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An Analysis of Risk Perceptions and Attitudes towards Climate Change among Residents of Southeastern Louisiana

Heather Marie Brown
Louisiana State University and Agricultural and Mechanical College

AN ANALYSIS OF RISK PERCEPTIONS AND ATTITUDES TOWARDS CLIMATE CHANGE AMONG RESIDENTS OF SOUTHEASTERN LOUISIANA

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ABSTRACT

Climate change is an important issue of concern, as its environmental impacts are already beginning to manifest in various means, such as through sea level rise and increased frequencies of storms. Areas of high vulnerability to the effects of climate change, such as southeastern Louisiana, are prime locations to initiate research in determining what factors influence individual's risk perceptions towards climate change. This study aims is to identify key factors, specifically in the areas of socioeconomic, demographic, exposure, and attitudinal attributes, which affect climate change risk perceptions. The study area is that of the zip codes around Lake Pontchartrain in southeastern Louisiana; the region to the north of Lake Pontchartrain has higher mean elevation and is considered to have less environmental pollution, while the region located south of Lake Pontchartrain is considered more industrialized and has much lower mean elevation. Statistical analysis occurred primarily through Pearson's chi-square tests, to determine whether frequencies from independent groups within specific variables showed significant difference in concern, and ordinal logit regression, to determine which factors account for variation in attitudes and risk perceptions concerning climate change.

Ordinal logit regression found that an increased level of concern towards climate change was significantly associated with lower educational attainment, slightly lower exposure to pollution, lower confidence in state government, and high environmental beliefs. It was also concluded that geography within the study region plays a role in the level of concern towards climate change, with the southern region of Lake Pontchartrain showing higher overall concern than the northern region. It is important to study risk perceptions of the general public within probable areas of vulnerability to the future effects of climate change because understanding risk

perceptions is important because adaptation and mitigation of climate change needs to occur both through policy making at the government level and the choices and behaviors of citizens at the individual level.

CHAPTER 1: INTRODUCTION

1.1 Problem Statement

The impacts of climate change, especially sea level rise, are growing areas of concern. This is especially the case for communities living within coastal areas, which will be the first to experience its effects. This thesis focuses on the topic of climate change, in specific, understanding the factors that influence risk perceptions and overall attitudes of residents towards this issue. The risk perceptions of climate change need to be understood more fully in areas within the United States, as this country is one of the world's largest emitter of carbon dioxide, accounting for up to twenty-five percent of the total global emissions (Dunlap, Liere, Mertig, & Jones, 2000; A. A. Leiserowitz, 2005). Interpreting the reasons why certain people agree or disagree with aspects within the topic of climate change and global warming is necessary in understanding the concept of climate change risk perceptions of the general public. The overall goal of this research is to identify key factors, specifically in the areas of socioeconomic, demographic, exposure, and attitudinal attributes, which affect climate change risk perceptions in order to provide educational resources and information to the proper vulnerable individuals and communities.

The study area for this thesis focuses on the communities around that of Lake Pontchartrain in southeastern Louisiana. The coastal communities of Louisiana will be significantly impacted by the effects of climate change, both in regards to sea level rise and increased frequency of storms. Given this, it is a good opportunity to examine attitudes among residents in communities that are and will be affected by the impacts of climate change dramatically in the future.

1.2 Significance of the Study

Gaining insights into the conditions that are associated with specific risk perceptions and attitudes towards climate change is beneficial for various reasons. This type of research is important because it is one way to help to target the communities and individuals that show the greatest vulnerability and least adaptive capacity towards climate change, in which adaptation initiatives and resources can be targeted towards the appropriate communities (Smit & Wandel, 2006). Targeting the proper communities that exhibit low risk perception within areas that will foremost be influenced by the effects of climate change is very important. Providing educational resources and information on climate change to persons who wouldn't have previously have had access to this information can be more easily completed due to understanding the attributes of persons within communities that concern where concern is truly needed. Understanding public perceptions to risk also helps to design and improve risk communication (Carlton & Jacobson, 2013).

Additionally, determining public risk perception on climate change within communities will be beneficial because public opinion greatly influences political, economic, and social actions towards risk reduction (Dunlap et al., 2000). Understanding public opinion on climate change is important not only for its potential impact on national and international policies, but due to the fact that voluntary actions by individuals will also be key to mitigating and adapting to the effects of climate change (Lorenzoni, Pidgeon, & O'Connor, 2005). Climate change policy should come about from both expert analysis as well as the risk perceptions of the general public because those opinions may come about from knowledge about the risk that experts do not process (Pidgeon, 1998). This knowledge can be equated to personal experience, which is usually outside the scope of expert analysis. Taking public risk perceptions into consideration

with decision making in regards to climate change management is useful especially in ensuring that specific cultural values are incorporated within adaptation and mitigation planning (Renn, 1998). Collaborative management is essential for public policy in environmental issues, and by incorporating risk perceptions into policy making, participation and decision making can integrate the opinions of the public as well. With the understanding of the public's risk perceptions, initiatives can be created by decision makers with better knowledge of what adaptation and mitigation efforts the public will support (Lujala, Lein, & Rod, 2015).

Responses in planning and policy towards climate change can be in the form of adaptation and mitigation, in which both strategies are necessary to combat the effects of climate change. As defined by the Intergovernmental Panel on Climate Change, adaptation is "the process of adjustment to actual or expected climate and its effects" and mitigation is "a human intervention to reduce the sources or enhance the sinks of greenhouse gases (GHGs)" (IPCC, 2014). Adaptation can be in the form of both reactive and proactive measures, while mitigation is only a proactive measure. Adaptation focuses on adjusting and improving the social and built environments towards the effects of climate change in order to protect local communities (Hamin & Gurran, 2008). Adaptation tend s to be more in the form of preventative measures, used to reduce the risk of current and potential effects of climate change (Semenza et al., 2008). Mitigation on the other hand focuses on reducing greenhouse gas emission, both current and future (Hamin & Gurran, 2008). Voluntary mitigation includes actions that are both sustainable and low-carbon emitting, thus many climate change related mitigation for individuals include lifestyle changes (Semenza et al., 2008).

As mentioned previously, public risk perceptions are relevant not only because the public votes on policy related to climate change, but because of the role that individuals can take

personally in adaptation and mitigation efforts. The choices and behaviors at the individual level in regards to adaptation and mitigation will play an intricate role in climate change management. Citizens can be influential towards climate change planning on the policy side by voting in relation to greenhouse gas limits and carbon taxes, but can also change their behaviors individually by conserving energy, reducing their greenhouse gas emissions by driving less or elevating their homes if they live in vulnerable coastal regions. In an earlier study, an analysis of adoption of adaptive behaviors within residents of southeastern Louisiana found that more concern towards climate change was associated with the adoption of household emergency plans (Carraway, 2013). The results of that study prompted the need for a study analyzing in more detail the public perception of climate change within southeastern Louisiana, thus the development of the study within this thesis.

1.3 Research Goals and Objectives

The overarching goal of this thesis is to interpret the characteristics of both individuals and the community at whole in order to find relationships between these characteristics and the level of concern towards environmental risk, specifically towards that of climate change. This will result in better understanding of the main drivers of climate change risk perception, specifically focusing on southeastern Louisiana in which comprehensive climate change risk perception studies have not been completed within the previous literature. The following research questions will define the main objectives within this study: (1) To what extent are residents of southeastern Louisiana concerned with climate change?, (2) What factors account for variation in level of concern for climate change?, and (3) Is there a difference in level of concern towards climate change between the northern region and southern region of the study

area? The results of these research questions will help to better understand the groups in which would benefit from climate change educational resources and outreach.

1.4 Background on Climate Change

Climate change is becoming a necessary area of concern, as its environmental impacts are already beginning to manifest in various means. Furthermore, the geographic areas initially affected are known to be important in regards to both anthropological development and rich ecosystem services. There are both natural and anthropogenic causes of climate change. Natural causes of climate change include sunspots, changes in orbital patterns of the sun, and volcanic activities (Matthews, Weaver, Meissner, Gillett, & Eby, 2004). Anthropogenic causes of climate change include land use, greenhouse gas emissions, and ozone depletion (Matthews et al., 2004). Climate change impacts are vast, displaying effects in differing ways depending on the geographic location and timescale being analyzed. As published in the Third National Climate Assessment, the most prominent indicators of global warming are increases in water temperature, air temperature, water vapor, and sea level, with decreases in sea ice, snow cover, glaciers, and ice sheets (Melillo, Richmond, & Gary W. Yohe, 2014).

Concern towards climate change amongst the population of the United States has only recently become a significant viewpoint or belief. With widespread heatwaves, drought affecting national crop production, and a hearing on climate change by the U.S. Senate Energy and Natural Resources Committee in the summer of 1988, American public opinion began to show increasing awareness and concern about global climate change (A. A. Leiserowitz, 2005). Increases in awareness and overall concern towards climate change within the early 2000s was the result of popular entertainment bringing the issue of climate change into the American home, with books like a State of Fear, movies such as The Day After Tomorrow, and documentaries such as Al

Gore's An Inconvenient Truth (Vig & Kraft, 2013). Gallup polls in 1989 and 2003 show that concern over climate change among U.S. residents has increased over time. Gallup found an increase from twenty-four percent to forty percent of respondents were worried about the issue 'a great deal' (Lorenzoni & Pidgeon, 2006). More recent polls from the Pew Research Center indicated that Americans who believe global warming was occurring account for fifty-seven percent in 2009 and fifty-nine percent in 2010 (Smith, Liu, Safi, & Chief, 2014). The idea of harm caused by climate change is one that is hard to comprehend for some, mainly due to the nature of how it is observed. Observations of the climate and, thus, climate change are conducted through mathematical model and other scientific measurements which are not directly observable or tangible to the average citizen (Whitmarsh, 2008). Thus, awareness and concern may not be on equal levels for many individuals.

An analysis of how different groups view climate change, based on whether they believe the Earth is warming based on human activity, warming based on natural patterns, or that there is a lack of evidence to support global warming was reported in a recent Pew Research poll in 2015. Of U.S. adults, fifty percent believe global warming is a result of human activity, twenty-three percent believe global warming is a result of natural patterns, and twenty-five percent to not think there is enough solid evidence to believe global warming is even occurring (Pew Research Center, February, 2015). It is also important to understand the public's opinion how the president and congress should prioritize climate change relevant to other national issues, as management for the issue through adaptation and mitigation measures will occur at both the policy level and through voluntary actions. In regards to U.S. adults opinion on where the president and congress' priority should stand with climate change, thirty-eight percent of Americans think climate change should be a top priority, twenty-nine percent think it is

important but not a top issue, whereas thirty-one percent think it is not a very important issue (Pew Research Center, January, 2015). The issue of global warming and climate change came near last in that survey, tested against more prominent issues to many Americans such as terrorism, economy, jobs, education, and health care, to name a few (Pew Research Center, January, 2015). It is important to note that climate change is not just a scientific issue; recently it has been treated more along the lines of a political issue. Along these lines, climate change faces a great deal of competition within the political agenda as Americans are concerned with numerous issues such as education, the economy, and crime, to name a few (Vig & Kraft, 2013).

Recently, the climate change issue has created a partisan divide, along the same time as the movement from climate change as a scientific issue towards that of a political issue. In a repeating Gallup poll asking about awareness that global warming is occurring, Democrats and Republicans responded very similarly in 1997 with forty-six percent and forty-seven percent respectively, whereas in 2011 awareness was reportedly increased to sixty-two percent for Democrats and dropped to thirty-two percent for Republicans (Vig & Kraft, 2013).

1.5 Louisiana and Climate Issues

Louisiana is an important study area for research concerning risk perceptions towards climate change. With a sea level rise of three meters, 27.6% of its population would be affected (Lam, Arenas, Li, & Liu, 2009). For example, the city of New Orleans would face vast impacts of a sea level rise of three meters, as it resides within Orleans parish which has a mean elevation of five feet. Louisiana is already experiencing observable sea level rise. As reported through long-term observations by NOAA, Grand Isle in Louisiana has undergone a relative sea level rise of 9.2 mm per year from 1947 to 2006 (Szabados, 2008). Grand Isle and Eugene Island, both coastal locations in Louisiana, are known for being the having the highest mean seal level trends

(Zervas, 2009). In relation to sea level rise regionally and globally, the coastal regions along the Gulf of Mexico have reported an average sea level rise of 2.9 mm per year and the global sea level rise averages 3.0 mm per year (Donoghue, 2011). Louisiana's coastal region has a much higher than average sea level rise, making it more vulnerable for future impacts of sea level rise.

A major contributing factor for Louisiana's high relative sea level rise is due to coastal subsidence from changes in sedimentation flow from the Mississippi River (Donoghue, 2011). Since the 1930s, Louisiana has lost approximately 1,880 square miles of land due to a combination of coastal erosion and canal dredging for oil and gas exploration (Carter et al., 2014). The problems that Louisiana is facing from land loss will only be exacerbated in the future from sea level rise and increased frequency of storm surges (Carter et al., 2014). Louisiana is known to be one of the most vulnerable regions to the impacts of climate change, as it encompasses abundant amounts marsh areas which are known to have high vulnerability to coastal issues because of their geomorphology and rate of relative sea level rise (Theiler & Hammar-Klose, 2000).

All of the states along the gulf coast of the United States already show high vulnerability to hurricanes and other coastal issues, sustaining much damage from them currently. The coastal states of Louisiana, Alabama, Mississippi, and Texas face an annually sum of fourteen billion U.S. dollars from hurricane and coastal related issues such as hurricane winds, sea level rise, and land subsidence(Carter et al., 2014). It is anticipated that future losses by 2030 within the gulf coast states could be eighteen billion U.S. dollars without the effects of sea level rise or reach upwards to twenty-three billion U.S. dollars with the anticipated increase in hurricane impacts and sea level rise (Carter et al., 2014). The most costly recent hurricane was Hurricane Katrina which hit the Louisiana coastline in 2005, caused approximately $108 billion U.S. dollars in

property damage and an estimated number of fatalities in Louisiana at 1,300 persons (Knabb, Rhome, & Brown, 2005). As storms become more intense and more frequent, coastal communities will face significant and costly risks.

