solutions. During interviews, residents offered numerous solutions they believed could improve outcomes.

Stakeholders who experienced flood damage in the last twenty years predicted further flooding and continuing economic hardship, but so did those who did not personally experience flooding. Predictions of the future appear to be more grounded in perceptions of community health rather than personal experiences. Future flooding is a concern but is only a single aspect of the future that residents perceive. In light of the interview data, it is safest to reject Hypotheses 2 and 3 as they do not present a complete view of how stakeholders contextualize the present as part of a longer timeline.

3.3: “It needs to be enduring and peace-bringing” – Residents speak about potential solutions

Hypothesis 4a: Stakeholders who have identified changing land-use and development as key factors will propose solutions that focus on reducing the use of at-risk spaces.

Hypothesis 4b: Most stakeholders will prefer to reduce the potential for damage and will therefore propose solutions focusing on proactive rather than reactive measures.

During interviews, residents were asked to discuss potential solutions in a couple of ways. Following questions about flood factors and their views of the future, they were first asked to offer any general solutions they thought could lessen flood damage. Then, they were asked to propose specific solutions relating to the allocation of grant money in a series of three questions. The first question dealt with investment in new business opportunities, the second with reducing flood impact, and the third with making the current business community more sustainable. Table 3.2 collects the categorized responses to these four questions. The proposed solutions focus on numerous aspects of flood risk, some of which were not specifically identified as factors previously. Similar to the responses for flood factors, most of the responses here occur with limited frequency. Rather than examining responses in descending order of frequency, it makes more sense to cover them in thematic groups, which are land-use and development, water flow and riverine health, and social or economic responses.

Factors involving land-use and development are relatively common when Windsor residents discuss flooding, enough so that they appear in news articles about the 2016 floods and were the basis for two of the hypotheses in this research (Hypotheses 2 and 4a). Given the

Proposed Solution	Frequency	Percentage
Bring Money into Town/Improve Economy	11	0.1325
Dredging/Cleaning River	8	0.0964
Relocate Entire Downtown/Shopping Area	8	0.0964
Relocate flood-prone businesses/homes	7	0.0843
Fix the Cashie Bridge	6	0.0723
Improve Drainage	5	0.0602
Raise the Town/Elevate Buildings	5	0.0602
Waterproofing/Floodproofing	5	0.0602
Dig a Canal	4	0.0482
Bring in Experts	4	0.0482
Build Dams/Control Flow	4	0.0482
Improve Schools	3	0.0361
Build a Flood Wall	3	0.0361
Invest/Create Fund	2	0.0241
Strengthen Current Downtown	2	0.0241
Restrict Building of New Structures	2	0.0241
Widen the River	1	0.0120
Build a Pump to Move Water	1	0.0120
Decrease Runoff	1	0.0120
Dig Trenches	1	0.0120

Table 3.2: Resident-proposed solutions to reduce flood damages with percentage of total solutions

frequency with which these factors were discussed, it is unsurprising that several of the proposed solutions address those issues. The solutions classified as dealing with land-use and development are: relocation of the downtown area, relocation of flood-prone business and homes, fixing the Cashie River Bridge, elevating buildings, and restricting the building of new structures in flood zones. Solutions within this category have a combined frequency of 28 occurrences, 33.73% of the 83 total options mentioned. It is notable that the Cashie River Bridge was referenced as a flood factor in twelve interviews, but only proposed as a solution in six of them. All the solutions involving the bridge proposed altering the design of the bridge to allow more water to flow through, typically favoring the “high-rise design” that many residents discussed.

Among responses that dealt with land-use and development, solutions advocating the relocation of the downtown area or of structures in areas with high flood risk were the most common. Relocation options were treated favorably by most residents that brought them up, apart from a couple who viewed abandoning the downtown area in any capacity as “a weak option” tantamount to “throwing in the towel.” Those who view relocation favorably most often brought it up because they feel that a central business and shopping area is crucial to Windsor’s economic health but would rather invest “away from the water” or “where the land isn’t so low.” Others who proposed a large-scale relocation see it as a way to reduce flood risk for residents while also helping with other problems they feel are inhibiting success for local business owners. One resident, a proponent of relocation, laid out their reasons that did not involve flood risk:

There’s a way to find out how many cars pass on 17, and it’s ridiculous. All your fingers and all your toes many times over. We know a guy from ECU who says 7,000 cars a day drive through the intersection at the State Employee’s Credit Union. Windsor was built around 17. All these little towns are built around a highway. You take the highway away, where’s the downtown go? Same place, it goes away. When they built the bypass, that’s what first killed downtown. And then the floods didn’t help. All the cars go around Windsor. Used to, they had to drive through Windsor. It used to take you down by Downtown from where the funeral home is, that was 17. Now it goes around. Nobody wants to come into town. That’s why all these places here on 17 are doing well. [7/18 #2]

Another resident who believes relocation is the most prudent answer to dealing with Windsor’s flood woes questioned why some residents are so adamant about preserving the downtown area.

I wish Windsor could relocate and build a new town. Out there across from Food Lion or somewhere where they’re on high land. I mean, this is ridiculous that it keeps happening over and over and over. For instance, there’s no reason those banks couldn’t be out of town. It’s not like we have any historical buildings downtown. They destroyed all those long ago. [7/16 #1]

Justifications for such a move vary between respondents, but the location in question is consistently along the new stretch of 17 that carries traffic around town. The flow of traffic in Windsor has changed just as the flow of water has, and residents recognize that land along the bypass offers better security on both fronts. For most, though, the cost of moving to the bypass is prohibitive. Much of the land is good for agriculture and has a high value, and when combined with a location along a major thoroughfare the cost becomes more than many in Windsor can justify. Even when loans could potentially help, residents interviewed admitted they were more likely to take an earlier-than-planned retirement than “go into debt at my age.” For relocation to be a possibility for most of the residents who brought it up, it would need to be an effort driven by the entire town.

Some of the proposed flood solutions involve human alteration of the landscape but are focused on altering how water moves across the local landscape. These solutions involve using human alteration of the environment to affect the interaction of natural processes and are classified here as a category of water flow and riverine health. Water transport is the common theme of this category, whether the proposal is to divert water away from occupied areas or improving the flow of water in the river. Solutions classified as dealing with water flow and riverine health are: dredging and cleaning the river, improving drainage, digging a canal, building dams or otherwise controlling river flow, building a floodwall, widening the Cashie River, building a pump to move water, decreasing runoff, and digging trenches. Solutions within the water flow and riverine health category have a combined frequency of 28 occurrences, 33.73% of the total options proposed.

Dredging came up the most frequently of any solution in this category, having been cited as a factor in seven interviews and proposed as a solution in eight. According to residents, the

U.S. Army Corps of Engineers had dredged the Cashie River for decades until there was too little river traffic to justify the cost of dredging. Residents who mentioned the cessation of dredging as a factor brought it up again when discussing solutions, believing that dredging the river would help deal with underwater barriers they worry are making floods worse.

