GC-HART

GULF COAST - HEALTH ALLIANCE ACHIEVING RESILIENCY THROUGH RESEARCH TOGETHER

Gulf Coast Health Alliance: achieving Resiliency Together (GC-HART)

A Communications and Engagement Plan Prepared for Texas OneGulf Leadership

August 31, 2019

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T·E·X·A·S ONEGULF Center Of Excellence *Science Driving Solutions*

utmb Health Sealy Center for Environmental Health & Medicine

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The goal of Texas OneGulf is to become a trusted source of scientific information about the Gulf of Mexico. To accomplish that goal, Texas OneGulf and its Texas OneGulf Network of Experts (TONE) must develop strong lines of communication with stakeholders and provide them with scientific information that stakeholders find useful to address Gulf of Mexico-related issues and crises as identified in the Texas OneGulf *Strategic Research and Action Plan* (2017). This goal prompted the Texas OneGulf Center of Excellence to invite proposals for a project to develop a communication and engagement plan to help Texas OneGulf interact effectively with Gulf of Mexico policy- and decision-makers, as well as other stakeholder groups. This proposal was selected to provide the basis for the desired stakeholder communication and engagement plan as awarded through a grant mechanism: RESTORE Centers of Excellence: Stakeholder Communication and Engagement Plan, Grant No. 582-15-57594, GAD No. 7-582-18-84395.

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Project Synopsis

The "Gulf Coast Health Alliance: achieving Resiliency Together," engaged diverse groups, including academic clinicians and scientists, community organizations, industry representatives, local and regional authorities, emergency response officials, and policy-makers involved in disaster preparedness, response, and resiliency. The concept of building and consistently engaging an environmental health network provided the infrastructure for this proposal. The aims have been to: 1) provide a stakeholder analysis, with emphasis on policy- and decision-makers; 2) solicit broad-based perceptions of issues and threats related to the Gulf; 3) analyze the ability of Texas OneGulf and the Texas OneGulf Network of Experts (TONE) to address these issues; and 4) develop a communications and engagement plan for Texas OneGulf. We have assessed issues related to the research priorities of Texas OneGulf as aligned with the components of the Integrated Socio-Ecological System for the Gulf, i.e., ecosystem status/living marine resources; human wellbeing and activities; habitat; social systems; climate and ocean drivers/environmental flows; pressures and stressors; and social factors. Our activities included convening TONE members to determine their priorities for research and the future direction of Texas OneGulf as well as soliciting quantitative and qualitative data from experts individually and in groups. We conducted focus groups including commercial and sports fishermen, recreational Gulf users, and those who work in the Gulf, and we carried out key informant interviews with governmental and health policy- and decision-makers, first responders, and the media. We have also developed comprehensive communications recommendations and plans that match gaps and research priorities with TONE skills and resources. It is our hope that these recommendations will inform research, policy, interventions, and funding priorities for OneGulf and the Gulf Coast.

Introduction

In Pursuit of a Resilient Gulf Coast

The Gulf of Mexico and her bordering states—America's celebrated Third Coast—represent a national treasure, rich with abundant water, fertile soil, teeming fisheries, beautiful beaches, and plentiful oil and gas. Consequently, the area has given rise to a vibrant economy supported by vast industrial complexes, on- and off-shore gas and oil exploration, robust foreign trade, several of the busiest ports in the world, a bustling tourist industry, extensive agricultural holdings, and both commercial and recreational fishing. The aerospace industry finds its home here, and the region is quickly becoming an important growth center for Technology. Due to its port enterprises and the energy industry's exploration and production efforts, the Texas coast serves as a main trade hub and leading energy producer for the nation. Texas ports also provide tremendous economic benefit to the state at $368 billion, representing approximately 23% of the total state gross domestic product. Texas provides more than one-fifth of the energy produced in the nation, including 30% of the U.S. production of crude oil and 25% of the nation's identified natural gas resources. Most of the state's refineries are located near port cities, and two liquefied natural gas import terminals are located in the coastal region. In total, the Texas coastal region accounts for approximately 24% of the state's population, 23.5% of the state's businesses, 26% of the state's workforce, and brings in 29% of the state's total annual average wages (Texas General Land Office, 2019). According to the U.S. Bureau of Economic Analysis and the World Bank, if Texas were a country, its economy would rank as the world's 10th largest. Unsurprisingly, therefore, Texas has also seen unprecedented growth in population and jobs. The thirteen-county Texas Gulf Coast Region's total population in 2017, at more than 7 million people, represents an increase of nearly 1 million since the 2010 census (Texas Comptroller of Public Accounts, 2019).

However, such development, let alone at such a rapid pace, is not without risk nor cost. The Gulf and her coastal communities have suffered the effects of both natural and manmade disasters, rising water, storm surges, and tropical weather systems. The Texas OneGulf Center of Excellence was born as a result of the Deepwater Horizon oilrig tragedy and its subsequent unprecedented oil spill. Its nine-member consortium of Texas research institutions represents expertise in marine sciences, human health, sociology, economics, law, and policy. OneGulf was established by the Resources and Ecosystem Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States (RESTORE) Act, which is funded by the Deepwater Horizon administrative and civil penalties, as well as funds from the Governor of Texas that were provided by British Petroleum to the State of Texas. With a mission to improve understanding of the Gulf of Mexico's large marine ecosystem and its effects on human health for the betterment of both, OneGulf offers the opportunity to utilize its considerable resources to foster a resilient and healthy Gulf and Gulf Coast. An important resource for achieving these goals lies in the Texas OneGulf Network of Experts (TONE), a body of over 160 experts. The overarching purpose of this project is to assist OneGulf leadership with plans to improve communications and engagement with Gulf of Mexico policy- and decision-makers, as well as other stakeholder groups. We seek to increase

awareness of opportunities for TONE members to improve the ability of decision-makers to implement science-driven solutions by fostering collaboration, encouraging engagement across our entire stakeholder group, building strong data management capabilities, and supporting the development of a baseline and long-term monitoring strategy.

Texas OneGulf *Strategic Research and Action Plan*

The work in this study builds upon the initial OneGulf *Strategic Research and Action Plan* (*SRAP*), developed in 2016-2017 as a collaborative effort of multiple Gulf stakeholders (Texas OneGulf, 2017). The *SRAP* was developed using a framework that solicited input from stakeholders and included analysis of twelve existing strategic plans that were chosen based on their relevance to the Texas coast as well as being current enough to include insight into the Deepwater Horizon disaster. Within these plans, 211 individual priorities were identified and categorized into a group of 10 broad themes, which served as the context for eliciting further information from stakeholders regarding priority areas and needs for research within the Gulf of Mexico region. A series of meetings was held for this purpose including Texas OneGulf Consortium Leadership, the Texas OneGulf Science Advisory Committee, the TONE membership, representatives from several environmental and public-health related NGO's, Texas state environmental and human-health agencies, non-consortium academic institutions, Gulf-related businesses, and other stakeholder groups. The *SRAP* was drafted, with extensive input and vetting from the public and stakeholder groups, and was ultimately released at the State of the Gulf of Mexico Summit in Houston in 2017 prior to finalization. In keeping with the requirements of the RESTORE Act, OneGulf, like its fellow Gulf of Mexico Centers of Excellence, focuses on coastal sustainability, restoration and protection; fisheries and wildlife research and monitoring; safe offshore energy development; sustainable and resilient economic growth; and comprehensive Gulf of Mexico observation, monitoring and mapping.

From this extensive stakeholder research emerged two strategic research goals, each with multiple priority research areas:

Strategic Goal 1: Improve understanding of the Gulf of Mexico as a large marine ecosystem

Priority Research Areas:

- Habitats: Understand quantity, quality, function, and connectivity among coastal habitats and their importance in environmental health and ecosystem service provisioning.
- Living Marine Resources: Understand the condition and interdependence of populations of living marine resources (i.e., fisheries, marine mammals, sea turtles, and many others), and identify and measure threats (i.e. marine debris, vessel strikes, invasive species, climate change, ocean acidification, etc.) to healthy populations, communities and biodiversity.
- Environmental Flows: Understand the relationships among quality, quantity and timing necessary to manage freshwater inflows and the movement of nutrients

and sediments to alleviate conflicts among users and mitigate negative impacts on environmental and human health.

- Estuarine and Coastal Environments: Improve understanding of the biological, physical and chemical processes that comprise the ecosystem starting at the input of rivers continuing out to the continental margins and beyond.
- Offshore and Deep Gulf: Improve understanding of the large-scale biological, physical, and chemical processes that define the offshore and Deep Gulf environments beyond the continental shelf and the implications for environmental and human health.
- Socio-Ecological Systems: Develop a comprehensive understanding of the interactions among a coupled socio-ecological system to improve community resilience, understand vulnerabilities/risks to environmental stressor/ disturbances, and further understand the provisioning of ecosystem services.
- Pressures and Stressors: Understand the human activities and natural processes that act as stressors such as climate change, relative sea level rise, habitat loss, hydrographic/hydrologic changes, effects of land use, coastal development, and others that impact the ability of the Gulf of Mexico large marine ecosystem to support thriving human and ecological communities.

Strategic Goal 2: Improve understanding of the connections between environmental and human health to benefit both

Priority Research Areas:

- Human and Environmental Health: Understand and make explicit the connections between human health and water/air quality, seafood safety/sustainability, human nutrition, natural/man-made disturbances/disasters, and waterborne, disease-causing pathogens to benefit human health and well-being.
- Environmental Stressors and Individual Health: Understand the human body, its' functions, pathways and systems that are vulnerable to the effects of environmental stressors.
- Environmental Stressors and Public Health: Understand the complex interactions that drive and contribute to environmental health disparities by understanding the effects of environmental stressors at the community level.
- Mental Health: Understand that environmental health supports healthy social systems and can have profound impact upon mental health for those people affected by environmental disasters/disturbances/stressors.
- Community Resilience: Understand the links between healthy social systems and a healthy environment including the drivers of community resilience, vulnerability, and human well-being.

Texas OneGulf also established Strategic Actions and Principles including Collaboration, Communication and Engagement, Data Management, Baseline and Long-Term Monitoring, and Capacity. The Research Priorities and the desired Strategic Actions were utilized to drive development of funding mechanisms for a number of OneGulf Initiatives in the first several years of funding.

Network Foundation

Gulf Coast Health Alliance: achieving Resiliency Together (GC-HART)

The foundation for this project is the belief that a fundamental need exists for a sustainable Gulf Coast network for the promotion of coastal resiliency. Our own journey to this realization, which spans a number of years and events across the Gulf Coast, began with Hurricane Katrina, followed by Hurricane Rita, which roared ashore just a few short weeks later. The UTMB Sealy Center for Environmental Health and Medicine (SCEHM) collaborated with community, other academic, and governmental entities to provide a comprehensive needs assessment and humanitarian response to the environmental crises engendered by the massive flooding and population displacement triggered by the storms. This series of events led to the National Institute of Environmental Health Sciences' (NIEHS) focus on disaster preparedness, response, and ultimately, timely and appropriate disaster research. As a NIEHS-funded P30 Center, with a number of long-standing partners, UTMB began to engage in efforts to promote a unified approach to disaster preparedness, response, and resiliency, establishing an informal network of diverse groups and organizations, including academic clinicians and scientific investigators, community and volunteer groups, industry, local and regional authorities and emergency response officials, and policy makers. With financial support from a Center pilot project, Center staff conducted environmental health needs assessments in multiple coastal communities affected by the storms and facilitated sharing of best practices from a community perspective.

The relationships formed as a result of the hurricane response and needs assessment provided the foundation for the Gulf Coast consortium and Community-Based Participatory Research proposal that was initiated following the 2010 Deepwater (DWH) Horizon disaster and subsequent oil spill. The SCEHM used a Community Science Workshop framework to plan and develop a research program that included > 20 community organizations in discussions of human health concerns related to consumption of seafood exposed to oil. This led to development of a consortium and a $7.85 M NIEHS-funded proposal (Elferink and Croisant, Co-PIs), the Gulf Coast Health Alliance: health Risks related to the Macondo Spill (GC-HARMS) study. The Alliance included multi-disciplinary, multi-institutional academic partners and involvement of six Gulf Coast communities. GC-HARMS enrolled >400 individuals for a 4-year longitudinal study to monitor the health of subsistence fishing communities impacted by the spill. As a function of this project, we engaged in outreach and engagement activities across the Gulf States, not only for our own research study, but with and on behalf of the other consortia studies that were ongoing at the time. Our task was to ensure that all science conducted related to the spill was made accessible to our audiences. We found over time that knowledge empowered effective decision making at many different levels—individual choices governing exposure, as well as policy and regulation. Our hope is that the findings yielded here will similarly inform decision-making. Our results indicate both a need and a desire for improved communications mechanisms and coordination and integration of activities across multiple disciplines and venues. Texas OneGulf is perhaps uniquely suited to serve as the nexus for a Gulf alliance that would not only bridge gaps between and among academia, policy, government, and the private sector, but also bring to bear the considerable expertise of the TONE membership in doing so.

Study Objectives

We embrace the concept of an Integrated Socio-Ecological System for the Gulf as described by Karnauskas et al. (**Figure 1**; 2017). This collaborative team of NOAA investigators, resource managers, and local community members are pioneering the use of an Integrated Ecosystem Assessment (IEA) approach to provide ecosystem science and management advice to natural resource managers. The goal of the Gulf of Mexico IEA is ecosystem management that delivers societally desired and sustainable levels of ecosystem services. This project is one global initiative toward Ecosystem-Based Management as an approach to safeguard marine ecosystems and services. As coastal populations continue to grow across the Gulf, the demand for access to benefits—and risk of resource depletion and/or damage—is increasing. The Socio-Ecological System implies that in order to sustain ecosystem services, it is important to first understand and protect the environments from which they are derived. As observed in **Table 1**, identified ecosystem components align well with the Research Priorities/Themes of Texas OneGulf as described in the *SRAP* (Texas OneGulf, 2017).

Table 1: Socio-Ecological System Components and SRAP Themes

Components and Themes	**Specific Areas of Focus**
Ecosystem status/living marine resources	Marine mammals, sea turtles, seabirds, protected species, species interactions, primary productivity, and fish abundance
Issues of human wellbeing	Social services, basic needs, economic security, health, education, safety, social connectedness, environmental stressors, mental health, public health, community resilience
Human activities	Fishing, farming, water use, recreation, research, management, and energy extraction
Habitat	Marine, freshwater, seagrass, oyster, estuaries, artificial habitat, offshore and deep Gulf
Social Systems	Law and policy, economic institutions, and political systems
Climate & Ocean Drivers/ Environmental Flows, Pressures & Stressors	Climate, sea-level rise, ocean currents, and hurricanes
Social Factors	Population growth, tourism, and economic patterns

Figure 1: Socio-Ecological System of the Gulf

Conceptual Model of the Gulf of Mexico Socio-Ecological System developed by the NOAA Integrated Ecosystem Assessment Team (Karnauskas et al., 2017).

The current study also includes a series of activities to collect both qualitative and quantitative data from broad-based stakeholders across the Gulf Coast regarding perceived concerns, issues, priorities, and opportunities for action, research, and policy, particularly as they are aligned with the research priorities of Texas OneGulf as described in the *SRAP.* By focusing on these issues, we sought to match identified gaps and research priorities with the skills and resources available through the TONE and thus develop a series of recommendations that could provide inference for research, policy, interventions, and funding priorities for Texas OneGulf and the Gulf Coast in moving forward. The specific objectives of this project have been to:

1. Provide a stakeholder analysis, with special emphasis on policy- and decision-makers
2. Solicit broad-based stakeholder perceptions of the short- and long-term issues and threats related to the Gulf
3. Analyze the ability of Texas OneGulf and the Texas OneGulf Network of Experts to help address these issues
4. Develop a comprehensive communications and engagement plan for Texas OneGulf, based upon findings

Specific tasks that support the above objectives include:

Task: Review existing data sources including, but not limited to the *NOAA Gulf of Mexico Ecosystem Status Report* (Karnauskas, 2017), the Gulf of Mexico Alliance *Governors' Action Plan III for Healthy and Resilient Coasts* (Gulf of Mexico Alliance, 2016), the Texas General Land Office's *Texas Coastal Resiliency Master Plan 2019* (GLO, 2019), and the Gulf of Mexico Research Initiative's Information and Data Cooperative (GRIID), to identify additional and potentially broader issues and priorities to inform survey development.

Task: Develop a broad-based database inclusive of individuals and groups representing the Texas One Gulf research themes as described in the *Strategic Research and Action Plan.* This database was used as the basis for distribution of the survey of resilience, preparedness, and prioritization of research and policy initiatives.

Task: Deploy surveys online to the expanded GC-HART membership and database to prioritize previously identified issues, concerns, risks, and priorities for Gulf Research and to identify additional topics, with particular emphasis on policy recommendations.

Task: Convene a series of meetings with TONE members (Galveston, Corpus Christi, College Station) to determine priorities and gaps in research related to: Gulf status and trends, risks and threats, mitigation and adaptation, and recommendations for policy.

Task. Hold focus groups in coastal communities for commercial and recreational fishermen, recreational Gulf users, and those who work in the Gulf, in Galveston and Corpus Christi, Texas and Baton Rouge, Louisiana. Focus groups are used to overcome communication barriers including literacy and language.

Task. Key informant phone interviews were conducted with: 1) Members of the Texas State Government from Coastal counties, 2) Health and Policy makers from government and municipal agencies, 3) Incident Command representatives, and 4) the Media.

Methods

Institutional Review Board

We prepared an Institutional Review Board Protocol, which was reviewed by UTMB's IRB and determined not to meet the definition of research.

Qualitative Review of Existing Documents

Thematic analysis is the process of identifying patterns or themes within qualitative data. Qualitative research within this project comprised two main activities. The first involved a synthesis of priorities, recommendations and actions from relevant existing documentation and reports, and the second involved the same type of analysis of the key informant interviews and focus group discussions. This work builds upon the Texas OneGulf Center of Excellence *Strategic Research and Action Plan*, which synthesizes priorities into broad categories. The overall purpose of a thematic analysis is to identify common themes, i.e., patterns in the data that are important or interesting and then to use these themes to address a research question. A much more valuable exercise than simply summarizing the data, a thematic analysis interprets and makes sense of it. In

this case, we sought to gather data from many different sources, to identify issues, priorities, and recommendations as they relate to Texas OneGulf Center priorities, then further categorize recommendations into action areas for Texas OneGulf. As will be seen, some recommendations are very specific while others are less so. Many, if not most, provide opportunities for TONE contributions. In addition to the *SRAP* document, the analysis included:

- *NOAA Gulf of Mexico Ecosystem Status Report* (Karnauskas, 2017)
- *Governors' Action Plan III for Healthy and Resilient Coasts* (Gulf of Mexico Alliance, 2016)
- *Texas Coastal Resiliency Master Plan 2019* (Texas General Land Office, 2019)
- *Eye of the Storm* (Governor's Commission to Rebuild Texas, 2018)

In creating this report, we used a multi-step inductive analysis (i.e., through reading of documents, themes arose organically). We then took all listed priorities/actions within the documents and ordered them around reoccurring ideas. We found that across the documents a thematic organization around action-verbs made sense, that is, organizing content around the activity to be undertaken rather than the discipline that it related to. Within these groupings, we then created sub-themes around discipline/content areas. This allows for more efficient cross-collaboration and planning, as well as use of resources, expertise, and equipment. From this first analysis, we then took a two-step approach to analyze the focus group and interview data. The first step involved coding focus group and interview data deductively to the themes generated from the documentary analysis. As we ordered data around the action-verb themes, we identified dominant narratives as sub-themes. In the second step, we inductively analyzed the focus group and interview data anew. This involved analyzing themes within this data independent of the previous analysis and again identifying dominant narratives across respondents.

Development of the Survey Distribution Database

We sought input from wide and diverse communities related to issues associated with coastal sustainability, restoration and protection; coastal fisheries and wildlife ecosystems; sustainable offshore energy resources; growth, economic and commercial development; and, observation, monitoring and mapping. We then compiled a surveillance database representing: TONE, Policy (Health Policy, Policy and Law, and Federal, Regional, State and Local Agencies); First Responders (Health Care Coalitions, Emergency Transport, Hospital and Clinical Facilities, Incident Command, and Industry); the Business Community (Industry, Ports, Commercial Cruise lines, Seafood Processors, Wholesale and Retail Marketers, and Commercial Fishermen); the Media (Television, Press, Radio, Social Media); the Scientific Community engaged in Human Health Research (Epidemiology, Risk Assessment, Toxicology, Exposure Science, Mental Health, Modeling and Mapping); the Scientific Community engaged in Marine Science research; Communities, NGO's and municipalities; and Clinical and Public Health Practitioners. Our existing partners and contacts were queried to elicit suggestions of other participants for the network and survey we were developing. This input helped ensure representation related to each of the aspects of the Integrated Socio-Ecological System described above. This "purposive sampling" is a non-

probability sampling technique, which focuses on characteristics of interest in a population. We employed "expert sampling," a variation of the purposive sampling technique used to glean knowledge from individuals with particular expertise. Categorical inclusion is detailed in **Table 2**.

Elaboration on what was done to Compile the Survey Distribution Database

The UTMB Sealy Center for Environmental Health and Medicine was initiated in 1997, and its Engagement Core established in 1999. The UTMB team thus has >20 years of experience in leading community-engaged research and outreach, and community engagement in response to environmental health issues experienced by Gulf Coast communities. Consequently, they have amassed a large network of contacts, both formal and informal. The team has been heavily involved in facilitating research partnerships and translating and disseminating environmental health information and research findings, including regarding emergent environmental concerns. In situations such as the Deepwater Horizon disaster in 2010, the aftermath of the Hurricane Ike storm surge in 2008, and Hurricane Harvey's flooding in 2017, the community relied upon academic investigators for assessment of risk and safety. We have therefore established and maintain a robust engagement network, having founded enduring relationships with local, state, and regional groups interested in developing or understanding research to drive community interventions and policies.