This chapter has presented the problem statement and significance of this study, as well as the main research objectives. Additionally, it provided a background onto climate change, both scientifically and socially, and to Louisiana. The second chapter includes a literature review on previous related research, both in regards to general risk perception and climate change specific risk perception. The third chapter discusses the research methodology used within this study, specifically focusing on the study area, variables, and statistical analysis used. The fourth chapter provides the results of the statistical methods used. The fifth and final chapter provides a discussion and conclusion in relation to the research objectives presented in this first chapter.

CHAPTER 2: LITERATURE REVIEW

Generalized public risk perceptions are typically influenced by a variety of factors, including scientific information described by the professionals and authority, personal experiences, values, and worldviews (Dunlap et al., 2000). Level of risk perception for individuals may influence decision making aspects, such as voting behavior, support of policy initiatives, and lifestyle decisions on an individual basis (Brody, Zahran, Vedlitz, & Grover, 2008). Risk perceptions can be determined based on attitudes and socioeconomic characteristics (Brody et al., 2008). Additionally, risk perceptions are influenced by the interactions of factors that an individual possesses, such as psychological, social, cultural, and political attributes (Slovic, 1999). The level of risk perception for climate change is reliant on the knowledge of causes of climate change, the consequences brought upon by climate change, and the extent in which individuals feel that the effects of climate change will be harmful to their lifestyles (Brody et al., 2008).

2.1 Theories in Risk Perception

Before delving into how specific such as demographics and attitudes affect risk perception, some examples of theory within risk perception are discussed. There are two main schools of thought in the research area of risk perception: psychometric paradigm and culture theory.

The psychometric paradigm is used within risk analysis and risk perception studies as a means to understand why different people perceive types of risk in various ways (Siegrist, Keller, & Kiers, 2005). Its focus is on the factors that influence risk perception of laypeople, or the general public, as opposed to experts within a particular hazard's field. The idea behind risk perception in relation to the psychometric paradigm is that individual's risk perception towards

hazards is based on the qualitative characteristics of the hazards themselves (Pidgeon, 1998). More specifically, hazards can be ranked against each other based on dimensions that relate to their perceived risk. Though most risk perception studies that utilize the psychometric paradigm focus purely on the differences in risk between hazards themselves, some studies combine the dimensions within the psychometric paradigm with that of how demographics compare. The dread factor can be described as having fear towards a hazard because it is catastrophic in nature or the hazard has unavoidable harm, while the personal exposure factor describes the fact of risk perception being due to personal experience with such hazard or fear towards that hazard on a strictly individual basis (Savage, 1993). In looking at demographics in relation to the dread and personal exposure factors of the psychometric paradigm, a higher level of risk corresponds to lower education, lower income, women, the young, and African Americans (Savage, 1993).

Where the psychometric paradigm does not provide information on social and cultural influences on risk perception, the Culture Theory fills that void (Rippl, 2002). The Cultural Theory focuses on the idea that risk perception is brought about by cultural biases and worldviews (Bickerstaff, 2004). More so, an individual's risk perception is strongly influenced by the social and cultural groups that an individual is associated with (Rippl, 2002; Sjöberg, 2000). One way that the Culture Theory is examined within the risk perception literature is by the classification of people within one of four groups based concepts of which they are fearful: egalitarian, individualistic, hierarchic and fatalistic (Sjöberg, 2000). Some factors that could be labeled within the Culture Theory include new ecological paradigm factors such as environmental beliefs and political party preference (Sjöberg, 2000).

Understanding why individuals find certain hazards as riskier than other individuals do is not as easy as a study purely within the psychometric paradigm tends to be (Chauvin, Hermand,

& Mullet, 2007). This thesis presents a study, as do many risk perception studies, which combines the ideas behind the psychometric paradigm, that is risk perception is mainly influenced by the hazard itself, and the Culture Theory, which states that risk perception is influenced by the social and cultural groups and impacts that an individual finds itself influenced by.

2.2 Factors that Influence Risk Perception

The literature specific to climate change risk perception gives varying results. There were a couple of relationships between variables and climate change perspectives which are important to look upon, including how personal efficacy relates to perspectives and what characteristics are most commonly seen with high and low concern towards climate change. Several studies were analyzed to obtain results on climate change perspectives found within the current literature on this topic, which will be explained below.

Demographic variables analyzed within the literature include sex, age, race, and ethnicity. Women tend to show more concern for the effects of climate change then men (Brody et al., 2008; A. Leiserowitz, 2006; O'Connor, Bord, & Fisher, 1999). More generally, men perceive most types of risk as less problematic than women do (Flynn, Slovic, & Mertz, 1994). Gender differences in concern towards environmental issues in general has been examined within the literature but is related more towards local rather than general issues (Mohai, 1997). Women are more likely to view the world as risky and take personal efficacy towards climate change in the form of voluntary actions to mitigate effects. This is in comparison to men who are more likely to support governmental policies that affect climate change mitigation than take voluntary actions themselves (O'Connor et al., 1999). Women tend to cognize the adverse effects of climate change more commonly than men do (Brody et al., 2008). The reason behind

this has been hypothesized that women are socialized into the role of family nurturer while men are typically put into the role of the main economic provider (Mohai, 1997).

In regards to research of perceptions dealing with differing race and ethnic identities, findings suggest that racial minorities tend to display high general risk perception due to more exposure to hazards (Kellstedt, Zahran, & Vedlitz, 2008). African Americans specifically tend to be exposed to more pollution than whites, which is believed to be a main reason for higher concern towards overall environmental issues (Mohai, 1997). Specifically focusing on climate change risk perception, minorities tend to believe that climate change is more of a risk than whites do (A. Leiserowitz, 2006).

The "white male" effect is a frequent term found in the risk perception literature, stating the idea that white males show less concern towards risk than their counterparts (Finucane, Slovic, Mertz, Flynn, & Satterfield, 2000). When comparing risk perception amongst white males, non-white males, white females and non-white females, the group that shows the lowest risk perception was white males, and the group that shows the highest risk perception was non-white females (Finucane et al., 2000). The "white male" effect could be due to several factors, including the fact that white males tend to have more authority and benefit thus from it the most, whereas women and non-white males show more vulnerability in general and have less power overall (Bickerstaff, 2004; Flynn et al., 1994).

Taking age into consideration, young individuals tend to show more concern of climate change whereas older individuals show less concern (Kellstedt et al., 2008). However, older individuals seem to be more likely to support government and vote for governmental policies that could affect climate change mitigation (O'Connor et al., 1999). Political affiliation has been

noted as a factor influencing differences in concern towards climate change, with liberals showing more concern towards the issue than conservatives do (A. Leiserowitz, 2006).

In regards to attitudinal variables, the literature focuses on personal efficacy, the school of thought of new ecological values, and confidence in professionals. Persons with more of a sense of personal efficacy towards climate change – that is they believe they have responsibility and the ability to mitigate the impacts of it – tend to show more concern about the potential risks that could occur from climate change (Brody et al., 2008; Kellstedt et al., 2008). In the literature, the trend seems to be that individuals who exhibit high personal efficacy or responsibility towards climate change tend to be older individuals with more sense of new environmental values (Kellstedt et al., 2008). Persons with low personal efficacy towards climate change tend to be individuals who are younger, more informed, have greater confidence in scientists, and overall higher confidence in government (Kellstedt et al., 2008). The main explanation of these results from the study by Kellstedt et al. involves the fact that the individuals with low personal efficacy don't necessarily believe that they are responsible for the impacts of climate change because of high confidence in scientists being able to manage a solution to fix climate change problems. Along the lines of confidence in professionals is social trust, which in regards to environmental risk perception is the confidence in government agencies and their ability to manage risk (Carlton & Jacobson, 2013). Typically, higher social trust relates to lower concern towards environmental risk (Carlton & Jacobson, 2013).

Persons who display characteristics of new ecological values and concern for the state of nature generally show a higher climate change risk perception and more concern (Brody et al., 2008). A typical viewpoint of Americans in that climate change is a moderate risk, something that is more of a danger to geographically and temporally distant communities (Dunlap et al.,

2000). Connection with social networks and trust with media and policy makers is an area of conflicting results regarding climate change perspectives. Members of environmental groups tend to show high concern towards climate change (A. Leiserowitz, 2006). In the study by Brody et al. in 2008, their results found that individuals displaying more connection to social networks interested in climate change tend to be more concern of the results that can occur from it, explained via the idea that connection with political discussion networks tends to promote attitude change and activism over time (Brody et al., 2008). The other side of this discussion was found in a study by Kellstedt et al. in 2008, in which they found that individuals with high levels of information on climate change, high confidence in scientists, and high trust in the media and policy experts within the field of global warming showed less concern of climate change risk (Kellstedt et al., 2008). As previously mentioned, this is accounted for by the belief that the more informed an individual is on a specific hazard and the more confidence they have towards scientists in that field, the less personal responsibility and concern they will display towards that hazard, including the issue of global warming (Kellstedt et al., 2008).

Lastly, experience with environmental hazards could influence one's risk perception towards other environmental detriments. As was stated prior, higher exposure to pollution and environmentally vulnerable areas impacts many African Americans' and other minorities' viewpoints on environmental hazards because a majority are impacted by environmental injustices. Similarly, people tend to trust their own experiences more than the information of others (Whitmarsh, 2008). The concern towards increased natural hazards locally and around the world as a result of climate change is likely to be greater for individuals who have personal experience with natural hazards themselves (Lujala et al., 2015). The research within the literature provides varying results when this idea is tested. In a study analyzing concern towards

climate change with that of experience with air pollution and flooding, air pollution sufferers displayed overall positive concern towards climate change – based on their environmental values – while flooding sufferers do not show any more concern towards climate change than those of no environmental hazard experience (Whitmarsh, 2008). However, direct personal experience with hazards influences one's risk perceptions while simply living in vulnerable does not necessarily impact risk perceptions (Lujala et al., 2015).

2.3 Studies in Climate Change Risk Perception

Though there are many explanations as to how characteristics of an individual can influence their risk perception towards environmental issues, comprehensive climate change risk perception studies give an additional explanation of the extent that these characteristics are influential on concern towards climate change. The following section provides a summary of several recent comprehensive studies on risk perception to climate change or global warming. Analyzing a risk perception study comprehensively is important in fully understanding how factors relate to one another within the study and to examine the fully variance explained within the model. These two things are very important in understanding why researchers within the area of risk perception choose certain factors to study over others, which will inevitably help in model creation for further risk perception studies.

In a recent study by Carlton et al. 2013, climate change risk perceptions of university undergraduate students within Florida were analyzed to determine which factors within social trust, new ecological paradigm, past experience with hurricanes, political affiliation, and gender provided significant influence towards concern of climate change (Carlton & Jacobson, 2013). Twenty-two percent of the variance was explained for the model based on the variables chosen. This study found that gender, new ecological paradigm, and political affiliation had the greatest

influence in explaining climate change risk perceptions, with democrats, females, and individuals with high environmental concern showing greater concern towards the risk of climate change (Carlton & Jacobson, 2013). In a recent international study, it was found that by including cognitive, experience, socio-cultural, and socio-demographic variables could result in a sixty-eight percent explanation of the variance of climate change risk perceptions (Linden, 2015). This study concluded that many different factors influence risk perceptions towards climate change, stating that experience and socio-culture factors such as worldviews influence risk perceptions far greater than cognitive, or knowledge of environmental issues, and socio-demographic factors (Linden, 2015). In a study by Kellstedt et al. 2008, which provided 42.7% explanation of concern towards climate change, socio-demographic variables were tested alongside factors of personal efficacy, worldviews, and trust of professionals (Kellstedt et al., 2008). While the socio-demographic variables of race, gender, age, and political affiliation provided significance towards the study, the factors of high levels of information, confidence in scientists, and personal efficacy towards the effects of climate change provided increased explanation in regards to climate change concern within the study (Kellstedt et al., 2008). Though there are other climate change risk perception studies that could be analyzed, the purpose of discussing a few within this section was to exhibit the importance of including a variety of factors within risk perception studies in order to provide greater amounts of explanation towards level of concern.

Attributes of an individual provide varying results in risk perception, both in the general sense and towards climate change specifically. Thus, the study presented within this thesis can contribute to the previous literature by providing an addition analysis of how certain factors

influence concern towards climate change within a location with much experience with environmental hazards, southeastern Louisiana.

This chapter provided a literature review on previous work on risk perceptions, both general and climate change specific. This chapter focused on the theories within risk perception, the influence of certain factors on risk perceptions, and examples of comprehensive climate change risk perception studies. The next chapter will explain the research methodology used within the study presented in this thesis, by describing the study region, variables, and the statistical methods used for this study.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Study Area

The study area was that of the zip codes surrounding Lake Pontchartrain located in southeastern Louisiana. Data was obtained within twenty-five of the zip codes surrounding Lake Pontchartrain, accounting for four counties. Fifteen of those zip codes are located north of Lake Pontchartrain and have a higher elevation, while ten of those zip codes are located south of Lake Pontchartrain and have a lower elevation. Figure 1 displays a map of the study area with labels for each zip code included within the study (Google Maps, 2015).