I feel like they could probably dredge the river and dig it out. All the debris, and junk, and trash. I mean, you can't fish, you can't run a boat up and down the Cashie without hitting something. And it's trash, it's all trash. There's port-a-potties and stuff, and trees. There's more logs. [7/18 #2]

Clean out the river. Clean out the river, I think that would help us a lot. Ain't no telling what's in there. We do know there's a lot of trees that came from Isabelle that we know are still in the river. [7/13 #1]

They could dredge what's already here -- because it's my understanding that, years ago when they had boat traffic, [...] they kept the river more clean or dredged out. Not just clean, that's not a good word. Open, so to speak. And since '99, every time we have a hurricane and get flooded there's a whole lot of debris that settles in places where it normally didn't. You don't know how much is down there. You don't know what's down there. [7/11 #1]

Solutions that highlighted dredging often referenced ideas that the river, following years without maintenance and a series of floods, contains numerous unseen and unknown dangers lie beneath the surface of the water. Residents also consistently reported that the U.S. Army Corps of Engineers used to dredge the river, aligning with views found across the interviews that the government does not care about Windsor or, at the least, does not prioritize the town's needs.

If it boils down to the biggest thing we need to do is to get the Corps of Engineers to dredge the river, to clean it out – you know, to make sure all the debris is out so that it can flow. Make sure that the marshes are healthy so that they can take the overflow. Whatever we do, there are systems at work. And realizing that the impact from one is gonna place stress on another. I mean, it's got to go somewhere. It's got to have relief and release. [7/21 #2]

Think about [business] out there with all them tires. I mean, where are they? They're in the river and they're obstructing the flow, but the state says they can't dredge it! They 'don't have the money.' Not to mention the fact that the environmentalists are saying, 'well, there's a fish that's raising babies over there, we can't obstruct that nest over there.' [7/13 #1]

Having every request denied with no alternatives being offered or acted upon leads residents to assume that the government no longer represents or cares for them. Four floods in twenty years with little action resulting in change has demonstrated to them that the government is unwilling to assist them, even when they bring their own solutions to the table.

Residents also voiced some unexpected responses to the issue of potential solutions. One question asked them to talk about the health of the local economy and what measures they would take to improve it with the possibility of future floods. Instead of responding that it was jeopardized by flooding, they responded instead by discussing the vulnerability of the general community – a vulnerability that required social and economic solutions. Solutions classified as relating to social or economic responses are: improving the local economy, bringing in experts, improving local schools, creating a fund to help impacted businesses, and strengthening the current downtown. Residents mentioned potential solutions in this category a total of 20 times, which was 24.1% of the total proposed solutions. Improving the local economy was the most frequent single solution discussed by residents, coming up in eleven different interviews. The focus on reducing vulnerability and improving quality of life demonstrates that residents view flooding as only a single aspect of a set of problems facing Windsor. By improving local economic opportunities and stability, they hope they can enable more of the population to reduce their personal flood risk and, in doing so, reduce the community's overall flood risk.

One method proposed to help improve the local economy is to find a way to draw more people into downtown. With the loss of the tobacco market and the bypass diverting traffic around the downtown area, fewer people have reason to come to Windsor's business district. A feature or business in the downtown area that could draw in more traffic would benefit the entire business community.

Tobacco market's been gone a long time. That's another thing contributing. There's no tobacco market, no people coming in. Back when you had tobacco markets, you had people coming in, eating, shopping, all that. All that's been – I don't know how long the tobacco market's been gone, but it's been a long time. [7/12 #1]

We need some more – something the draw people in. Having the [restaurant] here on King Street helps me, because people go there to eat and they see [my shop]. [...] It helps everybody. Something in that could draw some more people into town. [7/13 #1]

Others saw the best way to improve the economy as helping improve the current workforce and bringing in new industries to increase employment opportunities. Government assistance is seen by some as a social ill that damages the workforce and makes businesses less willing to come into town. Issues of addiction also came up during discussion of the labor force, discussed by four residents during interviews. Two of them are sampled here:

I know one of the things, Windsor's biggest drawback to bringing a business of any size to, is the labor force. One of our biggest problems in our area is the government handout system. We've got a lot of folks that don't want to and won't work, because if they do they won't get their government check, they call it. That is something that's crippling the people of our area. They get just enough money from the government to last them three quarters of the month. They'll beg for that last part of the month, and then the cycle starts over every month. That's one of the biggest things hurting our area. That and things like heroin. [7/18 #1]

Our labor force is not very educated, so it's gotta be pretty much manual. It's gotta be low skill. Chicken processing is very typical of what you could do. If it's high tech, we just wouldn't have the people to do it. The prison is probably a perfect example. They need people out there, and they can't get people out there because they can't get people to pass a drug test or pass their qualifications. They built it here to help our economy, and nobody here qualifies. So, they have to bring people in from outside. [7/27 #2]

Rising rates of addiction are linked with the disillusionment phase following a disaster, but the descriptions given in interviews and in casual conversations suggest a longer running problem that is exacerbated by the hurricanes and floods. Rates of addiction could go down if economic security was improved across the population, which would be helped by bringing in work appropriate to the current labor force. Going forward, however, residents would like to see investment in methods to improve the area's labor force.

Many emphasized the need to improve education and quality of life. Improvements to the local education system are also viewed as a way to draw more people to the town, as residents feel that the current school options are pushing potential new residents to consider moving away. Improving Windsor's schools, in their view, would make the town more attractive to new residents and businesses while also improving opportunities for students in the system.

Here, our education system just takes one step forward and slides back two. Take one step forward, slides back two. If we could magically move Chapel Hill schools to Bertie County, it would be the perfect place to live. It would be a place where – Doctors would live here instead of in Greenville. Pharmacists would live here instead of in the surrounding towns. It would be a place where you have people who are higher income, making more money, more professional people would come. It would help everybody. [7/27 #2]

To attract businesses, we'd have to do something with our school system. Because we don't have a very good record there. I mean, nobody's gonna bring their family here and then they've got to travel to Elizabeth City or somewhere just for their kids to get a decent education. That's part of it. And then you bring in some kind of industry, you know, something to bring people in. [7/27 #1]

While the two residents quoted above primarily advocated for improving the current school system to make the town more attractive to new businesses and residents, the third took a notably different approach. They questioned the suitability of the area's schools to the needs of the area, suggesting a vastly restructured education system for the region that was intended to improve multiple aspects of the students' lives while providing for labor-needs in Windsor as well.

It would be more along the lines of a free trade school or a market school. It would be educating them by giving them job skills and life skills. Not just – So many of the kids don't know where their food comes from. They don't have any idea. You know, they don't know what corn looks like in a field. They don't know what butter beans or string beans look like, things like that. Not everybody needs to go to college! They need to be able to have a trade that will support their family. Why can't we have something that teaches how to do plumbing? How to be an electrician or carpenter? How to be an auto mechanic? So that they're going to school, they get their education, they do an apprenticeship, they go out and they're helped to find a job. But they also learn life skills like how to boil an egg, sew on a button, or balance a checkbook. [...] It would, I feel, pull the community together to support it and help the people here. [7/21 #2]

Residents who discussed social and economic solutions drew connections between high unemployment and poverty, high addiction, poor education, and disaster vulnerability. Their perceptions of disaster vulnerability display an understanding of the complex interactions between various social, political, and economic systems in the area that results in drastically different outcomes for certain portions of the population. Their proposed solutions reflect that interwoven view and suggest multifaceted approaches to deal with vulnerability and increase the quality of life for locals. No residents who discussed such views named specific races or classes in the area, instead referring to individuals who have means and individuals who do not. If, as another resident stated, Windsor is struggling to recover because “they don't see a future,” then

perhaps involving local stakeholders with a clear vision for creating a new future can help provide a solution. Later in the interview, the resident who proposed changing the local schools revealed some of the motivating philosophy behind their proposal.