Over the years, we have established various mechanisms for engaging stakeholders, all of which have supported development of this database. We have maintained contact and good relations with our GC-HARMS Consortium, which spans the Gulf States and includes many community organizations. In 2014, Croisant founded the Research, Education, And Community Health (REACH) Coalition of Galveston County to facilitate institutional research and service efforts between community leaders and UTMB scientists representing multiple Centers and Institutes, to eliminate silos, thus leveraging time, funding, and efforts. To date, 23 UTMB Centers and Institutes and 39 community organizations are members, including public and mental health agencies, clinicians, policymakers, cultural and faith-based organizations, and local schools and colleges. Importantly, one member represents 34 non-profits, including two United Way chapters, representing dozens of additional health and social services agencies. We also employ a mechanism called the Community Science Workshop (CSW), which is a framework of engagement we use based upon the European Union's "Science Shops," that pairs scientists and community members to identify or discuss research needs, co-frame research questions, and design scientifically rigorous community-based research projects to inform public and public health policy. Since 2008, we have conducted 27 CSWs across the Gulf Coast, with an overall attendance of 1860. The SCEHM used a CSW framework to plan and develop GC-HARMS. We have also conducted events called "SCI Cafés" (where Science and Communities Interact) since 2013, where scientists and trainees informally dialogue with community members regarding science and medicine, thus directly translating research to the community while increasing ability to communicate with a lay audience. We have completed 56 SCI Cafés locally (typically monthly), involving 1708 attendees. Depending upon venue and topic, attendance has ranged from ~20 to >100.

Since 2017, when we first developed the proposal for this grant, we began soliciting categories for inclusion in the survey list as well as the names of key individuals. We introduced the project at multiple meetings and asked attendees to provide suggestions. TONE members were asked, of course, and everyone in attendance at our regular meetings was asked to provide additional input or to forward the survey to someone who might provide valuable information. Each individual who received an email link received an invitation explaining the purpose and importance of the project, and each hard copy mailed included a personalized letter.

Table 2: Synopsis of Categories included in Survey Distribution Database

Area of Expertise	General Category of Representation	Category	Total
Texas OneGulf	TONE	268	268
Policy	Health Policy	5	436
	State Law and Policy: Texas Senate	31	
	State Law and Policy: Texas House	150	
	Coastal City Managers and Staff	156	
	Coastal County Commissioners	94	
Federal Agencies	NIEHS	27	54
	US Army Corps of Engineers	3	
	US EPA	24	
Regional Agencies	HHS Region IV	6	51
	HHS Region VI	7	
	EPA Region IV	13	
	EPA Region VI	9	
	EPA Gulf of Mexico Program	16	
State Agencies	Office of the Governor	37	128
	TX Council of Governments	25	
	TX Department of State Health Services	7	
	Texas Parks and Wildlife	18	
	TX Commission on Environmental Quality	13	
	TX Workforce Commission	6	
	TX General Land Office	7	
	Gulf Coast Authority (Water)	15	
Research Initiatives	NASEM	15	227
	Gulf of Mexico Research Initiative	19	
	Gulf of Mexico Alliance	31	
	LA Sea Grant	37	

Area of Expertise	General Category of Representation	Category	Total
	MS-AL Sea Grant	40	
	Texas Sea Grant	27	
	Coastal Sea Grant Advisory Bd.	40	
	L. Livermore National Lab	2	
	National Weather Service	1	
	Houston Advanced Research Center	15	
Disaster Preparedness	SE TX Regional Advisory Council (SETRAC)	15	45
	Galveston County	7	
	SETRAC Advisory Board	23	
Business/Industry	Petrochemical Processing	53	231
	National Ocean Industries Association	41	
	Independent Petroleum Assn. of America	20	
	LA Mid-continent Oil and Gas Association	11	
	Texas Oil and Gas Association	10	
	Texas Ports Association	35	
	Cruise lines	2	
	Houston Galveston Area Council (HGAC): Local Development Corporation	19	
	HGAC Workforce Board	40	
Fisheries	LA Oystermen	1	165
	Vietnamese Fishing Community	2	
	Gulf of Mexico Fishery Mgmt. Council	52	
	Gulf Seafood Institute	10	
	Texas Coastal Conservation Association	100	
	Subtotal	165	
Media	Print, Radio, and TV	26	26
Public Health	TX Coastal Public Health Departments	22	100
	LA Coastal Public Health Departments	34	
	MS Coastal Public Health Departments	12	
	AL Coastal Public Health Departments	8	
	Indian Health Services	24	
Community	Non-profit Organizations	53	53
Grand Total			**1784**

Survey Creation

The questionnaire includes original questions as well as questions abstracted from validated questionnaires, including the "Communities Advancing Resilience Toolkit" (CART) (Pfefferbaum et al., 2013) and the "Climate Change and the Coast: Coastal Professional Opinion Survey," which was prepared for the New Jersey Climate Adaptation Alliance by Rutgers University, the Jacques Cousteau National Estuarine Research Reserve, and the Monmouth University Urban Coast Institute (NJCAA, 2013). The CART assessment survey is a field-tested instrument that has been used and tested for validity and reliability worldwide, which assesses a community's resilience across four domains: Connection and Caring, Resources, Transformative Potential, and Disaster Management. The instrument also explores respondents' personal relationships to their community and collects standard demographic information. The CART survey design encourages the addition of other items and/or domains suggested by the authors, such as faith-based belief in the community and communications and trust, both of which we employed. Each of these is discussed in more detail in the Results section of this report. CART survey results typically provide only a snapshot of strengths and challenges for communities described by participants. The survey is intended to be a component of a more extensive assessment of community resilience to disasters or other adversities as a means of stimulating communication, analysis, and action, and is usually followed by key informant interviews and community conversations. It is for this reason that we employed more qualitative methods of data collection to provide context and detail through focus groups and key informant interviews of stakeholders.

Communities Advancing Resilience Toolkit: Understanding the CART Domains

The ***Connection and Caring Domain*** includes a sense of relatedness, shared values, participation, support systems, and equity. This sense of belonging and commitment to one's community may be enhanced by the perception that the individual's personal well-being is maximized by affiliation with the community. Individuals who participate in community organizations and activities can increase their sense of belonging, ownership, and personal investment, and communities that actively foster the involvement of its members may better identify and address issues through collaboration and civic engagement. Such supportive communities not only nurture the needs of their diverse and vulnerable populations but also can provide hope and encouragement during times of crisis (Pfefferbaum et al., 2013).

The ***Resources Domain*** includes natural, physical, information, human, social, and financial resources. Perhaps unsurprisingly, more resilient communities have access to, possess, and use resources in an effective manner to best serve their constituents and the community at large. A community's resource base should be diverse and plentiful enough during duress or in the event of major disruption to permit the continuation of community operations. During a disaster, infrastructure and designated roles and responsibilities can create the capacity for preparedness and decisive, timely response to crises (Pfefferbaum et al, 2013).

The ***Transformative Potential Domain*** includes the ability of communities to identify and frame collective experiences, examine their successes and failures, assess their performance, and engage in critical analysis. You might say it's how well the community deals with the necessity of developing or utilizing a "Plan B." The ability to engage in this kind of comprehensive analysis can assist leadership with establishing objectives and making decisions, as well as developing and implementing strategies to not only deal with the current situation but to plan for a better future. This should be combined with skill building at individual, family, organizational, and systemic levels, as well as critical analysis and collective action, all of which will provide the force and essential mechanisms for transformation.

The *Disaster Management Domain* includes disaster prevention and mitigation, preparedness, response, and recovery. It includes activities at all stages of a crisis: to avoid or control a disaster, to reduce hazards or risks to both people and property, and lessen actual or potential adverse effects in the event that a disaster occurs. Mitigation, for example, seeks to decrease the likelihood of, exposure to, or loss from hazardous exposures if measures are taken before, during, or after an incident. Preparedness is a continuing process that identifies threats, assesses vulnerabilities, determines resource requirements, plans appropriate actions, and assembles necessary resources. Disaster response deals with the short-term effects of an incident including efforts to limit damage during or immediately after a disaster. This usually involves support of basic human needs and maintaining or restoring the affected community to basic functioning status. The relatively short-term response phase transitions to a longer period of recovery and reconstruction (Pfefferbaum et al., 2013).

Communication, Information, and Trust (suggested as an addendum to the original CART assessment) are critical to a community's ability to cope with disaster, and thus vital components of community resilience. If information is not relayed by a trusted and valued member of the community, adherence to public recommendations and directives may be poor. During times of low stress as well as during disasters, communication should be clear, accurate, timely, and effective among community members, between authorities and community members, and across community boundaries (Pfefferbaum et al., 2007, Pfefferbaum et al., 2015). This will increase both trust and resilience at a community level, facilitate the identification and resolution of needs, and enable the expression of opinions by community members. It may also encourage local stakeholders to become involved in community problem solving and to foster trust in leadership and decisions made (Pfefferbaum et al., 2015).

While not a domain per se, ***Faith-Based Community Renewal*** is an assessment of the eight major elements that Community Renewal International (CRI) has identified as the key components of society: Mutually Enhancing Relationships, Housing, Safe Environment, Healthcare, Education, Culture of Caring, Leadership System, and Meaningful Work. CRI is a faith-based, non-profit organization founded in 1994 that serves as an international model for community renewal by working citywide to unite individuals, faith groups, businesses, civic groups and others as caring partners in building stronger cities. Emphasis and effort are placed upon creating safe and healthy neighborhoods. These eight elements are a part of a macro evaluation that measures community-wide impact (CRI, 2019; Pfefferbaum, et al., 2016).

Interrelatedness of Domains and Shared Properties

The four community resilience domains are interconnected and have some overlapping properties. Communication is an important element of all four domains. It is a mechanism for fostering connection and caring, and communication channels are an important part of a community's resource base. Communication is vital to relay information that enables critical reflection, skill building, and transformation and fundamental for effective disaster management. Faith-Based Community Renewal speaks to those characteristics that define a resilient community. It has infrastructure and services, as well as good housing, transportation, power, water, and sanitation. It should be able to maintain, repair, and renovate them as well. It has economic opportunities for all, including diverse employment opportunities, income, and financial services. It has opportunities for all to learn, to grow, to lead, and to feel safe among people that they like and trust (Pfefferbaum et al, 2013; Pfefferbaum et al., 2015).

The CART model makes the assumption that communities who have higher levels of competence in each of the four domains may be more effective at responding to and/or mitigating the harmful effects of disasters or other crises. Communities with more or redundant resources would be expected to better handle the loss of infrastructure or services, and a very tight-knit, highly engaged community may better prepare for and respond to a disaster than one in which members share few interactions or values. Redundancy in emergency and human services and an accessible support system are likely to improve disaster management even if they were not established specifically to address disasters. The CART is one means, and a simple one at that, to begin to identify the most perceived areas with room for improvement. As stated, it should be buttressed by a more detailed and contextual analysis.

The Rutgers/ NJCAA Study was selected due to its numerous similarities to this particular research area of focus. In the aftermath of Hurricane Sandy, leaders representing and serving New Jersey's coastal communities were asked to participate in one of two activities, either a series of discussions or completion of an online survey to assess New Jersey's coastal communities' most pressing concerns resulting from climate change, and to help to prioritize a set of program, planning and policy adaptations that would be necessary to prepare for and mitigate their impacts. Major categories of stakeholders included in the "Coastal Community" sector were Mayors, Committee Persons, Municipal Administrators and Clerks, Land Use Planners, Planning/Zoning/Land Use Board and Environmental Commission Members, local and county Emergency Managers, Construction Code Officials, Public Works Officials, Floodplain Managers, Storm water Managers, municipal and county Engineers, and various county-level administrators and staff. We selected this instrument in large part because the components that focused on assessment and prioritization of many of the issues that faced the East Coast in the aftermath of Hurricane Sandy are the same types of issues that have faced the Gulf Coast in the aftermath of Hurricane Harvey.

Final Survey Composition

We also included a number of original questions, specific to the Texas Coast or Texas OneGulf. Our compiled survey thus included sections on:

- Demographics
- Core Community Resilience Items
- Disaster Response
- Employment
- Climate Change
- Impacts related to the Environment, Natural Resources, and Emergency Management
- Impacts related to the Infrastructure, Private Property, Economic Activity, and Vulnerable Populations
- Hurricane Harvey Impacts
- Desired Actions or Projects in Preparing for Climate Change Impacts or Rising Water
- Relative Importance of Coastal Community Stressors
- Importance of Issues for Driving Policy for Gulf Coast Communities
- Importance of Issues for Driving Research for Gulf Coast Communities

Survey Deployment

The survey was completed and content assessed for readability. It was shared with stakeholders, including the REACH Executive Committee and SCEHM leadership for feedback, then loaded into RedCap, following which it was deployed online and pilot tested for one week to ensure there were no technical difficulties. Our contact list for survey invitations included 1784 potential respondents. Upon deployment quite a number of the original 1784 deployed surveys were indicated to be undeliverable, some due to the fact that the database had been two years in the making and some emails were now outdated (e.g., some elected officials' email addresses had changed based upon recent election results). We updated this list, and redeployed surveys accordingly but were unable to correct contact emails for ~160 potential respondents. In addition, many elected officials' emails are form-type emails for "gate-keeping," and so we are unsure whether they actually received the email invitation to participate in the survey. Of the 1784 potential respondents, 143 were sent paper copies of the survey, as no email was available. Follow-up emails were sent to non-respondents at one-week intervals. A total of three reminders were sent.

Stakeholder Perceptions

TONE Meetings

To facilitate maximum attendance and to reduce the burden on TONE members, Drs. Croisant and Wowk determined to hold meetings in Corpus Christi, College Station, and Galveston, since a considerable number of TONE members reside and work in each location. In preparation for these meetings, Drs. Croisant and Wowk held a series of telephone planning calls to discuss the agenda, objectives for the meetings, and preparation of background materials that would be useful in guiding discussions. To ensure that their own assumptions were consistent with the expectations of likely attendees and refine the agendas accordingly, they held two teleconferences, i.e., one with Galveston representatives on January 16th and a second with College Station

representatives on January 17th. Dr. Wowk spoke with colleagues in Corpus Christi in person. A letter outlining the expectations of the meeting, along with the agenda and supporting documentation, including reports of previous TONE meetings and outcomes were finalized and distributed prior to each of the meetings to facilitate discussion. Sign-in sheets for the meetings in Galveston, College Station, and Corpus Christi were included. Meetings in Galveston and College Station were held during a working lunch. The meeting in Corpus Christi was held during a working breakfast. In the interest of encouraging TONE members to speak freely and candidly, meetings were not recorded. However, both Drs. Wowk and Croisant took extensive notes during the conversations.

Focus Groups

We developed a script for use with the focus groups to guide discussion. We utilized a trained community facilitator, John Sullivan, to carry out the focus groups in concert with local community organizations. He is well qualified to serve in this capacity, having had many years of extensive collaboration with local and regional community groups to develop infrastructure and programs for translation and communication of scientific project findings. He played a key role in our Center's Community Outreach and Dissemination Core, and his experience with local cultures and contexts extends back to environmental health and social recovery issues post Hurricanes Katrina and Rita in Terrebonne and Lafourche Parishes in South Louisiana, and includes working throughout the Gulf Coast with our community partners on our GC-HARMS Study in the aftermath of the Deepwater Horizon disaster. He worked with community organizations in the three study locations to facilitate recruitment of participants and logistics and throughout the Gulf States disseminating findings. Focus groups for this study were carried out in Baton Rouge, Louisiana; Galveston, Texas; and Corpus Christi, Texas. Sign-in sheets were included. All discussions were recorded, and tapes were transcribed by a professional transcription service, following which the transcription was checked in its entirety for accuracy by a study staff member who listened to the entire tape while reading the transcript. Any identifying references to participants were deleted. The transcript was then forwarded to Dr. Tumilty for thematic analysis.

Key Informant Phone Interviews

A UTMB Preventive Medicine and Community Health Population Health PhD student completed key informant interviews under the guidance of Drs. Emma Tumilty and John Prochaska. A script was developed for her use and she was provided instruction on interviewing, including use of guidelines developed by the University of California at Los Angeles (Carroll, Perez, and Toy, 2018). Names were selected from the compiled database. Representatives selected for inclusion in Key Informant Interviews were contacted for recruitment via email, with a follow-up phone call. Immediately prior to the interview, which was recorded for transcription purposes, participants reviewed the study purpose with project staff and were allowed sufficient time to ask any and all questions. They were asked to provide verbal consent to participate in the interview and to consent to recording of the conversation, with the understanding that following transcription of the interview, the recording would be destroyed. All tapes were

transcribed by a professional transcription service, following which the transcription was checked in its entirety for accuracy by a study staff member who listened to the entire interview while reading the transcript. The transcript was then forwarded to Dr. Tumilty for thematic analysis.

Results

Stakeholder Perceptions

TONE Meetings

Three meetings were held with Texas OneGulf Network of Experts (TONE) members to solicit their input regarding facilitating effective communication and engagement with TONE and Gulf of Mexico stakeholders and to identify and prioritize issues and areas of concern. The first meeting was held on March 20th, 2019 in a private meeting room at the Olympia Grill in Galveston, Texas. Eighteen participants attended the meeting. The second meeting was held on March 22nd, 2019 in the Heritage Room of the Texas A&M Equine Complex Facilities in College Station, Texas, with nine participants attending. The third meeting was held on March 29th, 2019 in Conference Room 127 of the Harte Research Institute in College Station, Texas. Thirteen participants attended the meeting.

As described under Methods, Drs. Wowk and Croisant held a series of teleconferences with potential participants prior to the meetings to clarify the purpose and agenda for the proposed meetings. In preparation for the face-to face discussions, Dr. Wowk circulated the *SRAP*, along with previous recommendations from a similar set of TONE meetings from several years past and those arising from her visits to TONE members previously in the year. Discussions are summarized below.

Research Priorities of Texas OneGulf

While the *SRAP* comprehensively identifies long-term research priorities for Texas OneGulf, it provides somewhat less of a roadmap for strategically addressing the issues or best employing TONE or OneGulf resources to do so. It would be useful to identify shorter-term strategic research foci and the potential for developing integrated, multidisciplinary research teams that transcend institutional boundaries. Given the past difficulty of working with TCEQ, it might be helpful to determine its research priorities to better align OneGulf projects to reduce delays and/or cancellations of projects. Faculty reported diminished enthusiasm for engaging in time and energy intensive activities that do not reach fruition. The suggestion was made to identify issues or potential projects that are crosscutting for the nine OneGulf institutions that could be common areas of research focus. For example, OneGulf could serve as a communications conduit for notifying members of shared research opportunities.

Membership

In Corpus Christi, one faculty member (with some support from other attendees) strongly suggested that Texas OneGulf reconsider its purpose and membership, and that it focus strictly on monitoring and restoration. His recommendation was to eliminate

any human studies or work related to informing decision or policy making and to eject from the TONE and the OneGulf membership those individuals and institutions representing disciplines engaged in this work. While this was the most extreme—or at least overt—suggestion related to curtailing membership in OneGulf, membership has nonetheless been restricted by actual participation. It was suggested explicitly by some attendees and implicitly by the overall lack of attendance at TONE meetings that members are not sufficiently engaged, nor do they understand, especially given the relative sparsity of available grant funding through OneGulf, the benefits of membership. While enthusiasm in the Galveston and College Station groups seemed relatively high for cross-institutional collaborations, a similar enthusiasm was not expressed in Corpus Christi, although geographic distances may serve as a dampening influence for such partnerships. More likely, however, may be the sense that limited funding may be more effective if distributed in a smaller field of focus than across many disciplines.

Funding Issues

Discussion at all three sites included research funding available through Texas OneGulf/TCEQ. Faculty from multiple campuses expressed dissatisfaction with application processes, extended funding delays, and what have been considered onerous reporting requirements. Many felt that OneGulf's potential has not been realized, in part, because the Center's funding has not been at a sufficient level to support significant research efforts. Several suggestions were made to increase potential funding for OneGulf and TONE projects, including that TCEQ be approached as a potential source for matching funds for projects in alignment with TCEQ priorities. Given that much of the small RFA budgets are consumed by overhead costs, it was suggested that new RFAs be issued with a request to reduce or waive Indirect costs from academic institutions. The recommendation was made to explore the possibility of shared pilot awards from other mechanisms across institutions to promote partnerships. It was also suggested that RFAs be altered to reflect larger amounts for cross collaborations, for example $100k for inclusion of only one institution, but $300k for collaborations involving three institutions. Dependent upon clarification of an integrated research agenda for OneGulf spanning institutions and programs, diversified funding mechanisms should be explored. In addition to TCEQ, National Institutes of Health, National Science Foundation, and the National Academies of Sciences, Engineering, and Medicine Gulf of Mexico Research Program are options for funding multidisciplinary research that bridges institutions. Given the significant number of projects ongoing or in the queue for funding through the GLO or the Governor's Office for Harvey Recovery, OneGulf should explore alliances with existing projects as well.

Roles for OneGulf

In many ways, OneGulf has the potential to be the "glue" that binds all of the institutions and investigators by providing a common purpose. It can also serve as the infrastructure for more broad-based Stakeholder engagement, i.e., as the means to capture local knowledge and maintain a Texas coastal network of research-interested citizens or community groups. For example, it is possible to use OneGulf staff to liaison with TCEQ and other state agencies to better understand how they function and develop ways the TONE can complement their efforts such as using academic

monitoring systems to supplement those of the state. OneGulf should annually gather input from members as well as decision-makers on key research needs across those areas identified in the *SRAP* that are most needed for Texas resilience. This input should be used to craft the yearly RFAs for funding research. OneGulf also should consider how it can best coordinate across sites and institutions to utilize deep expertise throughout the network and develop multidisciplinary teams that can pursue additional research grants to be responsive to the needs of the state.

Qualitative Review of Existing Documents

An essential task to be performed was to review existing documents, in part to identify additional issues and priorities to inform survey development and to provide the basis for the qualitative research component of this project, which includes synthesis of priorities, recommendations and actions from these documents, the key informant interviews, and the focus group discussions. As a part of the process of developing the *SRAP*, strategic plans and initiatives for 12 organizations were reviewed and underwent thematic analysis. In addition to these, we further included:

- NOAA *Gulf of Mexico Ecosystem Status Report* (Karnauskas, 2017)
- *Governors' Action Plan III for Healthy and Resilient Coasts* (Gulf of Mexico Alliance, 2016)
- *Texas Coastal Resiliency Master Plan 2019* (Texas General Land Office, 2019)
- *Eye of the Storm* (Governor's Commission to Rebuild Texas, 2018)

An overview of each is provided below, to provide context and relevance for the recommendations and priorities offered as a part of our Communications and Engagement Plan.