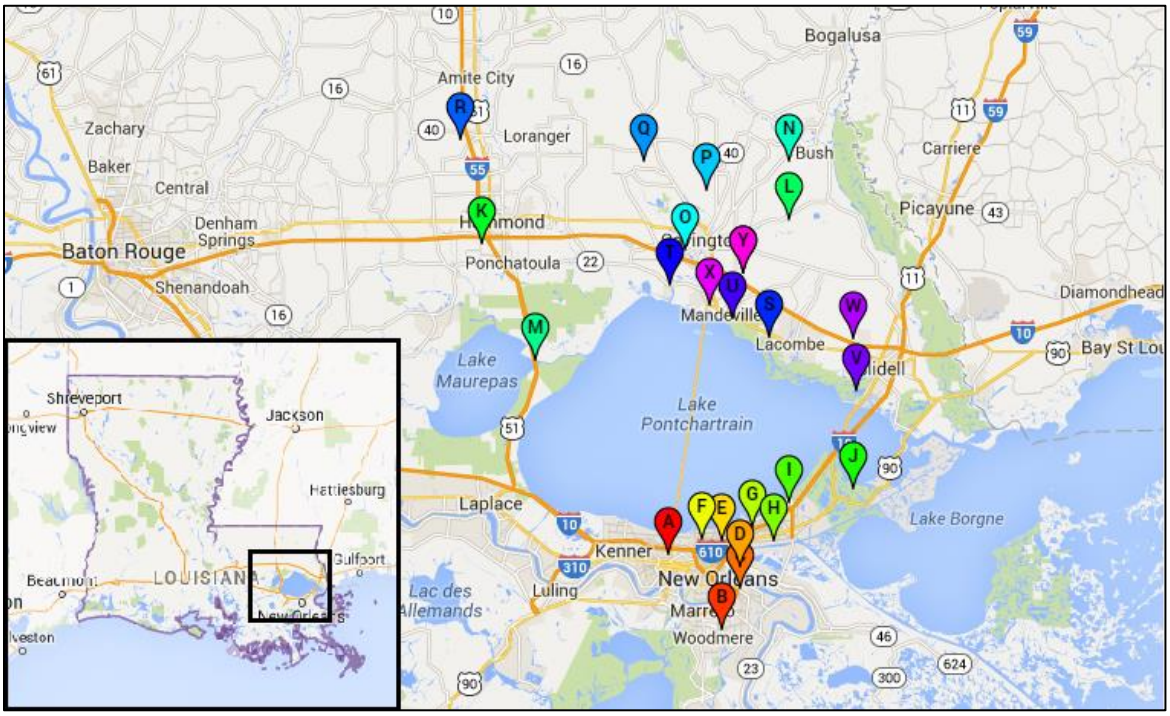

Figure 1: Map of Study Area

Roughly half of the survey responses in the dataset come from respondents located in the southern region, specifically within Jefferson and Orleans parishes. The other half located in the northern region come from Saint Tammany and Tangipahoa parishes. Table 1 lists the specific

cities relating to each zip code, the coding to correspond to the map in Figure 1, and the number of entries per zip code.

Table 1: Zip Codes of Study Area

Zip Code	City	Parish	Number of Entries	Study Region	Coding
70001	Metairie	Jefferson	1	South	A
70058	Harvey	Jefferson	1	South	B
70114	New Orleans	Orleans	16	South	C
70117	New Orleans	Orleans	20	South	D
70122	New Orleans	Orleans	56	South	E
70124	New Orleans	Orleans	29	South	F
70126	New Orleans	Orleans	42	South	G
70127	New Orleans	Orleans	45	South	H
70128	New Orleans	Orleans	56	South	I
70129	New Orleans	Orleans	13	South	J
70403	Hammond	Tangipahoa	1	North	K
70420	Abita Springs	Saint Tammany	4	North	L
70421	Akers	Tangipahoa	1	North	M
70431	Bush	Saint Tammany	4	North	N
70433	Covington	Saint Tammany	89	North	O
70435	Covington	Saint Tammany	41	North	P
70437	Folsom	Saint Tammany	5	North	Q
70443	Independence	Tangipahoa	3	North	R
70445	Lacombe	Saint Tammany	3	North	S
70447	Madisonville	Saint Tammany	5	North	T
70448	Mandeville	Saint Tammany	60	North	U
70458	Slidell	Saint Tammany	1	North	V
70460	Slidell	Saint Tammany	1	North	W
70470	Mandeville	Saint Tammany	1	North	X
70471	Mandeville	Saint Tammany	48	North	Y

3.2 Data and Variables

Several sources of data were acquired to perform this research and answer the research questions. Data was obtained through the randomized phone survey, General Perception Survey in 2012, conducted by the Public Policy Research Lab at Louisiana State University. The 2012 General Perception Survey was part of ongoing research through the Coupled Natural and

Human Systems research grant from the National Science Foundation in which Dr. Nina Lam was PI and Dr. Margaret Reams was Co-PI. This survey included questions on level of concern for specific risk hazards, along with demographic and ideological questions. The randomized phone survey included participants from the zip codes around that of Lake Pontchartrain and obtained 553 responses overall, spanning thirty two zip codes. Some entries were removed from the dataset, five entries were removed due to invalid or unknown zip codes and two entries were removed for being too far away from the intended study area. Some of the initial entries were too far away from the intended study area because cell phone numbers were allowed during the random sample. The final dataset included 546 total entries, spanning twenty-five zip codes encompassed within four counties. Descriptions of all variables and their specific coding can be found in Table 2.

The dependent variable for this study was based on the level of concern towards climate change. It was derived through the General Perception Survey, specifically the responses to the following question: "How concerned are you with climate change affecting your community?" Responses were on a Likert scale, ranging from (1) not at all concerned to (5) very concerned. Thus, the dependent variable *CONCCC* is an ordinal variable.

The independent variables included a combination of socio-demographic, socio-structural, socio-political, exposure and experience, and environmental beliefs variables. The grouping of socio-demographic, socio-structure, and socio-political variables was based on the combination of risk perception classifications within previous work in the risk perception literature (Bieberstein, 2013; Slimak & Dietz, 2006). The initial thirty-eight independent variables are located in Table 2, and include a combination of categorical variables, specifically ordinal and nominal, and continuous variables, specifically scale. The socio-demographic

variables used in this study were gender, age, race, ethnicity, and political affiliation. The socio-structural variables used were educational attainment, income, employment status, type of residential housing, presence of children within home, marital status, and relationship status. Confidence in different levels of government, specifically FEMA, EPA, local, state, and federal government, was used for socio-political variables. The environmental beliefs variables included concern towards pollution and natural disasters, opinion of biggest environmental threat towards community, and hazard preparation knowledge. All of the socio-demographic, socio-structural, socio-political, and environmental beliefs variables were obtained through the General Perception Survey.

The exposure and experience variables were mainly obtained through other data sources. The General Perception Survey did included two questions related to experience and exposure used for this study, including knowledge of prior hazards to community and length of residence within zip code. The indication of experience with disasters at the specific zip codes within the survey was taken account for via three methods: data of the number of FEMA claims for those areas at the county level, mean elevation to understand flood risk, and historical climate-related hazard occurrence data. The variable *FEMACLAIM* was acquired through the FEMA Public Assistance Subgrantee Summary[1] and was calculated as the per capita allotment in U.S. dollars averaged from the years 2001 to 2011 (Federal Emergency Management Agency, 2014). Mean elevation was obtained through the U.S. Zip Code Database and indicated the mean elevation above sea level at the county level (Zip Code Finder, 2014). The variable *NUMHAZ* was obtained through the data acquired within the SHELDUS database, which included climate-

[1] FEMA and the Federal Government cannot vouch for the data or analyses derived from these data after the data have been retrieved from the Agency's website(s) and/or Data.gov.

Table 2: Complete List of Variables Used within Study

Variable Name	Description	Type of Variable	Coding	Source
Dependent Variables				
CONCC	Concern with climate change affecting community	Ordinal	1 (not at all concerned) to 5 (very concerned)	Survey
Independent Variables				
RESLEN	Number of years living within zip code	Scale	0 to 86	Survey
MEANELEV	Mean elevation of county where zip code is encompassed in feet	Scale	5 to 130	Zip Code Database through zip-codes.com
FEMACLAIM	FEMA allocation average per year (2001-2011) per capita in dollars at county level	Scale	123.42 to 7040.88	FEMA Public Assistance Subgrantee Summary
NUMHAZ	Number of climate-related hazards at the county level from 1990-2010	Scale	139 to 387	SHELDUS database
CANCRISK	Total risk per million for cancer risk (inhalation) at county level	Scale	37 to 64	MyHealth via EPA MyEnvironment
FRS	Number of TRI facilities, brownfield sites, and superfund sites within zip code	Scale	0 to 17	EPA FRS EZ Query
REGION	Northern counties versus Southern counties	Nominal	1 (north) to 2 (south)	Survey
PRIORHAZ	Emergency event involving hazardous materials in community within past 5 years	Nominal	1 (yes) to 2 (no)	Survey
GENDER	Gender of respondent	Nominal	0 (male) to 1 (female)	Survey
DOB	Year of birth	Scale	1918 to 1994	Survey
AGE	Grouping based on age	Ordinal	1 (18 to 24 y.o.) to 6 (65 y.o. and older)	Survey
EDU_CAT	Highest level of education attained	Ordinal	1 (less than 9th grade) to 7 (advanced degree)	Survey
EDUCATION	Lower educational attainment versus higher educational attainment	Nominal	(Some college or below) to 1 (4 year college degree and above)	Survey

(Table 2 Continued)

Variable Name	Description	Type of Variable	Coding	Source
EMPLOY_CAT	Type of employment of respondent	Ordinal	1 (employed full-time); 2 (employed part-time); 3 (retired); 4 (unemployed and looking for work); 5 (not employed and not looking for work); 6 (on disability/volunteered)	Survey
EMPLOYMENT	Other employment versus full time employment	Nominal	0 (other) to 1 (work full time)	Survey
INCOME	Household income	Ordinal	1 (under $10,000) to 8 ($100,000 or more)	Survey
RACE	Race of respondent	Ordinal	1 (White/Caucasian); 2 (Black/African American); 3 (Asian/Asian American); 4 (American Indian or Native American); 5 (Other)	Survey
RACEAA	All other races versus African American	Nominal	0 (Other) to 1 (African American)	Survey
RACEMIN	White/Caucasian versus Minority	Nominal	0 (White/Caucasian) to 1 (Minority)	Survey
HOUSING	Respondent's relationship to residence	Nominal	1 (own home); 2 (pay rent); 3 (something else)	Survey
ETHNIC	Hispanic, Latino or Spanish origin	Nominal	0 (no) to 1 (yes)	Survey
MARITAL	Marital status of respondent	Nominal	1 (married); 2 (single); 3 (divorced); 4 (separated); 5 (widowed)	Survey
CHILDREN	Presence of children under 18 living with household	Nominal	0 (none) to 1 (children at home)	Survey
CONFFEMA	Confidence in FEMA	Ordinal	1 (not at all confident) to 5 (very confident)	Survey
CONFEPA	Confidence in EPA	Ordinal	1 (not at all confident) to 5 (very confident)	Survey

(Table 2 Continued)

Variable Name	Description	Type of Variable	Coding	Source
CONFLOC	Confidence in Local Government	Ordinal	1 (not at all confident) to 5 (very confident)	Survey
CONFST	Confidence in State Government	Ordinal	1 (not at all confident) to 5 (very confident)	Survey
CONFED	Confidence in Federal Government	Ordinal	1 (not at all confident) to 5 (very confident)	Survey
POLITICAL_CAT	Political party affiliation	Nominal	1 (Democrat); 2 (Republican); 3 (Independent); 4 (Other)	Survey
POLITICAL	Republican and Independent versus Democrat	Nominal	0 (other) to 1 (Democrat)	Survey
STRONGDEM	Respondent identifies as strong Democrat	Nominal	0 (no) to 1 (strong Democrat)	Survey
WEAKDEM	Respondent identifies as weak Democrat	Nominal	0 (no) to 1 (weak Democrat)	Survey
STRONGREP	Respondent identifies as strong Republican	Nominal	0 (no) to 1 (strong Republican)	Survey
WEAKREP	Respondent identifies as weak Republican	Nominal	0 (no) to 1 (weak Republican)	Survey
HAZKNOW	How knowledgeable one feels about the actions to take in the event of an environmental hazard	Nominal	0 (not at all knowledgeable) to 1 (very knowledgeable)	Survey
CONCPOL	Concern about overall environmental pollution in community	Ordinal	1 (not at all concerned) to 5 (very concerned)	Survey
CONCND	Concern with natural disasters (hurricanes/floods) affecting community	Ordinal	1 (not at all concerned) to 5 (very concerned)	Survey
BIGTHRT	Biggest environmental threat facing community	Nominal	1 (residual effects from the BP oil spill); 2 (the threat of future hurricanes); 3 (environmental pollutions); 4 (climate change)	Survey

related hazards specifically coastal hazard, drought, flooding, hail, heat, hurricane, lightning, severe storm/thunderstorm, tornado, wind, and winter weather (Hazards and Vulnerability Research Institute, 2013). Data obtained via the EPA MyEnvironment Cancer Risk Estimations was used to describe health risk in relation to pollution at the county level and was used for the *CANCRISK* variable (U.S. EPA, 2005). The data for the *FRS* variable was obtained via the EPA Facility Registry Services EZ Query was used to describe pollution significance from amount of TRI facilities, brownfield sites and superfund sites present at the zip code level (U.S. EPA, 2014).

3.3 Data Analysis

SPSS 22 was used as the primary statistical program for analysis. First, frequencies and descriptive statistics were reported to obtain a general understanding of the data set and study area as a whole. These statistics are reported in Section 4.1 of this thesis. Second, Pearson's chi-square tests were performed on a select number of variables to provide addition explanation of trends between categories within those variables. These statistics are reported in Section 4.2 of this thesis. Third, I performed an ordinal logit regression analysis to determine which factors account for variation in attitudes and risk perceptions concerning climate change. Regression was in the form of ordinal logit, or ordinal logistic, because the dependent variable was reported on a Likert scale meaning that it is an ordinal, or ordered, variable. The results of ordinal logit regression are found in Section 4.3 of this thesis.

Model development and variable determination was necessary before the more advanced forms of statistics were performed on the data set. Variable determination was accomplished through a combination of selection based on previous work within the literature followed by a test of multicollinearity of the chosen variables. Multicollinearity is the situation in which two or

more variables are highly correlated with each other (Field, 2013). Multicollinearity was tested by performing a Pearson's r correlation for continuous variables and Kendall's tau correlation for non-continuous variables. Correlation coefficients are values in between -1 and +1, with a coefficient of +1 displaying a completely positive relationship between two variables and a coefficient of -1 displaying a completely negative relationship between two variables (Field, 2013). As per the data, the only occasions of perfect multicollinearity is when a variable shows the correlation coefficient towards itself. The correlation matrices were examined to find correlation coefficients greater than r=0.8 or less than r=-0.8, as this is the known value of a strong correlation between independent variables (Antonius, 2003).