This is a beautiful place to live. It's very peaceful. When I drive into town, I just feel the stress fall away. There's certain qualities about it that you really want to keep intact. You don't need anything cheap or chintzy, it needs to be enduring and peace-bringing. It's got to be good and wholesome for the community. It can't be just anything to make money because money's not the answer. It may buy things, but it doesn't change the quality of people's lives. And the most important thing is to change that quality, to improve it. [7/21 #2]

The hypotheses that guide this section are both true based on the interview data. Residents who identified land-use and construction as flood factors proposed solutions that addressed those factors and all residents discussed solutions that focused on reducing risk for future floods or mitigating their damages. Residents make connections between their current disaster vulnerability and their future vulnerability and would prefer solutions that address long-term issues of risk and damage. Yet perhaps the most interesting are the few residents who proposed solutions that seek to address much broader issues of vulnerability than those relating solely to the floods. These responses treat the community's disaster vulnerability as a symptom of a larger problem and propose treating the symptom by addressing the greater issue.

3.4: Emergent Themes

“Deep roots” – Residents speak about their town and their decisions

Towns like Windsor are, in addition to the many other roles they may occupy, a foundational aspect of identity for residents. Residents have grown up there or made the decision to move there as an adult, and the town and its community influence their identities daily through myriad latent interactions. Windsor would not be the town that it is without the people living there, but by that same turn those people would not be the people they are without Windsor. During the course of research in Windsor, it became clear that any study of residents’ understanding of flooding and the future must also consider their views of the town. Writing about the residents of the East Swallow neighborhood in Fort Collins, CO, Kai Erikson discusses the important role that a sense of place and community play in individual well-being and how the loss of such a sense of belonging is deeply wounding (Erikson, 1994, pp. 122-124). East Swallow residents described their homes and their neighborhood in terms of their functions in daily life, as they related to their lifelong plans, and in emotional frameworks that revealed their love and attachment to these places alongside their grief and fear over the accidents that are forcing them away. The stakeholders interviewed in Windsor share a similar attachment to the town they call home, and their loving words about Windsor often contain feelings of pain over what is happening to their home.

During interviews and in everyday conversations, residents professed a love for Windsor and positive views of the town’s community. All expressed a reluctance to leave not only town, but the spaces they have lived and worked in throughout their lives. Even in the face of future floods, residents hope to maintain their own, small parts of Windsor. This desire to remain appears in all 16 of the interviews, but interviews with members of the community who suffered

the worst damages from the 2016 floods introduce a different dimension. In these interviews, attachment to place is often related to decisions of returning to the flood zone. While those who have left cite financial considerations as their primary motivation for leaving, residents who have stayed in the flood zone refer to mixtures of financial and emotional reasoning that ground their decisions.

Obviously, the smart thing financially or from a business point of view or common sense would be to move to higher ground. But you can't replicate our building and the fact that we've been here so long. You just can't up and move it, it wouldn't be the same. No other business has been here this long. [7/11 #1]

I think I'd stay put. That could change of course, but I think I would. It's a good location, we're used to being here and our customers are used to us being here. [7/26 #1]

I understand how easy it would be to move if I had the money to get to higher ground, to not have to worry about it again. But this is home to me. I've been here 23 years, and this is my space. And after Nicole came in 2010, we debated about fixing it back or moving. I borrowed some space to keep working while this was being redone, and the first day I was there I was on the phone with my [spouse], and I said, 'I just want to go home. I want to go back to King Street. This is not home, and I want to go home.' This is my space, my place. This is my home. [7/13 #1]

These quotes, taken from participants who experienced some of the most severe damage in the 2016 floods, demonstrate the competing sensibilities of Windsor's residents. Their financial sense pushes them towards locations with less risk as their senses of attachment to physical spaces and of duty to the other residents keep them rooted in some of Windsor's most flood-prone stretches. To leave would be to abandon the town and the other residents, an idea many treated as anathema. While some admitted that the right combination of circumstances could push them to leave, others were more adamant, linking their livelihoods with the survival of the town. One resident, in describing their long road to recovery in the wake of the floods, gave voice to such sentiments.

It's a pain, but that's what you got to do if you want to stay here, to keep your business. I can't imagine not reopening, not unless the town is gone and there's no business left. [7/25 #2]

So long as there are people for their businesses to serve and to keep their doors open, they want to stay in the same spaces and, in doing so, help sustain the community. To leave would be to lose their raison d'être and abandon a part of themselves. Thus, many residents have become determined to stay until they simply cannot.

Individual resilience such as this contributes to a sense of community resilience, as individuals view their homes and their businesses as a part of a broad network that many likened to family. The idea that even one member of that network might be lost was met with aversion.

The business straight across, they've been flooded every time. This last time, they said they were moving. The owner's house had flooded and their business. Sell the house and move the business. That business has been there 40 or 50 years, I know it's a long time. I remember going there with my Daddy. It devastated me that my neighbors were moving. I can bop in there, I walk in and sit at everybody's desk. I know all their families, and they know my family. It was devastating to me that they were leaving, and they finally decided that they're staying. They're still selling the house, but the business is staying. When they decided they were staying, I was so happy. [7/13 #1]

It's a shame to see. We were building up. This whole street, there was not one vacant spot, not one closed-up storefront. Everything was occupied. It presents a thriving community, it looks good and people feel good about it. It gives people hope. And if we sustain the people, they will sustain the businesses. It's a shame to see that loss of progress. [7/21 #1]

Similar sentiments were expressed in all 16 interviews as residents gave voice to grief at the loss of neighbors or joy that some found means to remain. Many residents interviewed also described

how the community comes together to help each other during all stages of a disaster, ensuring that the town is able to survive.

Everybody keeps coming back. Nobody's really gave up yet except a couple of places. [7/11 #1]

There's some good aspects of it. It brings us all closer together, and it strengthens the community. You lose some, but it strengthens what's left. There's a bond between us now, we're a community. We're all in this together. [7/27 #1]

If you have a close-knit town like we are, with good neighbors that give each other help – and we have that here, everybody helps everybody in a time of need – it makes a huge difference. We're all family here, and you don't mess with family. Everybody's running back and forth to help each other out. This one ain't trying to get their stuff done and open first, before anybody else. [7/25 #2]

Our customers, the people of Windsor, have been so supportive. The people of Windsor might be some of the kindest, toughest people there are. They're there for each other. It isn't just some that got flooded, it's everybody. Somebody's house might not have flooded, but their business did. And not the first, or the second, or the third time. They've been through this over and over again, and they're the first ones to come and help. [Their] kids are helping us move our stuff out, they marched over in their rainboots in ankle-deep water and said, 'let's get started, what needs to go and what needs to move?' [7/18 #2]

The town takes good care of the people in the town, and that makes it a good tight-knit place. You know, eastern North Carolina has such deep roots with family and stuff that I don't think something like rising water is gonna really change things for a lot of folks. I just think folks are resilient, and they adapt to what's going on. [7/18 #1]

Though the idea of adaptation will show up later in another form, here the speaker was referring to residents making accommodations so that they could remain part of the community. Many residents expressed a willingness to make small sacrifices if it meant keeping the town intact while remaining reluctant to follow those paths until no viable alternatives exist.

In this regard, Windsor residents somewhat resemble the Kigiqtaamiut of Shishmaref, Alaska, who, in the face of extremely damaging seasonal flooding, made the decision to move

their town to another area within their ancestral landscape (Marino, 2015). Though the situation in Windsor is not so dire as to require the entire community to move, there is a similar openness to shifting personal and public spaces to preserve the town and the community.