NOAA *Gulf of Mexico Ecosystem Status Report*

The NOAA Integrated Ecosystem Assessment Program provides scientific knowledge of the Gulf of Mexico integrated ecosystem and transfers that knowledge to scientists and managers to facilitate protection and best usage of Gulf resources and to promote sustainability. The Ecosystem Status Report provides monitoring and trend data for a wide variety of indictors that are specific, well defined and measurable and have been demonstrated to reflect the status of a particular component of the ecosystem. The IEA uses this suite of indicators to represent key components of the Gulf, in accordance with a conceptual modeling framework, the Integrated Socio-Ecological System previously depicted in **Figure 1**. The Reports are compiled by NOAA's Gulf of Mexico IEA Program, in collaboration with academic partners, conservation organizations, and other government and state agencies. The 2017 report greatly refines those used in the original *2013 Ecosystem Status Report for the Gulf of Mexico* (Karnauskas et al., 2013), which included over 100 indicators representing various physical forces, ecosystem pressures, biological states, ecosystem impacts, and community responses in the region. The current report focuses on key indicators including:

- Artificial Structures
- Land Use Change
- Bird Abundance
- Sea Level Rise

- Commercial Landings
- Fish Stock Status
- Sea Surface Temperature
- Atlantic Multidecadal Oscillation
- Hypoxia
- Integrated Perspectives

The highlights of the 2017 Report (Karnauskas et al., 2017) include:

- The Atlantic Multidecadal Oscillation, which had consistently increased throughout the 1980s to 2010, has begun to slightly decline in recent years but is still in its positive phase.
- Several important ecosystem pressures have experienced recent rate changes compared to long-term trends.
    - Both sea surface temperature and sea level rise have consistently increased over the past three decades. Both are now increasing at even faster rates in some areas.
    - Ocean acidification (resulting from increasing atmospheric CO2), has also increased over time but has recently become more severe off the coast of Texas, but less severe off the Louisiana coast.
- Areal coverage of natural habitats, including seagrasses and wetlands, are generally declining in the region; however, numbers of artificial habitats, such as artificial reefs and oil platforms, have generally increased.
- Primary productivity measures and zooplankton biovolume estimates are highly variable, but generally stable over time. Primary productivity has increased slightly in recent years relative to the long-term average.
- Mean trophic level of the commercial catch has remained stable in recent years. Nearly all species of fish of primary or secondary economic importance are at biomass levels at or above the mean biomass over the last three decades. Overfishing of all stocks is at an all-time low.
- Total fish and invertebrate commercial landings and revenues, which were declining or stable in past decades, have increased. Employment in the ocean economy and ocean-related GDP have increased during this period, and have become more stable each year. Recreational fishing effort has also recently increased substantially, despite having decreased from the 1980s to 2010.
- The conversion of other land cover types into developed land continues across the region, and is progressing at much faster rates in urban areas such as Houston, Texas and Tampa, Florida.
- Indicators of human dimensions throughout Gulf counties parallel wider trends. Increases in urbanization and migration to urban areas may be due to populations in low-lying areas being more susceptible and less resilient to environmental change brought about by catastrophic storms. Some of these same areas also show a higher rate of fishing engagement and reliance.

<u>Recommendations:</u>

- Indicators should be assessed to determine the appropriate spatial scales for the investigation being undertaken, which may vary by process and by the management question at hand. At minimum, select indicators could be

recalculated across varying domains, to determine the scales at which processes and pressures affect the Gulf.

- Several indicators could potentially be improved through enhanced data discovery, standardization, and analysis.
    - The eBird database could include developing indicators regarding the activity of the birders themselves rather than just the birds they are observing to better understand the tourism value of birds to the region. The bird indices of abundance presented in this report are a preliminary effort, and warrant further refinement and development.
    - The selected suite of indicator species should be refined in future updates.
    - True pelagic bird species are not well represented due to low occurrence rates in the database. Alternative statistical methods or data sources should be explored to create abundance indices for pelagic species.
- Zooplankton species and population distribution are a valuable indicator of whole ecosystem processes and shifts in many other coastal and marine ecosystems. In the Gulf, zooplankton observations are collected routinely; however, the biovolume as a proxy for biomass of the total zooplankton community is the only aspect of the zooplankton community routinely quantified. The sensitivity of this indicator would be dramatically improved and the insights gained increased if these samples were analyzed for zooplankton species distributions and shifts.
- The eutrophication indicator is currently based upon nutrient loading from rivers that flow into the Gulf, with data dominated by routine, long-term measurements of the Mississippi River. A re-application of the National Estuarine Eutrophication Assessment carried out in 1999 and 2007 to determine the degree of eutrophication would enable an understanding of the current status of eutrophication in these estuaries and quantify how eutrophication in Gulf estuaries has changed over time. If this is accomplished, we can then examine the eutrophication status of estuaries in conjunction with the other indicators typically monitored to determine and quantify the degree to which eutrophication in estuaries affects estuarine-dependent fishery species and fisheries in the Gulf.
- This Update Report lacks information on protected species such as corals, sea turtles, and marine mammals. Overall, monitoring programs for these species are fragmented and sporadic, which limits the development of indicators to describe their status and trends.
    - The best-studied coral reefs in the northern Gulf of Mexico are located within the Flower Garden Banks National Marine Sanctuary. This site is monitored by the NOAA Coral Reef Conservation Program's National Coral Reef Monitoring Plan that has been implemented for the past five years, and the data generated from this program could provide a basis for future indicator development.
    - For marine mammals, the expansion of existing research and monitoring programs and standardization of data collection and archiving are needed to provide information on status of these species.
- The standardization and centrality of data collection, archiving, and access would improve the ability to accurately assess the status of the Gulf ecosystem.

    - The estuarine habitat indicator could only consider areal extent of seagrass habitats in six estuarine bays, data for which had to be discovered, standardized, and collated specifically for this Report.
    - This indicator currently ignores many other important estuarine habitats, including salt marshes, oysters, and mangroves.
- Information presented in the report would be more meaningful if accompanied by associated measures of uncertainty. Calculating measures of variance and including these measures within each figure would allow for visualization of the amount of signal versus noise in each indicator. Additionally, it would be more useful to consider the significance of recent trends not only in light of the rate of change of the indicator, but also whether the change exceeds variability expected due to the uncertainty inherent in the measure.
- While the current ESR explores a host of indicators across both ecological and human dimensions, there is need for increased transdisciplinary analyses. Further integration and synthesis across biophysical or ecological indicators and indicators of human dimensions should be undertaken at various spatial and temporal scales. These data could include analysis on more in-depth indicators related to the economy, and human health, as well as potential migration patterns after large scale events (such as Hurricane Katrina and the DWH).
- Another line of inquiry might be the question of spatial and temporal scale, specifically focusing on how these relationships might change or decay with distance and time.

Governors' Action Plan III for Healthy and Resilient Coasts

The Gulf of Mexico Alliance is a collaboration among the five U.S. Gulf States, federal agencies, academic organizations, businesses, and other non-governmental organizations. Its mission is to enhance the environmental and economic health of the Gulf of Mexico through increased regional partnerships and collaborations as described in what is now the third iteration of the *Governors' Action Plan III for Healthy and Resilient Coasts.* The report describes the priority issues and work plans that have been determined by the Gulf States themselves including:

- Enhancing Coastal Community Resilience (Mississippi)
- Improving Data Access and Baseline Monitoring (Florida)
- Increasing Stewardship through Education and Engagement (Alabama)
- Conserving and Restoring Habitat Resources (Louisiana)
- Improving the Health of Wildlife and Fisheries (Texas)
- Improving the Quality of Water Resources (Mississippi)

The overarching goal of the Alliance is to address these priorities through:

- Providing forums for collaboration on priority issues
- Developing and modifying tools to address regional issues
- Tracking restoration efforts
- Identifying and expanding opportunities for comprehensive monitoring
- Expanding the Alliance network to enable strategic partnerships

- Continuing to administer a large oil-spill research program

The Gulf of Mexico Alliance collaborates to address identified priority issues in ways that a single entity cannot. Each state commits time and resources to the successful implementation of work plans, and state scientists, technical experts, and resource managers work collaboratively to address regional matters of shared concern. As observed above, each state leads a team focused on making progress on a particular issue. Although each team has its own goals and focus areas, there is a high level of cooperation and mutual assistance in achieving the objectives in other priority areas. Three additional initiatives provide opportunities for cross-team collaboration:

- Ecosystem Services
- Marine Debris
- Conservation, Restoration, and Resilience Planning

Participants of the cross-team initiatives represent specific Priority Issue Teams, bring alternative perspectives, and address problems with a different approach. The teams will leverage their expertise and resources beyond their own issues to produce results.

Additional Partners:

Thirteen federal agencies support the Alliance in an effort to support the Gulf States and to coordinate an integrated federal response to priority regional issues. The federal work group brings diverse expertise and experience to the table. The academic community provides expertise, innovation, and science capacities to support the Priority Issue Teams and meetings and disseminate information. They are also critical in training the next generation of scientists and engineers who will support a future healthy, sustained Gulf environment and economy. Non-governmental partners include organizations that focus on: natural resource conservation, restoration and protection, social and environmental justice, environmental advocacy, coastal resilience, education and outreach, and workforce development. These partners bring to the Alliance a stronger link to local communities and a variety of skills such as research and monitoring capabilities, project implementation, communication expertise, and funding opportunity development. The Alliance established the Business Advisory Council to partner with business members on priority issues and regional initiatives as well as to deepen a sense of stewardship in the Gulf of Mexico. The Council represents agriculture, commercial and recreational fishing, manufacturing, oil and gas, seafood processing, tourism, transportation, and utilities/energy. The Gulf of Mexico Alliance also recognizes that our neighboring countries also utilize and protect the resources of the Gulf of Mexico and that we must collaborate when possible to address our shared concerns. The Alliance has a history of partnerships with Mexico and as relationships evolve with Cuba, similar partnerships will be explored as is appropriate.

The Overall Goals of the Governor's Action Plan by Priority Team are as follows:

The Gulf of Mexico Alliance Coastal Resilience Team focuses on the regional ability to respond to natural and manmade hazards, including risk communication techniques and resilience assessments as well as coastal adaptation and planning methods. The

Coastal Resilience Team develops strategies and tools to create safer, more resilient communities. Team Goals include:

- Increase awareness and knowledge of tools and resources to assist coastal stakeholders in becoming more resilient and sustainable
- Promote understanding of coastal risks and availability of resilience and restoration tools for those who live, work, visit, and do business in the Gulf
- Promote adaptation, mitigation, and restoration as strategies to preserve heritage, conserve natural resources, and support the economic viability of the coast

The new Data and Monitoring Team combines two previous teams, including the monitoring efforts of the former Water Quality Team and many of the data management efforts of the former Ecosystem Integration and Assessment Team. The Data and Monitoring Team will focus on improving comparability of data, developing a community of monitoring practitioners, and establishing a framework for improving how data and information are delivered to coastal managers and the public. Team Goals include:

- Improve decision making through coordination and provide guidance for monitoring, mapping, and data sharing collaborations
- Enable data and monitoring integration to support Alliance priorities

The Education and Engagement Team will provide support to the other five priorities and three cross-team initiatives. Team members will use a broad spectrum of environmental education approaches to expand the public's environmental literacy and stewardship of the Gulf of Mexico. The Team uses approaches that leverage resources, build partnerships, and result in measurable impacts. The Team Goal is to:

- Engage and educate people to become stewards who enhance the environmental, ecological and economic health of the Gulf of Mexico

The Habitat Resources Team will focus its actions on developing tools and data regarding habitat assessment, living shorelines, sediment management, and sea level rise as well as Comprehensive Restoration and Resilience Planning and the Ecosystem Services Assessment Cross-Team Initiatives. Team Goals include:

- Increase the availability and utilization of habitat assessment data and information to coastal stakeholders
- Increase awareness and implementation of living shoreline alternatives in coastal communities
- Support the development of robust regional sediment management and beneficial use programs at the local, state, and regional scale
- Promote understanding of the capabilities and uses of sea level rise and storm surge models

The Water Resources Team focuses on a wide range of key water resource concerns that affect the region, including pathogens, harmful algal blooms, nutrient pollution, hypoxia, freshwater inflows, water resource sustainability, and additional emerging water resource issues in the Gulf. The team will explore and advance understanding of

the connections among these topics and seek solutions to provide improved protection of human health and aquatic life. Team efforts will increase awareness of how water resources are directly related to both human and aquatic health within the region, and how all of these influence the economic health of the region. Team Goals include:

- Protect human health, aquatic health, and economic health within the Gulf of Mexico by applying and advancing science and technology, improving education and overall environmental awareness, and enhancing partnerships
- Identify, prioritize, and pursue additional data and research needed to better characterize, understand, and reduce potential threats to human health or aquatic life
- Identify linkages between water quality, water quantity, water resource sustainability, human health, aquatic health, and economic health
- Support ongoing local, regional, national, and international efforts related to protecting and/or improving water resources within the Gulf of Mexico

The Wildlife and Fisheries Team focuses on identifying gaps in existing research and restoration efforts; works with other Alliance Teams to integrate wildlife and fisheries data, information and priorities; and coordinates and supports regional efforts to protect and conserve Gulf wildlife and fisheries. Team Goals include:

- Work to understand and support diverse wildlife and fisheries populations to sustain a resilient Gulf of Mexico ecosystem
- Inform conservation and policy decision makers through collaboration with the other Gulf of Mexico Alliance teams

The Ecosystem Services Assessment Cross-Team Initiative focus is to enhance the use and communication of ecosystem services science and tools for citizens, scientists, and practitioners. Ecosystem services are the benefits people obtain from the natural environment, including food, recreation, and storm protection. The Cross-Team Goal is:

- Advance the identification, measurement, and communication of coastal and marine ecosystem goods and services for better management of regional resources and the building of resilient communities

The Marine Debris Cross-Team Initiative was formed to address the increasing problem of persistent solid materials that are manufactured or processed and directly or indirectly, intentionally or unintentionally, disposed of or abandoned into the marine environment. Marine debris is now a global problem requiring international cooperation, and the Gulf of Mexico Alliance can help address a broad range of issues and coordinate on the local, state, and regional scale to help alleviate its negative impacts. The Cross-Team Goal of this initiative is to:

- Assess, reduce, prevent, and eliminate marine debris and aquatic trash in the Gulf of Mexico and its watershed for the benefit of habitats, wildlife and fisheries, humans, and the Gulf economy

The Conservation, Restoration, and Resilience Planning Cross-Team Initiative was established to serve as a coordination point around which relevant conservation,

restoration, socio-economic, and resiliency data and tools can be developed and managed to inform the decision-making of the wide array of stakeholders across the Gulf Coast. The Cross-Team Goal is to:

- Foster greater integration among planning aspects of restoration, conservation, and resiliency to increase the efficiency and effectiveness of on the ground efforts.

Texas Coastal Resiliency Master Plan

The Texas General Land Office's *2019 Texas Coastal Resiliency Master Plan* is the second iteration of a statewide plan to protect and promote a resilient Texas coast in terms of its economy and environment. The plan includes the built infrastructure and natural environments, both of which must be considered to understand and achieve coastal resiliency. The state's natural coastal environments contribute resources and ecosystem services including cultural and recreational benefits, seafood, flood prevention and habitat productivity that in turn bolster business development, improve quality of life, and attract people to Texas. The coast's built environments provide the support services, transportation and infrastructure systems that allow communities, businesses and families to grow and flourish up and down the coast.

The coastal region is susceptible to the extreme impacts from natural disasters as well as impacts from long-term environmental, social and economic pressures. These impacts can result in widespread flooding, structural damage and shoreline erosion—such as in the wake of a major hurricane —to smaller, but more numerous episodes of high tide events and fish kills. This Resiliency Plan identifies eight priority Issues of Concern that encompass risks and threats to the vitality of coastal communities, habitats and industries:

- Altered, Degraded or Lost Habitat
- Gulf Beach Erosion and Dune Degradation
- Bay Shoreline Erosion
- Existing and Future Coastal Storm Surge Damage
- Coastal Flood Damage
- Impact on Water Quality and Quantity
- Impact on Coastal Resources
- Abandoned or Derelict Vessels, Structures and Debris

Recommendations:

The Resiliency Plan proposes eleven actions to increase long-term resiliency, including:

- Beach and Dune Sustainability
- Coastal Storm Risk Management
- Delta Management
- Oyster Reef Enhancement
- Regional Infrastructure Improvements
- Responsible Development
- Rookery Island Enhancement

- Watershed Planning
- Wetland Protection and/or Shoreline Stabilization
- Data Collection and Monitoring (Coast wide)
- Storm Preparedness and Response (Coast wide)

To bring about these needed Actions along the entire Texas coast, the Resiliency Plan lists 123 recommended Tier 1 projects, selected from a group of approximately 250 reviewed projects. The Tier 1 projects address the majority of high priority needs identified by data gathering and modeling completed by the GLO's Planning Team. The projects range from small-scale, local projects to large-scale collaborative projects that involve multiple state and federal agencies, municipalities, and private and public stakeholders. In many cases, small-scale projects are one piece within a larger framework of restoration needs. The cumulative cost of the 123 Tier 1 projects is $5.4 billion. The 123 projects have been reviewed and vetted by the GLO and its Technical Advisory Committee. The projects mitigate, collectively and individually, the coastal Issues of Concern identified in the Resiliency Plan. They also align with the prescribed Actions to address current and future regional and coast wide needs. Furthermore, the implementation methods recommended within each of the project descriptions are Resiliency Strategies that are demonstrated to be successful by similar past achievements and current technical research. Each recommended Action to improve resiliency considers future conditions along the coast, including socially driven changes, such as increased development, and environmentally driven changes, such as relative sea level rise and more frequent and extreme storms. The GLO's Planning Team used advanced coastal modeling to predict where future coastal hazards may affect Texas. These models characterize how present-day built and natural environments are susceptible to climatic impacts, including relative sea level rise and coastal storm surge. These models support the need for present-day improvements and validate that the projects presented in the Resiliency Plan are viable solutions to the issues at hand.

Eye of the Storm

As part of his effort to respond quickly and effectively in the aftermath of Hurricane Harvey, Governor Greg Abbott created the Governor's Commission to Rebuild Texas headed by Texas A&M University System Chancellor John Sharp. The commission's role was to oversee the response and relief effort between the state and local governments. The report of the commission, *Eye of the Storm*, describes how the state responded to the disaster and began recovery efforts. The storm's devastation took an enormous toll on individuals, businesses and public infrastructure, causing the Governor to issue a call to "future-proof" the Gulf Coast — and indeed all of Texas — against future disasters. This report includes the commission's recommendations about how to begin this process.

Recommendations:

- Texas is a national leader in responding to disasters, whether a hurricane along the Gulf Coast or a Panhandle wildfire. Emergency management in Texas is highly organized and well run by professionals who know their jobs and move quickly and decisively. However, the state can improve the current system by

unifying the state's response and recovery responsibilities, and by providing better information, training and more effective application of emerging technologies. Texas must become an innovator in the field of emergency management as well as a leader.

- Texas must improve the long and difficult process of recovery — what is done in the weeks and months after a disaster to restore Texans, their communities and economies to a point where they are as good as or better than before disaster struck. In this regard, the task ahead matches the Federal Emergency Management Agency's (FEMA) national strategic priorities: To build a culture of preparedness, to be ready for future disasters, and to reduce complexity.
- Texas needs to be better prepared for future disasters. The state capabilities for emergency response must be organized, trained and equipped for whatever challenges lie ahead. We need to have better trained local officials and emergency managers.
- The state requires better communication with the communities affected by a disaster, better and timelier assistance to survivors, better coordination of recovery efforts, stronger partnerships with the federal agencies that provide funding and assistance during major disasters, and improved strategies for bringing state and federal resources to bear in time of need.
- Residents could be better prepared if they are provided with better and more accessible information about future risks.
- The state must maintain an inventory of what needs to be done to achieve resiliency when funding is available. It means creating an effective state-local planning process for improvement of our infrastructure and our communities, both along the coast and, again, in all of Texas.

Emergency Management

1. Reorganize emergency management functions to unify the most critical emergency response and recovery functions.
2. Update and expand the Texas Emergency Management Council.

Response

1. Consider appropriating additional funds from the existing Emergency Radio Infrastructure Account to fund radio infrastructure.
2. Strengthen the role of the Texas A&M Veterinary Emergency Team by giving it a more appropriate designation in the State of Texas Emergency Management Plan and consider additional appropriations.

Recovery

1. Create a catastrophic debris management plan and model guide for local use.
2. Improve contracting for debris removal.
3. Study the issues surrounding the removal of "wet" debris.
4. Improve the process for applying for D-SNAP benefits during a major disaster.
5. Investigate the possibility of creating a state case management program administered by the Health and Human Services Commission.

6. Determine the feasibility of developing a single intake form for disaster victims to complete to determine their eligibility for disaster programs.
7. Improve oversight, accountability, and availability of individuals in the building trades offering services to disaster survivors.
8. Institutionalize the use of extension agents from the Texas A&M AgriLife Extension Service as a "force extender" in support of the Texas Division of Emergency Management.
9. Use available state resources, such as staff from AgriLife Extension, TEEX and other state agencies, to create a recovery task force to provide specialized assistance for communities and individuals in areas like financial issues, federal assistance programs, and recovery and resiliency planning to speed recovery at the local level.
10. Set up a response team at the state level to respond to questions and other inquiries from local emergency management officials.
11. Organize ongoing briefings at least quarterly or as needed to inform legislators, their staffs, and appropriate agency personnel on hazard threats and disasters.
12. Ensure the state is prepared to quickly develop and present a well-reasoned report to the federal government listing projects requiring federal funding after large-scale disasters.
13. Clarify requirements local elected officials must meet to communicate in emergency situations under the state's Open Meetings Act.
14. Develop a process to capture vehicle identification information in FEMA's vehicle assistance program.
15. Explore ways to solve the issue of titling trailers in the FEMA temporary housing program.
16. Compile and maintain a comprehensive list of all the regulatory waivers needed during a disaster to expedite suspensions in any future event.
17. Increase utility customers' awareness of utility payment relief programs.
18. Grant the Texas Department of Transportation authority to pre-purchase food and water and stockpile these essentials for each hurricane season.
19. Study and recommend ways to resolve restrictions of homeowner associations or local jurisdictions impeding debris removal or trailer placement for short-term housing during disasters.