The results of the Pearson's *r* correlation matrix can be found in Appendix B. Four correlations were found to have a correlation coefficient of 0.8 or higher, these included: *MEANELEV* to *CANCRISK* (-0.823), *FEMACLAIM* to *CANCRISK* (0.992), *FEMACLAIM* to *NUMHAZ* (-0.998), and *CANCRISK* to *NUMHAZ* (-0.996). It was determined to remove *CANCRISK* and *NUMHAZ* from the model but leave the *FEMACLAIM* and *MEANELEV* to ensure some variables were included that could describe the environment and exposure influence towards the model.

The results of the Kendall's tau correlation matrix can be found in Appendix C. Only two variables showed strong correlation to one another, being *RACEAA* and *RACEMIN* (0.897). Both variables describe the study's racial differences in two similar ways, *RACEAA* comparing African Americans to all other race categories and *RACEMIN* comparing minorities to Caucasians. It was determined to remove *RACEAA* from the model and keep *RACEMIN* as the racial descriptive variable, as it was felt this would benefit the study objectives greater.

This chapter presented the research methodology used for this study by discussing the study area, the source and explanation of variables used, and the statistical methods used. The next chapter analyzes the results of each statistical method used to answer the research objectives of this study. The statistical methods include descriptive statistics, Pearson's chi-square test, and ordinal logit regression.

CHAPTER 4: RESULTS

4.1 Descriptive Statistics

In order to understand the demographic and ideological makeup of the study area in more detail, descriptive statistics were completed. In regards to gender, 35.9% of respondents were female and 64.1% were male. 56% of the respondents identified as White or Caucasian, 38.7% as Black or African American, 1.7% as Asian or Asian American, 1.5% as American Indian or Native American, and the remaining either refused or identified as other. Only 3.3% of the respondents within the study area identified themselves as ethnically Hispanic, Latino or Spanish origin. The average age of residents within the study area was 54.5 years old.

The respondents within the study area showed the following educational attainment: 4.8% completed some high school, 16.2% were high school graduates, 31.5% completed some college or vocational school, 25.1% hold a four-year college degree and 22.3% have graduate school experience or hold an advanced degree. Income was answered based on family income and provided a mean income value of 5.8, meaning the average family in the study area makes between $40,000 and $74,000. Going into more detail of income distribution within the study area, 10.6% of households make less than $20,000 per year, 25% between $20,000 and $49,999, 34.3% between $50,000 and $99,999 and $30.1% earning more than $100,000 or more per year. Though this variable shows unequal distribution of wealth, 330 respondents did not answer the income question, bringing reason into its removal from the regression models. The employment variable shows that 40.1% of respondents were employed full-time and 11% were part-time, while the remaining 48.8% were not employed due to retirement or unemployment. In regards to the marital status of respondents in this study, 52.5% were married, 25.4% single, 10.1% divorced, 0.6% separated and 11.4% widowed. The majority own their own home, with 77.1%

responding in kind. Whereas 13.1% pay rent and 9.8% have some other form of housing. The average respondent has no children 18 years or younger with only 32.4% stating that they have one or more children young enough to live at home.

Respondents had the option to classify themselves as a Democrat, Republican, Independent, or other in regards to their political affiliation. Overall, 42.7% of respondents described themselves as Democratic, 24.9% as Republican, and 20.1% as Independent. The rest of the respondents either classified themselves as "other" or refused to respond. To understand more specifically respondent's political ideology, the questions of political affiliation and strength of affiliation were combined. Thus, four new classifications were created to describe respondents: strong Democrat, weak Democrat, strong Republican, or weak Republican. Of the respondents, 32.4% were strongly Democratic, 9.9% weak Democratic, 15.2% strong Republican, and 8.8% weak Republican.

Respondents were asked for their level of confidence in the following levels of government: FEMA, EPA, Local government, State government, and Federal government. In order to determine which forms of government residents tend to support the most and the least, percentages for responses were combined. For example, the percentage for responses of "(4) somewhat confident" and "(5) very confident" were combined to give the overall positive confidence towards government entities, whereas responses of "(1) not at all confident" and "(2) not very confident" were combined to give the overall lack of confidence towards government entities. Of the residents within the study area, 32.1% show positive confidence towards FEMA, 36.6% towards EPA, 40.2% towards Local government, 32.4% towards State government, and 28.2% towards Federal government. On the other hand, of the residents within the study area, 38.2% show low confidence towards FEMA, 31.1% towards EPA, 29.6% towards Local

government, 36.1% towards State government, and 39.3% towards Federal government. From this, it can be concluded that within the study area as a generalized statement that residents tend to have the most confidence in Local government and show the least confidence in Federal government.

In looking at the results of environmental beliefs, respondents tend to lean on the side of more overall concern towards pollution, natural disasters, and climate change as opposed to a lack of concern towards these environmental issues. Concern towards natural disasters is shown to be the greatest concern of residents within southeastern Louisiana compared to pollution concerns and climate change concerns. Figure 2 shows a comparison of responses towards level of concern towards pollution, natural disasters, and climate change for the study area. To understand the level of concern more simplistically, responses of "(1) not at all concerned" and "(2) not very concerned" were combined to provide lack of concern response and "(4) somewhat concerned" and "(5) very concerned" were combined to provide high level of concern response. Concern towards pollution shows 19% of residents have a lack of concern, 17% moderate concern, and 64% a high level of concern. In regards to natural disasters, 5.5% of residents responded with a lack of concern, 6.5% a moderate concern, and 88% a high level of concern. Concern towards climate change showed 29.3% of residents have a lack of concern towards the issue, 15.7% a moderate concern, and 55% a high level of concern. As can be seen, residents within the study area show the highest concern for natural disasters affecting their communities, followed by concern towards pollution and then concern towards climate change. Though concern towards climate change shows the lowest level of concern in relation to the other two environmental issues, the level of concern is high enough to show that residents within the study area have an overall positive awareness of the issue.

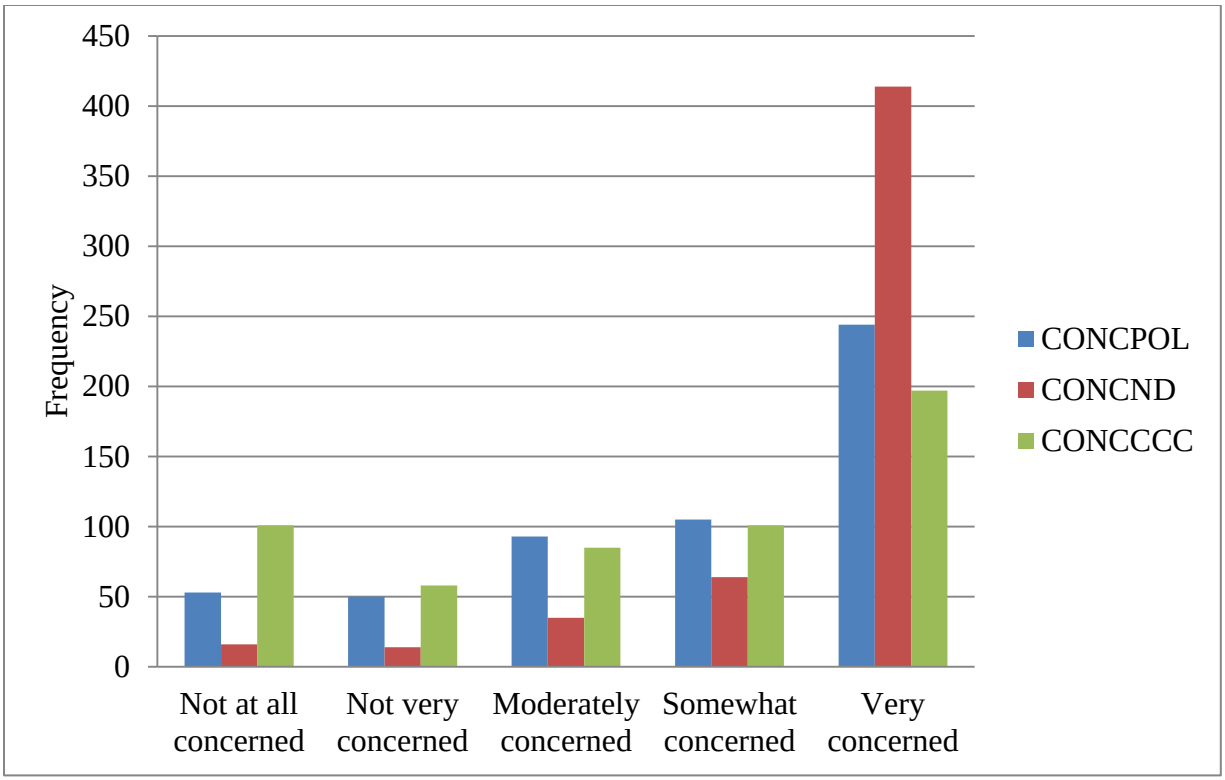

Figure 2: Comparison of Concern towards Different Types of Environmental Hazards

Southeastern Louisiana is a geographic area that is faced by numerous environmental issues. This could explain the overall positive amount of concern towards pollution, natural disasters, and climate change previously mentioned. In order to understand concern towards different environmental issues in comparison to one another, Figure 3 displays the results from the question "which of the following do you think is the biggest environmental threat facing your community right now?" Overall, residents are most concerned with the threat of hurricanes, with 72% of the responses. With the remaining options, 12% believe the effects of the BP oil spill are the greatest threat towards the community, 10% environmental pollution, and only 6% climate change. Though respondents showed more overall concern towards climate change rather than opposition towards the issue, respondents rank it as the least of a threat in comparison towards other environmental risks facing the community. This can be explained by the fact that although

most Americans tend to agree that climate change is a significant issue, they also believe that the impacts of climate change will likely be towards distant areas and people, both geographically and temporally (A. A. Leiserowitz, 2005). Thus, climate change is an issue of concern for most, but other environmental issues tend to be on the forefront because of their current significance towards individuals' lives.

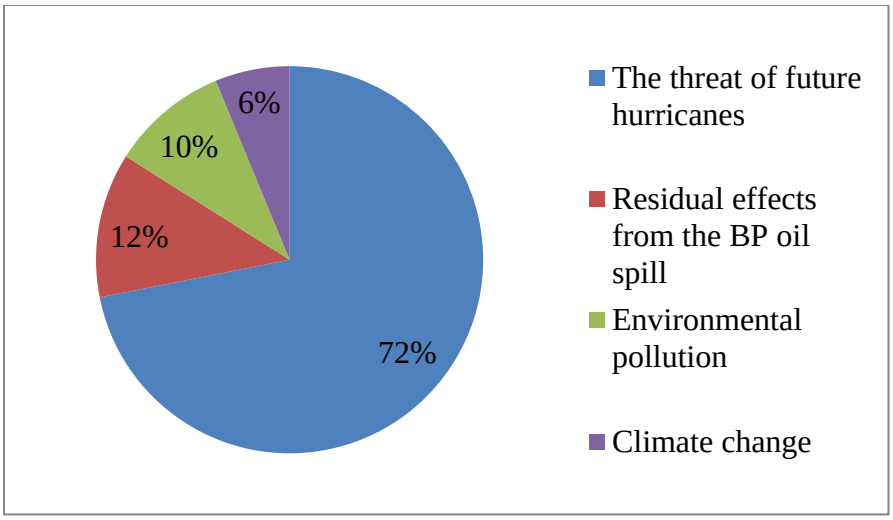

Figure 3: Overall Consensus of the Biggest Threat to Community

Exposure and experience, as stated earlier, can be described through a variety of variables. Length of residence had a range of 0 years to 86 years, with an average respondent living in their zip code 19.4 years. The average FEMA claim within the study area was a monetary value of $3674.44 per capita, over a range of $123.42 to $7040.88 per capita within four counties. The average elevation within the study area was 18.1 feet above sea level. More specifically, the mean elevation of the parishes in the northern region was 31.9 feet while the mean elevation of the parishes in the southern region was 5 feet. The variable *NUMHAZ* provided information about the amount of environmental hazards from 1990 to 2010, these hazards occurrences included: coastal hazard, drought, flooding, hail, heat, hurricane, lightning, severe storm/thunderstorm, tornado, wind, and winter weather. Overall, the average number of

hazards between the four counties of the study area was 260 events, with the minimum being 139 events and the maximum of 387 events. In looking at a comparison between the northern region and the southern region in relation to weather hazards, the north tended to have much more with an average of 385.4 while the southern parishes only reported 139.8 weather hazard events. However, this variable only states the number of weather related environmental events that were recorded, it doesn't explain the intensity. The *FRS* variable provides an idea of the polluted nature of the zip code as it reports the number of TRI facilities, brownfield sites, and superfund sites. In regards to the *FRS* variable, the average amount of pollution causing facilities was 0.63 in the northern zip codes and 4.23 in the southern zip codes. Environmental health impacts towards residents was acknowledged through inhalation cancer risks, with an average of 51.69 incidences per million at the parish level. The southern region can be described as more pollution or endangering to human health because the cancer risk showed an average of 64 incidences per million compared to the northern region with only 39 incidences per million.

4.2 Chi-Square Tests

In order to provide additional descriptive statistics on the data set, Pearson's chi-square tests were performed on a few variables to provide addition explanation at a more basic level before more complex statistical analysis was performed through ordinal logit regression, in the next section. To determine whether the frequencies from independent samples show significant difference, a Pearson's chi-square test is performed via SPSS (Field, 2013). Pearson's chi-square tests were performed on the variables of *REGION*, *GENDER*, *EDUCATION, RACEMIN* and *AGE* in order to see if there are significant differences in concern towards climate change between the sample groups within the variables. These variables were chosen to be analyzed because these variables typically show significance in providing explanation to models as seen in

previous work within the literature. Additionally, I hypothesize that there will be differences in concern towards climate change between residents in the northern region and southern region of the study area, between males and females, between low educational attainment and high educational attainment, between racial minorities and Caucasians, and between younger respondents and older respondents. For each of the variables being analyzed, the chi-square value indicates whether or not there is a statistical difference in frequencies observed in comparison to the expected values (Field, 2013). However, for each variable, the means for each category will be reported but only is a descriptive sense, as this value is not statistically obtained. In understanding mean values, the five variables underwent analysis in comparison with the same testing variable, *CONCCCC*, which was measured on a Likert scale from 1-5 with a response of 1 showing no concern towards climate change and a response of 5 showing high concern towards climate change.