Folks that get flooded, they make a wise decision and get out of town. Well, not out town, but out of Dodge. Away from the water. Because they know where the water comes up, so they'll move to higher ground. Our town is pretty close-knit, and so nobody's going to skip town because of the flood. They'll just move to higher ground. [7/18 #1]

I guess it wouldn't be hard to actually build another area. A shopping center or business area. But downtown areas just feel so historic, there are so many feelings attached. [7/25 #1]

Physical space, though it plays a key role in the community's sense of place, is clearly malleable to meet the needs of the community. But this should not be understood to mean that residents are considering such a possibility with any form of enthusiasm or eagerness. Quite to the contrary, residents have strong emotional attachments to the spaces and infrastructure that currently make up Windsor.

We want to come back to Windsor because Windsor is home. Downtown is historic and wonderful, but something needs to be done to alleviate the flooding. [7/18 #2]

Another flood like Floyd could destroy our business community because it's all centered on King Street. That land out toward the bypass is all farmland and it's very expensive, and it's not the heart of the town. The heart of the town is on King Street. Another flood the magnitude of Floyd could kill the heart of Windsor. But some would probably still come back. [7/21 #2]

The main thing that keeps you going is the customers saying, 'we're glad you came back, and we're glad you came back HERE.' Because it won't be the same anywhere else. It gives you a little encouragement, and if you didn't have that it would be a lot tougher. [7/11 #1]

I'd like to see them keep the downtown going, to keep the downtown alive. I just think it's neat-o. It brings people close together, you know. I just like a downtown better than big malls or stuff like that. I love a little downtown. I just like the old looks, like back in the '50s or '70s. It just seems like it makes people happier.
[7/25 #2]

Windsor residents possess a love for Windsor and the familiar structures that have been the face of the town for decades now. Losing those structures means losing a part of Windsor and a part of their own identity, a wound that is all the deeper for residents whose lives and livelihoods are tied to those structures. Attachment to place and the role of place in the formation of identity may explain the decisions of some to remain in the flood zone, though the role of personal finances should not be discredited.

“You don't know what's underneath” – Uncertainty and fear of the unknown

Residents discussed fear of uncertain scenarios or of unknown and unseen dangers in eight interviews (50%). One manifestation of this fear, being the fear of hidden dangers in the Cashie River, has already been addressed, but will be briefly discussed again here as it is relevant. Fear of the unknown comes across as a vague concept, but it provides an explanation for a diverse set of fears brought up by residents. In all the manifestations found in the interviews, fear of the unknown operates in essentially the same way: the resident expresses distress or worry about a scenario that could resolve with dangerous or damaging consequences. Due to the uncertain aspect of the scenarios and their dangers, they are often ones in which the individual can only recognize danger shortly before experiencing the impact and therefore has limited agency to respond.

Hidden dangers within the river are one of the most benign manifestations of the fear of the unknown, appearing in three interviews (18.75%) alongside discussion of dredging in the river. The dangers are spatially confined to the river, meaning that opportunities for individuals to interact with them are primarily confined to instances when the individual is engaged in an activity on the river. Residents who have boated on the river report being able to see some trees beneath the surface and believe there are other obstacles, natural and manmade, farther down. Though not all the hazards in the river are known, the general knowledge of their presence allows for individuals to exercise caution and lower the likelihood of a negative consequence.

There's so much debris. You better have a little boat. A little boat without too many big folks in it, if you're trying to get up past the bridge. [7/18 #2]

You got to know where to drive on the Cashie now. Used to, you could just head out and went. Now you have to know. We even have had two killed on a jet ski, and I believe they hit a tree. [7/13 #1]

Debris in the river is a concern with an understood set of mitigating behaviors and solutions, but also a spatially confined concern. Other similar concerns mentioned by residents still contain the feature of an uncertain scenario with potentially dangerous consequences but are only confined by the extent of the flood zones. Whereas the hazards in the river must be sought out, many of the other fears are ones that can come to residents.

Each flood brings with it a set of terrible damages that are plainly visible to anyone even passing through town. Though dealing with those damages is traumatic, after four floods the residents of Windsor feel that they are “kinda getting good at it.” Most residents at risk have plans for when a flood is coming. After the floods of 2016, however, some residents report

feeling on edge and constantly on alert for potential flooding. A business owner in one of the most flood-prone areas of Windsor recalled how unpredictable the most recent floods felt:

The only thing that I've particularly noticed is that I really thought that I could pinpoint when we needed to start moving things. And I still don't quite – 'Cuz I understood we had 23 inches of rainfall with Nicole. [...] We had a storm after that where the water came up to the curb out here and we started moving things. I don't remember if it was Irene or Isabel, but it's been since 2010. We had 16 inches of rain with that storm, so I figure I've got it. When we get to 16 inches, it's time to start. But we only got 12 inches with Julia! Where we are, at the bottom of the trough, all the water everybody got up north of us came here. So, there's no way to even estimate when you need to start moving stuff. I mean, we knew the water was coming up, but it came up as quick as – There's just no rhyme or reason to it. [7/15 #1]

Another resident whose property sits on the edge of the flood zone described the emotional distress that such unpredictable flooding causes:

It's not just the major storms, either, that you hear about on TV or when the government gets involved. It's something that – It rained the other day, Monday or Tuesday, on my way home and I was about in tears when I left. You know, you can't help it. Every time it rains heavily, you can't help but think, 'Here it comes again. Is it gonna happen again?' [7/21 #1]

Residents also worry about damages inflicted by the floods that may be invisible until it is too late. Such worries are not without precedent: Windsor has suffered pipe collapses that caved in roads months after a flood. Flooding causes erosion underground, potentially damaging foundations, sewer lines, and other critical infrastructure. A town official, speaking about a recent pipe collapse, noted that FEMA offers assistance for those sorts of events for six months. Sewer collapses “continue to happen” past that six-month window, the official stated, adding that “we’ll have something happen a year from now, probably.” A property owner in the flood zone fears that similar damage is being done beneath their building:

I worry about the structure of the building. You worry about that part. I know one of my beams under the building – the beams under here, you have to think about how old they are. [...] We had one, actually, my [spouse] had to jack back up and do some work to it. It was under the bathroom, here. So, you worry about, the more it floods and as fast as it comes in, what's it doing to the foundation of my building? [7/13 #1]

One resident out of the seventeen interviewed describes a fear that such unseen damage beneath the ground could have fatal results, linking fears of subterranean changes to sinkholes. Again, the fear features an intangible danger that the individual can exert little control over if it occurs. This is the most extreme manifestation of this fear that was encountered during the interviews but, considering the sewer collapses and foundation repairs that have happened nearby, it is an understandable fear.

The town does really need – because these old building ain't gonna be able to stand but so much. I mean, seriously. I mean, we've had roads cave in here in town. [...] These buildings ain't going to be able to take but so much. And how do you know when a sinkhole's going to – I mean, you know, it could cause a major, major thing! Sinkholes! You know, we could be sitting here and just bloop! You don't know, because the water come –. When that manhole there – you can stand there, and you can see the water coming, and you can see the water coming up the manhole. Out the drainage there. You can see it rising in there and when it gets up running out of that manhole, you better look out. That'll be here in a few minutes. So, you know, you don't know what kind of damage has done underneath here. You don't know. I mean, it could really end up causing a very, very more serious problems. And lives, if they don't do something. That's my fear. You don't know what's underneath. [7/25 #2]

The origins of such fears are not entirely clear, but they may be partially inspired by the flood that followed Hurricane Matthew. Descriptions of the flood during Matthew consistently described the water as rising faster than it had during previous floods, which reduced the amount of time residents had to prepare. The reduced ability to respond, along with the short interval between the floods in 2016, could partially explain the fear of sudden, catastrophic events found among some residents.