<u>Resiliency</u>

1. Establish a special study committee to evaluate and propose options for a state-local partnership to help future-proof Texas against flood events on a watershed basis.
2. Establish and fund a new Institute for a Disaster Resilient Texas to be established within Texas A&M University.
3. Investigate ways to improve the hardening of utilities and facilities.
4. Create a comprehensive inventory of needed mitigation and resiliency projects statewide and develop a prioritization methodology to guide local, state and federal decision makers.

Preparing for the Future

1. Develop for the Legislature a proposal for training and credentialing emergency management personnel.
2. Review current training courses with the goal of strengthening training for recovery operations for state and local personnel in emergency management.
3. Explore possible expansion of current degree programs in emergency management.
4. Examine and report on ways to strengthen the quality and sharing of data used in emergency management operations.
5. Emphasize to emergency management personnel the importance of working out partnership agreements and contracted services before a disaster strikes.
6. Explore whether the purchasing programs of the Texas Comptroller's office could be tailored to help local jurisdictions with their emergency management needs.
7. Collaborate with Congress and the federal government to improve emergency management laws and policies.
8. Embrace the basic tenets of FEMA's Strategic Plan with its emphasis on cooperation among federal emergency management agencies, state government, local government, non-governmental organizations, the private sector and individual citizens to meet the critical basic goals of making the Nation better prepared for and better able to deal with future disasters.
9. Review laws and practices affecting the use of drones during emergency events and recommend changes in operations to promote their use.
10. Establish a single, well-publicized state website at the Texas A&M University System that is easy to use and presents important post-disaster information about response and recovery activities.
11. Consider ways to make better use of 911 and social media during disaster response.
12. Explore expansion of the capabilities of the Rebuild Texas application or development of a new mobile app to deliver important information to responders and disaster victims alike.
13. Examine the costs and benefits of promoting a technology standard enabling a wider video representation of a disaster area for first responders.
14. Continue to cultivate relationships with private technology providers to coordinate their assistance in the early days of a disaster when communications systems are damaged or destroyed.
15. Examine ways for the state to apply data analytics to improve disaster management through more effective and timely information.
16. Examine ways to better inform the public about how to prepare for and survive a disaster.
17. Consider appropriating additional funds to expand and improve the state's trauma care network to be better prepared for future disasters.

The Gulf of Mexico Research Initiative Information and Data Cooperative

The Gulf of Mexico Research Initiative Information and Data Cooperative (GRIIDC) is not a document per se, but rather a team of investigators, data analysts and computer

system developers who support a data management system that collects and stores scientific data generated by Gulf of Mexico researchers. GRIIDC was established in the aftermath of the Deepwater Horizon Spill to ensure that all data collected or generated would be available to the public. GRIIDC is housed at the Harte Research Institute for Gulf of Mexico Studies at Texas A&M University – Corpus Christi. The GRIIDC staff includes software engineers, data analysts, web developers, subject matter experts and partners at Texas A&M University and the Florida Fish and Wildlife Research Institute. While the system assists researchers with multiple phases of data management, the main functions are storing and sharing data. Researchers from diverse fields of study, including biology, chemistry, physical oceanography, sociology, political science and public health, are able to store their data in the GRIIDC system. Through the GRIIDC Data Discovery portal other researchers, policy makers, and the general public are able to search for and download this data. This shared data can be used to address innovative scientific research questions, assess policies and programs, and in educational initiatives. By providing a forum for both storing and sharing data the GRIIDC system increases the impact of scientific research in the Gulf of Mexico and beyond for the benefit of society. We included GRIIDC in this review because, like the TONE, it is a rich resource that could potentially be even more widely utilized.

Summary of Existing Reports

Clearly, there are marked overlaps between and among these reports and strategic plans, as is illustrated by the shared areas of focus, the common action areas, and in some cases—shared personnel who work on common projects. There is still, however, obvious room for integration, and clear indications where TONE members collectively and individually could bring to bear expertise that would benefit projects and efforts.

Thematic Analysis of Existing Documents

The thematic tables organize the priorities listed in the various Gulf-based documents around the type of activities those priorities entail. The original TONE strategic plan, while comprehensive, was developed through the lens of our membership (primarily scientists). However, the ultimate end users and stakeholders impacted by our recommendations are policy-making entities and citizens themselves. With this in mind, we undertook this thematic analysis of the TONE strategic plan, along with critical other plans in an effort to identify themes that bridge the gaps between the lenses of scientists and policy makers. A next step may be to form TONE workgroups to re-examine current and upcoming TONE priorities through the identified themes that emerged from analyzing reports from our targeted end user population. Additional benefits of organizing priorities in this way are that the infrastructure, expertise, or resources required for modelling or education for example, will be similar despite topic area (ecosystem protection, disaster-response, or health-access). Therefore, each theme is a grouping of similar types of activities needed to achieve the priorities in a given report and then within each theme, there are a set of subthemes group priorities around specific areas. This allows for a different kind of overview supporting efficient planning. **Table 3** provides a summary of themes.

Table 3: Summary of Thematic Analysis

Theme	Explanation	Sub Themes	No. of Priorities
UNDERSTAND	This theme captures all activities that seek to understand issues and the relationships between different systems and their effects. This includes measure or standard setting, data collection, modelling, monitoring, citizen science and research activities (both small-scale and large-scale).	Disaster-Related Information	17
		Economic Impact Information	6
		Resilience-Related Information	5
		Health-Related Information	16
		Wildlife & Fisheries Information	10
		Habitat-Related Information	10
		Ecosystem-Related Information	42
		Weather & Sea Level Change Information	19
		Research & Monitoring Development	12
INFORM	This captures all activities that are about informing and educating the different stakeholders including policy makers at different levels (municipal, county, state, national, etc.), industry and the public. It covers not only means of outreach and training, but also topics that require outreach and training.	Processes	10
		Disaster	8
		Resilience	5
		Seafood Related	6
		Fishery Related	3
		Health Related	2
		Economy	4
		Education Provision	4
		Climate Change Related	7
		Environment Related	33

Theme	Explanation	Sub Themes	No. of Priorities
ACT	This theme captures all activities that describe either implementation or projects.	Task	2
		Fishing	5
		Recreation	4
		Resilience	4
		Disaster	14
		Protect Ecosystem	33
DEVELOP	This theme captures all activities that require the creation of either new tools, groups or processes.	Plan	8
		Groups	5
		Tools & Systems	11
ENGAGE	This theme describes activities that require engagement with communities and stakeholders to achieve goals in key areas.	For Health	1
		For Environment	7
		For Local Capacity	3
COLLABORATE	This theme describes partnerships/collaborations that would assist in response to different needs.	Gulf Of Mexico Ecosystem	6
		Disaster	5

Focus Groups

The first focus group was held in Galveston on Monday, January 29, 2019. The meeting was organized by Rob Ruffner, Director of the Galveston County Mutual Assistance Partnership (GC-MAP), a coalition of local non-profit agencies for communication and collaboration and facilitated by Mr. Sullivan. Ten members were in attendance. The second focus group was held in Baton Rouge, Louisiana on Thursday, March 21, 2019. The meeting was organized by the Louisiana Environmental Action Network, a community-based not-for-profit organization founded in 1986 that deals with environmental health issues in Louisiana through education, empowerment, advocacy, and support efforts. Again, the meeting was facilitated by Mr. Sullivan, with seven

discussion participants and ten attendees overall. The final focus group was held in Corpus Christi, Texas on Friday, March 30, 2019. The meeting was facilitated by Mr. Sullivan, although meeting attendees were suggested and invited by a representative of Texas Sea Grant. Seven individuals participated in the discussion, although 10 participants attended overall. **Table 4** provides background information on focus group participants.

Focus Group	Participant Ties to Gulf of Mexico	
Table 4 Focus	*Group Representation*	**Participant Occupation**
Galveston	Live and work in Galveston and coast	Architect/planner
	Galveston resident	Faculty in Higher Education in Galveston
	Lifelong resident	Ret., law enforcement and radiation oncology
	Resident. Work and volunteer related to environmental water quality issues	Community Outreach Coordinator for Env. Org.
	Resident of the coast	Exec. Director, Mental Health Facility
	Galveston native	Retired from Oil Industry
	Coastal resident	Non-profit Prevention Specialist
	Galveston resident	Higher Ed. Counselor
	Lifelong resident of Galveston	Public Health Coordinator
	Galveston resident	Real Estate
Baton Rouge	Lifelong resident. Involved in Environmental and Social Justice work	Environmental org. non-profit staff member
	Sr. organizer for faith-based non-profit	Financial advisor
	Lifelong resident of La.	Retired social worker
	United Houma Nation Tribal Member	Case manager
	Lifelong resident of the Gulf	Outreach coordinator
	Officer, LA Shrimp Association	Commercial fisherman
	Lifelong resident of Louisiana	Exec. Director, non-profit
Corpus Christi	Research Fisheries, inshore and offshore waters	Research scientist
	Gulf resident, recreational fisherman	Fisheries research
	Board of CCA, interested in getting locals to use science	Research scientist
	Coastal resident	Environmental consultant
	Run a fishing charter service. Member of Port Aransas Boatmen Association and two advisory panels for Gulf of Mexico fishery management	Charter boat owner/captain
	Fisherman and guide. Member of Flatsworthy	Fishing guide and boat rep.
	Bay systems fishing guide	Fishing guide

Deductive Analysis of Focus Group and Interviews

Tapes were transcribed, assessed for quality assurance and accuracy, and thematically analyzed. As with the documentary analysis, interview and focus group data had more data points in the "Understand" and "Inform" theme than others. In other words, these themes of collecting data and investigating issues, using data to inform decision-making etc. and educating and training others with the things we already know and raising awareness were prevalent in nearly every discussion we had with our participants. Below are more in-depth discussions of each theme.

UNDERSTAND THEME

The UNDERSTAND theme using focus group and interview data maps to the UNDERSTAND theme from planning and strategy documents. Here our respondents spoke about issues that affect their ability to research, measure/monitor and model information necessary to inform policy-makers. Various key issues were raised:

1) There is a lack of knowledge around the after-effects of some disasters (both industrial and natural), and there is the feeling that information provided by government or industry sometimes cannot be trusted.

2) There was praise for citizen science initiatives and groups who partnered with communities when gathering information post-disaster/emergency. There was criticism of, what is in the literature called "tarmac professors," who are funded to investigate effects, breeze in, don't collaborate with community, and report out completely disconnected from the realities of the local situation.

3) This disconnect was also mentioned in relation to some environmental work where research provided results that appeared to conflict with what people on the ground such as guides and fisherman were seeing; or where explanations for losses could not be given (i.e. wildlife populations never coming back to pre-disaster levels but no positive soil/water samples).

4) Most people discussed wanting policy-makers and decision-makers to be data-informed in their decision-making but also thought that sometimes political interests/commitments may trump data. They also felt that research or data could help strike compromises between communities and industries by setting regulation standards at the minimum required to keep communities healthy/safe (i.e. rather than being arbitrarily too high and industry balking).

5) There was a call for understanding the effects of both natural and industrial disasters over a longer time period and wanting communities to be empowered to collect that data so there was trust in the data.

6) Mental health was a big issue raised across multiple themes in relation to the effects of disasters (industrial and environmental) in the short and long-term at the individual and community-level.

7) Understanding the changing ecosystem after disasters (both industrial and environmental) by taking samples, monitoring habitats/wildlife and the effects of ecosystem change on health were brought up frequently.

8) Monitoring of environmental and health measures was considered crucial across the board to inform communities, policy-makers and industry. There was recognition that this requires funding and that sometimes monitoring (and research) is sometimes blocked for political reasons (the census count was raised for example).

INFORM THEME

1) All participants discussed across different topics areas and issues the need for better education and outreach to stakeholders in the community, in industry, and politicians and policy-makers. Examples focused on post-disaster rebuilding, water safety, conservation for fishermen, and many others.

2) Many barriers to education were discussed. The Gulf Coast is a naturally diverse environment with lots of tourist movement, making who to target, when, and with what level of education/information very difficult. Add to that, that in cities such as Houston there is a highly diverse population with very different language needs and cultures. Aside from these issues, multiple respondents mentioned attitudes among communities, industry, and politicians which were not receptive to education. They reported experiencing pushback to information whether it is around fishing and conservation, climate change, post-disaster planning, etc.

3) When respondents discussed strategies that they thought would be more effective they frequently mentioned starting early with children through schools and trying to capture their attention through social media. One respondent stated that they had great outreach and information-sharing success with short videos (which were highly watched), but that these were time-consuming and costly to make so there was always a needed balance. The other strategy brought up in focus groups and interviews was the idea of peer-to-peer outreach and information sharing, i.e., training willing members of certain groups; they spread knowledge to others who see them as a more responsible source of knowledge.

4) When discussing disasters, respondents discussed wanting to provide information to the public, not only in the acute and immediate phase of a disaster but also through the recovery. The lack of widespread knowledge about mold issues was given as an example for people post-Harvey. Respondents praised some alert systems but again felt that they need greater outreach and content given the diversity of audience that would be seeking information.

5) There was criticism about post-disaster training for those involved in clean-ups, with respondents feeling that those volunteering and helping were unnecessarily exposed to risks, because the training they received was insufficient.

6) Multiple focus groups and interview participants discussed difficulty in addressing climate change and sea-level rise because of prevalent attitudes against the science on this topic and difficulties in trying to educate and inform people.

ACT THEME

1) A dominant narrative within the ACT theme was the idea that the Gulf Coast was too often focused on short-term planning rather than long-term. Respondents described much action and planning as crisis-driven rather than proactive. When discussing reasons for this, some felt it was due to having frequently occurring disasters and their after-effects, others believed it was the problem of policy-making as politicians focus on election-cycles that are naturally shorter term.

2) Respondents also described that where discussions did involve proactive planning, long-term thinking, or a recognized issue (such as mental health, or housing), these discussions often led nowhere, or led to strategies but not actions. Again, this was explained as a lack of commitment by decision-makers and policy makers to consultation processes and their outcomes.

3) A final point within this theme was the idea of more enforcement being needed across many areas of conservation and habitat and wildlife management.

DEVELOP THEME

1) Within this theme, there was discussion of the need for creation of disaster assessment programs including baseline testing and equipment programs for scientific sampling in flooded areas to determine exposures and risks as well as potential early life exposures for pregnant women and their unborn children. Respondents also described the need for integrated community flood reduction efforts and integration of efforts across municipalities and agencies.

COLLABORATE THEME

1) Within this theme, there was very little variation in discussion. Respondents mostly described well-functioning collaborations in many different settings between different partners. There was mention of panels that convened to address local issues with multiple stakeholders, as well as partnerships between universities and community, or industry and government for strategy setting, etc. Respondents recognized a need to balance issues for the sake of all parties around industry and environment or private-public partnerships, etc.

ENGAGE THEME

1) Respondents described community engagement with universities. These partnerships involved shared learning, citizen science, and capacity building.

2) Non-governmental organizations and universities were also engaging in activities that helped communities advocate for themselves. This was in part through information sharing, but also through support and development activities.

Inductive Analysis of Focus Groups and Interviews

The inductive analysis across the diversity of respondents provided a broad set of sub-themes although there were some distinct issues that almost every participant brought up (health access, housing, and moving from crisis-driven planning to something more

proactive that was community-engaged). Below are these themes as they correlate with the Socio-Ecological System Components and *SRAP* Themes.

Ecosystem status/living marine resources (marine mammals, sea turtles, seabirds, protected species, species interactions, harmful impacts of marine debris, primary productivity, and fish abundance, etc.)

- Wildlife
- Impacts of water and air quality
- Effects of waste removal/management
- Effects of food sources
- Impacts of changing or lost habitats
- Impacts of climate Change and sea-level rise on reproduction and abundance

While not specifically referred to as "Citizen Science", the concept was raised that fishermen and others who work or otherwise spend time on the Gulf can provide valuable data to support sustainable management of marine resources. There was voiced concern over decreases in critical habitats such as oyster reefs, marshes, and seagrass nurseries and potentially destabilized fish recruitment at population levels.

Issues of Human Wellbeing (social services, basic needs, economic security, education, health, safety, social connectedness, environmental stressors, mental health, community resilience, etc.)

- Health
    - Healthcare access (insurance and geographically)
    - Provision of some local-based health services through schools or community organizations
    - Needed mental health services and support (generally and post-disaster)
    - Rural access especially
- Housing
    - Disaster-related issues (for health, availability, etc.)
    - Insurance changes required
    - Effects on vulnerable populations
- Resources
    - Available
    - Needed
    - Issues of funding (what's available, where it's spent, barriers to getting it, etc.)
- Social Issues
    - Food access
    - Transport access
    - Poverty
- Vulnerable Populations
    - Elderly and children
    - Those living in poverty or with precarity

In Louisiana, discussion tended to focus on effects of environmental impacts, including the Deepwater Horizon Oil Spill and the cumulative impacts of successive storms. Lack of access to health care and especially to mental health care is an issue for most Louisiana residents without insurance. Specifically, a lack of environmental health-informed diagnostic services for patients on the local level was mentioned in conjunction with this theme. It was noted that community members reported respiratory distress during burning of the oil offshore. Mention was also made of uneven results with financial reparations from damages from the oil spill, with the perception that many very small-scale commercial / subsistence fishers received little or nothing, perhaps as a consequence of lack of ability to function in the big business world. There are considerably fewer small fishing operations as a consequence.

Believable risk communication was cited as problematic, not only in the context of the oil spill but also with assessing risk during any industrial accidents that are somewhat frequent occurrences in Louisiana. Transparency is perceived not to be a major goal of governmental agencies, and participants expressed the desire for better, more efficient risk communication networks, especially at local levels. There was also expressed interest in validation of credibility of risk information - given the perceived weight given to industry priorities.

Participants expressed concern for the need for protection of vulnerable populations. It was stated that people living in close proximity to hazardous waste storage and treatment, refineries and chemical plants, tank farms, natural gas transmission, collection and storage hubs are often communities of color. While the risks are ongoing, they are amplified during a crisis with wind damage and flooding. There was strong emphasis on the need to build and maintain barriers around these facilities and the sense that existing barriers are inadequate.

Human Activities (fishing, farming, water use, recreation, research, management, and energy extraction, etc.)

- Waste
- Effects of human activities on habitats
- Effects of human activities on food sources for wildlife
- Water and air pollution

There was expressed concern for industrialization of the coastline related to resources used, including water, and impacts on the fisheries. There was also discussion regarding protection of the environment for purposes of sustainability, e.g., balancing access to vulnerable areas and the need for habitat to recover.

Habitat (marine, freshwater, seagrass, oyster, estuaries, artificial habitat, offshore and deep Gulf, etc.)

- Impacts of water and air quality
- Waste removal/management
- Effects on food sources
- Impacts of climate change and sea-level rise on habitats

Local expertise should be included in decisions that impact the local environment. For example, Louisiana fishermen voiced strong concern over state flood control plans to implement a freshwater diversion project, for fear that salinity changes could prove fatal to estuaries. They decried negative to catastrophic impacts on all types of fishing in a state that brands itself as the fishermen's paradise. These same points and concerns were echoed in Corpus Christi by fishermen who discussed their concerns over environmental impacts of the desalination plant under way in Port Aransas.

Social Systems (law and policy, economic institutions, and political systems, etc.)

- Politics, Regulation, and Policy
  - Need for local level engagement and policy initiatives
  - Lack of trust and sense that some politicians aren't looking out for their constituents
  - Issues with clashes between federal and state level regulators/legislators
  - Planning always short-term (tied to politicians' priorities) rather than long-term or crisis-driven rather than proactive.
- Economy and Industry Influence and Issues
  - Assets
  - Development
  - Industry interest in decision-making (plastic ban example, other petrochemical examples)
  - Economic/industry leaders' partnerships with community/government
- Community Advocacy, Partnerships, and Engagement
  - Advocacy for community (by community or others)
  - Partnerships and Engagement
  - Community assets and organizations

The suggestion was made that serious consideration be given to protecting existing marine habitats and developing additional spaces to replace those that have been destroyed, for example, natural and artificial reefs, and nursery spaces including seagrass and mangroves. Fisheries policies and regulations and angler perceptions were also emphasized as critical. Participants felt that we must examine law and policy as it relates to inshore and offshore fisheries, and should consider campaigns to change current culture around bag limits and fishing etiquette. Why would we foster a culture that finds it acceptable to fish an area or species until there are no fish left? We should teach sustainability, eco-friendly practices, safety, and boating and fishing decorum.

Climate and Ocean Drivers/Environmental Flows and Pressures and Stressors (climate, sea-level rise, ocean currents, and hurricanes, etc.)

- Disaster & Emergency Planning & Effects
  - Recovery
  - Resilience (present/development)
  - Compensation issues post-disaster
  - Effects on individuals and communities
  - Flood safety

In the larger context in Louisiana, land loss persists including the marshland and estuaries, in part due to the stronger storms, which impacts market species and particularly impacts isolated communities. Increasingly, communities on the far southern coast are becoming more vulnerable to the effects of storms and storm surge, since less infrastructure has been repaired over time. There was also discussion of the impacts of climate change, hurricanes, drought, and extreme weather impacts on the fisheries. In Corpus Christi, it was pointed out that increasing surface water temperature in the bay systems has led to certain species changing their behaviors. Brown shrimp, for example, migrate offshore earlier each year, leading to critical gaps in the food chain for species like redfish and sea trout.

Social Factors (population growth, tourism, and economic patterns, etc.)

- Economy and Industry Influence and Issues
    - Development
    - Economic/industry leaders partnership with community/government

There was the sense that what was crowded before is now extra crowded—and that while this may contribute to the economic viability of coastal communities, specifically recreational and commercial fishing communities, it may pose additional threats to the ecosystem. There was some discussion of the importance of educating tourists about protection of the environment and the potential for use of eco-tourism for doing so.