The *REGION* variable describes which region of the study area a respondent lives in in relationship to their zip code and is split into two regions, northern and southern. The results of the chi-square test can be found in Table 3. According to the Pearson's chi-square test, there was a significant association between the region in which a respondent lives in and concern towards climate change, providing the results $\chi 2\ (4) = 25.371$ with a p-value of 0.000. This means that there is a significant difference in climate change attitudes based on region. The northern region of the study area displays less concern towards climate change with a mean of 3.12 than the southern region, which displays more concern towards climate change with a mean of 3.73.

The *GENDER* variable describes whether the respondent is male or female. The results of the chi-square test for the *GENDER* variable can be found in Table 4. According to the Pearson's chi-square test, there was not a significant association between the respondent's

gender and concern towards climate change, providing the results $\chi 2\ (4) = 5.844$ with a p-value of 0.211. This means that there is not a significant difference in climate change attitudes based on the gender of a respondent. However, when looking at each group's means, males show less concern towards climate change with a mean of 3.24 in comparison to females who show more concern towards climate change with a mean score of 3.54. However, this difference is not statistically significant.

Table 3: Results of Chi-Square Test for *REGION*

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	23.371	4	.000
Likelihood Ratio	23.631	4	.000
Linear-by-Linear Association	21.977	1	.000
N of Valid Cases	542		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 28.36.

Table 4: Results of Chi-Square Test for *GENDER*

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.844[a]	4	.211
Likelihood Ratio	5.734	4	.220
Linear-by-Linear Association	5.051	1	.025
N of Valid Cases	542		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 20.76.

The *EDUCATION* variable describes the level of educational attainment of the respondent. This variable was split to show the difference in concern towards climate change for respondents with lower educational attainment in comparison to respondents with high

educational attainment. This split was arbitrary, with the idea that high educational attainment is a 4 year college degree or above and lower educational attainment being some college or below. The results of the chi-square test can be found in Table 5. According to the Pearson's chi-square test, there was a significant association between level of educational attainment and concern towards climate change, providing the results $\chi 2\ (4) = 18.941$ with a p-value of 0.001. The sample of high education showed less concern towards climate change with a mean score of 3.21 and the sample of low education showed more concern with a mean of 3.64. This means that respondents with high educational attainment tend to show less concern towards climate change in relation to respondents with less education, though only the difference in concern between groups can be stated as showing statistical significance not the actual level of concern.

Table 5: Results of Chi-Square Test for *EDUCATION*

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	18.941[a]	4	.001
Likelihood Ratio	19.138	4	.001
Linear-by-Linear Association	10.768	1	.001
N of Valid Cases	538		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 27.23.

The variable of *AGE* describes the age of the respondent. As before with education, the split for the *AGE* variable was arbitrary, with the decision that people age 40 and above are older and people age 39 and below are younger. The results of the chi-square test can be found in Table 6. According to the Pearson's chi-square test, there was not a significant association between the age of a respondent and concern towards climate change, providing the results $\chi 2\ (4) = 4.586$ with a p-value of 0.333. This means that we cannot conclude that there is a

difference in concern towards climate change based on the age of a respondent. That being said, in looking at the means of the groups within the *AGE* variable, older respondents have less concern towards climate change with a mean of 3.44 and that younger respondents have more concern with a mean of 3.51. However, the difference is not statistically significant.

Table 6: Results of Chi-Square Test for *AGE*

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.586[a]	4	.333
Likelihood Ratio	4.614	4	.329
Linear-by-Linear Association	.161	1	.688
N of Valid Cases	528		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 10.83.

The *RACEMIN* variable describes the racial identity of the respondent. The variable is split with two samples, white/Caucasian respondents and minority respondents. The results of the chi-square test can be found in Table 7. According to the Pearson's chi-square test, there was a significant association between the age of a respondent and concern towards climate change, providing the results $\chi 2\ (4) = 44.534$ with a p-value of 0.000. It can be stated that there is a statistical difference in the level of concern for climate change between that of Caucasians and minorities. Looking into the means of these two groups, white or Caucasian individuals show less concern towards climate change with a mean of 3.07 while minority individuals show more concern towards climate change with a mean score of 3.94. This means that somebody of a minority background will tend to show more concern towards climate change than that of an individual who identifies as white or Caucasian, though only the fact that there is a difference in

groups concern towards climate change is statistically significant and not the actual level of concern.

Table 7: Results of Chi-Square Test for *RACEMIN*

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	44.534[a]	4	.000
Likelihood Ratio	45.896	4	.000
Linear-by-Linear Association	43.582	1	.000
N of Valid Cases	526		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 23.61.

To recap the information presented from the difference of means test, the variables that displayed significant difference through the chi-square test were *REGION*, *EDUCATION* and *RACEMIN*. More specifically, there tends to be more concern towards climate change with minorities, low educational attainment and the southern region of the study area. Conversely, there is less concern towards climate change comparatively with white/Caucasian individuals, higher education and the northern region of the study area. However, it can be concluded that there is not enough significance to determine whether there is enough difference in concern towards climate change between that of young and old people and that of females and males.

Lastly, the difference of means of concern towards all three environmental issues between the northern and southern region was examined. Table 8 displays the results of the chi-square tests performed on each environmental issue in regards to the variable *REGION*, with significance found for a difference in frequency of concern between the northern region and the southern region for each environmental issue. The environmental issues tested were concern for pollution, natural disasters, and climate change. The results of the chi-square test for concern

toward climate change in relation to region were tested previously in this section. According to the Pearson's chi-square test, there was a significant association between the region in which a respondent lives in and concern towards pollution, providing the results $\chi 2\ (4) = 45.919$ with a p-value of 0.000. This states that there is a statistically significant difference with concern towards pollution between the northern and southern region of the study area. The northern region of the study area displays less concern towards pollution with a mean of 3.41 than the southern region, which displays more concern towards pollution with a mean of 4.18. According to the Pearson's chi-square test, there was a significant association between the region in which a respondent lives in and concern towards natural disasters, providing the results $\chi 2\ (4) = 25.371$ with a p-value of 0.000. Similarly to the effect of both concern towards climate change and pollution, the northern and southern region display a statistically significant difference in level of concern for natural disasters. The northern region of the study area displays less concern towards natural disasters with a mean of 4.38 than the southern region, which displays more concern towards natural disasters with a mean of 4.73. Thus, the northern region showed less concern for each environmental issue in comparison to the southern region.

Table 8: Results of Chi-Square Test for *REGION* based on Three Environmental Issues: Pollution, Natural Disasters, and Climate Change

	Pearson Chi-Square	df	Assym. Sig (2-sided)
CONCPOL	45.919	4	0.000
CONCND	25.248	4	0.000
CONCCC	23.371	4	0.000

4.3 Regression Analysis

In order to understand the relationships between independent variables towards the dependent variable of concern towards climate change, an ordinal logit regression was

performed. Ordinal regression was chosen as the form of statistical analysis because of the ordinal or ordered nature of the dependent variable. Two separate models were performed, with the results of ordinal logit regression found in Table 7. The choice to perform multiple sets of regressions was due to the nature and amount of variables. In ordinal regression, each predictor variable undergoes regression in relation to all other independent variables held constant at their means. Thus, in order to fully understand certain variables impacts upon concern towards climate change, it was determined that performing two regressions would be more suitable for exploratory purposes. Model creation was based off of previous studies within the risk perception literature, altered to fit the goals and variables of this study (Brody et al., 2008; Kellstedt et al., 2008; O'Connor et al., 1999). Model 1 included socio-demographic, socio-structural and exposure and experience variables. These variables included *AGE*, *GENDER*, *RACEMIN*, *CHILDREN*, *EDUCATION*, *EMPLOYMENT*, *POLITICAL*, *MEANELEV*, *FRS*, *FEMACLAIM* and *RESLEN*. It was determined that performing these variables separately from the entire model would give some explanation of how demographics and geography influence concern towards climate change. Model 2 included the variables within model 1, with an addition of socio-political and environmental beliefs variables. These included *CONFFEMA*, *CONFEPA*, *CONFLOC*, *CONFST*, *CONFFED*, *CONCPOL*, *CONCND*, and *HAZKNOW*.

The results of ordinal logit regression are found in Table 7, with both model 1 and model 2 located within the table. Ordinal regression can include both continuous and categorical independent variables. However ordinal independent variables are treated as continuous only if there are enough categories within the variable, which is the case for the ordinal variables within this study because they all are measured on a 5 point Likert scale.

Table 9: Results of Ordinal Logit Regression

	Model 1			Model 2		
Variables	**B**	**OR**	**p value**	**B**	**OR**	**p value**
Exposure & Experience						
MEANELEV	0.005	1.005	0.536	0.014	1.014	0.176
FRS	-0.055**	0.946	0.027	-0.049*	0.952	0.063
FEMACLAIM	4.88E-05	1.000	0.238	6.481E-05	1.000	0.187
RESLEN	-0.003	0.997	0.588	-0.006	0.994	0.313
Socio-Demographics and Socio-Structural						
AGE	0.001	1.001	0.843	-0.001	0.999	0.891
GENDER[A]	-0.232	0.793	0.180	-0.133	0.875	0.476
RACEMIN[B]	-0.777***	0.460	0.002	-0.287	0.751	0.277
CHILDREN[C]	-0.027	0.973	0.892	-0.051	0.950	0.808
EDUCATION[D]	0.360**	1.433	0.038	0.421***	1.523	0.024
EMPLOYMENT[E]	0.154	1.166	0.408	0.259	1.256	0.183
POLITICAL[F]	-0.360*	0.698	0.084	-0.351	0.710	0.114
Socio-Political						
CONFFED				0.140	1.150	0.140
CONFLOC				0.135	1.145	0.153
CONFST				-0.376****	0.687	0.000
Environmental Beliefs						
CONCPOL				0.707****	2.028	0.000
CONCND				0.293***	1.340	0.008
HAZKNOW				0.059	1.061	0.747
Pseudo *R*-Squared						
Cox and Snell	0.106			0.333		
Nagelkerke	0.111			0.350		
McFadden	0.037			0.133		

*p<0.10 , **p<0.05 , ***p<0.025 , ****p<0.001

A: comparing males to female

B: comparing white to minority

C: comparing no children to children at home

D: comparing low attainment to high attainment

E: comparing other employment to full time employment

F: comparing republican and independent to democratic

4.3.1 Model 1 Results

Model 1 included variables dealing with socio-demographic, socio-structural and geographic related factors. The model was statistically significant in comparison to the intercept only model, with model fitting results of $X^2(11) = 55.226$, *p*-value of 0.00. Both goodness-of-fit tests provided significant results that the model is a good fit for the observed data, with the Pearson goodness-of-fit test result of $X^2(1949) = 1978.796$ and a *p*-value of 0.314 and the deviance goodness-of-fit test result of $X^2(1949) = 1443.519$ and a *p*-value of 1.000. Variance is explained in ordinal regression through pseudo *R*-square values. The variance of Model 1 is explained through the following pseudo *R*-square values, Cox and Snell 0.106, Nagelkerke 0.111 and McFadden 0.037. Finally, the test of parallel lines provided a *p*-value of 0.093, which means that the model does not fail the proportional odds assumption.

The odds ratio in ordinal regression determines the probability of moving into a higher category of the dependent variable. In a regression of logit link, it is calculated by taking the exponential of the estimate of the given independent variable (Chan, 2005). Due to the fact that this study is for exploratory purposes into the nature of climate change risk perception, significant values within the regression models will be considered as a *p*-value of 0.1 or lower. However, the results of some independent variables with a *p*-value greater than 0.1 will still be analyzed and will be deemed trending on significance. Additionally, predicted probabilities were generated for each variable that displayed significance or trended on significance within Model 1. Predicted probabilities were generated in order to better understand the results the ordinal regression and explain the probability of having a specific level of concern towards climate change.

For model 1, only four of the eleven tested variables provided significant results. The *FRS* variable provided significance towards the model, with an odds ratio of 0.946 and *p*-value of 0.027. This states that an increase in *FRS* slightly reduces concern towards climate change. However, when analyzing the predicted probabilities in relation to grouping the *FRS* variable, it is found that respondents within zip codes of zero facilities show a 57.2% likelihood of having high concern towards climate change, respondents within zip codes with one to five facilities show a 50.4% likelihood of having high concern, while respondents within zip codes with six or more facilities show 60.9% likelihood of having high concern.

The *RACEMIN* variable provided significance towards the model, with an odds ratio of 0.460 and *p*-value of 0.002. The odds ratio of 0.460 is related to whites in comparison to minorities, so by reversing the b coefficient to describe minorities compared to whites, the odds ratio becomes 2.17. Thus, the odds of minorities having more concern towards climate change are 2.17 times that of whites. The predicted probabilities for *RACEMIN* found that there is a 69.3% chance of minorities considering climate change a high concern towards their community in comparison to 44.6% of white individuals.

The variable *EDUCATION* was significant with a *p*-value of 0.038. The odds of individuals of lower educational attainment of having higher concern towards climate change is 1.433 times that of individuals with high education attainment, or a 4 year college degree or above. The predicted probabilities for *EDUCATION* gathered that individuals with lower educational attainment have a 61.9% likelihood of stating climate change is a concern towards their community in comparison to individuals with high educational attainment having a 48.2% likelihood of having high concern towards climate change.

The variable *POLITICAL* provided significance towards the model, with an odds ratio of 0.698 and a *p*-value of 0.084. Again, by reversing the b coefficient to obtain the results for democrats in comparison to republicans and independents, the odds ratio becomes 1.433. The odds then of an individual of democratic political affiliation having higher concern towards climate change is 1.433 times that of individuals of republican or independent political affiliation. The predicted probability for Democrats to show high concern towards climate change was 66.6% while the predicted probability for Republicans and Independents was only 46.4%.

The other variables do not provide statistical significance and thus their results are not sufficient enough to be considered in prediction of the dependent variable. However, the variable of *GENDER* is somewhat relevant and can be described as trending on significance, providing an odds ratio of 0.793 and a *p*-value of 0.180. That is, the odds of males having more concern towards climate change are 0.793 times less than females. The predicted probabilities for *GENDER* stated that 50.4% of males believed climate change is a high concern and 58.5% of females believed climate change is a high concern.