“I don’t know who they’re helping” – Coverage and Suitability of Insurance and Assistance

Each resident interviewed was asked whether they carry flood insurance on their property and asked about the motivations behind their decision. They were also asked about their personal experiences with flooding. Those who have dealt with flood damage and the recovery process for personal assets often discussed the assistance offered to them by various insurance agencies, government agencies, and private groups during the recovery. The three religious leaders interviewed differ slightly because the physical spaces being discussed are not their privately-owned assets, but they still offered perspectives on post-flood assistance. Every resident interviewed, regardless of their personal decisions on insurance and need for post-flood help, expressed views that there are gaps in the coverage and assistance available.

Decisions to carry flood insurance are split nearly evenly among the interviewed residents. At the time of the interviews, nine residents carried flood insurance (56.25%) and seven did not (43.75%). Motivations for those decisions varied within each group and should be examined separately. Of the nine residents who carry flood insurance, four of them fall into the high damage/recovery category the other five are in the moderate category. One resident who carries flood insurance and is in the high recovery category has been intermittent with paying for coverage, citing tight financial situations as the reason they sometimes do not carry it. Three currently carrying flood insurance say they were required to purchase coverage by lending agreements with banks but have continued or will continue their coverage past the requirement.

You’d be crazy not to have it. I mean, crazy! I’ve heard people, particularly home-owners, after Floyd kept it a certain length of time and let it go. And then were flooded with Nicole. I don’t know. But I’m so grateful that we just went ahead and got it here. [7/15 #1]

The other seven residents interviewed do not currently carry flood insurance. Two of the residents who do not carry insurance fall into the high damage/recovery category, one is in the moderate category, and the remaining four are in the low category. Three of the residents not currently carrying flood insurance, all in the low category, have never felt the need to carry it and have only done so in the past when required. Two others, one in the high category and one in the low, wish to carry flood insurance but cannot find anyone willing to offer coverage. The remaining two, one in the high group and another in the moderate, feel that flood coverage is too expensive and have dropped their policies as a result. These two residents have decided to invest that money in making their properties “as waterproof as possible,” reducing the amount of work required following a flood.

Post-Disaster assistance is viewed as necessary but lacking, often treated with skepticism in the same way as the NCDOT. Through the course of their different experiences navigating the post-disaster environment, residents have dealt with FEMA, the Small Business Administration (SBA), the North Carolina Department of Public Safety, volunteer groups, and private companies. Opinions of the different aid options available vary, but the consensus among Windsor’s business owners who are at-risk for flooding is that there are insufficient options for them.

A significant complaint, and one found among business owners in all of the recovery intensity categories, was the lack of assistance in dealing with the economic conditions that follow a flood. Eight business owners, accounting for 50% of all respondents and 66.67% of business owners interviewed, mentioned the poor economic conditions that follow a flood. Four of those eight had business properties inundated during Hurricane Matthew, and four did not. As

mentioned previously, the local economy slows following a flood and makes financial situations difficult for businesses across the community, regardless of sustained damage. The difficulty, according to one business owner whose business was heavily damaged during the flood, is that the downtown area is “a lot of subsistence-type businesses” that rely on weekly income to make their operation costs and stay in business. The eight residents felt that there is little help available to businesses as they deal with the economic effects of a flood, so they are left to manage their regular costs as well as their repair costs while making less money. One resident with a business in the flood zone proposed that the town should have a fund to help businesses manage their basic costs after a flood, while a resident with a business outside the flood zone suggested it should be the responsibility of the state or federal government.

I feel like, if they want the town to stay here, they need to pitch in and help once in a while. You know, when it's devastated like that. Well, you've got insurance, you got flood insurance. Yeah, we got flood insurance, but sometimes it takes a little more. You know? You got workers out, you're out yourself. We lost thousands and thousands of dollars. We lost a lot. [7/25 #2]

As a business owner, there wasn't a huge amount of assistance offered. They said they were gonna offer us some assistance through unemployment, even though we're self-employed business owners. And they did not. We didn't qualify for anything. [...] There wasn't anything suited. They wanted to offer you \$100,000 to be paid back at a later date, but I didn't need \$100,000. I just needed two or three months of help to get through. [7/21 #1]

The last resident quoted above touches on the loan offers made by the SBA, which were discussed by three other business owners around Windsor. None of the four residents who mentioned SBA loans had taken out a loan to deal with flooding. Three of them had been in situations where a loan was a possibility, while the fourth relayed a story about a friend who had taken a loan. Age was given as a reason by one, stating that they were at a point in their life

where they “did not want to go into debt” and so had not sought a loan. Another business owner, seeking assistance after suffering heavy damage to their property, described the confusing and fruitless process they had undergone:

I'm sure [name] told you about the small business loan, the SBA loan. That was something that, when we found out about that – after going through FEMA, and Red Cross, and ‘this isn't where you need to be’ and ‘that's not where you need to be’ – When we finally found out about the SBA loan, we thought, ‘hey, you know, a no-interest or a 2% loan? That's cheaper than the loan we have through the bank, that's something we'd be interested in.’ We went through that application process and, because our credit was too good, we didn't qualify for the no-interest or the low-interest loan. And not to mention that, but once you take out that SBA loan it's not just a five or ten-year loan. It's fifteen or thirty years and, once you take out an SBA loan, you are required to pay it back in its entirety. And if you flood again while you're still making payments, you don't qualify for another loan and there's no kind of forgiveness. There's no amnesty if you can't pay it. So, I don't know who they're helping. [7/18 #2]

Windsor's business owners are understandably wary of failing to pay back SBA loans, as they have witnessed members of their own community caught between the need to repay loans and finance the repair of their businesses. Two residents described the loan processes their neighbors had gone through:

Of course, the grocery store that was over across the street there got hit in the first flood. [They] borrowed money to get back in there and wasn't ever able to pay it back, so the store closed. [7/12 #1]

You have to pay loans back. If you're a subsistence business before that and you add the debt to that, you probably won't make it. I do know, from Floyd, we had maybe six businesses that borrowed from SBA. Almost all of them are gone. So, that's not a panacea by any means. Wal-marts get money. [1/24 #1]

Business owners feel that they do not have enough aid options and that the couple of options they do have are unnecessarily restrictive. While FEMA helps buy out residential properties, there is no equivalent program for business owners. Business owners whose

properties have been flooded have to choose between taking a loss by leaving or risking further flood damage by staying. In a community where residents have limited means, such decisions are often made by circumstances. One business owner with connections across the community discussed how a lack of means affects decision making:

A lot of people just, financially, don't have the wherewithal to make the move that might be – strategically, that good judgment says you need to do it. It's just not a financial possibility, for the business owners or their families. It's not just, 'How much does it cost?' It's, 'How much does it cost me tomorrow?' [7/27 #2]

If Windsor's long-term health and recovery as a community are the goal of post-disaster assistance, then better assistance for local businesses is needed. Business owners repeatedly return to vulnerable spaces due to a mixture of emotional and financial considerations. If better financial assistance can be made available, then perhaps it will at least empower some business owners to make decisions they might not otherwise be able to and reduce the overall vulnerability of the business community.