Key Informant Interviews

A total of twelve key informant interviews were conducted with representatives selected from the database and contacted for recruitment via email, with a follow-up phone call. Immediately prior to the interview which was recorded for transcription purposes, participants reviewed the study purpose with project staff, at which time they were allowed sufficient time to ask any and all questions they might have. They were asked to provide verbal consent to participate in the interview and to consent to recording of the conversation, with the understanding that following transcription of the interview, the recording would be destroyed. All tapes were transcribed by a professional transcription service, following which the transcription was checked in its entirety for accuracy by a study staff member who listened to the entire interview while reading the transcript. The transcript was then forwarded to Dr. Tumilty for thematic analysis, along with a similar analysis of focus group discussions. Interviewees included:

- National public health figure who serves as an advisor to CDC and the White House on policy related to environmental health
- Six-time elected representative to the Texas House of Representatives, serving in leadership roles for policy related to children's and public health
- Environmental scientist, consultant and community advocate who served for seven years as vice-chair of the EPA's National Advisory Council for Environmental Policy and Technology, for six years on the EPA's National Environmental Justice Advisory Council, and for five years on the National Advisory Committee of the US Representative to the Commission for Environmental Cooperation

- Emergency Manager and Homeland Security Director, Texas Coastal County
- Chief of the Galveston Island Beach Patrol and Park Board Police Department, who is also Secretary General of the Americas Region of the International Lifesaving Federation, as well as the President of the United States Lifesaving Association. Cross-trains guards from Mexico, Puerto Rico, and Costa Rica.
- Bureau Chief for Environmental Health, Texas Coastal County
- Texas Education Agency Family Engagement Specialist
- Community-Based Participatory Researcher
- Former coastal ISD superintendent, community leader, and child health advocate
- Well known print and broadcast journalist
- Houston-Galveston Area Council Local Development Corporation, EVP, Major Houston Financial Institution
- Coastal County City Manager

Survey Results

Demographics

Our original distribution list included 1784 individuals. Of these, published email addresses for 160 were incorrect and unable to be updated to current, valid addresses, leaving a remainder of 1624 possible respondents. In addition, many published elected officials' email addresses are a form of "gate-keeper" to prevent spam mail, so we are unsure whether they actually received the survey invitation. Of the remaining 1624 potential respondents, 143 were sent paper copies of the survey, as no email was available (14 returned). We received a total of 197 responses to the survey, 189 electronic and 8 paper copies, representing response rates of 12% and 6% respectively. Ordinarily, these would be calculated only by the number who actually opened the invitation. We are unable to do so, however, compared to a very similar study, our results are actually favorable. In a study prepared for the New Jersey Climate Adaptation Alliance by Rutgers University, the Jacques Cousteau National Estuarine Research Reserve, and the Monmouth University Urban Coast Institute (reference), an email invitation to participate in a "Climate Change and the Coast: Coastal Professional Opinion Survey" was sent to 2259 coastal residents. The study investigators were able to track that the email was opened by 556 individuals, resulting in a 24.9% "open rate." Their survey was completed by only a total of 116 respondents, which suggests that our completion rate, while disappointing to us, may not be unusual, given the nature of the study. It should be noted that not all respondents responded to all questions. Missing data were accordingly treated as "missing" and not included in calculations of means, percentages, etc.

Our survey was completed by ~ equal numbers of males (82, 48.5%) and females (85, 50.3%). The majority of respondents were married. Respondents were older, and the majority were Caucasian. Less than one-third of households included children.

Marital Status: Counts/frequency: Married (116, 69.5%), Separated (0, 0.0%), Divorced (19, 11.4%), Widowed (6, 3.6%), Never Married (21, 12.6%), Other (5, 3.0%))

Age: Minimum 25, Maximum 94, Mean 55, St. Deviation 14.06

Race: Counts/frequency: American Indian / Alaska Native (1, 0.6%), Asian / Asian American (4, 2.4%), Black / African American / Afro-Caribbean (5, 3.0%), Hispanic / Latino (13, 7.9%), Native Hawaiian / Other Pacific Islander (2, 1.2%), White / Caucasian, not of Hispanic origin (137, 83.0%), Other (3, 1.8%)

Children in Home: No children (114, 73.1%), Age: 0-5 (19, 12.2%), Age: 6-12 (15, 9.6%), Age: 13-18 (19, 12.2%)

Job Status: Not employed but not looking for a job (13, 7.8%), Not employed but looking for a job (2, 1.2%), Working part time and looking for full time work (1, 0.6%), Working part time but not looking for full time work (6, 3.6%), Working full time (119, 71.3%), Retired (25, 15.0%), None of these. (1, 0.6%)

Communities Advancing Resilience Toolkit Survey Domains

We utilized the CART Expanded Core Survey, a 26-item validated instrument including the four resilience domains as well as measures of Communication, Information, and Trust. We also chose to use items from the optional CART module on Faith-Based Community Renewal (Pfefferbaum, Pfefferbaum, and Horn, 2011). Five response options allowed respondents to indicate agreement with each survey item along a range from "strongly disagree" to "strongly agree," coded from 1 to 5 respectively. Mean scores were calculated for each of the 26 individual core items, each of the four CART domains as well as for Faith-based Community Renewal and for Communication, Information, and Trust. When individual item responses were missing, the mean domain scores and the mean overall community resilience score were calculated as the average of the remaining non-missing item scores for the particular domain. The primary community resilience strength and challenge were identified as relatively high and low scores, respectively, on the core community resilience items as observed in **Table 5**. **Figure 3** depicts a more holistic view of community resiliency by domain.

Table 5: Core Community Resilience Items

Statement	Score (SD)
Connection and Caring	3.73 (0.90)
People in my community feel like they belong to the community.	3.99* (0.83)
People in my community are committed to the well-being of the community.	3.81 (0.87)
People in my community have hope about the future.	3.58 (0.89)
People in my community help each other.	3.90* (0.79)
My community treats people fairly no matter what their background is.	3.35 (0.97)
Resources	3.15 (1.00)
My community has the resources it needs to take care of community problems.	2.98 (1.10)
My community has effective leaders.	3.04 (1.02)
People in my community are able to get the services they need.	3.13 (0.94)
People in my community know where to go to get things done.	3.04 (0.95)
People in my community support programs for children and families.	3.55 (0.85)

Statement	Score (SD)
Transformative Potential	3.28 (0.94)
My community works with organizations and agencies outside the community to get things done.	3.38 (0.99)
People in my community communicate with leaders who can help improve the community.	3.42 (0.90)
People in my community work together to improve the community.	3.46 (0.88)
My community looks at its successes and failures so it can learn from the past.	3.03 (0.94)
My community develops skills and finds resources to solve its problems and reach its goals.	3.16 (0.88)
My community has priorities and sets goals for the future.	3.24 (0.98)
Disaster Management	3.41 (0.95)
My community tries to prevent disasters.	3.38 (0.93)
My community actively prepares for future disasters.	3.38 (1.00)
My community can provide emergency services during a disaster.	3.50 (0.94)
My community has services and programs to help people after a disaster.	3.39 (0.95)
Communication, information, and trust	3.24 (1.01)
My community has mechanisms for routinely providing accurate information to residents about local issues.	3.28 (1.01)
My community holds meetings so residents can voice their views and needs.	3.40 (1.08)
My community has a person(s) who is trusted to deliver accurate information to its residents in time of need or crisis.	3.20 (1.05)
People in my community trust the local news media to deliver accurate information.	3.04 (0.93)
My community has mechanisms for providing accurate information to residents during emergencies.	3.61 (0.92))
People in my community trust public officials.	2.87† (0.93)
Faith-based Community Renewal	3.57 (0.99)
My community is a safe place to live and work.	3.79 (0.89)
Good housing is available for people who live in my community.	3.33 (1.07)
Necessary health care services are available to people who live in my community.	3.58 (1.09)
Good educational opportunities are available to people who live in my community.	3.63 (1.02)
Good work opportunities are available to people who live in my community.	3.33 (0.97)
People in my community have friendships with their neighbors.	3.85 (0.77)
Leadership opportunities are available to people who live in my community.	3.46 (0.96)

*Primary Community Resilience Strength
†Primary Community Resilience Challenge

Figure 2: CART Resiliency Assessment by Domain

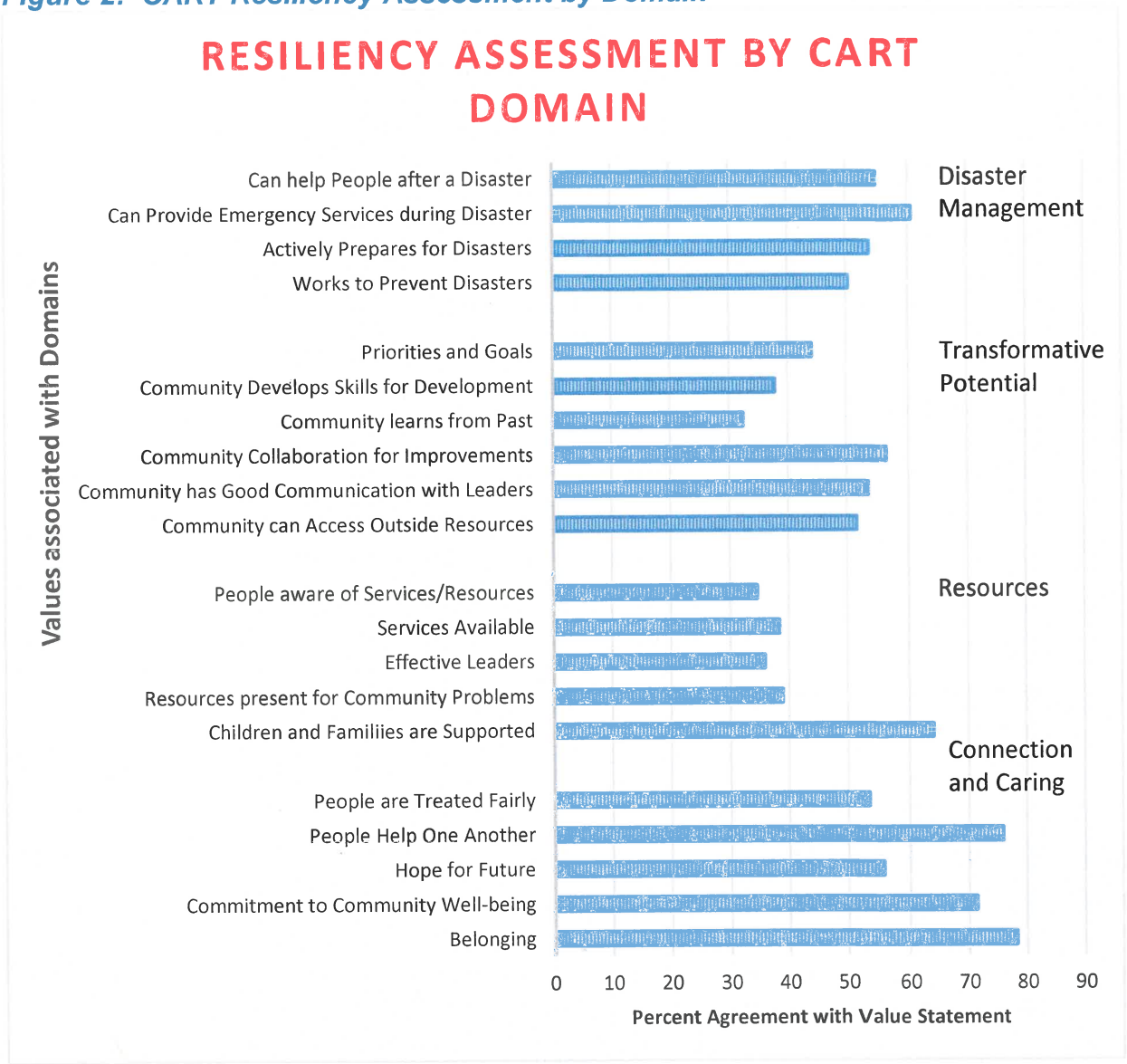
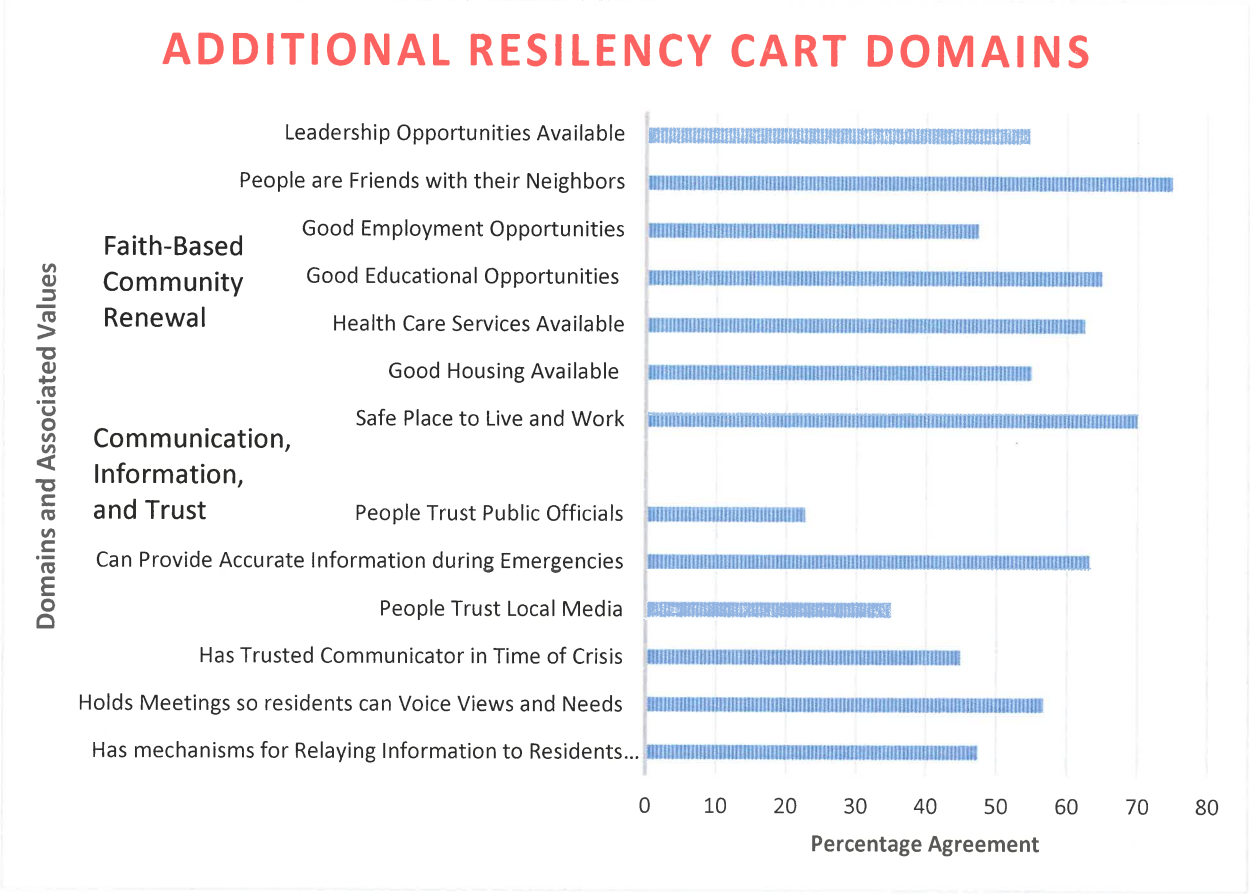


Figure 3: Additional Resiliency Domains



Interpretation of CART Results

The Primary Community Resiliency Strength and second highest Community Resiliency Strength are both found in the Connection and Caring Domain, which also has the highest mean score. The Primary Community Resilience Challenge, i.e., the lowest individual item, is related to trust of public officials, and its Domain, Communication, Information, and Trust, has the second-lowest mean Resilience score. The lowest mean Resilience score is for the Resources Domain. **Figures 2** and **3** illustrate that overall, respondents have strong connections to their communities and have strong beliefs that their communities have the major elements that make up a good place to live. The perception seems to be that disaster management is fair and that transformative potential is present, with opportunities for improvement in trust, resources, leadership, planning, and management.

Personal Experience with Disasters

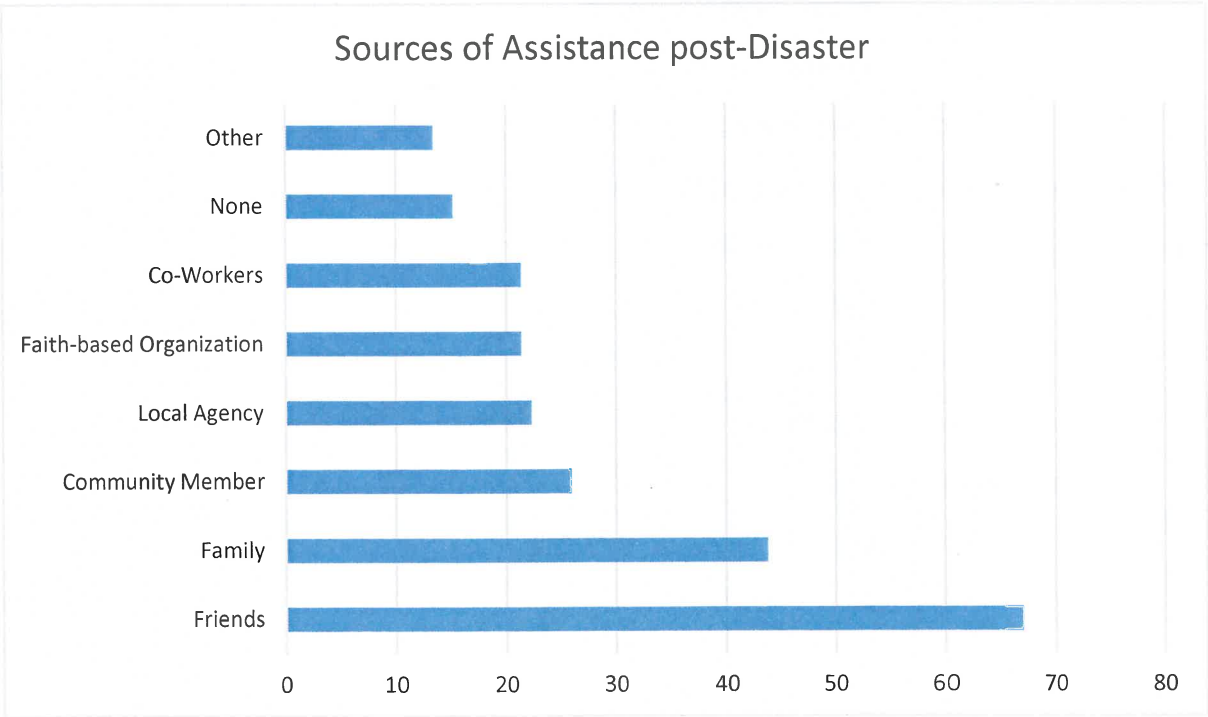
The vast majority of respondents reported personally experiencing a natural disaster (85.6%), with an additional 3.4% reporting having experienced a manmade disaster. More than half (57.6%) reported having responded to a disaster, 28.8% as a volunteer, 13.6% as a professional responder, and 15.3% in another capacity. Only 8.5% of respondents reported having completed FEMA's local Community Emergency Response Team (CERT) program, and 2.6% reported being active CERT members.

CERT educates volunteers about disaster preparedness and trains them in basic disaster response skills, such as fire safety, light search and rescue, team organization, and disaster medical operations. The CERT program is designed to support professional first response through volunteer efforts, enabling professional responders to focus on tasks that are more complex. Through CERT, the capabilities to prepare for, respond to and recover from disasters is built and enhanced.

Over one-third (36.0%) of respondents indicated they would be interested in becoming CERT members in the future. This has potentially significant implications since CERT training provides individuals (and thus communities) with the essential skills and capabilities to prepare for and respond to disasters. This would support the resiliency domain of increasing community resources. Given that the CERT program was designed as a grassroots initiative and specifically structured so that the local managers have the flexibility to shape their programs to best suit their communities, there is opportunity to increase community connectivity as well, particularly if training intentionally involves community members, representatives of local businesses and governmental leadership, etc. There is also opportunity to partner with local training events to ensure that environmental and environmental health education is appropriate and specific to the local hazards likely to be encountered and that response during a disaster is also appropriate.

As observed in **Figure 4**, individuals were asked to identify any sources of assistance following the disaster they had experienced (multiple options were allowed). Somewhat surprisingly, friends and family far exceeded agency or faith-based assistance.