4.3.2 Model 2 Results

During the steps of model creation, it was determined that two variables, *CONFEPA* and *CONFFEMA* would not be used in the ordinal regression of model 2 because they were responsible for violating the proportional odds assumption. The proportional odds assumption is a key assumption of ordinal regression, stating that an independent variable has the same effect across all splits within the dependent variable (Chan, 2005; O'Connell, 2006). Within SPSS, the proportional odds assumption is confirmed via the test of parallel lines, in which the presence of a significant p value ($p < 0.05$) means that the proportional odds assumption of the model has

been violated. Though the test of parallel lines provides the value necessary to determine whether or not the model has fulfilled the proportional odds assumption, there are words of caution to follow. The tests associated with the proportional odds assumption is not very reliable, producing low *p*-values for models with large sample sizes, large amounts of independent variables or include continuous variables (Allison, 1999; O'Connell, 2006). However, there are methods to modify the model slightly in order to improve the results of the test of the proportional odds assumption without resorting to changing the regression type. These include changing the variable set, by either removing or adding variables to the model or creating interactions between variables (Allison, 1999). Thus, after examining single ordinal regressions on each variable to determine whether the proportional odds assumption holds at the individual level, it was determined that the variables *CONFEPA* and *CONFFEMA* would be the best to remove from the model without losing too much information.

Model 2 provides a more complete understanding of the relationship between factors and concern towards climate change. The variance of the model is explained in further detail, with pseudo R^2 values of 0.333 for Cox and Snell, 0.350 for Nagelkerke and 0.133 for McFadden. The fit of the model in comparison to the intercept only model is significant, with $X^2(17) = 191.168$ and a *p*-value of 0.00. The goodness-of-fit values show that the model is of good fit, with a Pearson goodness-of-fit value of $X^2(1867) = 1887.594$ and *p*-value of 0.364 and a Deviance goodness-of-fit value of $X^2(1867) = 1241.116$ and *p*-value of 1.000. As mentioned earlier, the initial regression of the completed model violated the proportional odds assumption, thus the variables *CONFEPA* and *CONFFEMA* were removed. The resulting test of parallel lines met the proportional odds assumption, with a *p*-value of 0.054.

Model 2 consisted of a complete model, including socio-demographic, socio-structural, exposure and experience, socio-political and environmental beliefs variables. Of the sixteen variables used in model 2, only five of them provided good statistical significance in explaining concern towards climate change. However, six additional variables showed results trending on significance and will be analyzed as well. For the sake of redundancy, predicted probabilities will be reported for the variables not previously described in Model 1.

In regards to the socio-demographic and socio-structural variables, *EDUCATION* was the only factor to provide statistical significance, although exploratory information can be obtained through the results of *POLITICAL* and *EMPLOYMENT*. The variable *EDUCATION* provided statistical significance to the model, with an odds ratio of 1.523 and a *p*-value of 0.024. The odds of individuals of lower education attainment having higher concern towards climate change are 1.523 times that of individuals with higher educational attainment. The variable *POLITICAL* had a *p*-value of 0.114 and *EMPLOYMENT* had a *p*-value of 0.183. To get the desired odds ratio for *POLITICAL*, the exponential of the absolute value of the b coefficient was taken. The odds of an individual of democratic political affiliation having high concern towards climate change are 1.42 times that of an individual of republican or independent political affiliation. Finally, the odds of a person who does not work full-time of having higher concern towards climate change are 1.256 times that of someone with full-time employment. In regards to the predicted probabilities of the variable *EMPLOYMENT*, individuals who work full-time have a 51.5% chance of thinking climate change is a high concern in comparison to the rest of individuals with a 59.8% chance.

The variable within exposure and experience that provided statistical significance was *FRS*, although the results of *MEANELEV* and *FEMACLAIM* will be analyzed for exploratory

purposes. The variable *FRS* provided the model with statistical significance, with an odds ratio of 0.952 and a *p*-value of 0.063. As *FRS* increases, the odds of having more concern towards climate change are 0.952 times less than that of individuals in zip codes with fewer TRI facilities, brownfield sites and superfund sites. The odds ratio for *MEANELEV* is 1.014, meaning that with each unit increase in mean elevation; the odds of having higher concern towards climate change are 1.014 times that of individuals living in lower elevations. However, to better understand the opinions of the majority of respondents – those living within 5 feet and 30 feet above sea level – predicted probabilities were reported for those mean elevations. Individuals living at an elevation of 5 feet have a 65.4% likelihood of agreeing that climate change is a high concern while the likelihood of agreeing that climate change is a high concern was 45.8% when at an elevation of 30 feet. The odds ratio for *FEMACLAIM* is 1.000; there is no real effect on concern towards climate change with higher or lower amounts of FEMA claim within a county. However, in looking at predicted probabilities, residents living within the lowest FEMA claim county are 45.8% likely to have high concern towards climate change while residents living within the highest FEMA claim county have a 65.6% likelihood of having high concern towards climate change.

While only one variable within the group of socio-political, or support towards different government entities, showed statistical significance, the other two trended towards significance for the model. The variable *CONFST* provided an odds ratio of 0.687 and a *p*-value of 0.000. With each unit increase in confidence towards state government, there is 0.687 times less chance of having higher concern towards climate change. This means that individuals with high support towards state government are likely to have low concern towards climate change than individuals who do not support state government. The results of predicted probabilities for confidence in

state government provide similar findings, showing that individuals with low confidence in state government have a 62.3% likelihood of having high concern towards climate change, whereas individuals with high confidence in state government have a 52.8% likelihood of having high concern towards climate change. The variable *CONFLOC* did not show statistical significance, but it is useful to analyze because its *p*-value was 0.153. With each unit increase in confidence towards local government, individuals are 1.145 times more likely to have high concern towards climate change than individuals with low support towards local government. However, predicted probabilities for confidence in local government do not provide similar findings, providing the results that individuals with high confidence in local government have a 54.8% likelihood of having high concern for climate change and individuals with low confidence in local government have a 59.7% likelihood of having high concern for climate change. Lastly, the variable *CONFFED* showed results trending on significance, with a *p*-value of 0.140. With each unit increase in confidence towards federal government, individuals are 1.150 times more likely to have high concern towards federal government. In regards to predicted probabilities individuals with high confidence in federal government have a 61.1% likelihood of showing high concern towards climate change while individuals with low confidence in federal government have a 48.9% likelihood of showing high concern towards climate change.

Finally, the variables within environmental beliefs that provided statistical significance towards the model were *CONCPOL* and *CONCND*. The variable *CONCPOL* had an odds ratio of 2.028 with a *p*-value of 0.000 while the variable *CONDND* had an odds ratio of 1.340 and a *p*-value of 0.008. With each unit increase for concern towards pollution, individuals are 2.028 times more likely to increase their concern towards climate change. Along the same lines, individuals with increasing concern towards natural disasters are 1.340 times more likely to show

concern towards climate change compared to individuals with low concern for natural disasters. In regards to predicted probabilities, individuals displaying high levels of concern towards pollution have a 64.5% likelihood of having high concern towards climate change and individuals displaying high levels of concern towards natural disasters have a 58.4% likelihood of having high concern as well.

Lastly, the predicted probabilities for concern towards climate change for the northern region in comparison to the southern region can be found in Figure 4. The southern region shows significantly more likelihood for having more concern towards climate change, with 65.4% in comparison to the northern region with only 46.5%. To be noted however, there is more overall concern towards climate change for both regions in comparison to low concern, providing the conclusion that both regions show more concern than lack of concern.

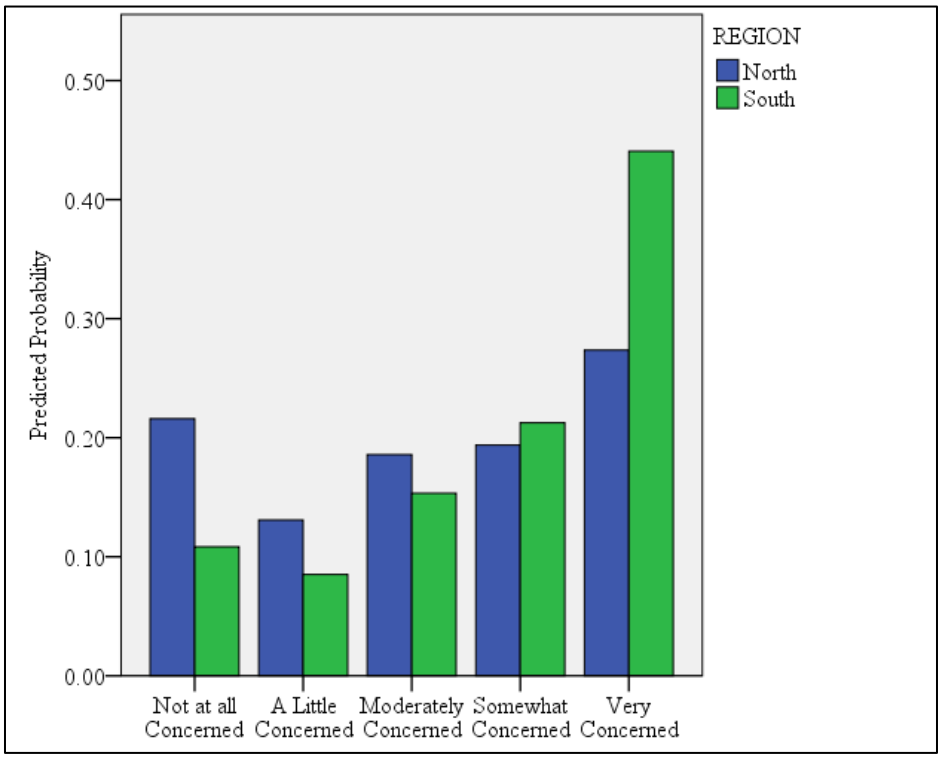

Figure 4: Predicted Probabilities for Concern towards Climate Change between the Northern and Southern Regions of the Study Area

This chapter provided a discussion on the results acquired through four different types of statistical tests, including descriptive statistics, difference of means tests, principal component analysis, and ordinal logit regression. The next chapter will use the results found in this chapter and provide a conclusion about this study based on the main research objectives.

CHAPTER 5: CONCLUSION

Studies within environmental risk perception are important in that they help to describe the reasons behind why individuals either have or do not have concern towards the issue being analyzed. The main goal of this study was to better understand underlying relationships between characteristics of the study area and the citizens themselves with that of concern towards climate change. The three main objectives will be discussed in relation to the statistical results obtained through analysis of the dataset. The statistical tests of Pearson's chi-square and ordinal logit regression were performed in order to understand how different factors influence an individual's concern towards climate change. Pearson's chi-square tests were performed on a few variables initially as a general analysis of whether or not different categories within variables showed significant difference between their levels of concern towards climate change. Ordinal logit regression was performed in order to fully understand the how the factors within the two models impact concern towards climate change.

The first objective asked the question: to what extent are residents concerned with climate change? Overall, residents tend to show more concern as oppose to less concern towards climate change. More specifically, for the study region as a whole, 29.3% of respondents showed a lack or low level of concern, 15.7% of respondents showed a moderate or neutral level of concern and 55% of respondents showed a high level of concern towards climate change, as seen in Figure 5. This level of concern is localized, that is it shows the level of concern that climate change will affect the community itself. Concern towards global climate change was beyond the focus of this study. That being said, as noted previously in the literature review, most Americans tend to view the impacts of climate change as geographically and temporally distant. Since 70.7% of the respondents within the study displayed at least moderate concern towards the

impacts of climate change affecting their community, the study region shows a substantial amount of awareness of climate change.

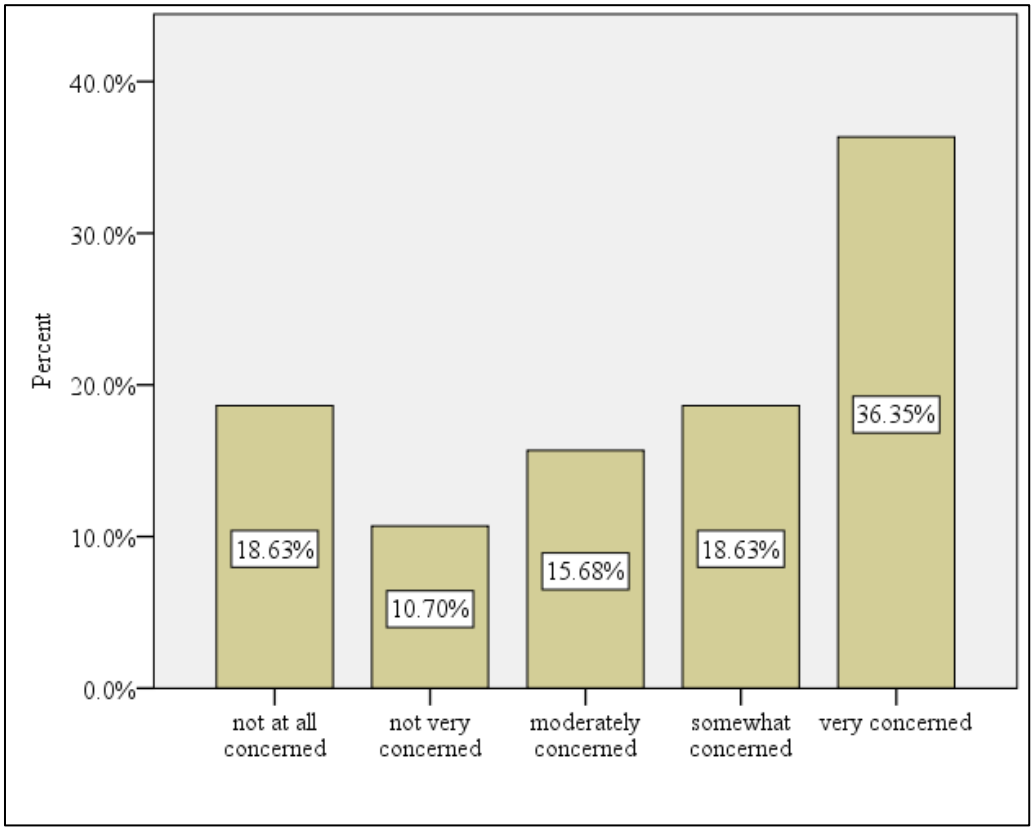

Figure 5: Level of Concern towards Climate Change amongst Residents within Study Area

The second objective asked the question: what factors account for variation in the level of concern for climate change? The results from the Pearson's chi-square tests provide a very general understanding of some variables within the study. Significant difference in concern towards climate change was found for region, educational attainment, and race. However, significant difference could not be concluded for age and gender. For exploratory purposes only and not statistically significance, the means of concern within the groups showed that individuals living in the southern region, individuals of lower educational attainment, and minorities showed more concern towards climate change than their counterparts, residents of the northern region of the study area, individuals of higher educational attainment and Caucasians.