Chapter 4: Discussion

4.1 Hypotheses

Regarding the four hypotheses that initially guided this research, the data reveal the complex ways that Windsor's residents contextualize the floods and how they fit into their view of the community. The causes of flooding identified by Windsor's residents confirm my hypothesis that they favor explanations centered around their local environment over other explanations. Predictions of the future reveal that residents view flooding as part of an ongoing series of troubles the community faces but do not confirm the second or third hypotheses in any meaningful way. The final hypothesis is confirmed since resident-proposed solutions tended to directly address perceptions of the local environment and community experiences, though with some unexpected viewpoints. It is my feeling now, however, that these hypotheses and the questions that led to them do not adequately represent Windsor's residents nor their current situation.

4.2 Breaking the Disaster Loop by Decreasing Vulnerability

A vulnerable community like Windsor does not spring into existence unprovoked, it is created. Windsor's vulnerability to flooding and other natural disasters is the product of political, social, and natural forces that have influenced the town over many years and culminated in the current situation. In interviews, Windsor residents note that the town is presently vulnerable, struggling to return to the pre-disaster status quo, struggling to establish a new post-disaster norm, and struggling to mitigate future vulnerability. Each flood compounds these effects and residents are increasingly discouraged about the ability of local, state, and federal leadership to address the issues, suggesting that they are experiencing the effects of a positive feedback loop

of disaster vulnerability (Sodhi, 2015). This loop started before the first flood, as the community dealt with decreasing economic opportunities, lagging educational outcomes, reduced healthcare access, and increasing population age – all factors associated with heightened disaster vulnerability (Gray, 2017; Ngo, 2001; Striessnig et al., 2013; Frankenberg et al., 2013). Each flood damages the local economy and sends shocks through the various social institutions, exacerbating Windsor’s vulnerable state and making it increasingly difficult for residents and local leadership to meaningfully address that state. Gaps in assistance coverage significantly influence post-disaster outcomes for residents, with many finding themselves forced to make decisions about their homes and businesses to meet short-term needs rather than making the best decisions for long-term planning. Further complicating matters, physical locations can be related to differing levels of social capital and community planning and support, while attachment to specific places negatively influences both risk perception and adaptive behaviors (De Dominicis et al., 2015; Rumbach et al., 2015). For Windsor, moving beyond the current vulnerable state requires considering the entire system that created that state and seeking to address vulnerability across time rather than focusing on the floods as discrete events. Floods over the last two decades have returned with an average periodicity of 4.25 years, meaning that post-disaster recovery is happening alongside preparations for the next disaster. It is imperative, therefore, that post-disaster recovery efforts become part of a broader vulnerability mitigation system rather than existing as singular responses.

Recovery as a concept is itself a significant barrier to dealing with vulnerability and helping a community move into a more sustainable state. Recovery is the goal of many post-disaster aid and reconstruction efforts, but recovery in this context is inconsistently defined, lacks clear objectives, and is understudied relative to other aspects of disasters (Jouannic et al.,

2016). Even the disaster model I feel holds truest for Windsor, the SAMHSA model, is vague regarding recovery, simply stating that it involves the assumption of responsibility for efforts, processing grief, a return to normalcy or adaptation to the new norm, and that it serves as an endpoint to the cycle (SAMHSA, 2017). Too often, recovery efforts are driven by the entities who benefited the most from the pre-disaster status quo and have lower vulnerability and higher agency as a result (Freudenburg et al., 2009; MacKinnon & Derickson, 2013). Allowed to drive efforts unchecked, these actors can reestablish the same system for their own benefit and leave victims as vulnerable or worse off. Windsor's current disaster loop requires recovery efforts in which vulnerability reduction is a key component and recovery is no longer viewed as a linear endpoint, instead becoming a single objective in reducing the community's long-term vulnerability. This view is shared among residents, as is seen by their overwhelming desire for solutions that prevent or mitigate future flooding. Perhaps the best guiding principle for efforts in Windsor is "Build Back Better" (BBB), a phrase used to describe the holistic approach to reconstruction favored following the Indian Ocean Tsunami in 2004 (Mannakkara & Wilkinson, 2015). BBB emphasizes a three-pronged approach to disaster response that gives social recovery the same level of importance as economic recovery and reconstruction of the built environment (Mannakkara & Wilkinson, 2015). Windsor is still economically, physically, and socially vulnerable to disaster following four floods and their associated recovery efforts. A significant change of tack is required, as many efforts resembling those previously employed in Windsor will prolong the vulnerable state.

Within the present vulnerable state, Windsor's residents feel abandoned and ignored. Interviews with residents feature complaints that assistance coverage is lacking, that residents feel uninformed and uninvolved, and that various agencies in the government are serving their

own interests rather than those of the town. Sentiments such as these are relatively common for disaster-impacted communities, as can be seen in cases such as Hurricane Katrina or the flooding of Shishmaref, Alaska (Freudenburg et al., 2009; Browne, 2015; Marino, 2015). If a guiding principle such as BBB is adopted, it could do a great deal to alleviate some of these feelings. Rather than interacting with impacted communities from a position of authority and dictating the terms of recovery, agencies should seek to engage with and involve communities throughout the process. A first, significant step toward increasing post-disaster community engagement and mitigating vulnerability would be to implement clear and comprehensive lines of communication between agencies and the community and foster improved communication networks within the community (Tagliacozzo & Magni, 2016). Creating better communication networks will aid in the distribution of accurate information that is vital in the pre- and post-disaster environment, whether it is providing situational updates for public awareness or helping victims navigate the assistance-seeking process. Implementing such a network would directly address resident complaints that they are kept in the dark on the assistance process and on reconstruction efforts. Improving access to information and communication technology should also reduce overall vulnerability, as inadequate access is associated with increased vulnerability (Toya & Skidmore, 2015). Better communication with communities will facilitate work with community stakeholders during the recovery and reconstruction process.

Interviews with Windsor's residents reveal feelings of helplessness among many members of the community. This helplessness is tied to feelings that they lack control and agency in dealing with Windsor's many difficulties, from employment and education to floods and the responses to those floods. Some members of the community are internalizing those feelings of helplessness, describing fears of situations they cannot control or believing that

vulnerability is now simply a part of who they are. I believe these issues can be directly confronted by adjusting recovery models to increasingly involve the local population. Windsor's residents are like the Kigiqtaamiut or the Peachy Gang in that they feel no control over the current situation, cannot see a future because of that lack of control, and do not have the means to realize any future they can visualize (Marino, 2015; Browne, 2015). In addition to improving communication with the community, it is imperative that recovery and reconstruction efforts involve residents in the planning and execution of recovery projects and utilize local resources as much as possible. Government agencies and contractors should, instead of acting as sole-directors of recovery efforts, provide assistance and resources for towns like Windsor to exercise self-determination and control their own recoveries (Ireni-Saban, 2012). The focus in this model is primarily on the creation of relationships and partnerships. Collaboration and engagement with stakeholders at various levels in the town, state, and nation can allow these partnerships to form and flourish, with the added benefit of potentially lowering the burden on the government agencies involved in disaster response (Lu et al., 2017). Under a BBB model that emphasizes the creation of a constantly-improving system with achievable, iterative objectives instead of a final goal, Windsor and similar towns could significantly reduce their vulnerability over time while improving residents' quality of life. Residents already understand that their state of vulnerability is the result of a complex series of interactions, of which natural processes are only a small part. Though they feel the need for immediate interventions to deal solely with mitigating flood damage, they also favor responses that deal with broader issues of vulnerability but will take more time than they can currently afford. Following my time in Windsor, I feel that what Windsor needs most is support for creating stability, fostering grass-roots organization, and providing a platform for the town to gradually manage its own future. One resident lamented that

Windsor's residents "can't see any future," while another said that the government "can't just come in here and dictate" a future for the community (7/16 #1; 7/21 #2). By altering how recovery is approached in places like Windsor, it is possible to help the community lift itself high enough to see its own future.