Figure 4: Sources of Assistance Received after a Disaster

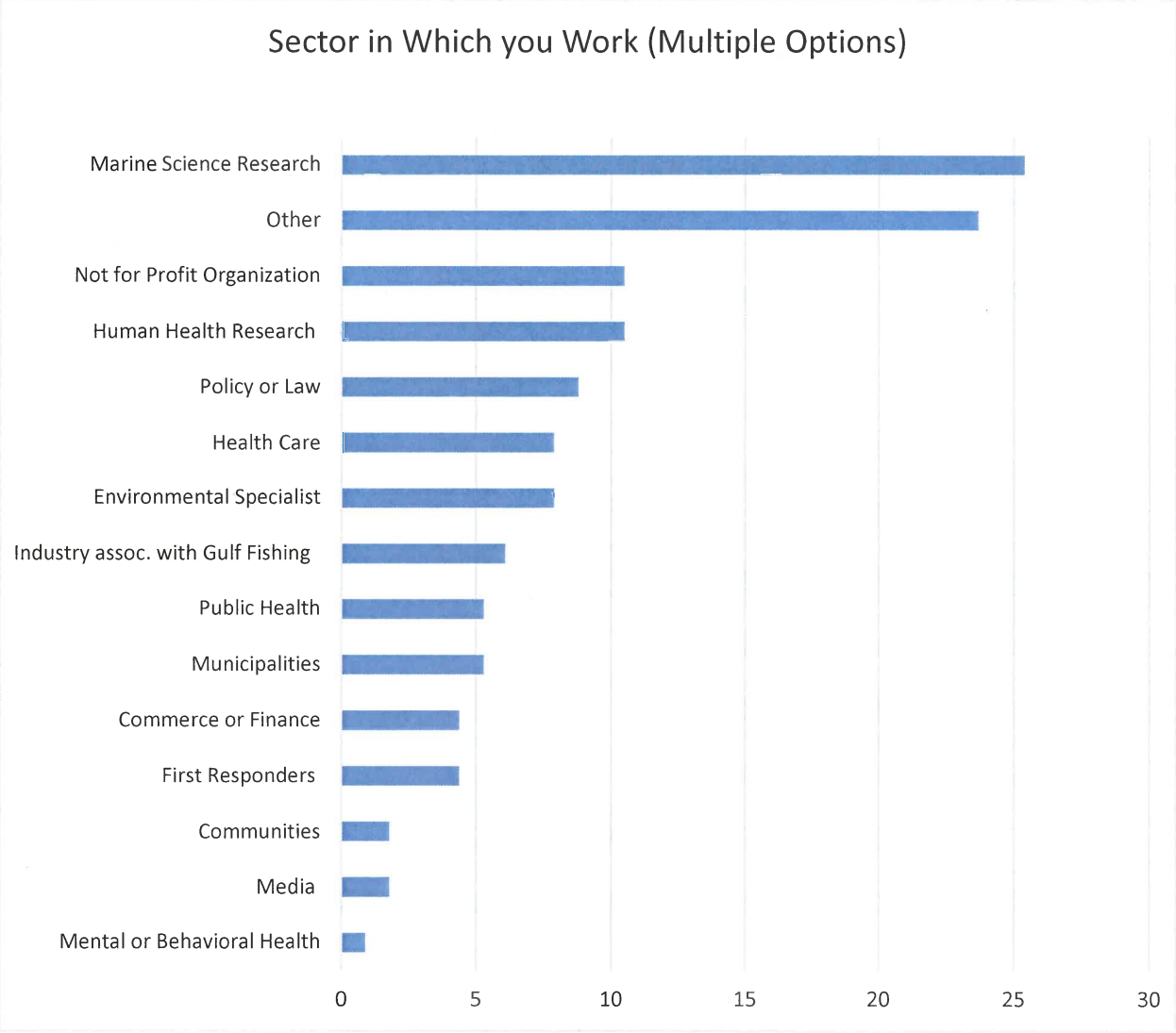


Employment

Individuals were asked to identify the sector in which they work (**Figure 5**):

- Policy or law
- First Responders
- Commerce or finance
- Industry associated with Gulf fishing
- Media (TV, Press, Radio, Social media)
- Human Health Research
- Marine Science research
- Environmental Specialist
- Communities
- Municipalities
- Health Care
- Mental or Behavioral Health Care
- Public Health
- Not for Profit Organization

Figure 5: Employment



Priorities for the Gulf of Mexico

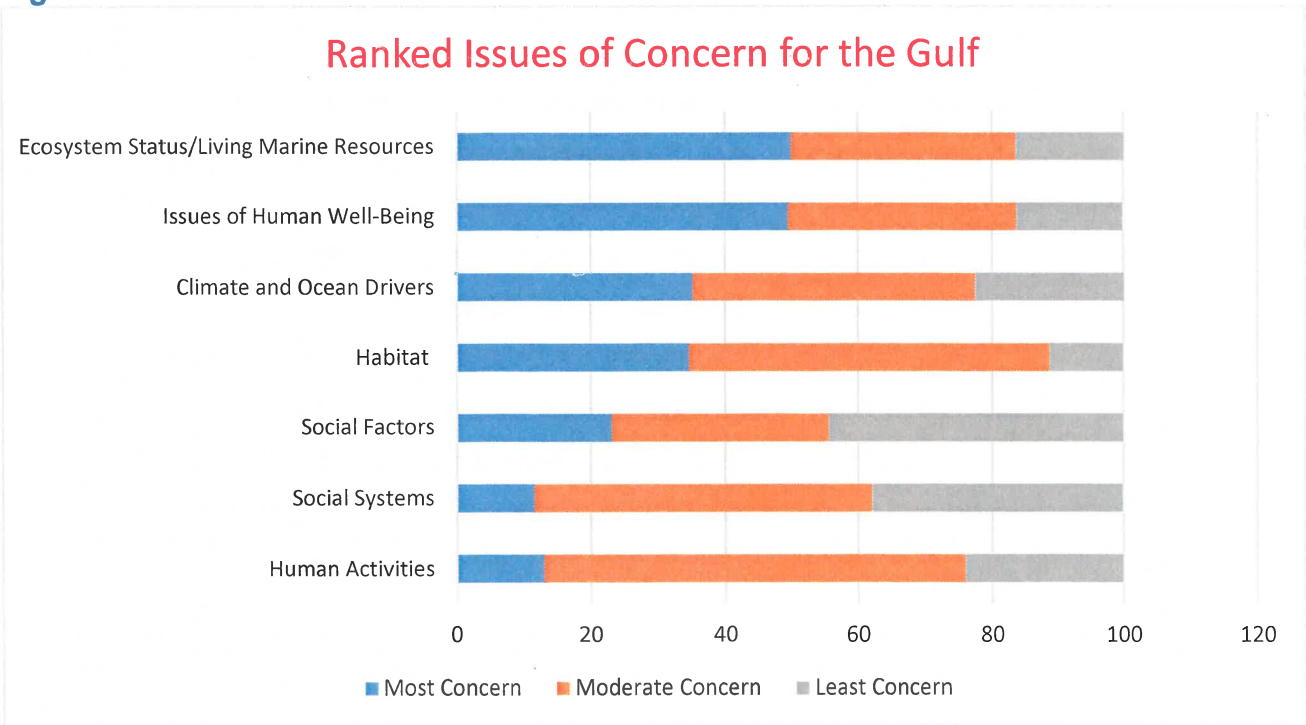
Issues of most concern for the Gulf of Mexico are identified in **Table 6** and ranked in order of importance in **Figure 6.** Below are the categories as defined.

- Ecosystem status/living marine resources
- Issues of human wellbeing
- Human activities
- Habitat
- Social systems
- Climate and ocean drivers/environmental flows and pressures and stressors
- Social factors

Table 6: Degree of Concern of Issues facing the Gulf of Mexico

Degree of Concern	1 (Most)	2	3	4	5	6	7 (Least)
Human Activities	4.0	9.0	25.0	16.0	22.0	13.0	11.0
Social Systems	1.9	9.7	16.5	11.7	22.3	12.6	25.2
Social Factors	10.2	13.0	10.2	13.9	8.3	19.4	25.0
Habitat	13.3	21.4	19.4	25.5	9.2	9.2	2.0
Climate / Ocean Drivers	23.5	11.8	16.7	10.8	14.7	16.7	5.9
Human Well-Being	28.3	21.2	11.1	11.1	12.1	12.1	4.0
Ecosystem Status/ Living Marine Resources	27.6	22.4	14.3	11.2	8.2	8.2	8.2

Figure 6: Ranked Issues of Concern for the Gulf of Mexico



As seen in **Figure 6**, overall concern for habitat slightly outweighs other issues, but degree of concern is most high for ecosystem status/living marine resources and human well-being. **Figure 7** depicts degree of importance of issues related to the environment, natural resources, and emergency management. **Figure 8** reflects the importance of issues related to infrastructure, property, economics, and vulnerable populations.

Figure 7: Environment, Natural Resources, and Emergency Management

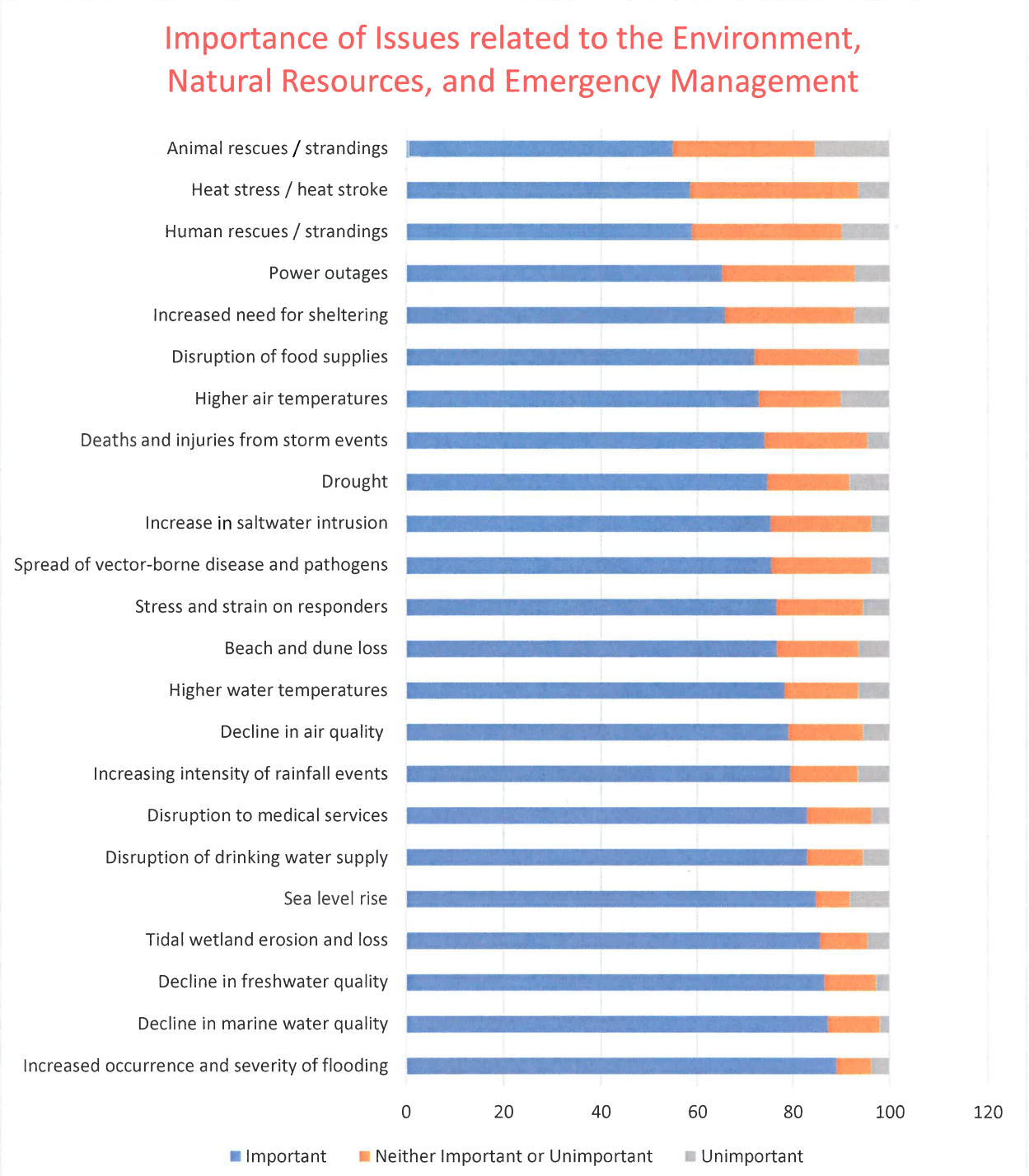
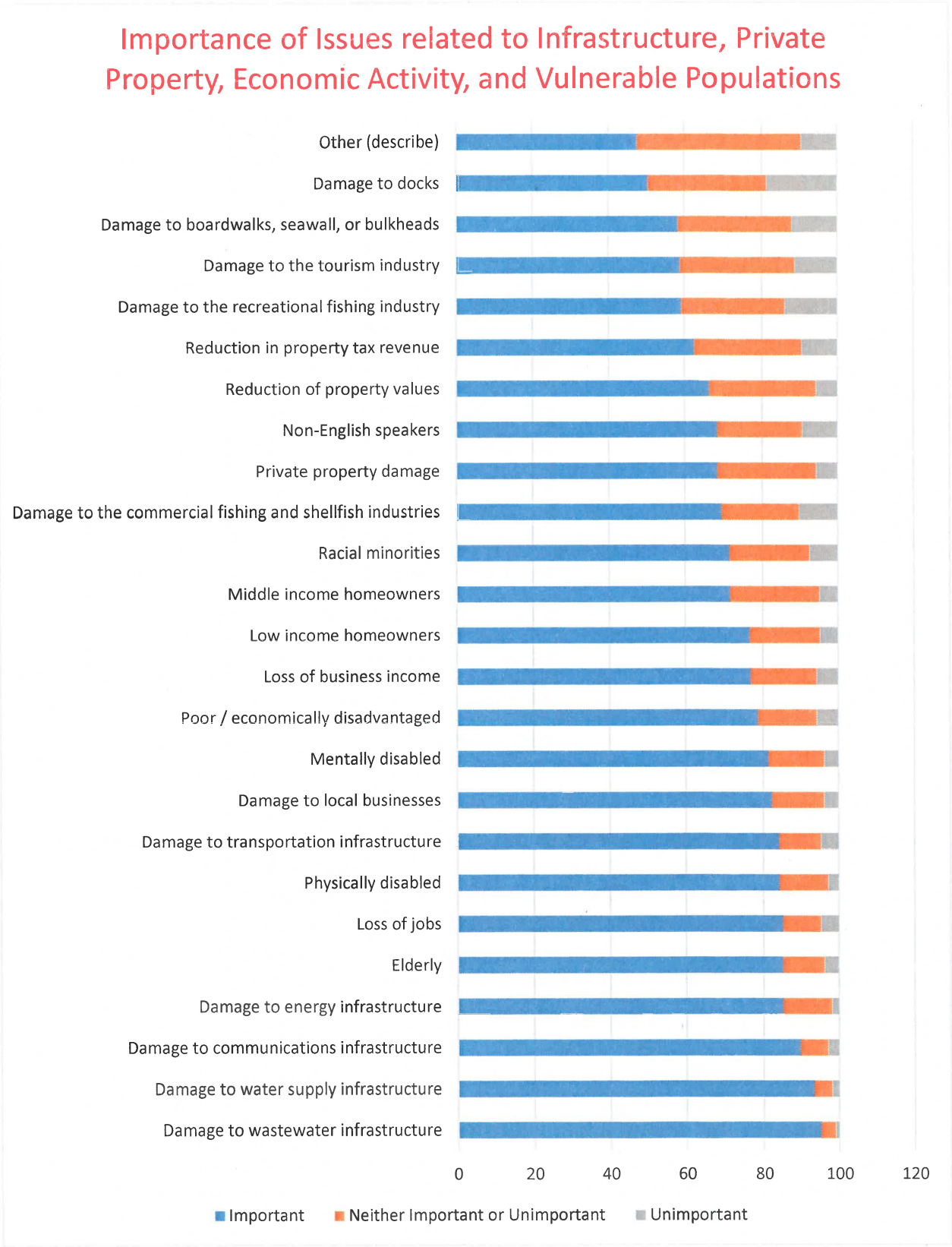


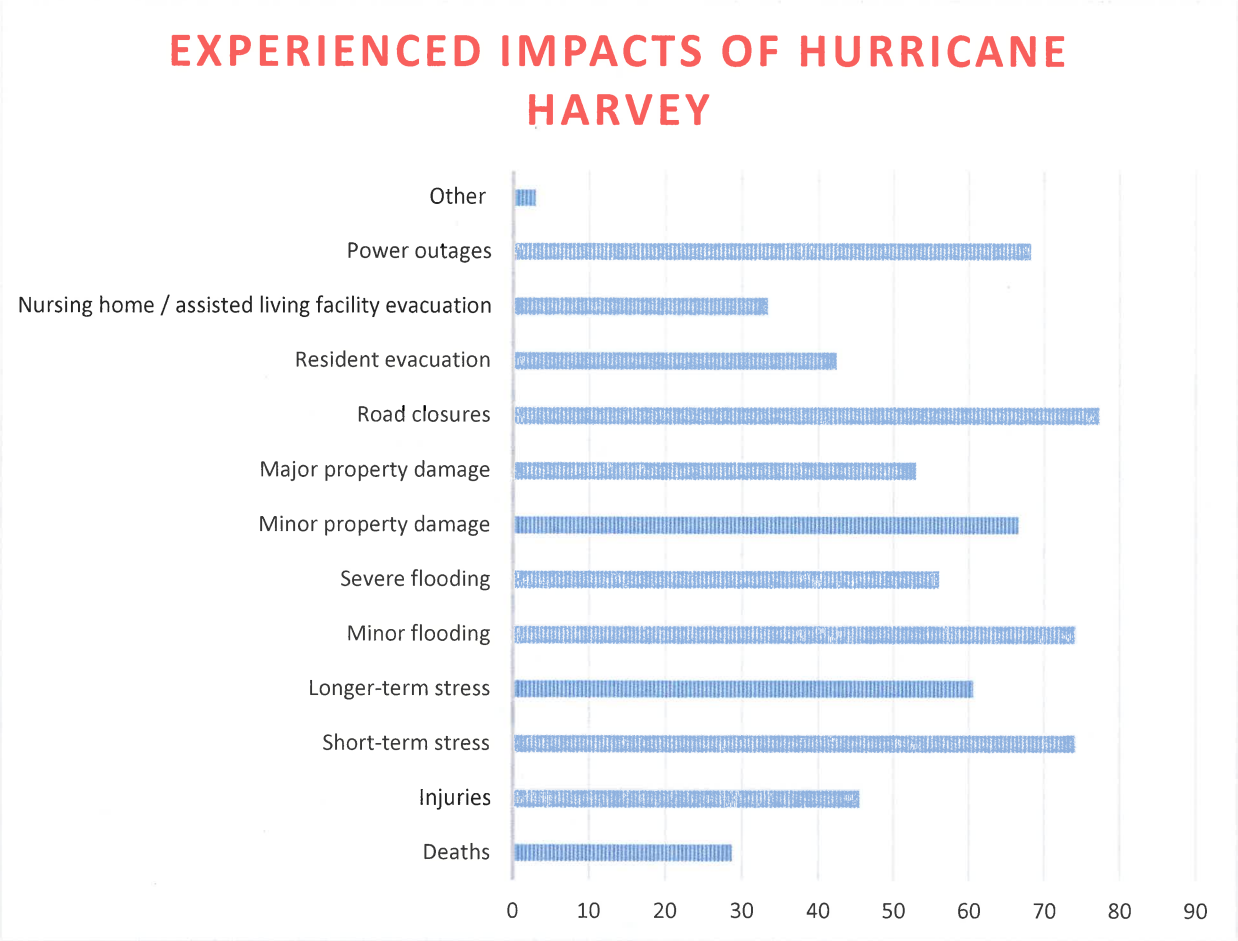
Figure 8: Infrastructure, Private Property, Economic Activity, and Vulnerable Populations



Hurricane Harvey's Impacts

Approximately two-thirds of respondents (63.2%) reported that their own communities had experienced impacts of Hurricane Harvey as categorized in **Figure 9**.

Figure 9: Hurricane Harvey Experiences



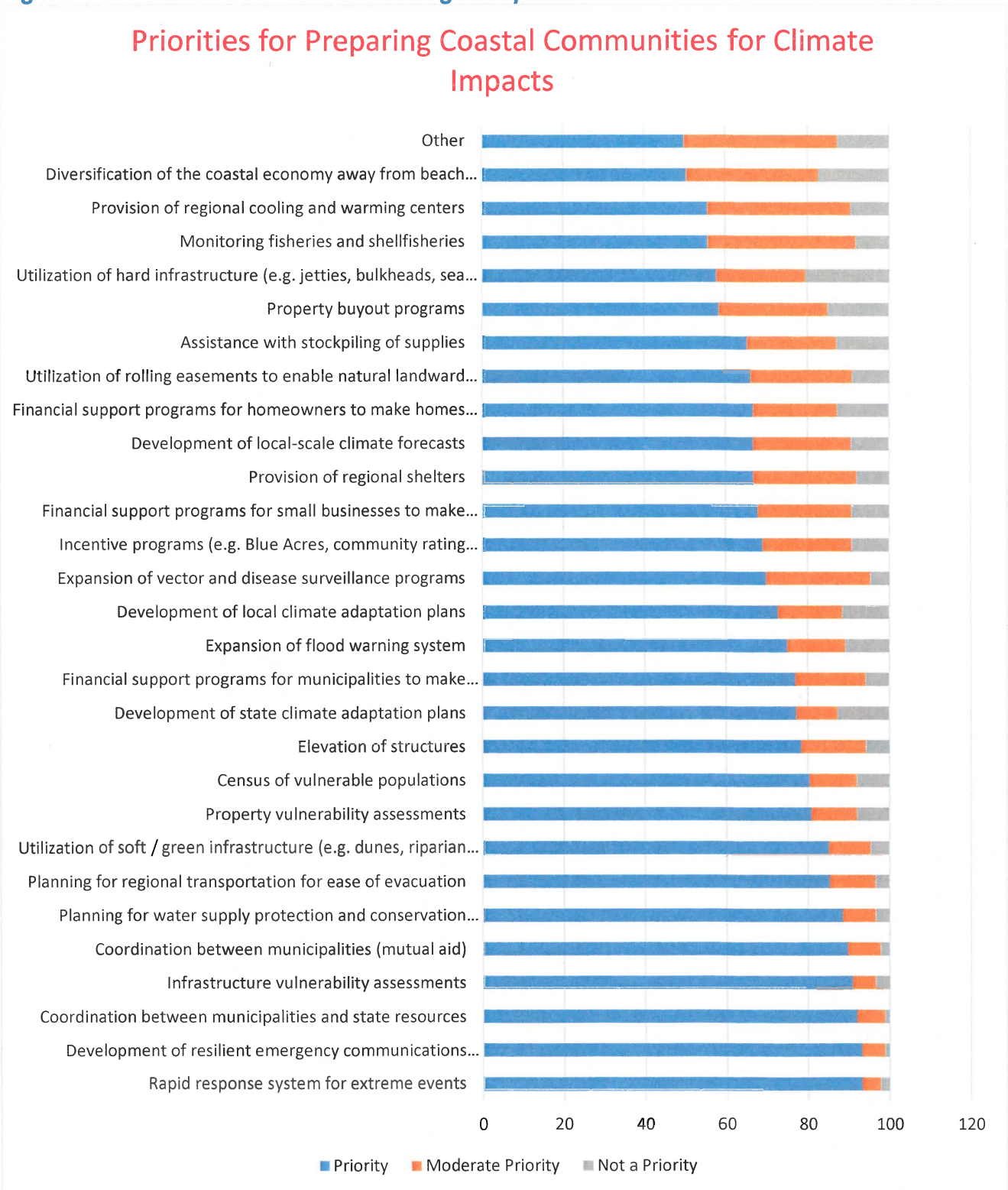
In anticipation of future flood events or disasters, the majority (85.8%) of individuals reported having the means to clean up their home, although only 65.1% reported having insurance to cover clean up. Significantly more reported having insurance that would cover repairs (85.7%). Presumably, this would reflect the difference in number of residents with homeowners' insurance as opposed to flood insurance, although the nature of the survey questions preclude such an exact determination.