The main purpose of the ordinal regressions was to better understand how factors influence concern towards climate change. Of the socio-demographic and socio-structural variables, age and presence of children at home did not provide any significance with either model. Males show less concern towards climate change than females do. Minorities show greater concern towards climate change than whites do. Individuals with lower educational attainment show greater concern towards climate change than individuals with higher educational attainment, that is a 4 year college degree or above. In regards to political party affiliation, democrats show greater concern towards climate change than republicans and independents do. Finally, individuals with full-time employment status show less concern towards climate change than other levels of employment.

Three variables were analyzed within the socio-political variable group, including confidence in local government, state government, and federal government. The variable *CONFST* provided significant results, however *CONFLOC* and *CONFFED* did not. The results of ordinal regression provided opposing results for local and federal government in comparison to state government confidence. As an individual increases support towards local and federal government, concern towards climate change increases as well. However, as an individual increases support towards state government, concern towards climate change decreases. Thus, within this study, an individual whom shows high confidence towards local and federal government but low confidence towards state government will tend to have higher concern towards climate change, while an individual whom shows low confidence towards local and federal government and high confidence towards state government will tend to have lower concern towards climate change.

Lastly, ordinal regression analyzed environmental beliefs as they influence concern towards climate change. The variables of *CONCPOL* and *CONCND* provided significance, while *HAZKNOW* did not. Within the study, as concern towards pollution increases, so does concern towards climate change. As well, as concern towards natural disasters increases, so does concern towards climate change. These two variables showed great significance in determining the nature of the dependent variable, providing a conclusion that environmental consciousness is one of the most significant predictors of concern towards other environmental issues.

Four variables were used in the regression analysis that were classified as exposure and experience variables, these included mean elevation, number of toxic facilities, FEMA claim amounts and length of residence. The results of the regression determined that experience and exposure did not provide much significant influence on concern towards climate change within the study region. In looking at the results for ordinal regression of the complete model, *MEANELEV* had an odds ratio of 1.014, *FRS* had an odds ratio of 0.952 and *FEMACLAIM* had an odds ratio of 1.000. *RESLEN* did not provide any statistical significance to be used for analysis. According to the regression of the model, an increase in mean elevation provides an increase in level of concern towards climate change while an increase in toxic facilities and superfund sites provides a decrease in level of concern towards climate change. An increase in FEMA claims does not provide odds either way. None of the exposure and experience variables provide very meaningful or prominent odds ratios, that is the odds ratios are all very close to 1 and thus do not provide much difference in increasing or decreasing concern towards climate change. The results of this study do not follow with the idea that more concern towards environmental issues coincides with more vulnerable communities. The reasoning behind why the results from the study provided strange conclusions could be due to the entire vulnerability of

the region to environmental issues such as hurricanes and flooding. Thus, it can be concluded that experience and exposure for Southeastern Louisiana neither helps nor harms the amount of concern towards climate change one possesses.

The third and final objective asked the question: is there a difference in level of concern towards climate change between the northern and southern region of the study area? In regards to general environmental risk perception, the northern region and southern region were tested against each other through a set of difference of means tests in order to understand the difference between regions and their concern towards climate change, pollution and natural disasters. For all three environmental issues, the southern region showed higher concern than the northern region, with results showing significant difference. No specific variable was used within the regression to determine the influence of region on the dependent variable due to multicollinearity issues. The closest variable used within the regression analysis in analyzing proximity to the coast would be *MEANELEV*. Although the odds ratio of this variable was insignificant, a look into predicted probabilities for exploratory purposes shows that individuals living within a mean elevation of 5 feet have a likelihood of 65.4% of having high concern towards climate change whereas individuals living with a mean elevation of 30 feet have a likelihood of 45.8% of having high concern towards climate change. To reiterate, the parishes of Jefferson and Orleans, which are south of Lake Pontchartrain, have a mean elevation of 5 feet, while the parish of St. Tammany, which is north of Lake Pontchartrain has a mean elevation of 30 feet. Analyzing the predicted probability results could be used in relation to the difference between the northern region and southern region. The southern region has 65.4% likelihood for displaying high concern towards climate change impacted the community, whereas the northern region only has a 46.5% likelihood of having high concern towards climate change.

Overall, this risk perception study provided insight into the three main research objectives. First, in general, individuals within Southeastern Louisiana show a significant amount of concern towards the effects of climate change upon their community. Their concern towards climate change is less than that of other environmental issues, specifically pollution and natural disasters, but this could simply be explained by the fact that those issues are more prominent and present. Secondly, concern towards climate change is influenced by a variety of demographic, political, exposure and belief factors. Although many results coincide with the previous literature, other variables provided unique outcomes. In regards to explanation through experience, exposure, and demographics of an individual only, concern towards climate change is influenced primarily by race, educational attainment, political affiliation, and exposure to pollution causing facilities. However, when analyzing all factors together, concern towards climate change is influenced primarily by educational attainment, exposure to pollution causing facilities, confidence in state government, and environmental beliefs. Third and finally, geography plays a role in the level of concern towards climate change within the study region. The northern region exhibited far less concern towards climate change than the southern region did. This could be explained by the nature of differences between that of the northern region of Lake Pontchartrain, a region of higher elevation, and that of the southern region of Lake Pontchartrain, a region of lower elevation.

In conclusion, understanding the risk perceptions of communities vulnerable to the future effects of climate change is necessary for numerous reasons; including general awareness of the cultural beliefs of communities, better targeting for environmental education regarding climate change, and for better decision making both for adaptation and mitigation efforts. One of the main conclusions brought about by this study is the positive awareness of individuals within

southeastern Louisiana to the concern that the effects of future climate change will have towards their community. Adaptation and mitigation of climate change needs to occur both through policy making at the government level and the choices and behaviors of citizens at the individual level. To ensure that adaptation and mitigation efforts occur at the individual level, people need to be aware and have concern towards the effects of climate change and be willing to take preventative actions to combat those negative effects (Lujala et al., 2015).

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APPENDIX A: SURVEY QUESTIONAIRRE

We are conducting a very short survey which includes research on health hazards, media, and the effect of hazards on the local community. Data collected via this study may be used to improve your local community. This study has been approved by the LSU IRB. For questions concerning participant rights, please contact the IRB Chair, Dr. Robert C. Mathews, 578-8692, or irb@lsu.edu.

QA: AGE
Are you 18 years of age or older?
1. Yes
2. No

QB: CELL
Have I reached you on a cell phone or a regular landline phone?
1. Cell Phone
2. Landline Phone

QC: SAFE
Are you in a safe place to talk?
1. Yes
2. No (THANKS---SCHEDULE CALL BACK)

QD: ZIP
What is your zip-code?
[INTERIVEWER - DO NOT READ - ALLOW RESPONDENT TO SAY ZIP]
1. 70114
2. 70117
3. 70122
4. 70124
5. 70126
6. 70127
7. 70128
8. 70129
9. Other

Alternate: QD: ZIP1
Do you live in Covington or Mandeville?
1. Yes
2. No

Alternate: QE: ZIP2
What is your zip code?
[ENTER RESPONSE]
-8. Don't Know / -9. Refused

Q: Q1
And for how long have you lived within this zip code?
-8. Don't Know / -9. Refused

Q: Q5
On a scale of 1 to 5 where 5 is "very knowledgeable" and 1 is "not at all knowledgeable" how knowledgeable do you feel you are about actions to take in the event of an environmental hazard?
5 - very knowledgeable
4 - somewhat knowledgeable
3 - average
2 - not very knowledgeable
1 - not at all knowledgeable
-8. Don't Know / -9. Refused

Q: Q7
Has there been an emergency event involving hazardous materials in your community within the past 5 years?
1. YES
2. NO
-8. Don't Know / -9. Refused

Q: Q19
I'm going to read you a list of environmental factors within your community. Please rate your concern about each on a scale of 1-5 with 5 being 'very concerned' and 1 being 'not at all concerned'. How concerned are you with overall environmental pollution in your community?
5 - very concerned
4 - somewhat concerned
3 - moderately concerned
2 - not very concerned
1 - not at all concerned
-8. Don't Know / -9. Refused

Q: Q20
How concerned are you with climate change affecting your community?
5 - very concerned
4 - somewhat concerned
3 - moderately concerned
2 - not very concerned
1 - not at all concerned
-8. Don't Know / -9. Refused

Q: Q21
How concerned are you with natural disasters such as hurricanes and floods affecting your community?
5 - very concerned

4 - somewhat concerned
3 - moderately concerned
2 - not very concerned
1 - not at all concerned
-8. Don't Know / -9. Refused

Q: Q22
Which of the following do you think is the biggest environmental threat facing your community right now?
1. - Residual effects from the BP oil spill
2. - The threat of future hurricanes
3. - Environmental pollution
4. - Climate change
-8. Don't Know / -9. Refused

Q: Q23
I'm going to read you a list of state and government entities that may assist your community in the event of an environmental hazard. Please rate your confidence in each of these groups to successfully assist your community on a scale of 1 to 5 with 5 being "very confident" and 1 being "not at all confident". How confident are you in FEMA's ability to assist your community in the event of an environmental hazard?
5 - very confident
4 - somewhat confident
3 - moderately confident
2 - not very confident
1 - not at all confident
-8. Don't Know / -9. Refused

Q: Q24
How confident are you in the EPA's ability to assist your community in the event of an environmental hazard?
5 - very confident
4 - somewhat confident
3 - moderately confident
2 - not very confident 74
1 - not at all confident
-8. Don't Know / -9. Refused

Q: Q25
How confident are you in your Local City Government's ability to assist your community in the event of an environmental hazard?
5 - very confident
4 - somewhat confident
3 - moderately confident
2 - not very confident
1 - not at all confident

-8. Don't Know -9. Refused

Q: Q26
How confident are you in State Government's ability to assist your community in the event of an environmental hazard?
5 - very confident
4 - somewhat confident
3 - moderately confident
2 - not very confident
1 - not at all confident
-8. Don't Know / -9. Refused

Q: Q27
How confident are you in the Federal Government's ability to assist your community in the event of an environmental hazard?
5 - very confident
4 - somewhat confident
3 - moderately confident
2 - not very confident
1 - not at all confident
-8. Don't Know / -9. Refused

Q: QF1
Generally speaking do you consider yourself a Democrat, Republican, Independent, or what?
1. Democrat
2. Republican
3. Independent
4. Other
-8. Don't Know / -9. Refused

Q: QF2
Would you consider yourself a strong or not so strong?
1. Strong
2. Not so Strong
-8. Don't Know / -9. Refused

Q: QF4
In what year were you born?
-8. Don't Know / -9. Refused

Q: QF5
Which of the following categories best describes your level of education? Please stop me when I get to that category.
1. Less than 9th grade
2. 9th through 11th grade75
3. High school diploma

4. Some college or vocational school
5. A 4-year college degree
6. Some graduate work
7. Advanced degree (M.A., M.S., J.D., Ph.D., M.D., etc.)
-8. Don't Know / -9. Refused

Q: QF6
Do you own your own home, pay rent, or something else?
1. Own home
2. Pay Rent
3. Something else
-8. Don't Know / -9. Refused

Q: QF7
Are you of Hispanic, Latino, or Spanish origin, such as Mexican, Puerto Rican, or Cuban?
1. Yes
2. No
-8. Don't Know / -9. Refused

Q: QF8
Which of the following best describes your race?
1. White/Caucasian
2. Black/African-American
3. Asian/Asian American
4. American Indian or Native American
5. Other
-8. Don't Know / -9. Refused

Q: QF9
What is your current marital status?
1. Married
2. Single
3. Divorced
4. Separated
5. Widowed
-8. Don't Know / -9. Refused

Q: QF10
And how many children under the age of 18 do you have living in your household?
[Enter # between 0 & 10]
-8. Don't Know / -9. Refused

Q: QF11
Are you currently employed full-time, employed part-time, retired, unemployed and looking for work, or not employed and not looking for work?
1. Employed Full-time

2. Employed Part-time
3. Retired
4. Unemployed and looking for work
5. Not employed and not looking for work
6. On Disability [volunteered]
-8. Don't Know / -9. Refused

Q: QF12
We would like to know what your family income was last year before taxes. This information will remain strictly confidential and will only be used for statistical purposes. Please stop me when I get to the category that includes your family income.

1. Under $10,000
2. $10,000 - $19,999
3. $20,000 - $29,999
4. $30,000 - $39,999
5. $40,000- $49,999
6. $50,000 - $74,999
7. $75,000 - $99,999
8. $100,000 or more
-8. Don't Know / -9. Refused

Q: QF13
Record Gender [DO NOT ASK]

1. Male
2. Female

Q: THANKYOU
That is the end of the survey. I'd like to thank you for participating.
Thank you for your time. Have a good day.

APPENDIX B: SURVEY MATERIALS

Application for Exemption from Institutional Oversight

Institutional Review Board
Dr. Robert Mathews, Chair
131 David Boyd Hall
Baton Rouge, LA 70803
P: 225.578.8692
F: 225.578.6792
irb@lsu.edu
lsu.edu/irb

Unless qualified as meeting the specific criteria for exemption from Institutional Review Board (IRB) oversight, ALL LSU research/ projects using living humans as subjects, or samples, or data obtained from humans, directly or indirectly, with or without their consent, must be approved or exempted in advance by the LSU IRB. This Form helps the PI determine if a project may be exempted, and is used to request an exemption.