4.3 Acceptance and Adaptation

Most likely, any viable futures for Windsor should emphasize adaptation to the new norm rather than seeking to establish the old norm. As seen in the interview data, many residents accept that the current pattern of flooding is a fact of their lives now, just as they accept that the broader socioeconomic situation in Windsor is what they have to work with for the time being. Several residents interviewed recognize that these are not discrete entities but are instead interwoven aspects of their present situation. Moving forward, I think it is probably best to adopt a disaster preparation and recovery model for Windsor that mirrors this recognition, in which disaster preparation, response, and recovery are part of a larger system intended to promote community health and wellbeing. This will mean accepting and adapting to some new realities, which residents in Windsor have shown a great willingness to do. Following Hurricane Floyd in 1999, many flood-prone residential properties in Windsor were bought out through FEMA. Rather than allowing this land to grow over, Windsor converted the purchased plots into public green spaces with a disc golf course. In doing so, land was retained for use by the community instead of truly being lost. Adaptation to the new reality allowed for the creation of something new for the community while helping some of the most at-risk residents of Windsor, though this paradigm can be taken further.

Recent attempts to address Windsor's economy have taken a similar approach. Focusing on the abundant and well-maintained natural areas around Windsor, there have been recent efforts to utilize those natural areas for economic growth. One of the most impressive manifestations of this effort is the opening of a campground along the Cashie with a pair of treehouses available above the water for vacationers interested in a bit of eco-tourism. According to local officials, the treehouse project has proven very successful and they hope to continue economic development along this path. Another important aspect of the treehouse project is that they have been designed and built with the Cashie's flooding in mind. Neither treehouse was damaged in the 2016 floods. Other smaller, personal efforts to grow economically while dealing with the reality of flooding have produced other solutions that strike a similar balance to the treehouses and the golf course. As mentioned previously, many business owners look for way to "flood-proof" their businesses as much as possible, allowing for quicker recovery and reduced damage. One restaurant that suffered severe damage during the 2016 floods has opted to open a food truck, allowing the owners to maintain professional and personal ties with the community while effectively eliminating the flood risk for their business. Though permanent, brick-and-mortar locations are more desirable for the long-term, their solution offers a bit of respite in the short-term.

While these adaptive strategies all work to reduce Windsor's vulnerability and have done so to the extent possible, there is more that could be done. These small adaptive strategies should be treated as the precursors or the first steps to a broader effort to revitalize the community. Many small, rural towns in eastern North Carolina have fallen on difficult times in recent decades, and Windsor is not unique in its need to find new ways to ensure stability and growth. But in Windsor and other vulnerable communities, that need for socioeconomic stability runs

parallel to a need for socioecological stability. While other towns may have the ability to focus on their infrastructure and rally around singular visions such as local foods or the arts to help revitalize their communities, Windsor must take a multi-front approach that addresses both the natural and human aspects of their situation. Adopting strategies like the treehouses, the disc golf course, and the food truck are great beginnings for that process. These solutions, though small, acknowledge the problems facing the community and the residents and work around those issues to create something new and enriching. Now it is time for residents, local leadership, and external parties to begin applying this sort of thinking to more long-term solutions and begin generating cohesive plans to improve the sustainability and resilience of Windsor, and in doing so improve the quality of life for the residents.

4.4 Limitations and Further Study

Results from this study are potentially influenced by the timing of the interviews relative to the floods. At only nine months since the flood following Hurricane Matthew, Windsor was still firmly within the disillusionment phase of the disaster cycle. Due to the emotional states common to the disillusionment phase, feelings of grief, abandonment, and hopelessness may be overrepresented within the interview data. I do not feel that those sentiments should be rejected out of hand, though. There is evidence in the interview data that the residents of Windsor are making meanings over time and connecting the different flood events to each other and to outside factors, even during this period of emotional duress. Emotions common to the disillusionment phase may be experienced more intensely but they are not without merit. Timing relative to the disaster is not the only time-related limitation on the research, and the solution for this problem is the same as the solution for the next.

A similar limitation in this research is the attempt to examine a longitudinal phenomenon from the perspective of a single research period. Interviews for this project prompted residents to discuss timespans of at least 40 years, from the past into the future. Yet residents likely had very different views following Hurricane Floyd in 1999 and are likely to have new and different views in the event of a future flood. If we accept that individuals and communities are malleable and able to change rapidly, then provoking such responses may lead to data that is not valid outside of the present context. As the lives of the community and individuals shift and change, sentiments about flooding, the government, and the environment are liable to do the same. Questions asking how residents' views have changed over time are an attempt to address this, though it is difficult to gauge the effectiveness of those attempts. Future research, whether in Windsor or a similar community, should address the issues of post-disaster disillusionment and longitudinal data by conducting waves of interviews. Interviewing the same individuals multiple times over a set time span will provide a better understanding of which sentiments are attributable to disillusionment and how viewpoints shift over time.

Issues of representation are also present in this research. The perspectives and conclusions drawn from the interview data cannot necessarily be applied across Windsor's community. As described in the methodology, there were difficulties recruiting members of Windsor's African-American population to participate in this project. Even if the recruitment had been more successful, there is the potential for response bias since I am a male, white researcher. Certain sentiments may have been shared with me by white residents that would not have been shared with a researcher from a different ethnic background, and my status as a man and an outsider may similarly influence residents' responses. The interview template does not contain any questions that prompt racially-motivated responses and I do not believe any of the responses

in the interview set solely represent the views of a discrete subgroup in Windsor's population. All the same, care should be taken not to assume that what is true for the residents interviewed is true for all residents. Better diversity in recruitment and interviewing could provide a more complete view of local perspectives on flooding. In the future, researchers working in Windsor or similar communities should form a research team that includes recruiters and interviewers who roughly match the cultural backgrounds of the residential population. Creating such a research team should help increase recruitment response rates while simultaneously reducing the potential for response bias.

Finally, there is the issue of vulnerability. Though Windsor's population is not vulnerable in some of the more traditional ways considered by researchers, they are vulnerable in others. Three residents interviewed said that they would not normally have agreed to an interview but that they are desperate for any form of help or assistance, agreeing to the interview because they hope it will increase the visibility of their situation. This sentiment is may be held by other residents and went unspoken. The very basis of this research is the community's state of sustained vulnerability, highlighting the fact that Windsor's residents are a vulnerable population of a different type. I took great care during the design and execution of this research to consider the vulnerability of the population and ensure that the research presented no potential harm to participants. Compensation for participation was designed so that it would be enticing without being compelling. Yet the political, social, and economic realities of life in the post-disaster environment could represent their own form of compulsion, pushing residents to participate out of a sense of duty to the community or even desperation. To counter this, all participants were informed of their rights regarding the project and of the measures taken to keep their identities confidential. Beyond these measures, it is difficult to separate individual vulnerability from

community vulnerability in many cases. The study of vulnerability necessitates the study of the vulnerable. Future researchers should consider broader perspectives of vulnerability in the populations they research and continue efforts to minimize or eliminate the potential for harm.