Priorities for Preparation of Coastal Communities for Climate Change Impacts

As observed in **Figure 10**, respondents expressed significant concern and need for preparation for perceived impacts of climate change. As reflected in **Figure 7**, there is major concern over the potential for increased occurrence and severity of coastal flooding, sea level rise, coastal erosion, and decline in fresh and marine water quality. As further depicted in **Figure 8**, the primary concerns focus on damage to the infrastructure and disproportionate impacts on vulnerable populations. **Figure 10**

emphasizes the desire for action to address these perceived vulnerabilities through assessments, integration, planning, preparation, and hardening of the infrastructure.

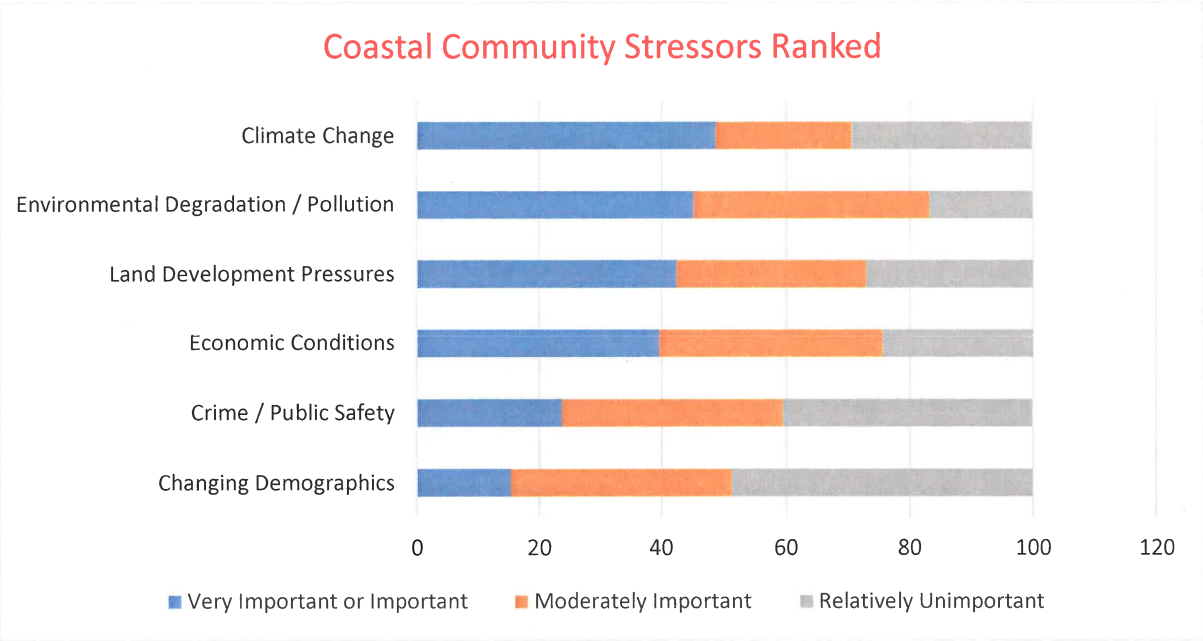
Figure 10: Priorities for Climate Change Preparation



Ranking of Coastal Community Stressors

Climate Change and Environmental Degradation are depicted in **Figure 11** as top coastal community stressors, as are land development and economic conditions.

Figure 11: Ranking of Coastal Community Stressors



Policy Implications

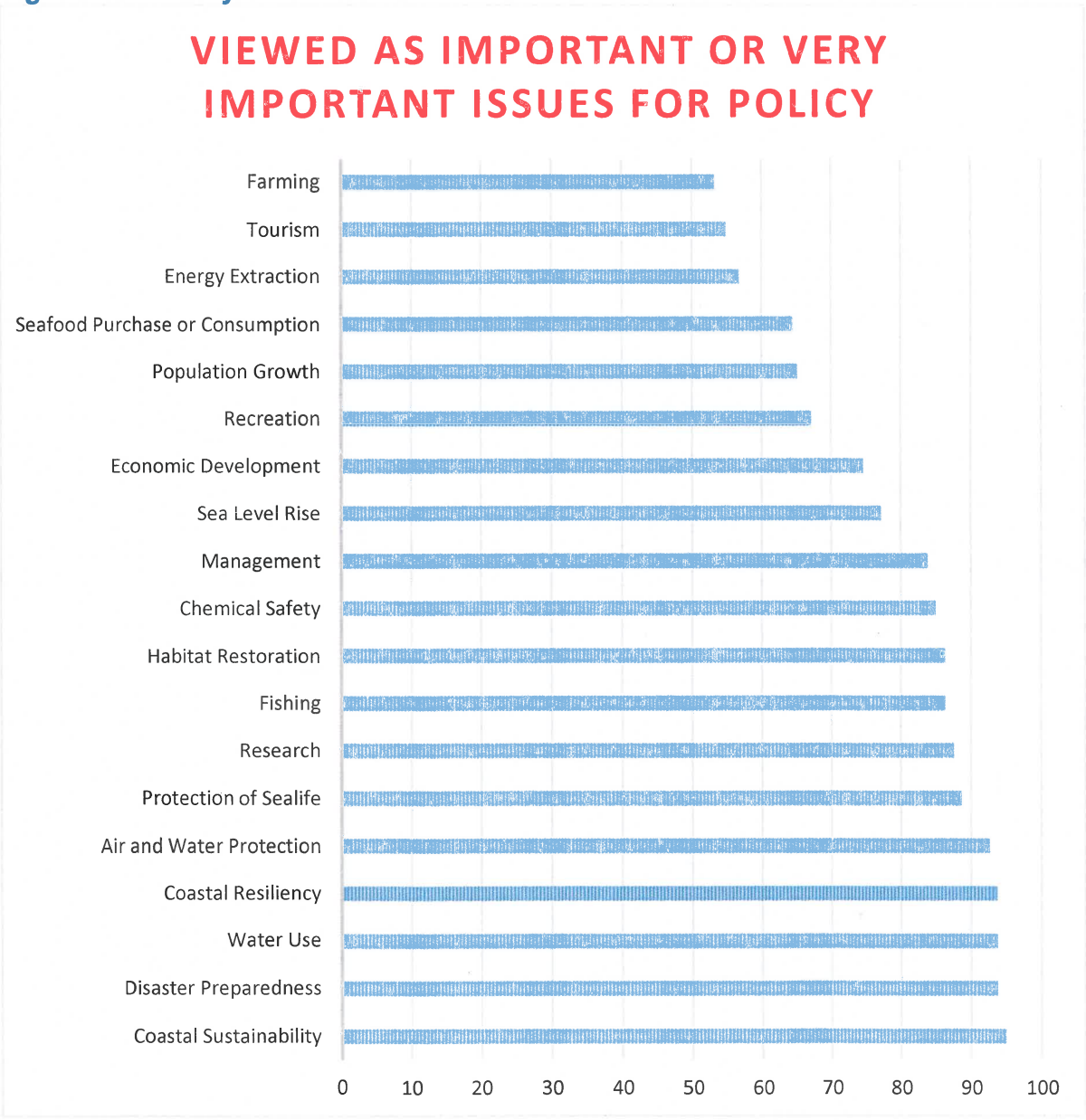
Survey respondents were asked to rank the importance of issues for driving policy for Gulf Coast communities as not at all important, important, neither important nor unimportant, important, or very important (**Table 7**). **Figure 12** depicts which issues were identified as most important, i.e., either selected as important or very important.

Table 7: Importance of Issues for Driving Policy for Gulf Coast Communities

Policy Priorities	Not at All Important	Unimportant	Neither	Important	Very Important
Coastal Sustainability	1.3	2.5	1.3	40	55
Fishing	0	3.8	10	60	26.3
Farming	1.3	8.9	36.7	41.8	11.4
Water Use	0	0	6.2	46.9	46.9
Recreation	0	2.5	30.4	49.4	17.7
Research	0	3.7	8.6	50.6	37
Management	0	2.5	13.8	57.5	26.3
Energy Extraction	1.2	16	25.9	32.1	24.7
Seafood	0	7.6	27.8	43	21.5
Economic Development	0	7.6	17.7	49.4	25.3
Population Growth	0	7.5	27.5	41.3	23.8

Policy Priorities	Not at All Important	Unimportant	Neither	Important	Very Important
Sea Level Rise	7.6	3.8	11.4	31.6	45.6
Disaster Preparedness	0	2.5	3.7	43.2	50.6
Coastal Resiliency	1.2	2.5	2.5	46.9	46.9
Tourism	1.3	15	28.8	40	15
Chemical Safety	1.3	1.3	12.5	42.5	42.5
Habitat Restoration	0	2.5	11.3	52.5	33.8
Air and Water Protection	1.2	1.2	4.9	45.7	46.9
Protection of Sealife	0	0	11.4	50.6	38

Figure 12: Policy Priorities for the Gulf Coast



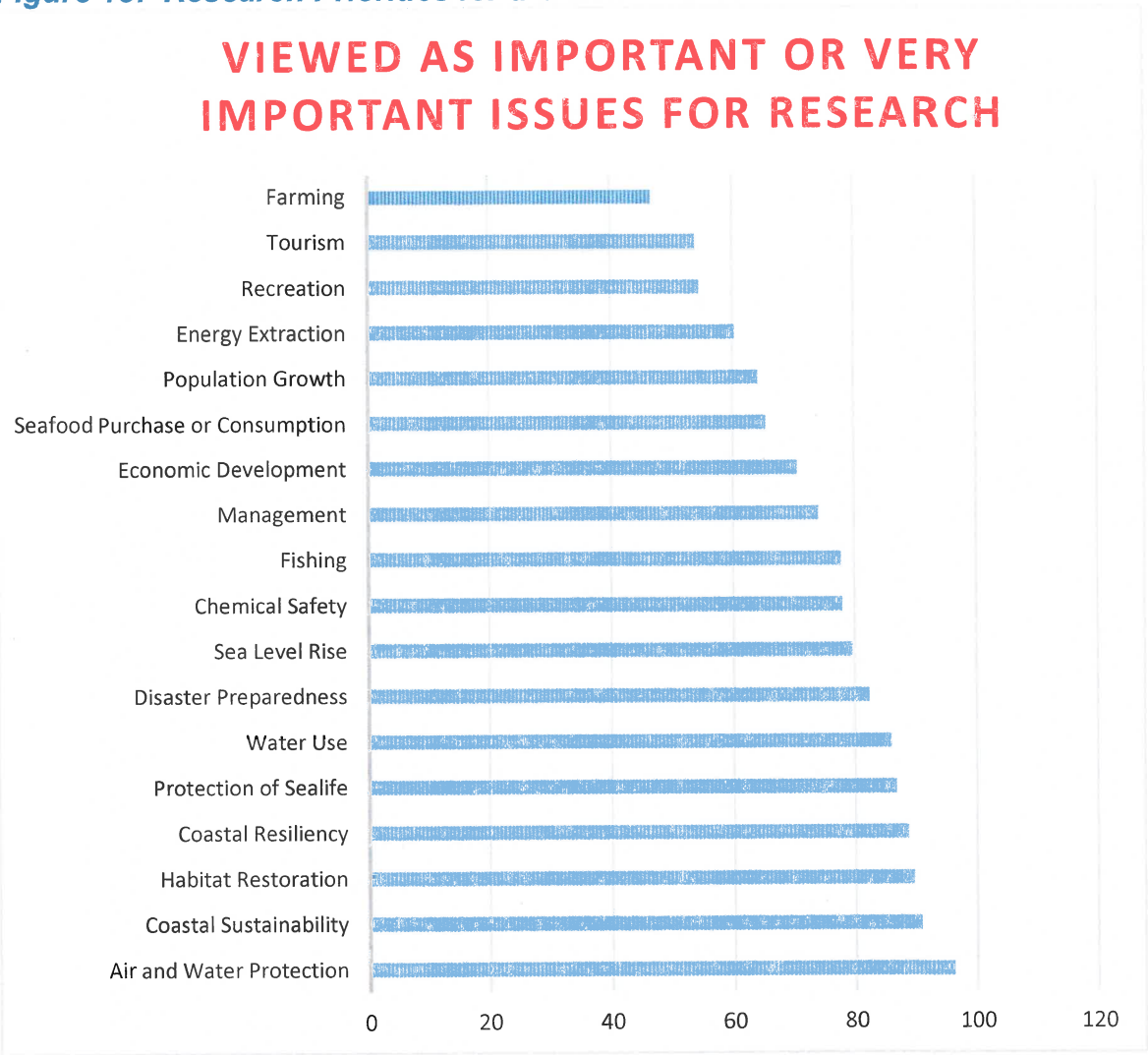
Research Implications

Survey respondents were asked to rank the importance of issues for driving research for Gulf Coast communities (**Table 8**). **Figure 13** depicts which issues were identified as most important, i.e., either selected as important or very important.

Table 8: Research Priorities for the Gulf Coast

Research Priorities	Not at All Important	Unimportant	Neither	Important	Very Important
Coastal Sustainability	0	2.6	6.5	40.3	50.6
Fishing	1.3	2.6	18.4	51.3	26.3
Farming	3.9	11.7	37.7	33.8	13
Water Use	0	3.8	10.3	46.2	39.7
Recreation	2.6	10.4	32.5	42.9	11.7
Management	3.9	3.9	18.2	45.5	28.6
Energy Extraction	7.7	11.5	20.5	38.5	21.8
Seafood	5.1	3.8	25.6	46.2	19.2
Economic Development	7.7	2.6	19.2	50	20.5
Population Growth	5.1	7.7	23.1	41	23.1
Sea Level Rise	5.1	3.8	11.5	28.2	51.3
Disaster Preparedness	0	2.5	15.2	34.2	48.1
Coastal Resiliency	0	1.3	10.1	34.2	54.4
Tourism	11.8	13.2	21.1	44.7	9.2
Chemical Safety	1.3	6.5	14.3	42.9	35.1
Habitat Restoration	0	1.3	9.1	44.2	45.5
Air and Water Protection	0	1.3	2.5	49.4	46.8
Protection of Sealife	0	2.7	10.7	41.3	45.3

Figure 13: Research Priorities for the Gulf Coast



Recommendations for Communications and Engagement

In reviewing the findings, it is clear that independently, each component of the project provides useful data, but that the synthesis of results is the most interesting and provides the most inference for action in moving forward. The survey, with only approximately 200 responses—and those weighted heavily by an overabundance of participants employed in marine science—is not generalizable to the general public. However, it was not intended to be a representative sample and includes representation of other fields and interests, whose opinions are depicted in more depth in the focus groups and key informant interviews. Interestingly, there is strong agreement regarding priorities among the qualitative review of documents, and those derived from the survey respondents, focus group participants, and interviewees, although there was some degree of disagreement regarding approaches and initiatives best suited to addressing problems. This variance in preferred methods or need for differing approaches to

problem identification and solving supports Dr. Tumilty's thematic approach to defining potential roles for Texas OneGulf, i.e., roles for science (understand), policy and education (inform), intervention and outreach (act and develop), community engagement (engage), and integration (collaborate). These are further subdivided primarily into OneGulf's own research themes. Based upon all of the findings, we have drafted a series of recommendations and a communications plan, both of which follow. These are guidelines, which of necessity, will have to be considered, prioritized, and tailored by OneGulf leadership and staff.

1) **Membership:** A decision about the membership issue must take precedence. Until this issue is determined, it will be difficult to clarify OneGulf's priorities and plot a way forward in terms of communication and engagement with stakeholders.
2) **Prioritize OneGulf's Research Areas:**
    a. Survey: Top Priorities
        i. Ranked Issues of Concern Facing the Gulf:
            1. Ecosystem status/living marine resources (marine mammals, sea turtles, seabirds, protected species, species interactions, harmful impacts of marine debris, primary productivity, and fish abundance, etc.)
            2. Issues of human wellbeing (social services, basic needs, economic security, education, health, safety, social connectedness, environmental stressors, mental health, community resilience, etc.)
            3. Climate and ocean drivers/environmental flows and pressures and stressors (climate, sea-level rise, ocean currents, and hurricanes, etc.)
        ii. Importance of Issues related to the Environment, Natural Resources, and Emergency Management
            1. Increased occurrence and severity of flooding
            2. Decline in marine water quality
            3. Decline in freshwater quality
            4. Tidal wetland erosion
            5. Sea level rise
        iii. Importance of Issues related to Infrastructure, Private Property, Economic Activity, and Vulnerable Populations
            1. Damage to wastewater infrastructure
            2. Damage to water supply infrastructure
            3. Damage to communications infrastructure
            4. Damage to energy infrastructure
            5. The elderly
        iv. Priorities for Preparing Coastal Communities for Climate Impacts
            1. Rapid response system for extreme events
            2. Development of resilient emergency communications
            3. Coordination between municipalities and state resources
            4. Infrastructure vulnerability assessments
            5. Coordination of mutual aid between municipalities

v. Policy Priorities for the Gulf Coast
    1. Coastal sustainability
    2. Disaster preparedness
    3. Water use
    4. Coastal resiliency
    5. Air and water protection
vi. Research Priorities for the Gulf Coast
    1. Air and water protection
    2. Coastal sustainability
    3. Habitat restoration
    4. Coastal resiliency
    5. Protection of sealife

b. Focus Groups:
    i. Include community input in policy and decision making related to science
    ii. Consider the possibility of citizen science contributions to monitoring and observation
    iii. Should be increased emphasis on vulnerable populations
    iv. Need for improved risk assessment and communication, especially during disasters
    v. Must begin to change the culture at the societal level related to protection of the environment and sustainability for conservation through education, modeling, and outreach

c. TONE (includes information from TONE meetings and Dr. Wowk's communications):
    i. The research areas in the *SRAP* are complex and would take many years and a large magnitude of resources to advance. OneGulf should annually prioritize research across these areas, focusing especially on where decision-makers need real-time support. Dr. Wowk canvassed OneGulf experts in 2019 to identify needs for FY19. Suggestions included securing water quality and quantity (H2OQ2) is an urgent challenge. Research in this area could include diverse projects on:
        1. Watershed function in and across the seven major bay systems
        2. Nutrient loading and coastal ecosystem impacts
        3. Indicator species for adequate freshwater flow
        4. Hydrological transport of nutrients or contaminants in groundwater systems
        5. Groundwater discharge
        6. Desalination
        7. Pathogen vectors
        8. Priority areas for disaster response or bioremediation
        9. Legal aspects of clean and abundant water to safeguard human health or in transboundary agreements with Mexico

3) **Opportunities for OneGulf and TONE in Research and Policy Efforts.** Opportunities are afforded for both to make central contributions to ongoing efforts in Gulf of Mexico Science and Decision Making. Many opportunities were identified for collaborations in the reports reviewed as a part of this study as well as suggestions made to Dr. Wowk as a part of her canvass, including:
    a. TCEQ/EPA
    b. Gulf of Mexico Alliance Task Forces
        i. Enhancing Coastal Community Resilience: Roles for TONE include:
            1. Providing guidance for risk and vulnerability assessments to increase resilience
            2. Assist with Coastal conservation planning
            3. Continue to promote outreach to coastal communities on coastal resiliency and preparedness and provide hazard planning assistance tools
            4. Conduct reslience workshops across the Gulf States, targeting local government representatives and land use managers, and teach them to access coastal hazard and climate change information and tools and use this information to make decisions about community planning and resource management
            5. Utilize the resilience toolbox techniques and strategies to provide resources to help communities implement reslience planning and adaptation
            6. Expand the resilience index to include additional sectors
            7. Update resilience tools with the best available science and expand the scope of these tools to reach broader audiences
        ii. Improving Data Access and Baseline Monitoring: Roles for TONE include:
            1. Providing guidance for monitoring, mapping, and data sharing collaborations
            2. Provide access to information about monitoring activities and monitoring resources
            3. Enabling data and monitoring integration to support Alliance priorities
            4. Facilitate dissemination and understanding of the ever-improving set of sea level rise models and tool between researchers, managers, and stakeholders
            5. Provide stakeholders with information about the models currently being used to predict environmental change for sea level rise across the Gulf Coast
            6. Share sea level rise modeling results from the Gulf region via the StormSmart Coasts Network, with other efforts around the Gulf

7. Use wetlands dynamics models to demonstrate the ecological impacts of projected sea level rise on estuarine systems to communities

iii. Increasing Stewardship through Education and Engagement
   1. Create audience-specific educational products or programs that translate Alliance Priority Issue team information into understandable messages to increase awareness of the value of Gulf natural resources
   2. Create public awareness and stewardship opportunities for audiences within the Gulf of Mexico and broader Gulf watershed

iv. Conserving and Restoring Habitat Resources
   1. Increase the availability and utilization of habitat assessment data and information to coastal stakeholders
   2. Support the development of robust regional sediment management and beneficial use programs at the local, state, and regional scale
   3. Promote understanding of the capabilities and uses of sea level rise and storm surge models
   4. Deliver priority datasets of landscape drivers and response actions to resiliency, conservation and restoration planning managers
   5. Disseminate priority habitat assessment and trend data and summary findings to Gulf Stakeholders to inform management and restoration actions
   6. Utilize data and information to inform management practices and priorities that support conservation needs
   7. Host workshops and practitioner forums for local communities on the application of science-based criteria to identify and prioritize conservation, restoration, and resiliency projects

v. Improving the Health of Wildlife and Fisheries: TONE can assist with:
   1. Providing data related to wildlife and/or the fisheries to support decision-making related to improving conservation efforts
   2. Engage local businesses and train and employ a local Gulf workforce in the implementation of protection and restoration projects
   3. Facilitate broad public involvement in wildlife and estuary policy, management, and implementation
   4. Engage key partners that work with wildlife and fisheries and assist them to overcome institutional barriers
   5. Increase participation of local government in wildlife and estuary program initiatives.

vi. Improving the Quality of Water Resources. TONE can assist with:

1. Providing expertise in key water resource concerns including pathogens, harmful algal blooms, nutrient pollution, hypoxia, freshwater inflows, water resources, and emerging water issues in the Gulf
2. Identifying, prioritizing, and pursuing new or additional data and research needed to better characterize or reduce potential threats to human health or aquatic life

vii. Ecosystem Services
1. Conduct outreach and education of regional sediment management and beneficial use of dredged material information and technology transfer to Gulf stakeholders
2. Coordinate the transfer of living shoreline information and tools to Gulf stakeholders, including resource managers, federal and state agencies, contractors, and home-owners
3. Enhance the communication of ecosystem services science and tools
4. Increase awareness of the benefits of healthy aquatic life in Gulf ecosystems
5. Promote Gulf environmental literacy on Alliance Social media, website, and through traditional media outlets
6. Use ecosystem services knowledge to inform the decision-making process

viii. Marine Debris
1. Assist with assessment of marine debris and aquatic trash in the Gulf of Mexico and its watershed
2. Prevent the introduction of marine debris and aqautic trash through raising awareness and improving individual stewardship through promoting local, regional and national coastal and river cleanups

ix. Conservation, Restoration, and Resilience Planning

c. NOAA Integrated Ecosystem Assessment Program: specific roles and gaps were highlighted in the 2017 Report that could be filled by TONE members and facilitated by GRIIDC, including:
i. Tracking of impact of urbanization and land use on fishing engagement and reliance
ii. Establishing new indicators to better understand the impacts and values of ecotourism on the Gulf (e.g., birding)
iii. Assistance with development of new statistical methodologies or data sources to create abundance indices for pelagic species and with calculating measures of uncertainty
iv. Analysis of zooplankton species distributions and shifts as indicators of whole ecosystem processes and shifts
v. Assessment of the estuaries and embayments to determine the degree of eutrophication over time to determine the degree to which estuarine-dependent fishery species and fisheries in the Gulf are impacted

vi. Development of comprehensive monitoring programs for protected species such as corals, sea turtles, and marine mammals, which are currently fragmented and sporadic
vii. Standardization and centralization of data collection, archiving, and access seems like a task well suited to GRIIDC, provided that resources are adequate to support inclusion of the additional data. Suggestions include estuarine habitat indicators such as salt marshes, oysters, and mangroves
viii. While the report offers somewhat vague suggestions about inclusion of transdisciplinary analyses to capture indicators of human dimensions related to the economy and human health, these are areas ripe for discussion with the potential partners mentioned here

d. Texas General Land Office
    i. The GLO plan is comprehensive and specific and projects are very detailed as to what is to be done and, in most cases, by whom. Given that a number of TONE members are involved in the projects, there should be opportunities for discussions for expanded programs that could be integrated with the GLO projects, increasing the likelihood of success.
e. The Governor's Office (*Eye of the Storm*)
    i. Many of the recommendations in Eye of the Storm are quite specific, while others are vague. Given that many TONE members collaborated on projects in Harvey's aftermath related to flooding and resilience, it would be valuable to inventory those projects to determine which are in line with proposed recommendations. If there are several that meet the stated needs of the state and are projects and skills ongoing within TONE, opportunities might exist to broker financial support through the Governor's office.
f. The Soil Board
g. Texas Department of Agriculture, USDA and Agrilife, Texas Parks and Wildlife
h. Local Waterkeepers

4) **Monitoring of Coastal Environments**. Many suggestions were forthcoming from the reports analyzed for this study. Additional suggestions include:
    a. H2OQ2
    b. Different trophic levels
    c. Hypoxia
    d. Habitat loss
    e. Erosion
    f. Pollutant transport
    g. Recovery dynamics
5) **Clarify the Role of OneGulf: not as a research entity, but in terms of the services and benefits it provides its members.**
    a. While a high-level analysis of member priorities was undertaken in developing the *SRAP*, a similar, albeit more practical assessment could

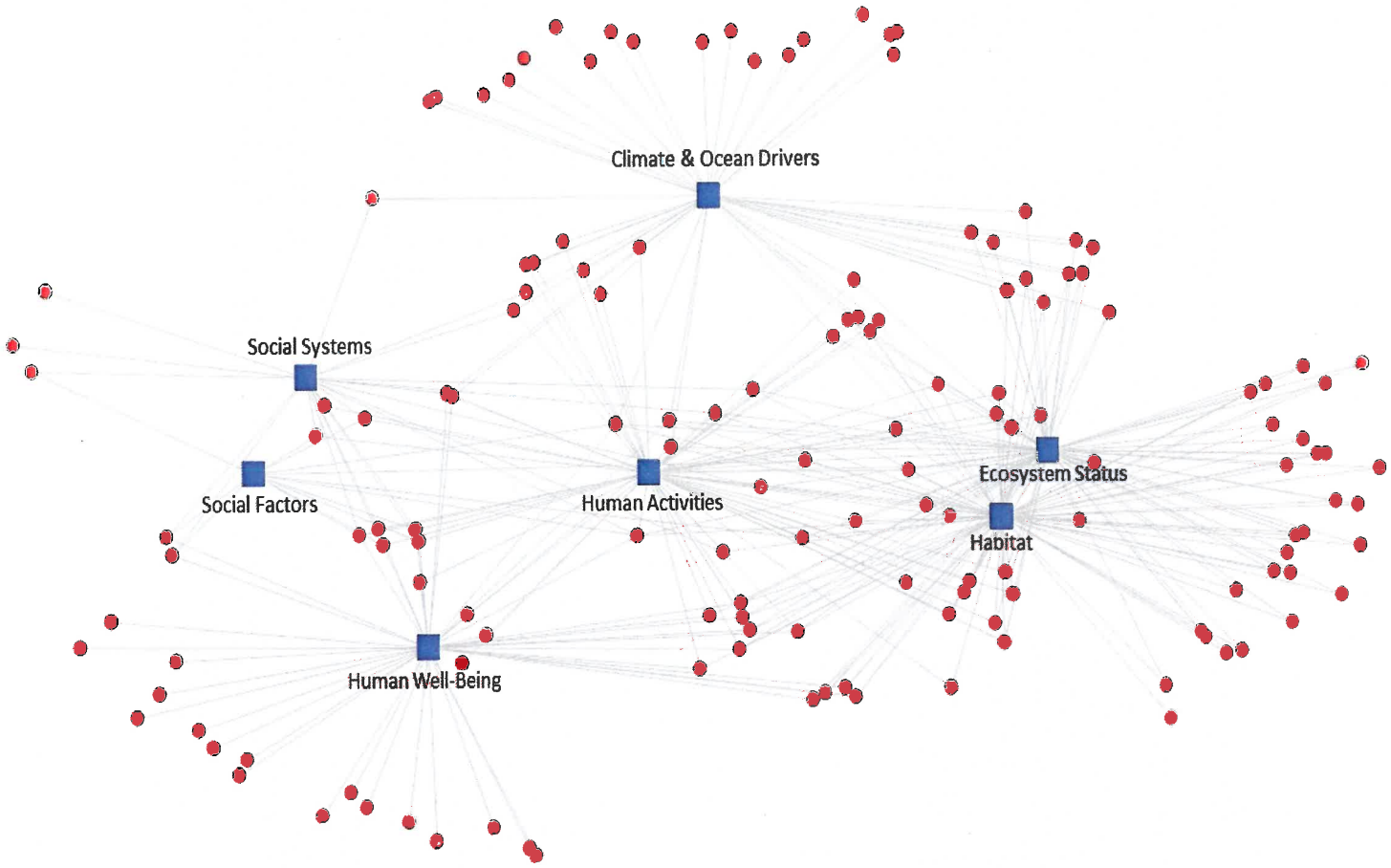
determine desired support that could be provided through OneGulf. Examples might include:

i. Support for integrated data monitoring
ii. Support for work groups across institutions/sites
iii. Support for research meetings
iv. Evaluation/metrics support for grantees

6) **Maximize use of the TONE**: OneGulf must consider how it can coordinate across and mobilize the deep expertise throughout the network.
   a. GulfBase only included about one-half of TONE members. Dr. Wowk possessed an updated list of TONE members including their areas of research focus and expertise. Most were gleaned from faculty profiles provided from academic websites; all sources are provided in the table. We have cross-referenced the interests of experts within those indexes against the seven categories of the Socio-Ecological System Components as they are aligned with *SRAP* Themes (identified in Table 1). The resulting cross-referenced database was examined using network visualization and analytical tools. Figure 14 below presents the relationships among TONE members as they relate to our seven key priority issues. Each red circle represents a TONE member, and the lines indicate a linkage between their research interests and foci and a priority area. Two primary findings emerge from this initial analysis of the TONE network. First, there is a large degree of overlap across priority areas, with multiple TONE members having interests in multiple priority areas. Second, significant interest within the network is centered around ecosystem activities, habitat, human activities, and climate and ocean drivers. There appears to be less interest in terms of direct research interest on social systems, social factors, and human well-being, as we would expect, given the make-up of OneGulf and the TONE. This provides the foundation for communications groups based upon interests, and potentially for work groups, based upon shared project interests.
   b. This index should be shared with the potential collaborative partners listed under 3.

7) **Data**
   a. **GRIIDC:** Currently, GRIIDC serves a useful purpose in storing a wide variety of Gulf data. This role could be greatly expanded, if resources are available and the will is present to do so
   b.

Figure 14: Network Visualization of TONE Members' Research



8) Environmental Health Network

a. A potential role for Texas OneGulf could be to serve as the institutional home for an ongoing Gulf Coast Environmental and Environmental Health Network such as GC-HART. Multiple participants in this study from both the academic and community groups included expressed interest in participating. While the work carried out as a function of this study would have to be expanded upon and certainly clarified by OneGulf leadership in terms of desirability and feasibility given resources and alignment with future strategic plans, several possible roles emerged that would increase communications and engagement between and among TONE members as well as constituent communities and coastal residents:

   i. Evaluating community resilience and sharing best practices
   ii. Identifying needs for environmental assessments, education, and intervention
   iii. Facilitating community/campus partnerships (pilot projects, citizen science monitoring programs, community support for environmental impact studies)

iv. Community Health Needs and Resource Assessments
v. Establishment of joint work groups

b. Serve as a Trusted Knowledge Broker for Scientific Information about the Gulf
    i. Disseminate findings from GoMRI, GRIIDC, TONE, and other partners
    ii. Help communities to access information and to understand scientific findings
c. Provide a Voice for Community Experts: e.g., engage fishermen in monitoring and education efforts

Communications and Engagement Plan

The purpose of creating a communication plan is to improve the quality and effectiveness of communication both internally (within OneGulf and the TONE) and externally (with stakeholders throughout Texas and across the Gulf). The ultimate goal is to create effective strategies to provide relevant, accurate, and consistent information to all stakeholders and to improve OneGulf's ability to be a resource to the Gulf of Mexico policy and research communities. The communication plan provides a basic framework to manage and coordinate the wide variety of communication that takes place across OneGulf and its constituent organizations. This is, of course, an initial suggested structure that will require considerable commitment of time and energy to best adapt it for OneGulf's use.

Stakeholders (target audiences)

Internal stakeholders:

- All OneGulf faculty and staff
- All TONE members

External target stakeholders:

- Our member institutions' campus staff and faculty
- Sponsors (TCEQ, Office of the Governor, NIH, NSF, etc.)
- Peer institutions
- Industry partners
- General public
- Local, state, regional, and federal government entities
- Other policy-makers
- Gulf economic interests: fishing, tourism, energy, foreign trade, ports, etc.
- Disaster preparedness and response entities, both natural and manmade

Communication Plan Objectives

- Encourage and promote open and clear communication within OneGulf and the TONE
- Foster trust between OneGulf institutions and among scientific disciplines
- Build a strong culture of shared identity

- Build a communication plan structure for dealing with urgent and or time-sensitive issues/communications
- Monitor consistent messaging across OneGulf
- Establish processes for feedback
- Establish procedures for continuous process improvement
- Develop systematic evaluation metrics for content and process
- Improve access to key information
- Raise awareness of the expertise offered by members of the TONE
- Increase awareness of the resources available from GRIIDC
- Assist the research community in communicating the benefits of research to the general public, industry partners, and to governmental and other policy stakeholders
- Assemble a cross-institution communications team led by OneGulf Communication Manager (to be determined)

Formation and Scope of a Cross-Institution Communications Team

Optimally, OneGulf will assemble a cross-institution working group to review this plan, develop communication plan strategies, complete a project task list and be responsible for implementation of all or part of the tasks under the guidance of OneGulf leadership.

A. Communication team make-up and goals

1. Communication team should ideally be made up of OneGulf component institution communication focals or leads
2. Create team roles and responsibilities
3. Review communication plan (look for gaps and opportunities), including review of regular updates
4. Review current communication methods (create OneGulf communication matrix)
   a. Review project list (target audiences, and communication mediums)
   b. Identify criteria for prioritizing requests
   c. Establish timelines
   d. Review gaps
5. Creation and implementation of communication plan strategies including task lists and timelines

B. Review of communication objectives and implementation strategies

1. Collaboration across institutions
   a. The communication team will review selected communication pieces to make sure all institutions are aware of communication being sent to ensure that the messaging is consistent, and that it is disseminated broadly within their institutions and/or to their partners
   b. Set up an internal project management blog and/or use of a SharePoint site – maybe two different blogs: 1) project tracking – internal 2) finished products for public dissemination

c. Build a communication plan for dealing with urgent and or time-sensitive issues/communications (e.g., grant proposals in progress or provision of feedback on policy)

2. Consistent messaging across institutions for all audiences (institutions, academic, industry partners, government and other policy-making partners, sponsors, Gulf interests, community partners, and extra-network researchers)
   a. Create best practices and processes for consistent messaging
      i. Create a check-list for messaging information:
         1. consistency within institutions
         2. search and replace outdated information when an announcement or update is sent
         3. make sure all the crucial information is included, and that it is brief and concise
         4. make sure the audience is correct so the information is going to the right people
   b. Process to monitor consistency of messaging
      i. Use templates (i.e., announcements on the web site) and some common formatting among institutions when appropriate
      ii. Use OneGulf brand
3. Centralizing communication
   a. Have a location for uploading internal and external pieces that are central to the OneGulf mission
      i. blogs, research commons concept (posts would need to be approved by an assigned moderator)
      ii. presence on administrative gateway (link to the OneGulf site)
      iii. Internal and external stakeholders need to know where to go for specific information and updates
4. Develop a communication strategy to improve communication within OneGulf and the TONE
   a. Build a strong culture of shared identity
   b. Encourage and promote open and clear communication within OneGulf and the TONE
   c. Foster trust between OneGulf institutions and members
5. Improve services to the research community
   a. Create a strategy to assist our research community in communicating the benefits of research to our community, general public, industry partners, and state and federal stakeholders (potentially work with marketing facilities on institutional campuses)
   b. Discuss a plan for an email newsletter
   c. Handle information overload while still reinforcing messaging appropriately

   d. Improve access to key information for researchers and their staff
   e. Researchers need to know where to go for specific information and updates
6. Develop strategies for marketing OneGulf services and informational pieces (again, possibly liaison with marketing for strategies)
   a. Develop a plan to market our resources and our services and increase the presence of OneGulf
   b. Bridge the gaps and improve communications at the inter-institutional level
   c. Market our services so that internal and external stakeholders know where to go for specific information and updates
   d. Include a link on the OneGulf website and consider other possible links to OneGulf institutions
7. Create an outreach plan to inform researchers, staff, and administrators about communication from OneGulf and OneGulf institutions
8. Develop communication plan metrics and tools for systematic evaluation and feedback
   a. Review feedback options (surveys, blogs, WIKI, Discussion Board, regular meetings, etc.)
   b. establish procedures for continuous process improvement

The detailed activities provided in the following communication plans will guide the Cross-Institution Communications Team in improving communications within OneGulf (**Table 9**), and with external stakeholders (**Table 10**). Using these plans will enable the Team to communicate key messages to the right people at the right time (**Table 11**).

Table 9: Plan for Internal Communication

Goals	Task	Designee(s)	Action Items	Progress to completion	Notes
1) Develop a centralized communication plan	**A.** Provide regular OneGulf-wide updates to all institutions: The content would include items such as: policy and budget updates, announcements, planned outreach to campus, admin items, staff updates, system tools, etc. **B.** OneGulf quarterly updates **C.** OneGulf monthly staff updates				
2) Regular updates to staff	**A.** Implement annual State of OneGulf address/meeting				
3) Develop a plan for collaboration across institutions	**A.** Cross-institutional Communications team will meet on a regular basis to discuss upcoming Communications plans and strategize for sharing information **B.** Creation of a plan for urgent and/or time-sensitive issues/communications. This plan would start with the identification of specific qualification criteria for time sensitive/urgent messages and would include a process for approvals and dissemination.				
4) Develop a plan for consistent messaging across all audiences	**A.** Communications team to meet on a regular basis to discuss upcoming communication and to make sure messaging is consistent. Communication pieces are routed through communications team for review (when appropriate) **B.** Shared templates and use of OneGulf brand·				
5) Develop an editorial calendar	**A.** Develop an editorial calendar to track communication and deadlines for OneGulf				

Goals	Task	Designee(s)	Action Items	Progress to completion	Notes
6) Help to build/strengthen a strong culture of OneGulf identity through communication	**A.** Create a culture that recognizes our shared identity –create an employee recognition program - celebrate milestones, publications, grant awards. An internal newsletter could include a profile on a faculty or staff member, etc. **B.** Suggestions for research or community highlight feature to enable members to learn about one another				
7) Establish processes for feedback and continuous process improvement	**A.** Establish processes for feedback **B.** Establish procedures for continuous process improvement				
8) Systematic review and evaluation of content and process	**A.** Systematic review and evaluation of messaging content **B.** Make sure that members have a way for their voices to be heard.				

Table 10: Plan for External Communication

Goals	Task	Designee(s)	Action Items	Progress to completion	Notes
1)Improve access to key information for researchers and their staff (updates, announcements)	A. Create process for posting announcements and information from the component institutions B. Create a Research and Communications Portal				
2) Develop a OneGulf external communications network	A. Review audience, purpose and messaging for the research community and publish regular mechanisms for relaying information to external stakeholders				
3) Communicate OneGulf's identity and the expertise of the TONE to potential partners in research or policy	A. Communicate OneGulf's identity B. Update GulfBase and create new tools for communicating TONE expertise for potential partners.				
4) Benchmarking	A. Review possible benchmarking metrics and information B. Consider use of social network analysis to monitor relationship building and changes in relationships				
5) Ideas for ways to handle information overload while still reinforcing messages	A. Look for overlaps of communication between institutions and discuss ways to handle information overload B. Unit communications focal is responsible for monitoring				
6) Create a plan so researchers know where and to whom to go for specific information and updates	A. Update the website and send out a "roles and responsibilities" clarification				

Goals	Task	Designee(s)	Action Items	Progress to completion	Notes
7) Discuss the feasibility and uses for a resource page	A. Resource Page for investigators B. Create an online request for services for members				
8) Create a strategy to assist our research community in communicating the benefits of research to our community, general public, industry partners, and local, state, and Federal stakeholders	A. Development of a communications plan from research community to community, public, industry partners, state and federal partners				

Table 11: Communication Matrix and Timeline

	Item	Practice	January	February	March	April	May	June	July	August	September	October	November	December
Internal	Cross-institutional communication protocols	Communication Team meeting												
		Emails							as needed					
		Work group meetings												
		OneGulf leadership meetings												
		Institutional meetings with OneGulf Staff												
	Emergency communications protocols	Email							as needed					
		Emergency contact cards							as needed					
		Staff information												
	Staff job duties/ functions	Profiles of OneGulf staff should be on website. Roles and responsibilities should be clear. TONE members should know who to contact about what.							as needed					
	OneGulf news and updates	Emails/Newsletter/Blogs							as needed					
		Web updates							as needed					
		Quarterly meetings with work groups or institutional members												
		Media releases							as needed					
		State of the Center Reports												
	Staff recognition	Emails/Newsletter/Blogs							as needed					
		OneGulf updates												
		Staff meetings												
	Current projects, initiatives, and focal areas of OneGulf and institutions	Revamp GulfBase and GRIIDC												

Item	Practice	January	February	March	April	May	June	July	August	September	October	November	December
Research and Policy Integration	Stakeholder Advisory Group (Industry, Govt., Policy, Community)												
	Appoint Policy Liaison												
	Develop work groups aligned with key Gulf research and policy initiatives. Seek representation on decision-making boards.	as needed											
	Quarterly meetings with institutional partners or across work groups. Set shared goals and initiatives.	as needed											
	Develop a Research Expertise Guide for TONE and OneGulf	as needed											
Opportunities for involvement in collaborative initiatives	Web announcements and emails/release of RFAs emphasizing collaborations between institutions and among disciplines	as needed											
OneGulf Mission, Vision, and Strategic Goals	Posted on OneGulf web page	as developed											
	Should be able to be articulated by every OneGulf and TONE member												
	SRAP												
News, updates, and events for OneGulf	Emails	as needed											
	Develop Research Expertise Guides	as developed											
	OneGulf meetings												
	Staff meetings												
	Training events	as needed											
	Update and revamp GulfBase												

	Item	Practice	January	February	March	April	May	June	July	August	September	October	November	December
	Notifications of new/changing personnel	Emails/Blogs							as needed					
		Websites							as needed					
		Staff meetings												
		Webinars												
	Successes: what is working well (examples, measures, outcomes)	TONE meetings												
		Staff meetings												
		Web updates							as needed					
		Emails												
External	Accomplishments	OneGulf Annual Report												
		OneGulf Fact Sheets												
		OneGulf Stats and Research Rankings page												
		Staff meetings												
	Communication with Stakeholders	Briefings with key stakeholders							as needed					
		Public Review pages							as needed					
		Emails to TONE members							as needed					
		Inter and intranet postings							as needed					
		Presentations to and discussions with communities							as needed					
		Presentations to TCEQ and other sponsors							as needed					
		Advisory team meetings with stakeholders such as NOAA, Governors' Task Force, etc.							as needed					
		Brochures							as needed					
		Correspondence with federal agencies							as needed					
		Email listserves							as needed					
		Media releases							as needed					
		OneGulf website							as needed					

Conclusion

Nearly 10 years out from the Deepwater Horizon tragedy, it would seem that the Gulf of Mexico in most ways is thriving. Recent reports, including the 2017 NOAA indicator report, reveal generally positive trends in the recovery of fish populations that have been at risk in the past. The economy and population are flourishing, and in some areas, growth is proceeding at unprecedented rates. Recovery from Hurricane Harvey continues, and with the promise of forthcoming federal funding from the recent disaster legislation, comes the opportunity to redouble efforts to invest in measures to ensure a healthy Gulf of Mexico and coastal communities for the future. However, while the concerted and integrated efforts of so many have yielded much progress in protecting and restoring the Gulf, continued and increasing stress on the coastal ecosystem persist from human development, human activities, increasing extreme weather events, and rising water. This will necessitate an even more integrated and concerted effort to understand the complex Gulf ecosystem and to collectively prepare for what challenges lie before us. Texas OneGulf is well positioned to lead these efforts, and it is our hope that this report will support the Center in pursuit of activities to do so.

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