-- Applicant,Please fill out the application in its entirety and include the completed application as well as parts A-E, listed below, when submitting to the IRB. Once the application is completed, please submit two copies of the completed application to the IRB Office or to a member of the Human Subjects Screening Committee. Members of this committee can be found at http://www.lsu.edu/screeningmembers.shtml

-- A Complete Application Includes All of the Following:
- **(A)** Two copies of this completed form and two copies of part B thru E.
- **(B)** A brief project description (adequate to evaluate risks to subjects and to explain your responses to Parts 1&2)
- **(C)** Copies of all instruments to be used.
  *If this proposal is part of a grant proposal, include a copy of the proposal and all recruitment material.
- **(D)** The consent form that you will use in the study (see part 3 for more information.)
- **(E)** Certificate of Completion of Human Subjects Protection Training for all personnel involved in the project, including students who are involved with testing or handling data, unless already on file with the IRB. Training link: (http://phrp.nihtaining.com/users/login.php.)
- **(F)** IRB Security of Data Agreement: (http://www.lsu.edu/irb/IRB%20Security%20of%20Data.pdf)

1) Principal Investigator: Barry Dellinger **Rank:**

Dept: Environmental Studies **Ph:** **E-mail:** barryd@lsu.edu

2) Co Investigator(s): please include department, rank, phone and e-mail for each

Margaret Reams, mreams@lsu.edu

IRB# E3587 LSU Proposal #
⊗ Complete Application
⊗ Human Subjects Training

3) Project Title: Superfund Basic Research and Training Program: Health Impacts of Toxic Combustion By-Products: Community Outreach Core

Study Exempted By:
Dr. Robert C. Mathews, Chairman
Institutional Review Board
Louisiana State University
203 B-1 David Boyd Hall
225-578-8692 | www.lsu.edu/irb
Exemption Expires: 7-11-2014

4) Proposal? (yes or no) Yes **If Yes, LSU Proposal Number**

Also, if YES, either ◯ **This application completely matches the scope of work in the grant**

OR ◯ **More IRB Applications will be filed later**

5) Subject pool (e.g. Psychology students) Leaders or representatives of community groups

*Circle any "**vulnerable populations**" **to be used:** (children <18; the mentally impaired, pregnant women, the ages, other). Projects with incarcerated persons cannot be exempted.

6) PI Signature **Date** (no per signatures)

**** I certify my responses are accurate and complete.** If the project scope or design is later changes, I will resubmit for review. I will obtain written approval from the Authorized Representative of all non-LSU institutions in which the study is conducted. I also understand that it is my responsibility to maintain copies of all consent forms at LSU for three years after completion of the study. If I leave LSU before that time the consent forms should be preserved in the Departmental Office.

Screening Committee Action: Exempted √ Not Exempted ____ Category/Paragraph 2

Reviewer Mathews **Signature** Robert C Mathews **Date** 7/12/11

Project Report and Continuation Application

(Complete and return to IRB, 130 David Boyd Hall, Direct questions go to IRB Chairman Robert Mathews 578-8692.)

Institutional Review Board
Dr. Robert Mathews, Chair
130 David Boyd Hall
Baton Rouge, LA 70803
P: 225.578.8692
F: 225.578.5983
irb@lsu.edu | lsu.edu/irb

IRB#: E3587 **Current Approval Expires On:** Jul 11, 2014

Review Type: Continuation of Exempt **Risk Factor:** Exempted

PI: PI: Dellinger; CO-PI: Reams **Dept:** Environmental Sciences **Phone:** 225-578-4299

Student/Co-Investigator:

Project Title: LSU Superfund Research Center - Environmentally Persistent Free Radicals (Community Engagement Core)

Number of Subjects Authorized: N/A

Please read the entire application. Missing information will delay approval!
IRB Security of Data Agreement: https://sites01.lsu.edu/wp/ored/files/2013/07/Security-of-Data-Agreement.pdf

I. PROJECT FUNDED BY: NIH - NIEHS LSU Proposal #: 36171-20

II. PROJECT STATUS: Check the appropriate blank(s) and complete the following:

- (•) 1. **Active**, subject **enrollment continuing;** # subjects enrolled: N/A
- ( ) 2. **Active,** subject **enrollment complete;** # subjects enrolled:
- ( ) 3. **Active,** subject **enrollment complete;** work with subjects continues.
- ( ) 4. **Active, work with subjects complete;** data analysis in progress.
- ( ) 5. Project **start postponed**
- ( ) 6. **Project complete;** end date:
- ( ) 7. **Project cancelled: no human subjects used.**

III. PROTOCOL: (Check one).

- (•) Protocol continues as previously approved
- ( ) Changes are requested*

--List (on separate sheet) any changes to approved protocol.

IV. UNEXPECTED PROBLEMS: (did anything occur that increased risks to participants):

---State number of events since study inception: None since last report: None
---If such events occured, describe them and how they affect risks in your study, in an attached report
---Have there been any **previously unreported** events? Yes/No: NO

V. CONSENT FORM AND RISK/BENEFIT RATIO:

Do new knowledge or adverse events change the risk/benefit ratio? Yes/No: NO
Is a corresponding change in the consent form needed? Yes/No: NO

VI. ATTACH A BRIEF, FACTUAL SUMMARY of project progress/results to show continued participation of subjects is justified; or to provide a final report on project findings.

VII. ATTACH CURRENT CONSENT FORM (only if subject enrollment is continuing); and check the appropriate blank;

- (•) 1. Form is unchanged since last approved
- ( ) 2. Approval of revision requested herewith: (identify changes)

Signature of Principle Investigator: Margaret Reams **Date:** 3/17/2014

IRB Action:
- ✓ Continuation approved; **Approval Expires:** 3/16/17
- ____ Disapproved
- ____ File Closed

Signed Robert C Mathews Date 3/17/14

Print Form

APPENDIX C: PEARSON'S CORRELATION MATRIX

		CONCCC	CONCPOL	CONCND	CONFFEMA	CONFEPA	CONFLOC	CONFST	CONFFED	AGE	MEANELEV	FEMACLAIM	CANCRISK	FRS	NUMHAZ
CONCCC	Pearson Correlation	1	.537	.349	.053	.114	-.054	-.138	.147	-.003	-.139	.211	.206	.049	-.207
	Sig. (2-tailed)		.000	.000	.223	.009	.212	.001	.001	.952	.001	.000	.000	.258	.000
	N	542	541	540	535	520	529	536	532	528	542	542	542	542	542
CONCPOL	Pearson Correlation	.537	1	.434	.049	.135	-.091	-.045	.235	.027	-.232	.285	.287	.141	-.285
	Sig. (2-tailed)	.000		.000	.257	.002	.035	.295	.000	.537	.000	.000	.000	.001	.000
	N	541	545	542	538	524	532	539	535	531	545	545	545	545	545
CONCND	Pearson Correlation	.349	.434	1	.033	.075	-.025	-.101	.093	.066	-.112	.185	.179	.072	-.185
	Sig. (2-tailed)	.000	.000		.441	.086	.559	.020	.031	.127	.009	.000	.000	.095	.000
	N	540	542	543	536	523	531	537	533	529	543	543	543	543	543
CONFFEMA	Pearson Correlation	.053	.049	.033	1	.505	.277	.297	.529	.076	-.044	.092	.086	.104	-.090
	Sig. (2-tailed)	.223	.257	.441		.000	.000	.000	.000	.080	.312	.034	.046	.016	.037
	N	535	538	536	539	520	529	536	532	526	539	539	539	539	539
CONFEPA	Pearson Correlation	.114	.135	.075	.505	1	.407	.398	.581	-.046	-.070	.104	.102	.086	-.104
	Sig. (2-tailed)	.009	.002	.086	.000		.000	.000	.000	.300	.110	.017	.020	.050	.018
	N	520	524	523	520	524	517	521	517	511	524	524	524	524	524
CONFLOC	Pearson Correlation	-.054	-.091	-.025	.277	.407	1	.652	.310	.014	.281	-.301	-.308	-.133	.307
	Sig. (2-tailed)	.212	.035	.559	.000	.000		.000	.000	.744	.000	.000	.000	.002	.000

	N	529	532	531	529	517	533	531	527	519	533	533	533	533	533
CONFST	Pearson Correlation	-.138	-.045	-.101	.297	.398	.652	1	.421	.020	.214	-.204	-.214	-.069	.210
	Sig. (2-tailed)	.001	.295	.020	.000	.000	.000		.000	.647	.000	.000	.000	.108	.000
	N	536	539	537	536	521	531	540	535	526	540	540	540	540	540
CONFFED	Pearson Correlation	.147	.235	.093	.529	.581	.310	.421	1	-.008	-.139	.221	.214	.134	-.216
	Sig. (2-tailed)	.001	.000	.031	.000	.000	.000	.000		.861	.001	.000	.000	.002	.000
	N	532	535	533	532	517	527	535	536	522	536	536	536	536	536
AGE	Pearson Correlation	-.003	.027	.066	.076	-.046	.014	.020	-.008	1	.039	.012	.002	.034	-.005
	Sig. (2-tailed)	.952	.537	.127	.080	.300	.744	.647	.861		.363	.788	.956	.433	.915
	N	528	531	529	526	511	519	526	522	532	532	532	532	532	532
MEANELEV	Pearson Correlation	-.139	-.232	-.112	-.044	-.070	.281	.214	-.139	.039	1	-.743	-.823	-.374	.777
	Sig. (2-tailed)	.001	.000	.009	.312	.110	.000	.000	.001	.363		.000	.000	.000	.000
	N	542	545	543	539	524	533	540	536	532	546	546	546	546	546
FEMACLAIM	Pearson Correlation	.211	.285	.185	.092	.104	-.301	-.204	.221	.012	-.743	1	.992	.457	-.998
	Sig. (2-tailed)	.000	.000	.000	.034	.017	.000	.000	.000	.788	.000		.000	.000	.000
	N	542	545	543	539	524	533	540	536	532	546	546	546	546	546
CANCRISK	Pearson Correlation	.206	.287	.179	.086	.102	-.308	-.214	.214	.002	-.823	.992	1	.460	-.996
	Sig. (2-tailed)	.000	.000	.000	.046	.020	.000	.000	.000	.956	.000	.000		.000	.000
	N	542	545	543	539	524	533	540	536	532	546	546	546	546	546
FRS	Pearson Correlation	.049	.141	.072	.104	.086	-.133	-.069	.134	.034	-.374	.457	.460	1	-.464

	Sig. (2-tailed)	.258	.001	.095	.016	.050	.002	.108	.002	.433	.000	.000	.000		.000
	N	542	545	543	539	524	533	540	536	532	546	546	546	546	546
NUMHAZ	Pearson Correlation	-.207	-.285	-.185	-.090	-.104	.307	.210	-.216	-.005	.777	-.998	-.996	-.464	1
	Sig. (2-tailed)	.000	.000	.000	.037	.018	.000	.000	.000	.915	.000	.000	.000	.000	
	N	542	545	543	539	524	533	540	536	532	546	546	546	546	546

APPENDIX D: KENDALL'S TAU CORRELATION MATRIX

		CONCCC	GENDER	POLITICAL	RACEMIN	RACEAA	EMPLOYMENT	CHILDREN	EDUCATION	HAZKNOW
CONCCC	Correlation Coefficient	1.000	.083*	.218**	.261**	.232**	-.075	.004	-.142**	.010
	Sig. (2-tailed)	.	.033	.000	.000	.000	.056	.915	.000	.796
	N	542	542	514	526	526	534	536	538	538
GENDER	Correlation Coefficient	.083*	1.000	.163**	.109*	.126**	-.113**	.021	-.035	-.098*
	Sig. (2-tailed)	.033	.	.000	.012	.004	.009	.630	.417	.023
	N	542	546	517	530	530	538	540	542	542
POLITICAL	Correlation Coefficient	.218**	.163**	1.000	.578**	.587**	-.100*	-.132**	-.123**	.010
	Sig. (2-tailed)	.000	.000	.	.000	.000	.024	.003	.005	.824
	N	514	517	517	508	508	512	513	514	513
RACEMIN	Correlation Coefficient	.261**	.109*	.578**	1.000	.897**	-.069	-.043	-.189**	.006
	Sig. (2-tailed)	.000	.012	.000	.	.000	.114	.319	.000	.898
	N	526	530	508	530	530	526	528	527	526
RACEAA	Correlation Coefficient	.232**	.126**	.587**	.897**	1.000	-.061	-.051	-.175**	.010
	Sig. (2-tailed)	.000	.004	.000	.000	.	.162	.241	.000	.814
	N	526	530	508	530	530	526	528	527	526
EMPLOYMENT	Correlation Coefficient	-.075	-.113**	-.100*	-.069	-.061	1.000	.274**	.242**	-.050
	Sig. (2-tailed)	.056	.009	.024	.114	.162	.	.000	.000	.249
	N	534	538	512	526	526	538	536	537	534
CHILDREN	Correlation Coefficient	.004	.021	-.132**	-.043	-.051	.274**	1.000	.040	.036
	Sig. (2-tailed)	.915	.630	.003	.319	.241	.000	.	.350	.410
	N	536	540	513	528	528	536	540	536	536

EDUCATION	Correlation Coefficient	-.142**	-.035	-.123**	-.189**	-.175**	.242**	.040	1.000	-.019
	Sig. (2-tailed)	.000	.417	.005	.000	.000	.000	.350	.	.666
	N	538	542	514	527	527	537	536	542	538
HAZKNOW	Correlation Coefficient	.010	-.098*	.010	.006	.010	-.050	.036	-.019	1.000
	Sig. (2-tailed)	.796	.023	.824	.898	.814	.249	.410	.666	.
	N	538	542	513	526	526	534	536	538	542

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

VITA

Heather Marie Brown was born in Cape Coral, Florida. She graduated from Florida State University in 2010 with a Bachelor's of Science in biological sciences and a minor in chemistry. She then attended Louisiana State University from 2012 to 2015 to pursue a Master's in environmental science with a concentration in planning and management. While a graduate student within the Department of Environmental Sciences, Heather was a GIS intern at the Baton Rouge City-Parish Planning Commission from September 2012 to January 2013. She also held a graduate assistantship as a recruiter for the Coastal Environmental Science undergraduate program within the School of the Coast and Environment at LSU from January 2013 to May 2015. She was an active member of the Coast and Environment Graduate Organization and held position of social chair of the organization from 2013-2014. She presented her research at Graduate Climate Conference through the University of Washington in Eatonville, Washington in October 2014. Heather will graduate from Louisiana State University in May 2015.