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Appendix 1: Interview Guide

How would you describe the risk of flooding in your area? (If needed: show flood maps, indicate where their residences/businesses/churches/etc. are located)

Do you have flood insurance for you home and/or other properties and assets?

What influenced you to purchase/forego flood insurance?

How have floods in the last 20 years impacted you personally? (Ask for specific floods)

How has flooding during the last 20 years influenced your opinions on having flood insurance?

How has Windsor been impacted by floods in the last years? (Ask for specific floods)

How does the flooding during the last 20 years compare to prior flooding?

Do you see any trends in flooding during the last 20 years?

What factors do you believe are responsible for these trends?

What trends in flooding do you predict in the next 20 years?

How do you believe flooding in the next 20 years will impact your business/congregation/government assets?

How will flooding in the next 20 years affect Windsor?

Can you suggest any general solutions that would curtail the impact of flooding in the next 20 years?

Imagine you have been given \$10,000,000 to invest in business opportunities. What changes could be made that would inspire you to invest that money in Windsor?

Imagine you are on a committee that has been given \$10,000,000 to reduce the impact of flooding in the next 20 years. How would you invest that money?

Imagine you are on a committee that has been given \$10,000,000 to make Windsor's business community more sustainable in the next 20 years. How would you invest that money?

Appendix 2: Consent Form

Study ID:UMCIRB 17-001105 Date Approved: 7/11/2017 Expiration Date: 7/10/2018



Informed Consent to Participate in Research

Information to consider before taking part in research that has no more than minimal risk.

Title of Research Study: Relationships between Explanation, Prediction, and the Building of Resilience in a Disaster-Impacted Community

Principal Investigator: William Alexander (Person in Charge of this Study)

Institution, Department or Division: Anthropology

Address: 207 B Eastbrook Dr

Greenville, NC

27858

Telephone #: (919)724-6140

Researchers at East Carolina University (ECU) study issues related to society, health problems, environmental problems, behavior problems and the human condition. To do this, we need the help of volunteers who are willing to take part in research.

Why am I being invited to take part in this research?

The purpose of this research is to understand how stakeholders in the community understand current trends in flooding, what informs their predictions for future flooding, and what solutions they have to deal with future flooding. You are being invited to take part in this research because you are a business owner, religious leader, or member of local government in Windsor. The decision to take part in this research is yours to make. By doing this research, we hope to learn what challenges to disaster resilience currently face Windsor and what can be done to address those issues in the opinions of local stakeholders.

If you volunteer to take part in this research, you will be one of about 36 people to do so.

Are there reasons I should not take part in this research?

You should not participate in this research if you are under 18, do not live in the town of Windsor, or are not a business owner, religious leader, or member of government.

What other choices do I have if I do not take part in this research?

You can choose not to participate.

Where is the research going to take place and how long will it last?

The research will be conducted at any site in Windsor where you are comfortable meeting. You will need to meet with the researcher once during the course of the study. The total amount of time you will be asked to volunteer for this study is 2 hours, at most, on a single day during the next 6 weeks.

What will I be asked to do?

You will be asked to do the following:

- Meet with the researcher for a single interview

Page 1 of 3

Consent Version # or Date: _____

Title of Study: Relationships between Explanation, Prediction, and the Building of Resilience in a Disaster-Impacted Community

- Answer questions during the interview about:
 - Personal experiences with flooding in the last 20 years
 - Any asset damage you have suffered as a result of flooding
 - Factors that influenced your decision to buy flood insurance or not to buy it
 - Personal opinions on trends in recent flooding and causes of those trends
 - Personal opinions on trends in flooding for the next 20 years
 - Solutions you believe could reduce the impact of flooding in the future
 - This interview will be audio recorded and please inform me if you choose not to be recorded during this interview.

What might I experience if I take part in the research?

We don't know of any risks (the chance of harm) associated with this research. Any risks that may occur with this research are no more than what you would experience in everyday life. We don't know if you will benefit from taking part in this study. There may not be any personal benefit to you but the information gained by doing this research may help others in the future.

Will I be paid for taking part in this research?

We will be able to pay you for the time you volunteer while being in this study. Participants will be compensated for their time at a flat rate of \$25 per participant for a session lasting, at most, 2 hours. Participants will receive compensation in the form of a gift card or gift cards at the end of their interview session.

Will it cost me to take part in this research?

It will not cost you any money to be part of the research.

Who will know that I took part in this research and learn personal information about me?

ECU and the people and organizations listed below may know that you took part in this research and may see information about you that is normally kept private. With your permission, these people may use your private information to do this research:

- The Principal Investigator
- The University & Medical Center Institutional Review Board (UMCIRB) and its staff have responsibility for overseeing your welfare during this research and may need to see research records that identify you.

How will you keep the information you collect about me secure? How long will you keep it?

Notes taken in a notebook during interviews will be attached to a pre-determined coded identification for the interview participant. Any identifying information on digitized interview notes and transcripts will be replaced by coded identification. A database of interview participants and their code identifications will be kept in a password secured folder on a private, password secured computer. Interview recordings will also be kept in a password secured folder, and will be attached to the participant's coded identification. Audio recordings will be destroyed once all of the recordings have been transcribed. Stored research data will be saved for a minimum of three years after completion of the research.

What if I decide I don't want to continue in this research?

You can stop at any time after it has already started. There will be no consequences if you stop and you will not be criticized. You will not lose any benefits that you normally receive.



EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board Office
4N-70 Brody Medical Sciences Building · Mail Stop 682
600 Moyer Boulevard · Greenville, NC 27834
Office 252-744-2914  Fax 252-744-2284  www.ecu.edu/ORIC/irb

Notification of Initial Approval: Expedited

From: Social/Behavioral IRB
To: William Alexander
CC: Christine Avenarius
Date: 7/11/2017
Re: UMCIRB 17-001105
Stakeholder Viewpoints of Flooding in Windsor

I am pleased to inform you that your Expedited Application was approved. Approval of the study and any consent form(s) is for the period of 7/11/2017 to 7/10/2018. The research study is eligible for review under expedited category #6, 7. The Chairperson (or designee) deemed this study no more than minimal risk.

Changes to this approved research may not be initiated without UMCIRB review except when necessary to eliminate an apparent immediate hazard to the participant. All unanticipated problems involving risks to participants and others must be promptly reported to the UMCIRB. The investigator must submit a continuing review/closure application to the UMCIRB prior to the date of study expiration. The Investigator must adhere to all reporting requirements for this study.

Approved consent documents with the IRB approval date stamped on the document should be used to consent participants (consent documents with the IRB approval date stamp are found under the Documents tab in the study workspace).

The approval includes the following items:

Name	Description
alexander_consent_form.doc	Consent Forms

alexander_thesis_phone_script.docx
interview_questions.docx
Will_Alexander_MA_proposal.pdf

Recruitment Documents/Scripts
Interview/Focus Group Scripts/Questions
Study Protocol or Grant Application

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

IRB00000705 East Carolina U IRB #1 (Biomedical) IORG0000418
IRB00003781 East Carolina U IRB #2 (Behavioral/SS) IORG0000418

